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REPORTS

DATE:

7/30/1998

NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
DISTRICT I HOBBS
PO BOX 1980, Hobbs, NM 88241
(505) 393-6161
FAX (505) 393-0720

Jennifer A. Salisbury
CABINET SECRETARY

July 30, 1998

Mr. Scott M. Webb
Regulatory Coordinator
Ocean Energy
410 17 th Street, Suite 1400
Denver, Colorado 80202
Fax # 303-534-8918

Re: UMC Carlisle State Com #1
Pit Remediation Projects and Original Site Clean-up.
UL K-Sec 10-Ts16s-R35e

Dear Mr. Webb:

New Mexico Oil Conservation Division (NMOCD) is in receipt of the Pit Remediation Protocol addendum (QP-47 Rev. A) submitted by Whole Earth Environmental. **Please note this plan is hereby approved as is including other aspects that were addressed in the first submittal dated July 6, 1998 and subject to the following additions and conditions:**

1. Monitor well construction shall be constructed with a minimum of 15 feet of well screen, 10 feet in the water and five feet above. The well shall be appropriately filled with a suitable sand & gravel pack 2 feet above the screen. A bentonite plug properly hydrated shall be set at this point and the well shall be grouted to the surface with cement and 1-3 % bentonite grout. A suitable base shall be constructed for protection. The wells shall be properly developed and purged before sampling. All bore holes must be plugged and abandoned by filling from bottom to top with cement & 1-3% bentonite grout. Any monitor well closure must be approved by NMOCD.

2. Ocean Energy shall provide the results of all sampling events upon request and/or closure. All sampling and testing shall be pursuant to EPA/ NMOCD standard acceptable protocols. The NMOCD requires the right to request additional sampling points, sampling events, and various WQCC chemical constituents upon request.

3. Please be advised that NMOCD approval of this plan does not relieve Ocean Energy, Inc. of liability should their operations fail to adequately investigate, remediate, or contain contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD District I approval does not relieve Ocean Energy, Inc. of responsibility for compliance with any other federal, state, or local laws and/or regulations including any additional requirements imposed by the NMOCD Environmental Bureau.

4. Please note if Groundwater is determined to be impacted you must notify the NMOCD Environmental Bureau and this office within 24 hours of discovery and written notification pursuant to NMOCD rule 116.

5. Ocean Engery/UMC is still responsible for the original submittal dated April 15, 1998 and NMOCD approval requirements dated April 18, 1998.

6. Pursuant to telephone conversation with Mr. Mike Griffin of Whole Earth Environmental, Ocean Energy has modified its plan for all soils used for backfill under the synthetic liners to be less or equal to the following limits; Total BTEX = 10 ppm or less, TPH = 100 ppm or less, and Chlorides = 1000ppm, EC=6 or less. Also Ocean Energy will modify its modeling program to an infiltration rate of $1x10^{-6}$ ft/day rather than $1x10^{-7}$ ft/day. This more closely represents a synthetic liner per Mr. Griffin.

The NMOCD is currently reviewing the closures submitted by Callaway Safety for the original submittal and will have comments to you in the near future. If you require any further information or assistance please do not hesitate to call (505-393-6161) or write this office.

Sincerely Yours,

Wayne Price

Wayne Price-Environmental Engineer

cc: Chris Williams-NMOCD District I Supervisor
Bill Olson-Environmental Bureau, Santa Fe, NM
Mike Griffin-Whole Earth Environmental

file: wp98/oeumc1

Pit Remediation Protocol
Ocean Energy Corporation
Carlisle State COM # 1
Pits Requiring Modeling

1.0 Purpose

This protocol is provide a detailed outline of the steps to be employed in the remediation and final closure of the Ocean Energy pits using risk assessment modeling.

2.0 Scope

This protocol is site specific for the Carlisle State COM # 1 emergency disposal pits.

3.0 Preliminary

Prior to any field operations, Whole Earth Environmental shall conduct the following activities:

3.1 Client Review

3.1.1 Whole Earth shall meet with cognizant personnel within Ocean Energy to review this protocol and make any requested modifications or alterations prior to submittal to the State of New Mexico Oil Conservation Division.

3.1.2 Changes to this protocol will be documented and submitted for final review by Ocean Energy prior to submittal to the Oil Conservation Division.

3.2 Oil Conservation Division Review

3.2.1 Upon client approval, this protocol and associated modeling results will be submitted to the New Mexico Oil Conservation Division for review and comment. Recommended changes will be reviewed by the client prior to implementation.

3.2.2 Any recommended changes effecting costs will require a revised quotation to be issued to the client for approval prior to the commencement of any on-site remediation activity.

4.0 Safety

4.1 Prior to work on the site, Whole Earth shall obtain the location and phone numbers of the nearest emergency medical treatment facility. We will review all safety-related issues with the appropriate Ocean Energy personnel, sub-contractors and exchange phone numbers.

4.2 A tailgate safety meeting shall be held and documented each day. All sub-contractors must attend and sign the daily log-in sheet.

4.3 Anyone allowed on to location must be wearing sleeved shirts, steel-toed boots, and long pants. Each vehicle must be equipped with two-way communication capabilities.

4.4 Prior to any excavation, the area shall be surveyed with a line finder. If lines are discovered within the area to be excavated, they shall be marked with pin flags on either side of the line at maximum five-foot intervals. The area will be photographed prior to any excavation or fluid removal.

4.5 Each pit area will be swept with a Ludlam 2350 to determine if NORM is present in concentrations greater than 40μr / hr.

5.0 Fluid Removal

Prior to any excavation, the pit fluids including liquids contained within the reserve pits shall be removed by vacuum truck and transported to the Gandy Crossroads recycling facility. A shipping manifest and an O.C.D. Form C-117-A shall be prepared for each waste load.

6.0 Monitor Wells

6.1 Atkins Engineering Associates, Inc. will drill develop and case three monitoring wells. The first will be in the approximate southeast corner of the east pit excavation, the second at the southeast corner of the west pit. The third well will be situated at a point due south of the center of the east / west line drawn between the two previous locations at a distance equal to the distance separating the two previous wells so as to form an equilateral triangle. The third well may be cased and completed within in a 4" diameter PVC pipe to allow for future conversion to a source well. Whole Earth

will obtain soil samples at each five-foot incremental depth following our procedure QP- 77. Whole earth will additionally field screen for TPH and BTEX in accordance with QP-06 and QP-19. Calibration, record retention, and instrument reporting accuracy procedures for these field screen tests are contained in QP-25 and QP-55. If the Whole Earth screen testing reveals BTEX or chloride concentrations within the first two wells in excess of NMWQCC standards, the holes will be left uncased until laboratory confirmation is obtained. Should the criteria pollutant concentrations be confirmed to be higher than NMWQCC standards Whole Earth will obtain the necessary additional information required to model the effects of natural attenuation using the USAF Bio Screen program. If the Bio Screen model reveals contamination potential to any off-site source well, the monitoring wells may be converted to recovery wells by completing within 4" casing. All confirmation samples will be analyzed by Environmental Labs of Texas for BTEX and DRO using EPA Methods 8020, 5030 and 8015m for TPH, BTEX and chlorides.

6.2 All monitoring or recovery wells will be drilled to a minimum depth of ten feet below the top of the water table, developed, fitted with a slotted screen, grouted to surface and fitted with a locking cap mechanism for security.

7.0 Modeling

7.1 Whole Earth will model the migration potential of the plume on VADSAT to determine the maximum concentrations of criteria pollutants allowed within the excavation consistent with a 100 year, zero percentage probability of the plume impacting ground water.

8.0 Liners

8.1 Each pit will receive a liner having the minimum thickness of 20 mil high density polyethylene. The sides of the liner will be brought up a minimum distance of 5' above the average grade of the pit.

8.0 West Pit Preliminary Compaction

8.1 In order to achieve sufficient separation between the bottom of the west pit and the top of the Ogallala, the pit will be filled in with fresh soils obtained from the area immediately to the southwest of the pit to a maximum distance of 20 bgl. The soils filling the excavation will be field tested as they are deposited for BTEX, TPH and chloride. Concentrations shall not exceed 10, 5,000 and 3,000 ppm respectively. Once filled to a sufficient depth, the bottom will be compacted using D-6 or larger bulldozers.

9.0 Remediation

9.1 Prior to any contaminated soils being re-deposited within the excavations, the Hobbs office of the OCD will be notified. The OCD may either witness, or collect split samples with Whole Earth. The bottom of the pit and all four side walls will be tested for TPH and Benzene concentrations using WEQP-06 and WEQP-19. The samples will be collected and analyzed as described in 6.1 of this protocol. Acceptable criteria pollutant concentrations shall be <5,000 ppm TPH, <10 ppm benzene, <50 ppm ttl. BTEX and < 3,000 ppm soluble chlorides.

9.2 Using a trackhoe and D-6 bulldozer, the west reserve pit will be breached at the southwest corner and spread over the newly excavated area immediately southwest of the west pit. ***Extreme care must be taken to insure that no unmixed fluids or solids from the reserve pit be allowed into the western emergency pit. Temporary berms shall be erected around the eastern and southern sides of the pit.*** Once dried to a working consistency, the reserve pit solids will be tested extensively to determine average criteria pollutant concentrations, mixed and blended with the soils contained within the western spread zones and freshly excavated soils as necessary to achieve of <5,000 ppm TPH, 10 ppm benzene, 50 ppm ttl. BTEX and 3,000 ppm soluble chloride concentrations. The materials will then be re-deposited with the pit in approximately 30 yd^3 increments. The pit bottom will be tested in a minimum of four locations for each 3' lift.

9.3 As drilling and completion operations allow, the eastern reserve pit will be similarly mixed and blended with the soils contained within the eastern spread zone and deposited into the east emergency containment pit.

10. Site Restoration

10.1 The top two feet of the excavation shall be covered in remediated materials having a maximum TPH concentration of <100 ppm and benzene concentrations of <2 ppm. The area will be seeded with a mixture of local grasses. If the sodium chloride concentrations with the spread material exceed a sodium adsorption ratio greater than 12, additional remediation to include treatment with gypsum and / or calcium nitrate may be required.

11.0 Documentation & Reporting

11.1 At the conclusion of the pit remediation project, Whole Earth will prepare a closure report to include the following minimum information:

- A plat map of the location showing the exact location of the pit, the dimensions prior to excavation and the actual excavated dimensions.

- Photographs of the pit prior to excavation, at the point of maximum excavation and after final closure
- Field Sampling Report to include the side wall and pit bottom TPH and BTEX concentrations after excavation.
- Field Sampling Report to include TPH and BTEX concentrations of all remediated materials deposited into the pit deposited into the pit.
- Daily calibration records of each testing instrument
- Shipping manifests and OCD Form C-117-A
- Risk assessment model and supporting documentation
- M.S.D.S. of any amendment materials
- Construction of monitor or recovery wells

Modeling Data Entry
Carlisle State COM # 1
West Pit
NaCl

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Low Permeability Layer Below Contamination	No	

Source Data		
Waste Zone Thickness	9.144	meters
Waste Zone Area	3,048	sq. meters
Ratio of Length to Width	2.43: 1	
Soil Thickness Above Waste Zone	0.1524	meter
Soluable Concentration in Soil / Waste Zone	3,000	ppm

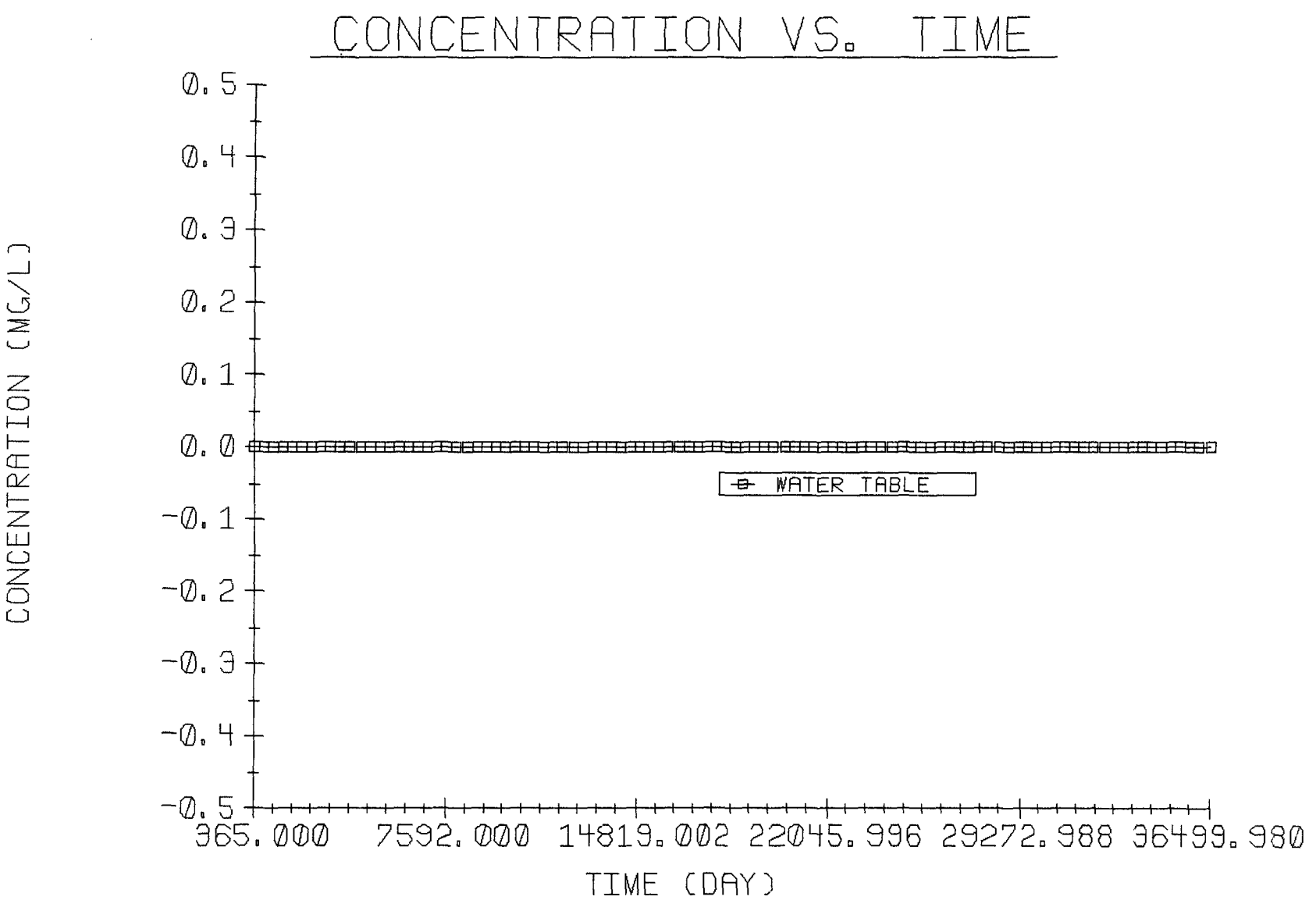
Chemical Data	
NaCl	Yes

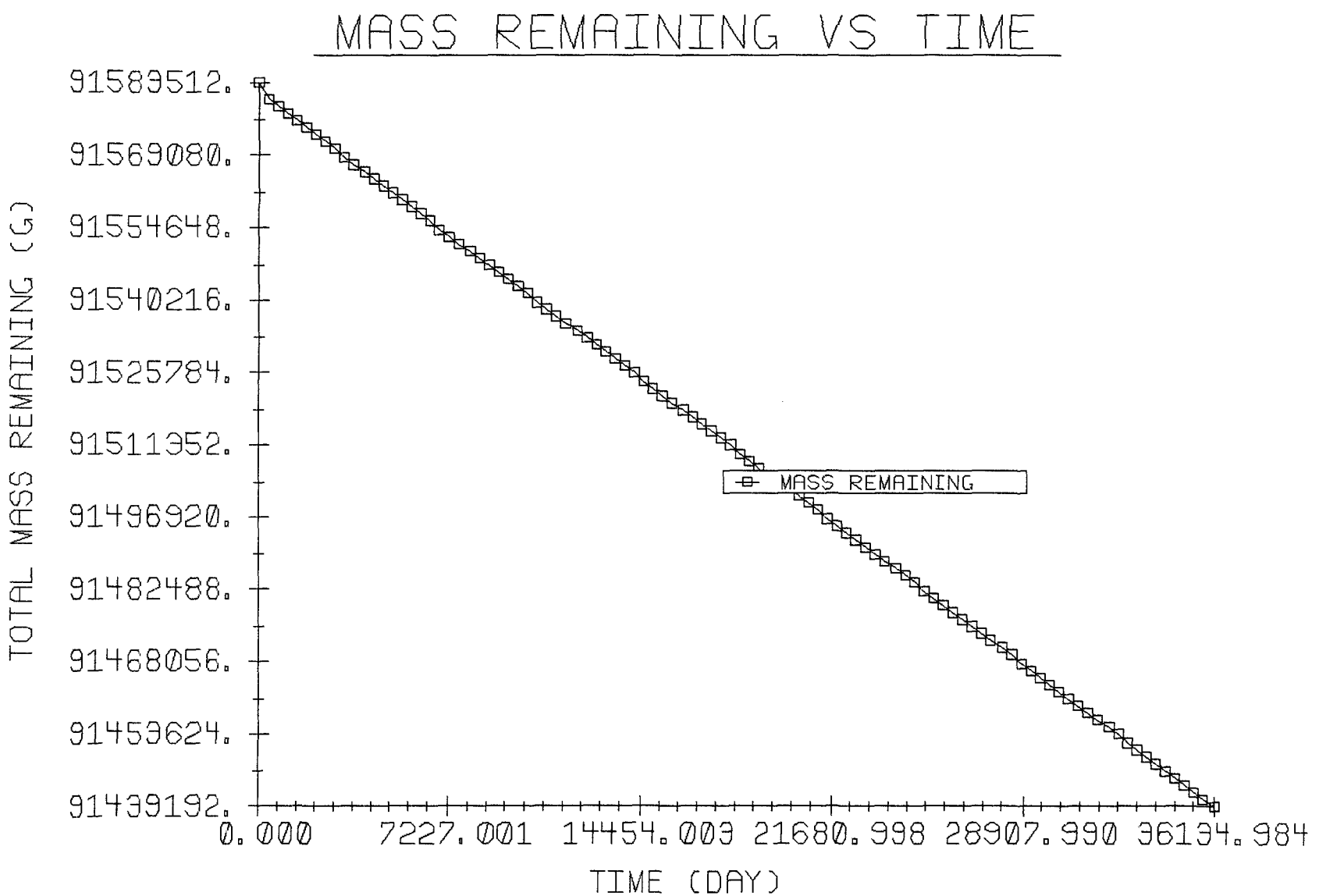
Unsaturated Zone		
Biodecay Cooefficient	0.001	1 / day
Soil Database	Sandy Clay	
Hydrological Database	Alluvial	
Unsaturated Zone Thickness	9.23	Meters
Soil Database	Sandy Clay	
van Genuchten n	1.48	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	Internally

Saturated Zone		
Aquifer Porosity	0.2	(Default)
Longitudinal Dispersivity	0	Internally
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	87	
Hydrological Database	Alluvial	
Aquifer Thickness	20.9	meters
Aquifer Gradient	0.001	
Saturated Hydraulic Conductivity	0.9	meters / day

Net Infiltration Rate	0.0000001	ft. / day

(1×10^{-7}) 1×10^{-6}


CONCENTRATION VS. TIME
CONCENTRATION (MG/L)
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
WATER TABLE
365.000
7592.000
14819.002
22045.996
29272.988
36499.980
TIME (DAY)


MASS REMAINING VS TIME
TOTAL MASS REMAINING (G)
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91569080.
91554648.
91540216.
91525784.
91511352.
91496920.
91482488.
91468056.
91453624.
91439192.
MASS REMAINING
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)

Modeling Data Entry
Carlisle State COM # 1
East Pit
NaCl

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Low Permeability Layer Below Contamination	No	

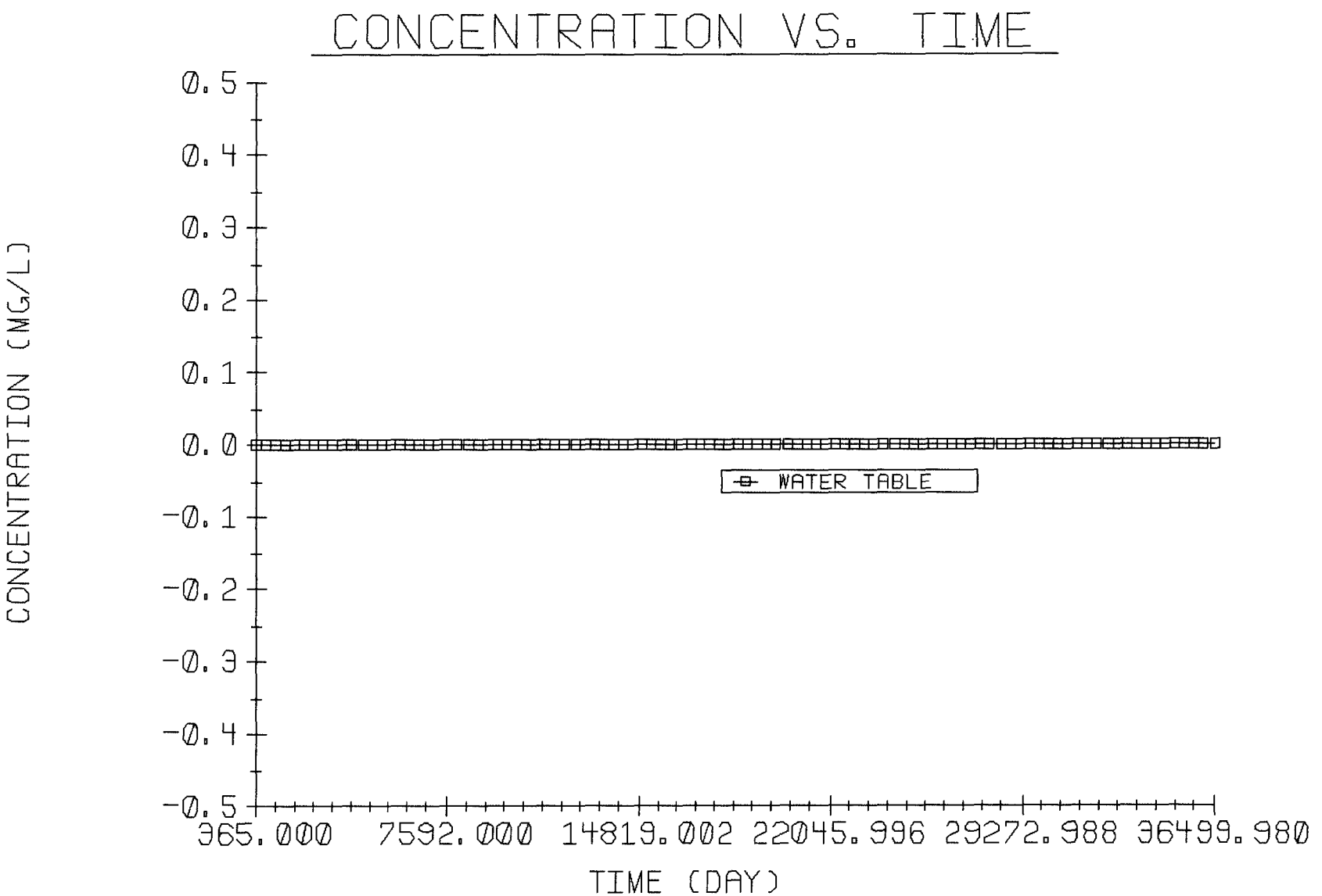
Source Data		
Waste Zone Thickness	6.096	meters
Waste Zone Area	4,432	sq. meters
Ratio of Length to Width	1:1	
Soil Thickness Above Waste Zone	0.1524	meter
Soluable Concentration in Soil / Waste Zone	3,000	ppm

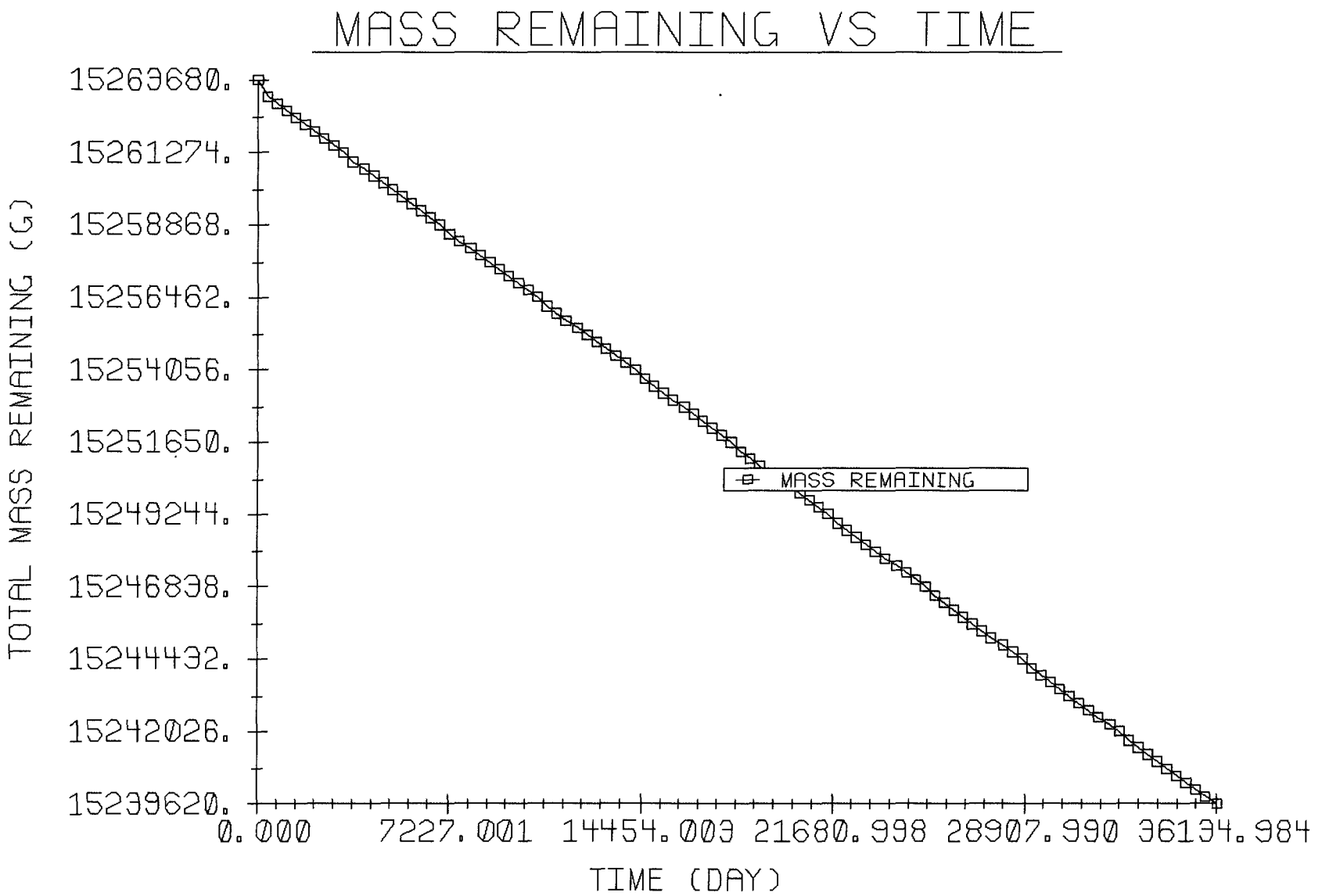
Chemical Data	
NaCl	Yes

Unsaturated Zone		
Organic Carbon Fraction	1.00E-06	
Soil Database	Sandy Clay	
Hydrological Database	Sedimentary	
Unsaturated Zone Thickness	9.23	Meters
Soil Database	Sandy Clay	
van Genuchten n	1.09	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	Internally

Saturated Zone		
Aquifer Porosity	0.2	(Default)
Longitudinal Dispersivity	0	Internally
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	87	
Hydrological Database	Sedimentary	
Aquifer Thickness	10	meters
Aquifer Gradient	0.023	
Saturated Hydraulic Conductivity	0.13	meters / day

Net Infiltration Rate	0.0000001	ft. / day


CONCENTRATION VS. TIME
CONCENTRATION (MG/L)
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
WATER TABLE
365.000
7592.000
14819.002
22045.996
29272.988
36499.980
TIME (DAY)


MASS REMAINING VS TIME
15263680.
15261274.
15258868.
15256462.
15254056.
15251650.
15249244.
15246838.
15244432.
15242026.
15239620.
TOTAL MASS REMAINING (G)
MASS REMAINING
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)

Modeling Data Entry
Carlisle State Com # 1
East Pit
Hydrocarbon Model # 1

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Evaporation of Chemicals	Yes	
Adsorbed Phase Biodecay	Yes	
Low Permeability Layer Below Contamination	Not Present	

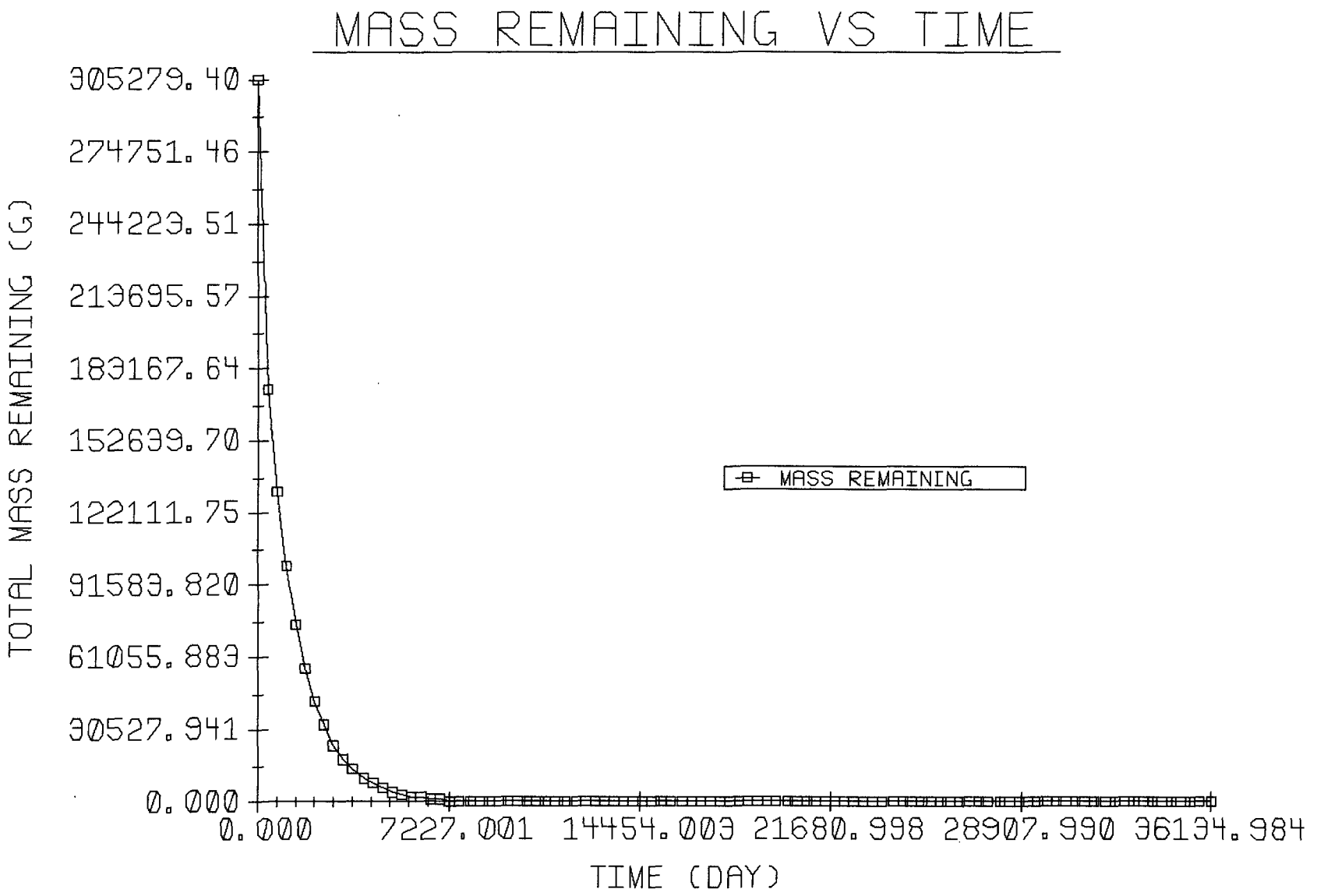
Source Data		
Waste Zone Thickness	6.096	meters
Waste Zone Area	4,432	Sq. meters
Ratio of Length to Width	1:1	
Soil Thickness Above Waste Zone	0.1524	meters
Contaminant Concentration in Soil / Waste Zone	10	ppm (benzene)
Hydrocarbon Concentration in Soil / Waste Zone	5,000	ppm

Chemical Data	
Benzene	Yes

Unsaturated Zone		
Biodecay Cooefficient	0.001	1 / day
Organic Carbon Fraction	1.00E-06	
Soil Database	Sandy Clay	
Hydrological Database	Sedimentary	
Unsaturated Zone Thickness	9.23	meter
Soil Database	Sandy Clay	
van Genuchten n	1.09	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	Internally

Saturated Zone		
Biodecay Cooefficient	0.001	1 / day
Aquifer Porosity	0.2	(Default)
Organic Carbon Fraction	0	Internally
Longitudinal Dispersivity	0	Internally
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	87	Default
Hydrological Database	Sedimentary	
Aquifer Thickness	10	meters
Aquifer Gradient	0.023	
Saturated Hydraulic Conductivity	0.13	meters / day

Net Infiltration Rate	0.0000001	ft. / day


MASS REMAINING VS TIME
TOTAL MASS REMAINING (G)
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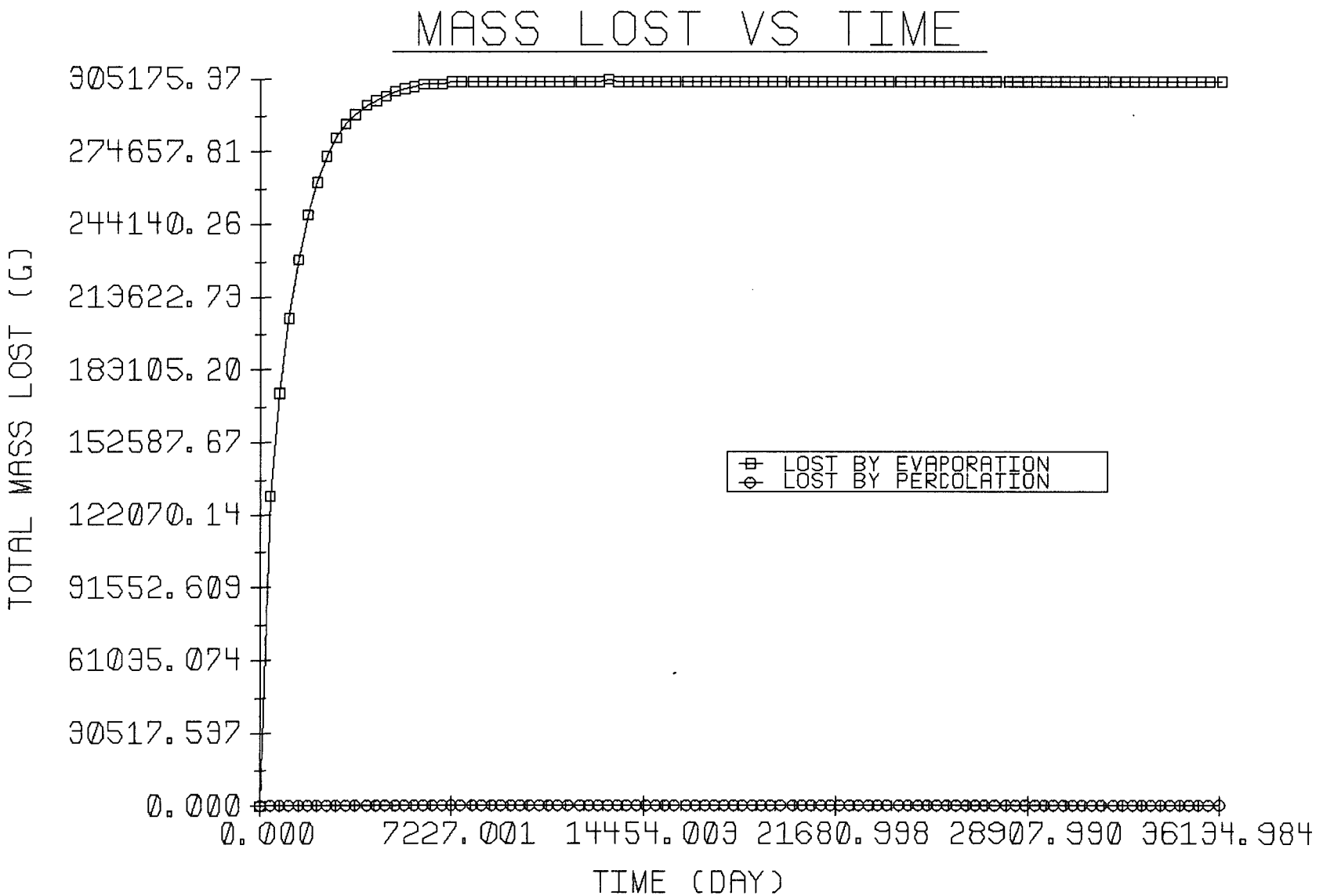
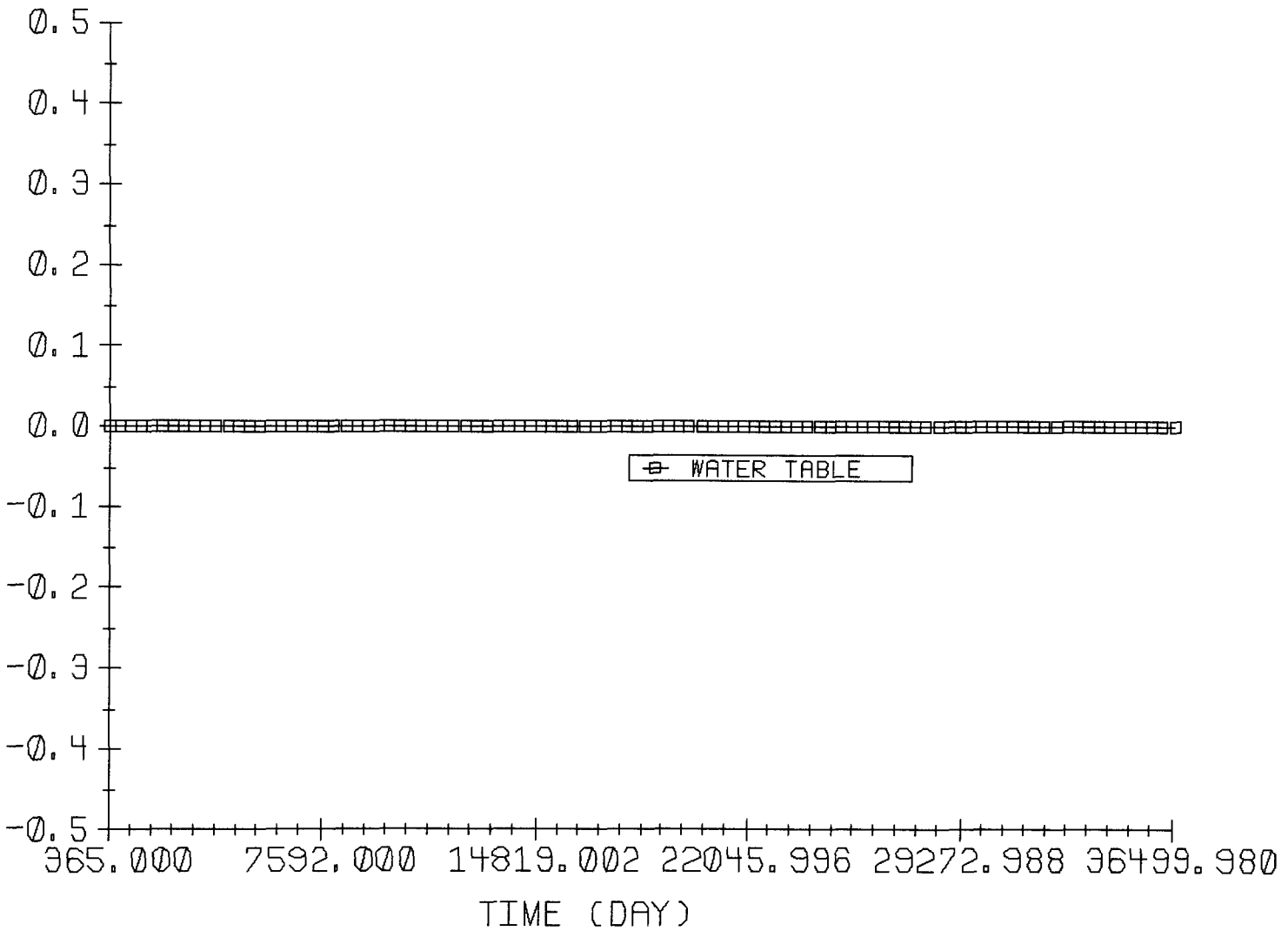
274751.46
244223.51
213695.57
183167.64
152639.70
122111.75
91583.820
61055.883
30527.941
0.000
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)
MASS REMAINING


MASS LOST VS TIME
TOTAL MASS LOST (G)
305175.37
274657.81
244140.26
213622.73
183105.20
152587.67
122070.14
91552.609
61035.074
30517.537
0.000
0.000
7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)
LOST BY EVAPORATION
LOST BY PERCOLATION

CONCENTRATION VS. TIME



Modeling Data Entry
Carlisle State Com # 1
West Pit
Hydrocarbon Model # 1

Control Data	Entry	U / M
Deterministic	Yes	
Monte Carlo	No	
Evaporation of Chemicals	Yes	
Adsorbed Phase Biodecay	Yes	
Low Permeability Layer Below Contamination	Not Present	

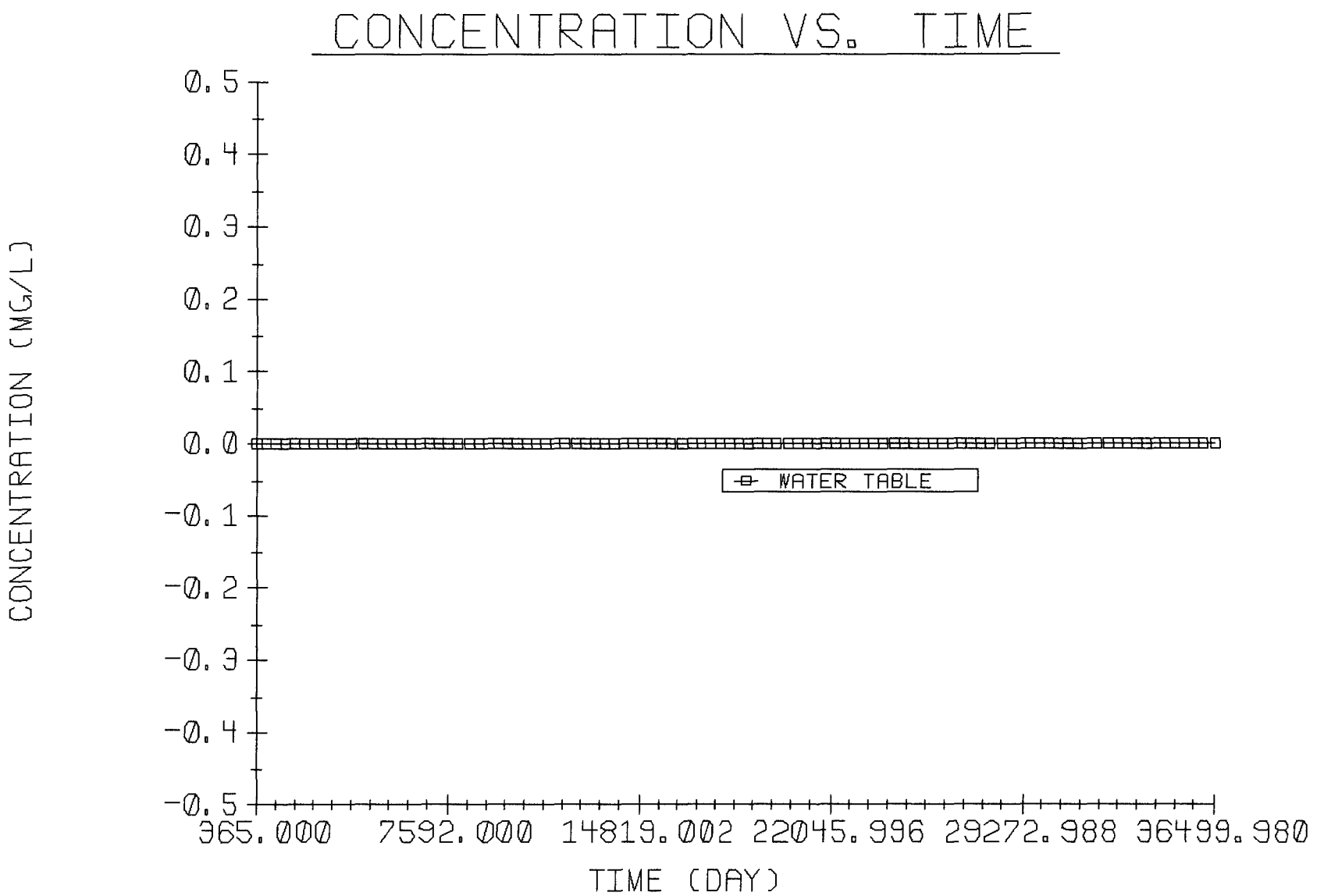
Source Data		
Waste Zone Thickness	6.096	meters
Waste Zone Area	3,048	Sq. meters
Ratio of Length to Width	2.43:1	
Soil Thickness Above Waste Zone	0.1524	meters
Contaminant Concentration in Soil / Waste Zone	10	ppm (benzene)
Hydrocarbon Concentration in Soil / Waste Zone	5,000	ppm

Chemical Data	
Benzene	Yes

Unsaturated Zone		
Biodecay Cooefficient	0.001	1 / day
Organic Carbon Fraction	1.00E-06	
Soil Database	Sandy Clay	
Hydrological Database	Sedimentary	
Unsaturated Zone Thickness	9.23	meter
Soil Database	Sandy Clay	
van Genuchten n	1.09	(Default)
Residual Water Content	0.01001	
Unsaturated Zone Dispersivity	0	Internally

Saturated Zone		
Biodecay Cooefficient	0.001	1 / day
Aquifer Porosity	0.2	(Default)
Organic Carbon Fraction	0	Internally
Longitudinal Dispersivity	0	Internally
Ratio of Long. / Trans. Dispersivities	3	
Ratio of Trans. / Vert. Dispersivities	87	Default
Hydrological Database	Sedimentary	
Aquifer Thickness	10	meters
Aquifer Gradient	0.023	
Saturated Hydraulic Conductivity	0.13	meters / day

Net Infiltration Rate	0.0000001	ft. / day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CONCENTRATION (MG/L)
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0.4
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0.2
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0.0
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-0.4
-0.5
WATER TABLE
365.000
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22045.996
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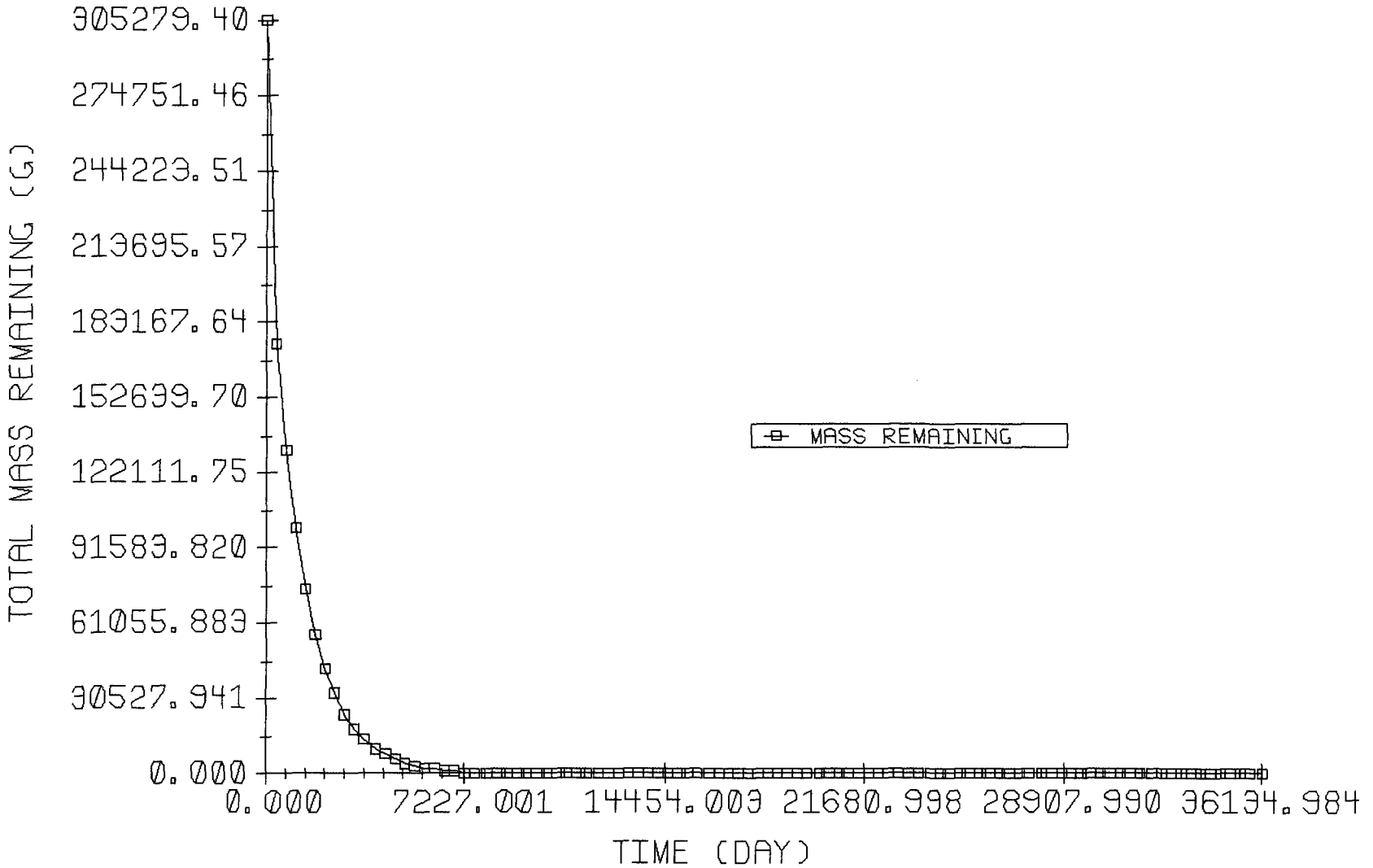
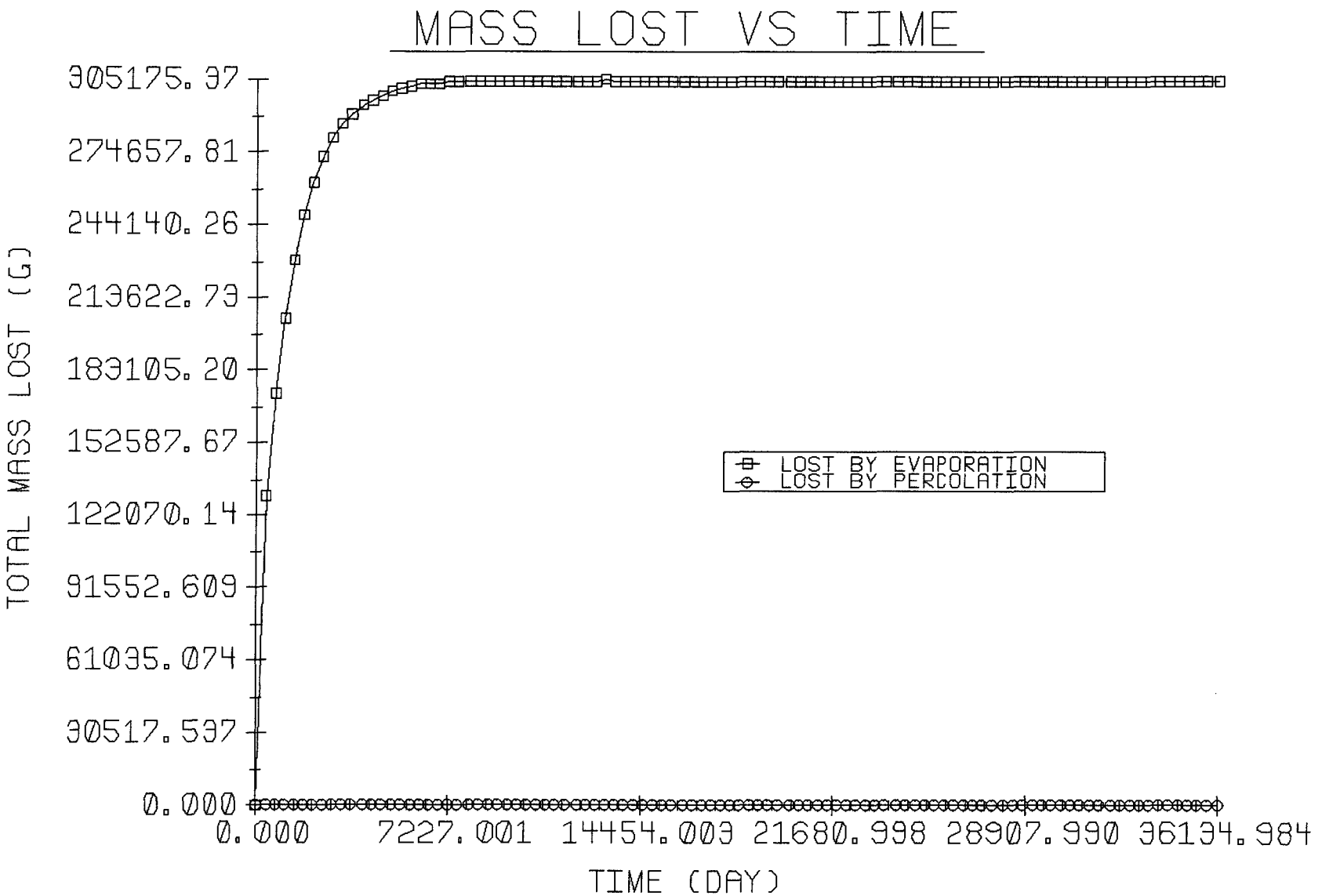
36499.980
TIME (DAY)

MASS REMAINING VS TIME

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91552.609
61035.074
30517.537
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7227.001
14454.003
21680.998
28907.990
36134.984
TIME (DAY)
LOST BY EVAPORATION
LOST BY PERCOLATION