Figure III.15.8: HELP Model Amarillo 8 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
360" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	360	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.9: HELP Model Amarillo 9 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
480" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	480	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.10: HELP Model Amarillo 10 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
600" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	600	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.11: HELP Model Amarillo 11 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
720" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	720	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.12: HELP Model Amarillo 12 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
840" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	840	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.13: HELP Model Amarillo 13 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
960" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	960	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.14: HELP Model Amarillo 14 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1080" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1080	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.15: HELP Model Amarillo 15 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1200" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1200	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.16: HELP Model Amarillo 16 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1320" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1320	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.17: HELP Model Amarillo 17 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1440" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1440	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.18: HELP Model Amarillo 18 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1560" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1560	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.19: HELP Model Amarillo 19 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1680" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1680	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.20: HELP Model Amarillo 20 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1800" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1800	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.21: HELP Model Amarillo 21 Summary

Landfill Cross Section
6" Daily Cover
120" Waste
120" Waste
1920" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	120	0.00100000	0.2850	0.2841	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2899	0.2920	0.0770	0.6710
4	18	1920	0.00100000	0.2900	0.2900	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

Figure III.15.22: HELP Model Amarillo 22 Summary

Landfill Cross Section
6" Daily Cover
54" Waste
120" Waste
2040" Waste
120" Waste
240" Waste
24" Protective Cover Soil
Geonet Drainage Layer
FML
Geosynthetic Clay Liner

Model Amarillo Parameters
(Simulation duration for one year)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	11	6	0.00006399	0.3100	0.2964	0.3100	0.1870	0.4640
2	18	54	0.00100000	0.2850	0.2772	0.2920	0.0770	0.6710
3	18	120	0.00100000	0.2841	0.2901	0.2920	0.0770	0.6710
4	18	2040	0.00100000	0.2900	0.2901	0.2920	0.0770	0.6710
5	18	120	0.00100000	0.2902	0.2902	0.2920	0.0770	0.6710
6	18	240	0.00100000	0.2905	0.2905	0.2920	0.0770	0.6710
7	11	24	0.00006399	0.3100	0.3100	0.3100	0.1870	0.4640
8	20	.2	10.000000	0.0100	0.0100	0.0100	0.0050	0.8500
9	35	.06	2.00E-13	-	-	-	-	-
10	17	.2	3.00E-9	0.7500	0.7500	0.7470	0.4000	0.7500

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 0.0 for bare ground.
Evaporative zone depth = 10 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 2% (bottom) = 2% (top)
Maximum length along slope = 700 feet (bottom) = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to field capacity to simulate steady state conditions. Initial moisture content for waste set to field capacity.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0000	0.000000

3.2 Estimated Life

The life of each cell area was estimated prior to running the HELP Model. The average waste deposition rate at the site is ranges from 900 to 1,000 tons per day. Based on this rate of fill, a ten-foot thick lift of waste could be placed in a given sector in approximately one year. Therefore, 120 inches of waste was input into the HELP Model for the first year's run with subsequent 120-inch lifts added each year until no leachate generation was calculated.

Based on the results of the modeling, leachate generation ceased at year two. Therefore, the leachate generated for year one was applied to the size of the cells to determine the peak amount of leachate expected at the sump.

The estimated available volume for each cell and the estimated waste deposition rate was used to determine the estimated life of the cells. The estimated life and height of fill was used as input data to the HELP Model for determining the leachate generation of the sump area over time.

3.3 HELP Model

The HELP Model requires three types of input data, including climatological, soil and general design data. The Model synthetically generates a table of precipitation values if actual data are not available. The first step in the modeling process is to establish the climatological (rainfall) and temperature data. The synthetic precipitation option, which provides up to 100 years of background rainfall data, was utilized for the facility. The program provides a table of default cities from each of the 50 states. In this case, Amarillo, Texas was selected as the default city. The normal rainfall and temperature data were obtained from NOAA, Climatography of the United States Report No. 81, for 1961-1990. The average annual rainfall for Amarillo as given in the NOAA documentation is 19.10 inches. The synthetic generator produced 30 years of meteorological data.

The next step in running the program is to establish the soil data. Table 4, included in the Version 3.07 HELP Model user's manual, provides default values for 42 soil, waste and

geosynthetic materials. These default values (moisture content, field capacity, wilting point, porosity and hydraulic conductivity) were used to describe the proposed landfill development. The moisture content for waste has been reported in literature to range between 15 and 40 percent, with a typical value of 20 percent (Tchobanoglous, et al; 1997). According to Dr. Paul Schroeder (developer of the HELP Model), the typical value for moisture content of waste is actually between 8 and 20 percent on a volumetric basis, with a mean value of 12 percent. For conservative values, the initial moisture content for the waste layer was set at 28.5 percent.

The last category of input data required for running the program is the general site design data. This information includes the SCS runoff curve number, vegetative soil type, slope of drainage layer, and maximum length along the slope. These input parameters are listed in Figures III.15.1 through III.15.22.

3.4 Input Data

The first HELP Model run was based on an initial lift of waste, daily cover, and the bottom liner system. The first run was modeled for one year, which is the minimum time increment provided in the model. A thickness of ten feet was selected for the first lift of waste. Figure III.15.1 shows the assumptions used for the initial lift of waste and in Model AMYR1 in Appendix 15A..

For the second run of the HELP Model, an additional lift of waste was added and covered with six inches of daily cover as shown on Figure III.15.2 (Model AMYR2). With the exception of the daily cover soil, the initial moisture contents used for each layer of Model AMYR2 were the final moisture contents of Model AMYR1. The successive lifts were modeled in a similar manner, which expedites the attenuation of the leachate generation toward a conservative, steady state condition. This process was repeated on an annual basis as the sequence of development, available airspace and waste deposition rates dictated. The final run after model year twenty two was run with the proposed final cover system utilizing the full thirty years of synthetically generated rainfall data. Figures III.15.1 through III.15.24 describe the landfill cross-sections, assumptions and results for each model. The HELP Model printouts are provided in Appendix 15A of Attachment 15.

3.5 Results

Table III.15.1 summarizes predicted the leachate generation for each sump area.

Table III.15.1: Prediction of Leachate Generation

Cell	Acres	Flow acre-in/day	Flow gpd	Comment
1	60.2	0.34	9,212	Partially filled
2	47.7	0.16	4,397	Partially filled
3	21.1	0.26	7,068	Partially filled
4a	54.7	0.30	8,263	Partially filled
4b	30.8	0.27	7,466	Partially filled
5	48.9	0.32	8,636	Not constructed
6	15.1	0.09	2,554	Not constructed
7	19.8	0.13	3,428	Not constructed
8	17.4	0.11	2,994	Not constructed
9	46.5	0.30	8,021	Not constructed
10	43.1	0.23	6,360	Not constructed
11	66.9	0.42	11,400	Not constructed
12	53.1	0.34	9,171	Not constructed

Peak average monthly drainage = 0.1899 in/month
Peak average daily drainage = 0.0063 in/day

This table depicts the HELP-estimated lateral drainage rate in inches per day for each sump, which was based on the greatest total monthly value for the year (reported as "average monthly" by the model) divided by 30 days per month. The HELP modeling further indicates that once ten feet of waste is in place, no further leachate will be generated.

Table III.15.2
Amarillo Landfill
HELP v3.07 Model Summary - Cells 1 - 12

Model Name	Time (yrs)	q peak avg month	q daily month/30	Cell No. and Area (acres) 1	2	3	4A	4B	10	11	12	9	6	7	8	5	year	Q (gal/day)	Cell 1	Cell 2	Cell 3	Cell 4A	Cell 4B	Cell 10	Cell 11	Cell 12	Cell 9	Cell 6	Cell 7	Cell 8	Cell 5
	0		Acres	60.2	47.7	21.1	54.7	30.8	43.10	66.9	53.1	46.5	15.1	19.8	17.4	48.9															
AMYR1	1	0.1899	0.0063	0.0063													1	10348	10348												
AMYR2	2	0.0000	0.0000	0.0000													2	0	0												
AMYR3	3	0.0000	0.0000	0.0000													3	0	0												
AMYR4	4	0.0000	0.0000	0.0000	0.0063												4	8200	0	8200											
AMYR5	5	0.0000	0.0000	0.0000	0.0000												5	0	0	0											
AMYR6	6	0.0000	0.0000	0.0000	0.0000	0.0063											6	3627	0	0	3627										
AMYR7	7	0.0000	0.0000	0.0000	0.0000	0.0000											7	0	0	0	0										
AMYR8	8	0.0000	0.0000	0.0000	0.0000	0.0000											8	0	0	0	0										
AMYR9	9	0.0000	0.0000	0.0000	0.0000	0.0000											9	0	0	0	0										
AMYR10	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063										10	9403	0	0	0	9403									
AMYR11	11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000										11	0	0	0	0	0									
AMYR12	12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000										12	0	0	0	0	0									
AMYR13	13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000										13	0	0	0	0	0									
AMYR14	14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063									14	5294	0	0	0	0	5294								
AMYR15	15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000									15	0	0	0	0	0	0								
AMYR16	16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000									16	0	0	0	0	0	0								
AMYR17	17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063								17	7409	0	0	0	0	0	7409							
AMYR18	18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								18	0	0	0	0	0	0	0							
AMYR19	19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								19	0	0	0	0	0	0	0							
AMYR20	20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063							20	11500	0	0	0	0	0	0	11500						
AMYR21	21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000							21	0	0	0	0	0	0	0	0						
AMYR22	22	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000							22	0	0	0	0	0	0	0	0						
AMFCALT	23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063						23	9128	0	0	0	0	0	0	0	9128					
AMFCALT	24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						24	0	0	0	0	0	0	0	0	0					
AMFCALT	25	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						25	0	0	0	0	0	0	0	0	0					
AMFCALT	26	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						26	0	0	0	0	0	0	0	0	0					
AMFCALT	27	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063					27	7993	0	0	0	0	0	0	0	0	7993				
AMFCALT	28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000					28	0	0	0	0	0	0	0	0	0	0				
AMFCALT	29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000					29	0	0	0	0	0	0	0	0	0	0				
AMFCALT	30	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063				30	2596	0	0	0	0	0	0	0	0	0	2596			
AMFCALT	31	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				31	0	0	0	0	0	0	0	0	0	0	0			
AMFCALT	32	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				32	0	0	0	0	0	0	0	0	0	0	0			
AMFCALT	33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				33	0	0	0	0	0	0	0	0	0	0	0			
AMFCALT	34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063			34	3404	0	0	0	0	0	0	0	0	0	0	3404		
AMFCALT	35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			35	0	0	0	0	0	0	0	0	0	0	0	0		
AMFCALT	36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			36	0	0	0	0	0	0	0	0	0	0	0	0		
AMFCALT	37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063		37	2991	0	0	0	0	0	0	0	0	0	0	0	2991	
AMFCALT	38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		38	0	0	0	0	0	0	0	0	0	0	0	0	0	
AMFCALT	39	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		39	0	0	0	0	0	0	0	0	0	0	0	0	0	
AMFCALT	40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		40	0	0	0	0	0	0	0	0	0	0	0	0	0	
AMFCALT	41	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0063	41	8406	0	0	0	0	0	0	0	0	0	0	0	0	8406
AMFCALT	42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	42	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure III.15.25: Leachate Generation Curve

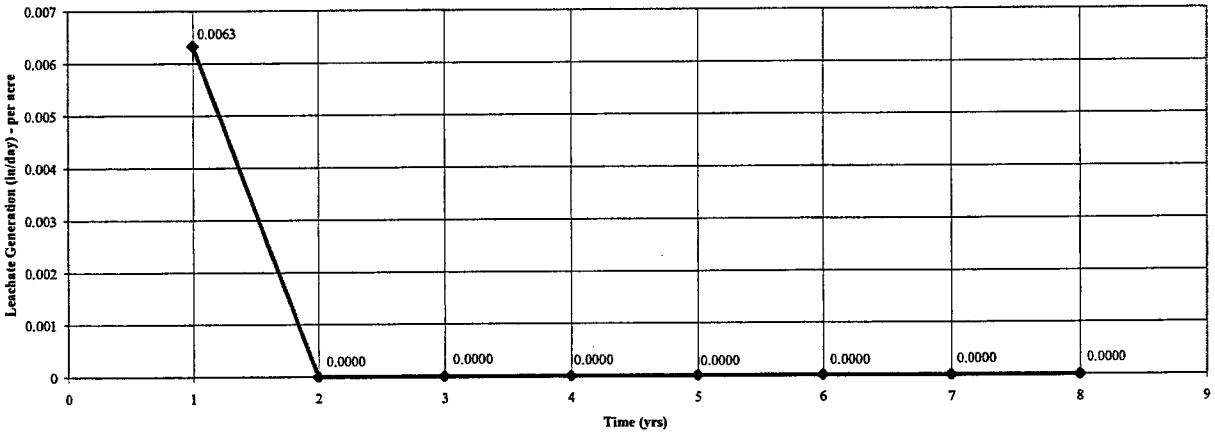


Figure III.15.26: Composite Leachate Generation Cells 1-12

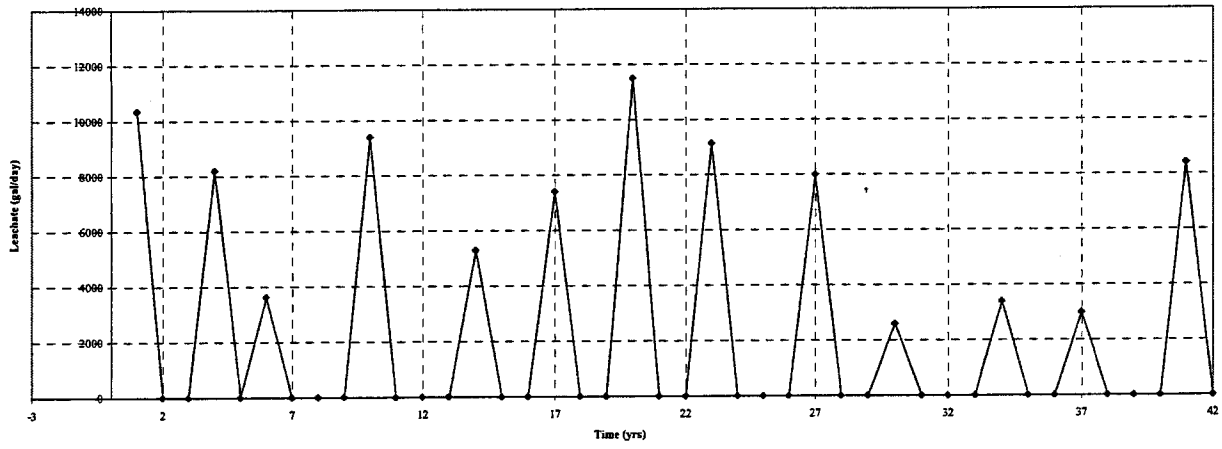
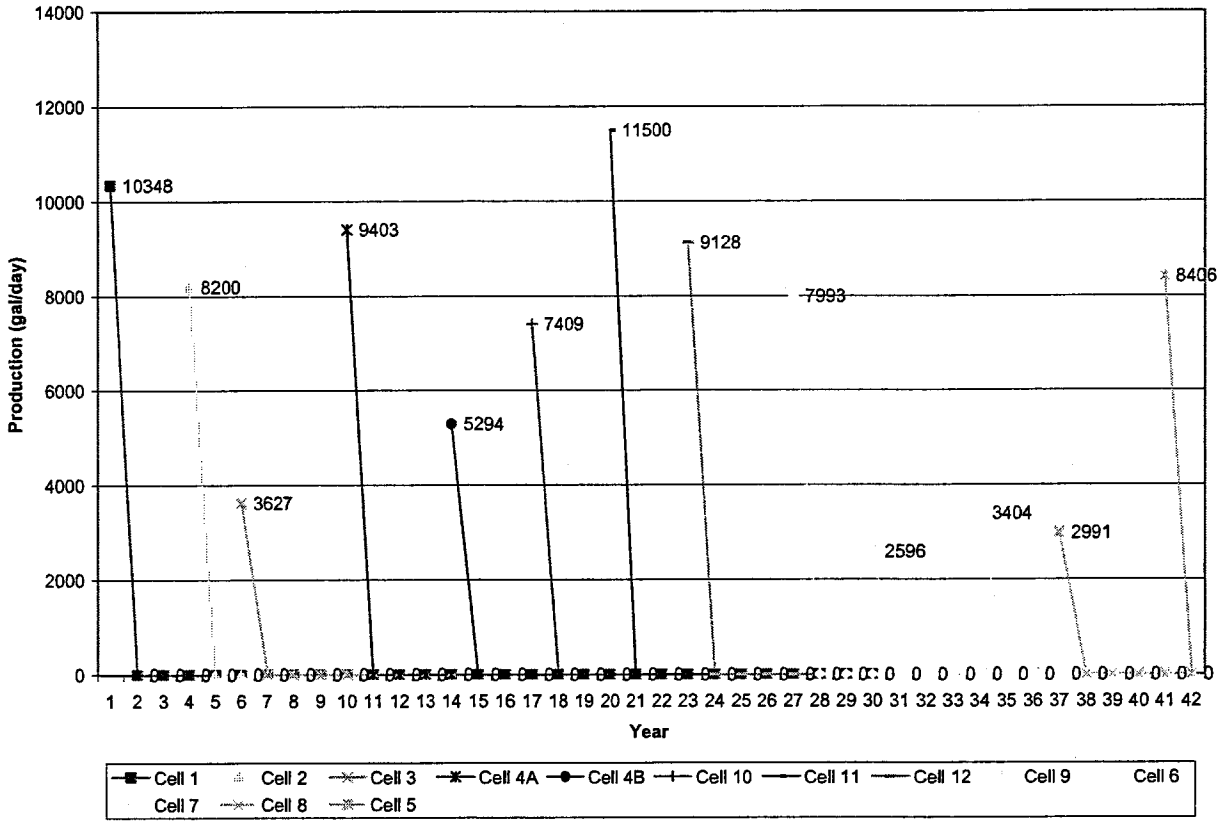


Figure III.15.27: Leachate Generation by Cell



4.0 LEACHATE COLLECTION AND MANAGEMENT SYSTEM

The leachate collection and management system is designed to ensure that the leachate head on the liner is not greater than one foot (30 cm). The final leachate collection and management system consists of six main components, as follows:

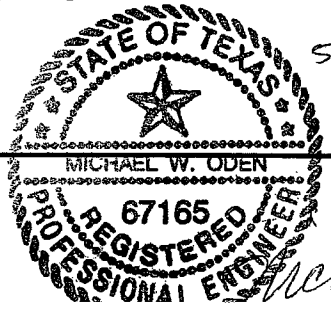
- Drainage layer
- Headers
- Sumps, pumps, and risers
- Leachate conveyance
- Storage
- Treatment and disposal

This system will collect and remove leachate from the landfill, minimize head buildup on the composite liner, and effectively manage leachate to its disposal point. Specific details of the leachate collection system can be seen on Figures III.1.5 and III.1.6.

4.1 Drainage Layer

The drainage layer is placed above the composite liner to allow leachate to flow laterally to perforated collector pipes. A geocomposite drainage layer consisting of a geonet and geotextile that separates the protective cover soil from the liner will be used. Because the pre-Subtitle D areas are closed, the vegetative cover will be removed and the current clay cap will be graded as a leachate management layer for the vertical expansion to allow leachate to flow to cells where a leachate collection system has been installed. This clay barrier has been field verified to have an average hydraulic conductivity of 1.17×10^{-7} cm/s for Cell 1 and 9.63×10^{-8} cm/s for Cells 2 and 3, for an overall average permeability of 8.73×10^{-8}. See Part III, Attachment 15, Appendix 15D for a more information.

The bottom drainage layer will be constructed with a minimum two percent cross slope to promote flow toward the leachate collector pipes, or headers, and ultimately to the sump. Both the granular drainage layer around the collection pipes and the geocomposite provide sufficient flow capacity to effectively transmit leachate to the header pipes and sump area, thereby reducing head buildup. Leachate head buildup is estimated with the Giroud Mounding equation using the resulting lateral drainage from the Hydrologic Evaluation of Landfill Performance (HELP) computer model.



5-18-2007
Pg 33-34

4.2 Leachate Collection [illegible]ng

The leachate collection system [illegible]udes six-inch diameter collectors, at a minimum grade of one-half percent. The headers are HDPE [illegible]R 17, or approved equal with 3/8-inch perforations. The perforated collector pipes will be placed at [illegible]e invert of the bottom slopes and embedded in granular material. Number 6 stone (nominal size ¾" [illegible]⅜") meeting the requirements of ASTM C-33 and ASTM D-446 will be used in the leachate collecti[illegible]ystem. (See calculation in Appendix 15B). This construction will be wrapped with a geotextile to prev[illegible]t soil from entering the granular layer and potentially clogging the pipe. Refer to Attachment 1 in [illegible] Site Development Plan for details. The perforated collector pipes discharge directly into the sump a[illegible]a at the low points in the base grade of each of the sumped cells or into leachate collection trenches [illegible]structed at the toe of the slope, which convey leachate to the sumps. (Cells 1 – 3 were constructed and filled prior to the requirement of leachate collection systems.) Collection pipes do not penetrate the liner. Information on collector pipework spacing can be found on Figure III.15.25.

The capacity of the headers has been calculated at approximately 334,000 gallons per day (0.52 cubic feet per second). See Appendix 15B for calculations. Based on flow rates from the HELP model runs for the Amarillo Landfill, the maximum calculated flow a collector pipe must accommodate is approximately 11,400 gallons per day, well below the capacity of the header pipes. This corresponds to the maximum amount of leachate that is predicted to be collected at an individual sump.

Cleanouts are provided at the top of the sideslopes for periodic maintenance of the collector pipes. Cleanouts are also provided for the pipes which are placed along the toe of the slope, using long-radius elbows to extend the pipe to the top of the slope. The cleanouts are constructed of a minimum six-inch diameter non-perforated HDPE or PVC pipe, which is joined to the perforated collector pipe. The six-inch pipe size allows sufficient cross-sectional area for effective cleaning by pressurized jetting equipment. Correspondence from two reputable service companies assuring the ability to clean out a collection system has been provided in Appendix 15C. Refer to Figure III.15.25 in this attachment for cleanout locations. The spacing between leachate collection pipes varies between 340 feet and 550 feet.

Pipe deflection calculations were performed to demonstrate that the leachate collection piping will perform satisfactorily under expected maximum overburden pressures. Refer to Appendix 15B of Attachment 15 for calculations.

4.3 Leachate Collection Sumps

Leachate entering the drainage layer and collector lines will be discharged into collection sumps. To allow accumulation of leachate, the sump invert is approximately three and one half feet below the pipe invert. The sump will hold leachate until it is pumped out and conveyed to an appropriate treatment facility. Attachment 1 in this Site Development Plan shows a plan and cross-section through the sump area.

The estimated maximum impingement rate as shown in Table III.15.2 is predicted to be 0.0063 inches per day per acre. This rate is used to estimate the hydraulic head above the liner system.

The Giroud equation provides an estimation of the depth of leachate above the liner system:

Where:

$$h_{max} = L\left[\frac{\sqrt{4C + \tan^2\alpha} - \tan\alpha}{2\cos\alpha}\right]$$

h_{max} = maximum calculated depth of leachate on the liner, (or head)
L = length of longest leachate flow path to an interceptor (header) = 700 feet
C = e/K, the impingement rate on the liner in inches per day (0.0063 in/day) divided by the reduced hydraulic conductivity of the drainage layer material (1.2 cm/sec) = 3.06E-5
α = angle of inclination. In the equation, tan α and cos α are calculated to equal 0.01 and 1.0 respectively.

Utilizing the above equation, the depth of leachate on the liner was calculated at approximately 0.4693 feet. A summary of the calculation of the head on the liner system is provided in Table III.15.3.

Table III.15.3: Leachate Mounding Equations

Giroud's Equation					
L(ft)	e(in/day)	Reduced K(cm/sec)	α (ft/ft)	C (e/k)	head(ft)
700	0.0063	1.2	0.01	1.388×10^{-5}	0.4693

Detailed calculations can be found in Appendix 15B.

4.4 Leachate Pump and Riser System

Extraction of leachate from the collection sumps will be accomplished by submersible pumps, which can be operated either manually or automatically. Leachate levels in the collection sumps will be monitored to maintain a head buildup of less than one foot (30 cm) on the landfill floor adjacent to the sump.

A sump riser pipe will be located directly up the sideslope from the sump at the disposal area perimeter. Risers are 18-inch diameter HDPE pipe and provide a means for lowering submersible pumps down the 3:1 sideslope incline into the collection sumps. The lower portion of the riser within the sump is perforated (3/8-inch diameter holes), which allows leachate to flow to the pumps.

The depth of leachate on the liner, adjacent to the sumps, will typically be measured using electronic transducers mounted on the leachate pumps. Other means of measurement (i.e. bubbler tubes) may also be used.

4.5 Conveyance

Submersible pumps will pump the leachate (contaminated water) from each collection sump directly into a tanker truck. A visual and audible alarm signal will notify landfill operators when it is time to pump the leachate out of the sump and into the tanker truck. The tanker truck will deliver the leachate to the City of Amarillo's wastewater treatment plant for treatment. Alternately, contaminated water may be recirculated into the waste which has been placed over a Subtitle D liner.

4.6 Leachate Storage

Leachate storage is not proposed for the site at this time. Temporary storage may be provided in the future, if needed.

4.7 Leachate Treatment and Disposal

The leachate that accumulates in the sumps will be collected and hauled by trucks to the City of Amarillo's sewage treatment plant. All leachate will be handled in compliance with TCEQ requirements.

Leachate may also be re-circulated at the landfill. This process involves taking leachate from the sumps, and pumping it back into active waste areas.

4.8 Monitoring and Maintenance Activities

Regular maintenance and monitoring will be performed for the leachate collection and transfer system throughout the operational life and during the post-closure care period for the landfill. The following monitoring and maintenance activities will be performed:

- Depth of leachate on liner. Electronic transducers on the leachate pumps (or other means) will measure depth of leachate. The depth of fluid will be recorded monthly and after significant rainfall events during the active life of the landfill, and semi-annually during the post-closure care period.

- Pump maintenance/replacement. Portable pumps will be maintained as appropriate. Backup portable pumps will be provided so the primary pumps may be removed and repaired. Maintenance activities on the pumps will occur during the active life of the landfill and during the post-closure care period.

- Cleanout. Cleanouts have been provided on all headers. Cleanout activities will occur as needed during the active life of the landfill as well as during the post-closure care period.

5.0 DOCUMENTATION

5.1 Record Keeping

All records relating to this plan will be retained until the end of the Post-Closure monitoring period. At a minimum, the following records will be kept on file at the landfill:

- Leachate monitoring field information records
- Leachate analysis results reports
- Leachate removal and disposal records

Other information will be retained as necessary to ensure proper implementation of this plan.

6.0 CONTAMINATED WATER PLAN

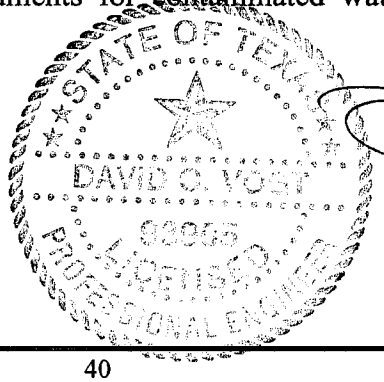
The Solid Waste Manager will take all steps necessary to control and prevent the discharge of contaminated water from the facility. In all excavated areas, containment berms and liner termination berms will be constructed to prevent water from undeveloped areas of the landfill from entering the lined area. Ditches and other structures will control surface drainage as necessary. In addition, working face berms will be constructed as operations progress to an aerial fill. Refer to Attachment 6 of Part III for berm details. Any water that comes in contact with waste, leachate, gas condensate or daily cover will be considered contaminated. It will be confined in the working face area and will be collected in the leachate collection system. Should a rainfall event occur whereby the collected contaminated surface water run-off remains on the working face for 48 hours, the excess contaminated water will be pumped directly into tanker trucks and hauled to the City of Amarillo's wastewater treatment plant for treatment.

The interim drainage controls will help to minimize the amount of water entering the leachate collection system and potential flooding in the developed cell area. Water that is collected outside the working face area, but within the cell area, is considered to be uncontaminated and can be pumped out of the excavated area if water accumulation is excessive (does not evaporate within 48 hours).

Contaminated surface water and groundwater may not be placed in or on the landfill.

Contaminated surface water and contaminated groundwater shall be disposed of at an authorized facility or as authorized by a National Pollutant Discharge Elimination System permit.

On-site collection ponds and impoundments for contaminated water shall be lined with an approved liner.



5/8/06 for page 40

7.0 ALTERNATE FINAL COVER PLAN

This Alternate Final Cover Plan (AFCP) is proposed to meet the requirements of 30 TAC 330.253(c)(1) and (2) for the City of Amarillo Municipal Solid Waste Landfill. This plan was developed in accordance with the requirements of the TCEQ as listed in 30 TAC 330.253, as modified, and supersedes all other final cover plans.

This Alternate Final Cover Plan includes "an infiltration layer that achieves an equivalent reduction in infiltration" as the infiltration layer specified in subsection (b)(1) or (2) of 30 TAC 330.253.

The areas used for waste disposal prior to implementation of Subtitle D rules do not have a constructed liner, but rely on TDH approved in-situ soils. The sandy clay soils were determined to have a permeability of between $2.3x10^{-8}$ to $8.1x10^{-8}$ cm/sec, liquid limit from 33.6 to 38.9 %, and plasticity index from 14.9 to 18.2.

Cell 1 was brought to final grades and closed in accordance with Permit 73 in September, 1993. The final cover consists of a minimum 12 inches of clay with a permeability of 1×10^{-5} cm/sec or less and two feet of soil with the upper six inches capable of sustaining vegetative growth. The vegetative layer was achieved by the spreading of stockpiled topsoil and the application and working-in of municipal wastewater treatment sludges (as authorized by the TDH in November, 1990) as a soil conditioner to help support arid region vegetation. Cells 2 and 3 were similarly constructed.

The remaining landfillable area, cells 4-12, will be lined with a geosynthetic clay liner, a HDPE flexible membrane liner and a drainage net. The final cover, based on this amendment, is proposed to consist of a 12 inch compacted, density and permeability ($K \leq 10^{-5}$ cm/sec) controlled clayey soil overlain by a 24 inch erosion layer, with at least the top six inches being suitable to sustaining native vegetation. This final cover system is essentially the same final cover system approved under the original permit.

The regulatory design standard final cover system, consistent with 31 TAC 330.253(b)(2) and (3), was modeled using HELP Version 3.07. This standard final cover design consists of:

1) A 12 inch vegetation/erosion layer comprised of on-site clay soils with established grass cover (HELP model "good" vegetative cover with appropriate rooting depth).
2) A HDPE flexible membrane liner (HELP model "good" placement with a pinhole density and installation defect value of 4 holes per acre) with a hydraulic conductivity of 10^{-13} cm/sec.
3) An "infiltration" or "barrier" layer consisting of 18 inches of compacted clay soils with a hydraulic conductivity of 10^{-5} cm/sec or less.

The design standard was modeled using 20-year synthetic precipitation data for Amarillo, Texas (about 19 inches average annual precipitation). The resulting average annual percolation from the infiltration layer was reported by the model to be 0.0145 inches (see model AMFCD in Appendix 15A).

The alternative cover design consists of the following layers:

1. A vegetation/erosion layer consisting of 24 inches of on-site clay soils with established grass cover, a saturated hydraulic conductivity of 10^{-5} cm/sec.
2. An infiltration layer consisting of 12 inches of compacted clay soils with a saturated hydraulic conductivity of 10^{-5} cm/sec.

Modeling of the alternative cover design with the same climatic, run-off curve number, and cover soil conditions used for the design standard final cover results in .0015 inches of average annual percolation from the infiltration layer (see AMFCALT in Appendix 15A).

Essentially, the alternative cover design utilizes the water retention properties and evapotranspiration processes modeled for Amarillo by HELP to achieve an equivalent performance based design of two feet of vegetative/erosion layer underlain by a low permeability "barrier" layer

of compacted clay. It can be seen by inspection of the HELP model results that a greater level of cover performance is achieved by the proposed alternative as with the Subtitle D design standard.

Figure III.15.23: HELP Model Amarillo 23-43 Summary Alternate Cover

Landfill Cross Section

24" Erosion Control Layer

12" Compacted Clay

Model Amarillo Parameters
(Simulation duration for twenty years)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	0	24	0.00001	0.1870	0.1909	0.3100	0.1870	0.4640
2	0	12	0.00001	0.3730	0.2252	0.3730	0.2660	0.4370

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 3.5 for good ground.
Evaporative zone depth = 24 inches
Runoff curve number determined by model.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 4% (top)
Maximum length along slope = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to wilting point to achieve steady state conditions prior to 20 year period.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0015	0.00005

Figure III.15.24: HELP Model Amarillo 24-44 Summary Subtitle D Cover

Landfill Cross Section
12" Erosion Control Layer
FML
18" Compacted Clay

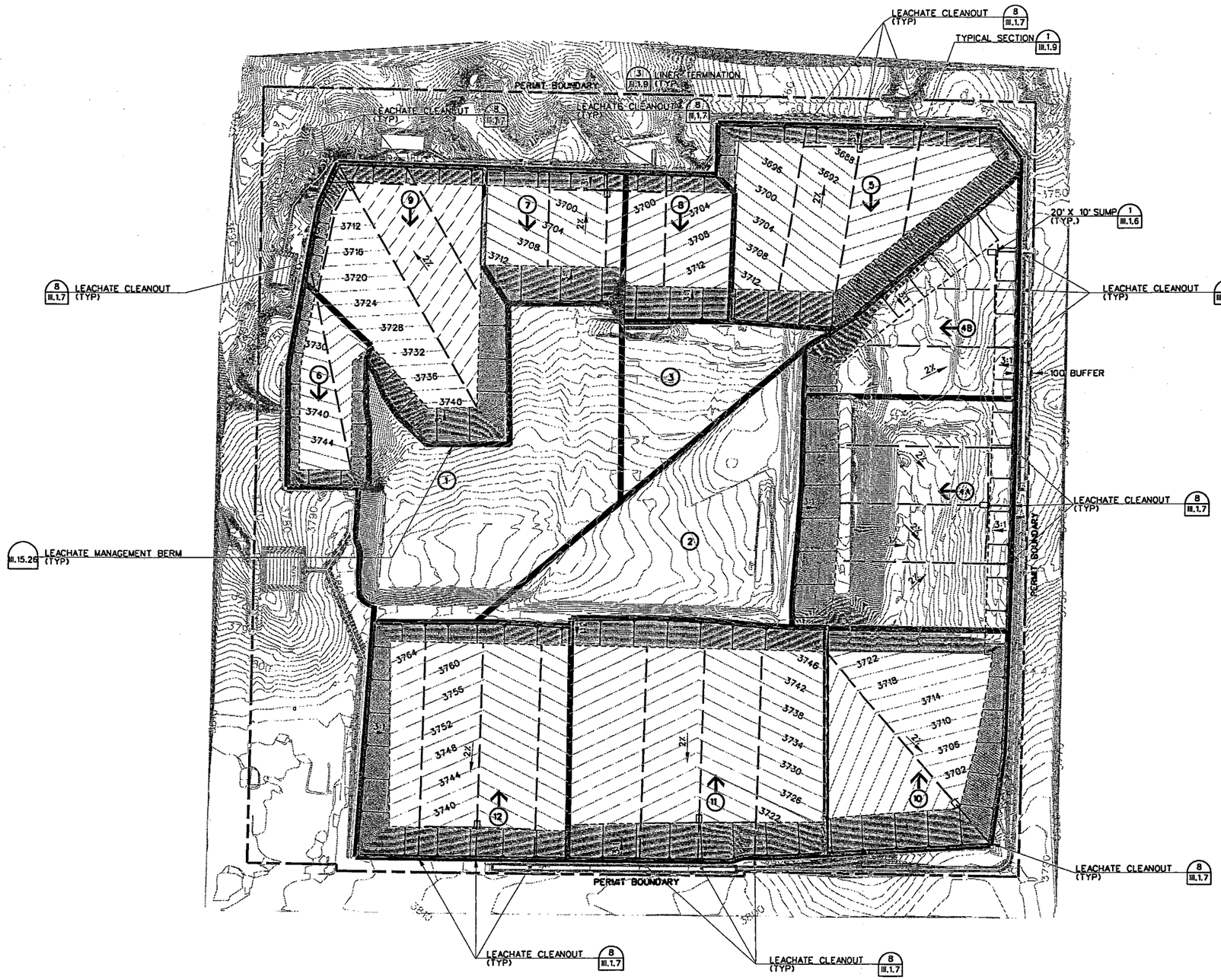
Model Amarillo Parameters
(Simulation duration for twenty years)

Layer	Soil Texture	Thickness (in)	Permeability (cm/sec)	Initial Moisture Content	Final Moisture Content	Field Capacity	Wilting Point	Porosity
1	0	12	0.00001	0.1870	0.1931	0.3100	0.1870	0.4640
2	35	.06	2.0 E-13	-	-	-	-	-
3	0	18	0.00001	0.3730	0.4610	0.3730	0.2660	0.4370

Assumptions
Synthetic weather generation using normal monthly temperature and precipitation values for Amarillo, TX.
Default City – Amarillo, TX.
Soil texture for daily and protective cover is based on the available on-site soils.
Leaf area index = 3.5 for good ground.
Evaporative zone depth = 24 inches
Runoff curve number determined by model.
FML placement = good.
FML pinhole density = 4 holes / acre.
FML installation defects = 4 holes / acre.
Landfill surface area = 1.0 acre.
Slope of drainage layer = 4% (top)
Maximum length along slope = 700 feet (top)
User initialized values for moisture content. Soil moisture content set to wilting point to achieve steady state conditions prior to 20 year period.

Results

	inches/month	inches/day
Peak Average Monthly Lateral Drainage (per acre)	0.0145	0.00048



N

0 400 800

SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- DIRECTION OF FILL
- CELL BOUNDARY
- LEACHATE SUMP
- LEACHATE COLLECTION LINE

NOTES

1. THE PROPOSED GRADES REPRESENT THE BOTTOM OF EXCAVATION

2. CELLS 1, 2, AND 3 WILL HAVE A LEACHATE MANAGEMENT SYSTEM CONSISTING OF THE EXISTING FINAL COVER SYSTEM WHICH HAS BEEN FIELD VERIFIED TO HAVE AN AVERAGE HYDRAULIC CONDUCTIVITY OF 1.17x10-7 CM/SEC FOR CELL 1 AND 9.63x10-8 CM/SEC FOR CELLS 2 AND 3. THESE CELLS WILL BE GRADED TO DRAIN TO THE LEACHATE COLLECTION SYSTEMS OF ADJOINING CELLS.

USER: ssumner
FILE: \AMIII15.25.DGN
DATE: 5/17/2007
TIME: 9:58:19 AM

CITY OF AMARILLO TEXAS

HDR

HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	M. ODEN
CIVIL ENGINEER	M. ODEN
CHECKED BY	M. ODEN
DESIGNED	S. MILLER
DRAWN BY	B. GREEN
QA/QC	M. ODEN
PROJECT NUMBER	23358-037

5-18-2007

STATE OF TEXAS
MICHAEL W. ODEN
67165
REGISTERED
PROFESSIONAL ENGINEER

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CITY OF AMARILLO LANDFILL
MSW PERMIT NO. 73A
POTTER COUNTY, TEXAS

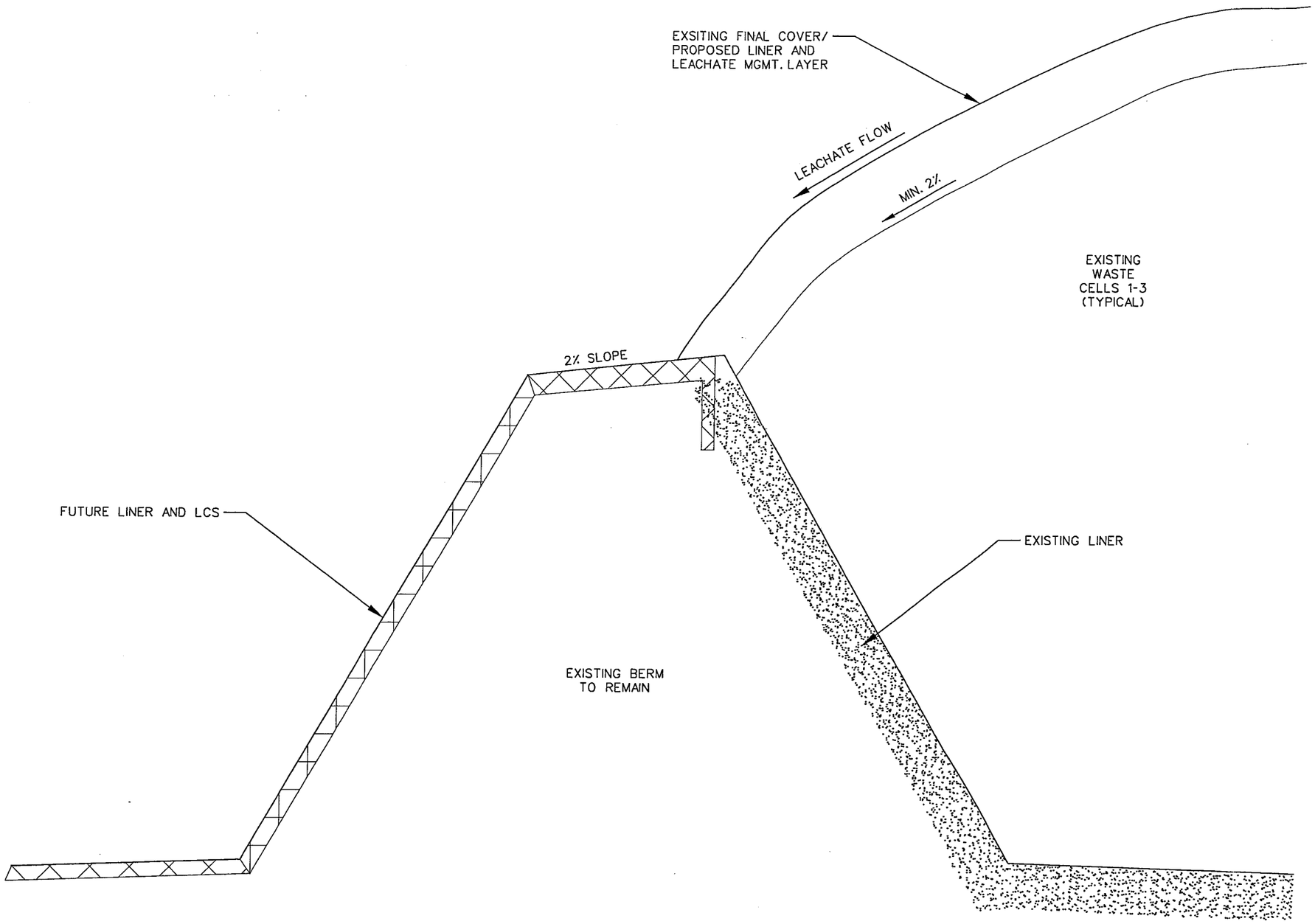
LEACHATE COLLECTION SYSTEM LAYOUT

0 1" 2"

FILENAME	...\AMIII15.25.DGN
SCALE	

SHEET III.15.25

NOTE:
THIS DRAWING IS NOT TO SCALE



PROJECT MANAGER	M. ODEN
CIVIL ENGINEER	M. ODEN
CHECKED BY	M. ODEN
DESIGNED	S. SUMNER
DRAWN BY	S. SUMNER
QA/QC	M. ODEN
PROJECT NUMBER	23358-037

ISSUE	DATE	DESCRIPTION

HDR ENGINEERING, INC.

5-18-2007

STATE OF TEXAS
MICHAEL W. ODEN
67165
REGISTERED
PROFESSIONAL ENGINEER

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CITY OF AMARILLO LANDFILL
MSW PERMIT NO. 73A
POTTER COUNTY, TEXAS

LEACHATE MANAGEMENT PLAN

0 1" 2"

FILENAME
SCALE

SHEET
III.15.26

USER: SSUMNER
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DATE: 5/17/2007
TIME: 4:07:38 PM

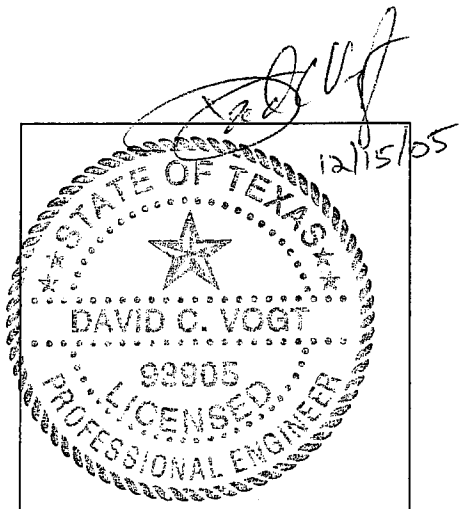
Part III – Attachment 15

Appendix 15A - HELP Version 3.07 Output

for

City of Amarillo Landfill

Potter County, Texas



This document is released for the purpose of review only under the authority of David C. Vogt, P.E. # 93905. It is not to be used for bidding or construction.

For pages 1 thru 274

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**                                                                           **
**                                                                           **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                    USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                           **
**                                                                           **
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 TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
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 EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
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 TIME:  17:12     DATE:   9/ 1/2005


 *******************************************************************************

      TITLE:  Amarillo Year 1, Alternate Liner with Intermediate Cover

 *******************************************************************************


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


                                    LAYER  1
                                    --------

                    TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER  11
          THICKNESS                     =      6.00   INCHES
          POROSITY                      =      0.4640 VOL/VOL
          FIELD CAPACITY                =      0.3100 VOL/VOL
          WILTING POINT                 =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 4

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 5

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

LAYER 6

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	43.652	INCHES
TOTAL INITIAL WATER	=	43.652	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	

END OF GROWING SEASON (JULIAN DATE)	=	303
EVAPORATIVE ZONE DEPTH	=	10.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 4	0.0161	0.0499	0.1899	0.0323	0.1628	0.0001
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 5	0.000	0.001	0.004	0.001	0.003	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 5	0.001	0.001	0.001	0.001	0.001	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 4	0.4511	1637.524	3.06
PERC./LEAKAGE THROUGH LAYER 6	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 5	0.0008		
CHANGE IN WATER STORAGE	0.054	194.874	0.36
SOIL WATER AT START OF YEAR	43.652	158456.562	
SOIL WATER AT END OF YEAR	43.706	158651.437	
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	0.046	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 4						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0161	0.0499	0.1899	0.0323	0.1628	0.0001
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 6						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0003	0.0010	0.0039	0.0006	0.0034	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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 4	0.45111	(0.00000)	1637.524	3.05836
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.00000	(0.00000)	0.004	0.00001
AVERAGE HEAD ON TOP OF LAYER 5	0.001	(0.000)		
CHANGE IN WATER STORAGE	0.054	(0.0000)	194.87	0.364

PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000

DRAINAGE COLLECTED FROM LAYER 4	0.00949	34.46387
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.000000	0.00003
AVERAGE HEAD ON TOP OF LAYER 5	0.006	
MAXIMUM HEAD ON TOP OF LAYER 5	0.012	
LOCATION OF MAXIMUM HEAD IN LAYER 4 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3480
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964
2	34.3352	0.2861
3	7.4400	0.3100
4	0.0020	0.0100
5	0.0000	0.0000
6	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR2.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR2.OUT

TIME:  17:15     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 2, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2861	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 5

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL

FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 6

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

LAYER 7

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES

EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	77.984	INCHES
TOTAL INITIAL WATER	=	77.984	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 6	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00

RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 5	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 7	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 6	0.0000		
CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	77.984	283081.687	
SOIL WATER AT END OF YEAR	78.489	284914.094	
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	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36 3.07	0.33 3.27	1.54 0.70	0.04 1.89	0.17 0.96	1.45 0.97
STD. DEVIATIONS	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
RUNOFF						
TOTALS	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
STD. DEVIATIONS	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION						

TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

LATERAL DRAINAGE COLLECTED FROM 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

PERCOLATION/LEAKAGE THROUGH LAYER 7

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 6

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

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

	INCHES		CU. FEET		PERCENT
PRECIPITATION	14.75	(0.000)	53542.5		100.00
RUNOFF	0.000	(0.0000)	0.00		0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05		96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 5	0.00000	(0.00000)	0.000		0.00000

PERCOLATION/LEAKAGE THROUGH LAYER 7	0.00000 (0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 6	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.505 (0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 5	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 6	0.000	
MAXIMUM HEAD ON TOP OF LAYER 6	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 5 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964
2	34.2063	0.2851
3	34.9120	0.2909
4	7.4400	0.3100
5	0.0020	0.0100
6	0.0000	0.0000
7	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)            **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY               **
**                    USAE WATERWAYS EXPERIMENT STATION                 **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY           **
**                                                                      **
**                                                                      **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR3.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR3.OUT


TIME:  17:19     DATE:   9/ 1/2005


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     TITLE:  Amarillo Year 3, Alternate Liner with Intermediate Cover

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


                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2851	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2909	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL

```
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

```
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 7

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

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

```
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.7500 VOL/VOL
FIELD CAPACITY              =      0.7470 VOL/VOL
WILTING POINT               =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.300000003000E-08 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	112.772	INCHES
TOTAL INITIAL WATER	=	112.772	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 6	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	0.505	1832.365	3.42
SOIL WATER AT START OF YEAR	112.772	409362.187	
SOIL WATER AT END OF YEAR	113.277	411194.531	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.083	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45

	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00

RUNOFF

TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

EVAPOTRANSPIRATION

TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

LATERAL DRAINAGE COLLECTED FROM LAYER 6

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

PERCOLATION/LEAKAGE THROUGH LAYER 8

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 7

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

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75 (0.000)	53542.5	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245 (0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.505 (0.0000)	1832.36	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964
2	34.1412	0.2845
3	34.8559	0.2905
4	34.9092	0.2909
5	7.4400	0.3100
6	0.0020	0.0100
7	0.0000	0.0000
8	0.1500	0.7500
SNOW WATER	0.000	

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 **                                                                      **
 **                                                                      **
 **              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
 **                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)            **
 **                  DEVELOPED BY ENVIRONMENTAL LABORATORY               **
 **                    USAE WATERWAYS EXPERIMENT STATION                 **
 **             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY           **
 **                                                                      **
 **                                                                      **
 **************************************************************************
 **************************************************************************


 PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
 TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
 SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
 EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
 SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR4.D10
 OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR4.OUT


 TIME:  17:21     DATE:   9/ 1/2005


 **************************************************************************

      TITLE:  Amarillo Year 4, Alternate Liner with Intermediate Cover

 **************************************************************************


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


                                  LAYER  1
                                  --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
           THICKNESS                     =      6.00   INCHES
           POROSITY                      =      0.4640 VOL/VOL
           FIELD CAPACITY                =      0.3100 VOL/VOL
           WILTING POINT                 =      0.1870 VOL/VOL
           INITIAL SOIL WATER CONTENT    =      0.3100 VOL/VOL
           EFFECTIVE SAT. HYD. COND.     =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2845	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL

```
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 6

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

```
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 7

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

LAYER 8

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

```
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.7500 VOL/VOL
FIELD CAPACITY              =      0.7470 VOL/VOL
WILTING POINT               =      0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.300000003000E-08 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	147.512	INCHES
TOTAL INITIAL WATER	=	147.512	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000

STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 7	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 6	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 8	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 7	0.0000		
CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	147.512	535468.312	
SOIL WATER AT END OF YEAR	148.017	537300.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45

	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00

RUNOFF

TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

EVAPOTRANSPIRATION

TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

LATERAL DRAINAGE COLLECTED FROM LAYER 6

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

PERCOLATION/LEAKAGE THROUGH LAYER 8

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 7

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

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75 (0.000)	53542.5	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245 (0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 6	0.00000 (0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.00000 (0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.505 (0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 6	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 8	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 7	0.000	
MAXIMUM HEAD ON TOP OF LAYER 7	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 6 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964
2	34.1023	0.2842
3	34.8237	0.2902
4	69.7204	0.2905
5	7.4400	0.3100
6	0.0020	0.0100
7	0.0000	0.0000
8	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR5.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR5.OUT

TIME:  17:25     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 5, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2842 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    240.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
```

FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	4.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	4.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	182.300	INCHES
TOTAL INITIAL WATER	=	182.300	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%

AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563

LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 8	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 7	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 9	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0000		
CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	182.300	661748.750	
SOIL WATER AT END OF YEAR	182.805	663581.125	
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	0.055	0.00

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 7						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 9						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 8

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

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75 (0.000)	53542.5	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245 (0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 7	0.00000 (0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00000 (0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 8	0.000 (0.000)		
CHANGE IN WATER STORAGE	0.505 (0.0000)	1832.39	3.422

PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 7	0.00000	0.00000

PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 8	0.000	
MAXIMUM HEAD ON TOP OF LAYER 8	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964
2	34.0871	0.2841
3	34.7997	0.2900
4	34.8275	0.2902
5	69.7200	0.2905
6	7.4400	0.3100
7	0.0020	0.0100
8	0.0000	0.0000

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                    9           0.1500          0.7500

               SNOW WATER       0.000

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**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR6.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR6.OUT

TIME:  18: 3     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 6, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                     =      6.00   INCHES
          POROSITY                      =      0.4640 VOL/VOL
          FIELD CAPACITY                =      0.3100 VOL/VOL
          WILTING POINT                 =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

```
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	217.088	INCHES
TOTAL INITIAL WATER	=	217.088	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	217.088	788029.187	
SOIL WATER AT END OF YEAR	217.593	789861.625	
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

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	34.8000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                DEVELOPED BY ENVIRONMENTAL LABORATORY             **
**                USAE WATERWAYS EXPERIMENT STATION                 **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR7.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR7.OUT


TIME:  18: 6     DATE:   9/ 1/2005


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     TITLE:  Amarillo Year 7, Alternate Liner with Intermediate Cover

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


                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    240.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
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FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

```
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

```
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

```
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	251.888	INCHES
TOTAL INITIAL WATER	=	251.888	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	251.888	914353.187	
SOIL WATER AT END OF YEAR	252.393	916185.562	
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

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	69.6000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR8.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR8.OUT


TIME:  18: 8     DATE:   9/ 1/2005


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     TITLE:  Amarillo Year 8, Alternate Liner with Intermediate Cover

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


                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    360.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
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FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	286.688	INCHES
TOTAL INITIAL WATER	=	286.688	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	286.688	1040677.310	
SOIL WATER AT END OF YEAR	287.193	1042509.560	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	104.4000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR9.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR9.OUT

TIME:  18:11     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 9, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	480.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	321.488	INCHES
TOTAL INITIAL WATER	=	321.488	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	321.488	1167001.250	
SOIL WATER AT END OF YEAR	321.993	1168833.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	139.2000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR10.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR10.OUT

TIME:  18:14     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 10, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    600.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
```

```
FIELD CAPACITY                =      0.2920 VOL/VOL
WILTING POINT                 =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC
```

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

```
THICKNESS                     =    240.00   INCHES
POROSITY                      =      0.6710 VOL/VOL
FIELD CAPACITY                =      0.2920 VOL/VOL
WILTING POINT                 =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC
```

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

```
THICKNESS                     =     24.00   INCHES
POROSITY                      =      0.4640 VOL/VOL
FIELD CAPACITY                =      0.3100 VOL/VOL
WILTING POINT                 =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.639999998000E-04 CM/SEC
```

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

```
THICKNESS                     =      0.20   INCHES
POROSITY                      =      0.8500 VOL/VOL
FIELD CAPACITY                =      0.0100 VOL/VOL
WILTING POINT                 =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  10.0000000000     CM/SEC
SLOPE                         =      2.00   PERCENT
DRAINAGE LENGTH               =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	356.288	INCHES
TOTAL INITIAL WATER	=	356.288	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	356.288	1293325.120	
SOIL WATER AT END OF YEAR	356.793	1295157.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	174.0000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR11.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR11.OUT

TIME:  18:16     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 11, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	720.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	391.088	INCHES
TOTAL INITIAL WATER	=	391.088	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	95
END OF GROWING SEASON (JULIAN DATE)	=	303
EVAPORATIVE ZONE DEPTH	=	10.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	391.088	1419649.120	
SOIL WATER AT END OF YEAR	391.593	1421481.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	208.8000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR12.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR12.OUT


TIME:  18:17     DATE:   9/ 1/2005


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     TITLE:  Amarillo Year 12, Alternate Liner with Intermediate Cover

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


                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	840.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

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FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
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LAYER 8

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          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20 INCHES
POROSITY	=	0.7500 VOL/VOL
FIELD CAPACITY	=	0.7470 VOL/VOL
WILTING POINT	=	0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	425.888	INCHES
TOTAL INITIAL WATER	=	425.888	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.392	3.42
SOIL WATER AT START OF YEAR	425.888	1545973.120	
SOIL WATER AT END OF YEAR	426.393	1547805.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.39	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	243.6000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR13.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR13.OUT

TIME:  18:19     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 13, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                     =      6.00   INCHES
          POROSITY                      =      0.4640 VOL/VOL
          FIELD CAPACITY                =      0.3100 VOL/VOL
          WILTING POINT                 =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	960.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

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FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	460.688	INCHES
TOTAL INITIAL WATER	=	460.688	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	460.688	1672297.120	
SOIL WATER AT END OF YEAR	461.193	1674129.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	278.4000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR14.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR14.OUT

TIME:  18:20     DATE:   9/ 1/2005

**********************************************************************

     TITLE:  Amarillo Year 14, Alternate Liner with Intermediate Cover

**********************************************************************

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1080.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

```
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	495.488	INCHES
TOTAL INITIAL WATER	=	495.488	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	95
END OF GROWING SEASON (JULIAN DATE)	=	303
EVAPORATIVE ZONE DEPTH	=	10.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	495.488	1798621.120	
SOIL WATER AT END OF YEAR	495.993	1800453.370	
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	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET		PERCENT
PRECIPITATION	14.75	(0.000)	53542.5		100.00
RUNOFF	0.000	(0.0000)	0.00		0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05		96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000		0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000		0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)			
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28		3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	313.2000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                      **
**                                                                      **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)            **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY               **
**                    USAE WATERWAYS EXPERIMENT STATION                 **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY           **
**                                                                      **
**                                                                      **
**************************************************************************
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR15.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR15.OUT


TIME:  18:21     DATE:   9/ 1/2005


**************************************************************************

     TITLE:  Amarillo Year 15, Alternate Liner with Intermediate Cover

**************************************************************************


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


                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
```

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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                     =    120.00   INCHES
POROSITY                      =      0.6710 VOL/VOL
FIELD CAPACITY                =      0.2920 VOL/VOL
WILTING POINT                 =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                     =    120.00   INCHES
POROSITY                      =      0.6710 VOL/VOL
FIELD CAPACITY                =      0.2920 VOL/VOL
WILTING POINT                 =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                     =   1200.00   INCHES
POROSITY                      =      0.6710 VOL/VOL
FIELD CAPACITY                =      0.2920 VOL/VOL
WILTING POINT                 =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                     =    120.00   INCHES
POROSITY                      =      0.6710 VOL/VOL
```

```
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	530.288	INCHES
TOTAL INITIAL WATER	=	530.288	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.503	3.42
SOIL WATER AT START OF YEAR	530.288	1924945.120	
SOIL WATER AT END OF YEAR	530.793	1926777.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.50	3.423

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	348.0000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR16.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR16.OUT

TIME:  18:22     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 16, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
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          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =   1320.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
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FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	565.088	INCHES
TOTAL INITIAL WATER	=	565.088	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	95
END OF GROWING SEASON (JULIAN DATE)	=	303
EVAPORATIVE ZONE DEPTH	=	10.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	565.088	2051269.250	
SOIL WATER AT END OF YEAR	565.593	2053101.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	382.8000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR17.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR17.OUT

TIME:  18:25     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 17, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1440.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	599.888	INCHES
TOTAL INITIAL WATER	=	599.888	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23 DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	95
END OF GROWING SEASON (JULIAN DATE)	=	303
EVAPORATIVE ZONE DEPTH	=	10.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	599.888	2177593.500	
SOIL WATER AT END OF YEAR	600.393	2179425.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	417.6000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)            **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY               **
**                    USAE WATERWAYS EXPERIMENT STATION                 **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY           **
**                                                                      **
**                                                                      **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR18.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR18.OUT

TIME:  18:26     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 18, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1560.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00 INCHES
POROSITY	=	0.4640 VOL/VOL
FIELD CAPACITY	=	0.3100 VOL/VOL
WILTING POINT	=	0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04 CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL
WILTING POINT	=	0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000 CM/SEC
SLOPE	=	2.00 PERCENT
DRAINAGE LENGTH	=	700.0 FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	634.688	INCHES
TOTAL INITIAL WATER	=	634.688	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	634.688	2303917.500	
SOIL WATER AT END OF YEAR	635.193	2305749.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET		PERCENT
PRECIPITATION	14.75	(0.000)	53542.5		100.00
RUNOFF	0.000	(0.0000)	0.00		0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05		96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000		0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000		0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)			
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28		3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	452.4000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR19.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR19.OUT

TIME:  18:27     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 19, Alternate Liner with Intermediate Cover

**********************************************************************

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
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                        LAYER  2
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2850 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  3
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2841 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  4
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =   1680.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
FIELD CAPACITY               =      0.2920 VOL/VOL
WILTING POINT                =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2900 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.100000005000E-02 CM/SEC


                        LAYER  5
                        --------

          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  18
THICKNESS                    =    120.00   INCHES
POROSITY                     =      0.6710 VOL/VOL
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FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	669.488	INCHES
TOTAL INITIAL WATER	=	669.488	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	669.488	2430241.250	
SOIL WATER AT END OF YEAR	669.993	2432073.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET		PERCENT
PRECIPITATION	14.75	(0.000)	53542.5		100.00
RUNOFF	0.000	(0.0000)	0.00		0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05		96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000		0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000		0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)			
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28		3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	487.2000	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE            **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)            **
**                DEVELOPED BY ENVIRONMENTAL LABORATORY                 **
**                  USAE WATERWAYS EXPERIMENT STATION                   **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY           **
**                                                                      **
**                                                                      **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR20.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR20.OUT

TIME:  18:29     DATE:   9/ 1/2005

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     TITLE:  Amarillo Year 20, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1800.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

```
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

```
TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	704.288	INCHES
TOTAL INITIAL WATER	=	704.288	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	704.288	2556565.250	
SOIL WATER AT END OF YEAR	704.793	2558397.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	521.9999	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:      C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:    C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:  C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR21.D10
OUTPUT DATA FILE:           C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR21.OUT

TIME:  18:30     DATE:   9/ 1/2005

**********************************************************************

     TITLE:  Amarillo Year 21, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	1920.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2902	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 6

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	240.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2905	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 7

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 8

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0100	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	2.00	PERCENT
DRAINAGE LENGTH	=	700.0	FEET

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	739.088	INCHES
TOTAL INITIAL WATER	=	739.088	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.281	3.42
SOIL WATER AT START OF YEAR	739.088	2682889.250	
SOIL WATER AT END OF YEAR	739.593	2684721.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.166	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.28	3.422

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3478

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	34.0880	0.2841
3	34.7903	0.2899
4	556.7999	0.2900
5	34.8240	0.2902
6	69.7200	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR1.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR22.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMYR22.OUT

TIME:  18:57     DATE:   9/20/2005

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     TITLE:  Amarillo Year 22, Alternate Liner with Intermediate Cover

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

                                LAYER  1
                                --------

                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  11
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3100 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.639999998000E-04 CM/SEC
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	54.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2850	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2841	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	2040.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2900	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	120.00	INCHES
POROSITY	=	0.6710	VOL/VOL

```
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2902 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 6

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  18
THICKNESS                   =    240.00   INCHES
POROSITY                    =      0.6710 VOL/VOL
FIELD CAPACITY              =      0.2920 VOL/VOL
WILTING POINT               =      0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.2905 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.100000005000E-02 CM/SEC
```

LAYER 7

```
        TYPE 1 - VERTICAL PERCOLATION LAYER
            MATERIAL TEXTURE NUMBER  11
THICKNESS                   =     24.00   INCHES
POROSITY                    =      0.4640 VOL/VOL
FIELD CAPACITY              =      0.3100 VOL/VOL
WILTING POINT               =      0.1870 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.3100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =  0.639999998000E-04 CM/SEC
```

LAYER 8

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          TYPE 2 - LATERAL DRAINAGE LAYER
            MATERIAL TEXTURE NUMBER  20
THICKNESS                   =      0.20   INCHES
POROSITY                    =      0.8500 VOL/VOL
FIELD CAPACITY              =      0.0100 VOL/VOL
WILTING POINT               =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT  =      0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.   =   10.0000000000     CM/SEC
SLOPE                       =      2.00   PERCENT
DRAINAGE LENGTH             =    700.0    FEET
```

LAYER 9

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

LAYER 10

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 17

THICKNESS	=	0.20	INCHES
POROSITY	=	0.7500	VOL/VOL
FIELD CAPACITY	=	0.7470	VOL/VOL
WILTING POINT	=	0.4000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7500	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000003000E-08	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #11 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 2.% AND A SLOPE LENGTH OF 700. FEET.

SCS RUNOFF CURVE NUMBER	=	94.30	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.000	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.468	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.430	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	755.078	INCHES
TOTAL INITIAL WATER	=	755.078	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
LATERAL DRAINAGE COLLECTED	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FROM LAYER 8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 9	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	14.245	51710.055	96.58
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.000	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		

CHANGE IN WATER STORAGE	0.505	1832.503	3.42
SOIL WATER AT START OF YEAR	755.078	2740933.000	
SOIL WATER AT END OF YEAR	755.583	2742765.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.055	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
STD. DEVIATIONS	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						
TOTALS	0.361	0.273	1.198	0.581	0.391	0.670
	2.806	3.542	0.563	2.655	0.644	0.563
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
LATERAL DRAINAGE COLLECTED FROM LAYER 8						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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

PERCOLATION/LEAKAGE THROUGH LAYER 10

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

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 9

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

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

	INCHES		CU. FEET	PERCENT
PRECIPITATION	14.75	(0.000)	53542.5	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	14.245	(0.0000)	51710.05	96.578
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00000	(0.00000)	0.000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.505	(0.0000)	1832.50	3.423

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 1

	(INCHES)	(CU. FT.)
PRECIPITATION	0.96	3484.800
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00000
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.000	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.15	545.6433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3478
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1519

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

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

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FINAL WATER STORAGE AT END OF YEAR 1

LAYER	(INCHES)	(VOL/VOL)
1	1.7784	0.2964

2	14.9695	0.2772
3	34.8157	0.2901
4	591.8760	0.2901
5	34.8276	0.2902
6	69.7234	0.2905
7	7.4400	0.3100
8	0.0020	0.0100
9	0.0000	0.0000
10	0.1500	0.7500
SNOW WATER	0.000	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY          **
**                     USAE WATERWAYS EXPERIMENT STATION            **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY      **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFCALT.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFCALT.OUT

TIME:  10:27     DATE:   9/14/2005

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     TITLE:  Amarillo Year 23-43, Alternate Liner with Alternate Cover

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

                                LAYER  1
                                --------

                    TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER   0
          THICKNESS                     =     24.00   INCHES
          POROSITY                      =      0.4640 VOL/VOL
          FIELD CAPACITY                =      0.3100 VOL/VOL
          WILTING POINT                 =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.1870 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.999999975000E-05 CM/SEC
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 0

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1870	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.999999975000E-05	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	86.50	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.488	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	11.136	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	4.488	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	6.732	INCHES
TOTAL INITIAL WATER	=	6.732	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

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MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.002	0.000	0.000	0.002	0.018	0.000
EVAPOTRANSPIRATION	0.101	0.186	1.079	0.609	0.413	1.500
	2.627	3.708	0.584	1.095	0.549	0.550
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0003	0.0003	0.0003	0.0007
	0.0014	0.0021	0.0002	0.0001	0.0002	0.0001

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.022	80.065	0.15
EVAPOTRANSPIRATION	13.001	47192.473	88.14
PERC./LEAKAGE THROUGH LAYER 2	0.005683	20.630	0.04
CHANGE IN WATER STORAGE	1.722	6249.320	11.67
SOIL WATER AT START OF YEAR	6.732	24437.025	
SOIL WATER AT END OF YEAR	8.454	30686.346	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.06	0.71	2.12	0.81	2.69	2.84
	1.34	3.67	4.33	2.82	0.79	0.19
RUNOFF	0.000	0.000	0.008	0.003	0.128	0.169
	0.000	0.013	0.345	0.063	0.000	0.000
EVAPOTRANSPIRATION	0.268	0.604	1.632	1.629	3.826	2.655
	1.354	2.881	3.995	1.094	0.571	0.327

PERCOLATION/LEAKAGE THROUGH	0.0000	0.0002	0.0004	0.0021	0.0095	0.0004
LAYER 2	0.0019	0.0007	0.0018	0.0008	0.0000	0.0014

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	22.37	81203.117	100.00
RUNOFF	0.728	2642.756	3.25
EVAPOTRANSPIRATION	20.837	75638.164	93.15
PERC./LEAKAGE THROUGH LAYER 2	0.019161	69.554	0.09
CHANGE IN WATER STORAGE	0.786	2852.651	3.51
SOIL WATER AT START OF YEAR	8.454	30686.346	
SOIL WATER AT END OF YEAR	9.239	33538.996	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	0.12	0.48	3.49	1.14	1.67
	4.18	4.76	0.55	0.02	0.00	0.23
RUNOFF	0.000	0.000	0.000	0.341	0.000	0.000
	0.121	0.050	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.397	0.643	0.621	1.774	4.161	1.694

	3.752	3.871	1.640	0.076	0.000	0.195
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0003	0.0006	0.0020	0.0026	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.07	61964.113	100.00
RUNOFF	0.512	1859.028	3.00
EVAPOTRANSPIRATION	18.824	68330.633	110.27
PERC./LEAKAGE THROUGH LAYER 2	0.005551	20.152	0.03
CHANGE IN WATER STORAGE	-2.272	-8245.697	-13.31
SOIL WATER AT START OF YEAR	9.239	33538.996	
SOIL WATER AT END OF YEAR	6.968	25293.299	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.07	0.30	1.78	1.61	2.84	2.20
	4.21	1.23	1.57	0.75	0.39	0.69
RUNOFF	0.000	0.000	0.000	0.000	0.182	0.132
	0.129	0.005	0.006	0.000	0.000	0.000

EVAPOTRANSPIRATION	0.079	0.146	0.660	1.705	2.443	3.485
	3.733	1.358	1.521	0.808	0.348	0.243
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.64	64033.211	100.00
RUNOFF	0.454	1649.528	2.58
EVAPOTRANSPIRATION	16.530	60002.199	93.70
PERC./LEAKAGE THROUGH LAYER 2	0.000005	0.019	0.00
CHANGE IN WATER STORAGE	0.656	2381.485	3.72
SOIL WATER AT START OF YEAR	6.968	25293.299	
SOIL WATER AT END OF YEAR	7.624	27674.785	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.67	0.68	0.13	1.05	2.06	4.11
	2.80	3.58	0.56	1.31	0.99	0.00

RUNOFF	0.000	0.000	0.000	0.000	0.000	0.010
	0.001	0.116	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.647	0.500	0.404	0.526	2.649	4.590
	2.855	2.474	1.421	0.621	0.456	0.183
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.94	65122.203	100.00
RUNOFF	0.127	461.837	0.71
EVAPOTRANSPIRATION	17.329	62903.785	96.59
PERC./LEAKAGE THROUGH LAYER 2	0.000002	0.007	0.00
CHANGE IN WATER STORAGE	0.484	1756.549	2.70
SOIL WATER AT START OF YEAR	7.624	27674.785	
SOIL WATER AT END OF YEAR	8.108	29431.334	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.31	0.00	0.62	0.20	2.87	4.91

	1.98	5.90	2.89	1.19	0.00	0.34
RUNOFF	0.000	0.000	0.000	0.000	0.011	0.212
	0.000	0.540	0.203	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.416	0.409	0.666	0.533	2.351	5.479
	1.942	5.403	1.564	0.889	0.386	0.237
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.21	76992.312	100.00
RUNOFF	0.965	3501.914	4.55
EVAPOTRANSPIRATION	20.275	73598.102	95.59
PERC./LEAKAGE THROUGH LAYER 2	0.000001	0.004	0.00
CHANGE IN WATER STORAGE	-0.030	-107.719	-0.14
SOIL WATER AT START OF YEAR	8.108	29431.334	
SOIL WATER AT END OF YEAR	8.078	29323.615	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.008	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

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

PRECIPITATION	0.44	1.37	0.33	0.75	1.67	3.61
	1.52	1.34	0.74	3.50	0.03	1.38
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.261
	0.001	0.000	0.000	0.027	0.000	0.000
EVAPOTRANSPIRATION	0.371	0.791	0.874	0.583	3.043	3.132
	1.772	1.340	0.313	0.975	0.406	0.468
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.68	60548.395	100.00
RUNOFF	0.289	1048.239	1.73
EVAPOTRANSPIRATION	14.070	51074.484	84.35
PERC./LEAKAGE THROUGH LAYER 2	0.000001	0.005	0.00
CHANGE IN WATER STORAGE	2.321	8425.667	13.92
SOIL WATER AT START OF YEAR	8.078	29323.615	
SOIL WATER AT END OF YEAR	10.056	36504.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.343	1245.030	2.06
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.23	0.77	1.24	2.16	2.03	2.88
	1.95	1.29	3.46	0.03	1.11	2.17
RUNOFF	0.000	0.000	0.000	0.002	0.045	0.001
	0.180	0.000	0.131	0.000	0.011	0.321
EVAPOTRANSPIRATION	0.452	0.826	1.380	2.310	4.778	2.865
	1.784	1.166	3.196	0.287	0.282	0.832
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.32	70131.609	100.00
RUNOFF	0.690	2506.017	3.57
EVAPOTRANSPIRATION	20.158	73172.891	104.34
PERC./LEAKAGE THROUGH LAYER 2	0.000003	0.009	0.00
CHANGE IN WATER STORAGE	-1.528	-5547.298	-7.91
SOIL WATER AT START OF YEAR	10.056	36504.250	
SOIL WATER AT END OF YEAR	8.871	32201.984	
SNOW WATER AT START OF YEAR	0.343	1245.030	1.78
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.008	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	0.22	0.55	0.30	0.87	1.46
	3.54	4.09	2.74	0.07	1.03	0.44
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.101	0.204	0.386	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.394	0.583	0.729	0.642	1.894	1.645
	3.443	3.886	0.240	0.989	0.566	0.226
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.97	57971.098	100.00
RUNOFF	0.691	2506.569	4.32
EVAPOTRANSPIRATION	15.239	55317.992	95.42
PERC./LEAKAGE THROUGH LAYER 2	0.000004	0.015	0.00
CHANGE IN WATER STORAGE	0.040	146.536	0.25
SOIL WATER AT START OF YEAR	8.871	32201.984	
SOIL WATER AT END OF YEAR	8.911	32348.520	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.85	0.00	1.09	0.52	6.08	2.33
	2.27	0.24	1.72	1.44	0.14	1.94
RUNOFF	0.000	0.000	0.005	0.000	0.421	0.000
	0.000	0.000	0.000	0.058	0.000	0.000
EVAPOTRANSPIRATION	0.424	0.545	0.873	0.935	5.829	2.944
	2.802	0.474	1.622	0.817	0.376	1.033
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.62	67590.586	100.00
RUNOFF	0.484	1756.873	2.60
EVAPOTRANSPIRATION	18.673	67784.078	100.29
PERC./LEAKAGE THROUGH LAYER 2	0.000004	0.013	0.00
CHANGE IN WATER STORAGE	-0.537	-1950.382	-2.89
SOIL WATER AT START OF YEAR	8.911	32348.520	
SOIL WATER AT END OF YEAR	8.374	30398.139	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 11

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.21	0.00	1.70	0.54	4.14	1.85
	4.04	3.36	2.38	2.23	1.57	1.22
RUNOFF	0.000	0.000	0.000	0.000	0.041	0.000
	0.022	0.000	0.126	0.035	0.114	0.000
EVAPOTRANSPIRATION	0.358	0.465	0.626	1.410	4.843	1.901
	4.147	3.339	0.504	1.336	0.670	0.853
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.24	84361.203	100.00
RUNOFF	0.338	1227.846	1.46
EVAPOTRANSPIRATION	20.452	74241.453	88.00
PERC./LEAKAGE THROUGH LAYER 2	0.000004	0.013	0.00
CHANGE IN WATER STORAGE	2.450	8891.897	10.54
SOIL WATER AT START OF YEAR	8.374	30398.139	
SOIL WATER AT END OF YEAR	10.544	38272.949	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.280	1017.085	1.21
ANNUAL WATER BUDGET BALANCE	0.0000	-0.002	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 12

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.82	0.00	0.05	1.66	3.48	2.69
	2.28	1.05	2.56	1.39	0.49	0.22
RUNOFF	0.051	0.000	0.000	0.005	0.158	0.179
	0.002	0.000	0.039	0.051	0.000	0.000
EVAPOTRANSPIRATION	0.914	0.398	0.723	1.328	6.045	2.554
	2.275	1.052	1.409	1.067	0.487	0.313
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.69	60584.707	100.00
RUNOFF	0.484	1755.455	2.90
EVAPOTRANSPIRATION	18.565	67392.609	111.24
PERC./LEAKAGE THROUGH LAYER 2	0.000004	0.014	0.00
CHANGE IN WATER STORAGE	-2.359	-8563.349	-14.13
SOIL WATER AT START OF YEAR	10.544	38272.949	
SOIL WATER AT END OF YEAR	8.465	30726.687	
SNOW WATER AT START OF YEAR	0.280	1017.085	1.68
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.019	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 13

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	0.69	0.54	1.27	8.39	1.41
	1.20	2.03	3.28	1.81	0.60	0.01
RUNOFF	0.000	0.000	0.000	0.000	1.338	0.000
	0.000	0.000	0.169	0.014	0.000	0.000
EVAPOTRANSPIRATION	0.488	0.317	0.712	1.181	5.367	4.420
	1.248	1.797	3.385	0.509	0.592	0.230
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.60	78408.000	100.00
RUNOFF	1.520	5518.537	7.04
EVAPOTRANSPIRATION	20.246	73492.648	93.73
PERC./LEAKAGE THROUGH LAYER 2	0.000010	0.037	0.00
CHANGE IN WATER STORAGE	-0.166	-603.249	-0.77
SOIL WATER AT START OF YEAR	8.465	30726.687	
SOIL WATER AT END OF YEAR	8.298	30123.437	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 14

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.48	0.88	0.51	0.63	5.54	0.78
	0.80	2.08	0.20	0.00	0.78	0.29
RUNOFF	0.000	0.000	0.000	0.000	0.497	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.565	0.642	0.769	0.609	4.649	2.204
	0.346	2.540	0.206	0.000	0.169	0.260
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.97	47081.109	100.00
RUNOFF	0.497	1803.769	3.83
EVAPOTRANSPIRATION	12.960	47045.062	99.92
PERC./LEAKAGE THROUGH LAYER 2	0.000003	0.012	0.00
CHANGE IN WATER STORAGE	-0.487	-1767.737	-3.75
SOIL WATER AT START OF YEAR	8.298	30123.437	
SOIL WATER AT END OF YEAR	7.811	28355.701	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 15

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	0.82	0.65	0.74	3.63	3.78
	1.33	1.98	0.86	0.08	0.63	0.79
RUNOFF	0.000	0.000	0.000	0.000	0.247	0.172
	0.002	0.001	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.358	0.457	0.704	0.754	4.292	3.691
	1.331	1.976	0.772	0.170	0.281	0.264
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.72	57063.609	100.00
RUNOFF	0.422	1530.537	2.68
EVAPOTRANSPIRATION	15.050	54630.027	95.74
PERC./LEAKAGE THROUGH LAYER 2	0.000012	0.042	0.00
CHANGE IN WATER STORAGE	0.249	903.001	1.58
SOIL WATER AT START OF YEAR	7.811	28355.701	
SOIL WATER AT END OF YEAR	8.060	29258.701	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 16

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.15	0.00	1.21	1.00	1.04	5.81
	2.45	3.51	0.60	2.89	0.00	0.04
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.274
	0.080	0.193	0.000	0.331	0.000	0.000
EVAPOTRANSPIRATION	0.252	0.104	0.587	1.152	2.181	4.106
	3.798	3.316	0.600	0.461	0.393	0.245
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.70	67881.008	100.00
RUNOFF	0.879	3189.134	4.70
EVAPOTRANSPIRATION	17.195	62419.395	91.95
PERC./LEAKAGE THROUGH LAYER 2	0.000007	0.026	0.00
CHANGE IN WATER STORAGE	0.626	2272.447	3.35
SOIL WATER AT START OF YEAR	8.060	29258.701	
SOIL WATER AT END OF YEAR	8.686	31531.148	

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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 17

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.29	0.24	0.38	0.11	2.97	1.80
	0.44	1.73	1.84	0.71	0.34	0.77
RUNOFF	0.000	0.000	0.000	0.000	0.109	0.000
	0.000	0.006	0.097	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.786	0.570	0.529	0.487	2.423	3.370
	0.456	1.722	1.460	0.680	0.267	0.389
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.62	45810.613	100.00
RUNOFF	0.213	771.468	1.68
EVAPOTRANSPIRATION	13.137	47686.590	104.10
PERC./LEAKAGE THROUGH LAYER 2	0.000006	0.023	0.00
CHANGE IN WATER STORAGE	-0.729	-2647.487	-5.78
SOIL WATER AT START OF YEAR	8.686	31531.148	

SOIL WATER AT END OF YEAR	7.957	28883.662	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 18

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.12	0.34	1.30	0.54	3.83	2.88
	0.25	5.35	0.01	0.38	2.13	0.11
RUNOFF	0.000	0.000	0.000	0.000	0.068	0.000
	0.000	0.302	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.303	0.428	0.926	0.650	3.986	3.415
	0.253	3.507	1.550	0.209	0.559	0.242
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.24	62581.184	100.00
RUNOFF	0.370	1343.078	2.15
EVAPOTRANSPIRATION	16.027	58179.609	92.97
PERC./LEAKAGE THROUGH LAYER 2	0.000014	0.050	0.00
CHANGE IN WATER STORAGE	0.843	3058.473	4.89

SOIL WATER AT START OF YEAR	7.957	28883.662	
SOIL WATER AT END OF YEAR	8.799	31942.135	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 19

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.03	0.04	0.46	1.84	2.42	7.17
	3.14	2.81	0.50	2.35	1.47	0.34
RUNOFF	0.000	0.000	0.000	0.202	0.000	1.655
	0.027	0.017	0.000	0.026	0.048	0.000
EVAPOTRANSPIRATION	0.270	0.415	0.432	1.369	3.712	5.390
	3.229	2.718	0.582	1.123	0.557	0.397
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	22.57	81929.086	100.00
RUNOFF	1.977	7175.656	8.76
EVAPOTRANSPIRATION	20.195	73308.594	89.48
PERC./LEAKAGE THROUGH LAYER 2	0.000008	0.030	0.00

CHANGE IN WATER STORAGE	0.398	1444.777	1.76
SOIL WATER AT START OF YEAR	8.799	31942.135	
SOIL WATER AT END OF YEAR	9.197	33386.910	
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	0.025	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.47	0.35	0.79	0.80	0.51	1.70
	3.70	2.71	1.06	0.00	0.34	0.18
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.004
	0.061	0.075	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.595	0.596	0.882	1.134	1.721	1.416
	3.918	2.636	0.902	0.149	0.245	0.189
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.61	45774.305	100.00
RUNOFF	0.140	509.069	1.11
EVAPOTRANSPIRATION	14.382	52208.074	114.06

PERC./LEAKAGE THROUGH LAYER 2	0.000017	0.062	0.00
CHANGE IN WATER STORAGE	-1.913	-6942.878	-15.17
SOIL WATER AT START OF YEAR	9.197	33386.910	
SOIL WATER AT END OF YEAR	7.285	26444.033	
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

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.42	0.39	0.87	1.00	2.92	2.87
	2.32	2.80	1.63	1.24	0.69	0.62
STD. DEVIATIONS	0.32	0.39	0.59	0.83	2.02	1.63
	1.24	1.51	1.25	1.11	0.58	0.63
RUNOFF						
TOTALS	0.003	0.000	0.001	0.028	0.162	0.153
	0.036	0.076	0.075	0.030	0.010	0.016
STD. DEVIATIONS	0.011	0.000	0.002	0.086	0.312	0.367
	0.056	0.139	0.119	0.074	0.027	0.072
EVAPOTRANSPIRATION						
TOTALS	0.422	0.481	0.791	1.066	3.530	3.123
	2.353	2.558	1.373	0.668	0.408	0.384
STD. DEVIATIONS	0.206	0.193	0.297	0.519	1.506	1.232
	1.262	1.219	1.062	0.411	0.168	0.247
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0000	0.0000	0.0001	0.0002	0.0006	0.0001

	0.0002	0.0001	0.0001	0.0000	0.0000	0.0001
STD. DEVIATIONS	0.0000	0.0001	0.0002	0.0006	0.0022	0.0002
	0.0005	0.0005	0.0004	0.0002	0.0000	0.0003

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.78 (3.249)	64528.7	100.00
RUNOFF	0.590 (0.4712)	2141.87	3.319
EVAPOTRANSPIRATION	17.157 (2.7821)	62280.94	96.517
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.00153 (0.00449)	5.536	0.00858
CHANGE IN WATER STORAGE	0.028 (1.3523)	100.35	0.156

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 20

	(INCHES)	(CU. FT.)
PRECIPITATION	3.66	13285.801
RUNOFF	1.273	4620.9253
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.004100	14.88400
SNOW WATER	1.05	3812.6436

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3602

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1870

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FINAL WATER STORAGE AT END OF YEAR 20

LAYER	(INCHES)	(VOL/VOL)
1	4.5827	0.1909
2	2.7021	0.2252
SNOW WATER	0.000	

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**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)        **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY           **
**                    USAE WATERWAYS EXPERIMENT STATION             **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY       **
**                                                                  **
**                                                                  **
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PRECIPITATION DATA FILE:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D4
TEMPERATURE DATA FILE:       C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D7
SOLAR RADIATION DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D13
EVAPOTRANSPIRATION DATA:     C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFC.D11
SOIL AND DESIGN DATA FILE:   C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFCD.D10
OUTPUT DATA FILE:            C:\MYDOCU~1\LANDFI~1\HELP3\Amarillo\AMFCD.OUT

TIME:  16:10     DATE:   9/13/2005

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     TITLE:  Amarillo Year 23-43, Alternate Liner with Subtitle D Cover

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

                                LAYER  1
                                --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER   0
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4640 VOL/VOL
          FIELD CAPACITY               =      0.3100 VOL/VOL
          WILTING POINT                =      0.1870 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.1870 VOL/VOL
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EFFECTIVE SAT. HYD. COND.    =  0.999999975000E-05 CM/SEC


                          LAYER  2
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              TYPE 4 - FLEXIBLE MEMBRANE LINER
                MATERIAL TEXTURE NUMBER  35
THICKNESS                     =      0.06   INCHES
POROSITY                      =      0.0000 VOL/VOL
FIELD CAPACITY                =      0.0000 VOL/VOL
WILTING POINT                 =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY           =      4.00   HOLES/ACRE
FML INSTALLATION DEFECTS      =      4.00   HOLES/ACRE
FML PLACEMENT QUALITY         =  3 - GOOD



                          LAYER  3
                          --------

              TYPE 3 - BARRIER SOIL LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                     =     18.00   INCHES
POROSITY                      =      0.4610 VOL/VOL
FIELD CAPACITY                =      0.3600 VOL/VOL
WILTING POINT                 =      0.2030 VOL/VOL
INITIAL SOIL WATER CONTENT    =      0.4610 VOL/VOL
EFFECTIVE SAT. HYD. COND.     =  0.999999975000E-05 CM/SEC



          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
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 NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER             =     81.30
FRACTION OF AREA ALLOWING RUNOFF    =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
EVAPORATIVE ZONE DEPTH              =     12.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE   =      2.244  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE  =      5.568  INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.244  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =     10.542  INCHES
TOTAL INITIAL WATER                 =     10.542  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
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EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
AMARILLO TEXAS

STATION LATITUDE	=	35.23	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	95	
END OF GROWING SEASON (JULIAN DATE)	=	303	
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	13.70	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	55.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	52.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	57.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	57.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.57	0.87	1.08	2.79	3.50
2.70	2.95	1.72	1.39	0.58	0.49

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
35.40	39.60	46.40	56.50	65.50	74.90
78.60	77.00	69.70	59.20	45.40	38.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR AMARILLO TEXAS
AND STATION LATITUDE = 35.23 DEGREES

MONTHLY TOTALS (IN INCHES) FOR YEAR 1

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.36	0.33	1.54	0.04	0.17	1.45
	3.07	3.27	0.70	1.89	0.96	0.97
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.015	0.000
EVAPOTRANSPIRATION	0.101	0.218	1.309	0.641	0.138	1.482
	2.725	3.615	0.642	1.266	0.721	0.643
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.504	100.00
RUNOFF	0.015	54.208	0.10
EVAPOTRANSPIRATION	13.503	49015.168	91.54
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	1.232	4473.113	8.35

SOIL WATER AT START OF YEAR	10.542	38267.461	
SOIL WATER AT END OF YEAR	11.774	42740.574	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 2

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.06	0.71	2.12	0.81	2.69	2.84
	1.34	3.67	4.33	2.82	0.79	0.19
RUNOFF	0.000	0.000	0.000	0.000	0.007	0.040
	0.000	0.000	0.128	0.026	0.000	0.000
EVAPOTRANSPIRATION	0.380	0.573	1.735	1.905	3.022	2.787
	1.352	3.075	4.334	1.207	1.309	0.679
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0036	0.0056

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	1.100	1.682
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.001	0.436	0.029

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	22.37	81203.117	100.00
RUNOFF	0.202	732.137	0.90
EVAPOTRANSPIRATION	22.358	81159.812	99.95
PERC./LEAKAGE THROUGH LAYER 3	0.009221	33.471	0.04
AVG. HEAD ON TOP OF LAYER 2	0.2319		
CHANGE IN WATER STORAGE	-0.199	-722.333	-0.89
SOIL WATER AT START OF YEAR	11.774	42740.574	
SOIL WATER AT END OF YEAR	11.575	42018.242	
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	0.033	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 3

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	0.12	0.48	3.49	1.14	1.67
	4.18	4.76	0.55	0.02	0.00	0.23
RUNOFF	0.000	0.000	0.000	0.171	0.000	0.021
	0.038	0.009	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.343	0.239	0.233	2.962	2.671	1.697
	4.102	3.920	1.364	0.078	0.000	0.211
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0053	0.0045	0.0048	0.0072	0.0044	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	1.580	1.496	1.424	2.344	1.410	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.029	0.021	0.021	1.385	1.727	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.07	61964.113	100.00
RUNOFF	0.238	865.224	1.40
EVAPOTRANSPIRATION	17.820	64685.074	104.39
PERC./LEAKAGE THROUGH LAYER 3	0.026228	95.208	0.15
AVG. HEAD ON TOP OF LAYER 2	0.6877		
CHANGE IN WATER STORAGE	-1.014	-3681.374	-5.94
SOIL WATER AT START OF YEAR	11.575	42018.242	
SOIL WATER AT END OF YEAR	10.561	38336.871	
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	-0.021	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 4

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

PRECIPITATION	0.07	0.30	1.78	1.61	2.84	2.20
	4.21	1.23	1.57	0.75	0.39	0.69
RUNOFF	0.000	0.000	0.000	0.006	0.047	0.217
	0.050	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.079	0.102	0.977	2.060	1.755	3.576
	3.814	1.418	1.482	0.943	0.214	0.364
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.64	64033.211	100.00
RUNOFF	0.320	1161.471	1.81
EVAPOTRANSPIRATION	16.784	60925.098	95.15
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.536	1946.633	3.04
SOIL WATER AT START OF YEAR	10.561	38336.871	
SOIL WATER AT END OF YEAR	11.097	40283.504	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.67	0.68	0.13	1.05	2.06	4.11
	2.80	3.58	0.56	1.31	0.99	0.00
RUNOFF	0.000	0.012	0.000	0.000	0.000	0.022
	0.000	0.036	0.000	0.005	0.000	0.000
EVAPOTRANSPIRATION	0.684	0.572	0.489	0.574	2.360	4.522
	2.818	2.592	1.416	0.649	0.550	0.222
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.94	65122.203	100.00
RUNOFF	0.075	271.996	0.42

EVAPOTRANSPIRATION	17.446	63329.434	97.25
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.419	1520.754	2.34
SOIL WATER AT START OF YEAR	11.097	40283.504	
SOIL WATER AT END OF YEAR	11.516	41804.258	
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	0.018	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 6

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.31	0.00	0.62	0.20	2.87	4.91
	1.98	5.90	2.89	1.19	0.00	0.34
RUNOFF	0.000	0.000	0.000	0.000	0.002	0.060
	0.000	0.252	0.021	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.450	0.486	0.686	0.462	2.177	5.561
	1.972	5.657	1.589	1.096	0.459	0.254
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.21	76992.312	100.00
RUNOFF	0.335	1217.580	1.58
EVAPOTRANSPIRATION	20.847	75676.031	98.29
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.027	98.687	0.13
SOIL WATER AT START OF YEAR	11.516	41804.258	
SOIL WATER AT END OF YEAR	11.544	41902.941	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 7

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.44	1.37	0.33	0.75	1.67	3.61
	1.52	1.34	0.74	3.50	0.03	1.38
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.176
	0.000	0.000	0.000	0.028	0.000	0.000

EVAPOTRANSPIRATION	0.397	0.861	0.977	0.633	2.690	3.355
	1.603	1.340	0.336	1.085	0.915	0.532
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0010	0.0181	0.0166

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.293	6.313	5.541
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.482	0.870	0.160

ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.68	60548.395	100.00
RUNOFF	0.203	737.485	1.22
EVAPOTRANSPIRATION	14.724	53448.309	88.27
PERC./LEAKAGE THROUGH LAYER 3	0.035782	129.890	0.21
AVG. HEAD ON TOP OF LAYER 2	1.0122		
CHANGE IN WATER STORAGE	1.717	6232.704	10.29
SOIL WATER AT START OF YEAR	11.544	41902.941	
SOIL WATER AT END OF YEAR	12.918	46890.617	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.343	1245.030	2.06
ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 8

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.23	0.77	1.24	2.16	2.03	2.88
	1.95	1.29	3.46	0.03	1.11	2.17
RUNOFF	0.000	0.000	0.000	0.000	0.001	0.000
	0.023	0.000	0.008	0.000	0.000	0.290
EVAPOTRANSPIRATION	1.180	0.368	1.306	2.337	3.903	2.876
	1.931	1.154	3.337	0.281	0.849	1.209
PERCOLATION/LEAKAGE THROUGH	0.0145	0.0123	0.0113	0.0103	0.0047	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	4.771	4.300	3.646	3.424	1.471	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.232	0.129	0.232	0.150	1.339	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	19.32	70131.609	100.00
RUNOFF	0.322	1167.856	1.67
EVAPOTRANSPIRATION	20.732	75255.773	107.31
PERC./LEAKAGE THROUGH LAYER 3	0.053089	192.714	0.27
AVG. HEAD ON TOP OF LAYER 2	1.4676		

CHANGE IN WATER STORAGE	-1.786	-6484.722	-9.25
SOIL WATER AT START OF YEAR	12.918	46890.617	
SOIL WATER AT END OF YEAR	11.474	41650.926	
SNOW WATER AT START OF YEAR	0.343	1245.030	1.78
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.011	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 9

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.66	0.22	0.55	0.30	0.87	1.46
	3.54	4.09	2.74	0.07	1.03	0.44
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.006
	0.032	0.019	0.272	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.845	0.310	0.460	0.469	1.286	1.613
	3.510	4.071	0.252	1.222	0.607	0.908
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0020	0.0045	0.0042

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.575	1.366	1.229
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.444	0.057	0.062

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.97	57971.098	100.00
RUNOFF	0.329	1192.562	2.06
EVAPOTRANSPIRATION	15.555	56463.137	97.40
PERC./LEAKAGE THROUGH LAYER 3	0.010691	38.809	0.07
AVG. HEAD ON TOP OF LAYER 2	0.2641		
CHANGE IN WATER STORAGE	0.076	276.584	0.48
SOIL WATER AT START OF YEAR	11.474	41650.926	
SOIL WATER AT END OF YEAR	11.550	41927.508	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.008	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.85	0.00	1.09	0.52	6.08	2.33
	2.27	0.24	1.72	1.44	0.14	1.94
RUNOFF	0.000	0.000	0.000	0.000	0.463	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.409	0.234	1.048	0.642	5.640	2.645
	2.910	0.383	1.626	1.424	0.145	1.223
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0038	0.0032	0.0032	0.0024	0.0008	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	1.107	1.022	0.918	0.688	0.223	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.030	0.020	0.078	0.040	0.256	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.62	67590.586	100.00
RUNOFF	0.463	1682.463	2.49
EVAPOTRANSPIRATION	18.330	66536.969	98.44
PERC./LEAKAGE THROUGH LAYER 3	0.013463	48.870	0.07
AVG. HEAD ON TOP OF LAYER 2	0.3298		
CHANGE IN WATER STORAGE	-0.187	-677.693	-1.00
SOIL WATER AT START OF YEAR	11.550	41927.508	
SOIL WATER AT END OF YEAR	11.364	41249.816	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 11

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.21	0.00	1.70	0.54	4.14	1.85
	4.04	3.36	2.38	2.23	1.57	1.22
RUNOFF	0.000	0.000	0.001	0.000	0.000	0.028
	0.008	0.000	0.086	0.001	0.005	0.000
EVAPOTRANSPIRATION	0.454	0.235	0.417	1.500	4.669	1.901
	4.089	3.350	0.486	1.642	1.086	1.660
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0011	0.0129	0.0189

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.338	4.360	6.355
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.872	0.352	0.553

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	23.24	84361.203	100.00
RUNOFF	0.129	468.938	0.56
EVAPOTRANSPIRATION	21.488	78001.898	92.46
PERC./LEAKAGE THROUGH LAYER 3	0.032855	119.265	0.14
AVG. HEAD ON TOP OF LAYER 2	0.9211		
CHANGE IN WATER STORAGE	1.590	5771.109	6.84
SOIL WATER AT START OF YEAR	11.364	41249.816	
SOIL WATER AT END OF YEAR	12.673	46003.840	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.280	1017.085	1.21
ANNUAL WATER BUDGET BALANCE	0.0000	-0.006	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 12

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.82	0.00	0.05	1.66	3.48	2.69
	2.28	1.05	2.56	1.39	0.49	0.22
RUNOFF	0.026	0.000	0.000	0.014	0.018	0.045
	0.000	0.000	0.022	0.010	0.000	0.000
EVAPOTRANSPIRATION	0.990	0.220	0.294	1.516	5.261	2.666
	2.279	1.050	1.924	1.549	0.437	0.331
PERCOLATION/LEAKAGE THROUGH	0.0123	0.0110	0.0158	0.0148	0.0070	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	4.020	3.818	5.250	5.049	2.268	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	1.843	1.697	0.098	0.277	2.111	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	16.69	60584.707	100.00

RUNOFF	0.136	491.981	0.81
EVAPOTRANSPIRATION	18.517	67217.789	110.95
PERC./LEAKAGE THROUGH LAYER 3	0.060768	220.589	0.36
AVG. HEAD ON TOP OF LAYER 2	1.7004		
CHANGE IN WATER STORAGE	-2.024	-7345.681	-12.12
SOIL WATER AT START OF YEAR	12.673	46003.840	
SOIL WATER AT END OF YEAR	10.930	39675.242	
SNOW WATER AT START OF YEAR	0.280	1017.085	1.68
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.030	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 13

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.37	0.69	0.54	1.27	8.39	1.41
	1.20	2.03	3.28	1.81	0.60	0.01
RUNOFF	0.000	0.000	0.000	0.007	1.054	0.000
	0.000	0.000	0.041	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.471	0.242	0.702	1.058	5.348	4.015
	1.247	1.802	3.482	0.702	1.004	0.336
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0046	0.0034
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	1.544	1.177

TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	3.171	2.397
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	21.60	78408.000	100.00
RUNOFF	1.102	4001.093	5.10
EVAPOTRANSPIRATION	20.409	74086.055	94.49
PERC./LEAKAGE THROUGH LAYER 3	0.007990	29.005	0.04
AVG. HEAD ON TOP OF LAYER 2	0.2267		
CHANGE IN WATER STORAGE	0.080	291.857	0.37
SOIL WATER AT START OF YEAR	10.930	39675.242	
SOIL WATER AT END OF YEAR	11.010	39967.102	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 14

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.48	0.88	0.51	0.63	5.54	0.78
	0.80	2.08	0.20	0.00	0.78	0.29

RUNOFF	0.000	0.000	0.000	0.000	0.214	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.560	0.358	0.878	0.703	4.513	2.059
	0.338	2.532	0.214	0.000	0.185	0.282
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.97	47081.109	100.00
RUNOFF	0.215	778.641	1.65
EVAPOTRANSPIRATION	12.620	45812.387	97.31
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.135	490.082	1.04
SOIL WATER AT START OF YEAR	11.010	39967.102	
SOIL WATER AT END OF YEAR	11.145	40457.184	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 15

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.43	0.82	0.65	0.74	3.63	3.78
	1.33	1.98	0.86	0.08	0.63	0.79
RUNOFF	0.000	0.000	0.002	0.000	0.110	0.024
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.378	0.705	0.490	0.847	4.289	3.800
	1.337	1.977	0.863	0.080	0.309	0.290
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.228	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.381	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.72	57063.609	100.00
RUNOFF	0.136	493.710	0.87
EVAPOTRANSPIRATION	15.366	55778.809	97.75
PERC./LEAKAGE THROUGH LAYER 3	0.000800	2.903	0.01

AVG. HEAD ON TOP OF LAYER 2	0.0190		
CHANGE IN WATER STORAGE	0.217	788.170	1.38
SOIL WATER AT START OF YEAR	11.145	40457.184	
SOIL WATER AT END OF YEAR	11.362	41245.352	
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	0.016	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 16

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.15	0.00	1.21	1.00	1.04	5.81
	2.45	3.51	0.60	2.89	0.00	0.04
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.062
	0.020	0.014	0.000	0.271	0.000	0.000
EVAPOTRANSPIRATION	0.284	0.140	0.762	1.289	1.746	4.259
	3.919	3.496	0.600	0.511	0.597	0.468
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0042	0.0077

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	1.304	2.412
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.531	0.109

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.70	67881.008	100.00
RUNOFF	0.366	1329.224	1.96
EVAPOTRANSPIRATION	18.071	65599.437	96.64
PERC./LEAKAGE THROUGH LAYER 3	0.011987	43.513	0.06
AVG. HEAD ON TOP OF LAYER 2	0.3097		
CHANGE IN WATER STORAGE	0.250	908.819	1.34
SOIL WATER AT START OF YEAR	11.362	41245.352	
SOIL WATER AT END OF YEAR	11.613	42154.172	
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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MONTHLY TOTALS (IN INCHES) FOR YEAR 17

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.29	0.24	0.38	0.11	2.97	1.80
	0.44	1.73	1.84	0.71	0.34	0.77
RUNOFF	0.000	0.000	0.000	0.000	0.059	0.000
	0.000	0.000	0.012	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.747	0.281	0.454	0.378	2.489	3.417
	0.448	1.730	1.828	0.389	0.262	0.675
PERCOLATION/LEAKAGE THROUGH	0.0071	0.0060	0.0063	0.0058	0.0023	0.0000

LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	2.207	2.056	1.921	1.819	0.692	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.051	0.044	0.039	0.031	0.820	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.62	45810.613	100.00
RUNOFF	0.071	256.630	0.56
EVAPOTRANSPIRATION	13.098	47544.516	103.78
PERC./LEAKAGE THROUGH LAYER 3	0.027571	100.081	0.22
AVG. HEAD ON TOP OF LAYER 2	0.7245		
CHANGE IN WATER STORAGE	-0.576	-2090.632	-4.56
SOIL WATER AT START OF YEAR	11.613	42154.172	
SOIL WATER AT END OF YEAR	11.037	40063.539	
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

MONTHLY TOTALS (IN INCHES) FOR YEAR 18

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.12	0.34	1.30	0.54	3.83	2.88
	0.25	5.35	0.01	0.38	2.13	0.11
RUNOFF	0.000	0.000	0.000	0.000	0.002	0.000
	0.000	0.128	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.493	0.443	0.736	0.556	4.108	3.166
	0.251	3.823	1.409	0.209	0.766	0.602
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.24	62581.184	100.00
RUNOFF	0.130	470.864	0.75
EVAPOTRANSPIRATION	16.562	60119.051	96.07
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.549	1991.266	3.18
SOIL WATER AT START OF YEAR	11.037	40063.539	
SOIL WATER AT END OF YEAR	11.585	42054.809	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

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MONTHLY TOTALS (IN INCHES) FOR YEAR 19

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.03	0.04	0.46	1.84	2.42	7.17
	3.14	2.81	0.50	2.35	1.47	0.34
RUNOFF	0.000	0.000	0.000	0.085	0.000	1.417
	0.000	0.002	0.000	0.000	0.044	0.000
EVAPOTRANSPIRATION	0.479	0.288	0.315	1.617	3.050	5.725
	3.165	2.798	0.513	1.392	1.037	0.748
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.010	0.114
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.027	0.303
	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT

PRECIPITATION	22.57	81929.086	100.00
RUNOFF	1.548	5618.919	6.86
EVAPOTRANSPIRATION	21.126	76686.281	93.60
PERC./LEAKAGE THROUGH LAYER 3	0.000433	1.571	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0103		
CHANGE IN WATER STORAGE	-0.104	-377.686	-0.46
SOIL WATER AT START OF YEAR	11.585	42054.809	
SOIL WATER AT END OF YEAR	11.481	41677.121	
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

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MONTHLY TOTALS (IN INCHES) FOR YEAR 20

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.47	0.35	0.79	0.80	0.51	1.70
	3.70	2.71	1.06	0.00	0.34	0.18
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.009	0.015	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.712	0.305	0.477	1.240	1.125	1.438
	3.953	2.695	0.990	0.070	0.251	0.196
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.000	0.000	0.000	0.000	0.000	0.000
TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATION OF DAILY	0.000	0.000	0.000	0.000	0.000	0.000
HEAD ON TOP OF LAYER 2	0.000	0.000	0.000	0.000	0.000	0.000

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.61	45774.305	100.00
RUNOFF	0.025	89.103	0.19
EVAPOTRANSPIRATION	13.452	48829.883	106.68
PERC./LEAKAGE THROUGH LAYER 3	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-0.866	-3144.675	-6.87
SOIL WATER AT START OF YEAR	11.481	41677.121	
SOIL WATER AT END OF YEAR	10.615	38532.445	
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

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 20

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

TOTALS	0.42	0.39	0.87	1.00	2.92	2.87
	2.32	2.80	1.63	1.24	0.69	0.62
STD. DEVIATIONS	0.32	0.39	0.59	0.83	2.02	1.63
	1.24	1.51	1.25	1.11	0.58	0.63

RUNOFF

TOTALS	0.001	0.001	0.000	0.014	0.099	0.106
	0.009	0.024	0.029	0.017	0.003	0.015
STD. DEVIATIONS	0.006	0.003	0.000	0.041	0.251	0.314
	0.015	0.061	0.066	0.060	0.010	0.065

EVAPOTRANSPIRATION

TOTALS	0.522	0.359	0.737	1.169	3.112	3.128
	2.388	2.624	1.434	0.790	0.585	0.592
STD. DEVIATIONS	0.273	0.194	0.395	0.721	1.547	1.270
	1.300	1.289	1.133	0.556	0.366	0.398

PERCOLATION/LEAKAGE THROUGH LAYER 3

TOTALS	0.0021	0.0019	0.0021	0.0020	0.0012	0.0002
	0.0000	0.0000	0.0000	0.0002	0.0022	0.0027
STD. DEVIATIONS	0.0044	0.0038	0.0044	0.0042	0.0021	0.0008
	0.0000	0.0000	0.0000	0.0005	0.0049	0.0056

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

AVERAGES	0.6842	0.6346	0.6579	0.6661	0.3923	0.0645
	0.0000	0.0000	0.0000	0.0603	0.7221	0.8610
STD. DEVIATIONS	1.4170	1.3083	1.4283	1.4070	0.6952	0.2630
	0.0000	0.0000	0.0000	0.1552	1.6734	1.8697

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

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.78 (3.249)	64528.7	100.00

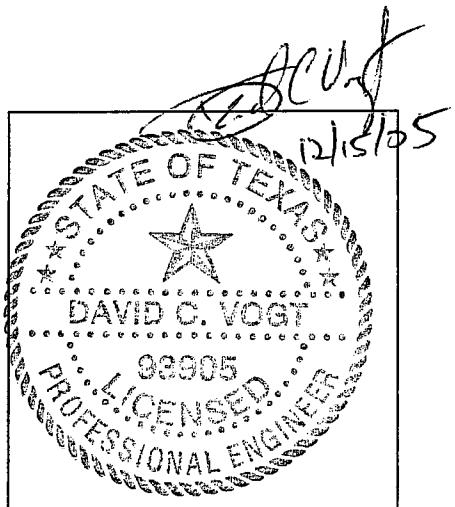
Part III – Attachment 15

Appendix 15B - Pipe and Sump Capacity, Head on Liner, and Pipe Strength Calculations

for

City of Amarillo Landfill

Potter County, Texas



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For pages i thru 7

Job No.	23358	Calc No.	III.15B.1

Computation

HDR

Project	Amarillo Landfill	Computed	DCV
System	Leachate and Contaminated Water Plan	Date	8/30/2005
Component	Leachate Collection System	Reviewed	
Task	Pipe capacity	Date	

Purpose

Using Manning's equation, calculate pipe capacity of leachate headers.

Find

Description	Variable	Units
Pipe capacity	Q	gal/day

Given

Description	Value	Source
Pipe diameter [in]	6	leachate pipe diameter
Slope [ft/ft]	0.02	design value
roughness coefficient	0.02	HDPE pipe

Solution

Description	Value	Comment
Pipe capacity	**334,239**	**gallons / day**

Assumptions

Use Manning's Equation

Equations

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$ *equation 1*

A = cross-sectional area [ft^2]
n = Manning's roughness coefficient
R = hydraulic radius [ft]
S = slope [ft/ft]
Q = flow [cfs]

Calculation

Description	Equation	Comment	Value	Verification
solve for area	$A = \pi r^2$	[SF]	0.196	
solve for perimeter	$P = \pi d$	[ft]	1.571	
solve for R	R = A / P	[ft]	0.125	
solve for Q	equation 1 above	[cfs]	0.517	
convert to gal/day	1 cfs = 646,272 gpd	[gpd]	334,239	

Job No.	23358	Calc No.	III.15B.2

Computation

HDR

Project	Amarillo Landfill	Computed	DCV
System	Leachate and Contaminated Water Plan	Date	8/30/2005
Component	Leachate Collection System	Reviewed	
Task	Leachate Sump Capacity	Date	

Purpose

Calculate the sump capacity of leachate sump.

Find

Description	Variable	Units
Sump Available Capacity	V_a	gallons
Sump Total Capacity	V_{TOT}	gallons

Given

Description	Value	Source			
Bottom Sump Area [sf]	200	Design Plans	10	x	20
Top Sump Area [sf]	1656	Design Plans	36	x	46
Sump Depth [ft]	3.5	Design Plans	42	inches	

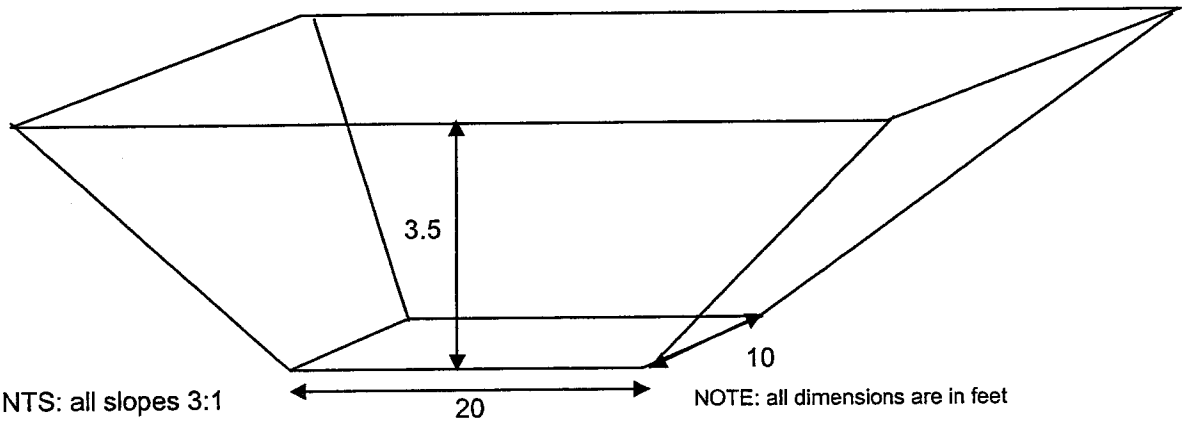
Solution

Description	Value	Comment
Sump total capacity	**7289**	[gallons] 42" deep sump

Assumptions

Use average end area to calculate volumes.

Diagram



NTS: all slopes 3:1

NOTE: all dimensions are in feet

Equations

Vol = (A1+A2)/2 x D *Equation 1* *average end area volume*

Calculation

Description	Equation	Comment	Value	Verification
Total capacity	equation 1	42 " sump	3248	cf
Convert to gallons	cf x 7.48		24295	gal
Convert with gravel porosity	assume gravel porosity	0.3	7289	gallons

Job No.	23358	Calc No.	III.15B.3

Computation

HDR

Project	Amarillo Landfill	Computed	DCV
System	Leachate and Contaminated Water Plan	Date	8/30/2005
Component	Leachate Collection System	Reviewed	
Task	Head above the liner calculation	Date	

Purpose

For a given head, calculate the transmissivity using Giroud's Equation.
Compute the Factor of Safety for the calculation.
Finally, calculate the actual head above liner using the reduced transmissivity, and the given impingement rate.

Find

Description	Variable	Units
Transmissivity	Ψ	[m^2/sec]
Factor of Safety	FS	[n/a]
Head above liner	h_{max}	[ft]

Given

Description	Value	Source
Assumed head [ft]	**1**	assumed value below regulatory maximum
Leachate length [ft]	**700**	longest leachate flow path to interceptor
Slope [ft/ft]	**0.020**	slope of liner system
α [deg]	**1.15**	angle of inclination of liner system
e, impingement rate [in/day]	**4.53E-02**	HELP runs

Solution

Description	Value	Comment
Calculated Transmissivity	**2.176E-06**	[m^2/sec]
Factor of Safety	**2.2**	
Calculated head above liner	**4.693E-01**	[ft]

Assumptions

thickness of liner (t) **0.5** [cm]

Reduction Factors

$$\sum RF = RF_{in} \times RF_{cr} \times RF_{cc} \times RF_{bc}$$

Described by Koerner (1994)

	VALUE
Where RF_{in} = elastic deformation or intrusion of geotextile into channel, 1.5-2.0	1.8
Where RF_{cr} = creep deformation of geonet/geotextile into channel, 1.4-2.0	1.6
Where RF_{cc} = chemical clogging/precipitation, 1.5-2.0	1.7
Where RF_{bc} = biological clogging, 1.5-2.0	1.7
$\sum RF =$	**8.3232**

Equations

Giroud's Equation

$$h_{max} = L\left[\frac{\sqrt{4C + \tan^2\alpha} - \tan\alpha}{2\cos\alpha}\right]$$

Conversely

$$C = \frac{\left[\left(\frac{h_{max}\,2\cos\alpha}{L} + \tan\alpha\right)\right]^2 - \tan^2\alpha}{4}$$

Job No.	23358	Calc No.	III.15B.3

Computation

Project	Amarillo Landfill	Computed	DCV
System	Leachate and Contaminated Water Plan	Date	8/30/2005
Component	Leachate Collection System	Reviewed	
Task	Head above the liner calculation	Date	

Calculation

Description	Equation	Comment	Value	Verification
cos α	n/a		1.000	
tan α	n/a		0.02	
solve for C	see converse equation above		**3.06E-05**	
solve for K	K = e/C	*in/day*	1.480E+03	
	in/day to cm/sec	*cm/sec*	**4.351E-02**	
solve for Ψ	Ψ = Kt t = thickness	cm^2/sec	2.176E-02	
unit conversion	cm^2/sec *to* m^2/sec	m^2/sec	**2.176E-06**	
Given Fabric Transmissivity		m^2/sec	0.00004	
apply Reduction Factor	use above RF	m^2/sec	4.81E-06	
Determine factor of safety	FS = reduced Ψ / calculated Ψ		**2.2**	
Solve for K	K = Ψ/ t, use reduced Ψ	*cm/sec*	0.10	
unit conversion	*cm/sec to in/day*	*in/day*	3269	
Solve for C	C = e / K e = impingement rate		1.386E-05	
Solve for h_{max}	use Giroud's equation above	*ft*	**4.693E-01**	

HDPE PIPE STRENGTH CALCULATIONS
AMARILLO LANDFILL

TABLE 1
LANDFILL CROSS SECTION

ITEM	DEPTH (in)		DENSITY (pcf)	DEPTH DENSITY
EROSION/ PROTECTIVE COVER	24	@	125	250
CLAY CAP	18	@	125	187.5
INTERMED / DAILY COVER	6	@	125	62.5
WASTE	2568	@	57	12198
PROTECTIVE COVER	24	@	125	250
P_t (psi)				90

TABLE 2
WALL CRUSHING

SDR	P_t (psi)	SA (psi)	DRISCO COMPR. STR.	PASS FAIL
11	90	449.6	**1500**	**PASS**
17	90	719.3	**1500**	**PASS**
19	90	809.3	**1500**	**FAIL**
21	90	899.2	**1500**	**FAIL**
32.5	90	1416.2	**1500**	**FAIL**

TABLE 3
WALL BUCKLING (E' = 3000 psi)

SDR	SA (psi)	E (psi)	Pc (psi)	E' (psi)	Pcb (psi)	P_t (psi)	PASS FAIL
11	450	21000	37	**3000**	265	90	**PASS**
17	719	15500	7	**3000**	119	90	**PASS**
19	809	13800	5	**3000**	95	90	**PASS**
21	899	12200	3	**3000**	77	90	**FAIL**
32.5	1416	10000	1	**3000**	36	90	**FAIL**

AMARILLO LANDFILL

TABLE 4
RING DEFLECTION (6" DIAMETER, E' = 3000 psi)

SDR	Maximum Allowable Deflection	D_L	K	PT	OD	WC	T	R	R^3	E	I	E'	DX	Maximum Allowed Deflection	PASS FAIL
11	3.0%	1	0.1	90	6.625	595.69792	0.602	3.01	27.3	**21000**	0.018	**3000**	0.302	0.199	**FAIL**
17	5.0%	1	0.1	90	6.625	595.69792	0.390	3.12	30.3	**15500**	0.005	**3000**	0.321	0.331	**PASS**
19	5.5%	1	0.1	90	6.625	595.69792	0.349	3.14	30.9	**13800**	0.004	**3000**	0.323	0.364	**PASS**
21	6.0%	1	0.1	90	6.625	595.69792	0.315	3.16	31.4	**12200**	0.003	**3000**	0.324	0.398	**PASS**
32.5	8.5%	1	0.1	90	6.625	595.69792	0.204	3.21	33.1	**10000**	0.001	**3000**	0.325	0.563	**PASS**

WHERE:

P_T = EXTERNAL PRESSURE (psi)
OD = OUTSIDE DIAMETER (in)
T = THICKNESS (in)
DX = CALCULATED DEFLECTION (in)
MAX = MAXIMUM DEFLECTION (in)
DL = deflection lag factor
K = bedding constant
Wc = Marston's load per unit length of pipe, lb/Lin

Part III – Attachment 15

Appendix 15C - Cleanout Correspondence

for

City of Amarillo Landfill

Potter County, Texas

HARBEN
High Pressure Water Technology

HARBEN INCORPORATED
POST OFFICE BOX 2250
CUMMING, GA 30130 USA

TEL: (404) 889-95
FAX: (404) 887-94
TOLL FREE: 1-800-327-JE

February 12, 1994

Ms. Lori Chapin
HDR Engineering, Inc.
12700 Hilcrest Road, Suite 125
Dallas, TX 75230-2096
214-960-4409

Dear Ms. Chapin:

In response to our conversation on 2/11/94, it is possible to clean leachate lines up to 2,000 feet in length. We have successfully cleaned in excess of 1,500 feet and foresee no problems cleaning 2,000 feet of piping.

The recommended machine to use would be Harben Century Series 825.019 water jetting machine producing 5,000 psi at 25 gpm using 2,000 feet of 1/2" hose rated at operating pressure and a pulsation system. It is recommended that you do not stop jetting once the cleaning process has started in order to prevent momentum loss. Therefore, an ample water supply would be needed at the cleaning site.

A smaller Harben unit, the 4016 DTH series, has effectively cleaned in excess of 1,000 feet; but it cannot achieve 1,500 feet. The cost comparison between these two units is approximated as follows.

4016 DTH Series	$ 30,000.00
825.019 Century Series	$ 65,000.00

Any additional technical information can be obtained by contacting our corporate office at 800-327-5387.

Sincerely,

Trae Rogers
Internal Support Engineer

ROTO-ROOTER PLUMBING SERVICE

SEWER AND DRAIN CLEANING ★ PLUMBING REPAIR

COAST TO COAST

February 9, 1994

HDR Engineering, Inc.
12700 Hillcrest
Dallas, Tx 75230-2096

Attn: Lori Chapin

Dear Ms. Chapin:

Thank you for your inquiry concerning our pipe cleaning capabilities. As I indicated in our phone conversation Roto-Rooter maintains the state of the art in pipe cleaning equipment.

The equipment most suited for the job you described at the proposed landfill would be a Hydro-Jetter. It is difficult to be totally sure how time consuming a job will be the first time it is attempted. However, I am totally confident that the 2000 feet of 6 inch pipe with two or three turns you described would be able to be cleaned with equipment that we currently have in our arsenal.

Further, I am totally sure that if it can be done that Roto-Rooter can do it. Please let me know if I can be of further assistance.

Sincerely,

Dan D. Davis
Service Manager
Roto-Rooter Fort Worth, TX

DDD/kjr

ROTO-ROOTER SERVICES • 4600 MARSALIS • FORT WORTH, TEXAS 76117 • (817) 336-5708 • FAX: (817) 831-7802

Part III – Attachment 15

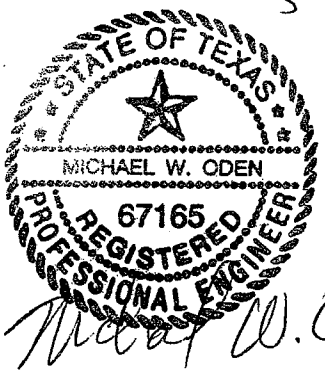
Appendix 15D - Soil Summary Report

for

City of Amarillo Landfill

Potter County, Texas

5-18-2007



Pg 1-15

SOIL SUMMARY REPORT

Cell 1			Cells 2-3			Wet Weather Area		
Test Location	Permeability (cm/s)	Thickness (in)	Test Location	Permeability (cm/s)	Thickness (in)	Test Location	Permeability (cm/s)	Thickness (in)
12	3.09E-08	30	1	3.30E-08	30	1-16	7.60E-07 **	23
13	2.81E-07	30	2	2.75E-08	30	1-22	7.50E-07 **	17
14	1.07E-08	30	3	3.00E-08	30	1-29	5.00E-07 **	15
15	4.35E-08	30	4	6.74E-08	30	1-43	9.90E-08	14
16	6.16E-09	30	5	3.63E-08	30	1-50	9.60E-07	15
17	9.49E-09	30	6	9.99E-08	30	1-69	8.50E-08	16
18	2.34E-09	30	7	4.43E-08	30	2-6	4.10E-08	17
19	2.12E-07	30	8	3.35E-08	30	2-18	1.20E-07	13
20	4.42E-09	13	9	3.60E-08	30	2-29	7.70E-07	19
21	3.65E-09	34	10	4.98E-08	30	2-36	6.20E-08	17
22	5.30E-08	30	11	6.27E-08	30	2-59	4.00E-08	20
23	2.81E-08	10	12	3.64E-08	30			
24	3.33E-08	24	13	5.24E-08	30			
25	2.30E-07	15	14	7.29E-09	30			
26	1.93E-08	30	15	2.66E-08	30			
27	4.49E-08	30	16	4.90E-08	30			
28	3.38E-07	30	17	5.86E-08	30			
29	9.74E-08	30	18	4.70E-08	30			
30	5.68E-07	30	19	3.82E-08	30			
31	5.67E-07	30	20	3.01E-08	30			
32	2.24E-08	30	21	6.33E-09	30			
33	5.68E-08	30	22	5.13E-08	30			
34	6.25E-08	30	23	6.13E-08	30			
35	9.28E-09	30	24	2.74E-08	30			
36	2.00E-07	30	25	5.50E-08	30			
37	n/a	30	26	2.16E-08	30			
37A	5.60E-08	15	27	2.92E-08	30			
38	6.21E-08	30	28	5.05E-08	30			
39	1.37E-07	30	29	5.57E-08	30			
40	3.00E-08	30	30	4.18E-08	30			
41	2.32E-07	30	31	1.01E-08	30			
42	7.98E-08	30	32	7.32E-09	30			
43	n/a	30	33	2.09E-08	30			
43A*	4.41E-08	23	34	6.50E-09	30			
44	8.05E-08	30	35	1.02E-08	30			
45	1.18E-07	30	36	4.03E-08	30			
46	3.33E-08	26	37	3.80E-08	30			
46B*	n/a	29	38	3.50E-09	30			
47	6.48E-09	30	39	5.27E-09	30			
48	1.81E-08	30	40	9.94E-09	30			
49	6.21E-07	30	41	4.55E-08	30			
			42	1.41E-08	30			
			43	5.04E-08	30			
			44	9.75E-09	30			
			45	9.26E-08	30			
			46	6.18E-08	30			
			47	1.08E-07	30			
			48	5.60E-08	30			
			49	9.68E-08	30			
			50	7.75E-08	30			
			51	7.18E-08	30			
			52	1.17E-08	30			
			53	7.94E-08	30			
			54	2.39E-08	30			
			VP1***	5.68E-08	24			
			VP2***	4.82E-08	24			
			VP3***	3.60E-08	24			
Average:	**1.17E-07**	**28**	**Average:**	**4.14E-08**	**30**	**Average:**	**3.81E-07**	**17**

Overall Average Permeability: **8.73E-08 cm/s** Overall Cell 2&3 Avg.: 9.63E-08 cm/s
Overall Average Thickness: **28 inches** (includes wet weather area)

* Grid Points 43 and 46 were sampled again due to a thin depth to trash
** These permeabilities were obtained by modified proctor and were not used in the overall average permeability calculation
*** VP1, VP2, and VP3 are permeability and thickness verification points for Cells 2 & 3

Note: Average thickness is actually greater than the 28 inches calculated since all points listed as 30 inches are actually 30+ inches.

Soil Data for Cell 1 from
Cell 1 Cap Thickness Verification Report
November 2006
By Vista Environmental Services Company

Table 1
Soil Thickness Information
Cell 1 Cap Thickness Verification
City of Amarillo MSW Landfill

Sample Location	Topsoil Thickness (in)	Infiltration Layer Thickness (in)	Total Hole Depth (in)	Sample Depth (in)
12	24	30+	46	44
13	8	30+	52	36
14	8	30+	44	29
15	8	30+	47	42
16	6	30+	40	28
17	7	30+	40	24
18	8	30+	44	29
19	7	30+	48	18
20	4	13	46	17
21	10	34	48	13
22	7	30+	50	20
23	7	10	44	22
24	6	24	24	16
25	8	15	40	30
26	8	30+	54	33
26A	8	30+	54	30
27	27	30+	66	36
28	24	30+	48	38
28A	8	30+	54	30
29	19	30+	48	25
30	11	30+	46	26
31	12	30+	38	24
32	24	30+	58	10
33	10	30+	48	28
34	8	30+	44	24
35	10	30+	44	23
36	6	30+	42	24
37	12	30+	54	40
37A	9	15	24	24
38	13	30+	44	27
39	12	30+	46	24
40	16	30+	65	40
41	10	30+	60	10
42	10	30+	37	32
43	3	24	26	DNT
43A	8	23	31	31
44	8	30+	32	26
45	6	30+	42	17
46	DNT	26	DNT	DNT
46A	24	DNT	30	DNT
46B	3	29	24	9
47	9	30+	34	32
48	10	30+	50	30
49	8	30+	52	35

DNT = Did Not Test

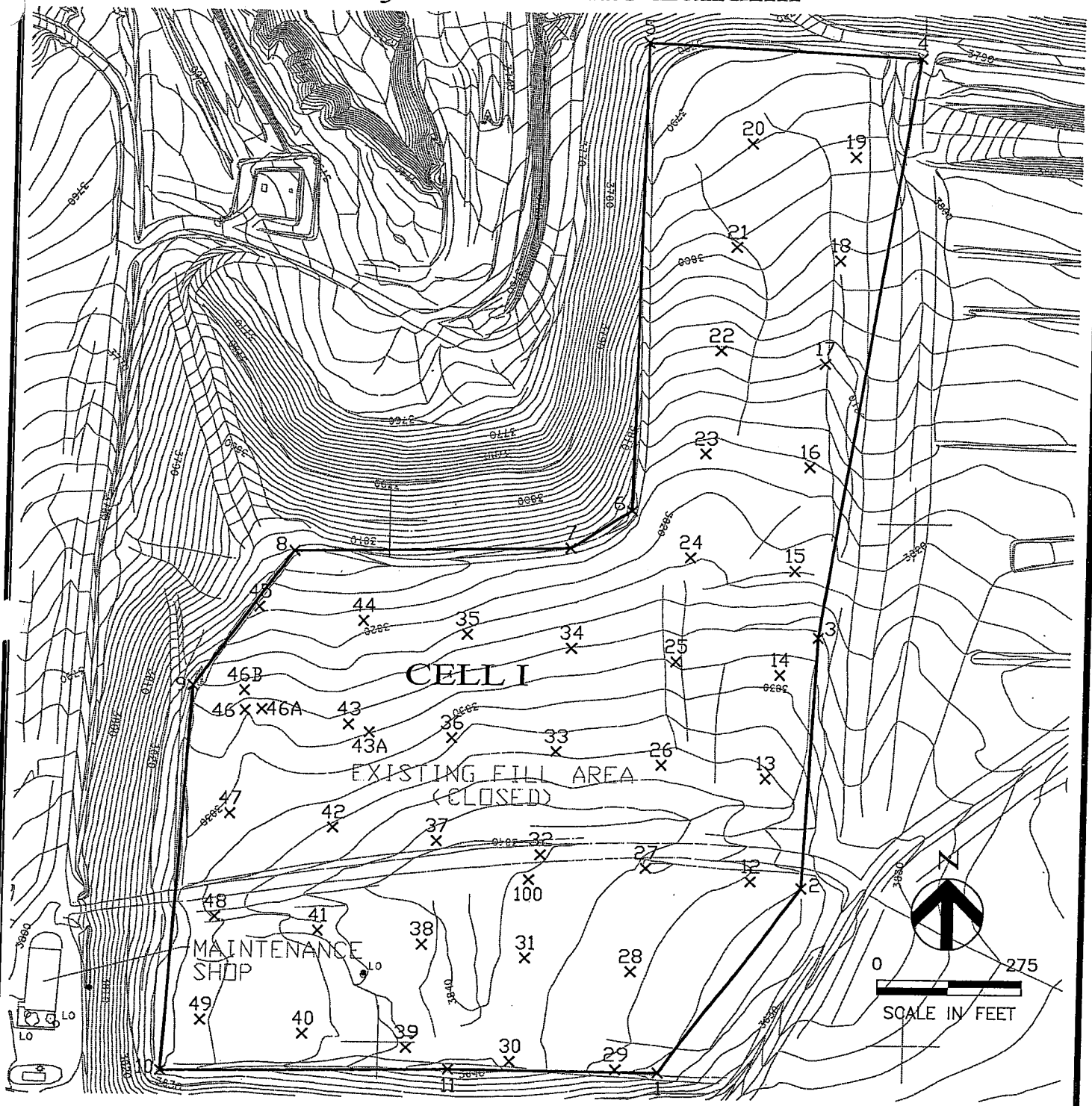
RO T CITY OF AMARILLO LANDFILL
JEN T: VISTA ENVIRONMENTAL SERVICES

LABORATORY PERMEABILITY TEST RESULTS

MPLE	LENGTH (in)	INITIAL WET WT. (g)	FINAL WET WT. (g)	FINAL DRY WT. (g)	INITIAL MOISTURE CONTENT	INITIAL WET DENSITY (LBS/CF)	INITIAL DRY DENSITY (LBS/CF)	FINAL MOISTURE CONTENT	FINAL WET DENSITY (LBS/CF)	FINAL DRY DENSITY (LBS/CF)	COEFFICIENT OF PERMEABILITY (k) cm/s	ATTEBERG LIMITS LL=LIQUID LIMIT PI=PLASTICITY IDEX
12	4.750	1039.5	1076.2	920.0	13.0%	130.7	115.7	17.0%	135.3	115.7	3.09E-08	LL=37 PI=17 #200=74%
13	5.500	1150.8	1255.6	1025.5	12.2%	125.0	111.3	22.4%	136.3	111.3	2.81E-07	LL=33 PI=15 #200=82%
14	5.250	1207.1	1248.0	1070.7	12.7%	137.3	121.8	16.6%	142.0	121.8	1.07E-08	LL=45 PI=25 #200=71%
15	4.875	993.5	1034.7	861.0	15.4%	121.7	105.5	20.2%	126.7	105.5	4.35E-08	LL=38 PI=31 #200=62%
16	5.125	1218.1	1229.8	1068.8	14.0%	141.9	124.5	15.1%	143.3	124.5	6.16E-09	LL=37 PI=17 #200=81%
17	3.750	817.8	841.7	730.5	12.0%	130.2	116.3	15.2%	134.0	116.3	9.49E-09	LL=31 PI=14 #200=81%
18	6.000	1256.7	1301.6	1109.3	13.3%	125.1	110.4	17.3%	129.5	110.4	2.34E-09	LL=40 PI=21 #200=67%
19	4.000	831.5	871.5	721.4	15.3%	124.1	107.7	20.8%	130.1	107.7	2.12E-07	LL=37 PI=18 #200=69%
20	3.500	770.6	778.5	659.6	16.8%	131.5	112.5	18.0%	132.8	112.5	4.42E-09	LL=32 PI=14 #200=81%
21	5.000	1193.4	1217.2	1055.0	13.1%	142.5	126.0	15.4%	145.4	126.0	3.65E-09	LL=43 PI=23 #200=92%
22	5.000	1042.3	1065.0	891.5	16.9%	124.5	106.5	19.5%	127.2	106.5	5.30E-08	LL=35 PI=14 #200=78%
23	4.250	957.4	967.6	806.6	18.7%	134.5	113.3	20.0%	136.0	113.3	2.81E-08	LL=33 PI=16 #200=84%
24	3.250	721.3	732.3	631.8	14.2%	132.5	116.1	15.9%	134.6	116.1	3.33E-08	LL=37 PI=19 #200=63%
25	5.000	865.2	901.5	754.3	14.7%	103.3	90.1	19.5%	107.7	90.1	2.30E-07	LL=43 PI=22 #200=82%
26	4.000	633.6	710.5	566.7	11.8%	94.6	84.6	25.4%	106.1	84.6	1.93E-08	LL=37 PI=19 #200=70%
27	4.750	869.0	933.9	776.0	12.0%	109.3	97.6	20.3%	117.4	97.6	4.49E-08	LL=31 PI=11 #200=78%
28	4.150	853.3	887.2	725.6	17.6%	122.8	104.4	22.3%	127.7	104.4	3.38E-07	LL=37 PI=19 #200=72%
29	5.000	893.2	907.8	764.3	16.9%	106.7	91.3	18.8%	108.4	91.3	9.74E-08	LL=34 PI=16 #200=80%
30	5.875	1183.0	1210.5	999.9	18.3%	120.2	101.6	21.1%	123.0	101.6	5.68E-07	LL=35 PI=15 #200=83%
31	5.750	1229.8	1273.5	1072.8	14.6%	127.7	111.4	18.7%	132.3	111.4	5.67E-07	LL=31 PI=11 #200=78%
32	5.125	1113.0	1148.5	982.5	13.3%	129.7	114.5	16.9%	133.8	114.5	2.24E-08	LL=35 PI=16 #200=51%
33	5.125	1151.7	1179.9	991.6	16.1%	134.2	115.5	19.0%	137.5	115.5	5.68E-08	LL=29 PI=13 #200=81%
34	3.500	784.4	847.5	715.4	9.6%	133.8	122.1	18.5%	144.6	122.1	6.25E-08	LL=30 PI=13 #200=85%
35	4.000	757.0	841.4	685.5	10.4%	113.0	102.3	22.7%	125.6	102.3	9.28E-09	LL=36 PI=15 #200=81%
36	5.500	1087.8	1122.6	919.5	18.3%	118.1	99.8	22.1%	121.9	99.8	2.00E-07	LL=31 PI=14 #200=78%
37	3.500	649.3	696.2	574.3	13.1%	110.8	98.0	21.2%	118.8	98.0	5.60E-08	LL=35 PI=18 #200=76%
38	4.000	871.1	892.0	751.4	15.9%	130.1	112.2	18.7%	133.2	112.2	6.21E-08	LL=29 PI=12 #200=77%
39	5.750	1165.1	1202.5	976.1	19.4%	121.0	101.4	23.2%	124.9	101.4	1.37E-07	LL=32 PI=12 #200=81%
40	5.125	1043.3	1086.5	914.8	14.0%	121.6	106.6	18.8%	126.6	106.6	3.00E-08	LL=35 PI=17 #200=88%

SAMPLE ID	LENGTH (in)	INITIAL WET WT. (g)	FINAL WET WT. (g)	FINAL DRY WT. (g)	INITIAL MOISTURE CONTENT	INITIAL WET DENSITY (LBS/CF)	INITIAL DRY DENSITY (LBS/CF)	FINAL MOISTURE CONTENT	FINAL WET DENSITY (LBS/CF)	FINAL DRY DENSITY (LBS/CF)	COEFFICIENT OF PERMEABILITY (k) cm/s	ATTEBERG LIMITS LL=LIQUID LIMIT PI=PLASTICITY IDEX
41	5.500	1150.0	1178.6	976.1	17.8%	124.9	106.0	20.7%	128.0	106.0	2.32E-07	LL=35 PI=16 #200=74%
42	4.615	954.0	961.1	777.9	23.6%	123.4	99.9	24.5%	124.4	99.9	7.98E-08	LL=33 PI=15 #200=79%
43	4.625	1055.5	1080.7	935.4	12.8%	136.3	120.8	15.5%	139.5	120.8	4.41E-08	LL=38 PI=18 #200=84%
44	5.000	1090.9	1103.0	918.2	18.8%	130.3	109.7	20.1%	131.7	109.7	8.05E-08	LL=35 PI=17 #200=58%
45	4.500	1035.6	1055.8	873.1	18.6%	137.4	115.9	20.9%	140.1	115.9	1.18E-07	LL=34 PI=15 #200=82%
46	5.000	1056.7	1093.7	919.7	14.9%	126.2	109.8	18.9%	130.6	109.8	3.33E-08	LL=38 PI=19 #200=81%
47	4.250	1002.1	1029.5	896.3	11.8%	140.8	125.9	14.9%	144.7	125.9	6.48E-09	LL=35 PI=19 #200=79%
48	5.500	1295.1	1319.4	1171.0	10.6%	140.6	127.1	12.7%	143.3	127.1	1.81E-08	LL=40 PI=23 #200=82%
49	5.750	1020.3	1115.2	915.2	11.5%	106.0	95.1	21.9%	115.8	95.1	6.21E-07	LL=35 PI=16 #200=84%

FIGURE 3
SOIL SAMPLE LOCATION MAP
City Of Amarillo Landfill



VISTA Environmental Services Company
410 4th Avenue — Phone: 806.655.8461
Lubbock, Texas 79015 — Fax: 806.655.5605

Hagar, Brown & Dorsey, LLC.
LAND SURVEYORS

P.O. Box 1248
Hereford, Texas 79045
(806) 364-6084
(806) 364-6088 FAX

Sheet 1 of 1
Drawn By: James W. Adams
File: A5313.dwg

4713 S. Western St.
Amarillo, Texas 79109
(806) 352-8040
(806) 352-1008 FAX

November 30, 2006 – Z:\AMA_HBD_JOBS\5000_JOBS\A5313\A5313_...

Soil Data for Cells 2 & 3 from
Cap Verification Report (Report No. 3350)
March 1999
By Dyess-Peterson Testing Laboratory, Inc.

TABLE 1

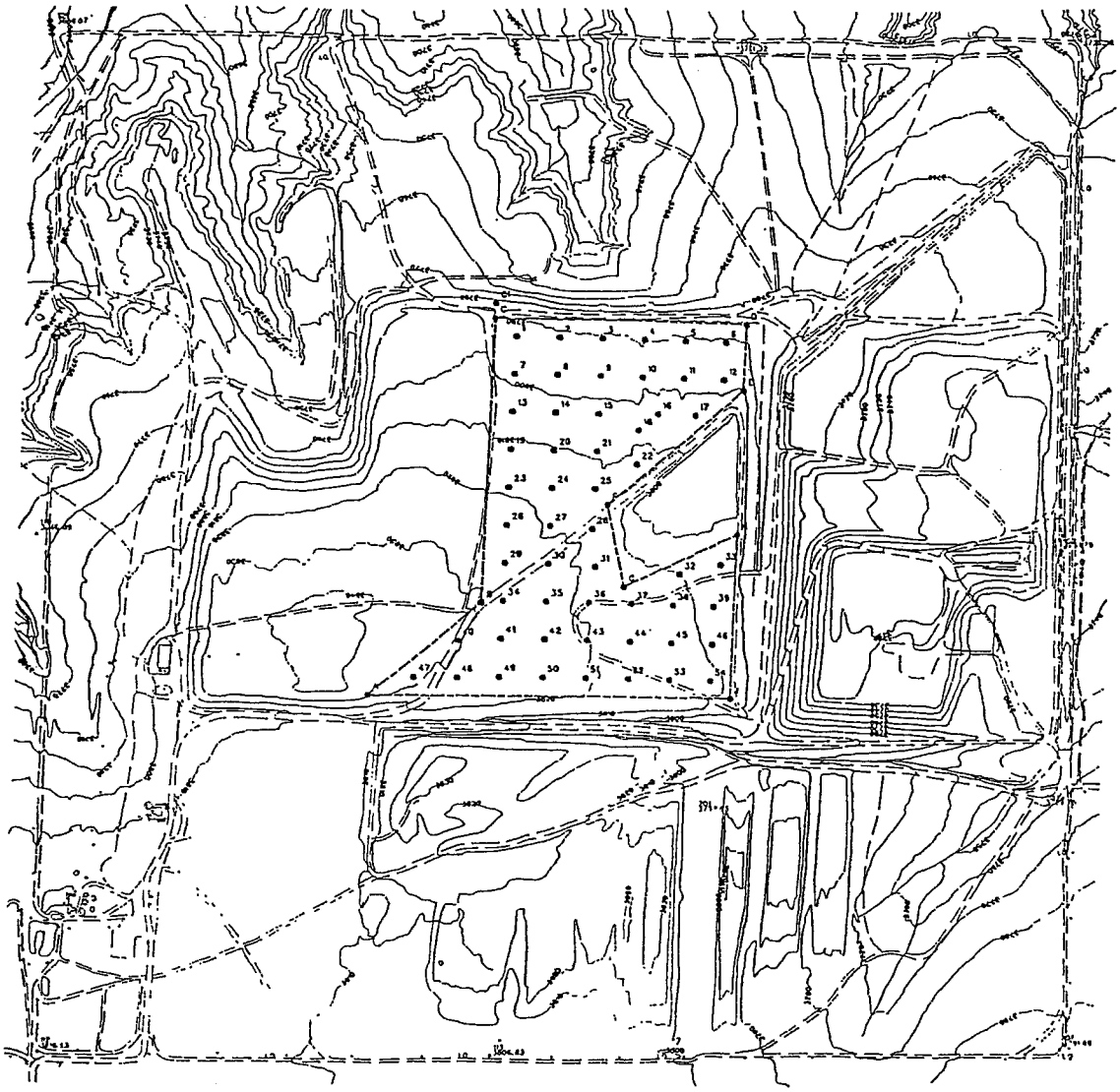
City of Amarillo Municipal Solid Waste Landfill Cap Verification Project

Sample Location	Erosion/Vegetative Layer (Dark Brown) Thickness (in)	Reddish Brown Lean Clay with Sand Infiltration Layer Thickness (in)	Depth to Sample Below Grade (in)	In-Place Density (%)	Moisture Content (%)	Permeability (cm/sec)
1	14	30+	38	96.0	16.4	3.3×10^{-8}
2	12	30+	36	99.0	17.6	2.75×10^{-8}
3	15	30+	39	98.0	17.2	3.00×10^{-8}
4	8	30+	32	90.3	15.2	6.74×10^{-8}
5	12	30+	36	95.7	15.1	3.63×10^{-8}
6	24	30+	48	91.5	20.5	9.99×10^{-8}
7	18	30+	42	94.3	16.8	4.43×10^{-8}
8	10	30+	34	98.9	16.2	3.35×10^{-8}
9	8	30+	32	98.4	17.4	3.60×10^{-8}
10	10	30+	34	99.7	17.0	4.98×10^{-8}
11	30	30+	54	96.8	18.2	6.27×10^{-8}
12	6	30+	30	98.3	13.8	3.64×10^{-8}
13	8	30+	32	96.7	19.7	5.24×10^{-8}
14	6	30+	30	99.3	18.1	7.29×10^{-9}
15	12	30+	36	98.4	19.2	2.66×10^{-8}
16	12	30+	36	95.0	16.1	4.90×10^{-8}
17	14	30+	38	96.7	16.3	5.86×10^{-8}
18	14	30+	38	97.9	15.4	4.70×10^{-8}
19	11	30+	35	95.7	16.2	3.82×10^{-8}
20	15	30+	39	96.8	16.8	3.01×10^{-8}
21	10	30+	34	102.0	17.2	6.33×10^{-9}
22	12	30+	36	95.5	16.5	5.13×10^{-8}
23	18	30+	42	95.0	22.8	6.13×10^{-8}
24	6	30+	30	98.0	21.8	2.74×10^{-8}
25	8	30+	32	95.7	18.0	5.50×10^{-8}
26	9	30+	33	98.4	20.4	2.16×10^{-8}
27	15	30+	39	101.0	21.6	2.92×10^{-8}

TABLE 1

City of Amarillo Municipal Solid Waste Landfill Cap Verification Project

Sample Location	Erosion/Vegetative Layer (Dark Brown) Thickness (in)	Reddish Brown Lean Clay with Sand Infiltration Layer Thickness (in)	Depth to Sample Below Grade (in)	In-Place Density (%)	Moisture Content (%)	Permeability (cm/sec)
28	24	30+	48	96.9	15.4	5.05×10^{-8}
29	20	30+	44	95.3	20.6	5.57×10^{-8}
30	24	30+	48	96.7	16.4	4.18×10^{-8}
31	24	30+	48	101.7	17.3	1.01×10^{-8}
32	24	30+	48	100.3	14.3	7.32×10^{-9}
33	24	30+	48	99.6	16.2	2.09×10^{-8}
34	24	30+	48	100.0	14.8	6.50×10^{-9}
35	24	30+	48	100.2	19.2	1.02×10^{-8}
36	24	30+	48	98.4	16.9	4.03×10^{-8}
37	24	30+	48	95.5	16.0	3.80×10^{-8}
38	24	30+	48	102.1	15.0	3.50×10^{-9}
39	24	30+	48	102.2	14.3	5.27×10^{-9}
40	24	30+	48	102.3	13.3	9.94×10^{-9}
41	24	30+	48	98.8	19.1	4.55×10^{-8}
42	24	30+	48	102.3	15.2	1.41×10^{-8}
43	24	30+	48	96.7	16.4	5.04×10^{-8}
44	24	30+	48	100.2	16.1	9.75×10^{-9}
45	24	30+	48	89.5	23.7	9.26×10^{-8}
46	24	30+	48	96.1	20.8	6.18×10^{-8}
47	24	30+	48	86.7	26.9	1.08×10^{-7}
48	24	30+	48	95.4	16.8	5.60×10^{-8}
49	24	30+	48	87.5	19.8	9.68×10^{-8}
50	24	30+	48	89.8	24.5	7.75×10^{-8}
51	24	30+	48	95.0	22.6	7.18×10^{-8}
52	24	30+	48	102.2	14.9	1.17×10^{-8}
53	24	30+	48	102.6	17.4	7.94×10^{-9}
54	24	30+	48	98.8	15.2	2.39×10^{-8}



0 300 600 900 1200

N

LANDATA GEO SERVICES

PHOTOGRAMMETRIC, GIS, AND CARTOGRAPHIC SPECIALISTS

AMARILLO SANITARY LANDFILL

SITE LOCATED NORTH OF IH-40 AND EAST OF STATE HWY. 2381

MAP SCALE: 1" = 288' CONTOUR INTERVAL: 2'

DATE OF PHOTOGRAPHY: APRIL 28, 1998 VERTICAL DATUM: NGVD 29

HORIZONTAL DATUM: OKLAHOMA S. P. S. SURVEY DWN BY: R.E.B.

LOG NO: 5563 FILE: 5563 SHEET NO. 1 OF 1 12/11/98

DYESS-PETERSON TESTING LABORATORY, INC.

oil Data for Wet Weather Area from
nal Cover System Evaluation Report
November 2006
By Raba-Kistner Consultants, Inc.

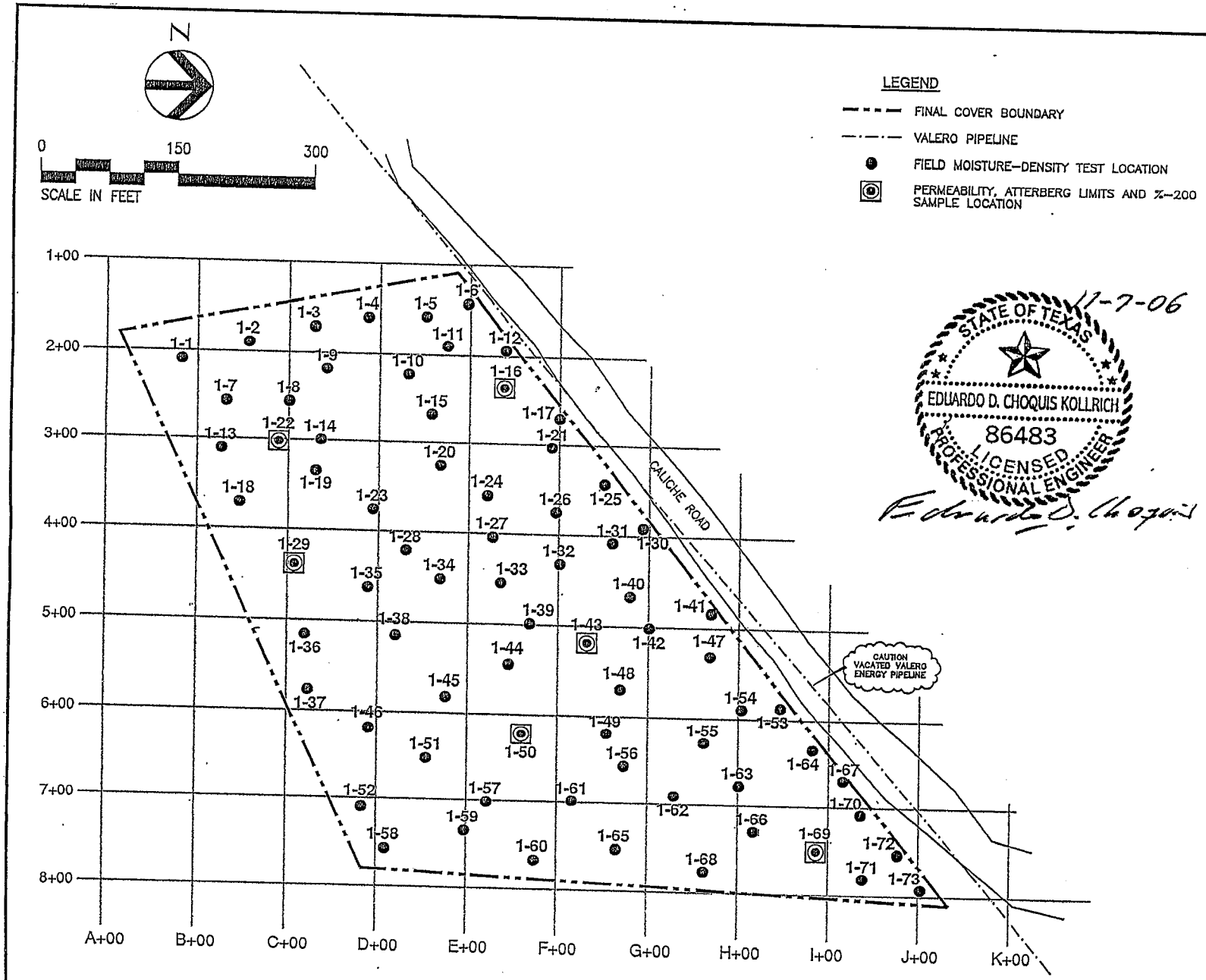
SUMMARY OF INFILTRATION LAYER LA ORATORY TESTS

CELL 2, CITY OF AMARILLO LANDFILL (MSW Pe it No. 73)
R-K Project No.: ASF06-283-00
General Contractor: Big Sky Enterprises LLC

Proctor	Opt. M.C., %	Max. Dry Density, pcf
1 (std.)	20.0	102.0
2 (mod.)	16.6	109.5
3		
4		

Sample			Site Grid Station		Ref.	Field Testing				Laboratory Testing [1]			
Date	Time	ID	North	East	Proctor	Wet Density (pcf)	Moisture (%)	Dry Density (pcf)	Compaction (% max.)	LL	PI	-#200 (%)	k cm/sec
06/13/06	—	—	Onsite Stockpiles		1 (std.)	—	—	—	—	38	18	91.5	4.7E-09
					2 (mod.)								1.3.E-08
09/25/06	4:15 PM	1-16	E+40	2+30	2	125.7	18.7	105.8	97.0	39	23	84.6	7.6.E-07
09/25/06	5:55 PM	1-22	B+80	3+05	2	135.6	18.4	120.2	93.0	37	22	80.5	7.5E-07
09/24/06	9:10 AM	1-29	C+05	4+40	2	129.3	21.1	106.8	98.0	37	27	83.1	5.0E-07
10/10/06	11:45 AM	1-43	F+30	5+20	1	120.1	22.5	98.0	96.0	39	24	84.3	9.9E-08
09/28/06	3:30 PM	1-50	E+60	6+25	1	120.1	20.1	100.0	98.0	35	20	85.6	9.6E-07
10/04/06	3:30 PM	1-69	F+10	7+00	1	120.6	23.9	97.3	95.0	38	22	85.6	8.5E-08
10/04/06	5:10 PM	2-6	C+30	2+20	1	123.2	24.3	99.1	97.0	40	24	86.1	4.1E-08
10/10/06	3:40 PM	2-18	F+00	3+00	1	120.0	22.7	97.7	96.0	38	22	85.9	1.2E-07
10/10/06	1:50 PM	2-29	C+80	5+05	1	121.7	22.2	99.6	98.0	39	23	86.0	7.7E-07
10/13/06	2:10 PM	2-36	D+80	5+80	1	123.6	21.0	102.2	100.0	37	21	88.0	6.2E-08
10/13/06	3:20 PM	2-59	I+20	7+70	1	121.7	25.0	97.4	95.0	40	23	85.6	4.0E-08

Notes: 1) LL = Liquid Limit; PI = Plasticity Index; -#200 = Percent Passing U.S. Standard Sieve No. 200; k = Hydraulic Conductivity (permeability)



STATE OF TEXAS
EDUARDO D. CHOQUIS KOLLRICH
86483
LICENSED
PROFESSIONAL ENGINEER
11-7-06

Raba Kistner
Engineering • Testing • Environmental • Facilities • Infrastructure

No.	DATE	REVISIONS:	DESCRIPTION

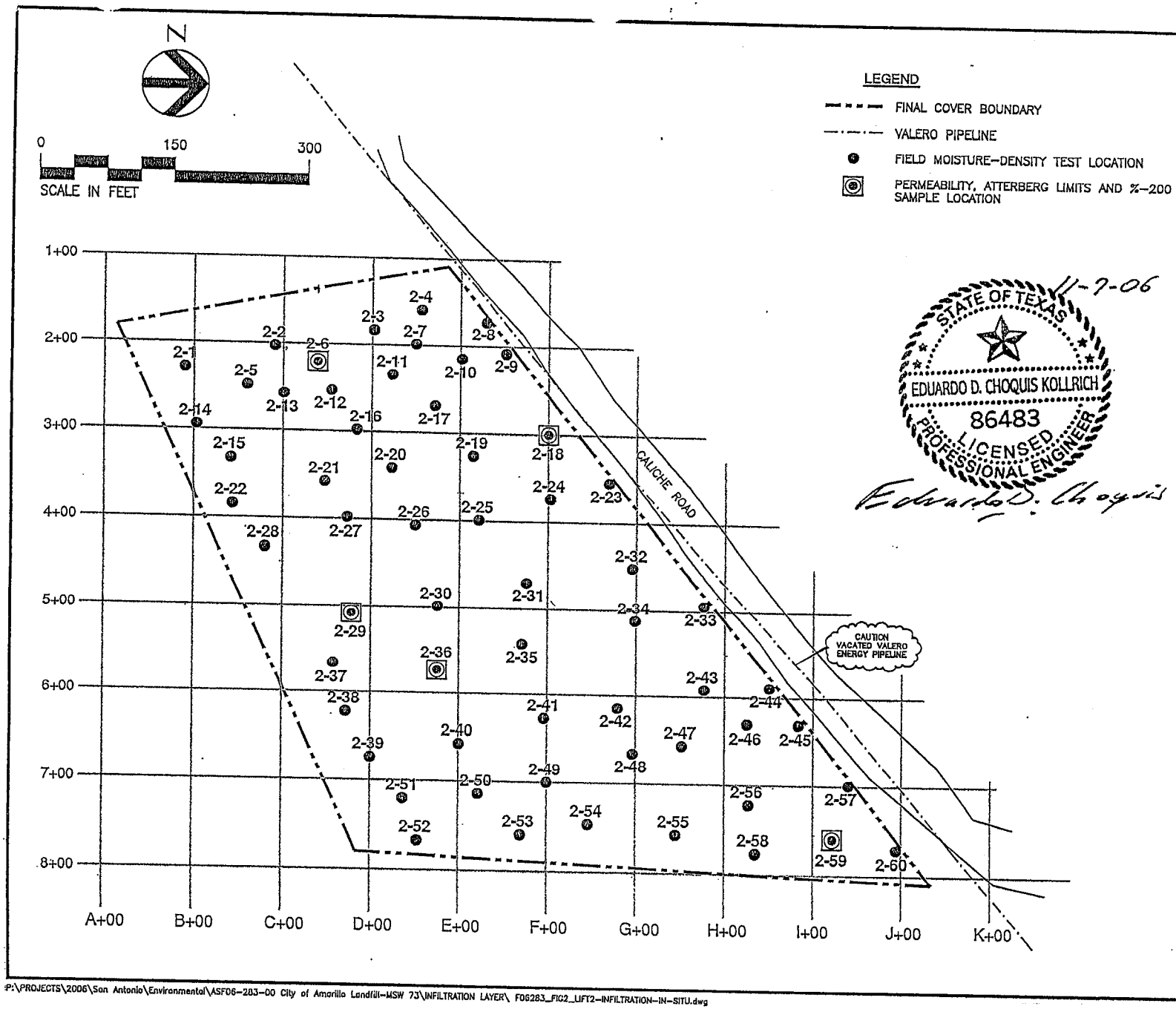
FIELD TEST / SAMPLE LOCATION MAP - LIFT 1

INFILTRATION LAYER
CELL 2 - CITY OF AMARILLO LANDFILL
MSW PERMIT No. 73
AMARILLO, POTTER COUNTY, TEXAS

PROJECT No.: ASF06-283-00
DRAWN BY: LAW
CHECKED BY: EDC
DATE: November 2, 2006

FIGURE 1

P:\PROJECTS\2006\San Antonio\Environmental\ASF06-283-00 City of Amarillo Landfill-MSW 73\INFILTRATION LAYER\ F06283_FIG1_LIFT1-INFILTRATION-IN-SITU.dwg



STATE OF TEXAS
EDUARDO D. CHOQUIS KOLLRICH
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PROFESSIONAL ENGINEER
11-7-06

Raba Kistner
Engineering • Testing • Environmental • Facilities • Infrastructure

No.	DATE	DESCRIPTION
REVISIONS:		

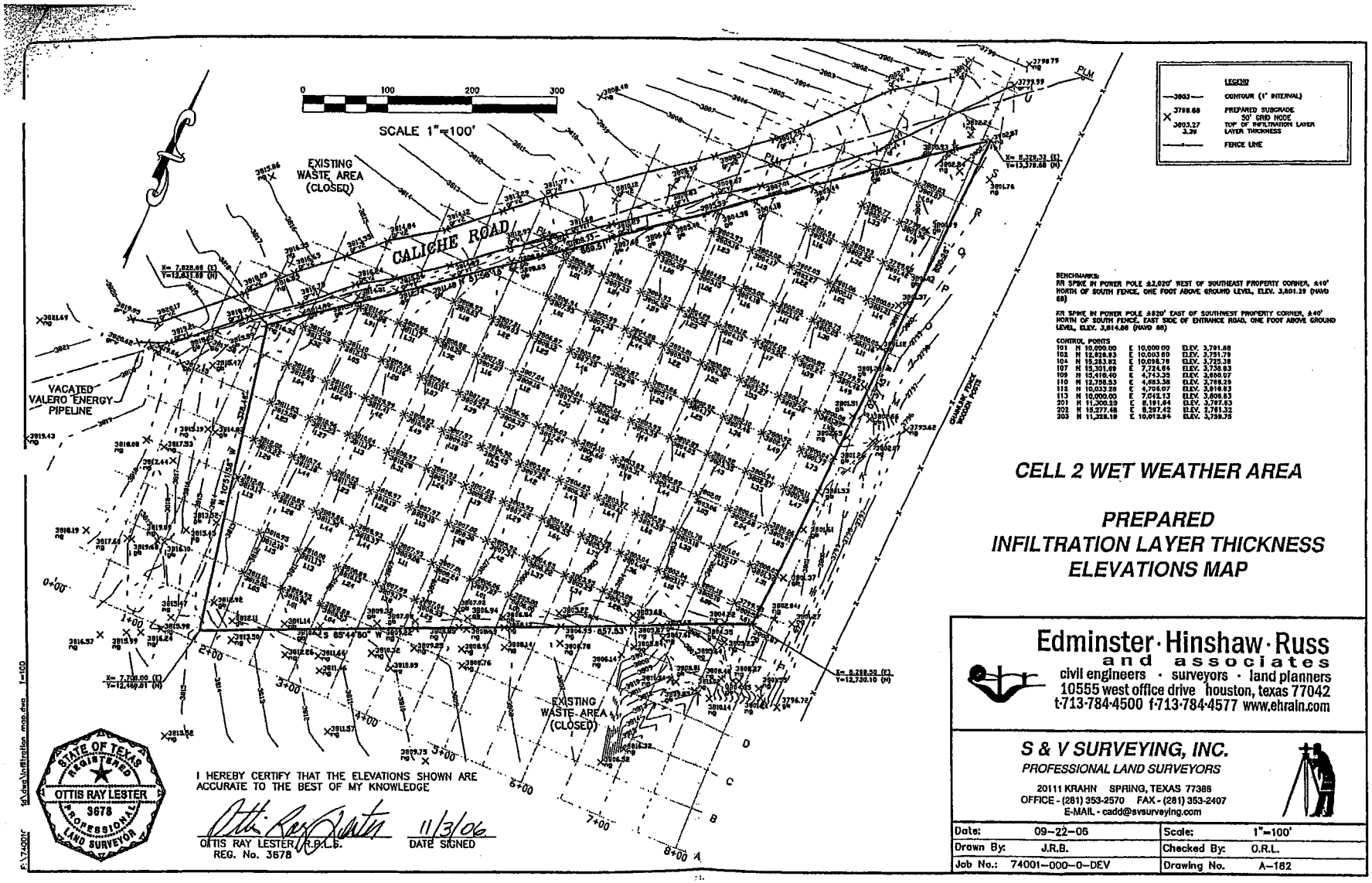
FIELD TEST / SAMPLE LOCATION MAP - LIFT 2

INFILTRATION LAYER
CELL [illegible] CITY OF AMARILLO LANDFILL
AMA[illegible] MSW PERMIT No. 73
POTTER COUNTY, TEXAS

PROJECT No.: ASF06-283-00
DRAWN BY: LAW
CHECKED BY: EDC
DATE: November 2, 2006

FIGURE 2

P:\PROJECTS\2006\San Antonio\Environmental\ASF06-283-00 City of Amarillo Landfill-MSW 73\INFILTRATION LAYER\ F06283_FIG2_LIFT2-INFILTRATION-IN-SITU.dwg


SCALE 1"=100'
0
100
200
300
CALICHE ROAD
EXISTING WASTE AREA (CLOSED)
VACATED VALERO ENERGY PIPELINE
EXISTING WASTE AREA (CLOSED)
QUANAH PACE WOODEN POSTS
LEGEND
CONTOUR (1' INTERVAL)
PREPARED SUBGRADE 50' GRID NODE
TOP OF INFILTRATION LAYER LAYER THICKNESS
FENCE LINE
BENCHMARKS:
RR SPIKE IN POWER POLE ±2,020' WEST OF SOUTHEAST PROPERTY CORNER, ±10' NORTH OF SOUTH FENCE, ONE FOOT ABOVE GROUND LEVEL, ELEV. 3,801.29 (NAVD 88)
RR SPIKE IN POWER POLE ±820' EAST OF SOUTHWEST PROPERTY CORNER, ±40' NORTH OF SOUTH FENCE, EAST SIDE OF ENTRANCE ROAD, ONE FOOT ABOVE GROUND LEVEL, ELEV. 3,814.86 (NAVD 88)
CONTROL POINTS
101 N 10,000.00 E 10,000.00 ELEV. 3,781.88
102 N 12,638.93 E 10,003.80 ELEV. 3,751.79
104 N 15,283.82 E 10,006.76 ELEV. 3,725.38
107 N 18,301.89 E 7,714.84 ELEV. 3,735.83
109 N 15,416.40 E 4,743.33 ELEV. 3,808.07
110 N 12,788.93 E 4,883.38 ELEV. 3,789.28
112 N 10,033.28 E 4,705.07 ELEV. 3,816.83
113 N 10,000.00 E 7,042.13 ELEV. 3,806.83
201 N 11,300.20 E 8,191.64 ELEV. 3,797.83
202 N 10,277.48 E 8,297.42 ELEV. 3,781.32
203 N 11,328.19 E 10,012.94 ELEV. 3,759.75
CELL 2 WET WEATHER AREA
PREPARED
INFILTRATION LAYER THICKNESS
ELEVATIONS MAP
STATE OF TEXAS REGISTERED
OTTIS RAY LESTER
3678
PROFESSIONAL LAND SURVEYOR
I HEREBY CERTIFY THAT THE ELEVATIONS SHOWN ARE ACCURATE TO THE BEST OF MY KNOWLEDGE
OTTIS RAY LESTER, R.P.L.S.
REG. No. 3678
11/3/06
DATE SIGNED
Edminster·Hinshaw·Russ and associates
civil engineers · surveyors · land planners
10555 west office drive houston, texas 77042
t·713·784·4500 f·713·784·4577 www.ehrain.com
S & V SURVEYING, INC.
PROFESSIONAL LAND SURVEYORS
20111 KRAHN SPRING, TEXAS 77388
OFFICE - (281) 353-2570 FAX - (281) 353-2407
E-MAIL - cadd@svsurveying.com
Date: 09-22-06
Scale: 1"=100'
Drawn By: J.R.B.
Checked By: O.R.L.
Job No.: 74001-000-0-DEV
Drawing No. A-182

Soil Data for Cells 2 and 3 Permeability Verification
April 2007
By Dyess-Peterson Testing Laboratory, Inc.

May 8, 2007

City of Amarillo
%Michael Rice, P.E.
P.O. Box 1971
Amarillo, Texas 79186

Re: City of Amarillo Municipal Solid Waste Landfill Project – Amarillo, Texas

Mr. Rice:

As requested by Mike Smith, P.E. representatives of this firm were on-site at the above mentioned project location on April 24, 2007. The purpose of the site visit was to perform in-situ soil field measurements and obtain soil samples for laboratory analysis.

We were requested to determine the thickness of the vegetation layer (dark brown soil), then the clay cap to verify that at least 24 inches of clay cap material (reddish brown) existed and finally the permeability of the in-place clay cap material.

The requested sampling and testing was performed at three (3) locations chosen by City of Amarillo personnel. At each location, a maintainer was utilized to scrape away the vegetation layer. At this time, the thickness of the dark brown vegetation layer was measured. The next step was to push a Shelby tube down into the clay cap liner material (reddish brown). This sample was used to determine the permeability rate of the clay cap liner. After the Shelby tube was removed and sealed to prevent moisture loss and/or damage to the sample the maintainer operator scraped down until the bottom of the reddish brown clay cap liner material was visible. At this point, the thickness of the clay cap liner was measured. The last step was to fill the Shelby tube sample hole with bentonite pellets and for the on-site City of Amarillo equipment operators to properly backfill the sample location pits.

The sample locations along with the field measurements and laboratory testing were as follows:

Verification Point #1 (12133.457055 Northing, 7088.942265 Easting, 3826.458082' Elevation)	- Vegetation layer thickness = 14 inches - Clay Cap liner thickness = 24+ inches - In-Place permeability = 5.68×10^{-8} cm/sec
Verification Point #2 (12694.634431 Northing, 7212.391045 Easting, 3823.758835' Elevation)	- Vegetation layer thickness = 18 inches - Clay Cap liner thickness = 24+ inches - In-Place permeability = 4.82×10^{-8} cm/sec
Verification Point #3 (13460.051315 Northing, 7134.740883 Easting, 3803.836858' Elevation)	- Vegetation layer thickness = 12 inches - Clay Cap liner thickness = 24+ inches - In-Place permeability = 3.60×10^{-8} cm/sec

CITY OF AMARILLO MUNICIPAL SOLID WASTE LANDFILL

N

Topographic survey done by Stewart Geo Technologies on March 5, 2007

CITY OF AMARILLO ENGINEERING DEPARTMENT	DRAWN BY: TRAVIS MUNO	DATE: 05/09/07		DESCRIPTION CAP VERIFICATION SAMPLE LOCATIONS
	DESIGNED BY:	REVISED:		
	APPROVED BY:			
	APPROVED BY:			JOB NUMBER / SHEET 1 OF 1
	FILE NAME: K:/CAD/ENGINEERING/LANDFILL/LFVERPT.DGN	SCALE: 1" = 800'		

City of Amarillo

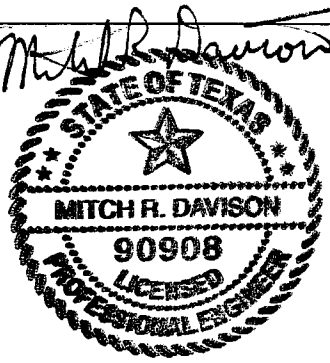
Municipal Solid Waste Permit No. 73A

Part IV

Site Operating Plan

Potter County, Texas

May 2006



5/9/2006

This document is released for the purpose of review only under the authority of Mitch R. Davison, P.E. # 90908. It is not to be used for bidding or construction.

For pages 1 thru 74

City of Amarillo

Landfill Permit Amendment – Part IV

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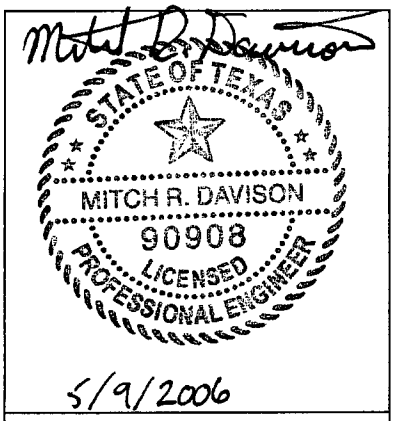


This document is released for the purpose of review only under the authority of Mitch R. Davison, P.E. # 90908. It is not to be used for bidding or construction.

For pages i thru ii

1.0 INTRODUCTION

The City of Amarillo Landfill (Landfill), Municipal Solid Waste Permit 73A, is located at the intersection of Hill and Bezner Roads, approximately five miles west of Soncy Road and two miles north of IH 40. This site is located within a portion of the City of Amarillo's extra-territorial jurisdiction, in an unincorporated area of Potter County. The City owns 622 permitted acres at this location. The primary function that takes place at the landfill is disposal of municipal solid waste generated by Amarillo residents and businesses. The City also provides disposal services to some surrounding communities in the region. Of the permitted 622 acres that the City owns, approximately 526 are included in the landfill disposal footprint.

In March 1975 the City applied for, and was subsequently granted a permit to operate the municipal solid waste landfill. The landfill permit was issued to the City on July 1, 1975.

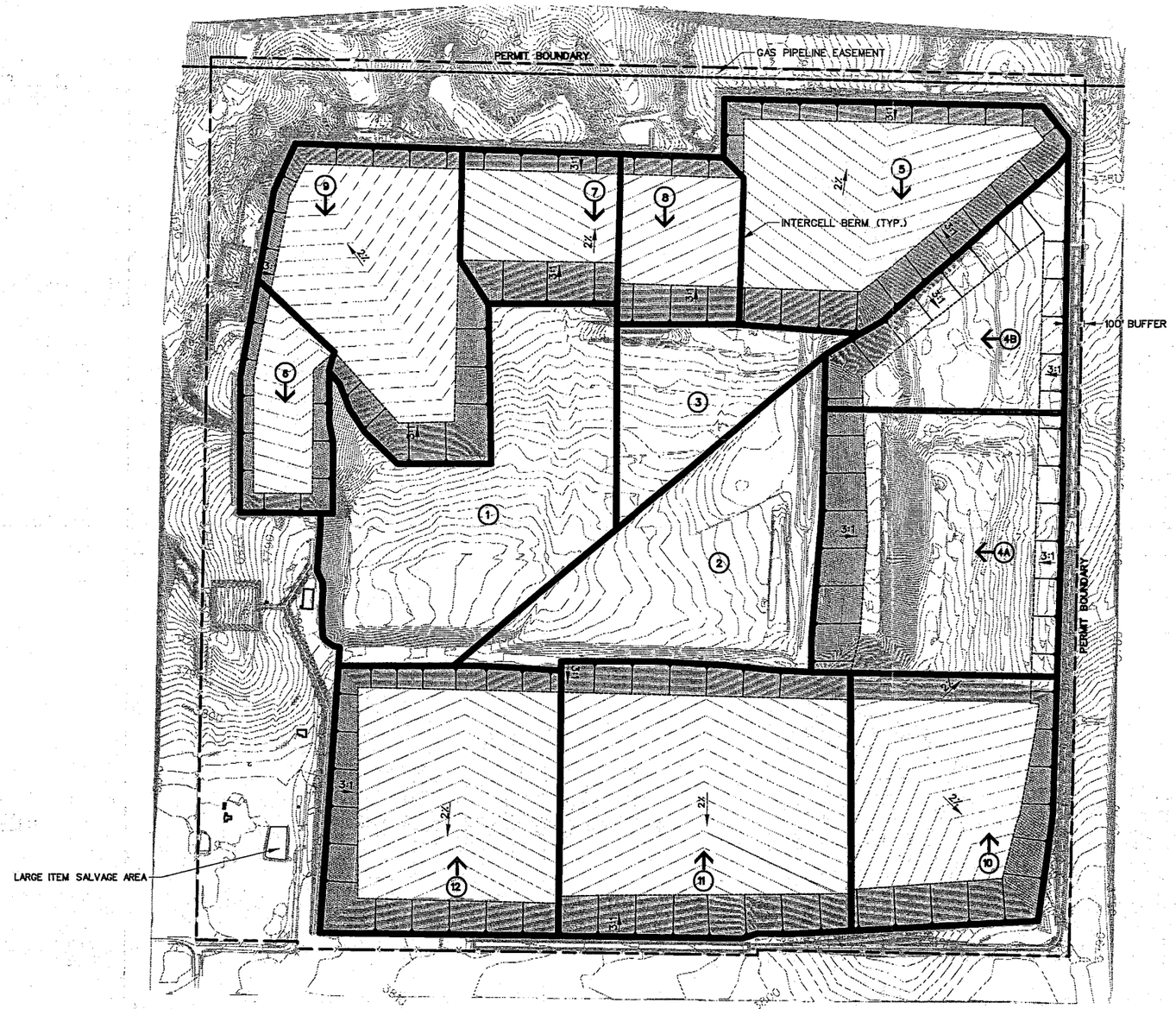
The City is responsible for day-to-day landfill operations using City personnel. Certain support activities are contracted to outside personnel on an as-needed basis.

This Site Operating Plan (SOP) is intended to provide guidance for site management and operations. It will facilitate site operation in compliance with applicable Texas Commission on Environmental Quality (TCEQ) regulations and current standards of practice in the industry. The Site Operating Plan (SOP) is intended to provide guidance from the design engineer to the site management and operating personnel. The landfill operations reflect current standards of practice in the solid waste industry and is compatible with the facility's permitted design. This Plan will also serve as a reference source and is to be used as a training tool for landfill personnel.

The landfill operations reflect current standards of practice in the solid waste industry and are compatible with the facility's permitted design. This SOP will also serves as a reference source and is to be used as a training tool for landfill personnel.

1.1 Description of On-Site Facilities

The facility includes a currently permitted 622 acre Type I MSW disposal area which will be developed in 12 major phases. A description of sequencing of the site is provided later in this SOP. Buffer areas, storm-water management/drainage structures, landscaping and fencing and other structures and support facilities are, or will be, located on City owned and controlled property on, and off, the permitted acreage. A scale facility, maintenance building and white goods storage area are also found on the site. There are also two structures (formerly houses) onsite that are currently used for storage. At some time in the future, the City may elect to construct and maintain a citizen's convenience station at the landfill location. Figure IV.1.1 illustrates the planned sequencing for the landfill site and onsite facilities.



N

0 400 800

SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- SEQUENCE OF DEVELOPMENT/ DIRECTION OF FILL - SEE TABLE
- CELL BOUNDARY
- EASEMENT
- EXISTING CONTOURS (3750)
- PROPOSED EXCAVATION CONTOURS

SEQUENCE OF CELL DEVELOPMENT
1
2
3
4A
4B
10
11
12
9
6
7
8
5

NOTES

1. THE PROPOSED GRADES REPRESENT THE BOTTOM OF EXCAVATION

DATE: 1/22/2007
TIME: 11:44:09 AM
USER: mdavison
FILE:..\AMIV.01.01.dgn

CITY OF AMARILLO TEXAS

HDR Engineering, Inc.

ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	M. DAVISON
CIVIL ENGINEER	M. DAVISON
CHECKED BY	M. ODEN
DESIGNED	S. MILLER
DRAWN BY	B. GREEN
QA/QC	M. ODEN
PROJECT NUMBER	23358-037

STATE OF TEXAS
MITCH R. DAVISON
90908
LICENSED
PROFESSIONAL ENGINEER

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF TCEQ REVIEW UNDER THE AUTHORITY OF MITCH R. DAVISON, P.E. 90908. IT IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.

1/25/2007

CITY OF AMARILLO LANDFILL
MSW PERMIT NO. 73A
POTTER COUNTY, TEXAS

PLANNED SEQUENCING

0 1" 2"

FILENAME	...\AMIV.01.01.dgn
SCALE	

SHEET IV.1.1

2.0 RECORD-KEEPING REQUIREMENTS

The Landfill Supervisor is responsible for maintaining the Site Operating Record in compliance with 330.113 – Record Keeping Requirements.

2.1 Permit and Registration Documents

The latest copy of the approved permit will be maintained in the Site Operating Record, of which the Site Development Plan (SDP) and this Site Operating Plan (SOP) are a part. In addition to the SDP and SOP, there are eleven permit documents, not included as part of this SOP, that landfill operating personnel must adhere to as part of the site's operation. Any modification or amendment to these documents could result in a modification or amendment to the SOP. The attachments to Part III of the permit document are considered landfill operating requirements and are considered part of the operating record of the facility. A copy of the permit and permit modifications are incorporated by reference into the permit and are maintained at the landfill office. The eleven plans/procedures are listed below.

Plans and Procedures Relevant to the SOP

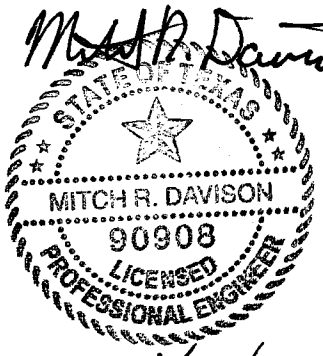
1. NPDES Permit and Stormwater Pollution Prevention Plan.
2. Site Location Restriction Demonstrations and Certifications – Part II
3. Alternative Liner Demonstration Submittal – December 1994 – Attachment 4 of Part III
4. Erosion Control Plan (ECP) – Appendix 12 of Attachment 6 of Part III
5. Soil and Liner Quality Control Plan (SLQCP) – Attachment 10 of Part III
6. Groundwater Sampling and Analysis Plan (GWSAP) – Attachment 11 of Part III
7. Final Closure Plan (CP) – Attachment 12 of Part III
8. Post-Closure Care Plan (PCP) – Attachment 13 of Part III
9. Landfill Gas Management Plan (LGMP) – Attachment 14 of Part III
10. Leachate and Contaminated Water Plan (LCWP) – Attachment 15 of Part III
11. Final Cover Quality Control Plan (FCQCP) – Appendix 12A of Attachment 12 of Part III

Reports that are to be submitted to the Austin TCEQ office will be mailed to the following address.

Texas Commission on Environmental Quality
MC: 124
P.O. Box 13087
Austin, Texas 78711-3087

2.2 Other Record Keeping

The following table (Table IV.2.1) presents a summary of other record keeping and reporting for the landfill. The table indicates the frequency of documentation and submittal if appropriate. All reports are maintained at the landfill office. Reports will be placed in the operating record within seven working days of their development. In addition to the records identified in the table, all correspondence with the TCEQ and other agencies as it pertains to the landfill, its operation or permit status will be maintained in the Site Operating Record.



FOR PAGE 5

1/25/2007

Table IV.2.1: Recordkeeping Schedule

Records Needed	Recordkeeping Required?	Rule Citation*	Frequency of Submittal
Location Restriction Demonstrations	Required	330.113(b)(1)	Permit Application – Part II – no additional submittal required unless permit is amended.
Prohibited Waste Inspection Records, Training and Receipt Notification Procedures	Required	330.113(b)(2)	Per occurrence
Gas Monitoring Results	Required	330.113(b)(3)	Quarterly
Remediation Plans for Explosive & Other Gases, if applicable	Required	330.113(b)(3)	Per occurrence
Unit Design Documentation for Leachate or Gas Condensate Placement	Required	330.113(b)(4)	As required
Groundwater Monitoring and Corrective Action Demonstration, Certification, Monitoring, Testing & Analytical Data	Required	330.113(b)(5)	Monitoring – semi-annual Corrective action as required
Closure and Post-Closure Plans	Required	330.113(b)(6)	Permit Application – Part III; updated as needed
Post-Closure Monitoring, Testing and Analytical Data	Required	330.113(b)(6)	Groundwater monitoring – semi-annual; inspections – annual
Cost Estimates and Financial Assurance Documentation for Closure & Post-Closure	Required	330.113(b)(7)	Annually
Small Community Exemption Criteria Compliance Documentation	Required	330.113(b)(8)	Not applicable for the Amarillo Landfill
Facility Operation, Permit Modification, Approvals, & Technical Assistance Correspondence & Responses	Required	330.113(b)(9)	Per occurrence
Special Waste Manifests, Trip Tickets and All Other Documents Relating to Special Waste	Required	330.113(b)(10)	Per occurrence
Other Documents Specified in the Permit or by the Executive Director	Required	330.113(b)(11)	As needed
Personnel Training Records - 335.586(d)-(e)	Required	330.113(e)	Annually
Personnel Operator Licenses	Required	330.113(f)	Annually – revised when licenses are secured
Annual Waste Acceptance Rate Documentation including Quarterly & Annual Solid Waste Summary Reports required by 330.603	Required	330.113(h)	Annually and quarterly
Unauthorized Material Removal	Required	330.117(b)	Per occurrence
Alternate Operating Hours	Required	330.118(c)	Per occurrence
Landfill Marker Inspections	Required	330.122	Monthly
Landfill Gas Management Plan Required Reports & Submittals	Required	330.130	Quarterly
Cover Inspection Record	Required	330.133(g)	Daily cover – Daily Intermediate Cover – Monthly Final Cover – Quarterly

Records Needed	Recordkeeping Required?	Rule Citation*	Frequency of Submittal
RACM Acceptance Records, if applicable	Required	330.136(b)(3)(B)	Per occurrence
Access Control Breach and Repair Notices	Recommended		As required
Access Control Inspection and Maintenance	Recommended		Quarterly
Litter Pickup and Debris/Mud Removal	Recommended		Daily
Fire Occurrence Notices	Recommended		As required
Windblown Waste and Litter Control Operations	Recommended		Daily
Management and Disposal of Large Items	Recommended		Monthly
Documentation of Compliance with Odor Management Plan	Recommended		Quarterly
Dust Nuisance Control Efforts	Recommended		Monthly
Access Roadway Regrading	Recommended		As required
Salvaged Material Storage Nuisance Control Efforts	Recommended		Quarterly
Ponding Prevention Plan Compliance Documentation	Recommended		As required
Special Waste Operational Plan Compliance Documentation	Recommended		Quarterly
Special Waste Contingency Plan Compliance	Recommended		As required
RACM Contingency Plan Compliance	Recommended		As required

*The rules cited in this table are accurate at this time. The TCEQ is currently reorganizing 30 TAC 330.

In the event that it is desirable to modify any of the recordkeeping requirements listed in Table IV.2.1, the City will request a permit modification from the Executive Director and will not make such change until authorization is received. All information contained in the Site Operating Record will be provided upon request to the Executive Director and will be made available at all reasonable times for inspection by the Executive Director or TCEQ staff. The City will retain at the landfill office all information contained within the Site Operating Record and the various plans required for the life of the facility and the post-closure care period.

Annual written notice will be submitted to the Executive Director for each occurrence that documents were placed into the operating record. All information in the operating record will be made available to the executive director upon request.

2.3 Breach Related Reporting & Records

In the event of a breach of any access control measures, notice will be given to the TCEQ's regional office to document when a breach is identified and when a repair is completed, if necessary. The TCEQ's regional office will be notified of the breach within 24 hours of detection. The breach will be temporarily repaired within 24 hours of detection and will be permanently repaired by the time specified to the TCEQ regional office when it was reported in the initial breach report. The TCEQ regional office will be notified when the permanent access control breach repair is completed. If a permanent repair can be made within eight hours of detection, no notice will be submitted. A copy of these notices will be retained in the Site Operating Record in accordance with 330.113(b)(9).

2.4 Fire Incident Reporting & Records

If a waste related fire occurs onsite, the City will contact the TCEQ regional office. The notification will include: contact by telephone as soon as possible, but no later than 4 hours following fire discovery, and a written description of the cause and extent of the fire and the resulting fire response within 14 days of fire detection. In the case of a fire, the following agencies or personnel will be contacted:

- Fire – 911
- Police – 911
- Ambulance – 911
- Solid Waste Supervisor – Office Phone 806-378-6811
- Region 1 TCEQ – 806/353-9251

2.5 Final Cover Reporting and Records

As final cover is applied to the landfill, a log will be maintained indicating the area covered, date(s) the cover was applied, thickness of cover and the activities and management practices used in placing the cover. Any damage to in-place final cover will be reported to the TCEQ within five days. The report will include the timeframe and methods to be used for the repair.

2.6 Waste Inspections and Unauthorized Waste Reporting

The Landfill Supervisor will maintain and include in the Site Operating Record the following reports: (1) load inspection reports, (2) records of regulated hazardous or PCB waste notifications, and (3) personnel training records. The report will include the date and time of the inspection, the name of the hauling company and driver, the type of vehicle, the size and source of the load, contents of the load, indicators of prohibited waste and the results of the inspection. Personnel training records will also be maintained at the Public Works Department office.

A record of any removal of unauthorized material will be maintained in the Site Operating Record. The Executive Director will be notified of any liquid processing activities that occur at the landfill.

2.7 Air Criteria Reporting and Records

The City's Title V air permit, or other air permit authorizations, will be renewed as required by applicable regulation.

2.8 Reporting of Extended Hours:

Records will be maintained documenting days when hours of extended waste acceptance occur. The landfill is authorized to operate 24 hours per day as it relates to heavy equipment operations.

3.0 WASTE ACCEPTANCE RATE

In fiscal year 2005, the City of Amarillo accepted an average of 780tons of municipal solid waste per day as determined by dividing total annual acceptance of waste by the number of landfill operating days (6 days per week, 52 weeks per year). The quantities of waste accepted at the site are anticipated to increase with increases in both population and economic activity. Table IV.3.1 presents projected waste quantities at the site for the next twenty years. The table assumes that waste generation in Amarillo will increase at approximately a 1 percent annual increase, which is consistent with historic trends for the City.

Table IV.3.1: Projected Waste Quantities

Date	Yearly Tonnage
2005	243,000
2006	245,430
2007	247,884
2008	250,363
2009	252,867
2010	255,395
2011	257,949
2012	260,529
2013	263,134
2014	265,766
2015	268,423
2016	271,107
2017	273,818
2018	276,557
2019	279,322
2020	282,115
2021	284,937
2022	287,786
2023	290,664
2024	293,570
2025	296,506

The City does operate and maintain sufficient equipment for the current amount of waste accepted. The site's labor force is also sufficient to meet the requirements of the Site Operating Plan. In the future, the City may decide to provide disposal services to other communities in the

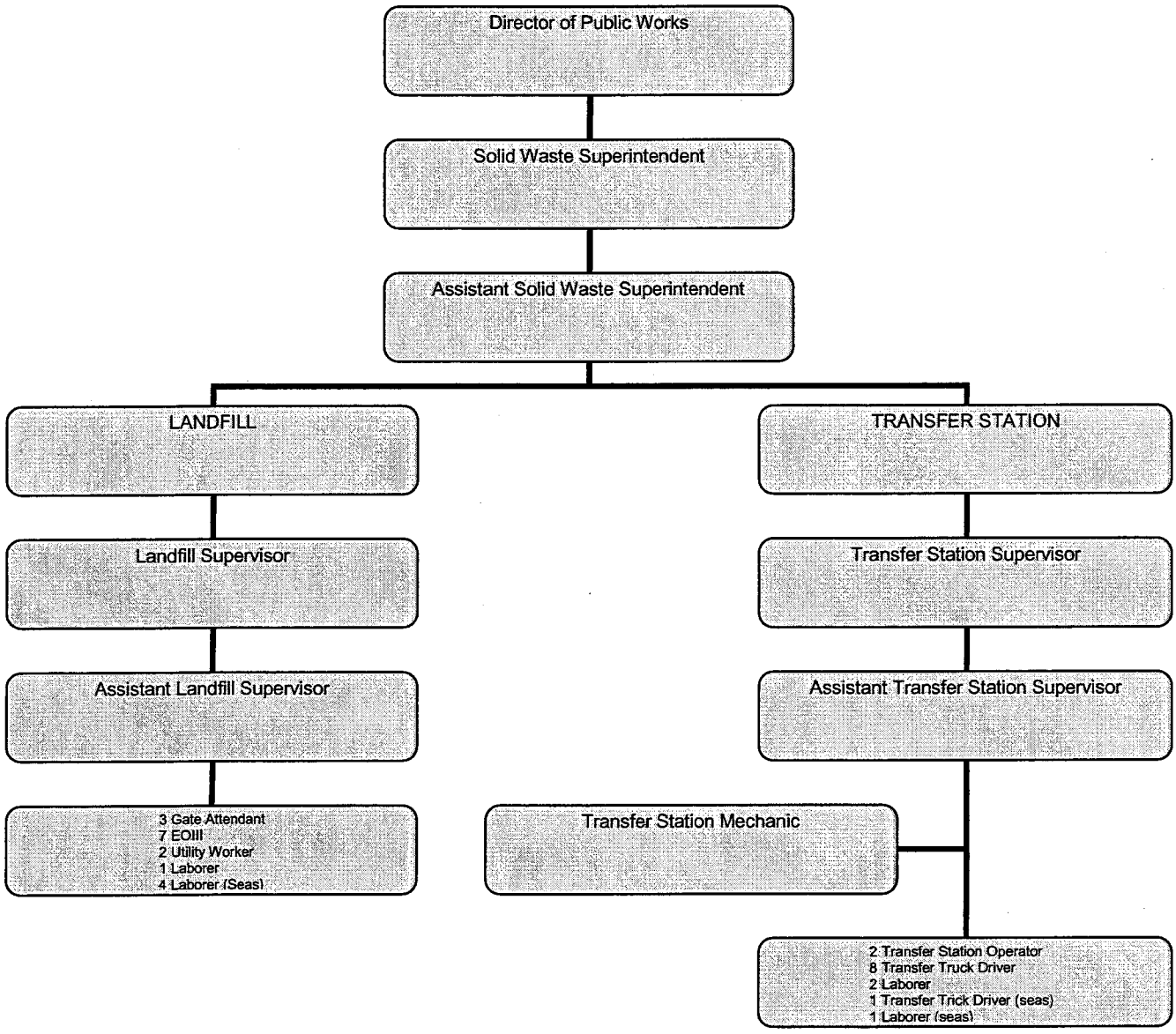
region. Any future increases in waste quantities will be managed with equipment and staffing levels described in this SOP. The City has established tables for identifying equipment and labor requirements under varying waste acceptance rates. The City will maintain quarterly waste acceptance records and based on the rolling average, as defined by the TCEQ, will adjust equipment and labor requirements accordingly.

Reporting requirements related to the waste acceptance rate are listed in Table IV.2.1 in Section 2.0.

4.0 PERSONNEL AND RESPONSIBILITIES

Figure IV.4.1 presents an organization chart for the management of the City's solid waste management program. The primary decision maker for the landfill is the Public Works Director. The Public Works Director is also responsible for street maintenance, fleet maintenance and engineering. A Solid Waste Superintendent has responsibilities for managing both collection of waste, operation of the City's transfer station and the City's landfill. The City's Landfill Supervisor has direct operational responsibilities for day-to-day operation of the landfill. The Landfill Supervisor or designee will have final authority on the determination to reject waste from being disposed at the landfill. A table presenting training requirements for each position is included in Section 6.0 of this SOP. The following section also describes responsibilities of on-site and supplemental landfill personnel. The SOP defines specific instructions and procedures that personnel will be responsible for undertaking to properly operate the facility.

Figure IV.4.1: Organization Chart



The Director of Public Works (Director) and the Solid Waste Superintendent are responsible for overall MSW disposal, processing, storage, treatment and collection. As such, these individuals are designated as the contact staff for matters related to regulatory compliance. The Director is responsible for providing an adequate personnel staff and sufficient equipment to support facility operations in accordance with the SDP and the TCEQ Municipal Solid Waste Management Regulations (MSWMR). The Director is also responsible for assuring that all provisions of all of

the additional plans and permit requirements identified in Section 1.0 of this SOP are implemented.

A Landfill Supervisor, under the general direction of the Solid Waste Superintendent, will monitor the landfill on a daily basis. The Landfill Supervisor will be responsible for day-to-day operations and will coordinate activities to assure compliance with the SDP, SOP, and the MSWMR. Either the Landfill Supervisor or his designated replacement shall be on site at least 75 percent, and normally 100 percent, of the time the site is in operation.

In addition to the supervisory staff, the site will have one (1) gate attendant, one (1) landfill attendant and two equipment operators, one of which will act as a spotter when not operating equipment, and two laborers/screeners. The number of site employees may change in direct proportion to future waste quantities received. To meet the operational needs of the facility, the Director will secure sufficient staffing to meet the varying waste acceptance rates as defined later in this SOP.

The Gate Attendant, Equipment Operators and Laborers are responsible for implementing the waste screening program described in this SOP.

The Gate Attendant, stationed at the site entrance, is primarily responsible for maintaining complete and accurate records of vehicles entering and leaving the facility, as well as recording waste quantities received. The Gate Attendant will visually inspect incoming waste hauling vehicles disposing of waste in the landfill, to check for properly secured loads and prohibited or unauthorized waste to the extent waste is visible. The Gate Attendant will direct customers to the appropriate waste disposal or unloading area.

The spotter will direct incoming vehicles to the proper location to unload refuse at the working face. His primary function will be to prevent unloading in undesignated areas and to monitor and visually inspect all loads as they are dumped to assure compliance with posted operating rules. The spotter will communicate with the Landfill Supervisor, or designee, should

unauthorized waste be delivered to the landfill. It is then the responsibility of the Landfill Supervisor, or designee, to determine if the waste must be rejected.

Equipment Operators are responsible for the safe operation of the site equipment. As the personnel most closely involved with the actual landfill disposal operation, these employees are responsible for being alert for any potentially dangerous conditions, or careless or improper actions on the part of non-employees and others while in the disposal area premises. They will report receipt of any unauthorized waste directly to the Landfill Supervisor, the designated supervisor, or other designated on-site authority.

All on-site personnel are responsible for visually observing unloading to attempt to detect unacceptable wastes. A designated individual is responsible for directing vehicles in the unloading area. Additional responsibilities may be assigned by the Landfill Supervisor as necessary.

Other supplemental personnel will be on site as necessary for construction, litter control, and the operation and maintenance of the leachate management system, groundwater monitoring, landfill gas monitoring, and other site management responsibilities.

The following is a list of landfill positions anticipated, and the minimum number of employees at each position required to operate the facility (Table IV.4.1). Personnel will be cross-trained to enable continued operation in the event of employee absences or vacancies.

Table IV.4.1: Landfill Positions

Position	Waste Acceptance Rate Based on Annual Rolling Avearage				
	1-100 tpd	101-1000 tpd	1001-2000 tpd	2001–3000 tpd	3001-4000 tpd
Landfill Supervisor		1	1	1	1
Gate Attendant		1	1	1	1
Operators	1	2*	3*	4*	5*
Spotter/Screener/Laborer	1*	1*	2*	2*	3*

*The function of the position may be performed by other personnel.

The table below presents qualification requirements for landfill personnel (Table IV.4.2).

Table IV.4.2: Landfill Personnel Required Qualifications

Position	Required Qualifications
Director of Public Works	▪ A B.S. or B.A. degree in a related field, a master's degree is preferred, including seven (7) years of responsible administrative management and supervisory experience in the public works filed for a major municipality is required.
Solid Waste Superintendent	▪ High School Graduate with a minimum of 5 years of supervisory / management experience in Solid Waste. ▪ Class A Letter of competency from Texas Department of Health
Landfill Supervisor	▪ Minimum experience and training equivalent to a High School Graduate. ▪ Minimum of three years experience with landfill operations. ▪ Must obtain strong supervisory skills. ▪ Minimum of two years experience/training in the operation of landfill equipment. ▪ Must possess a valid Texas Driver's license, Class C. ▪ Must possess a Class A Solid Waste Technician Letter of Competency from the TCEQ and must have completed a waste screening class approved by the TCEQ.
Operators	▪ Must possess a Class C Solid Waste Technician Letter of Competency from the TCEQ.

5.0 EQUIPMENT

Equipment requirements for MSW disposal and site support will vary in accordance with the method and scope of activities on site at any given time. Additional, or different units of equipment, may be provided as necessary to enhance operational efficiency. The minimum quantities of front-line equipment will be provided to support MSW disposal operations at the facility. Sizes will vary with types and amounts of waste and work conducted on-site.

The following generally describes the functions of the heavy equipment listed below.

- Dozer – removing, replacing, moving daily and intermediate cover soils; repair berms, building and repairing roads
- Compactor – compacting waste and cover
- Motorgrader – building and repairing on-site roads and drainage features
- Water truck – dust control; transporting leachate; supplemental watering
- Scraper –moving gravel and soils for daily and intermediate cover soils, levees and berms.

Equipment requirements for MSW disposal and site support will vary in accordance with the method and scope of activities on site at any given time. Table IV.5.1 presents a range of equipment anticipated to be on-site at given rates of waste acceptance. This table represents anticipated equipment needs under normal operations. As operations evolve, there may be variances in the number and types of equipment maintained on site at a specific time. Special circumstances, such as a significant weather or other event may result in waste handling spikes that will result in equipment having to be used longer hours during the day to meet unexpected higher waste acceptance rates. The City will maintain minimum equipment in order to meet the requirements of the SOP.

Table IV.5.1: Equipment per Acceptance Rates

Equipment	1-100 tpd	101-1000 tpd	1001-2000 tpd	2001–3000 tpd	3001-4000 tpd
Landfill Compactor > 55,000 pounds	1	1	1	0	1
Landfill Compactor > 85,000 pounds			1	2	2
Tracked Dozer		1	1	2	2
Motor Grader	1	1	1	1	1
Scraper* (15 cubic yard heaped capacity)		1	2	2	2
Water truck >3000 gallons capacity	1	1	1	1	1
Water Pumps 3-inch or greater	1	1	1	1	1
Portable Litter Fence (feet)	100	200	300	350	400

* Or equivalent capacity of other earth moving equipment.

Additional backup equipment may be maintained at the facility or may be available from other city operations or equipment rental vendors within 24 hours notice.

The number, types and equipment manufacturers of the heavy equipment and miscellaneous vehicles and equipment may vary during the operations for the site based on operational needs and availability. The City has made arrangements for routine equipment maintenance and repairs and has identified sources to obtain additional equipment as necessary to avoid interruptions of waste services. Additional backup equipment may be maintained at the facility or will be available from other city operations or equipment rental vendors with 24 hours notice.

Equipment and vehicles may be owned, rented, leased or loaned. In addition to the equipment listed in Table IV.5.1, the Solid Waste Department, Fleet Services and other city departments will be providing a variety of other operations, service and support vehicles and equipment at the facility to conduct the day-to-day operations of the integrated solid waste management system. These may include miscellaneous pickups, vans, and other light utility vehicles, as well as, various pumps and instruments. Safety and training equipment will be available at the facility as necessary to support the various operations.

6.0 PERSONNEL TRAINING

Table IV.6.1 lists the qualifications and training requirements for various supervisory and operator positions as currently established by the City. All landfill personnel will receive appropriate training regarding City policies as required by City of Amarillo policies.

Table IV.6.1: Minimum Qualifications for Landfill Staff

TITLE	TRAINING	EXP.
Director of Public Works	Reg. Prof. Engineer	"A" Certified
Solid Waste Superintendent	"A" Certification	"A" Certified
Landfill Supervisor	"A" Certification Waste Screening	"A" Certified
Equipment Operator III	"C" Certification Waste Screening	"C" Certified

The training requirements and license requirements for various positions will meet TCEQ rules. At a minimum, the Landfill Supervisor will obtain the training listed in Table IV.6.1 or its equivalent within 12 months of job assignment or in the timeframe provided in the appropriate TCEQ rules. Landfill personnel are encouraged to receive training in Solid Waste Management for the A, B, and C certificate.

The Landfill Supervisor is responsible for determining the appropriate training for specific landfill personnel beyond those listed in Table IV.6.1. A training log is maintained and monitored on an annual basis to demonstrate that staff is receiving the appropriate levels of training. Each employee undergoes an annual review and this review will identify the anticipated training levels for the coming year. A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position will be provided.

Safety meetings are scheduled throughout the year. Training sessions shall be scheduled to allow uninterrupted site operations. Records of personnel attending each training session and the

topics covered will be maintained at the site. Topics for training may vary each month but must be conducted at least annually for: (1) fire protection, prevention and evacuation, (2) emergency response, (3) storm water management, (4) HAZCOM, and (5) personnel protective equipment. New landfill employees will be trained upon being hired to be able to respond to emergencies, including an understanding of unacceptable wastes, fire protection and general site safety.

Facility personnel must successfully complete a program of classroom instruction or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements of this SOP, specifically emergency procedures. The Director of Public Works will ensure that this program includes all the elements described in the SOP. This program is directed by the Solid Waste Superintendent and will include instruction that teaches facility personnel proper waste management procedures (including contingency plan implementation) relevant to the positions in which they are employed. At a minimum, the training program must be designated to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including where applicable: (a) procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment; (b) communications or alarm systems, (c) response to fires or explosions; (d) response to groundwater contamination incidents, and (e) shutdown of operations.

The training program will also include information sessions related to the identification of prohibited waste, hazardous waste and PCB waste. Site personnel will be trained on what acceptable and unacceptable wastes are, how to perform a random inspection, how to control site access, and what to do should unacceptable waste arrive at the site.

7.0 WASTE SCREENING – DETECTION AND PREVENTION OF DISPOSAL OF PROHIBITED WASTE, HAZARDOUS WASTE AND PCB WASTE

Incoming MSW should not contain materials which would violate the TCEQ regulations. These include regulated hazardous wastes and prohibited wastes, as defined in 40 CFR 258.20 Parts 261 and 761. In addition, a sign at the entrance displays the facility rules for waste.

7.1 Types of Waste Received

The facility is permitted to accept municipal solid waste resulting from or incidental to municipal, community, commercial, institutional, and recreational activities, including putrescible wastes, rubbish, ashes, brush, construction-demolition debris, and inert materials and Class II or III industrial wastes. Class II and Class III industrial wastes accepted include inert material. Class II and III waste acceptance will not interfere with site operations. Should conditions exist where these materials would interfere with operations, they will not be accepted.

Special wastes accepted include: sludge, dead animals, petroleum contaminated soils, health care related facility waste. The paint filter test will be utilized by the City to determine if stabilized sludge is acceptable. The facility will not accept any industrial hazardous (Class I), hazardous, radioactive, or liquid wastes; and will only accept Class I (non-hazardous waste) upon specific prior written approval from TCEQ. Any special waste received will be in strict accordance with TCEQ Municipal Solid Waste Management Regulations (MSWMR). All haulers must provide documentation in accordance with TCEQ MSWMR ensuring non-allowable materials are eliminated from their waste streams. The documentation must include identification and classification of all special wastes prior to disposal. This classification requires the generator to state the characteristics, origin and estimated quantity of special waste proposed for disposal. In addition, the generator must provide any other pertinent information regarding the waste that might aid in its identification. In some instances, as determined by the City, this information may entail sampling and analysis of a certified representative sample. Each generator is required to recertify every special waste they dispose of at this site at an interval not to exceed two years.

Any hauler which cannot provide the necessary documentation and certification shall be refused entry to the facility.

The following wastes are specifically excluded from the City of Amarillo Landfill.

- Liquid wastes
- Articles, equipment and clothing containing or contaminated with polychlorinated biphenyls (PCB's)
- Pumpings from septic tanks
- Grease/grit trap wastes
- Waste classified as hazardous by the TCEQ
- Waste oil, oil filters, batteries and tires not properly quartered, split or shredded
- Regulated Asbestos containing Material (RACM)
- Non-stabilized sludge

Other unacceptable wastes include lead acid storage batteries, used motor vehicle oil, used oil filters from internal combustion engines, whole used or scrap tires from cars or trucks, items containing chlorinated fluorocarbon (CFC) unless all CFC contained is properly managed, regulated hazardous waste as defined in TCEQ regulations and prohibited wastes. Used motor oil, oil filters and tires may be accepted and stored on-site until sufficient quantities are accumulated for shipment off-site for recycling and / or proper disposal.

7.2 Control of Incoming Wastes

Incoming wastes will be controlled in five ways so that the facility does not inadvertently receive waste materials which would violate the MSWMR. These techniques are described below.

The first level of control is conducted by the City collection vehicle drivers. These individuals are informed of the typical visible characteristics of special and hazardous wastes and which of their customers are likely to be generators of these wastes. Such materials, when identified by waste haulers, are not collected and notice is given to the generator what appropriate disposal options are available for unacceptable materials. Non-city haulers will be provided information

related to acceptable and unacceptable wastes, as well as their responsibilities if unacceptable waste is delivered to the site. In addition, rules for waste disposal and prohibited wastes will be prominently displayed on signs at the site entrance. Recyclable large and bulky items will be collected at the white goods collection area, west of the site entrance.

The second level of control is provided by an inspection program carried out at the transfer station as well as at the landfill. At the transfer station, a spotter trained to identify wastes that are unacceptable at the landfill will randomly select at least one percent of the commercial loads delivered to the transfer station for inspection. Selected vehicles will be directed to discharge their entire loads on a designated portion of the tipping floor where it is spread and visually inspected for non-allowable wastes. After the inspections have been completed on waste determined to be acceptable, the waste will be combined with the remainder of the waste stream for transfer to the landfill. Commercial loads are defined as those which have not been designated as primarily residential in nature based on the arrangement of routes to segregate commercial and residential loads.

The third level of control is exercised by informing the haulers using the landfill of what wastes will be and will not be accepted, and the particular requirements for their disposal. The customers served by the City should also be properly informed of the restrictions at the landfill.

The fourth level of control is provided by a Gate Attendant through the waste screening process. The Gate Attendant will be trained to recognize unauthorized wastes and in the proper methods of traffic control. The Gate Attendant will be alert for indications that non-allowable wastes may be present and be familiar with the rules and regulations governing what can and cannot be accepted into this facility. This includes a thorough knowledge of applicable sections of the state and federal regulations and a basic understanding of both industrial and hazardous waste generators and their associated transportation and disposal requirements. Particular things that will be given more careful examination will include barrels, liquids, TCEQ transporter numbers on trucks, or company names on trucks which could be industrial or hazardous waste generators or generators of non-allowable special wastes.

The fifth level of control is provided by the site spotter(s). This spotter may be a laborer or equipment operator trained to recognize unauthorized wastes and properly manage traffic. The spotter will be alert for indications that non-allowable wastes may be present in a load. They will be familiar with the rules and regulations governing what can and cannot be accepted into this facility. This includes a thorough knowledge of the MSWMR and a basic understanding of both industrial and hazardous waste generators and their associated transportation and disposal requirements. Particular items to be aware of are barrels, possible liquids, TCEQ transporter numbers on trucks or company names on trucks which could be industrial or hazardous waste generators or generators of non-allowable

Should any unacceptable or prohibited waste be observed or suspected, the material will be isolated if possible from the landfilled material. Once a suspected unacceptable waste has been isolated and secured, the Landfill Supervisor or designee will be notified to determine the proper course of action.

7.2.1 Unauthorized Disposal

In the event of a discharge of unauthorized wastes, including but not limited to hazardous waste or PCB waste, or wastes in an unauthorized location within the landfill, the City will employ equipment, personnel, and materials as necessary to control those discharged wastes and to remove them for disposal onto the active working face or other proper disposal location. Unauthorized wastes, hazardous wastes, or PCB waste shall be removed from the working face immediately upon discharge and returned to the transporter/generator. If the transporter/generator is unknown, the waste will be segregated, covered and stored in a roll-off container or other method as appropriate.

Upon determination of an unauthorized disposal of regulated hazardous waste, PCB waste or prohibited waste, the Executive Director will be notified within two weeks of the disposal. Any unauthorized disposal will also be included in the facility's annual report.

7.2.2 Inspections – Waste Screening

The Gate Attendant is trained to identify wastes that are unacceptable at the landfill and will randomly select vehicles to be screened for inspection prior to disposal. The Landfill Supervisor will direct a randomly selected truck to discharge its entire waste load adjacent to the working face. Waste will be carefully spread using suitable equipment. The Landfill Supervisor will direct a randomly selected truck to discharge its load adjacent to the working face. The City will exercise its ability to focus random inspections to non-city haul vehicles. City collection vehicles typically have their loads screened as they dispose of waste at the transfer station. The City will over the period of one year, randomly screen a minimum of one percent of all non-city vehicles using the landfill. If unacceptable waste is identified, procedures defined in the waste screening requirements of the SOP will be followed. Random inspections will be conducted 3 times per week at the landfill and the transfer station.

The functions of the landfill staff involved with waste screening include the following:

- The Gate Attendant directs the randomly selected loads to the inspection area and notifies the personnel that will perform the inspection.
- Spotters or equipment operators will inspect the randomly selected loads.
- The compactor operator views all loads as they are broken apart for compaction.
- The Solid Waste Supervisor or Landfill Supervisor are available to view any restricted materials and will advise on appropriate remedial actions needed.

7.2.3 Record Keeping – Waste Screening

The following records will be kept at the site to document load inspections.

- The date and time wastes were received for inspection
- Source of the wastes
- Vehicle and driver identification
- All observations made by the inspector
- Final disposition of waste after inspection

8.0 FIRE PREVENTION PLAN

If a fire occurs that is not extinguished within ten minutes of detection, the TCEQ regional office will be contacted by phone immediately after detection, but no later than four hours after detection, and in writing within 14 days with a description of the fire and the resulting response.

8.1 Fire Prevention

The following measures are taken by all landfill personnel to prevent fires.

- Incoming "hot loads" are identified, if possible, prior to being unloaded at the active face. The Gate Attendant and equipment operators must be alert for signs of hot loads, such as smoke, steam, or heat being released from incoming waste loads.
- A "no smoking" rule is rigidly enforced by all personnel and applies to anyone at the site.
- Fuel spills are contained and cleaned up immediately.
- Open burning is not allowed.
- Motorized equipment must not be parked near fuel stations longer than necessary for refueling.
- Dead trees, brush or vegetation adjacent to the landfill must be removed immediately. Grass and weeds must be mowed so that grass or brush fires cannot spread to the landfill.
- The City will use limited amounts of high pressure hot water or steam to remove combustible waste and caked material that may cause equipment overheating. Use of water or steam for equipment used on the working face will be limited to equipment specifically designed for landfill operations.

8.2 Fire Control

The Potter County Fire Department Central Fire Station will be contacted any time a fire which cannot be extinguished in ten minutes occurs on-site. This station is located at:

2301 E. Willowcreek

Amarillo, TX 79108

Phone: 911 for emergencies

The City will coordinate a meeting with the City of Amarillo Fire Department to discuss fire control, prevention and fire management at least once per year.

8.2.1 Specific Fire-Fighting Procedures

- If the fire is contained within a vehicle or piece of equipment, the first step is to bring the vehicle or equipment to a safe stop, away from fuel supplies, the active fill area, uncovered solid wastes, and other vehicles. Shut off the engine and engage brake or other method to prevent subsequent movement of the vehicle.
- Fire fighting methods include smothering with soil, separating burning material from other waste, and spraying with water from a water truck. If detected soon enough, a small fire may be fought with a hand-held extinguisher. Any water used in fire fighting will be and must be treated as contaminated or uncontaminated storm water, as appropriate.
- If the fire is in the working face, the burning area should be isolated or pushed away from the other waste material quickly before the fire can spread throughout the working face. If this is not possible or unsafe, efforts to cover the working face with earth must be initiated immediately to smother the fire.
- If the area of burning waste is small (e.g., an area of 10 feet by 10 feet or less) and is a surface fire, it will be extinguished using a fire extinguisher located on the equipment at the working face. After the fire is extinguished, the affected portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Inspection of the fire area will be conducted by the Landfill Manager or his designee.
- The burning waste material will be removed (i.e., "cut out" of the working face by a dozer or similar equipment) from the working face to an area where it can be covered with 6-inches of soil. The water truck may also be used to extinguish the burning waste. The working face area in which the burning waste was removed will be covered with 6-inches of soil. The affected portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Water that is used to fight the

fire will be contained by the contaminated water containment berm. Contaminated water will be managed as specified in Part III, Attachment 15 – Leachate and Contaminated Water Plan. Inspection of the fire area will be conducted by the Landfill Manager or his designee.

- The burning waste material within the working face will be sprayed with water from one of the water trucks (or tanks) stationed at the working face. The working face area which contained the burning waste will be covered with 6-inches of soil to smother the fire. Upon extinguishing a fire at the working face through smothering with soil, that portion of the working face will remain closed while the area is inspected to verify the fire is completely extinguished. Inspection of the fire area will be conducted by the Landfill Manager or his designee. Water that is used to fight the fire will be contained by the contaminated water containment berm. Contaminated water will be managed as specified in Part III, Attachment 15 – Leachate and Contaminated Water Plan.

In each case listed above, the Landfill Manager or his designee confirms that the fire has been extinguished, and then waste filling operations in that area may resume. In the event that the fire cannot be controlled using the methods above, the local fire department will be called at 911.

8.2.2 General Rules for Fires

Immediately call the City of Amarillo Fire Department (911) regardless of the apparent extent of the fire.

- For fires in unknown materials, call Chemical Transportation Emergency Center (Chemtrec), 1-800-424-9300.
- Alert other facility personnel.
- Assess extent of fire and possibilities for the fire to spread.
- If it appears that the fire can be safely fought with available fire fighting devices until arrival of the Fire Department, attempt to contain or extinguish the fire.
- Upon arrival of the Fire Department personnel, direct them to the fire, and render any assistance they may request.

- Do not attempt to fight a fire alone.
- Be familiar with the use and limitation of fire fighting equipment.
- The maintenance building has a fire alarm and fire extinguishers specifically designed for the types of materials stored in the facility.

8.3 Stockpiling of Fire-Fighting Materials and Water Truck Requirements

Generally, the fire-fighting technique most commonly employed to fight landfill fires is smothering with soil. The faster that stockpiled soil can be placed over the fire, the more effective this method will be in controlling and extinguishing the fire. Enough cover soil will be stockpiled within 2500 feet of the working face to cover it to a depth of 1 foot as an aid to fighting fires. Typically, the working area will be limited to an area approximately 5600 square feet in size. Assuming one-half foot of soil over an area of 5600 square feet, approximately 104 cubic yards of soil will be maintained with 2,500 feet of the active area. As the working face either expands or becomes smaller, the stockpile size will be adjusted. The following equation will be used to determine the size of the stockpile.

1 foot * working face surface area * (1 cy / 27 ft) = cubic yards of soil

Sufficient equipment is available on site to provide a minimum of six inches of soil over the working face in the event of a fire; however, this is not always deemed to be the most appropriate method for fire control. Under most circumstances, when the fire is limited to a small area of the site, material that is on fire will be removed from the working face to limit the size of the fire. Once removed, the fire can be extinguished using soil, fire extinguishers, or water from the water truck. If the fire becomes too large for control using these methods, the fire department will be notified immediately.

Below is a calculation of the City's ability to place six inches of material over the normal working face which is typically 75' x 75'.

Calculation Assumptions:

1,000 tons per day

1,200 lbs / cubic yard = 1667 cubic yards / day = 45,000 cubic feet

Waste lift thickness = 10'; Area = 4,500 square feet

Amount of soil required = surface area (75'*75') * cover thickness (.5') = 104 cubic yards

15 cubic yards per load = 7 loads

10 miles per hour = 880 feet / minute

7 loads @ 2,500' * 2 way = 35,000 ft / 880 ft per minute = 39.7 minutes which is less than the required 60 minutes.

The site must be provided with fire extinguishers of a type, size, location and number as recommended by the local Fire Department or the insurance carrier for the City. Fire extinguishers must be fully-charged and ready for use at all times. The Landfill Supervisor shall be notified when any fire extinguisher is discharged so that it may be refilled. At a minimum, fire extinguishers will be located at the Gate House and at the Maintenance Area. Additionally, fire extinguishers will be provided for all equipment.

The staff will be trained annually in fire protection and containment techniques and will be advised of the procedural listing in this document.

As specified below, a water source will be maintained at each working face (either a water truck or storage tank). The water truck or tank will be equipped with a water cannon and positioned to assist with the fighting of any potential working face fire. Water for fire control will be obtained from on-site sources.

Maximum Working Face Size (width by length)	**No. of Water Trucks or Tanks (minimum capacity of 2,000 gallons)**
150 feet by 175 feet (or 26,250 sf)	1
250 feet by 325 feet (or 81,250 sf)	1

9.0 ACCESS CONTROL

9.1.1 Site Security

Site security measures are designed to prevent unauthorized persons from entering the site, to protect the facility and its equipment from possible damage caused by trespassers, and to prevent disruption of facility operations caused by unauthorized site entry.

To prevent inadvertent unauthorized entry, conspicuous warning signs legible from a distance of at least 25 feet, will be placed at intervals on the fences surrounding the site. These signs will state "NO TRESPASSING". A barbed wire fence will be maintained to fully enclose the permitted site. Periodic inspections of the fence and any constructed earthen berms used for access control will be made to ensure their integrity.

The unauthorized entry of persons into the site will be minimized by controlling vehicular access to the landfill site with barbed wire fences. There is only one public access road to the site. A gate attendant will control vehicle access to the site when the landfill is open.

During normal site operating hours, facility personnel in the vicinity of the operational area and the entrance can observe any unauthorized persons in these areas. Outside normal operating hours, the gate to the site is locked.

Entry to the active portion of the site will be restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by site management. Visitors may be allowed on the active area only when accompanied by a site representative.

Perimeter fences will be inspected at least on a monthly basis. Records of these inspections will be kept in the Site Operating Record.

During operating hours, facility personnel will regularly watch for unauthorized individuals in the vicinity of the working face and at the site entrance, as well as any other areas of the site visited during the normal course of carrying out their duties.

Should an access control breach occur, a report will be filed with the regional TCEQ office. If any damage is done to a fence or other non-natural barrier, repairs will be accomplished in accordance with the following table.

Table IV.9.1: Breach Repair Timetable

Requirements	Access Breach Repaired within 8 hours	Access Breach Not permanently repaired in 8 hours
Notify TCEQ regional office of breach and repair schedule	Not required	Within 24 hours
Make temporary repairs	Not required	Within 24 hours
Make permanent repairs	Within 8 hours	Within schedule submitted to TCEQ regional office in initial notice
Notify regional office when permanent repair completed	Not required	When repair is completed

9.1.2 Vehicle Access

Access to the site is from South Hill Road, which is maintained by the City and the County. The public access roads to the landfill are paved, all-weather roads.

All waste-hauling vehicles deposit their loads at the working face. Only vehicles authorized by the Director of Public Works or Solid Waste Supervisor or Landfill Supervisor, landfill construction vehicles, landfill personnel vehicles, and authorized haul vehicles have access beyond the scale house/entrance facility. Only vehicles authorized by the Landfill Supervisor or designee, and authorized haul vehicles are allowed access to the working face.

Solid waste transportation vehicles arrive at the working face at random intervals. Often there are a number of vehicles unloading waste at the same time, while other vehicles are waiting. Operations at the working face will be conducted in a manner which will encourage the efficient

movement of transportation vehicles to and from the working face. Operational procedures will be established to expedite the unloading of solid waste.

The approach to the working face will be maintained such that two or more vehicles may safely unload side-by-side. A vehicle turn-around area large enough to enable vehicles to arrive and turn around safely with reasonable speed will be provided adjacent to the unloading area. The vehicles will back to a vacant area near the working face to unload. Upon completion of the unloading operation, the transportation vehicles will immediately leave the working face area. Landfill personnel will direct traffic as necessary to expedite safe movement of vehicles.

No scavenging or loitering will be permitted at the landfill working face. Items that are set aside for recycling (scrap tires and white goods) will be removed often enough to prevent them from becoming a nuisance and preclude discharge of pollutants to the environment.

Signage will provide direction to customers and the public to the public entrances of the landfill. Additional signage within the facility will provide direction to public unloading areas.

9.1.3 All-Weather Access

The existing site entrance is a paved-asphalt driveway that transitions into a crushed stone road. Site personnel maintain the crushed stone on-site roads for all-weather access. The entrance to the facility, and all interior access roads leading to the active face, are all-weather roads. If conditions prohibit access to the active fill face during inclement weather, an all-weather access area will be constructed near the working face of the active area. A separate wet-weather area may be designated by the Landfill Supervisor and continually maintained for this purpose. Haulers will dump waste at the edge of the designated wet weather area and allow the Equipment Operators to push the waste into the fill.

9.1.4 Traffic Control

The gate attendant and appropriate signs will direct vehicles to a special unloading area near the site entrance for the unloading of white goods for recycling.

The approach to the working face will be maintained so that two or more vehicles may safely unload side-by-side. A vehicle maneuvering area to allow vehicles to arrive and turn around safely will be provided adjacent to the unloading area. The vehicles will be directed back into an unoccupied area at the working face area to unload. In the first lift on the Leachate Collection System protective cover, trucks will unload at the top of the face. After unloading, the vehicle will immediately leave the working face area. Metals and white goods recovered as part of the on-site recycling program will be stored away from the working area in order to reduce interference with vehicles or disposal operations.

On-site roads will be constructed of asphalt, crushed rock, gravel, recycled shingles (no nails), or other suitable all-weather material, and maintained so that access is available to the normal operating area at all times. On-site roads will be free draining, passable in two directions, and free of excessive ruts. Non-paved roadways will be re-graded on a monthly basis, or as needed, to allow for adequate drainage, be passable and free of excessive ruts. Paved roads will be inspected monthly to determine if any major re-grading is required. If re-grading is required, the City will take necessary steps to repair roadways.

10.0 OPERATING PROCEDURES

10.1 Unloading of Waste

The facility will accept general municipal solid waste as well as brush, rubbish, construction/demolition waste and certain special wastes. No industrial hazardous or Class I hazardous wastes will be allowed for disposal at the facility.

The landfill is authorized to receive municipal solid waste and those solid wastes allowable under 30 TAC 330.136 of the Municipal Solid Waste Management Regulations (MSWMR). In accordance with 30 TAC 330.136 and 330.137 of the MSWMR, the landfill is authorized to receive the following special wastes (subject to the provisions of 330.136 and 330.137).

- Dead animals and slaughter house waste
- Empty triple rinsed containers that have been used for pesticides, herbicides, fungicides, and rotentcides
- Grease trap and grit trap waste
- Waste water treatment sludge
- Contaminated soil (TPH<1500 ppm)
- Non-regulated asbestos-containing materials
- Waste generated from oil, gas and geothermal activities
- Treated special waste from healthcare-related facilities

Should a specific waste require disposal that is not specifically listed in 30 TAC 330.136, a request will be made to the TCEQ in accordance with 30 TAC 330.136 (a)(2). An approval letter from the TCEQ will be required prior to accepting any such waste for disposal. Trained personnel, familiar with the rules and regulations governing the various types of waste that can or cannot be accepted into this facility, including knowledge of 30 TAC 330.136 and 330.137 of the MSWMR, monitor the incoming waste. These personnel also have a basic understanding regarding industrial and hazardous waste and their transportation and disposal requirements.

The City will continue to maintain an on-going waste screening program. The City conducts periodic inspections of solid waste to determine if acceptable waste is being brought to the facility. The City begins its waste screening program at the point of collection. The majority of waste currently accepted at the landfill is brought to the site in City-owned vehicles. Collection staff are provided with training on what are acceptable and unacceptable wastes. If identified at the point of collection, the owner is notified that the waste is not acceptable and it is not collected.

All landfill personnel are trained in understanding acceptable and unacceptable wastes. Periodic screenings of waste entering the site are conducted by site personnel. A waste screening report is completed when the screening is undertaken. Inspections are conducted randomly.

10.2 Working Face

Solid waste entering the landfill will be directed to the working face by the Gate Attendant. Portable signs and/or barricades will be positioned to direct vehicles from the entrance area to the active area. Solid waste unloading at the working face is directed by landfill personnel to prevent disposal in locations other than those specified.

The Landfill Supervisor will attempt to confine the working face to a minimum width, yet allow safe and efficient operations. The width and length of the working face will be maintained as small as practical, typically less than one-half acre, in order to maintain the appearance of the site, minimize windblown litter, minimize stormwater infiltration into the waste, and minimize the amount of daily cover required each day. The typical size of the working face will increase proportionally if the quantity of waste disposed per hour of operation increases. The size of the working face will also increase depending on daily waste acceptance rates delivered to the facility. Normally, only one working face will be active on any given day, with all the deposited waste in other areas covered by daily, intermediate, or final cover, as appropriate.

Table IV.10.1: Varying Sizes of Working Face Due to Throughput Considerations*

Tons/Day	1-100	101-1000	1001-2000	2001-3000	3001-4000
Square Feet	20-450	450-4,500	4,500-9,000	9,000-13,500	13,500-18,000

*Assumes 10' lift, however City may operate lifts as high as 15 feet

+Assumes 1200 lbs/cubic yard waste density

Under conditions caused by extraordinary events, the working face may increase in size, but landfill staff will work to reduce the working face by working additional hours or the Director may seek additional staff and equipment to properly manage the waste stream. When additional operating hours are required, TCEQ regional staff will be notified.

10.2.1 Waste in Unauthorized Areas

In the event of a discharge of wastes in an unauthorized location within the landfill, the City will employ equipment, personnel, and materials, as necessary, to control these discharged wastes and move them to the proper disposal area. Depending on the quantities of the waste disposed in an unauthorized area, the waste may either be moved via a front-end loader directly to the appropriate disposal area, or be loaded into a truck and moved to the appropriate disposal location.

10.2.2 Unauthorized Waste

In the event of a discharge of unauthorized wastes at the landfill, the City will employ equipment, personnel, and materials as necessary to move them to a proper disposal site. Unauthorized wastes shall be removed from the working face immediately upon discharge and placed back in the offending transporter's vehicle, if possible. Unauthorized waste will be isolated from the remaining waste and contained to the extent possible. If replacing the material in the offending transporter's vehicle is not possible, the unauthorized waste will be placed in a suitable location until removal from the facility for proper disposal.

10.2.3 Disposal of Appliances

Any large white goods that may include refrigerators, washers, dryers or freezers will be disposed at the area across from the facility entrance. The area is approximately 80' x 100'. The trained scale operator will direct individuals hauling such materials to the appropriate disposal location and visually monitor the disposal of these materials. The City will dispose of these in accordance with the requirements of Section 17.0 Disposal of Large Items.

10.2.4 Disposal of Scrap Tires:

The city will also maintain an area for the disposal of scrap tires in the same location as the area used for the disposal of appliances. The scale attendant will be responsible for directing haulers or residents to the appropriate area for disposing scrap tires. The city may then either quarter or shred the tires and dispose of them in the landfill, or recycle the scrap tires.

HOURS OF OPERATION

Public access to the site for waste disposal will be limited to the following schedule.

Public Access Hours

	April through October	November through March
Monday through Friday	8:00 am - 7:00 pm	8:00 am - 5:00 pm
Saturday	8:00 am - 5:00 pm	8:00 am - 5:00 pm
Sunday	1:00 pm - 5:00 pm	1:00 pm - 5:00 pm
Closed Sunday (Dec. - Feb.)		

Hours for the City of Amarillo collection and transfer vehicle waste acceptance will be limited to the following hours.

City Collection / Transfer Vehicle Acceptance Hours

	April through October	November through March
Monday through Friday	6:30 am - 12:00 am	6:30 am - 10:00 pm
Saturday	7:30 am - 7:00 pm	7:30 am - 7:00 pm
Sunday	12:00 pm - 6:00 pm	12:00 pm - 6:00 pm

Landfill operating hours will be 24 hours per day for cover activities, site and equipment maintenance, waste compaction and cell final and intermediate cover construction. During normal site operating hours, facility personnel in the vicinity of the operational area and the

entrance can observe any unauthorized persons in these areas. Outside normal operating hours, the gate to the site will be locked.

Alternate waste acceptance hours and alternate operating hours may be required for the five working days following Christmas. For these days, both public acceptance and City of Amarillo collection / transfer vehicle acceptance times will be extended by 2 hours.

Entry to the active portion of the site will be restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by the site management. Visitors may be allowed on the active area only when accompanied by a site representative.

12.0 SITE SIGNAGE

A 4 foot by 4 foot sign is located at the entrance to the landfill. The sign indicates the hours of operation and the phone number of the Emergency Fire Department.

Rules for waste disposal are also prominently displayed on a sign, the size to be at least 4 foot by 4 foot using minimum 3 inch letters at the facility entrance. The sign clearly states the site rules. Rules posted will address the following topics.

- Operating hours.
- Landfill type.
- Landfill permit number.
- Surcharge for improperly covered or secured loads.
- 24 hour contact phone number for emergencies call 911.
- Emergency Fire Department's phone number.

Anyone observed violating the site rules will be immediately contacted by site personnel, who will secure their compliance or cause their eviction from the site.

13.0 CONTROL OF WINDBLOWN WASTE AND LITTER

Litter will be controlled through several methods, including proper unloading, compaction, and cover procedures; use of portable litter control fences; orientation of the working face relative to the prevailing wind direction; placement of screening berms, stockpiles, and adequate staffing for litter control.

Except in the first lift or layer, waste hauling vehicles will generally be unloaded either at the bottom or top of the working face, or toe of the lift. Compactors, or dozers, will move the waste to the working face and spread and condense the newly deposited waste in a thin layer for compaction as quickly as possible after unloading. The procedure will be consistent with the safe movement of vehicles as determined by the Landfill Supervisor. Waste will be placed in layers generally no more than two feet thick before being compacted.

Alternate daily cover such as tarps, slurries or other approved systems will be used to conserve cover soil and control litter. Daily cover will be placed in areas of the working face that reach lift height.

Litter pickup will be undertaken daily on days the facility accepts waste. Litter collection will be made at the gate, along fences and along the route to the landfill along Hill Road. Hill Road is a county-owned road; therefore, Potter County has ultimate responsibility for the road's maintenance and upkeep. However, on a daily basis, City crews collect litter on Hill Road for a distance of two miles from the facility entrance. The specific route that will be maintained includes Hill Road and the entrance road into the landfill and within the boundary of the facility. The Landfill Supervisor is responsible for securing the labor force required to meet the litter control requirements of the MSW regulations. Refer to Section 16.0 Materials along the Route to the Site for a figure illustrating areas where litter will be collected.

Portable litter fences will be placed as necessary around the active area to contain blowing trash. Other litter control methods will be used if necessary to control excessive blowing litter.

Berms along the perimeters of the site at the top of the highest lift may be used to provide visual screening of the active working face and an additional means of containing windblown litter. Perimeter fences and landscaping will provide additional safeguards against litter leaving the site.

Table IV.13.1: Control of Windblown Material

Litter Control Measure	Frequency
Portable Fences	Ongoing
Other Measures Required	Ongoing
Berms	Ongoing
Perimeter Fences	Ongoing
On-site Litter Pickup	Day of Waste Acceptance
Litter Pickup along Route	Day of Waste Acceptance

14.0 EASEMENTS AND BUFFER ZONES

No solid waste unloading, storage, disposal or processing operations shall occur within 25 feet of the center line of any utility line or pipeline easement that crosses the site.

Buffers are established as a separation from the property boundary and the nearest point of waste disposal. Buffers provide space for the movement of fire fighting vehicles and other emergency vehicles on a perimeter road, drainage structures, berms and landscaping, as necessary for visual screening. Other facilities such as temporary leachate storage tanks, force mains, scales, and maintenance facilities may be located in the buffer area.

Buffer zones generally range from 100 feet to 900 feet along the border of the landfill. Figure IV.1.1 illustrates the location of the buffer areas along the site's boundary.

15.0 LANDFILL MARKERS AND BENCHMARK

A permanent benchmark is established at the site at an elevation of 3808.65 and geographic coordinates of N 35° 13.48' W 102° 01.03' in an area that is readily accessible and will not be used for disposal. Additionally, three Global Positioning System (GPS) control coordinates are located on the facility.

Landfill markers have been installed to mark significant features of the landfill clearly, in compliance with the appropriate solid waste regulations. The markers are installed at locations visible during operating hours. Should the markers become damaged or lost, then they will be repainted or replaced within 15 days to retain visibility. The marker system is generally described below. Markers will be inspected monthly.

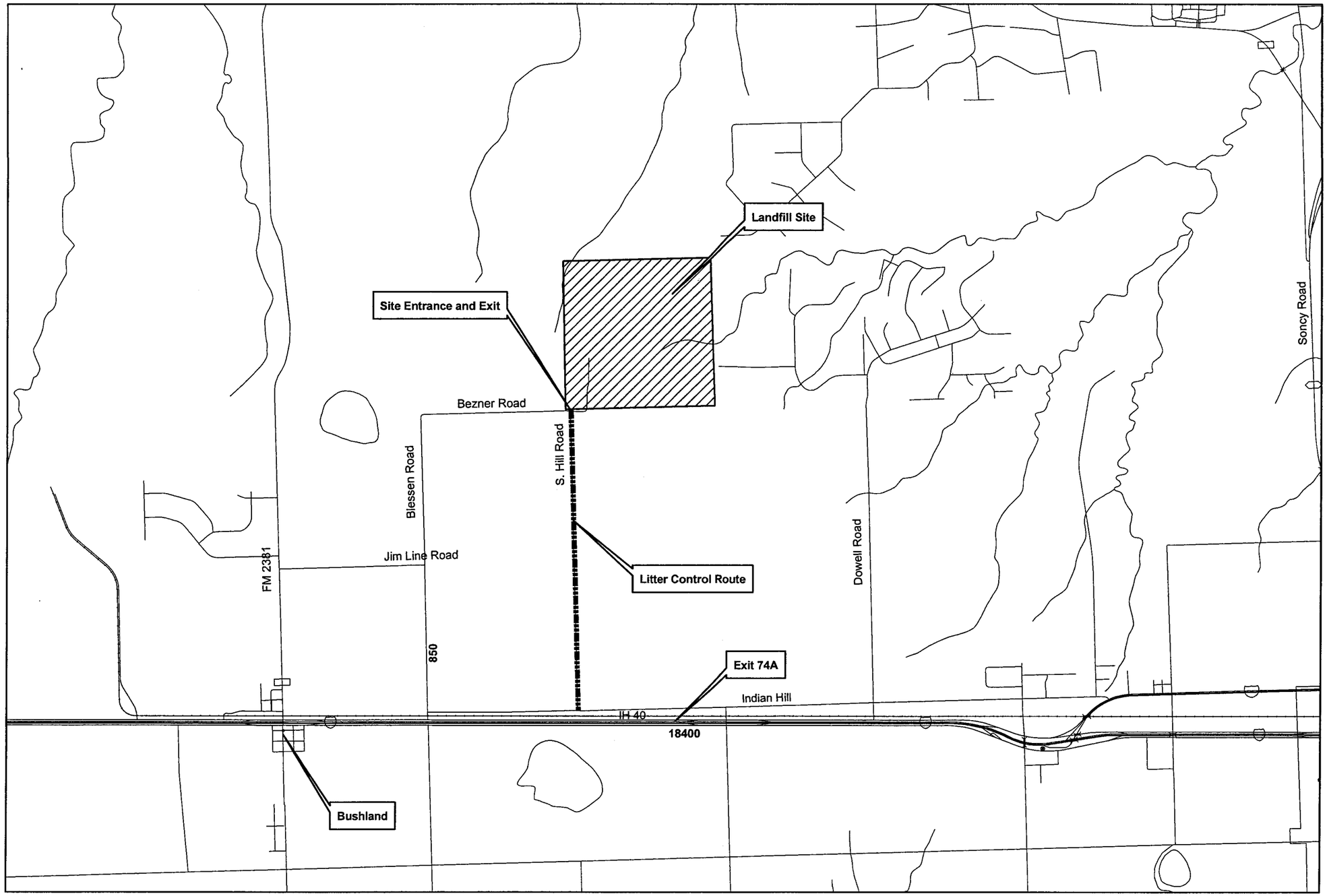
All markers shall be steel, wooden or fiberglass posts and shall extend at least six feet above ground level. The markers shall not be obscured by vegetation. Markers shall be color coded as described below.

- Black - boundary markers. The boundary markers are placed at each corner of the site and along each boundary line at intervals no greater than 300 feet. Fencing may be placed within these markers as required.
- Yellow - buffer zones. The buffer zone markers are placed along each buffer zone boundary, at all corners and between corners at intervals of no more than 300 feet.
- Green - easements and rights-of-way. Easement and right-of-way markers are placed along the boundaries of the easement and rights-of-way at the intersection of the site boundary.
- White - landfill grid. The landfill grid system encompasses at least the area expected to be filled within the following three year period. Markers are spaced no greater than 100 feet apart, measured along perpendicular lines. Intermediate markers are installed if necessary to allow visibility from opposite boundaries. The grid system encompasses, at a minimum, the area to be worked for the next three years.

- Red - approved SLER areas. The SLER or GLER markers are placed so that all areas for which a SLER or GLER has been submitted and approved by the Commission are readily determinable. These markers are located so that they are not destroyed during operations or until operations extend into the next area, and provide site workers immediate knowledge of the extent of approved disposal areas. The location of the markers is tied into the landfill grid system and reported on each SLER or GLER submitted.

16.0 MATERIALS ALONG THE ROUTE TO THE SITE

Any litter which leaves the site will be removed on a daily basis either by City personnel or through contract labor around the entire site perimeter and for a distance of two miles from the site entrance along access roadways. The City will coordinate with the County regarding daily litter pick-up and maintenance of the access roads to the site. Periodic correspondence will be undertaken to determine road maintenance requirements and responsibilities. Figure IV.16.1 illustrates the roadways that will be maintained as part of the litter control plan. To reduce litter, the majority of waste accepted at the site is delivered in transfer trailers.



Legend

- Roads to have daily litter pick-up
- Landfill Boundary
- Roads
- **18400** Annual Traffic Counts

Notes:
1. Maping Images are TxDOT raw data provided bt TNRIS. Date: Approximately 1995-1996.
2. All access roads consist of concrete or two-course asphalt over crushed stone base.

STATE OF TEXAS
MITCH R. DAVISON
90908
LICENSED
PROFESSIONAL ENGINEER
5/9/2006

Source: TXDOT, May 2005

CITY OF AMARILLO TEXAS

HDR Engineering, Inc.

Issue	Date	Description

Project Manager	M. Davison
Civil	M. Oden
Project Number	23358-037

CITY OF AMARILLO LANDFILL
MSW PERMIT NO. 73A
POTTER COUNTY, TEXAS

LITTER CONTROL ROUTE

Coordinate System: UTM Zone 13 N

0 500 1,000 2,000 Feet

File Name

Sheet **IV.16.1**

17.0 DISPOSAL OF LARGE ITEMS

Large items will be recycled when possible and placed in a designated area. If disposed, they will be reduced in size at the working face to the extent practical. Large and bulky items, including brush will be disposed near the bottom of the fill face. Items that can be classified as large, heavy, or bulky can include, but are not limited to, white goods (household appliances), air conditioner units, metal tanks, large metal pieces, large pieces of brush and automobiles. Special care will be taken to achieve the maximum practical compaction of these items prior to placement of the next layer of waste in the lift. Large items including appliances will be removed at least monthly to eliminate the potential from these materials from becoming a nuisance. Scrap tires will be removed from this area every two weeks. Tires and appliances will be managed in a manner to reduce and eliminate possible ponding of water to eliminate the potential for creating conditions conducive to the disease vectors becoming an issue. Special care will be taken while disposing these materials so that the liner is not damaged while this material is disposed. These materials will not be placed within the first five feet above the liner or sidewalls.

Appliances containing chlorinated fluorocarbons (CFCs) must be handled in accordance with 40 CFR 82.156(f). Appliances with CFC will be separated from the municipal solid waste stream and set aside. A certified contractor or properly trained and certified staff member will remove the CFC. Once the CFC is removed, the appliance may either be disposed in the landfill or recycled.

18.0 AIR CRITERIA

State and/or Federal regulations may require that an active landfill gas collection and control system be installed at the landfill to control emissions. The City will design and install a gas collection and control system within the compliance schedules of applicable regulations.

18.1 Odor Control Plan

For odor control, the City will undertake a number of measures from the point of accepting waste to final cover of the waste.

18.1.1 Waste Acceptance

The Gate Attendant will be responsible for identifying any wastes which may pose an odor problem. The gate attendant will notify the Landfill Supervisor or designee that a load requiring special management is entering the facility. The spotter will be responsible for directing that waste to the working face, where it will be disposed and covered promptly with solid waste or soil.

18.1.2 Working Face

Waste disposal operations will be maintained in limited areas during operations, thereby exposing as little waste as possible to the open air. Waste will be disposed of promptly into the working face of the landfill. Any waste identified by the gate attendant, spotter or equipment operator as having special odor concerns, such as grease, grit trap wastes, dead animals or other similar wastes will be managed as timely as possible and typically covered with MSW and/or cover as these materials are identified.

Waste will be covered on a daily basis. If ADC is used, and significant odors are detected, the use of ADC will be re-evaluated by landfill staff.

18.1.3 Leachate Management

Leachate will be collected into trucks and hauled to an appropriate treatment facility. The frequency of collection will be dictated by the quantities generated, but not any less than once per month.

18.1.4 Ponded Water

Ponded water will be kept to a minimum on the site as a means of reducing both vectors and odors. The Landfill Supervisor will periodically evaluate site conditions and where ponded water is identified, appropriate measures will be undertaken to reduce or eliminate ponding on site. This is further discussed in Section 27.0.

18.1.5 Intermediate and Final Cover

The intermediate and final covers will be evaluated on a periodic basis per the final cover plan and any erosion that may have occurred will be repaired in accordance with either the final cover or post-closure care plans.

18.1.6 Sludges

When waste water treatment plant sludge is accepted, the material will be disposed in a manner that allows for immediate covering by other MSW. To the extent practical, sludge will not be disposed at the end of the day. Daily cover will be applied over all of the waste, including sludge at the end of the day. If sludge is disposed as one of the final loads of the day, soil will be used as cover for the sludge if an alternative daily cover material is used for the other wastes.

18.1.7 Medical Waste

Only treated medical wastes are accepted at the landfill. When they are accepted, the material will be disposed in a manner that allows for mixing with other MSW. To the extent practical, medical wastes will not be disposed at the end of the day. Daily cover will be applied over all of the waste, including medical waste at the end of the day. If medical wastes are disposed as one

of the final loads for the day, soil will be used as cover for the treated medical wastes if an alternative cover material is used.

18.1.8 Other Odor Control Measures

Other measures that the City will take to control air pollution at the landfill include:

- No open burning will occur at the site except as approved by the Executive Director
- Extremely wet waste will be promptly covered with daily cover; and
- Accidental fires are controlled as outlined in the Fire Protection Plan

Special waste disposal will follow handling requirements as outlined in 30 TAC 330.136 or as directed by the special waste authorizations obtained from the Executive Director. To our knowledge, there are no other areas of the landfill that have special odor control issues than those listed above.

19.0 DISEASE VECTOR CONTROL

The need for extensive vector control (control of rodents, birds, flies, and mosquitoes) will be minimized through proper site operation, including on-going compaction and application of daily cover. The primary method for vector control is proper cover. If insects or rodents become a problem, insecticides and/or pesticides will be used to eliminate the vector problem. A licensed pest control professional will be utilized if necessary. Birds are not a problem at the current landfill operation. If the incidence of birds at the landfill increases and further bird control is warranted, a program of bird deterrence using appropriate landfill bird control techniques will be developed. Any ponded water at the site shall be controlled to avoid its becoming a nuisance and attracting vectors.

20.0 SITE ACCESS ROADS

20.1 All-weather Access

The entrance area and approximately 5,500 feet of the on-site haul road from the scale to the working face are asphalt paved. Haul roads to the working face will be constructed of an all-weather surface such as asphalt, crushed rock, gravel, or other suitable materials. These roads will be maintained so as to provide suitable access in all weather conditions. The location of these roads will vary depending on the progress of cell construction.

The roads leading to the citizen's drop-off area, when constructed, will be paved.

20.2 Maintenance and Control of Dust, Mud, and Litter on On-site Roads

Those portions of the on-site haul roads which are paved with asphalt do not generate significant dust from moving vehicles. Dust will be controlled as needed by spraying the haul roads and frequent equipment routes with water using the on-site water truck. Other methods of dust control include establishing intermediate and final cover as quickly as possible after interim or final completion of an area.

The City will remove mud from the paved on-site haul road and public roadways daily on days that mud is being tracked off site to prevent accumulation of mud and slippery conditions. Trucks using the landfill will have to travel over approximately 5,500 feet of on-site, paved roadway before leaving the site (this will vary depending on the location of the wet weather area). This distance will provide opportunity for a majority of mud collected on vehicles to be left on-site before the truck exits the facility. The City will utilize a water truck to wash away any mud that may accumulate on off-site access roads. City hired laborers will be responsible for the collection of any litter that may be associated with mud from trucks using the site.

Litter control requirements applied to entering vehicles and prevention and control of windblown litter at the working face will minimize litter on the site. Litter will be picked up at least daily

and properly disposed. The City will maintain adequate staffing, either using City personnel or contract labor to keep the site, including on-site roads free of litter.

21.0 SALVAGING AND SCAVENGING

For the purposes of this SOP, salvaging is considered to be the organized removal of materials from the working face or waste hauling vehicles for reuse or recycling. Scavenging is considered to be searching for and removing materials from the waste deposited at the working face. Salvaging will be conducted only by City personnel or City-authorized agents, and will be confined to predetermined areas. Salvaging will be limited to the white-goods salvaging program, tires diverted from the working face, and other similar, organized salvaging activities which do not interfere in any way with the safe and efficient operation of the site. Scavenging will not be permitted.

The quantities of salvageable materials collected at the landfill will vary considerable from time to time. The city will remove salvageable materials as often a required to prevent nuisances from occurring in accordance with 330.124.

22.0 ENDANGERED SPECIES PROTECTION

There are no identified threatened or endangered species or critical habitats for such species on the site. This facility, nor its operation, will result in the destruction, or adverse modification of any critical habitat of endangered or threatened species, or cause the taking of any endangered or threatened species.

23.0 LANDFILL GAS CONTROL

The Landfill Gas Management Plan (LGMP) is found in Part III, Attachment 14. It has been developed in accordance with 330.56 and will be adhered to during the operation of the landfill. The gas control plan included in Part III, Attachment 14 also identifies specific operating practices for managing landfill gas. Specific operating procedures that are defined with LGMP are:

1.0 INTRODUCTION
2.0 BACKGROUND INFORMATION
  2.1 General
  2.2 Site Information
3.0 LANDFILL GAS
4.0 LANDFILL GAS MONITORING
  4.1 Proposed Landfill Gas Monitoring Procedure
  4.2 Schedule for Installation of Monitoring Elements
  4.3 Plan Implementation Schedule
  4.4 Maintenance and Calibration of Monitoring Elements
5.0 CONTINGENCY PLAN
  5.1 Contingency Plan Guidelines
  5.2 Verification Procedures
  5.3 On-Site Structures Monitoring
  5.4 Facility Property Boundary Monitoring
  5.5 Underground Utility Trench Vent Monitoring
6.0 LANDFILL GAS CONTROL SYSTEM INSTALLATION AND MONITORING
7.0 SAFETY

List of Appendices

Appendix 14A – Proposed Gas Monitor Probe Location Map
Appendix 14B – Typical Detail of Gas Probe & Utility Vent
Appendix 14C – Example – Landfill Gas Monitoring Report
Appendix 14D – Proposed Passive Gas Relief Well System, May 2000

List of Figures in Appendices

Figure III.14A.1 – Proposed Gas Monitor Probe Location Map
Figure III.14B.1 – Utility Vent Details
Figure III.14B.2 – Landfill Gas Probe Details

23.1 Introduction

The purpose of this Landfill Gas Management Plan (LGMP) is to provide a guide to management practices for the monitoring and control of landfill gas (LFG) generated by the City of Amarillo Municipal Solid Waste Landfill (MSW Permit No. 73A). This plan was developed in accordance with the requirements of the Texas Commission on Environmental Quality (TCEQ) as listed in 30 TAC § 330.56(n) and will address monitoring and management of the entire landfill. Once approved, this plan will supersede all methane monitoring plans currently in place at the facility.

Monitoring programs described in this plan will continue until the end of the post-closure monitoring and maintenance period, currently defined as thirty years after final closure of the landfill, unless an alternate time is approved by the TCEQ. Following TCEQ approval, this plan will be placed in the site operating record and will remain open for revisions and modifications throughout the active disposal and post-closure period.

The Amarillo Landfill currently does not have a gas collection and control system (GCCS) in place. Tier II sampling was performed in May 2005 and analysis shows the Amarillo Landfill will not exceed 50 Mg/yr of NMOC until well into the future. Annual emission calculations will be submitted to TCEQ for the Amarillo Landfill. A standard air permit will be applied for in the year the facility exceeds 50 Mg/yr of NMOC emissions.

23.2 Proposed Landfill Gas Monitoring Procedure

The City of Amarillo has implemented a monitoring procedure that meets the monitoring requirements of 30 TAC §330.56(n). The procedure includes the use of permanent monitoring probes to monitor and measure any subsurface migration of methane gas. The monitoring frequency is quarterly. The monitoring frequency of individual permanent probes may be increased if methane is detected above the LEL. If necessary and appropriate, bar-hole probes will also be used to help determine the location and size of any migrating plumes of LFG, and to determine the effectiveness of LFG control measures.

23.2.1 Monitoring Permanent Gas Probes

All gas probes shall be monitored for the following parameters:

- Static Gas Pressure - with a suitable pressure gauge
- Combustible Gas (methane) - with a dual range methane monitor (thermal conductivity combustible gas indicator (CGI), infrared gas detection device, or equivalent)

To prevent any pressure fluctuations that can give erroneous results, no venting will occur prior to measuring pressure.

The landfill currently uses a Landfill Control Technologies GEM-500 Gas Extraction Monitor. Other suitable equipment such as a GasTech Model NP 204 natural gas indicator may also be used. When a GasTech Model NP 204 monitor is used, the probe will be sufficiently evacuated with the hand pump so that methane concentrations are constant for at least thirty seconds. The large scale (0 to 100% methane-in-air) will be used first. If readings are below 5%, the reading will be obtained using the lower (0 to 5% methane-in-air) scale.

23.2.2 Continuous Monitoring of On-site Structures

The five permanent inhabitable structures on-site are currently equipped with a Sierra Gas Sensor Model 2001 series (or an equal) continuous monitoring device to detect combustible gas concentrations that may accumulate inside the buildings. The structures currently monitored include the scale house, maintenance building, construction trailer and the two residences used for storage. Continuous monitoring of facility structures may be supplemented quarterly with portable instrument monitoring as described in this plan. The three well house structures located within the permitted boundary will also be monitored with portable instrument in a similar manner.

23.2.3 Reporting of Data and Record Keeping

All monitoring data acquired in the field will be recorded on a field data form similar to the form contained in Appendix 14C, and submitted to the Commission in a quarterly report. A graph of Methane vs. Time will be updated and included in the next quarterly report for all monitoring

points that have produced methane levels of any measurable quantity. Quarterly reports will be submitted to the Commission at the following address:

MSW Permits Section, MC-124
P. O. Box 13087
Austin, Texas 78711-3087

Included in the report will be all information related to subsurface gas migration and control, including records of any contingencies that were implemented as a result of migration (see Section 5.0 of this plan). Copies of the completed quarterly reports, including the original completed field data forms, will be kept in the Operating Record on-site for a minimum of two years.

A separate calibration log for each instrument will be kept on-site, and will contain the following information:

- Date and time of calibration
- Name of person calibrating
- Serial number and model number of instrument
- Type of calibration
- Results of calibration

23.3 Schedule for Installation of Monitoring Elements

If the City determines that additional permanent monitoring probes are needed beyond the proposed probe locations, a Class I permit modification request will be submitted to the Commission showing probe design, location, and installation schedule. Record drawings will be submitted to the Commission after installation.

23.4 Maintenance and Calibration of Monitoring Elements

The City will implement the following maintenance schedule and calibration procedures for the gas monitoring elements at the landfill. Training of personnel will be conducted when necessary.

23.4.1 Maintenance of Permanent Monitoring Probes

A visual inspection of the permanent probes will be conducted quarterly in conjunction with the monitoring events. The inspection schedule will increase with any increases in the monitoring schedule. The following elements will be inspected:

- Probe label
- Condition of protective cover
- Lock
- Probe surroundings, including standing water and vegetation

Any abnormalities with the condition of the probe will be noted on the field log, and will be immediately addressed.

24.0 ABANDONED OIL AND WATER WELLS

There are no known crude oil or natural gas wells on-site. If any such wells are identified during the course of site development and facility operation, the Executive Director of TCEQ shall be notified in writing within 30 days. Such wells will be capped, plugged, and closed in accordance with all applicable rules and regulations of the Texas Railroad Commission. Plugging reports will be submitted to the appropriate agencies. A copy of the well plugging reports will be provided to the Executive Director within 30 days after the well has been plugged.

Any water wells encountered within the permit area not previously documented will be capped, plugged, and closed by a licensed water well driller in accordance with all applicable rules of the Commission or other state agencies prior to developing the area where the well is located. A written certification that the wells have been capped, plugged, and closed will be provided by the City to the Executive Director within thirty days prior to disposal operations at the well location. A copy of the well plugging reports will be provided to the Executive Director within 30 days after the well has been plugged.

25.0 WASTE COMPACTION

Compaction of the waste will be accomplished by repeated passages of landfill compaction equipment over the waste material. Adequate compaction must be accomplished to minimize future consolidation and settlement and provide for the proper application of daily and final cover. The equipment operator's training will include instruction on techniques for good compaction. Compaction requirements will include (1) a minimum of three passes of compaction equipment, (2) compaction of solid waste in appropriate lifts, and (3) compaction on relatively shallow slopes. A density of 1000 lbs/cubic yard should be the minimum goal of compactive efforts.

Operators will be given periodic feedback regarding compaction performance. Data on density ratios will be determined periodically during the year and reports will be provided to the equipment operators. Part of the overall training program is also intended to inform equipment operators of best management practices for achieving maximum compaction.

26.0 LANDFILL COVER

26.1 Daily Cover

Daily cover shall consist of six inches of well-compacted earthen material not previously mixed with waste or approved alternate daily covers (ADC). Authorization to use different alternate daily cover materials not previously approved will only be used after approval has been secured from the Executive Director.

The landfill operation includes the use of ADC to reduce soil usage. Tarps, slurries, or other ADC materials will not be utilized when the landfill is closed for a period greater than 24 hours. Soil cover will be placed periodically to provide fire breaks. Prior to using an ADC, the City will secure approval from the Executive Director. This request will include an ADC operating plan.

A status report on ADC will be submitted to the Executive Director every two months during the temporary authorization period. Included in the report will be a discussion of the effectiveness of the material, problems, and corrective action as a result of the problem. Following the temporary authorization period, if approved by the Executive Director, the City will modify the SOP to allow for permanent use of this ADC.

Soil daily cover will be made up of clean soil excavated on-site or imported. Several days' worth of cover material will be available for use in the event that weather conditions limit excavation and stockpiling activities. In general, cover material will be located so as not to interfere with vehicular traffic or impede drainage. Stockpiles will conform with the provisions of the Erosion Control Plan.

At least enough soil to cover one day's waste will be stockpiled near the working area. Sufficient daily cover will be stockpiled no further than 2,500 feet from the working area for fire fighting purposes.