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NWFT Self-Teaching Curriculum

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ABSTRACT

This document contains a series of lecture notes, sample problems and solutions for the Network Flow and Transport (NWFT) model developed at Sandia National Laboratories for the Risk Methodology for Geologic Disposal of Radioactive Waste Program (A-1192). The purpose of these notes and problems is to familiarize the student with the code, its capabilities and its limitations. When the student has completed this curriculum, he or she should be able to prepare data input for NWFT and have some insights into interpretation of the model output. This report represents one of a series of self teaching curricula prepared under a technology transfer contract for the U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards (FIN A-1158).

NWFT Self Teaching Curriculum

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NOTE BOOK DIVIDER SHOULD READ : INTRODUCTION

NWFT Self-Teaching Curriculum

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I. INTRODUCTION

The purpose of this course is to develop familiarity with the Network Flow and Transport (NWFT) model. After completing this course, the participant should understand the mathematical models used in NWFT and, with the user manual (Appendix I), should be able to set up and run problems. Sample problems will be used to provide familiarity with NWFT input and output.

The version of NWFT which will be presented here has advantages and limitations. NWFT offers the advantages of being easy to use and requiring little computer time. Its disadvantages include the following: (1) it can only treat decay chains of up to three isotopes which must have the same distribution coefficient, (2) solubility limits cannot be accounted for and (3) NWFT represents two-dimensional flow using a network of one-dimensional segments. Thus some multi-dimensional problems cannot be treated adequately. A simplified model such as NWFT should only be used in conjunction with a model such as SWIFT which provides a realistic description of the fluid flow field.

The NWFT flow model will be presented first, followed by several sample problems to illustrate NWFT flow calculations. The analytic

transport model used in NWFT will be presented next, followed by appropriate sample problems. A brief description of the general flow charts of NWFT logic is included as Appendix 2 to this report. This discussion, although not essential to the reader for working with the sample problems, is included to give the student a greater understanding of the NWFT code.

NWFT /STC

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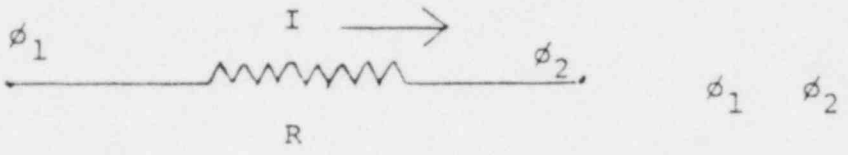
NOTEBOOK DIVIDER SHOULD READ: NWFT FLOW MODEL.

II. THE NWFT FLOW MODEL

The Electrical Analog

NWFT uses a network representation to simulate two-dimensional fluid flow at the reference site. Before discussing the flow model in NWFT, it may be useful to briefly review the concept of the electrical network analog for representation of fluid flow systems. Consider the figure below.



Single Resistor

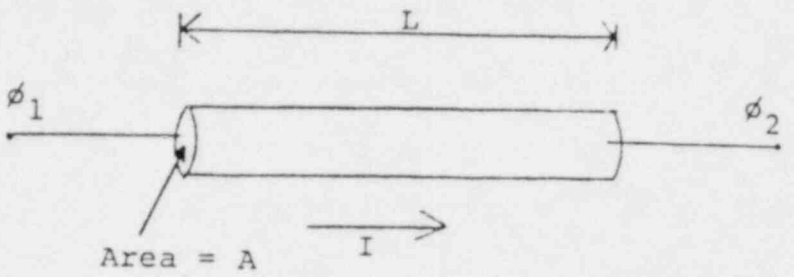
Figure 1.

This simple circuit represents a single resistor. The voltage drop across the resistor is $\phi_1 - \phi_2$. According to Ohm's law, the current through the resistor is given by

$$I = (\phi_1 - \phi_2)/R \qquad 1.$$

If ϕ_1 and ϕ_2 are expressed in volts and R is expressed in ohms, then the units of I are amperes.

Suppose we replace the resistor in Figure 1 with a length of resistive material as indicated in Figure 2 below.



Resistive Material

Figure 2.

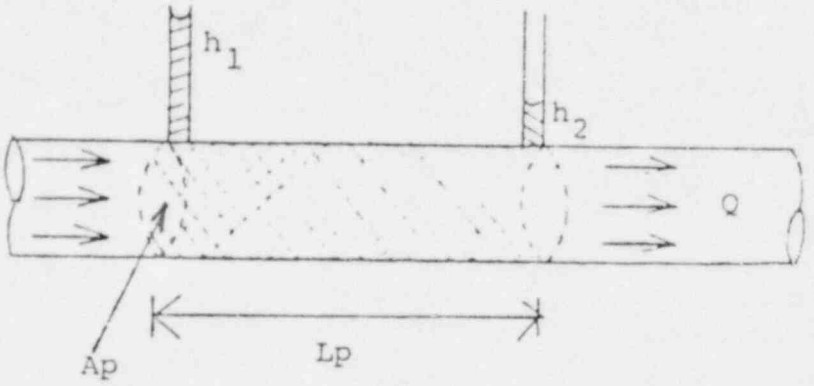
The resistance of the material is directly proportional to its length and inversely proportional to its cross-sectional area. That is,

$$R = \rho \frac{L}{A} \qquad 2.$$

where the proportionality constant ρ is called the resistivity. The units of ρ may be expressed as ohms . meters^2/meter or ohm . meters. If we apply Ohm's law to the circuit element in Figure 2, we can express the current as

$$I = \frac{A}{\rho} \frac{(\phi_1 - \phi_2)}{L} \qquad 3.$$

We are now ready to illustrate the analogy between Ohm's law and Darcy's law. Consider a sand filled pipe of length Lp and cross sectional area Ap as shown in Figure 3.



Sand Filled Pipe

Figure 3.

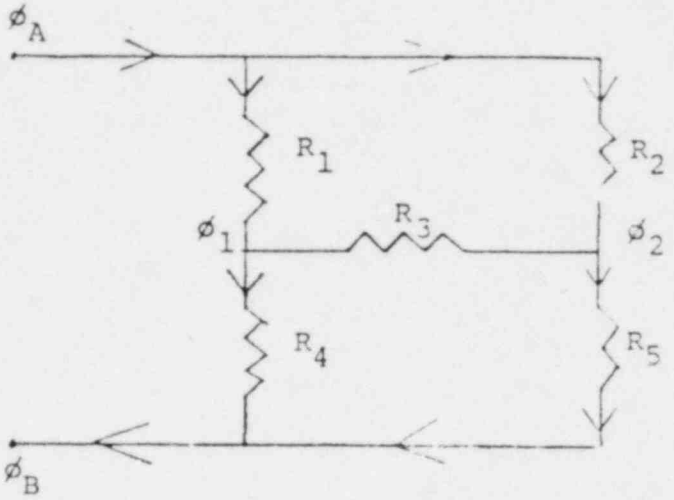
For this simple case, Darcy's law gives

$$Q = K\ Ap\ \frac{h_1 - h_2}{Lp} \qquad 4.$$

where K is the hydraulic conductivity of the sand. Thus (1/K) is analogous to resistivity, head (h) is analogous to voltage (ϕ) and fluid flow rate (Q) is analogous to current.

Now suppose one were given the problem of finding the current through each resistor in the circuit of Figure 4.

Arrows indicate direction assigned for positive current flow.



Circuit of Resistors

Figure 4.

Assume that ϕ_A, ϕ_B, and R_1 through R_5 are known. Then if ϕ_1 and ϕ_2 can be determined, Ohm's law can be used to determine the current through any of the resistors. The unknown voltages ϕ_1 and ϕ_2 can be determined by using Kirchoff's first rule for electrical networks which states, "At any junction point in a network, the total current arriving at the junction must equal the total current leaving." As current results from the movement of electrical charge, this rule is equivalent to charge conservation. If we define I_j as the current through resistor R_j, then Kirchoff's first rule gives

$$I_1 = I_3 + I_4$$

$$I_2 + I_3 = I_5 \qquad 5.$$

Also, Ohm's law gives

$$I_1 = \frac{\phi_A - \phi_1}{R_1} \qquad I_3 = \frac{\phi_1 - \phi_2}{R_3} \qquad I_5 = \frac{\phi_2 - \phi_B}{R_5} \qquad 6.$$

$$I_2 = \frac{\phi_A - \phi_2}{R_2} \qquad I_4 = \frac{\phi_1 - \phi_2}{R_4}$$

If Equations 6 are substituted into Equations 5, two equations with two unknowns result. These equations can be solved for the unknown voltages ϕ_1 and ϕ_2 and thus the unknown currents I_1 through I_5 can be calculated.

The procedure for calculating unknown currents in a resistance circuit is identical to the procedure used in NWFT to calculate unknown fluid flow rates.

The analogy between groundwater systems and electrical circuits can be taken considerably further. For instance, the aquifer storage coefficient can be related to capacitance. However, we have adequate material here to understand the flow model in NWFT.

The Reference Site Flow System

Groundwater flow calculations for the reference site have been performed using the more general SWIFT model.* The hydraulic head distribution, as predicted by SWIFT, is shown in Figure 5. Darcy velocity (or specific discharge) vectors are shown in Figure 6. As the valley in which the reference site is located is assumed to be symmetrical about River L, a no-flow boundary is used under River L. Therefore all the water moving through the middle and lower sandstone aquifers discharges to River L. Except for the near vicinity of River L, fluid flow in the middle and lower sandstone aquifers is essentially one-dimensional. The hydraulic gradient in the vicinity of the depository is downward across the salt and shale layers. However, because of the extremely low hydraulic conductivities assigned the salt and shale, there is very little fluid flow across these layers.

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* The SWIFT model has been documented in Dillon, R. T., R. B. Lantz and S. B. Pahwa: Risk Methodology for Geologic Disposal of Radioactive Waste: The Sandia Waste Isolation Flow and Transport (SWIFT) Model, SAND78-1267, NUREG/CR-0424, October 1978. The SWIFT Self-Teaching Curriculum, SAND81-0410, NUREG/CR-1968, March 1982, will give the reader further information on this code.

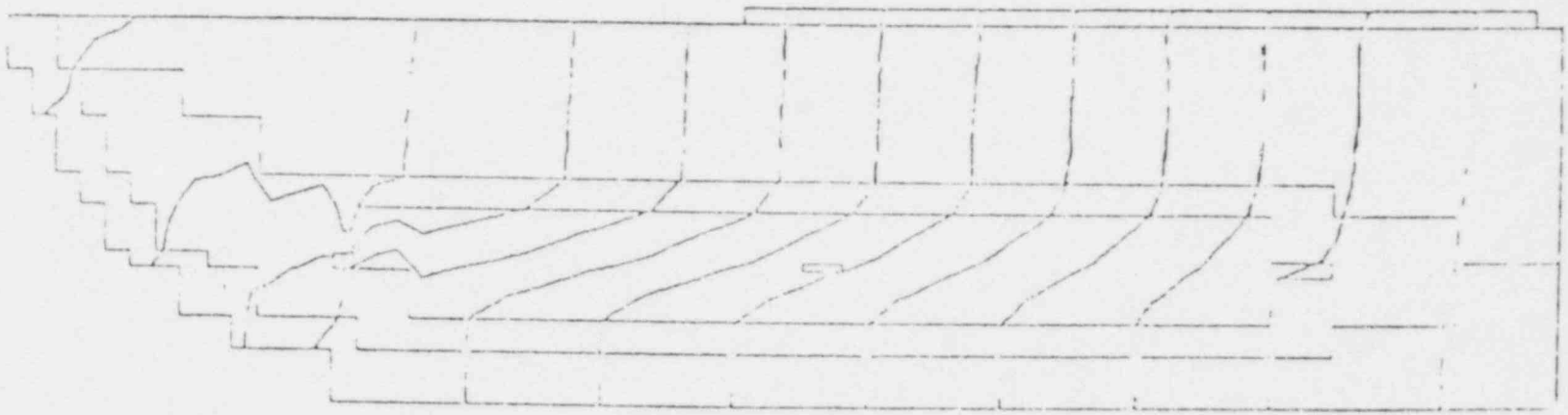


Figure 5: Hydraulic Head Distribution at the Reference Site.

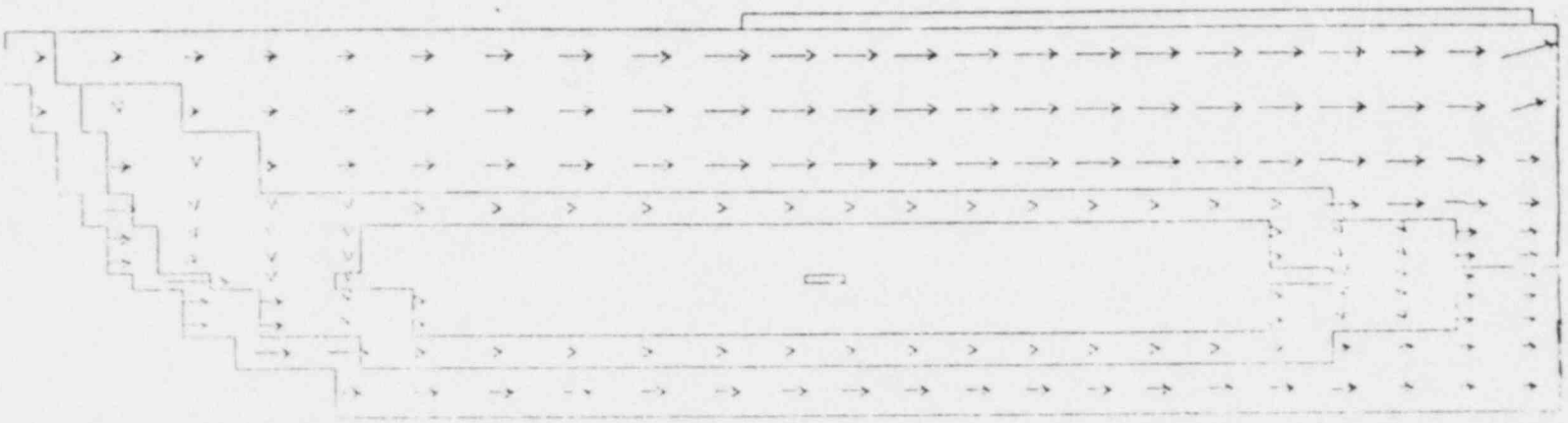
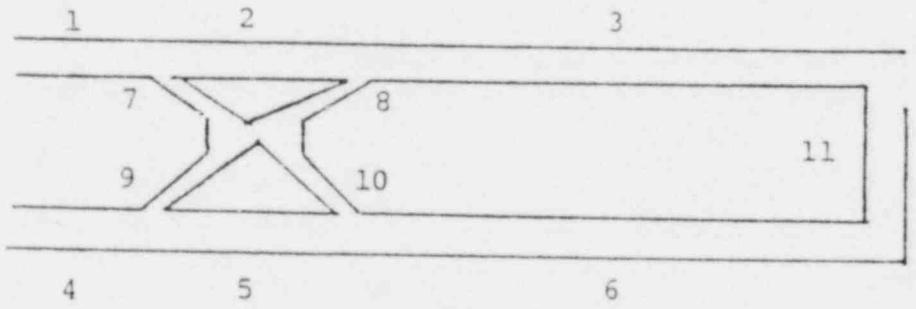


Figure 6: Darcy Velocity Vectors for the Reference Site.

The NWFT Network

The network analog used in NWFT to represent the reference site is shown in Figure 7. Legs 1, 2 and 3 are used to represent the middle sandstone aquifer and Legs 4, 5 and 6 are used to represent the lower sandstone aquifer. Leg 11 provides for discharge from the lower sandstone aquifer to River L. Legs 7, 8, 9 and 10 are used to represent various distruptive features near the depository.

Although Figure 7 shows a flow leg at the depository, the leg representing the depository is assumed to offer no resistance to flow. Thus it might be more accurate to present the NWFT network as shown in Figure 8 below.



More Accurate NWFT Network

Figure 8.

Nevertheless, we will continue to use the representation in Figure 7 to avoid confusion.

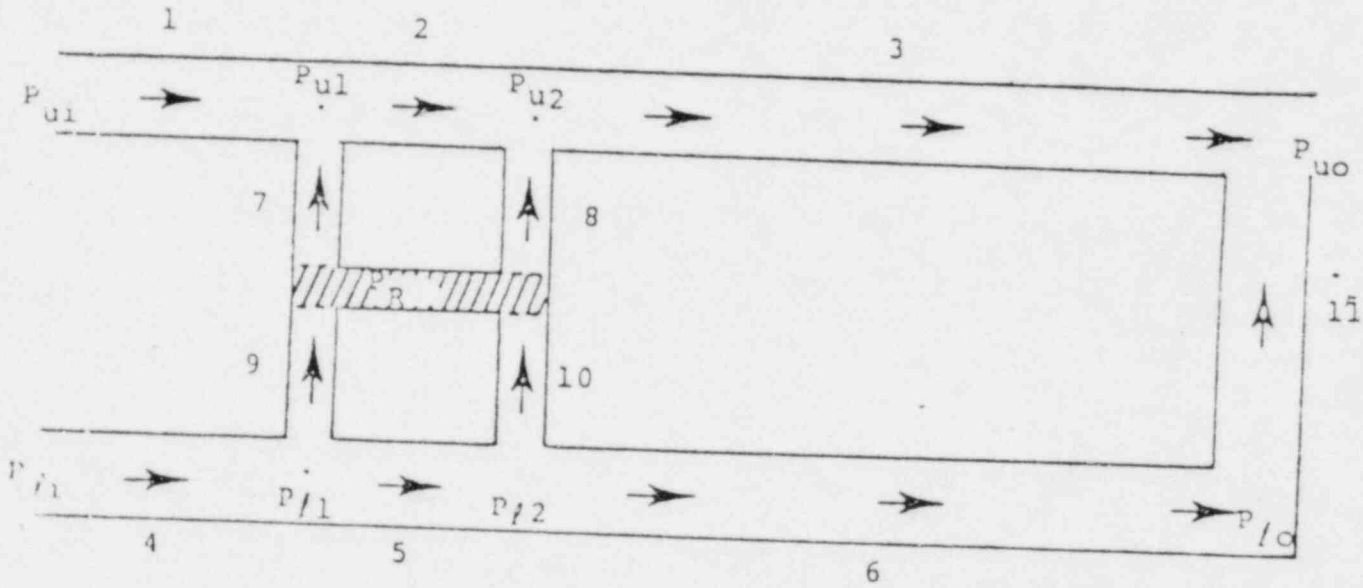


Figure 7. Identification of Legs and Leg Junctions Used in NWFT. Arrows Indicate Positive Flow Directions.

From Equation 4, the fluid discharge in Legs I through 11 is given by

$$q_1 = \theta_1 (h_{ui} - h_{u1})$$
$$q_2 = \theta_2 (h_{u1} - h_{u2})$$
$$q_3 = \theta_3 (h_{u2} - h_{uo})$$
$$q_4 = \theta_4 (h_{\ell i} - h_{\ell 1})$$
$$q_5 = \theta_5 (h_{\ell 1} - h_{\ell 2})$$
$$q_6 = \theta_6 (h_{\ell 2} - h_{\ell o})$$
$$q_7 = \theta_7 (h_R - h_{u1})$$
$$q_8 = \theta_8 (h_R - h_{u2})$$
$$q_9 = \theta_9 (h_{\ell 1} - h_R)$$
$$q_{10} = \theta_{10} (h_{\ell 2} - h_R)$$
$$q_{11} = \theta_{11} (h_{\ell o} - h_{uo})$$

7.

where q_i = fluid discharge in Leg i (L^3/T)

h_a = $P_a + d_a$ (L) = hydraulic head at junction a (L)

P_a = pressure head at junction a (L)

d_a = elevation of junction a above datum (L)

θ_i = $KiAi/Li$ (L^2/T)

K_i = hydraulic conductivity of Leg i (L/T)

A_i = cross sectional area of Leg i (L^2)

L_i = length of Leg i (L)

The pressure head boundary conditions (P_{ui}, P_{li}, P_{uo}) are required as model input as are all junction elevations. All leg properties (hydraulic conductivity, area, length, porosity) are also required as input.

Conservation of mass at each junction (the equivalent of Kirchoff's first rule for electrical circuits) requires that

$$q_1 + q_7 = q_2$$
$$q_2 + q_8 = q_3$$
$$q_4 = q_9 + q_5$$
$$q_5 = q_{10} + q_6$$
$$q_9 = q_{10} = q_7 + q_8$$
$$q_{11} = q_6 \qquad 8.$$

If Equations 7 are substituted into Equations 8, we have six equations involving the six unknown pressure heads (i.e., P_{u1}, P_{u2}, $P_{\ell 1}$, $P_{\ell 2}$, P_R and $P_{\ell o}$). These equations can be solved simultaneously to determine the unknown pressure heads which can then be used to determine fluid discharge (q_i) for each leg. Fluid seepage velocities can then be determined from

$$vi = q_i/(A_i \phi_i) \qquad 9.$$

where

v_i = seepage velocity in Leg i (L/T)

ϕ_i = porosity in Leg i

Possible radionuclide migration paths from the depository to River L are

Legs 7, 2, 3

Legs 8, 3

Legs 9, 5, 6, 11

Legs 10, 6, 11

The total migration path length is the sum of the individual leg lengths. The average isotope velocity is the total path length divided by the total migration time.

Although NWFT was developed primarily to provide a radionuclide transport capability, the initial sample problems deal with the NWFT flow model.

NWFT / STC

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Notebook divider Should Read: Sample Problem 1.

Problem 1. Using NWFT, Recreate the Reference Site Flow System as Modelled by SWIFT

Problem 1A

The system properties for the NWFT flow network are taken from input to the SWIFT model. Boundary conditions (aquifer inlet and outlet pressure heads) are taken from SWIFT output. The SWIFT calculations used here are based on the full reference site setup shown in Figure 9. NWFT uses a shortened system wherein the upper and lower aquifer inlets are located several thousand feet up-dip from the depository. The location of the NWFT network relative to the two-dimensional geometry used in SWIFT is shown in Figure 10. The aquifer inlets are located in the center of X-grid Block 29. The upper aquifer outlet is located at the center of X-grid Block 69. Legs 1, 2, and 3 lie along the middle sandstone/shale interface. Legs 4, 5, and 6 lie along the lower sandstone/shale interface. Input descriptions follow in the order in which they are read in NWFT.

(i) Pressure Heads (ft)

The user must input three (3) heads. Referring to Figure 2, the aquifer inlets for NWFT are somewhat arbitrarily located at the midpoint of Column 29. Noting that SWIFT pressures are calculated for the top center of a grid block, the row indices for the inlets are 5 and 12.

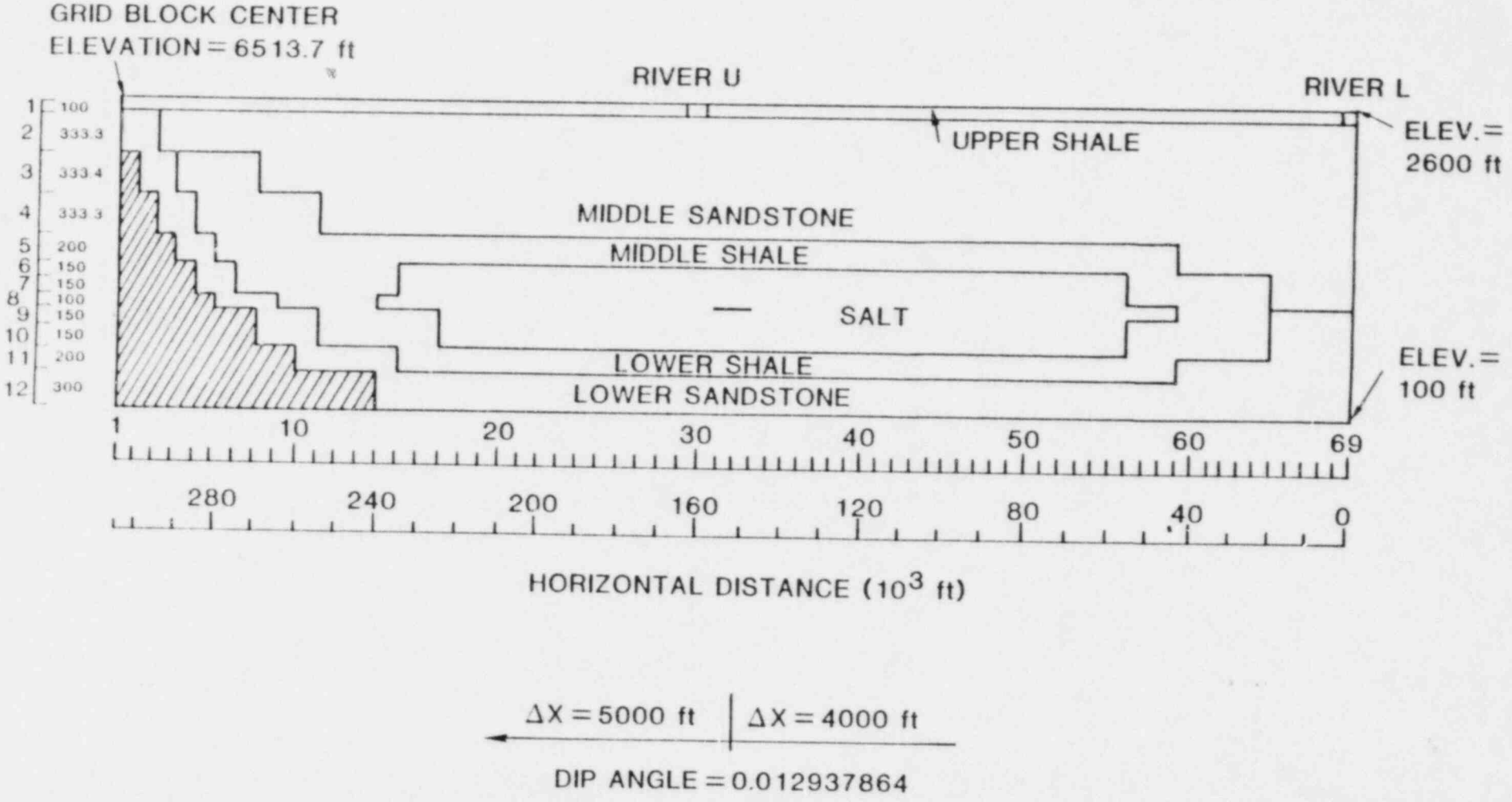
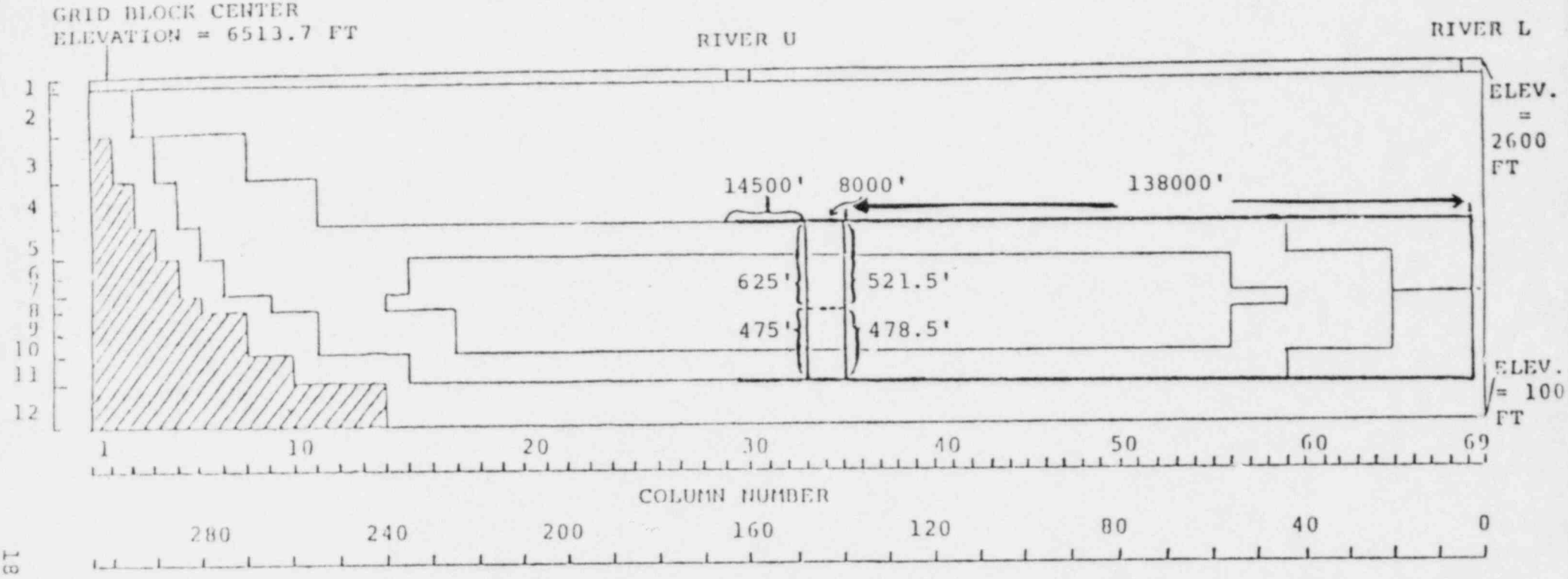


Figure 9.

SWIFT Setup for Reference Site



Thicknesses of Layers

1	100.0 ft
2	333.4 ft
3	333.4 ft
4	333.4 ft
5	200.0 ft
6	150.0 ft
7	150.0 ft
8	100.0 ft
9	150.0 ft
10	150.0 ft
11	200.0 ft
12	300.0 ft

Figure 10. NWFT NETWORK

Dark lines indicate NWFT Legs

Outlet pressure head is figured from grid block (69, 5). As the elevations are included explicitly in the NWFT flow model, we need pressures at elevation from SWIFT. Pressures calculated by SWIFT for the reference site are given in Table 1. The head distribution is shown in Figure 11. SWIFT output pressures are in lbs/in^2. Units conversion is by 144 $in^2/ft^2/62.4\ lb/ft^3$.

For this problem,

$$P_{ui} = 432.7\ (144/62.4) = 998.5$$
$$P_{li} = 646.1\ (144/62.4) = 1491.0$$
$$P_{uo} = 475.5\ (144/62.4) = 1097.3$$

(ii) Hydraulic Conductivities (ft/day)

The reference site hydraulic properties used in the SWIFT calculations are shown in Table 2. Appropriate hydraulic conductivities for Legs 1, 2. and 3 are the horizontal conductivity of the middle sandstone. The horizontal conductivity of the lower sandstone is used for Legs 4, 5, and 6. As the hydraulic conductivity across the salt and shale near the depository is essentially vertical, we assign the vertical conductivity of salt to Legs 7, 8, 9, and 10. Leg 11 represents vertical flow through portions of both the middle and lower sandstone. Recalling the

Table 1

PRESSURE AT ELEVATION H (PSI)

	1	2	3	4	5	6	7	8	9	10
1	-449.0	-425.5	-401.4	-371.6	-345.0	-322.0	-302.4	-286.1	-264.4	-245.8
2	-405.9	-382.4	-358.5	-328.8	-302.2	-279.2	-259.5	-243.0	-221.7	-202.7
3		-238.5	-215.3	-184.0	-159.0	-146.3	-129.5	-99.9	-78.1	-58.8
4			-71.6	-59.3	-46.6	-24.2	-13.9	15.6	38.1	57.1
5				84.6	96.2	102.8	106.8	114.2	137.5	154.7
6					172.6	182.9	177.8	170.7	194.8	203.9
7					237.4	247.7	229.2	209.5	234.7	247.6
8						312.5	287.1	251.2	278.9	289.4
9								304.3	313.9	322.3
10								359.2	378.9	388.2
11										452.9
12										

	11	12	13	14	15	16	17	18	19	20
1	-226.7	-207.8	-187.9	-170.7	-153.0	-138.1	-122.8	-110.4	-97.5	-87.4
2	-184.0	-164.7	-145.2	-127.7	-110.3	-95.1	-80.1	-67.3	-54.8	-44.3
3	-40.8	-21.0	-1.6	16.2	33.4	48.8	63.2	76.6	88.9	99.6
4	102.2	123.0	142.4	160.4	177.4	193.0	207.6	220.7	233.0	243.7
5	225.1	244.3	262.1	303.3	321.6	337.2	351.9	365.0	377.2	388.0
6	275.1	290.9	305.4	388.0	360.9	374.4	408.6	421.7	433.5	443.9
7	309.2	321.5	332.7	451.8	330.5	340.4	414.0	427.0	437.8	447.5
8	348.7	357.9	365.5	395.7	313.8	322.5	429.8	442.3	452.2	461.3
9	366.9	372.6	376.5	318.1	324.3	332.4	424.4	435.9	445.0	453.5
10	402.2	403.3	403.3	382.2	389.1	397.1	432.3	441.2	449.3	457.2
11	452.3	451.1	449.2	446.5	454.0	461.6	468.8	476.4	483.9	491.5
12				532.8	540.4	547.9	555.5	563.0	570.5	578.1

	21	22	23	24	25	26	27	28	29	30
1	-76.9	-59.1	-61.0	-55.7	-50.0	-47.0	-43.7	-43.0	-43.0	-43.4
2	-34.2	-26.1	-18.3	-12.6	-7.3	-4.0	-1.0	.0	.1	-.4
3	109.5	117.9	125.4	131.3	136.4	140.0	142.8	143.9	144.1	143.8
4	253.6	262.0	269.5	275.5	280.5	284.2	286.8	288.1	288.4	288.1
5	397.9	406.3	413.8	419.8	424.8	428.5	431.1	432.4	432.7	432.4
6	453.5	461.9	469.3	475.5	480.8	484.9	488.1	490.0	491.1	491.6
7	456.6	464.8	472.2	478.7	484.6	489.5	493.8	497.0	499.7	501.7
8	470.0	478.0	485.5	492.3	498.6	504.2	509.3	513.7	517.7	521.0
9	461.8	469.7	477.2	484.2	491.0	497.3	503.3	508.8	514.0	518.6
10	465.0	472.6	480.2	487.5	494.8	502.0	509.0	515.9	522.6	528.7
11	499.0	506.6	514.1	521.7	529.2	536.8	544.3	551.9	559.4	566.2
12	585.6	593.2	600.7	608.3	615.8	623.4	631.0	638.5	646.1	652.9

	31	32	33	34	35	36	37	38	39	40
1	-43.5	-43.6	-43.7	-43.8	-43.9	-44.0	-44.2	-44.3	-44.4	-44.5
2	-.7	-1.0	-1.3	-1.6	-2.0	-2.3	-2.6	-3.0	-3.3	-3.7
3	143.5	143.2	142.9	142.6	142.2	141.9	141.6	141.2	140.9	140.5
4	287.8	287.5	287.2	286.9	286.6	286.2	285.9	285.6	285.2	284.8
5	432.1	431.8	431.5	431.2	430.9	430.6	430.2	429.9	429.5	429.1
6	492.0	492.4	492.7	493.1	493.5	493.8	494.2	494.5	494.8	495.1
7	503.4	503.2	506.9	508.6	510.4	512.1	513.8	515.5	517.2	518.9
8	523.8	526.7	529.6	532.4	535.3	538.2	541.0	543.9	546.7	549.6

	41	42	43	44	45	46	47	48	49	50
1	-44.6	-44.8	-44.9	-45.1	-45.2	-45.4	-45.5	-45.7	-45.8	-46.1
2	-4.1	-4.5	-4.9	-5.3	-5.8	-6.3	-6.8	-7.3	-7.8	-8.4
3	140.1	139.7	139.3	138.9	138.4	137.9	137.4	136.9	136.4	135.9
4	284.4	284.0	283.6	283.2	282.7	282.3	281.8	281.2	280.7	280.1
5	428.8	428.4	427.9	427.5	427.1	426.6	426.1	425.5	425.0	424.4
6	495.5	495.8	496.0	496.3	496.5	496.8	497.0	497.1	497.3	497.4
7	520.6	522.3	524.0	525.6	527.2	528.9	530.5	532.1	533.6	535.2
8	552.4	555.2	558.1	560.9	563.7	566.5	569.3	572.0	574.8	577.5
9	562.6	566.5	570.5	574.5	578.5	582.4	586.4	590.3	594.3	598.2
10	587.8	593.1	598.5	603.9	609.2	614.6	619.9	625.3	630.7	636.0
11	632.8	638.9	645.0	651.0	657.1	663.2	669.2	675.3	681.4	687.4
12	719.5	725.6	731.6	737.7	743.8	749.9	755.9	762.0	768.1	774.1

	51	52	53	54	55	56	57	58	59	60
1	-46.3	-46.5	-46.8	-47.0	-47.3	-47.5	-47.8	-48.1	-48.2	-47.6
2	-9.1	-9.7	-10.4	-11.2	-11.9	-12.8	-13.6	-14.4	-14.8	-12.9
3	135.1	134.5	133.8	133.0	132.2	131.4	130.5	129.6	128.8	131.1
4	279.4	278.8	278.1	277.3	276.6	275.7	274.8	273.7	271.8	275.0
5	423.8	423.1	422.4	421.7	420.9	419.6	419.0	417.4	419.1	419.1
6	497.5	497.6	497.6	497.6	497.4	505.3	505.4	503.5	494.2	499.9
7	536.7	538.2	539.7	541.1	542.4	569.9	576.3	568.1	546.0	553.2
8	580.3	583.0	585.7	588.3	590.4	592.4	596.1	598.3	599.7	608.5
9	602.1	606.0	609.9	613.8	616.7	593.2	600.2	607.0	631.8	642.1
10	641.4	646.7	652.1	657.4	662.3	658.3	665.1	671.6	683.6	695.4
11	693.5	699.6	705.7	711.7	717.8	723.7	730.0	736.1	742.0	754.6
12	780.2	786.3	792.4	798.5	804.5	810.6	816.7	822.8	828.9	841.3

	61	62	63	64	65	66	67	68	69
1	-46.7	-45.8	-44.8	-43.8	-42.5	-40.3	-38.0	-36.3	-38.2
2	-10.3	-7.5	-4.7	-1.6	2.3	8.8	16.0	20.9	15.2
3	133.8	136.6	139.5	142.4	145.9	152.9	160.8	167.8	172.8
4	278.0	280.9	283.7	286.4	288.8	296.8	306.0	315.4	326.2
5	422.3	425.2	428.0	430.5	430.9	440.7	451.0	462.0	475.5
6	504.1	508.0	511.8	515.0	515.3	526.9	538.0	549.9	564.8
7	559.4	565.4	571.2	576.2	578.9	591.6	603.3	615.9	631.6
8	616.3	624.0	631.6	638.3	643.4	655.5	668.5	681.3	697.4
9	651.6	661.0	670.3	678.9	686.5	699.8	711.9	724.8	741.0
10	706.9	718.4	729.7	740.8	751.6	764.9	776.9	790.0	806.3
11	767.1	779.6	792.0	804.4	816.7	829.9	842.0	855.1	871.5
12	853.9	866.3	878.7	891.1	903.5	916.6	928.8	942.0	958.5

PRESSURE AT DATUM (PSI)

	1	2	3	4	5	6	7	8	9	10
1	2396.3	2391.5	2387.4	2388.9	2387.2	2381.9	2373.3	2361.4	2354.8	2345.2
2	2395.6	2390.9	2386.5	2388.1	2386.4	2381.1	2372.5	2360.7	2353.8	2344.5
3		2389.2	2384.2	2377.3	2373.9	2368.4	2357.0	2358.3	2351.9	2342.9
4			2382.3	2366.3	2350.8	2349.9	2327.0	2328.2	2322.4	2313.2
5				2364.6	2338.0	2326.3	2302.0	2281.2	2276.3	2265.2
6					2337.0	2319.1	2285.7	2250.3	2246.2	2233.1

Table 1 (Con't)

Table 2

Reference Site Hydraulic Properties

	Horizontal Hydraulic Conductivity (ft/day)	Vertical Hydraulic Conductivity (ft/day)	Porosity
Middle Sandstone	50	1.4	0.3
Lower Shale	10^{-2}	10^{-3}	0.3
Salt	10^{-5}	10^{-6}	0.03
Lower Sandstone	40	7.0	0.3

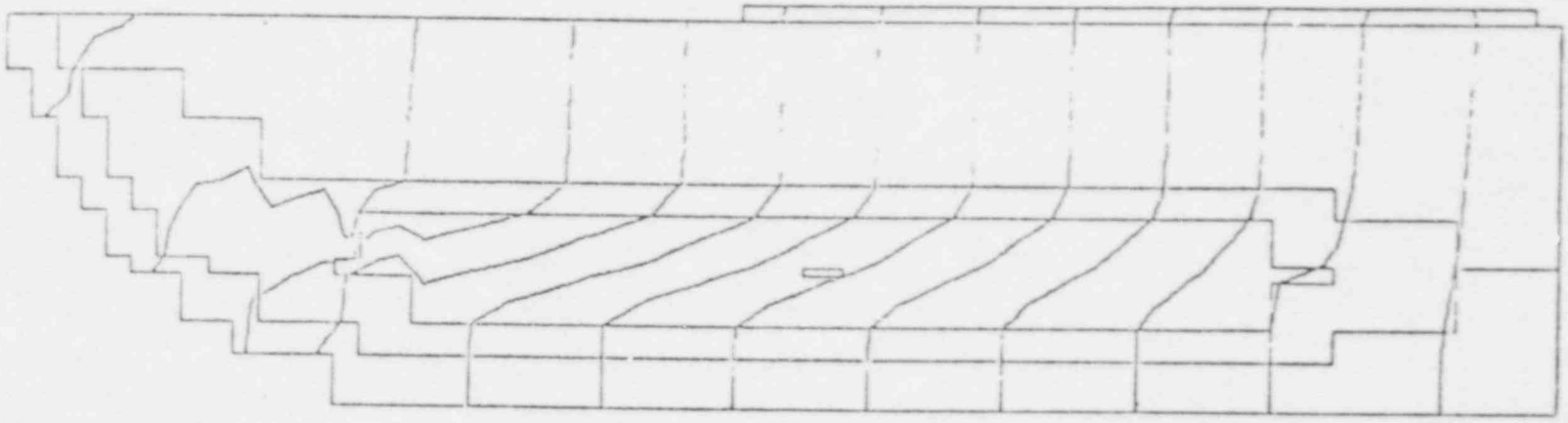


Figure 11.

Head Distribution at Reference Site

analogy with the electrical circuits, the middle and lower sandstone appear as resistances in series. Thus

$$\overline{R} = R_L + R_m$$

where

$\overline{R}$ = Total resistance to be assigned Leg II

R_L = Resistance of lower sandstone

R_m = Resistance of middle sandstone

Thus

$$\frac{L_{II}}{K_{II}A_{II}} = \frac{L_L}{K_L A_L} + \frac{L_m}{K_m A_m}$$

where

L_{II} = Length of Leg II

K_{II} = Conductivity assigned Leg II

A_{II} = Cross-sectional area of Leg II

L_L = Length of Leg II through lower sandstone

K_L = Vertical hydraulic conductivity of lower sandstone

L_m = Length of Leg 11 through middle sandstone

K_m = Vertical hydraulic conductivity of middle sandstone

$A_L = A_m = A_{11}$

From Figure 9 and Table 2

$$\frac{1100}{K_{11}} = \frac{600}{7} + \frac{500}{1.4}$$

So, Legs 1 → 3 $K = 50$ ft/day

Legs 4 → 6 $K = 40$ ft/day

Legs 7 → 10 $K = 10^{-6}$ ft/day

Leg 11 $K = 2.5$ ft/day

(iii) Cross-Sectional Areas (ft^2)

As Legs 7, 8, 9 and 10 are generally used to represent disruptive features, they would normally be assigned a cross-sectional area appropriate for the desired disruptive feature. In this sample problem, we are primarily interested in predicting fluid flow in the

middle and lower sandstone aquifers rather than examining the effects of disruptive features. Thus the cross-sectional areas of Legs 7 through 10 are arbitrarily set to 1 ft^2. Recall that these legs were assigned the vertical hydraulic conductivity of salt. Because of the small transmissibilities (conductivity area/length) of Legs 7 through 10, the fluid flow through these legs will be negligible. Small fluid flow in Legs 7 through 10 is consistent with the fact that the shale and salt layers effectively isolate the middle and lower sandstone aquifers. Legs 1, 2, and 3 represent the middle sandstone aquifer and Legs 4, 5, and 6 represent the lower sandstone aquifer. Leg 11 represents discharge from the lower aquifer to River L. The cross-sectional areas of these legs are determined by assigning their lateral dimension (width) to be that of the depository (i.e., 6000 ft). The only requirement on the width of the aquifer legs is that they be at least as wide as the disruptive feature represented by Legs 7 through 11. We choose a width of 6000 ft here because this width will be adequate for all the sample problems to follow.

So,	Legs 1 → 3	Area = $1000 \times 6000 = 6 \times 10^6$ ft^2
	Legs 4 → 6	Area = $300 \times 6000 = 1.8 \times 10^6$ ft^2
	Legs 7 → 10	Area = $1 \times 1 = 1$ ft^2
	Leg 11	Area = $20000 \times 6000 = 1.2 \times 10^8$ ft^2

(iv) Leg Lengths (ft)

As pressures are located at grid block midpoints, lengths are measured likewise. From the right edge of the depository to the river midpoint is 138,000 feet. Depository length is 8000 feet. From the left edge of the depository to NWFT system cutoff is 14,500 feet. Vertical legs must maintain a total distance of 1100 feet with no elevation change across the depository.

So,	Legs 1 and 4	Length = 14500
	Legs 2 and 5	Length = 8000
	Legs 3 and 6	Length = 138000
	Leg 7	Length = 625
	Leg 8	Length = 521.5
	Leg 9	Length = 475
	Leg 10	Length = 578.5
	Leg 11	Length = 1100

(v) Junction Elevations (ft)

The sine of the dip-angle used in SWIFT is .012937864. Elevations in SWIFT are given at top centers of grid blocks. From Figure 1 the horizontal distance from grid block (1,1) to grid block (29,1) is 140.000 feet. Thus the elevation of (29,1) is

$$6513.7 - (140000)(.012937864) = 4702.41.$$

The elevation of the upper aquifer inlet is therefore

4702.41 - 1100 = 3602.41.

Using the leg lengths and the dip-angle, the remaining junction elevations are:

Lower Aquifer Inlet	2502.41
Junction of Legs 1, 2, 7	3414.81
Junction of Legs, 4, 5, 9	2314.81
Junction of Legs 2, 3, 8	3311.31
Junction of Legs 5, 6, 10	2211.31
Upper Aquifer Outlet	1525.89
Junction of Legs 6, 11	425.89
Across Depository	2789.81

(vi) Porosities

Porosities for Legs 1 through 6 and 11 are taken from the values for sandstone in Table 2. Legs 7 through 10 are assigned salt porosity.

So, Legs 1 6,11 = 0.3

Legs 7 10 = 0.03

This ends the flow-system data. Radionuclide transport must be performed in any NWFT run so the type of data that follows must be included.

NOISO = 1, ISONAME = A, THALF = 10^3, CURZ = 10^3

LEACH = 10^3, ALPHA = 10^2, KD(J) = 0, J = 1,11.

Further, to eliminate radionuclide discharge rate output but to print system properties, the option card should read

IOPT(J) = 1

IOPT(J) = 0 (or blank)

J = 2,20

The vector/time card is also unimportant for this calculation. Therefore, a blank card may be inserted. The input data required for running this problem using NWFT are now complete. Figure 12 gives a summary of the input data and Table 3 is the actual input data format for Problem 1A. Results derived from the flow calculations are used in NWFT to perform radionuclide transport in one dimension. The important results are migration path length (a sum of leg-lengths in NWFT) and fluid velocities. The migration path length in NWFT is that of SWIFT by definition. To verify fluid velocity results from NWFT, we will have to compare Darcy velocities from NWFT with those from SWIFT as interstitial velocities are not available in the SWIFT output. Table 4 shows Darcy velocity results from SWIFT.

If we examine the X-direction Darcy velocities from SWIFT in the portion of the upper aquifer simulated by NWFT (Columns 29 69), we find that values range from about 0.64 to 0.67 ft/day. However, NWFT

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	1E-6	1E-6	1E-6	1E-6	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.03	.03	.03	.3

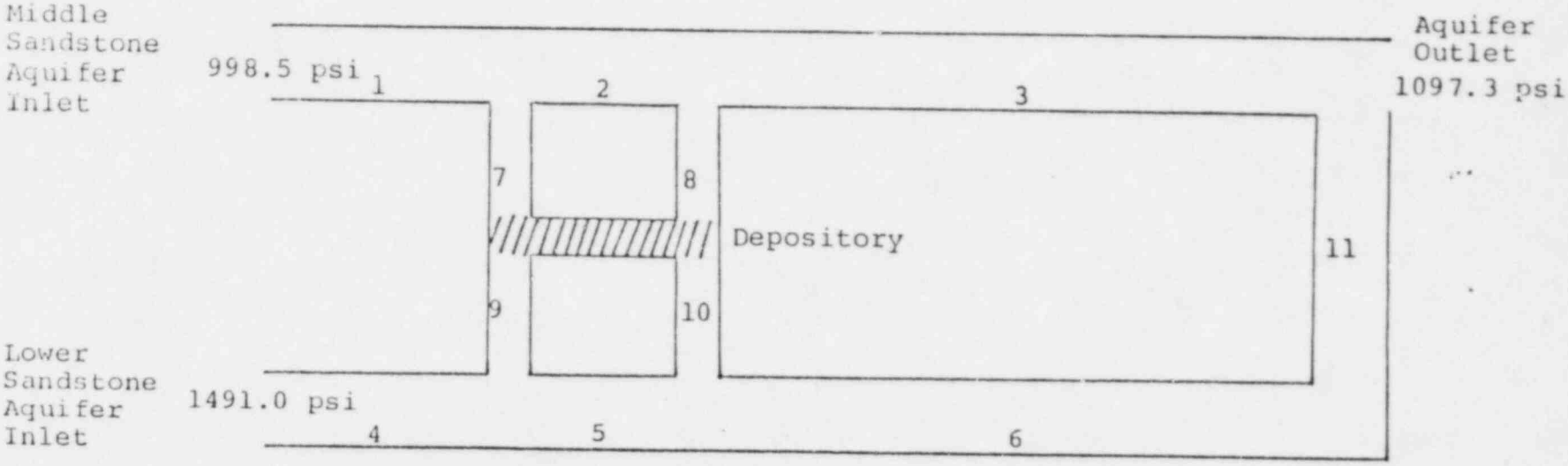


Figure 12

Problem 1A.

Reproduce Reference Site
Flow System From SWIFT

```
          **********INPUT FOR PROBLEM 1-A**********                    ( 1)
                                   ---                                 ( 2)
1                                                                      ( 3)
      998.5     1491.0     1097.3                                      ( 4)
50.0       50.0       50.0       40.0       40.0       40.0            1.E-6      1.E-6   ( 5)
    1.0E-6     1.0E-6  2.5                                            ( 6)
      6.0E6      6.0E6      6.0E6     1.8E6      1.8E6      1.8E6        1.0        1.0   ( 7)
        1.0        1.0      1.2E8                                     ( 8)
   14500.0     8000.0  138000.0   14500.0     8000.0  138000.0      625.0      521.5   ( 9)
     475.0      573.5     1100.0                                      (10)
   3602.41    3414.81    3311.31   2789.81    2789.81    2502.41    2314.81    2211.31  (11)
     425.89    1525.89                                              (12)
0.3        0.3        0.3        0.3        0.3        0.3        0.03       .03      (13)
.03        .03        .3                                           (14)
    1                                                              (15)
  A              1.E3     1000.                                     (16)
     1.0E3       100.                                              (17)
                                                                   (18)
                                                                   (19)
                                                                   (20)
          **********         END         **********                 (21)
```

Table 3

1	0.	.1012E+00	.8420E-01	-.4149E-01	.3148E-01	.1131E+00	.1909E+00	.2662E+00	.4436E+00	.6133E+00
2	0.	.8118E-01	.8239E-01	-.4159E-01	.3220E-01	.1128E+00	.1804E+00	.2622E+00	.1522E+00	.3051E+00
3		0.	.8724E-01	.6055E-04	.1394E-04	.2385E-04	.5098E-04	-.1402E-04	.1397E+00	.2000E+00
4			0.	.2375E+00	.1395E-03	.2564E-04	.8085E-04	-.6760E-05	.2522E-04	.4072E-04
5				0.	.4819E+00	.1047E-03	.1098E-03	.9395E-04	.2146E-04	.4944E-04
6					0.	.3236E+00	.3025E-03	.1608E-03	.1759E-04	.5896E-04
7						.3237E+00	.4257E-03	.2182E-03	.1260E-04	.6955E-04
8						0.	.9769E+00	.9875E+00	.8372E-04	.8048E-04
9								0.	.3365E+00	.3411E+00
10								0.	.3349E+00	.3433E+00
11										0.
12										

	11	12	13	14	15	16	17	18	19	20
1	.2027E+00	.2075E+00	.1852E+00	.2458E+00	.2356E+00	.2987E+00	.2904E+00	.3555E+00	.3453E+00	.4035E+00
2	.2112E+00	.1996E+00	.1931E+00	.2380E+00	.2432E+00	.2912E+00	.2982E+00	.3475E+00	.3531E+00	.4010E+00
3	.2271E+00	.1866E+00	.1972E+00	.2322E+00	.2485E+00	.2852E+00	.3037E+00	.3420E+00	.3586E+00	.3959E+00
4	-.1565E-03	.1655E+00	.1974E+00	.2293E+00	.2506E+00	.2844E+00	.3059E+00	.3401E+00	.3608E+00	.3941E+00
5	-.1941E-03	.4037E-04	.4692E-04	-.6056E-04	.4457E-04	.5685E-04	.6110E-04	.6802E-04	.7221E-04	.7885E-04
6	-.1701E-03	.5622E-04	.6151E-04	-.2495E-03	.5039E-06	.6644E-07	-.2818E-07	.6797E-07	.7449E-07	.8043E-07
7	-.1537E-03	.7190E-04	.7686E-04	-.4155E-03	.1365E-05	.8249E-07	-.2082E-06	.6854E-07	.7903E-07	.8356E-07
8	-.1434E-03	.8644E-04	.9340E-04	-.1937E-07	.5025E-06	.8842E-07	-.3625E-06	.7129E-07	.8281E-07	.8625E-07
9	-.1425E-03	.1022E-03	.1104E-03	.3950E-03	.9996E-04	.9088E-04	-.5846E-06	.7586E-07	.8665E-07	.8891E-07
10	.1280E-03	.1232E-03	.1284E-03	.2247E-03	.9620E-04	.9165E-04	-.6531E-07	.8731E-07	.9134E-07	.9210E-07
11	.5235E+00	.5348E+00	.5478E+00	.5623E+00	.1853E-03	.9346E-04	.9934E-04	.9372E-04	.9372E-04	.9371E-04
12				0.	.3749E+00	.3749E+00	.3750E+00	.3750E+00	.3750E+00	.3750E+00

	21	22	23	24	25	26	27	28	29	30
1	.4000E+00	.4615E+00	.4549E+00	.5183E+00	.5098E+00	.5713E+00	.5645E+00	.6230E+00	.6401E+00	.2927E-03
2	.4076E+00	.4544E+00	.4624E+00	.5107E+00	.5173E+00	.5641E+00	.5718E+00	.6177E+00	.6378E+00	.6522E+00
3	.4129E+00	.4498E+00	.4677E+00	.5056E+00	.5226E+00	.5594E+00	.5770E+00	.6138E+00	.6353E+00	.6496E+00
4	.4150E+00	.4482E+00	.4699E+00	.5038E+00	.5248E+00	.5578E+00	.5791E+00	.6123E+00	.6342E+00	.6490E+00
5	.8306E-04	.8966E-04	.9404E-04	.1008E-03	.1050E-03	.1116E-03	.1159E-03	.1225E-03	.1269E-03	.1299E-03
6	.8423E-07	.9009E-07	.9403E-07	.1000E-06	.1038E-06	.1097E-06	.1135E-06	.1194E-06	.1233E-06	.1256E-06
7	.8652E-07	.9094E-07	.9397E-07	.9848E-07	.1014E-06	.1058E-06	.1088E-06	.1132E-06	.1162E-06	.1179E-06
8	.8842E-07	.9166E-07	.9390E-07	.9722E-07	.9939E-07	.1026E-06	.1048E-06	.1081E-06	.1103E-06	.1115E-06
9	.9030E-07	.9238E-07	.9383E-07	.9595E-07	.9735E-07	.9943E-07	.1008E-06	.1029E-06	.1043E-06	.1052E-06
10	.9257E-07	.9326E-07	.9374E-07	.9444E-07	.9491E-07	.9560E-07	.9607E-07	.9676E-07	.9722E-07	.9755E-07
11	.9371E-04	.9370E-04	.9370E-04	.9370E-04	.9369E-04	.9369E-04	.9369E-04	.9369E-04	.9369E-04	.9367E-04
12	.3749E+00	.3749E+00	.3749E+00	.3749E+00	.3749E+00	.3749E+00	.3748E+00	.3748E+00	.3748E+00	.3748E+00

	31	32	33	34	35	36	37	38	39	40
1	.1288E-03	.1286E-03	.1286E-03	.1286E-03	.1286E-03	.1286E-03	.1286E-03	.1287E-03	.1287E-03	.1287E-03
2	.6495E+00	.6491E+00	.6492E+00	.6492E+00	.6493E+00	.6495E+00	.6497E+00	.6500E+00	.6503E+00	.6506E+00
3	.6492E+00	.6493E+00	.6494E+00	.6495E+00	.6496E+00	.6498E+00	.6500E+00	.6503E+00	.6506E+00	.6509E+00
4	.6491E+00	.6495E+00	.6497E+00	.6498E+00	.6499E+00	.6501E+00	.6503E+00	.6505E+00	.6509E+00	.6513E+00
5	.1299E-03	.1300E-03	.1300E-03	.1300E-03	.1300E-03	.1301E-03	.1301E-03	.1302E-03	.1302E-03	.1303E-03
6	.1260E-06	.1261E-06	.1261E-06	.1261E-06	.1262E-06	.1262E-06	.1263E-06	.1263E-06	.1263E-06	.1264E-06
7	.1182E-06	.1183E-06	.1183E-06	.1183E-06	.1184E-06	.1184E-06	.1184E-06	.1184E-06	.1185E-06	.1185E-06
8	.1118E-06	.1118E-06	.1118E-06	.1118E-06	.1119E-06	.1119E-06	.1119E-06	.1119E-06	.1119E-06	.1120E-06
9	.1053E-06	.1053E-06	.1053E-06	.1053E-06	.1054E-06	.1054E-06	.1054E-06	.1054E-06	.1054E-06	.1054E-06
10	.9754E-07	.9755E-07	.9755E-07	.9755E-07	.9755E-07	.9755E-07	.9755E-07	.9755E-07	.9755E-07	.9756E-07
11	.9367E-04	.9366E-04	.9366E-04	.9366E-04	.9365E-04	.9365E-04	.9364E-04	.9364E-04	.9363E-04	.9363E-04
12	.3748E+00	.3747E+00	.3747E+00	.3747E+00	.3747E+00	.3747E+00	.3747E+00	.3746E+00	.3746E+00	.3746E+00

Table 4: X-Direction Darcy Velocity

	41	42	43	44	45	46	47	48	49	50
1	.1287E-03	.1288E-03	.1288E-03	.1288E-03	.1289E-03	.1289E-03	.1290E-03	.1290E-03	.1291E-03	.1291E-03
2	.6510E+00	.6515E+00	.6519E+00	.6525E+00	.6531E+00	.6537E+00	.6544E+00	.6552E+00	.6560E+00	.6569E+00
3	.6513E+00	.6518E+00	.6523E+00	.6529E+00	.6534E+00	.6541E+00	.6548E+00	.6555E+00	.6564E+00	.6573E+00
4	.6517E+00	.6521E+00	.6526E+00	.6531E+00	.6537E+00	.6544E+00	.6551E+00	.6558E+00	.6567E+00	.6576E+00
5	.1304E-03	.1305E-03	.1306E-03	.1307E-03	.1308E-03	.1309E-03	.1311E-03	.1312E-03	.1314E-03	.1315E-03
6	.1265E-06	.1265E-06	.1266E-06	.1267E-06	.1268E-06	.1269E-06	.1271E-06	.1272E-06	.1274E-06	.1275E-06
7	.1186E-06	.1186E-06	.1187E-06	.1188E-06	.1189E-06	.1189E-06	.1190E-06	.1191E-06	.1193E-06	.1194E-06
8	.1120E-06	.1121E-06	.1121E-06	.1122E-06	.1122E-06	.1123E-06	.1123E-06	.1124E-06	.1125E-06	.1126E-06
9	.1054E-06	.1055E-06	.1055E-06	.1055E-06	.1056E-06	.1056E-06	.1056E-06	.1057E-06	.1057E-06	.1058E-06
10	.9756E-07	.9757E-07	.9757E-07	.9758E-07	.9759E-07	.9760E-07	.9761E-07	.9762E-07	.9763E-07	.9765E-07
11	.9363E-04	.9362E-04	.9362E-04	.9361E-04	.9361E-04	.9360E-04	.9360E-04	.9359E-04	.9359E-04	.9358E-04
12	.3746E+00	.3746E+00	.3745E+00	.3745E+00	.3745E+00	.3745E+00	.3745E+00	.3744E+00	.3744E+00	.3744E+00

	51	52	53	54	55	56	57	58	59	60
1	.1292E-03	.1293E-03	.1293E-03	.1294E-03	.1295E-03	.1296E-03	.1296E-03	.1296E-03	.1286E-03	.1295E-03
2	.6579E+00	.6589E+00	.6601E+00	.6613E+00	.6625E+00	.6638E+00	.6648E+00	.6639E+00	.6497E+00	.5858E+00
3	.6582E+00	.6593E+00	.6604E+00	.6616E+00	.6629E+00	.6643E+00	.6657E+00	.6669E+00	.6523E+00	.5766E+00
4	.6586E+00	.6596E+00	.6607E+00	.6619E+00	.6633E+00	.6648E+00	.6668E+00	.6717E+00	.6499E+00	.5487E+00
5	.1318E-03	.1320E-03	.1322E-03	.1324E-03	.1327E-03	.1357E-03	.1314E-03	.1375E-03	.2942E-03	.4962E-00
6	.1277E-06	.1279E-06	.1281E-06	.1283E-06	.1290E-06	.1662E-06	.1276E-03	.1395E-03	.1811E-03	.9568E-04
7	.1195E-06	.1196E-06	.1198E-06	.1200E-06	.1210E-06	-.5753E-07	.1260E-03	.1409E-03	.2544E-03	.8721E-04
8	.1127E-06	.1128E-06	.1129E-06	.1131E-06	.1164E-06	.1159E-06	.1071E-06	.1155E-06	.2406E-06	.7813E-04
9	.1059E-06	.1059E-06	.1060E-06	.1062E-06	.1118E-06	.5246E-06	.8804E-04	.8982E-04	-.1385E-04	.6951E-04
10	.9764E-07	.9768E-07	.9770E-07	.9778E-07	.1006E-06	.3015E-05	.8921E-04	.9126E-04	.5493E-04	.6051E-04
11	.9356E-04	.9357E-04	.9356E-04	.9356E-04	.9357E-04	.9473E-04	.9199E-04	.9346E-04	.1839E-03	.2239E-03
12	.3744E+00	.3744E+00	.3743E+00	.3743E+00	.3743E+00	.3743E+00	.3742E+00	.3742E+00	.3742E+00	.2278E+00

	61	62	63	64	65	66	67	68	69
1	.1230E-03	.1227E-03	.1225E-03	.1221E-03	.1295E-03	.1157E-03	.1143E-03	.1188E-03	.2773E-03
2	.5657E+00	.5605E+00	.5582E+00	.5520E+00	.5274E+00	.4543E+00	.4350E+00	.4996E+00	.8029E+00
3	.5618E+00	.5598E+00	.5592E+00	.5565E+00	.5392E+00	.4413E+00	.4136E+00	.4403E+00	.4977E+00
4	.5548E+00	.5587E+00	.5607E+00	.5647E+00	.5710E+00	.4105E+00	.3786E+00	.3733E+00	.3302E+00
5	.5496E+00	.5583E+00	.5616E+00	.5708E+00	.6295E+00	.3604E+00	.3455E+00	.3272E+00	.2533E+00
6	.1042E-03	.1058E-03	.1065E-03	.1130E-03	.2535E-03	.3076E+00	.3240E+00	.3013E+00	.2167E+00
7	.9274E-04	.9413E-04	.9481E-04	.9982E-04	.2256E-03	.2770E+00	.3075E+00	.2822E+00	.1921E+00
8	.8326E-04	.8440E-04	.8502E-04	.8983E-04	.1983E-03	.2133E+00	.2398E+00	.2196E+00	.1498E+00
9	.7381E-04	.7468E-04	.7519E-04	.7915E-04	.1675E-03	.2117E+00	.2383E+00	.2167E+00	.1426E+00
10	.6252E-04	.6301E-04	.6334E-04	.6508E-04	.1325E-03	.2113E+00	.2368E+00	.2150E+00	.1404E+00
11	.2276E+00	.2287E+00	.2297E+00	.2303E+00	.2309E+00	.2125E+00	.2354E+00	.2133E+00	.1385E+00
12	.2277E+00	.2288E+00	.2297E+00	.2304E+00	.2305E+00	.2135E+00	.2344E+00	.2120E+00	.1368E+00

Z-DIR - DARCY VELOCITY - FT/DAY

	1	2	3	4	5	6	7	8	9	10
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.5412E-02	.5902E-02	.5106E-02	.5047E-02	.5525E-02	.5323E-02	.4982E-02	.4393E-02	.3736E-02	.2601E-02
3		.5819E-02	.1337E-01	.1271E-03	.1496E-03	.1539E-03	.1921E-03	.8710E-02	.4467E-02	.2199E-02
4			.1917E-01	.1302E-03	.1489E-03	.1515E-03	.1963E-03	.3932E-03	.3951E-03	.3873E-03
5				.1928E-01	.1564E-03	.1478E-03	.2021E-03	.3907E-03	.3834E-03	.4002E-03
6					.1943E-01	.1475E-03	.2026E-03	.3937E-03	.3825E-03	.4099E-03
7					.9713E-02	.9845E-02	.2068E-03	.3973E-03	.3813E-03	.4166E-03
8						.1954E-01	.2130E-03	.4040E-03	.3795E-03	.4232E-03
9								.2015E-01	.3797E-03	.4276E-03

2	.8077E-02	.2925E-02	.8023E-02	.2907E-02	.7954E-02	.3073E-02	.8153E-02	.2872E-02	.7911E-02	.2973E-02
3	.8849E-02	.3356E-02	.5030E-02	.2552E-02	.4763E-02	.2505E-02	.4845E-02	.2492E-02	.4720E-02	.2529E-02
4	.1154E-01	.2449E-02	.2693E-02	.1453E-02	.2253E-02	.1436E-02	.2284E-02	.1335E-02	.2227E-02	.1396E-02
5	.4819E-03	.5241E-03	.5613E-03	.2979E-04	.1934E-05	.1677E-05	.1189E-05	.1079E-05	.1192E-05	.1106E-05
6	.4784E-03	.5237E-03	.5654E-03	.2558E-04	.1442E-05	.1505E-05	.9113E-06	.9108E-06	.9259E-06	.9364E-06
7	.4715E-03	.5234E-03	.5746E-03	.1837E-04	.1455E-05	.1508E-05	.9082E-06	.9104E-06	.9255E-06	.9361E-06
8	.4646E-03	.5231E-03	.5893E-03	.5531E-05	.1493E-05	.1516E-05	.8997E-06	.9099E-06	.9252E-06	.9358E-06
9	.4599E-03	.5229E-03	.5910E-03	.5520E-05	.1501E-05	.1525E-05	.8908E-06	.9095E-06	.9249E-06	.9356E-06
10	.4525E-03	.5226E-03	.5824E-03	.1437E-04	.1773E-05	.4269E-05	.8709E-06	.9091E-06	.9247E-06	.9354E-06
11	.4525E-03	.5223E-03	.5794E-03	.1822E-04	.1909E-05	.7019E-05	.8661E-06	.9087E-06	.9245E-06	.9352E-06
12				.2250E-01	.5700E-05	.6957E-05	.9140E-06	.9085E-06	.9241E-06	.9348E-06

	21	22	23	24	25	26	27	28	29	30
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.7809E-02	.3192E-02	.8006E-02	.2936E-02	.7793E-02	.3112E-02	.7735E-02	.4257E-02	.2716E-02	.1113E-04
3	.4681E-02	.2652E-02	.4788E-02	.2547E-02	.4669E-02	.2597E-02	.4671E-02	.2910E-02	.1799E-02	.2376E-03
4	.2215E-02	.1452E-02	.2262E-02	.1406E-02	.2209E-02	.1424E-02	.2214E-02	.1467E-02	.8622E-03	.1776E-03
5	.1209E-05	.1123E-05	.1217E-05	.1112E-05	.1198E-05	.1095E-05	.1169E-05	.1061E-05	.9640E-06	.8595E-06
6	.9991E-06	.9969E-06	.9968E-06	.9916E-06	.9336E-06	.9207E-06	.9049E-06	.8842E-06	.9504E-06	.8377E-06
7	.9437E-06	.9966E-06	.9964E-06	.9913E-06	.9332E-06	.9204E-06	.9045E-06	.8839E-06	.8601E-06	.8371E-06
8	.9434E-06	.9963E-06	.9961E-06	.9910E-06	.9329E-06	.9201E-06	.9042E-06	.8836E-06	.8599E-06	.8369E-06
9	.9432E-06	.9961E-06	.9958E-06	.9908E-06	.9327E-06	.9199E-06	.9040E-06	.8834E-06	.8597E-06	.8367E-06
10	.9429E-06	.9959E-06	.9956E-06	.9906E-06	.9324E-06	.9197E-06	.9038E-06	.8832E-06	.8596E-06	.8366E-06
11	.9427E-06	.9957E-06	.9954E-06	.9904E-06	.9322E-06	.9195E-06	.9036E-06	.8830E-06	.8594E-06	.8364E-06
12	.9423E-06	.9953E-06	.9949E-06	.9900E-06	.9318E-06	.9191E-06	.9032E-06	.8827E-06	.8590E-06	.8361E-06

	31	32	33	34		36	37	38	39	40
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.1975E-04	.2929E-04	.3883E-04	.4948E-04	.5827E-04	.6826E-04	.7848E-04	.8899E-04	.9982E-04	.1110E-03
3	.4994E-04	.2583E-04	.2718E-04	.3277E-04	.3916E-04	.4573E-04	.5261E-04	.5961E-04	.6683E-04	.7430E-04
4	.3957E-04	.1603E-04	.1447E-04	.1685E-04	.1997E-04	.2326E-04	.2666E-04	.3015E-04	.3375E-04	.3748E-04
5	.8217E-06	.7980E-06	.7769E-06	.7564E-06	.7359E-06	.7155E-06	.6950E-06	.6745E-06	.6540E-06	.6334E-06
6	.8166E-06	.7958E-06	.7750E-06	.7542E-06	.7334E-06	.7125E-06	.6916E-06	.6707E-06	.6498E-06	.6288E-06
7	.8164E-06	.7956E-06	.7748E-06	.7540E-06	.7332E-06	.7123E-06	.6915E-06	.6706E-06	.6496E-06	.6286E-06
8	.8162E-06	.7954E-06	.7746E-06	.7538E-06	.7330E-06	.7122E-06	.6913E-06	.6703E-06	.6495E-06	.6285E-06
9	.8160E-06	.7953E-06	.7745E-06	.7537E-06	.7329E-06	.7121E-06	.6912E-06	.6703E-06	.6493E-06	.6284E-06
10	.8159E-06	.7951E-06	.7744E-06	.7536E-06	.7328E-06	.7119E-06	.6911E-06	.6702E-06	.6492E-06	.6282E-06
11	.8157E-06	.7950E-06	.7742E-06	.7534E-06	.7326E-06	.7118E-06	.6909E-06	.6700E-06	.6491E-06	.6281E-06
12	.8154E-06	.7947E-06	.7739E-06	.7531E-06	.7323E-06	.7115E-06	.6906E-06	.6698E-06	.6488E-06	.6279E-06

	41	42	43	44	45	46	47	48	49	50
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.1227E-03	.1347E-03	.1474E-03	.1605E-03	.1744E-03	.1889E-03	.2041E-03	.2202E-03	.2372E-03	.2551E-03
3	.8205E-04	.9012E-04	.9853E-04	.1073E-03	.1165E-03	.1262E-03	.1364E-03	.1471E-03	.1584E-03	.1704E-03
4	.4135E-04	.4537E-04	.4957E-04	.5396E-04	.5856E-04	.6339E-04	.6846E-04	.7381E-04	.7946E-04	.8543E-04
5	.6128E-06	.5922E-06	.5715E-06	.5508E-06	.5301E-06	.5093E-06	.4884E-06	.4675E-06	.4465E-06	.4254E-06
6	.6077E-06	.5866E-06	.5654E-06	.5442E-06	.5229E-06	.5015E-06	.4801E-06	.4585E-06	.4368E-06	.4151E-06
7	.6076E-06	.5865E-06	.5653E-06	.5441E-06	.5228E-06	.5014E-06	.4799E-06	.4584E-06	.4367E-06	.4150E-06
8	.6074E-06	.5863E-06	.5652E-06	.5440E-06	.5227E-06	.5013E-06	.4798E-06	.4583E-06	.4366E-06	.4149E-06
9	.6073E-06	.5862E-06	.5651E-06	.5439E-06	.5226E-06	.5012E-06	.4797E-06	.4582E-06	.4366E-06	.4148E-06
10	.6072E-06	.5861E-06	.5650E-06	.5438E-06	.5225E-06	.5011E-06	.4797E-06	.4581E-06	.4365E-06	.4147E-06
11	.6071E-06	.5860E-06	.5649E-06	.5436E-06	.5224E-06	.5010E-06	.4796E-06	.4580E-06	.4364E-06	.4146E-06
12	.6068E-06	.5858E-06	.5646E-06	.5434E-06	.5221E-06	.5008E-06	.4794E-06	.4578E-06	.4362E-06	.4145E-06

Table 4 (Cont'd)

4	.3926E-06	.3706E-06	.3485E-06	.3251E-06	.2303E-06	-.4535E-05	.1572E-05	.1823E-05	-.1098E-01	-.9763E-05
5	.4043E-06	.3831E-06	.3619E-06	.3394E-06	.4560E-06	.1124E-04	.3100E-05	.1525E-03	.2506E-01	.2853E-02
6	.3932E-06	.3712E-06	.3490E-06	.3264E-06	.3078E-06	.1145E-04	.2794E-05	.7409E-05	.1990E-03	.1789E-03
7	.3931E-06	.3711E-06	.3490E-06	.3268E-06	.3053E-06	.6672E-05	.2348E-05	.5847E-05	.2012E-03	.1785E-03
8	.3930E-06	.3710E-06	.3489E-06	.3257E-06	.3119E-06	.1942E-05	.1791E-05	.1588E-05	.2079E-03	.1783E-03
9	.3929E-06	.3709E-06	.3488E-06	.3256E-06	.3119E-06	.1942E-05	.1790E-05	.1585E-05	.2054E-03	.1781E-03
10	.3929E-06	.3709E-06	.3487E-06	.3263E-06	.2963E-06	-.1343E-05	.1723E-05	.5472E-05	.2022E-03	.1779E-03
11	.3928E-06	.3708E-06	.3487E-06	.3261E-06	.2887E-06	-.4673E-05	.1646E-05	.5645E-05	.2022E-03	.1778E-03
12	.3926E-06	.3706E-06	.3485E-06	.3251E-06	.2303E-06	-.4535E-05	.1572E-05	.1823E-05	-.1098E-01	-.9763E-05

	61	62	63	64	65	66	67	68	69
1	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.3127E-03	.2290E-03	.1409E-03	.4719E-04	-.7272E-04	-.2639E-03	-.4883E-03	-.6391E-03	-.1955E+00
3	.7448E-03	.4145E-03	.6577E-03	.2092E-02	.5972E-02	.1390E-02	-.5878E-02	-.2593E-01	-.1285E+00
4	.9115E-03	.4587E-03	.8790E-03	.3532E-02	.1412E-01	.3692E-02	-.8103E-02	-.3058E-01	-.8701E-01
5	.5815E-03	.2864E-03	.5466E-03	.3003E-02	.2748E-01	.6342E-02	-.7654E-02	-.2708E-01	-.5946E-01
6	.1481E-03	.1168E-03	.8571E-04	.5364E-04	.4092E-01	.7092E-02	-.6738E-02	-.2337E-01	-.4678E-01
7	.1480E-03	.1168E-03	.8556E-04	.5824E-04	.2939E-01	.6464E-02	-.5886E-02	-.2019E-01	-.3864E-01
8	.1479E-03	.1167E-03	.8535E-04	.5351E-04	.1900E-01	.5315E-02	-.4936E-02	-.1681E-01	-.3143E-01
9	.1479E-03	.1167E-03	.8521E-04	.5030E-04	.1367E-01	.4651E-02	-.4405E-02	-.1496E-01	-.2781E-01
10	.1478E-03	.1167E-03	.8505E-04	.4748E-04	.5737E-02	.3654E-02	-.3598E-02	-.1213E-01	-.2245E-01
11	.1478E-03	.1166E-03	.8497E-04	.4434E-04	-.2183E-02	.2693E-02	-.2780E-02	-.9382E-02	-.1719E-01
12	.8742E-04	.6996E-04	.5079E-04	.1365E-04	-.1266E-02	.1554E-02	-.1676E-02	-.5636E-02	-.1026E-01

ELAPSED SIMULATION TIME 1.0000E-02 DAYS (2.7397E-05 YEARS)

TIME STEP NUMBER 1 NUMBER OF OUTER ITERATIONS 4 CURRENT TIME STEP 1.0000E-02 DAYS

	FLUID (LBM)	HEAT (BTU)	INERT COMP (LBM)
MASS BALANCE	1.0000	1.0000	1.0000
WELL SUMMARY			
TOTAL PRODUCTION	0.	0.	0.
TOTAL INJECTION	0.	0.	0.
TOTAL IN PLACE	1.1046E+10	3.8769E+11	0.
AQUIFER INFLUENCE FUNCTION			
TOTAL EFFLUX	0.	0.	0.
TOTAL INFLUX	0.	0.	0.
CUMULATIVE FLUX	0.	0.	0.
MAXIMUM CHANGE AT	(69, 1,12)	(69, 1,12)	(69, 1,12)
OVER LAST TIME STEP	0. PSI	0. DEG.F	0. LBM

AVERAGE PRESS 1785. PSI HEAT LOSS TO OVER/UNDERBRDN 0. BTU CUM SALT DISSOL 0. LBM

THE TIME IS 1.000E-02 DAYS

WELL NO	LOCATION I	J	K	PRODUCTION RATES WATER LB/DAY	HEAT BTU/DAY	COMP LB/DAY	CUMULATIVE PRODUCTION WATER LBM	HEAT BTU	COMP LBM	CUMULATIVE INJECTION WATER LBM	HEAT BTU	COMP LBM	GRID BLOCK PRESS	F_WG BHP PSIA	FLWG WHDP PSIA	BH TEMP DG.F	WH TEMP DG.F
1	0	0	0- 0	0.	0.	0.0000	0.	0.	0.	0.	0.	0.	-38.	-38.	0.	68.	0.

results for Legs 1, 2, and 3 show a Darcy velocity of 0.616 ft/day (see Table 5). Similarly, SWIFT predicts 0.37 ft/day for the lower aquifer whereas NWFT predicts 0.341 ft/day. While these comparisons indicate reasonably good agreement, Part B of Problem 1 suggests an input change for NWFT which will improve the comparison.

Problem 1 B

The purpose here is to improve the comparison between Darcy velocities predicted by NWFT and SWIFT. Referring to the pressure output from SWIFT gives an explanation for the slightly low Darcy velocities observed in NWFT. The row 5 pressures remain in the 425-430 psi range for most of the down-dip grid blocks. In the last four blocks, however, pressure increases to drive the fluid upward to River L (grid block 1,69) in SWIFT. So, entering the pressure from block (69,5) (i.e., 475.5 psi) overestimates the appropriate NWFT pressure head. This causes the underestimation of fluid velocity observed in Problem 1A. As a remedy the following change is suggested

$$P_{uo} = P_{ui} = 998.5 \text{ ft}$$

That is, equate upper aquifer inlet and outlet pressure heads. Figure 13 summarizes the data for Problem 1B. Actual input data for NWFT are contained in Table 6.

OPTIONS 1 1 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

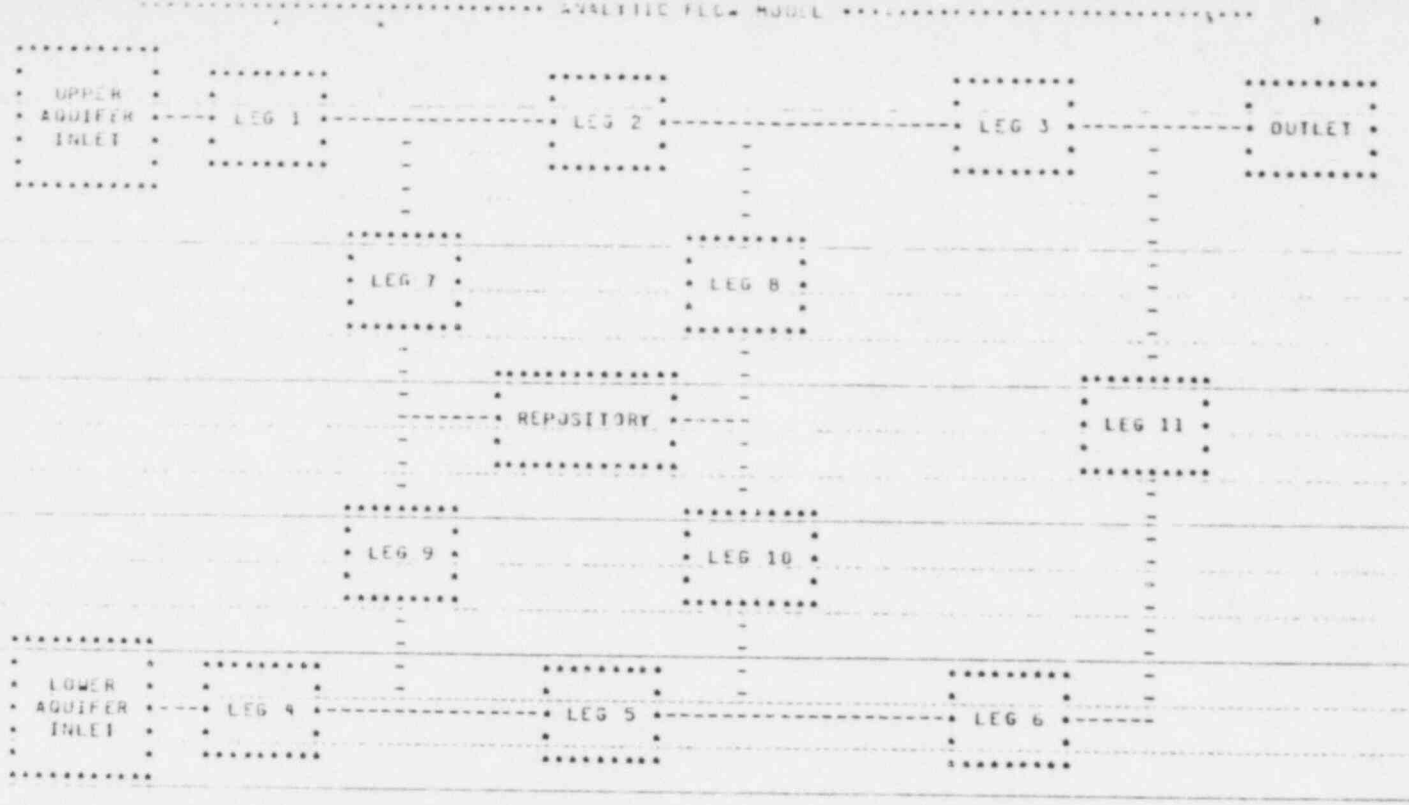
NUMBER OF ISOTOPES 1

ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
A	1.000E+03	1.000E+03

LEACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 9 TIME UPPER BOUND = 1.00E+06

Table 5: NWFT Output for Problem 1A



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 1097.30 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .30%
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.0CE+00

Table 5 (cont'd)

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 2
LENGTH = 8.00E+03 FT
AREA = 6.30E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 3
LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 4
LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 5
LENGTH = 8.00E+03 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 6
LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 7
LENGTH = 6.25E+02 FT
AREA = 1.00E+07 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .2300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 8
LENGTH = 1.22E+02 FT

Table 5 (cont'd)

CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .3370
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
****
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
****
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
****
LENGTH = 1.10E+03 FT
AREA = 1.20E+08 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 1.4910E+03 FT
AQUIFER OUTLET = 1.0373E+03 FT
JUNCTION LEGS 1-7-2 = 1.0074E+03 FT
JUNCTION LEGS 2-8-3 = 1.0123E+03 FT
JUNCTION LEGS 4-9-5 = 1.5550E+03 FT
JUNCTION LEGS 5-10-6 = 1.5913E+03 FT
JUNCTION LEGS 7-4-DEPOSITORY = 1.3026E+03 FT
JUNCTION LEGS 8-11-DEPOSITORY = 1.3026E+03 FT
JUNCTION LEGS 6-11 = 2.1996E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.73E+05	6.16E-01	2.05E+00
2	3.73E+05	6.16E-01	2.05E+00
3	3.73E+05	6.16E-01	2.05E+00
4	6.84E+05	3.41E-01	1.14E+00
5	6.84E+05	3.41E-01	1.14E+00
6	6.84E+05	3.41E-01	1.14E+00
7	-5.78E-07	-5.24E-17	-1.74E-16
8	-4.43E-07	-4.43E-17	-1.48E-16
9	-4.74E-07	-4.69E-17	-1.56E-16
10	-5.38E-07	-5.03E-17	-1.68E-16
11	1.14E+06	5.11E-03	1.70E-02

Table 5 (cont'd)

```
RADIONUCLIDE MIGRATION PATH-----LEGS    10    6    11

        PATH LENGTH (FT) =  1.3968E+05
   ISOTOPE VEL. (FT/DAY) =  4.2235E-03
   MIGRATION TIME (YEARS) =  9.5111E+04

OTHER PATHS ARE     9    5    6    11
```

Table 5 (cont'd)

LEGS

	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	1 E-6	1 E-6	1E-6	1 E-6	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.03	.03	.03	.3

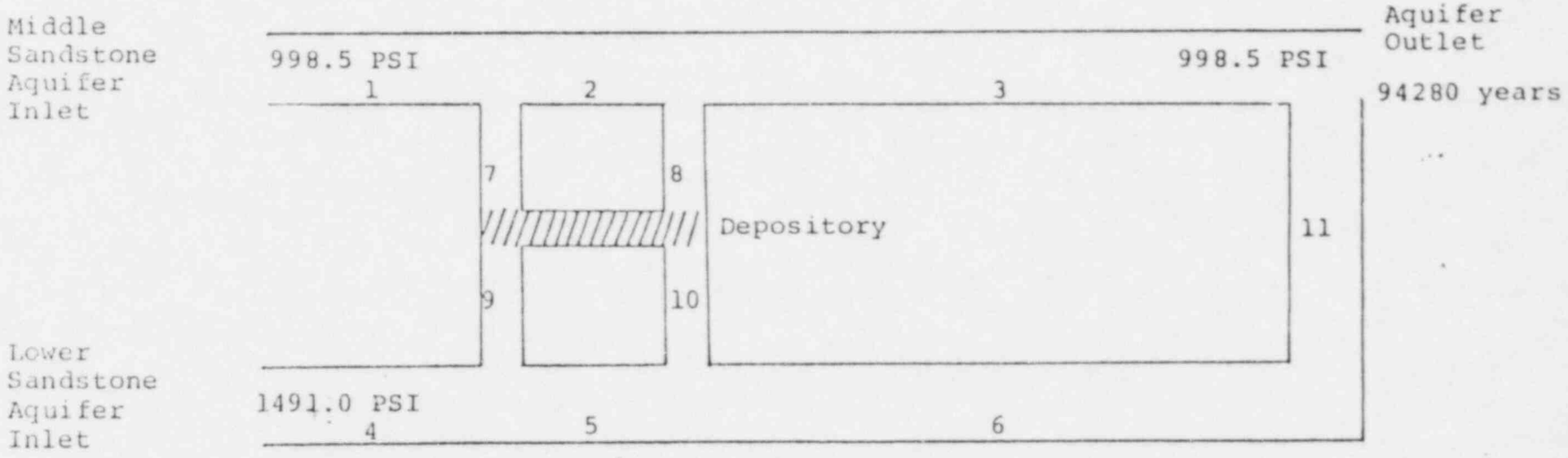


Figure 13.

Problem 1B.

REPRODUCE REFERENCE SITE FLOW SYSTEM FROM SWIFT MORE EXACTLY

NWFT

```
..........INPUT FOR PROBLEM 1-B..........
                                    ---
1
   998.5    1491.0    998.5
50.0      50.0      50.0      40.0      40.0      40.0           1.E-6     1.E-6
   1.0E-5    1.0E-5  2.5
   6.0E6     5.0E6     6.0E5     1.8E6     1.8E6     1.8E6       1.0       1.0
     1.0       1.0     1.2E4
 14500.0    8000.0  138000.0   14500.0    2000.0  138000.0     625.0     521.5
   475.0     578.5    1100.0
 3602.41   3414.81   3311.31   2789.81   2789.81   2502.41   2314.81   2211.31
  425.89   1525.89
0.3       0.3       0.3       0.3       0.3     . 0.3       0.03      .03
.03       .03       .
1  1
 A                1.E3     1000.
   1.0E3     100.



..........          END          ..........
```

Table 6

The output fluid velocities from NWFT Table 7 now are:

.647 ft/day in the upper aquifer

and

.366 ft/day in the lower aquifer.

OPTIONS 1 1 2 1 3 1 4 0 5 0 6 0 7 1 8 0 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

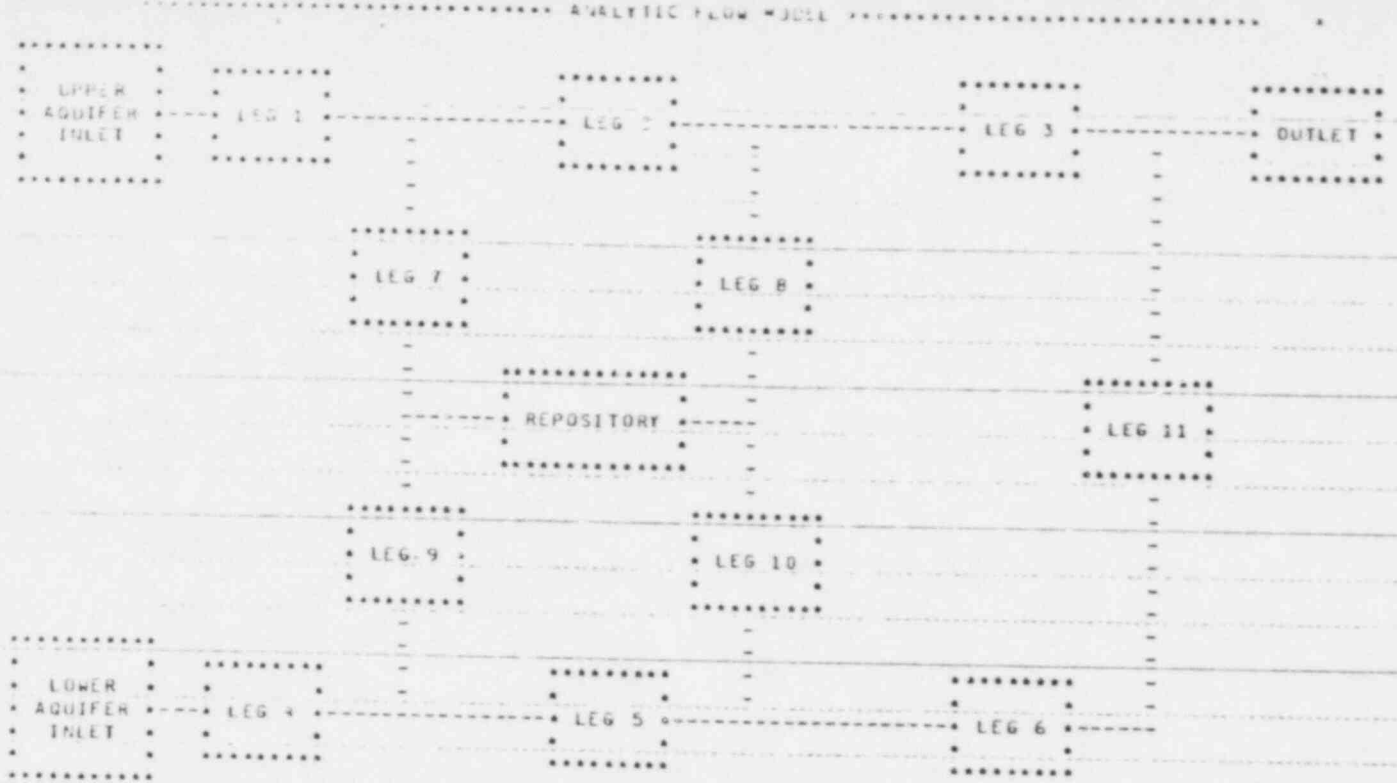
NUMBER OF ISOTOPES 1

ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
A	1.000E+15	1.000E+03

LEACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 3 TIME UPPER BOUND = 1.00E+06

Table 7: NWFT Output for Problem 1B



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.30E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

Table 7 (cont'd)

LEG PROPERTIES

LEG 2 ********

LENGTH = 8.00E+03 FT
AREA = 8.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 3 ********

LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 4 ********

LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 5 ********

LENGTH = 8.00E+03 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 6 ********

LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 7 ********

LENGTH = 6.25E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 8 ********

LENGTH = 5.22E+02 FT
AREA = 1.00E+00 FT**2

Table 7 (cont'd)

CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
****
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
****
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
****
LENGTH = 1.10E+03 FT
AREA = 1.20E+08 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3001
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 1.4310E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 1.5461E+03 FT
JUNCTION LEGS 5-10-6 = 1.5765E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.2912E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.2912E+03 FT
JUNCTION LEGS 6-11 = 2.1003E+03 FT

LEG NO.	FLOW VOL. (CU FT/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.88E+06	6.47E-01	2.16E+00
2	3.88E+06	6.47E-01	2.16E+00
3	3.88E+06	6.47E-01	2.16E+00
4	6.58E+05	3.66E-01	1.22E+00
5	6.58E+05	3.66E-01	1.22E+00
6	6.58E+05	3.66E-01	1.22E+00
7	-5.32E-07	-5.32E-07	-1.77E-06
8	-4.53E-07	-4.53E-07	-1.49E-06
9	-4.53E-07	-4.53E-07	-1.49E-06
10	-5.17E-07	-5.17E-07	-1.69E-06
11	3.11E+05	3.44E-01	1.81E-02

Underestimates Darcy's Velocity (7.5×10^{-7}) in SWIFT since it is represented as salt instead of salt and shale in series.

```
RADIONUCLIDE MIGRATION PATH------LESS    10    5   11

        PATH LENGTH (FT) =  1.3969E+05
   ISOTOPE VEL. (FT/DAY) =  4.1530E-03
MIGRATION TIME (YEARS) =  9.2280E+04

OTHER PATHS ARE    9    5    6   11
```

Table 7 (cont'd)

NWFT / STC

New Right Hand Page

Notebook Divider Should Read. Sample Problem 2

Problem 2. Simulate the Disruptive Effects of a Drill-Hole through the Depository

Problem 2A

Part 2 A differs from the undisturbed system of Problem I by the presence of a borehole connecting the upper and lower aquifers through the depository. Legs 8 and 10 are used to simulate this feature and their physical properties are described below. Otherwise, input for Part A is unchanged from that of Problem 1B.

For Legs 8 and 10, vertical conductivities are chosen to be 50 ft/day. The cross-sectional areas are assigned the typical value of 1 ft^2. Porosities are set to 0.3. A summary of input data for Problem 2A is given in Figure 14. Table 8 contains the actual NWFT input data and Table 9 gives the results.

Flow is downward through Legs 8 and 10. Therefore, the path for possible radionuclide migration to the surface environment now follows Legs 10, 6, and 11. In Problem 5A, a 3-isotope decay chain is transported using this scenario.

Problem 2B

Part B couples the drill hole scenario of Part A with a blockage to flow in the lower sandstone down-dip from the depository. This blockage could be caused by a fault or a dike. The most notable change in the

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	1 E-6	50	1E-6	50	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.3	.03	.3	.3

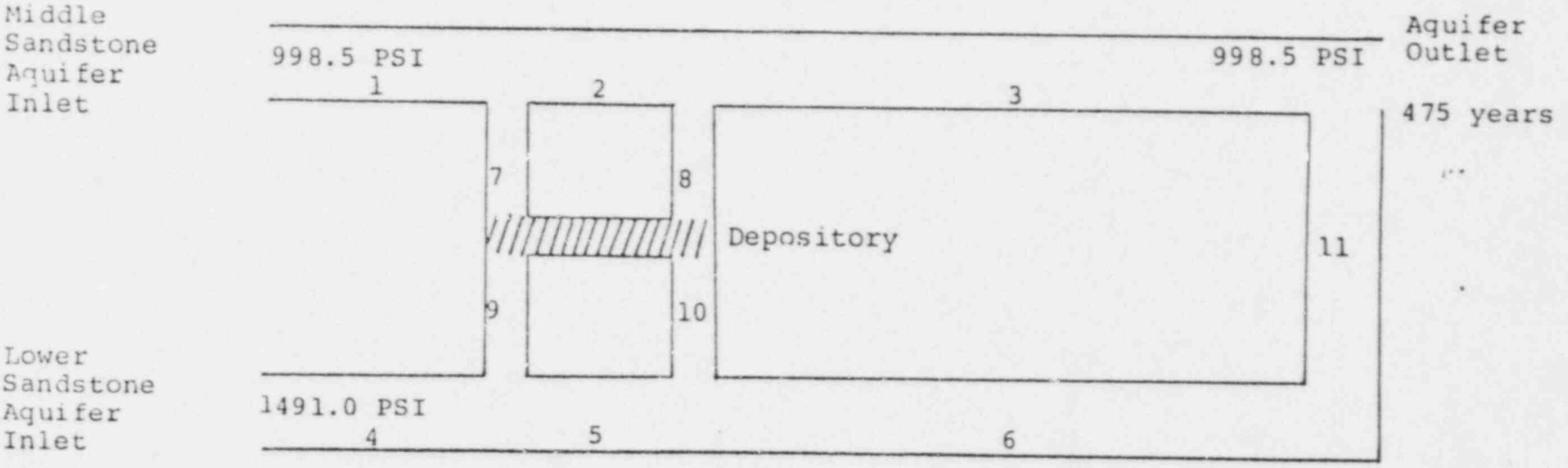


Figure 14.

Problem 2A.

SIMULATE THE DISRUPTIVE EFFECTS OF DRILL HOLE THROUGH DEPOSITORY

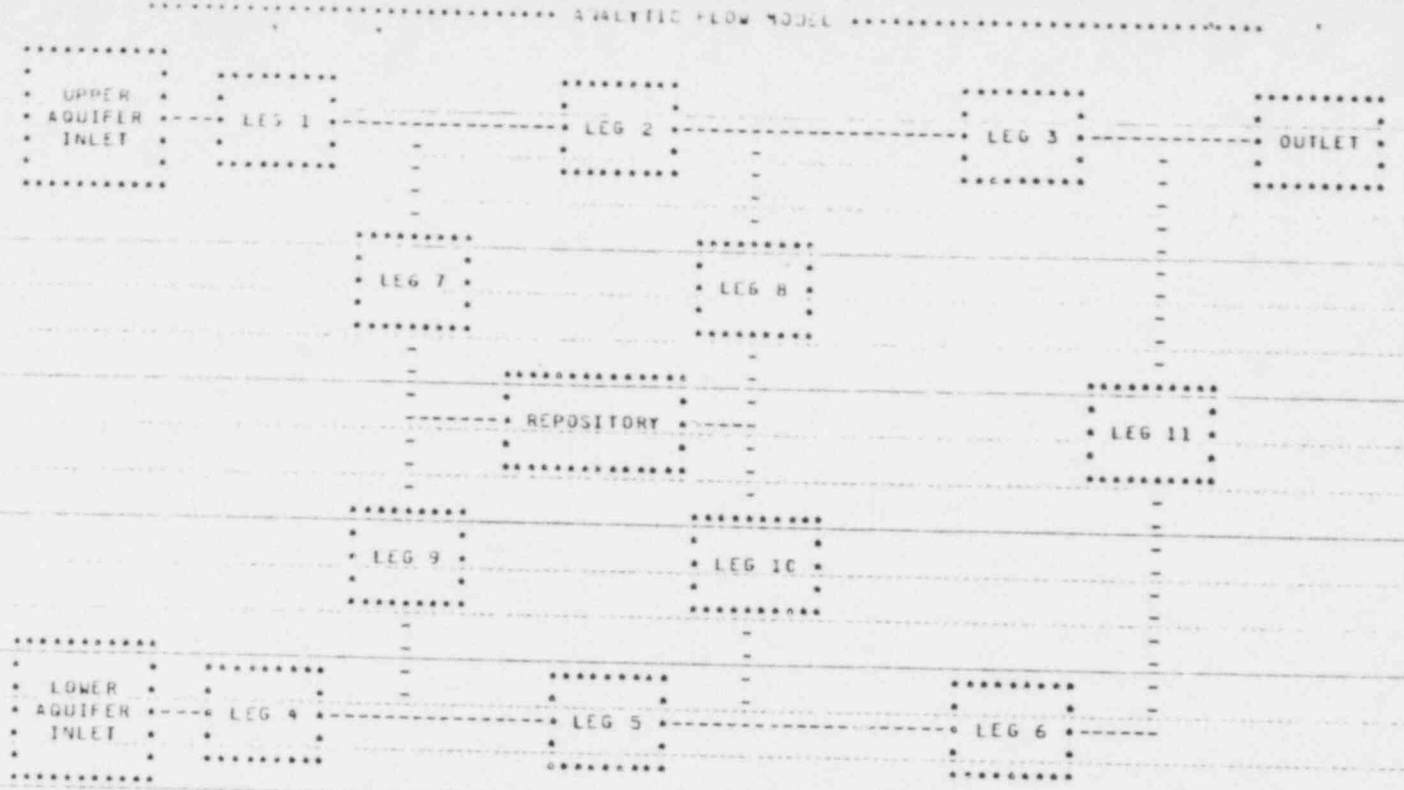
RADIONUCLIDE MIGRATION PATH IS ALONG LEGS 10, 6, 11.

```
                              NWFT
          **********INPUT FOR PROBLEM 2-A**********
                                          ---
1
     998.5    1491.0      998.5
50.0      50.0      50.0       40.0      40.0      40.0          1.E-6      50.
   1.0E-6        50.  2.5
    6.0E6     6.0E6     6.0E6     1.8E6     1.8E6     1.8E6       1.0       1.0
      1.0       1.0     1.2E8
  14500.0    8000.0  138000.0   14500.0    8000.0  138000.0     625.0     521.5
    475.0     578.5    1100.0
  3602.41   3414.81   3311.31   2789.81   2789.81   2502.41   2314.81   2211.31
   425.89   1525.89
0.3       0.3       0.3       0.3       0.3       0.3       0.03      .3
.03       .3        .3
   1
  A                1.E3      1000.
     1.0E3       100.


          **********          END          **********
```

Table 8

```
OPTIONS  1 1   2 0   3 0   4 0   5 0   6 0   7 0   8 0   9 0  10 0  11 0  12 0  13 0  14 0  15 0  16 0  17 0  18 0  19 0  20 0
NUMBER OF ISOTOPES    1

      ISOTOPE NAME          HALF LIFE (YEARS)      INITIAL AMOUNT (CI)
           A                  1.000E+03              1.000E+03
      LEACH TIME =    1.000E+03 YEARS     DISPERSIVITY =   1.000E+02 FEET
NO OF VECTORS =    0 TIME UPPER BOUND =       1.000E+06
```

Table 9: NWFT Output for Problem 2A



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2514.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

Table 9 (cont'd)

```
   DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  2                 LENGTH =  8.00E+03 FT
 ********               AREA =  6.00E+06 FT**2
                  CONDUCTIVITY =  1.83E+04 FT/YR
                      POROSITY =   .3000
                       DENSITY =  1.19E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  3                 LENGTH =  1.38E+05 FT
 ********               AREA =  6.00E+06 FT**2
                  CONDUCTIVITY =  1.83E+04 FT/YR
                      POROSITY =   .3000
                       DENSITY =  1.19E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  4                 LENGTH =  1.45E+04 FT
 ********               AREA =  1.80E+06 FT**2
                  CONDUCTIVITY =  1.46E+04 FT/YR
                      POROSITY =   .3000
                       DENSITY =  1.19E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  5                 LENGTH =  8.00E+03 FT
 ********               AREA =  1.80E+06 FT**2
                  CONDUCTIVITY =  1.46E+04 FT/YR
                      POROSITY =   .3000
                       DENSITY =  1.19E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  6                 LENGTH =  1.38E+05 FT
 ********               AREA =  1.80E+06 FT**2
                  CONDUCTIVITY =  1.46E+04 FT/YR
                      POROSITY =   .3000
                       DENSITY =  1.19E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  7                 LENGTH =  6.25E+02 FT
 ********               AREA =  1.00E+00 FT**2
                  CONDUCTIVITY =  3.65E-04 FT/YR
                      POROSITY =   .0300
                       DENSITY =  1.65E+02 LB/FT**3
             RETARDATION FACTOR =  1.00E+00
     DISTRIBUTION COEFFICIENT =  0.        FT**3/LB

                    LEG PROPERTIES

 LEG  8                 LENGTH =  [illegible] FT
```

Table 9 (cont'd)

CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

RADIONUCLIDE MIGRATION PATH-----LEGS 10 5 11

PATH LENGTH (FT) = 1.3968E+05
ISOTOPE VEL. (FT/DAY) = 8.0524E-01
MIGRATION TIME (YEARS) = 4.7524E+02

LEG PROPERTIES

LEG 9
****
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
****
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 1.83E-04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
****
LENGTH = 1.10E+03 FT
AREA = 1.20E+03 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 1.4910E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 1.5951E+03 FT
JUNCTION LEGS 5-10-6 = 1.5765E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.2725E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.2725E+03 FT
JUNCTION LEGS 6-11 = 2.1009E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.44E+05	6.47E-01	2.16E+00
2	3.44E+05	6.47E-01	2.16E+00
3	3.44E+05	6.47E-01	2.16E+00
4	6.58E+05	3.65E-01	1.22E+00
5	6.58E+05	3.65E-01	1.22E+00
6	6.58E+05	3.66E-01	1.22E+01
7	-5.62E-07	-5.62E-07	-1.87E-03
8	-2.37E+01	-2.37E+01	-7.91E+01
9	-4.24E-07	-4.24E-07	-1.41E-03
10	-2.37E+01	-2.37E+01	-7.91E+01
11	6.58E+05	3.48E-01	1.93E-01

Table 9 (cont'd)

reference site created by this scenario is the reversal of the hydraulic gradient across the depository (Figure 15). The pressure results from SWIFT are shown in Table 10.

Two modifications to the NWFT setup of Problem 2A are required to simulate this scenario. First the pressure head at the lower aquifer inlet has increased. Using the same procedure as in Problem 1, from SWIFT calculations, the new value is determined to be

$$P_{1i} = 2324.1 \text{ ft.}$$

The second change required in the NWFT setup is to increase the resistance (decrease the conductivity) of Leg 6 to simulate the addition of the low transmissivity zone in the lower aquifer. In SWIFT, the transmissivity of grid block (53,12) was reduced by the factor 0.01. This decrease in transmissivity is equivalent to decreasing the hydraulic conductivity. The width of the grid block in the flow (X) direction is 4000 feet. Therefore, the new conductivity for Leg 6 is determined as follows:

$$\frac{138000}{K_6} = \frac{138000-4000}{40} + \frac{4000}{0.4}$$

$$K_6 = 10.3 \text{ ft/day}$$

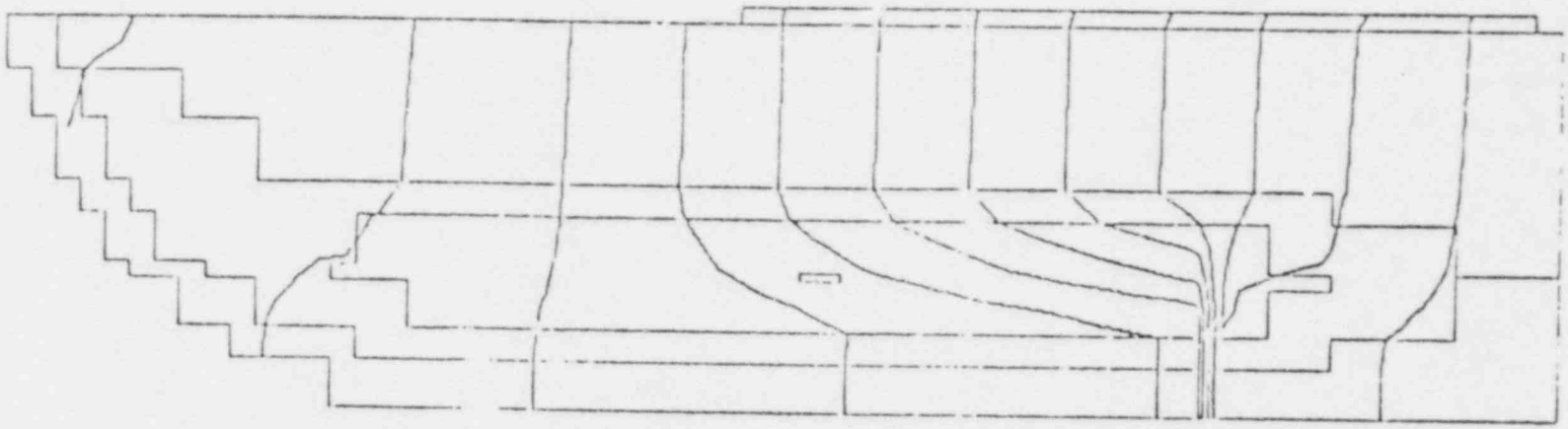


Figure 15.

Head Distribution Resulting from Flow Blockage
in Lower Sandstone Down-Dip from Depository

Table 10: Pressure At Elevation H(PSI)
(Blockage Down-Dip)

	1	2	3	4	5	6	7	8	9	10
1	-449.0	-425.4	-401.1	-371.6	-345.0	-322.0	-302.4	-286.1	-264.4	-245.8
2	-405.9	-382.3	-357.8	-328.7	-302.2	-279.2	-259.5	-243.8	-221.7	-202.7
3	-266.4	-238.4	-214.0	-188.5	-162.8	-139.5	-120.E	-99.9	-78.0	-58.8
4	-129.2	-98.8	-70.0	-49.8	-28.8	-3.8	15.8	36.6	57.8	76.7
5	18.7	44.5	67.0	95.0	111.3	133.8	148.E	163.4	186.6	206.8
6	104.4	130.1	152.5	169.8	197.8	217.9	225.E	239.7	263.7	283.9
7	168.8	194.4	216.7	234.7	262.7	282.8	285.E	295.7	320.5	340.6
8	233.3	258.8	281.2	299.7	319.7	347.7	352.E	356.1	378.7	398.6
9	276.2	301.7	324.1	343.0	363.0	388.2	371.4	399.4	419.3	439.1
10	346.8	366.2	388.7	408.0	427.9	449.7	436.3	464.3	484.3	504.1
11	405.4	430.8	453.3	472.9	492.7	511.9	504.E	528.6	541.0	569.0
12	491.8	517.2	539.7	559.6	579.1	596.4	593.8	614.6	628.9	655.0

	11	12	13	14	15	16	17	18	19	20
1	-226.7	-207.8	-187.9	-170.7	-153.0	-138.1	-122.8	-110.4	-97.5	-87.4
2	-184.8	-164.7	-145.2	-127.6	-110.3	-95.1	-80.1	-67.3	-54.8	-44.3
3	-40.7	-20.5	-1.5	16.3	33.4	48.8	63.5	76.6	88.9	59.6
4	102.4	123.1	142.6	160.4	177.4	193.0	207.6	220.7	233.0	243.7
5	240.6	261.0	280.1	309.4	321.7	337.2	351.9	365.0	377.3	388.1
6	316.5	336.4	355.0	390.6	396.9	413.0	432.6	446.5	455.5	471.2
7	373.1	391.8	409.8	455.4	438.9	456.3	485.8	501.3	515.8	529.4
8	430.9	448.9	466.1	488.8	484.1	503.1	541.1	557.8	573.6	588.7
9	467.2	484.2	500.E	500.E	519.5	539.1	574.9	592.6	609.7	626.3
10	523.8	539.7	556.3	565.3	584.4	604.0	628.E	647.4	666.0	684.5
11	589.E	599.5	615.1	630.1	649.4	668.8	688.0	707.4	726.7	746.1
12	671.1	685.8	688.6	716.7	736.9	755.4	774.7	794.1	813.4	832.8

	21	22	23	24	25	26	27	28	29	30
1	-76.5	-69.1	-61.0	-55.7	-50.0	-47.0	-43.7	-43.0	-43.0	-43.4
2	-34.2	-26.1	-18.3	-12.6	-7.3	-4.0	-1.0	.0	.1	-.5
3	109.5	117.9	125.4	131.3	136.4	140.0	142.8	143.9	144.1	143.7
4	253.6	262.0	269.5	275.5	280.5	284.2	286.8	288.1	288.3	288.0
5	397.5	406.3	413.8	419.8	424.9	428.5	431.2	432.4	432.7	432.4
6	482.1	491.7	500.5	507.9	514.5	519.8	524.3	527.5	529.8	531.4
7	542.3	554.2	565.5	575.8	585.5	594.2	602.2	609.3	615.7	621.1
8	603.3	617.2	630.6	643.2	655.5	667.0	678.C	688.3	698.1	706.7
9	642.6	658.4	674.0	689.0	703.8	718.1	732.1	745.6	758.9	770.6
10	702.8	721.0	739.0	757.0	774.8	792.5	810.0	827.5	844.8	860.3
11	765.4	784.8	804.1	823.5	842.8	862.2	881.E	900.9	920.3	937.8
12	852.2	871.6	890.9	910.2	929.6	949.0	968.4	987.7	1007.1	1024.6

	31	32	33	34	35	36	37	38	39	40
1	-43.E	-43.7	-43.8	-44.0	-44.1	-44.2	-44.4	-44.5	-44.7	-44.8
2	-.5	-1.3	-1.6	-2.0	-2.4	-2.8	-3.2	-3.7	-4.1	-4.6
3	143.3	142.9	142.6	142.2	141.8	141.4	141.0	140.5	140.1	139.6
4	287.6	287.3	286.9	286.5	286.1	285.7	285.3	284.8	284.4	283.9
5	432.0	431.E	431.3	430.9	430.5	430.1	429.7	429.2	428.8	428.3
6	532.7	534.1	535.4	536.7	538.0	539.3	540.E	541.9	543.2	544.4
7	629.8	630.5	635.2	640.0	644.7	649.4	654.1	658.8	663.5	668.2
8	719.2	721.8	729.4	736.9	744.5	752.0	759.6	767.1	774.7	782.2

10	874.1	887.9	901.7	915.5	929.3	943.1	956.9	970.7	984.5	998.3
11	953.3	968.8	984.3	999.8	1015.3	1030.8	1046.3	1061.8	1077.3	1092.9
12	1040.1	1055.6	1071.1	1086.6	1102.1	1117.6	1133.2	1148.7	1164.2	1179.7

	41	42	43	44	45	46	47	48	49	50
1	-45.0	-45.1	-45.3	-45.5	-45.7	-45.9	-46.1	-46.3	-46.5	-46.8
2	-5.0	-5.5	-6.1	-6.6	-7.2	-7.8	-8.4	-9.0	-9.7	-10.5
3	139.2	138.7	138.1	137.6	137.0	136.4	135.8	135.1	134.4	133.7
4	283.5	283.0	282.5	281.9	281.3	280.7	280.1	279.5	278.8	278.0
5	427.9	427.4	426.8	426.3	425.7	425.1	424.5	423.9	423.2	422.4
6	545.7	546.5	548.1	549.3	550.4	551.6	552.7	553.7	554.8	555.8
7	672.9	677.5	682.2	686.8	691.4	696.0	700.5	705.1	709.6	714.1
8	785.7	797.2	808.7	812.2	819.7	827.2	834.6	842.1	849.5	856.9
9	884.5	895.3	905.6	916.0	926.4	936.7	947.0	957.4	967.7	978.0
10	1012.1	1026.8	1039.8	1053.6	1067.4	1081.2	1095.0	1108.8	1122.6	1136.3
11	1108.4	1123.9	1139.4	1154.9	1170.5	1186.0	1201.5	1217.1	1232.6	1248.2
12	1195.3	1210.8	1226.3	1241.8	1257.4	1272.9	1288.5	1304.0	1319.6	1335.1

	51	52	53	54	55	56	57	58	59	60
1	-47.0	-47.3	-47.6	-47.9	-48.2	-48.6	-49.0	-49.3	-49.5	-49.8
2	-11.3	-12.1	-13.0	-13.9	-14.9	-15.9	-17.0	-18.1	-18.6	-17.0
3	132.9	132.1	131.2	130.3	129.3	128.2	127.1	126.0	125.0	127.0
4	277.2	276.4	275.5	274.6	273.6	272.5	271.4	270.1	267.9	270.9
5	421.6	420.8	419.9	418.9	417.9	416.3	415.5	413.6	410.1	415.0
6	556.7	555.6	508.5	486.9	486.7	502.8	501.9	499.3	486.4	492.5
7	718.4	716.3	577.2	514.3	515.9	566.4	566.6	563.7	530.5	539.2
8	864.8	863.0	644.4	547.2	550.2	556.8	564.6	571.7	577.6	589.1
9	588.0	589.7	689.0	557.6	562.7	525.5	541.4	558.0	603.1	617.2
10	1150.0	1159.6	753.2	581.3	592.3	598.4	606.8	622.5	647.1	664.8
11	1263.7	1279.2	608.9	624.3	639.8	655.3	671.0	686.7	701.7	720.0
12	1356.7	1366.2	695.5	711.0	726.5	742.0	757.5	773.0	788.5	806.7

	61	62	63	64	65	66	67	68	69
1	-48.2	-47.3	-46.4	-45.5	-44.2	-41.5	-35.3	-37.3	-38.6
2	-13.6	-12.1	-9.4	-6.5	-2.6	4.2	12.1	18.1	14.2
3	129.5	132.1	134.7	137.4	140.8	148.2	156.6	164.8	170.9
4	273.7	276.4	278.9	281.3	283.4	291.9	301.9	312.0	323.7
5	418.0	420.7	423.2	425.4	425.1	435.6	446.7	458.5	472.6
6	497.1	501.4	505.6	509.1	509.2	521.7	533.7	546.3	561.7
7	547.1	554.7	562.2	568.8	572.5	586.3	598.5	612.2	628.4
8	595.6	609.9	620.2	629.5	636.7	651.1	664.0	677.6	694.2
9	636.5	643.5	656.5	668.8	679.9	694.4	707.4	721.1	737.7
10	680.5	696.8	713.1	729.1	744.8	759.4	772.4	786.2	803.0
11	738.0	756.0	773.9	791.8	809.8	824.4	837.5	851.4	868.2
12	824.8	842.8	860.7	878.6	896.4	911.1	924.3	938.2	955.1

Table 10 (cont'd)

PRESSURE AT DATUM (PSI)

	1	2	3	4	5	6	7	8	9	10
1	2396.3	2391.6	2387.6	2388.9	2387.2	2381.9	2373.3	2361.4	2354.8	2345.2
2	2395.6	2391.6	2387.3	2384.2	2386.4	2381.1	2372.5	2360.8	2353.8	2344.6
3	2385.7	2389.4	2385.5	2382.4	2380.1	2375.3	2365.7	2358.3	2351.9	2342.9
4	2386.2	2389.1	2383.5	2376.6	2369.4	2365.3	2353.8	2347.2	2341.3	2332.7
5	2383.5	2381.1	2375.3	2375.1	2363.1	2357.3	2343.5	2330.4	2325.4	2317.3

Figure 16 contains a summary of the required data changes for this problem. Table 11 contains the NWFT input data and Table 12, the results. Comparing Darcy velocities obtained from SWIFT and NWFT output, we find (see Table 13):

	SWIFT	NWFT
Middle Sandstone Aquifer	0.66	0.647
Lower Sandstone Aquifer	0.16	0.165

NWFT results indicate upward flow in Legs 8 and 10. Thus, the migration path is along Legs 8 and 3. In Problem 5B, a 3-isotope chain is transported using this scenario.

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	10.3	1 E-6	50	1E-6	50	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.3	.03	.3	.3

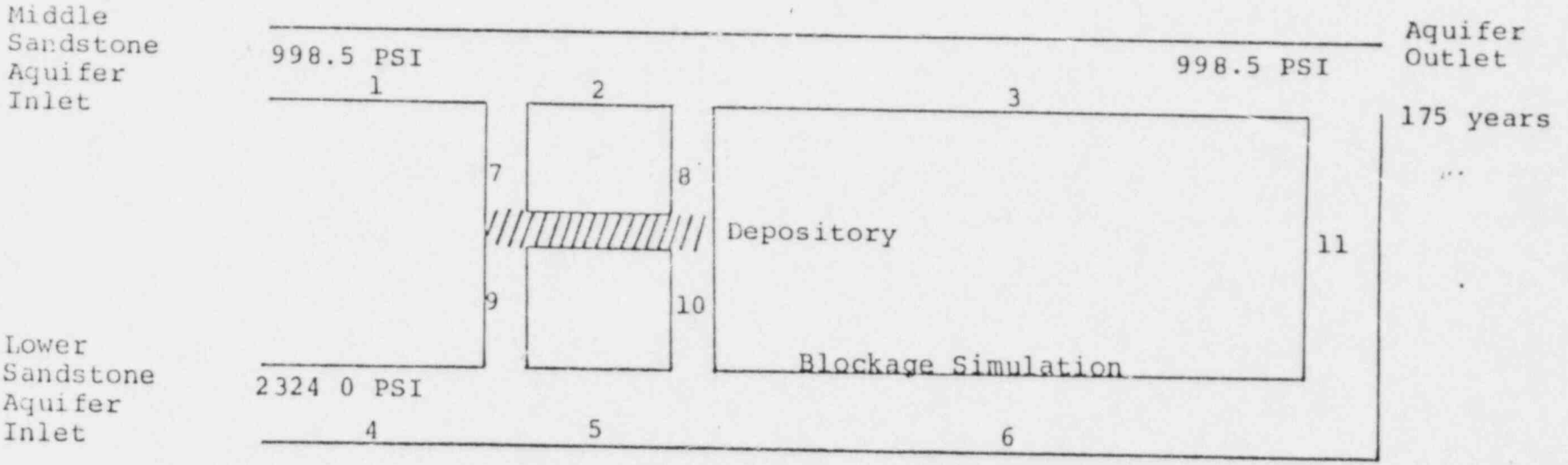


Figure 16.

Problem 2B.

SIMULATE THE DISRUPTIVE EFFECTS

OF DRILL HOLE WITH BLOCKAGE AT LEG 6
RADIONUCLIDE MIGRATION IS ALONG LEGS 8,3

Table 11.

NWFT

```
           **********INPUT FOR PROBLEM 2-B**********
                                          ---
1
     998.5     2324.1     998.5
50.0      50.0      50.0      40.0      40.0      10.3           1.E-6      50.
   1.0E-6         50.  2.5
     6.0E6     6.0E6     6.0E6     1.8E6     1.8E6     1.8E6       1.0       1.0
       1.0       1.0     1.2E8
   14500.0    8000.0  138000.0   14500.0    8000.0  138000.0     625.0     521.5
     475.0     578.5    1100.0
   3602.41   3414.81   3311.31   2789.81   2789.81   2502.41   2314.81   2211.31
    425.89   1525.89
0.3       0.3       0.3       0.3       0.3       0.3       0.03      .3
.03       .3        .3
    1
  A                 1.E3     1000.
     1.0E3         100.

           **********        END        **********
```

OPTIONS 1 1 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

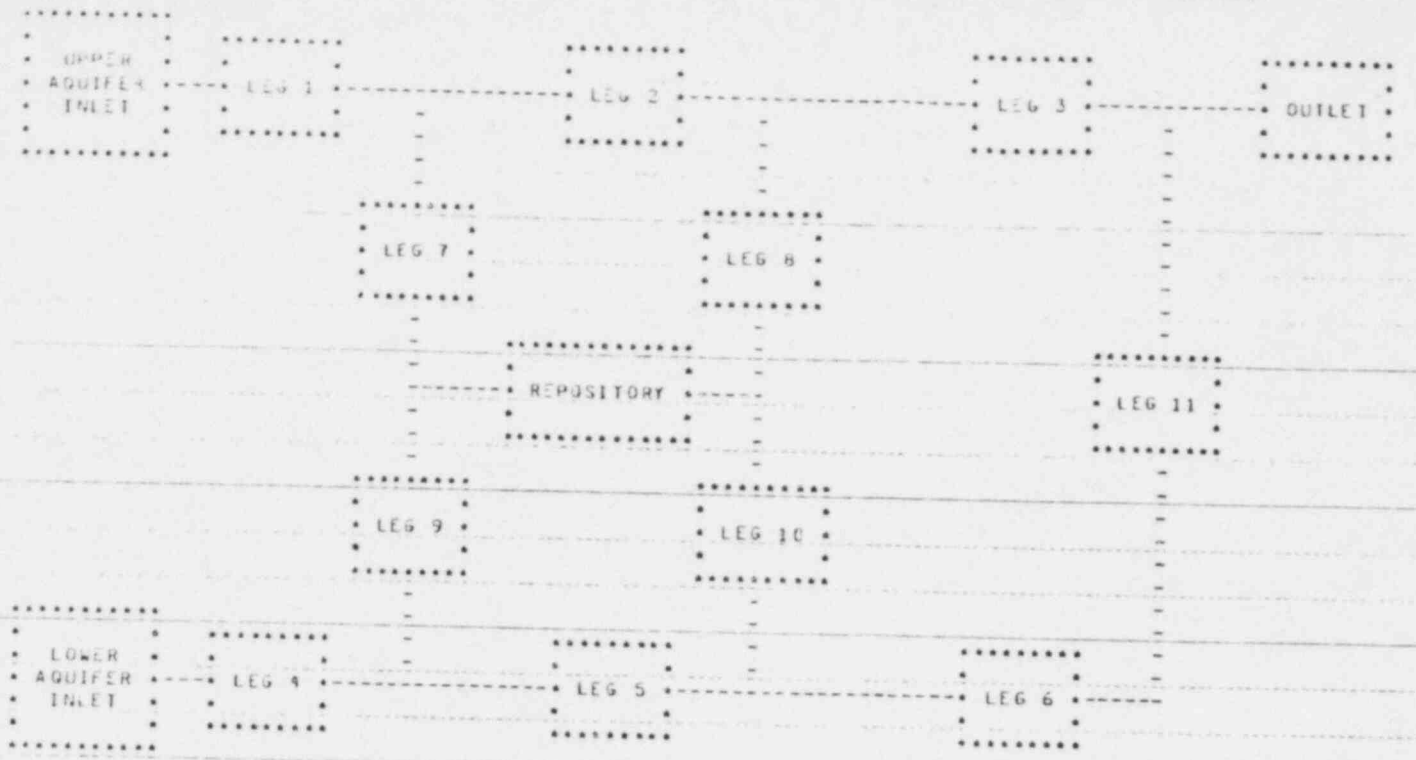
NUMBER OF ISOTOPES 1

ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
A	1.000E+03	1.000E+03

LEACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 0 TIME UPPER BOUND = 1.00E+06

Table 12: NWFT Output for Problem 2B



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 2324.10 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.83 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.83 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

Table 12: (cont'd)

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 2
LENGTH = 8.00E+03 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 3
LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 4
LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 5
LENGTH = 8.00E+03 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 6
LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 3.76E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 7
LENGTH = 6.25E+02 FT
AREA = 1.00E+02 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .3300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LENGTH = 5.00 +02 FT

Table 12 (cont'd)

PATH LENGTH (FT) = 1.3852E+05
ISOTOPE VEL. (FT/DAY) = 2.1642E+00
MIGRATION TIME (YEARS) = 1.7536E+02

CONDUCTIVITY = 1.83[illegible]+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
LENGTH = 9.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .3000
DENSITY = 1.85E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
LENGTH = 1.10E+03 FT
AREA = 1.20E+03 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9852E+02 FT
LOWER AQUIFER INLET = 2.3241E+03 FT
AQUIFER OUTLET = 9.9852E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 2.9519E+03 FT
JUNCTION LEGS 5-10-6 = 2.6225E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.7210E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.7210E+03 FT
JUNCTION LEGS 6-11 = 2.3996E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.44E+06	5.47E-01	2.16E+00
2	3.44E+06	5.47E-01	2.16E+00
3	3.44E+06	5.47E-01	2.16E+00
4	2.37E+05	1.65E-01	5.49E-01
5	2.37E+05	1.65E-01	5.49E-01
6	2.37E+05	1.65E-01	5.49E-01
7	1.55E-07	1.56E-07	5.21E-07
8	1.91E+01	1.33E-01	4.42E-01
9	5.13E-07	1.35E-07	1.41E-06
10	1.93E+01	1.63E+01	4.42E+01
11	2.37E+05	2.47E-03	8.24E-03

Table 12 (cont'd)

	[illegible]	[illegible]	3	4	5	6	7			
1	0.	.1225E+00	.9344E-01	-.3674E-01	.2209E-01	.1132E+00	.1908E+00	.2661E+00	.1426E+00	[illegible]
2	0.	.7542E-01	.5916E-01	-.2491E-01	.1398E-01	.1133E+00	.1950E+00	.2615E+00	.1522E+00	.2051E+00
3	0.	-.1577E-11	.6526E-01	.2541E-04	.6959E-05	.2113E-04	.4246E-04	.6495E-04	.1256E+00	.1995E+00
4	0.	.4142E-106	-.9776E-12	.1274E+00	.5363E-04	.1746E-04	.5129E-04	.2884E-04	.2581E-04	.3882E-04
5	0.	.4566E-100	.1252E-99	-.2291E-11	.2142E+00	.5024E-04	.6018E-04	.6658E-04	.2188E-04	.3592E-04
6	0.	.5272E-100	.1274E-99	.2462E-99	.3164E-11	.1434E+00	.1492E-03	.5195E-04	.1854E-04	.3562E-04
7	0.	.5515E-100	.1285E-99	.2206E-99	-.2482E-11	.1428E+00	.1925E-03	.1002E-03	.1456E-04	.3602E-04
8	0.	.5667E-100	.1256E-99	.2141E-99	.1867E-99	.8671E-11	.4235E+00	.4374E+00	.5667E-04	.3656E-04
9	0.	.5750E-100	.1288E-99	.2079E-99	.1825E-99	.6447-100	.1027E-98	-.4186E-11	.1484E+00	.1497E+00
10	0.	.5863-100	.1282E-99	.1991E-99	.1251E-99	.1425E-99	.9471E-99	.7748E-11	.1477E+00	.1505E+00
11	0.	.5562-100	.1276E-99	.1519E-99	.1853E-99	.2028E-99	.8070E-99	.9205-100	.3550E-99	-.1297E-10
12	0.	.6544-100	.1265E-99	.1864E-99	.1541E-99	.2469E-99	.7816E-99	.1654E-99	.3142E-99	.4520-100

	11	12	13	14	15	16	17	18	15	20
1	.2026E+00	.2075E+00	.1852E+00	.2460E+00	.2355E+00	.2987E+00	.2904E+00	.3556E+00	.3452E+00	.4085E+00
2	.2116E+00	.1556E+00	.1932E+00	.2243E+00	.2424E+00	.2912E+00	.2902E+00	.2475E+00	.3521E+00	.4510E+00
3	.2268E+00	.1866E+00	.1974E+00	.2330E+00	.2450E+00	.2863E+00	.3033E+00	.3421E+00	.3586E+00	.3955E+00
4	.2116E-04	.1655E+00	.1597E+00	.2097E+00	.2511E-06	.2845E+00	.3055E+00	.2401E+00	.3608E+00	.3541E+00
5	-.2663E-04	.2485E-04	.4075E-04	.1694E-04	.4915E-04	.5690E-04	.6120E-04	.6802E-04	.7221E-04	.7884E-04
6	-.2279E-04	.3872E-04	.4337E-04	.3490E-04	.1486E-06	.5455E-07	.3857E-07	.6442E-07	.6875E-07	.7465E-07
7	-.2357E-04	.4200E-04	.4618E-04	.8036E-04	.4068E-06	.4868E-07	-.7027E-08	.5741E-07	.6160E-07	.6627E-07
8	-.1863E-04	.4674E-04	.4555E-04	.4861E-07	.1456E-06	.4153E-07	.4592E-07	.5201E-07	.5661E-07	.5530E-07
9	-.1025E-06	.5115E-04	.5324E-04	.1286E-03	.1173E-04	.3862E-04	-.7112E-07	.4708E-07	.5022E-07	.5224E-07
10	.7625E-04	.5530E-04	.5656E-04	.8243E-04	.4067E-04	.3894E-04	.3694E-07	.4221E-07	.4328E-07	.4295E-07
11	.2282E+00	.2214E+00	.2350E+00	.2389E+00	.1010E-04	.3970E-04	.4020E-04	.2982E-04	.3981E-04	.3981E-04
12	.2714E-99	.3064E-99	.5763E-99	-.2097E-10	.1551E+00	.1593E+00	.1592E+00	.1593E+00	.1592E+00	.1593E+00

	21	22	23	24	25	26	27	28	25	20
1	.4000E+00	.4615E+00	.4545E+00	.5183E+00	.5058E+00	.5712E+00	.5646E+00	.6220E+00	.6462E+00	.2930E-03
2	.4372E+00	.4544E+00	.4624E+00	.5107E+00	.5133E+00	.5641E+00	.5718E+00	.6178E+00	.6382E+00	.6545E+00
3	.4125E+00	.4458E+00	.4677E+00	.5056E+00	.5216E+00	.5595E+00	.5770E+00	.6140E+00	.6360E+00	.6504E+00
4	.4166E+00	.4456E+00	.4655E+00	.5038E+00	.5248E+00	.6679E+00	.5792E+00	.6125E+00	.6345E+00	.6488E+00
5	.8305E-04	.8565E-04	.9403E-04	.1608E-03	.1053E-03	.1116E-03	.1155E-03	.1225E-03	.1270E-03	.1298E-03
6	.7844E-07	.8423E-07	.8821E-07	.9423E-07	.5865E-07	.1035E-06	.1676E-06	.1127E-06	.1177E-06	.1201E-06
7	.6915E-07	.7261E-07	.7604E-07	.8115E-07	.8409E-07	.8850E-07	.9147E-07	.5592E-07	.9856E-07	.1008E-06
8	.6147E-07	.6471E-07	.6655E-07	.7026E-07	.7244E-07	.7568E-07	.7788E-07	.8114E-07	.8335E-07	.8476E-07
9	.5373E-07	.5581E-07	.5726E-07	.5938E-07	.6079E-07	.6285E-07	.6428E-07	.6637E-07	.6781E-07	.6865E-07
10	.4445E-07	.4614E-07	.4562E-07	.4633E-07	.4680E-07	.4745E-07	.4756E-07	.4865E-07	.4513E-07	.4542E-07
11	.3981E-04	.2581E-04	.3966E-04	.3997E-04	.3983E-04	.3579E-04	.3575E-04	.3575E-04	.3978E-04	.3978E-04
12	.1594E+00	.1592E+00	.1592E+00	.1592E+00	.1592E+00	.1592E+00	.1592E+00	.1591E+00	.1551E+00	.1591E+00

	31	32	33	34	35	36	37	38	35	40
1	.1285E-03	.1287E-03	.1287E-03	.1287E-03	.1288E-03	.1288E-03	.1288E-03	.1288E-03	.1288E-03	.1285E-03
2	.6513E+00	.6511E+00	.6511E+00	.6512E+00	.6514E+00	.6517E+00	.6520E+00	.6522E+00	.6527E+00	.6531E+00
3	.6512E+00	.6513E+00	.6514E+00	.6515E+00	.6517E+00	.6520E+00	.6522E+00	.6526E+00	.6520E+00	.6535E+00
4	.6516E+00	.6511E+00	.6512E+00	.6519E+00	.6521E+00	.6523E+00	.6526E+00	.6629E+00	.6533E+00	.6538E+00
5	.1302E-03	.1303E-03	.1304E-03	.1304E-03	.1305E-03	.1305E-03	.1306E-03	.1306E-03	.1307E-03	.1308E-03
6	.1206E-06	.1207E-06	.1207E-06	.1207E-06	.1207E-06	.1298E-06	.1206E-06	.1209E-06	.1210E-06	.1211E-06
7	.1012E-06	.1012E-06	.1012E-06	.1013E-06	.1013E-06	.1013E-06	.1014E-06	.1014E-06	.1015E-06	.1015E-06
8	.8502E-07	.8507E-07	.8505E-07	.8510E-07	.8512E-07	.8514E-07	.8517E-07	.8520E-07	.8524E-07	.8528E-07
9	.6888E-07	.6885E-07	.6850E-07	.6891E-07	.6852E-07	.6893E-07	.6855E-07	.6897E-07	.6855E-07	.6501E-07
10	.4943E-07	.4544E-07	.4946E-07	.4548E-07	.4948E-07	.4948E-07	.4548E-07	.4545E-07	.4945E-07	.4950E-07
11	.3977E-04	.2577E-04	.3977E-04	.3576E-04	.3976E-04	.3975E-04	.3575E-04	.2574E-04	.3973E-04	.3973E-04
12	.1591E+00	.1591E+00	.1591E+00	.1599E+00	.1590E+00	.1590E+00	.1590E+00	.1590E+00	.1585E+00	.1585E+00

Table 13: Darcy Velocities for SWIFT (Borehole Simulation)

2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	.6540E+00	.6548E+00	.6550E+00	.6559E+00	.6560E+00	.6574E+00	.6582E+00	.6592E+00	.6604E+00	.6615E+00
4	.6543E+00	.6546E+00	.6555E+00	.6562E+00	.6569E+00	.6574E+00	.6587E+00	.6596E+00	.6607E+00	.6618E+00
5	.1309E-03	.1310E-03	.1311E-03	.1313E-03	.1314E-03	.1316E-03	.1318E-03	.1322E-03	.1322E-03	.1324E-03
6	.1211E-06	.1212E-06	.1214E-06	.1215E-06	.1216E-06	.1218E-06	.1219E-06	.1221E-06	.1222E-06	.1225E-06
7	.1017E-06	.1017E-06	.1018E-06	.1019E-06	.1020E-06	.1021E-06	.1022E-06	.1022E-06	.1025E-06	.1026E-06
8	.8533E-07	.8539E-07	.8544E-07	.8551E-07	.8558E-07	.8566E-07	.8574E-07	.8584E-07	.8594E-07	.8610E-07
9	.6904E-07	.6907E-07	.6911E-07	.6915E-07	.6919E-07	.6924E-07	.6930E-07	.6935E-07	.6942E-07	.6952E-07
10	.4950E-07	.4951E-07	.4952E-07	.4953E-07	.4954E-07	.4955E-07	.4956E-07	.4958E-07	.4959E-07	.4962E-07
11	.3572E-04	.3572E-04	.3571E-04	.3570E-04	.3970E-04	.3969E-04	.3568E-04	.3562E-04	.3567E-04	.3566E-04
12	.1585E+00	.1585E+00	.1582E+00	.1584E+00	.1584E+00	.1598E+00	.1587E+00	.1597E+00	.1587E+00	.1596E+00

	51	52	53	54	55	56	57	58	59	60
1	.1295E-03	.1296E-03	.1257E-03	.1298E-03	.1254E-03	.1300E-03	.1301E-03	.1300E-03	.1251E-03	.1245E-03
2	.6623E+00	.6637E+00	.6651E+00	.6666E+00	.6682E+00	.6699E+00	.6712E+00	.6702E+00	.6567E+00	.5932E+00
3	.6627E+00	.6640E+00	.6655E+00	.6670E+00	.6686E+00	.6704E+00	.6722E+00	.6737E+00	.6654E+00	.5828E+00
4	.6631E+00	.6644E+00	.6658E+00	.6673E+00	.6659E+00	.6799E+00	.6725E+00	.6787E+00	.7058E+00	.5546E+00
5	.1327E-03	.1325E-03	.1326E-03	.1337E-03	.1329E-03	.1373E-03	.1326E-03	.1395E-03	.2957E-03	.5016E+00
6	.1232E-06	.1265E-06	.3553E-06	.2522E-06	.1253E-06	.8153E-07	.1286E-03	.1426E-03	.2621E-03	.9551E-04
7	.1040E-06	.1400E-06	.9225E-06	.4884E-05	.1189E-06	-.3213E-06	.1272E-03	.1447E-03	.3184E-03	.7825E-04
8	.8766E-07	.1342E-06	.1376E-05	.6845E-06	.1112E-06	.9025E-07	.8228E-07	.8907E-07	-.1888E-06	.6267E-04
9	.7093E-07	.1190E-06	.1848E-05	.8796E-06	.5907E-07	.6818E-06	.3723E-04	.2218E-04	-.1255E-03	.4752E-04
10	.5021E-07	.7713E-07	.2445E-05	.1111E-05	.6208E-07	.2793E-06	.3778E-04	.3525E-04	-.1251E-04	.3177E-04
11	.3961E-04	.3568E-04	.2561E-04	.4025E-04	.2966E-04	.3955E-04	.3895E-04	.2841E-04	.8420E-04	.9677E-01
12	.1586E+00	.1586E+00	.1585E+00	.1545E+00	.1585E+00	.1545E+00	.1585E+00	.1586E+00	.1587E+00	.9845E-01

	61	62	63	64	65	66	67	68	69
1	.1235E-03	.1231E-03	.1236E-03	.1225E-03	.1296E-03	.1149E-03	.1133E-03	.1168E-03	.2703E-03
2	.5715E+00	.5688E+00	.5645E+00	.5575E+00	.5252E+00	.4440E+00	.4145E+00	.4657E+00	.7504E+00
3	.5680E+00	.5661E+00	.5657E+00	.5629E+00	.5421E+00	.4298E+00	.3520E+00	.4125E+00	.4652E+00
4	.5605E+00	.5650E+00	.5675E+00	.5724E+00	.5802E+00	.3967E+00	.3572E+00	.2495E+00	.3085E+00
5	.5557E+00	.5644E+00	.5685E+00	.5794E+00	.6402E+00	.3415E+00	.3222E+00	.3050E+00	.2365E+00
6	.1016E-03	.1025E-03	.1042E-03	.1081E-03	.2555E-03	.2825E+00	.2993E+00	.2798E+00	.2018E+00
7	.8331E-04	.8478E-04	.8557E-04	.9661E-04	.2141E-03	.2460E+00	.2812E+00	.2611E+00	.1785E+00
8	.6791E-04	.6517E-04	.6585E-04	.7462E-04	.1742E-03	.1849E+00	.2182E+00	.2015E+00	.1344E+00
9	.5256E-04	.5266E-04	.5417E-04	.5788E-04	.1255E-03	.1821E+00	.2164E+00	.2000E+00	.1322E+00
10	.3417E-04	.3481E-04	.3526E-04	.3685E-04	.7712E-04	.1795E+00	.2147E+00	.1982E+00	.1302E+00
11	.9997E-01	.1018E+00	.1022E+00	.1042E+00	.1026E+00	.1788E+00	.2131E+00	.1967E+00	.1284E+00
12	.1000E+00	.1018E+00	.1022E+00	.1043E+00	.1056E+00	.1778E+00	.2118E+00	.1952E+00	.1265E+00

Z-DIR - DARCY VELOCITY - FT/DAY

	1	2	3	4	5	6	7	8	9	10
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.5309E-02	.3664E-02	-.2228E-02	.4117E-02	.5325E-02	.5213E-02	.4843E-02	.2132E-02	.7672E-02	.2317E-02
3	.7114-100	.4260E-07	.4165E-02	.5839E-04	.6468E-04	.6013E-04	.7328E-04	.9442E-02	.9144E-02	.1918E-02
4	.1865-100	.6000-100	.8520E-02	.5549E-04	.6404E-04	.5867E-04	.7175E-04	.1325E-03	.1262E-03	.1203E-03
5	.1588-100	.1589-100	.1712E-99	.8573E-02	.6709E-04	.5640E-04	.7320E-04	.1327E-03	.1252E-03	.1213E-03
6	.1391-100	.1684-100	.1902-100	.2578E-55	.6621E-02	.5598E-04	.7316E-04	.1342E-03	.1247E-03	.1228E-03
7	.1232-100	.1458-100	.1548-100	-.8630-102	.4216E-02	.4365E-02	.7516E-04	.1261E-03	.1241E-03	.1255E-03
8	.1067-100	.1226-100	.1242-100	-.1528-101	.2906E-59	.8672E-02	.7795E-04	.1386E-03	.1225E-03	.1272E-03
9	.9533-101	.1091-100	-.1064-100	-.8203-102	.1145-101	.1045E-59	.9033E-95	.8865E-02	.1227E-03	.1283E-03
10	.7794-101	.8780-101	.8266-101	-.5664-102	.2254-101	.7562-100	.8862-102	.4431E-02	.8465E-04	.4418E-02
11	.6024-101	.6655-101	.6142-101	.3637-102	.3618-101	.5145-100	-.6024-100	.1561-100	.2318E-98	.9125E-02

Table 13 (Con't)

2	.1740E-02	.2545E-02	.7743E-02	.2782E-02	.7912E-02	.3261E-02	.8121E-02	.2265E-02	.7905E-02	.2972E-02
3	.4563E-02	.3212E-02	.4722E-02	.2439E-02	.4721E-02	.2542E-02	.4843E-02	.2495E-02	.4712E-02	.2528E-02
4	.1117E-01	.2285E-02	.2358E-02	.1360E-02	.2229E-02	.1427E-02	.2281E-02	.1383E-02	.2226E-02	.1395E-02
5	.1373E-03	.1461E-03	.1521E-03	.6210E-05	.6576E-06	.5637E-06	.4524E-06	.3226E-06	.3988E-06	.2725E-06
6	.1348E-03	.1458E-03	.1530E-03	.4929E-05	.2466E-06	.3395E-06	.1802E-06	.1561E-06	.1325E-06	.1045E-06
7	.1325E-03	.1457E-03	.1553E-03	.3056E-05	.3559E-06	.3313E-06	.1792E-06	.1555E-06	.1327E-06	.1048E-06
8	.1311E-03	.1455E-03	.1559E-03	.1443E-05	.2616E-06	.3325E-06	.1774E-06	.1558E-06	.1326E-06	.1046E-06
9	.1297E-03	.1454E-03	.1601E-03	.1449E-05	.2637E-06	.3346E-06	.1754E-06	.1557E-06	.1325E-06	.1046E-06
10	.1283E-03	.1453E-03	.1578E-03	.4045E-05	.4569E-05	.1495E-05	.1718E-06	.1555E-06	.1324E-06	.1045E-06
11	.1267E-03	.1452E-03	.1576E-03	.5248E-05	.5664E-06	.2652E-05	.1714E-06	.1555E-06	.1322E-06	.1045E-06
12	.2164-101	.1015-100	.2488E-55	.9557E-02	.2124E-05	.2637E-05	.1506E-06	.1555E-06	.1322E-06	.1044E-06

	21	22	23	24	25	26	27	28	29	30
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.7808E-02	.3191E-02	.8006E-02	.2936E-02	.7795E-02	.3123E-02	.7761E-02	.4326E-02	.2983E-02	.1459E-04
3	.4688E-02	.2652E-02	.4707E-02	.2547E-02	.4572E-02	.2693E-02	.4691E-02	.2560E-02	.1056E-02	.2587E-03
4	.2214E-02	.1451E-02	.2261E-02	.1405E-02	.2209E-02	.1427E-02	.2224E-02	.1497E-02	.9282E-03	.1919E-03
5	.3384E-06	.2135E-06	.2654E-06	.1261E-06	.1725E-06	.3050E-07	.6892E-07	.7615E-07	-.2073E-06	-.3528E-06
6	.7405E-07	.3828E-07	-.4223E-09	-.4416E-07	-.5073E-07	-.1422E-06	-.1966E-06	-.2555E-06	-.3184E-06	-.3765E-06
7	.7386E-07	.3816E-07	-.6026E-09	-.4427E-07	-.5085E-07	-.1423E-06	-.1967E-06	-.2566E-06	-.3184E-06	-.3764E-06
8	.7371E-07	.3806E-07	-.7380E-09	-.4435E-07	-.5100E-07	-.1424E-06	-.1968E-06	-.2560E-06	-.3184E-06	-.3764E-06
9	.7363E-07	.3801E-07	-.8043E-09	-.4438E-07	-.5105E-07	-.1424E-06	-.1966E-06	-.2562E-06	-.3184E-06	-.3763E-06
10	.7356E-07	.3795E-07	-.8675E-09	-.4442E-07	-.5110E-07	-.1424E-06	-.1965E-06	-.2560E-06	-.3183E-06	-.3762E-06
11	.7352E-07	.3763E-07	-.8856E-09	-.4442E-07	-.5110E-07	-.1424E-06	-.1965E-06	-.2560E-06	-.3182E-06	-.3762E-06
12	.7345E-07	.3785E-07	-.9262E-09	-.4443E-07	-.5110E-07	-.1423E-06	-.1968E-06	-.2555E-06	-.3182E-06	-.3760E-06

	31	32	33	34	35	36	37	38	39	40
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.2533E-04	.2659E-04	.4888E-04	.6052E-04	.7256E-04	.8487E-04	.9749E-04	.1105E-03	.1235E-03	.1378E-03
3	.5626E-04	.3103E-04	.3346E-04	.4034E-04	.4824E-04	.5641E-04	.6481E-04	.7346E-04	.8235E-04	.9165E-04
4	.4324E-04	.1822E-04	.1656E-04	.1599E-04	.2383E-04	.2787E-04	.3205E-04	.3635E-04	.4079E-04	.4539E-04
5	-.4231E-06	-.4781E-06	-.5362E-06	-.5814E-06	-.6333E-06	-.6948E-06	-.7363E-06	-.7875E-06	-.8355E-06	-.8912E-06
6	-.4282E-06	-.4802E-06	-.5221E-06	-.5840E-06	-.6360E-06	-.6880E-06	-.7400E-06	-.7921E-06	-.8442E-06	-.8964E-06
7	-.4282E-06	-.4801E-06	-.5326E-06	-.5835E-06	-.6358E-06	-.6878E-06	-.7398E-06	-.7915E-06	-.8440E-06	-.8962E-06
8	-.4281E-06	-.4800E-06	-.5215E-06	-.5838E-06	-.6357E-06	-.6877E-06	-.7397E-06	-.7917E-06	-.8438E-06	-.8960E-06
9	-.4281E-06	-.4799E-06	-.5318E-06	-.5837E-06	-.6356E-06	-.6875E-06	-.7355E-06	-.7516E-06	-.8437E-06	-.8958E-06
10	-.4280E-06	-.4798E-06	-.5317E-06	-.5836E-06	-.6355E-06	-.6874E-06	-.7394E-06	-.7914E-06	-.8435E-06	-.8957E-06
11	-.4275E-06	-.4797E-06	-.5316E-06	-.5834E-06	-.6353E-06	-.6873E-06	-.7393E-06	-.7913E-06	-.8434E-06	-.8955E-06
12	-.4277E-06	-.4795E-06	-.5314E-06	-.5832E-06	-.6351E-06	-.6870E-06	-.7390E-06	-.7910E-06	-.8430E-06	-.8951E-06

	41	42	43	44	45	46	47	48	49	50
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.1522E-03	.1672E-03	.1825E-03	.1594E-03	.2166E-03	.2347E-03	.2528E-03	.2738E-03	.2951E-03	.3175E-03
3	.1013E-03	.1113E-03	.1217E-03	.1327E-03	.1442E-03	.1562E-03	.1685E-03	.1823E-03	.1965E-03	.2114E-03
4	.5018E-04	.5516E-04	.6026E-04	.6581E-04	.7153E-04	.7754E-04	.8287E-04	.9054E-04	.9755E-04	.1050E-03
5	-.9425E-06	-.5546E-06	-.1046E-05	-.1098E-05	-.1150E-05	-.1202E-05	-.1254E-05	-.1306E-05	-.1359E-05	-.1411E-05
6	-.9488E-06	-.1001E-05	-.1053E-05	-.1106E-05	-.1158E-05	-.1211E-05	-.1264E-05	-.1317E-05	-.1370E-05	-.1423E-05
7	-.9486E-06	-.1001E-05	-.1053E-05	-.1105E-05	-.1158E-05	-.1211E-05	-.1264E-05	-.1317E-05	-.1370E-05	-.1423E-05
8	-.9482E-06	-.1001E-05	-.1053E-05	-.1105E-05	-.1158E-05	-.1211E-05	-.1263E-05	-.1316E-05	-.1369E-05	-.1422E-05
9	-.9481E-06	-.1003E-05	-.1053E-05	-.1105E-05	-.1158E-05	-.1210E-05	-.1263E-05	-.1316E-05	-.1365E-05	-.1422E-05
10	-.9475E-06	-.1000E-05	-.1053E-05	-.1105E-05	-.1158E-05	-.1210E-05	-.1263E-05	-.1316E-05	-.1369E-05	-.1422E-05
11	-.9477E-06	-.1000E-05	-.1052E-05	-.1105E-05	-.1157E-05	-.1210E-05	-.1263E-05	-.1316E-05	-.1365E-05	-.1422E-05
12	-.9473E-06	-.5996E-06	-.1052E-05	-.1104E-05	-.1157E-05	-.1209E-05	-.1262E-05	-.1315E-05	-.1368E-05	-.1421E-05

Table 13 (Cont'd)

4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	-.1460E-0?	-.1454E-02	-.5515E-07	.5478E-06	.3102E-06	.1290E-04	.4555E-01	.1913E-04	.2735E-01	.2956E-02
6	-.1474E-0?	-.1477E-02	-.6173E-07	.5690E-06	.3442E-05	.1232E-04	.4228E-01	.1126E-04	.3151E-02	.2187E-03
7	-.1474E-0?	-.1465E-02	-.5633E-07	.5735E-06	.2435E-06	.8191E-05	.3701E-01	.9122E-05	.3191E-03	.2163E-03
8	-.1477E-0?	-.1454E-02	-.4001E-07	.5872E-06	.1623E-06	.3413E-05	.3051E-01	.2603E-05	.3280E-03	.2181E-03
9	-.1471E-0?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3051E-01	.2009E-05	.3284E-03	.2177E-03
10	-.1473E-0?	-.1743E-01	.1395E-03	.6324E-06	.3468E-06	.2025E-05	.3240E-01	.8704E-05	.3159E-03	.2177E-03
11	-.1477E-05	-.1574E-01	.6371E-07	.6097E-06	.1317E-06	.6291E-06	.3300E-01	.1551E-04	.3179E-03	.2772E-03
12	-.1479E-0?	-.1674E-01	.2152E-03	.5985E-06	.2282E-06	.6596E-06	.3226E-01	.8215E-05	-.4516E-02	.1171E-03

	61	62	63	64	65	66	67	68	69
1	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	.4434E-03	.3655E-02	.2850E-03	.1972E-03	.1421E-04	.1295E-02	-.3696E-01	-.5522E-03	-.1824E+00
3	.8723E-03	.2222E-03	.5660E-02	.2258E-02	.7165E-02	.2226E-02	-.4573E-02	-.2294E-01	-.1156E+00
4	.1027E-03	.4817E-03	.1552E-02	.4197E-02	.1661E-01	.5395E-02	-.6684E-02	-.2824E-01	-.8100E-01
5	.4772E-03	.2751E-03	.5752E-02	.3527E-02	.2150E-01	.8578E-02	-.6044E-02	-.2482E-01	-.5526E-01
6	.2248E-03	.1795E-03	.1365E-02	.4733E-04	.4722E-01	.9625E-02	-.5177E-02	-.2127E-01	-.4342E-01
7	.2284E-03	.1788E-03	.1288E-02	.8196E-04	.5680E-01	.9020E-02	-.4447E-02	-.1844E-01	-.3566E-01
8	.2288E-03	.1789E-03	.1281E-02	.7731E-04	.7727E-01	.7695E-02	-.3695E-02	-.1574E-01	-.2916E-01
9	.2283E-02	.1782E-02	.1284E-02	.7481E-04	.2275E-01	.6854E-02	-.3283E-02	-.1365E-01	-.2579E-01
10	.2284E-03	.1747E-03	.1282E-02	.7212E-04	.1568E-01	.5579E-02	-.2670E-02	-.1110E-01	-.2068E-01
11	.2286E-03	.1781E-03	.1282E-02	.7059E-04	.5174E-02	.4274E-02	-.2056E-02	-.8551E-02	-.1554E-01
12	.1361E-02	.1672E-03	.7744E-04	.9939E-04	.5417E-02	.2591E-01	.1222E-01	-.5126E-02	-.9516E-02

ELAPSED SIMULATION TIME 1.0000E-02 DAYS (2.7397E-05 YEARS)

TIME STEP NUMBER 1 NUMBER OF OUTER ITERATIONS 4 CURRENT TIME STEP 1.0000E-02 DAYS

	FLUID (LBM)	HEAT (BTU)	INERT COMP (LBM)
MASS BALANCE	1.0000	1.0000	1.0000
WELL SUMMARY			
TOTAL PRODUCTION	0.	0.	0.
TOTAL INJECTION	0.	0.	0.
TOTAL IN PLACE	1.2041E+13	4.2480E+11	0.
AQUIFER INFLUENCE FUNCTION			
TOTAL EFFLUX	0.	0.	0.
TOTAL INFLUX	0.	0.	0.
CUMULATIVE FLUX	0.	0.	0.
MAXIMUM CHANGE AT	(69, 1,12)	(69, 1,12)	(69, 1,12)
OVER LAST TIME STEP	0. PSI	0. DEG.F	0. LBM

AVERAGE PRESS 1290. PSI HEAT LOSS TO OVER/UNDERBDN 0. BTU CUM SALT DISSOL 0. LBM

THE TIME IS 1.000E-02 DAY

WELL LOCATION		PRODUCTION RATES			CUMULATIVE PRODUCTION			CUMULATIVE INJECTION			GRID	FLWG	FLWG	BH	WH
		WATER	HEAT	COMP	WATER	HEAT	COMP	WATER	HEAT	COMP	BLOCK	BHP	WHCP	TEMP	TEMP
NO I J K		LB/DAY	BTU/DAY	LB/DAY	LBM	BTU	LBM	LBM	BTU	LBM	PRESS	PSIA	PSIA	DEG.F	DEG.F
1	[illegible]	0.	0.	0.0000	0.	0.	0.	0.	0.	0.	-19.	-19.	0.	68.	0.

Table 13 (Cont'd)

NWFT/STC

New Right Hand Page

Notebook Divider Shield Read: Sample Problem 3.

Problem 3. Simulate a Large Disruption Through the Depository

As in Problem 2A, Legs 8 and 10 are used to create flow through the depository with normal pressure gradients. In this problem, however, the disruption is assumed to be much larger than a drill hole. For example, such a zone could represent a fault. Input is that of Problem 2A except for the cross-sectional areas of Legs 8 and 10. Since the depository is assumed to be 6000 feet wide (Problem 1A), the lateral dimension of the disruption is taken to be the same. Assuming a zone width of 10 feet, the cross-sectional areas of Legs 8 and 10 are assigned the value 60000 ft^2. The hydraulic conductivity is somewhat arbitrarily assumed to be 1 ft/day. The data change summary is given in Figure 17, data input in Table 14 and results in Table 15.

The migration path follows Legs 10, 6, and 11. It is interesting to compare flow volume and velocity through Leg 10 to that of Problem 2A. Flow volume has increased by a factor of 1.2×10^3, whereas the pore velocity has decreased by a factor of 5. Clearly, the disruptive feature simulated in this problem represents a major disruption of the reference site. Nevertheless, we have used the same pressure head boundary conditions at the aquifer inlets and outlet that were used for the undisrupted reference site (Problem 1B). It would be valid to question at this point whether new boundary conditions should be established by running SWIFT with the same disruptive feature. Insight into this question can be gained by comparing calculated pressures for Problem 3 with those of Problem 1B. Specifically, the pressure heads at the intersections of Legs 2, 8, and 3 and at the intersections of Legs 5, 10, and 6 are listed below for both problems.

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	1 E-6	1.8E-6	1E-6	1.8E-6	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	60000	1	60000	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	1	.03	1	.3

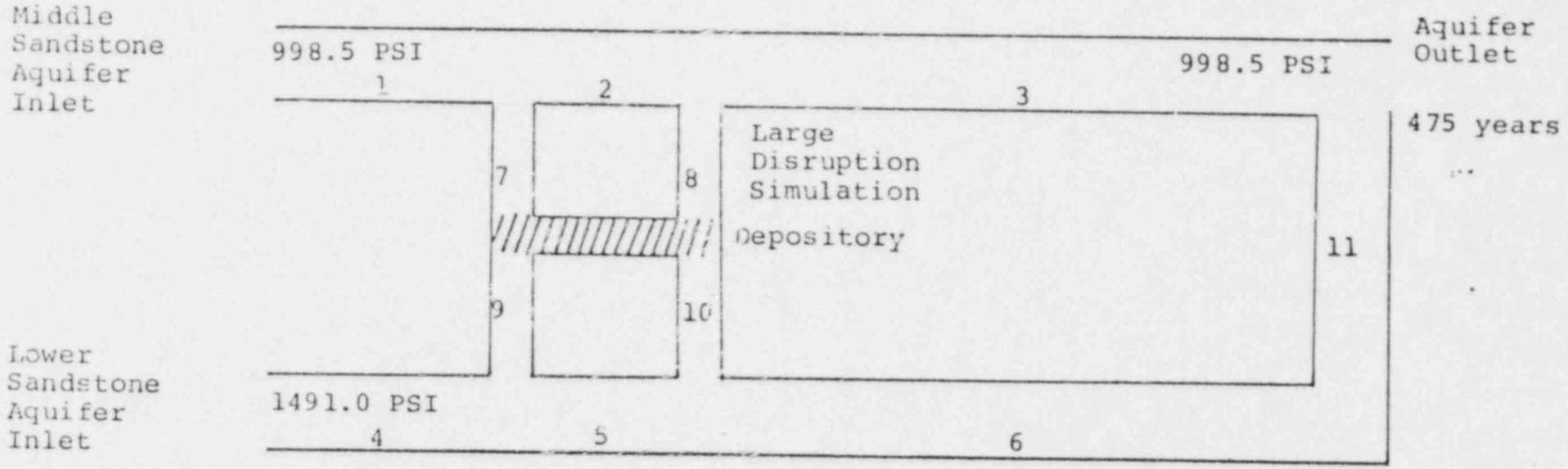


Figure 17.

Problem 3.

SIMULATE LARGE DISRUPTION THROUGH DEPOSITORY

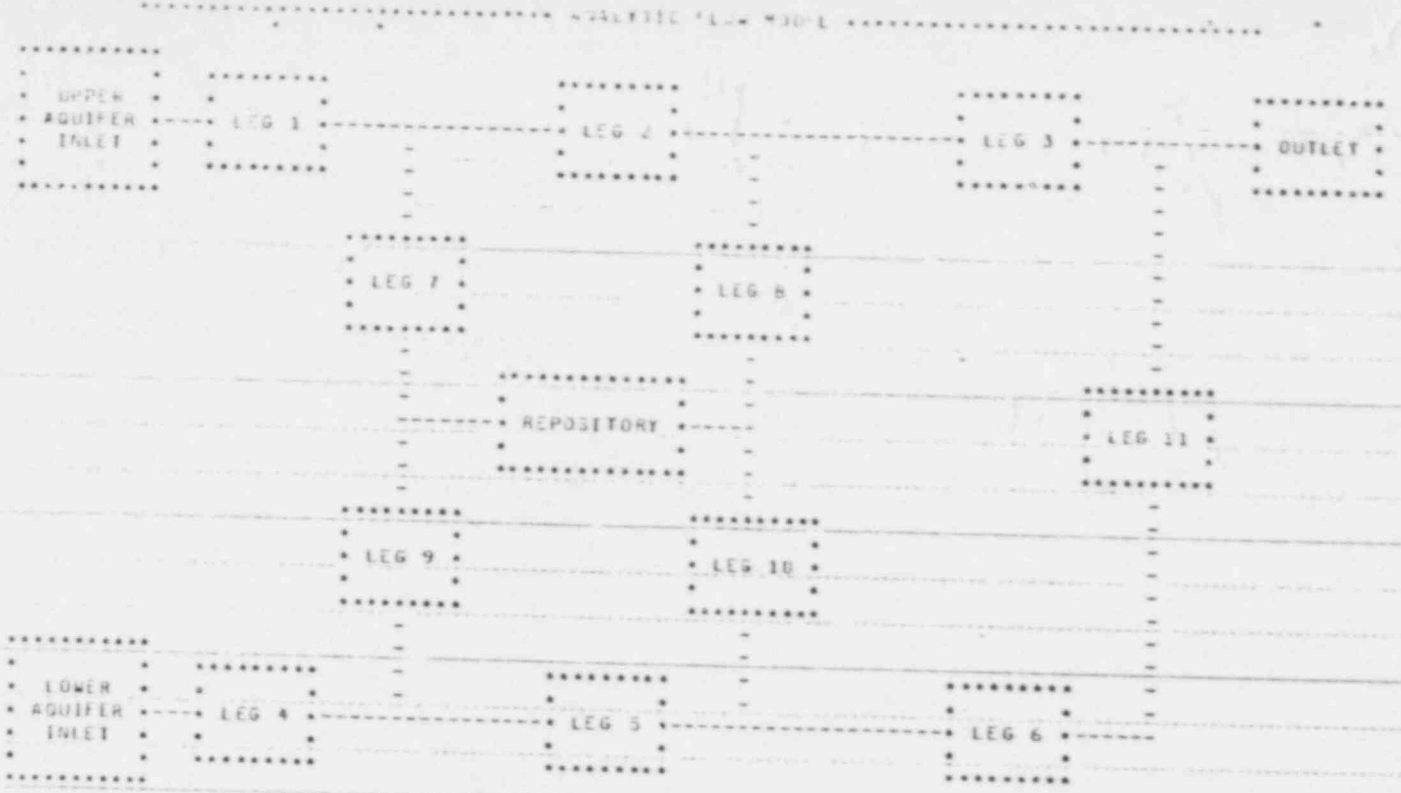
NWFT

```
***********INPUT FOR PROBLEM  3 **********
                                ---
1
      998.5    1491.0     998.5
50.0      50.0      50.0      40.0      40.0      40.0            1.E-6        1.
    1.0E-6          1.  2.5
      6.0E6     6.0E6     6.0E6     1.8E6     1.8E6     1.8E6       1.0   60000.
        1.0    60000.     1.2E3
    14500.0    8000.0  138000.0   14500.0    8000.0  138000.0     625.0     521.5
      475.0     578.5    1100.0
    3602.41   3414.81   3311.31   2789.81   2789.81   2502.41   2314.81   2211.31
     425.89   1525.89
0.3       0.3       0.3       0.3       0.3       0.3       0.03      .03
.03       .03       .3
    1
  A               1.E3    1000.
    1.0E3         100.



             **********         END          **********
```

Table 14:

```
OPTIONS  1 1   2 2   3 0   4 5   5 0   6 0   7 1   8 0   9 0   10 0   11 0   12 0   13 0   14 0   15 2   16 0   17 0   18 0   19 0   20 0
 NUMBER OF ISOTOPES    1

        ISOTOPE NAME          HALF LIFE (YEARS)     INITIAL AMOUNT (CI)
             4                  1.000E+03              1.000E+03
        LEACH TIME =    1.000E+03 YEARS    DISPERSIVITY =    1.000E+02 FEET
 NO OF VECTORS =    0 TIME UPPER BOUND =      1.01E+06
```

Table 15: NWFT Output for Problem 3



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

Table 15 (cont'd)

LEG PROPERTIES

LEG 2 ********

LENGTH =	8.[illegible]E+03 FT
AREA =	6.[illegible]E+06 FT**2
CONDUCTIVITY =	1.83E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 3 ********

LENGTH =	1.38E+05 FT
AREA =	6.00E+06 FT**2
CONDUCTIVITY =	1.83E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 4 ********

LENGTH =	1.45E+04 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	1.46E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 5 ********

LENGTH =	8.00E+03 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	1.46E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 6 ********

LENGTH =	1.38E+05 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	1.46E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 7 ********

LENGTH =	6.25E+02 FT
AREA =	1.00E+00 FT**2
CONDUCTIVITY =	3.65E-04 FT/YR
POROSITY =	.0300
DENSITY =	1.65E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 8 ********

LENGTH =	5.22E+02 FT
AREA =	6.00E+04 FT**2

Table 15 (cont'd)

CONDUCTIVITY = 3.65E+02 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
LENGTH = 4.75E+02 FT
AREA = 1.00E+03 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
LENGTH = 5.79E+02 FT
AREA = 6.00E+04 FT**2
CONDUCTIVITY = 3.65E+02 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
LENGTH = 1.10E+03 FT
AREA = 1.20E+04 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 3. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 1.4919E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9734E+02 FT
JUNCTION LEGS 2-8-3 = 9.9670E+02 FT
JUNCTION LEGS 4-9-5 = 1.5539E+03 FT
JUNCTION LEGS 5-11-6 = 1.5840E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.2751E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.2751E+03 FT
JUNCTION LEGS 6-11 = 2.1019E+03 FT

RADIONUCLIDE MIGRATION PATH-----LEGS 10 9 11

PATH LENGTH (FT) = 1.3968E+05
ISOTOPE VEL. (FT/DAY) = 8.3989E-01
MIGRATION TIME (YEARS) = 4.7251E+02

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.91E+05	6.51E-01	2.17E+03
2	3.91E+05	6.51E-01	2.17E+03
3	3.46E+05	6.46E-01	2.15E+03
4	6.34E+05	3.52E-01	1.17E+03
5	6.34E+05	3.52E-01	1.17E+03
6	5.62E+05	3.48E-01	1.23E+03
7	-5.56E+04	-5.56E-01	-1.85E+03
8	-3.49E+04	-4.66E-01	-1.55E+03
9	-4.19E+04	-4.19E-01	-1.40E+03
10	-2.80E+04	-4.00E-01	-1.33E+03
11	6.62E+04	6.02E-02	1.84E+02

Table 15 (cont'd)

	Undisrupted Reference Site (Problem 1B)	Major Disruption Through Depository (Problem 3)
Intersection Legs 2, 8, 3	998.5 ft	996.7 ft
Intersection of Legs 5, 10, 6	1576.5 ft	1584 ft

Thus for the undisrupted reference site, the downward hydraulic gradient across the salt and shale layers at the depository is

$$G = \frac{(998.5+1100)\ \text{ft} - 1576.5\ \text{ft}}{1100\ \text{ft}} = 0.475$$

with the disruptive feature, the gradient is

$$G = \frac{(996.7+1100)-1584}{1100} = 0.466$$

The influence of the large disruptive feature on pressures near the depository and on the vertical hydraulic gradient across the depository is small. Thus one can reasonably expect that, for this case, the effect of the disruption on the boundary conditions would be small. Nevertheless, large scale disruptions near the depository may occasionally necessitate

additional SWIFT runs to establish new boundary conditions. For the reference site, experience indicates* that increases in conductivity in the salt and shale layers have little influence on the pressure distribution throughout the system. However, decreases in hydraulic conductivity in the sandstone layers can dramatically alter the pressure distribution.

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*This experience is documented in a draft report on scenario development (SAND80-1429, NUREG/CR-1667, to be published).

NOFT/STC

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Notebook Divider Should Read Sample Problem 4.

Problem 4: Simulate a U-Tube Scenario

The name U-tube arises from the geometrical picture presented by creating flow down Leg 7, across the depository, and up Leg 8. In this case Leg 7 represents an access shaft and Leg 8 represents a drill hole. Since no flow is considered through Legs 9 and 10, they are effectively blocked by assigning them low conductivities.

Input is that of Problem 1B (see Figure 18) with the following exceptions: Conductivities of Legs 7 and 8 are assumed to be 50 ft/day. The porosity is assumed to be 0.3. The cross-sectional area of Leg 8 is 1 ft^2. The cross-sectional area of Leg 7 is found by considering it to be a circular access shaft with a 15 foot radius. That is,

$$\begin{aligned} \text{AREA (7)} &= \pi r^2 \\ &= \pi (15)^2 \\ &= 707 \text{ ft}^2 \end{aligned}$$

NWFT input data are in Table 16.

The resultant migration path follows Legs 8-3 (Table 17).

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	50	50	1E-6	1 E-6	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	707	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.3	.3	.03	.03	.3

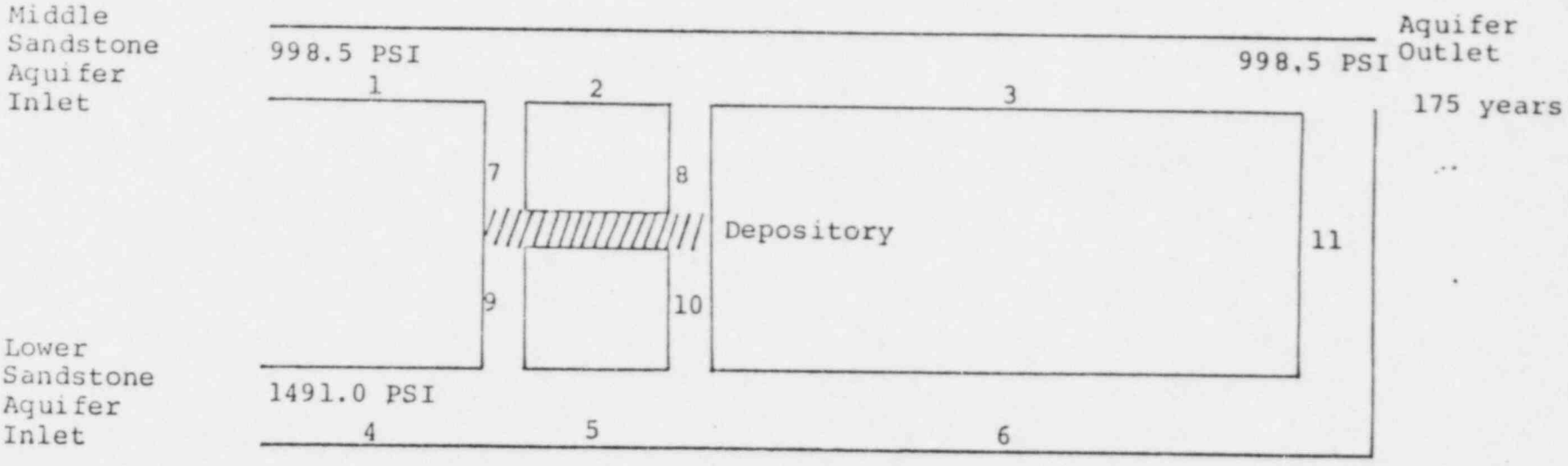


Figure 18.

Problem 4

SIMULATE A U-TUBE SCENARIO

NWFT

```
***********INPUT FOR PROBLEM  4 **********
                                 ---
1
     998.5     1491.0     998.5
50.0      50.0      50.0       40.0       40.0       40.0          50.        50.
   1.0E-6     1.0E-6  2.5
     6.0E6     6.0E6     6.0E6     1.8E6      1.8E6      1.8E6      707.        1.0
       1.0       1.0     1.2E8
   14500.0    8000.0  138000.0   14500.0     8000.0  138000.0      625.0      521.5
     475.0     578.5    1100.0
   3602.41   3414.81   3311.31   2789.81    2739.81   2502.41    2314.81    2211.31
    425.89   1525.89
0.3       0.3       0.3        0.3        0.3        0.3        0.3        .3
.03       .03       .3
   1
 A                 1.E3    1000.
   1.0E3           100.


          **********          END          **********
```

Table 16

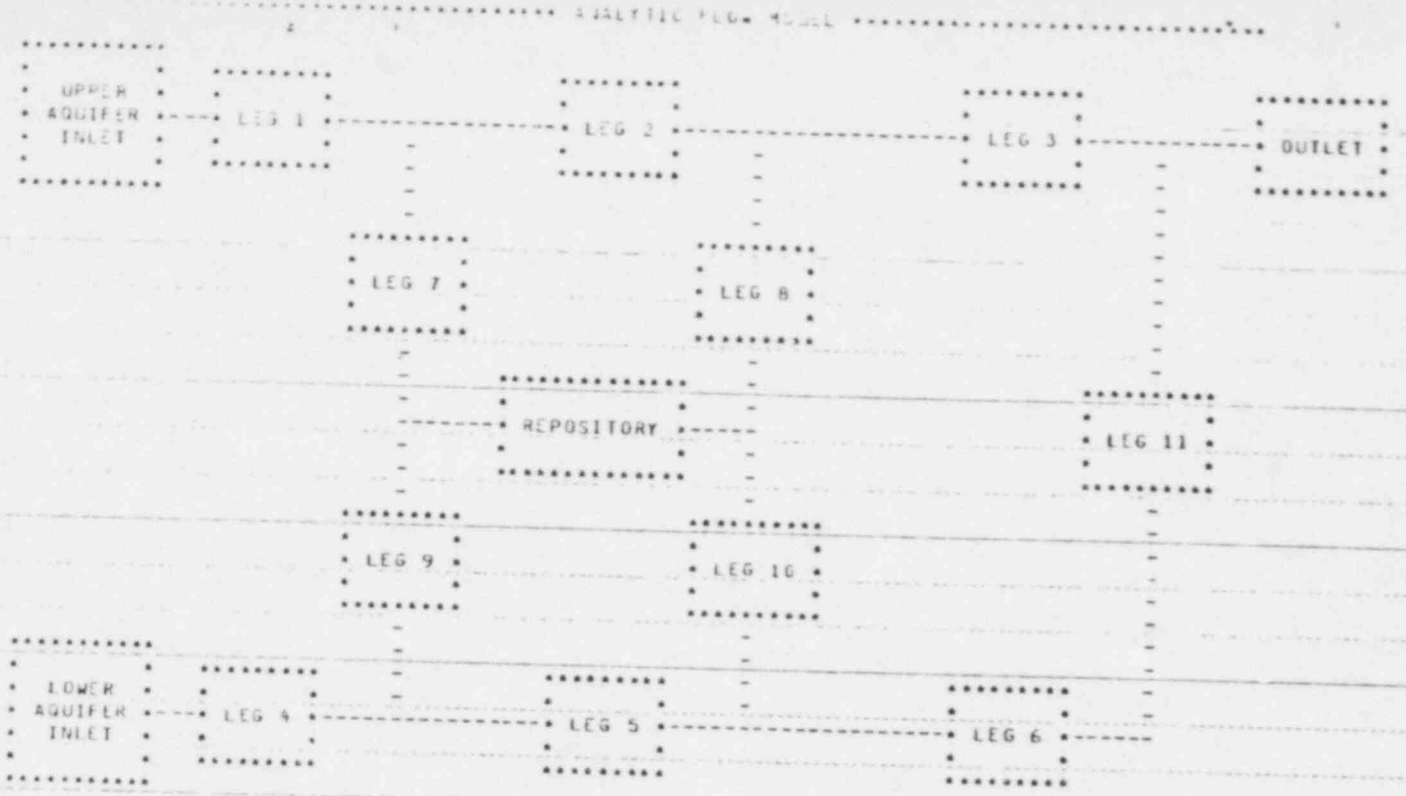
```
OPTIONS  1 1   2 0   3 0   4 0   5 0   6 0   7 0   8 0   9 0  10 0  11 0  12 0  13 0  14 0  15 0  16 0  17 0  18 0  19 0  20 0
 NUMBER OF ISOTOPES    1

        ISOTOPE NAME            HALF LIFE (YEARS)      INITIAL AMOUNT (CI)

              A                   1.000E+03              1.000E+03

        LEACH TIME =    1.000E+03 YEARS     DISPERSIVITY =   1.000E+02 FEET
 NO OF VECTORS =    3 TIME UPPER BOUND =        1.01E+06
```

Table 17: NWFT Output for Problem 4



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .300
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

Table 17 (cont'd)

FT**3/LB

LEG PROPERTIES

LEG 2
****
LENGTH = 8.01E+03 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 3
****
LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 4
****
LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 5
****
LENGTH = 8.00E+03 FT
AREA = 1.82E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 6
****
LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 7
****
LENGTH = 6.25E+02 FT
AREA = 7.07E+02 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 8
****
LENGTH = 5.22E+02 FT
AREA = 1.00E+00 FT**2

Table 17 (cont'd)

CONDUCTIVITY = 1.43E+04 FT/YR

POROSITY = .30

DENSITY = 1.14E+02 LB/FT**3

RETARDATION FACTOR = 1.00E+00

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

RADIONUCLIDE MIGRATION PATH-----LEGS 8

PATH LENGTH (FT) = 1.38520E+05

ISOTOPE VEL. (FT/DAY) = 2.1638E+02

MIGRATION TIME (YEARS) = 1.7538E+02

LEG PROPERTIES

LEG 9

LENGTH = 4.75E+02 FT

AREA = 1.00E+00 FT**2

CONDUCTIVITY = 5.65E-04 FT/YR

POROSITY = .230

DENSITY = 1.65E+02 LB/FT**3

RETARDATION FACTOR = 1.00E+00

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10

LENGTH = 5.79E+02 FT

AREA = 1.00E+01 FT**2

CONDUCTIVITY = 5.65E-04 FT/YR

POROSITY = .0300

DENSITY = 1.65E+02 LB/FT**3

RETARDATION FACTOR = 1.00E+00

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11

LENGTH = 1.10E+03 FT

AREA = 1.20E+04 FT**2

CONDUCTIVITY = 9.13E-02 FT/YR

POROSITY = .3000

DENSITY = 1.19E+02 LB/FT**3

RETARDATION FACTOR = 1.00E+00

DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.985JE+02 FT

LOWER AQUIFER INLET = 1.491CE+03 FT

AQUIFER OUTLET = 9.9853E+02 FT

JUNCTION LEGS 1-7-2 = 9.9853E+02 FT

JUNCTION LEGS 2-8-3 = 9.9853E+02 FT

JUNCTION LEGS 4-9-5 = 1.5461E+03 FT

JUNCTION LEGS 5-10-6 = 1.5765E+03 FT

JUNCTION LEGS 7-8-DEPOSITORY = 1.6233E+03 FT

JUNCTION LEGS 9-10-DEPOSITORY = 1.6233E+03 FT

JUNCTION LEGS 6-11 = 2.1099E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.4[illegible]E+05	6.47E-01	2.16E+00
2	3.39E+06	6.47E-01	2.16E+00
3	3.[illegible]E+06	6.47E-01	2.16E+00
4	6.59E+05	3.66E-01	1.22E+00
5	6.38E+06	3.66E-01	1.22E+00
6	6.54E+06	3.66E-01	1.22E+00
7	-9.91E+02	-1.47E-03	-4.67E-03
8	9.91E+03	9.91E-02	3.30E-01
9	-1.[illegible]E+06	-1.[illegible]E+00	-3.[illegible]E+00
10	-1.[illegible]E+06	-1.[illegible]E+00	-3.[illegible]E+00
11	5.[illegible]E+06	5.[illegible]E-03	1.[illegible]E-02

Table 17 (cont'd)

NWFT/STC

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NOTEBOOK DIVIDER SHOULD READ. NWFT TRANSPORT MODEL

The NWFT Transport Model

Before proceeding to sample Problem 5, it is useful to review the analytic transport model used in NWFT.

The differential equations describing one dimensional migration of radionuclides and their decay products can be written as follows

$$R_1 \frac{\partial C_1}{\partial t} + v\frac{\partial C_1}{\partial x} = D \frac{\partial^2 C_1}{\partial x^2} - R_1\lambda_1 C_1$$

$$R_2 \frac{\partial C_2}{\partial t} + v\frac{\partial C_2}{\partial x} = D \frac{\partial^2 C_2}{\partial x^2} - R_2\lambda_2 C_2 + R_1\lambda_1 C_1 \qquad 10.$$

$$R_3 \frac{\partial C_3}{\partial t} + v\frac{\partial C_2}{\partial x} = D \frac{\partial^2 C_2}{\partial x^2} - R_3\lambda_3 C_3 + R_2\lambda_2 C_2$$

where

C_i = concentration of species i in solution

v = fluid velocity

λ_i = decay constant for species i

D = $a\,v$ = dispersion coefficient

α = dispersivity

R_i = $1 + \frac{k_{d,i}\rho}{\phi}$ = retardation factor for species i

$k_{d,i}$ = distribution coefficient for species i

ρ = rock density

ϕ = porosity

Boundary conditions appropriate for a leach-limited source with a constant leach rate are given in Table 18. Equations 10 can be solved by using Laplace transforms. For the special case of equal retardation factors, i.e.,

$$R_1 = R_2 = R_3 \cdots$$

the solutions for the first three species in terms of discharge rates can be written as follows

$$D_1(t) = \frac{N_1(0)}{2\tau} e^{-\lambda_1 t} [G(t) - G(t-\tau)\, S(t-\tau)]$$

$$D_2(t) = \left\{ \frac{N_2(0) e^{-\lambda_2 t}}{2\tau} + \frac{N_1(0)}{2\tau} \left(\frac{\lambda_1}{\lambda_2 - \lambda_1}\right) \left(e^{-\lambda_1 t} - e^{-\lambda_2 t}\right) \right\} \{G(t) - G(t-\tau)\, S(t-\tau)\}$$

$$D_3(t) = \left\{ \frac{N_3(0) e^{-\lambda_3 t}}{2\tau} + \frac{N_2(0)}{2\tau} \left(\frac{\lambda_2}{\lambda_3 - \lambda_2}\right) \left(e^{-\lambda_2 t} - e^{-\lambda_3 t}\right) + \frac{N_1(0)}{2\tau} \lambda_1 \lambda_2 \left(\frac{e^{-\lambda_1 t}}{(\lambda_2-\lambda_1)(\lambda_3-\lambda_1)} + \frac{e^{-\lambda_2 t}}{(\lambda_1-\lambda_2)(\lambda_3-\lambda_2)} + \frac{e^{-\lambda_3 t}}{(\lambda_1-\lambda_3)(\lambda_2-\lambda_3)} \right) \right\} \cdot \{G(t) - G(t-\tau)\, S(t-\tau)\} \quad 11.$$

where $D_i(t) = C_i(x,t)Q$ = discharge rate of species i

Table 18

Boundary Conditions

I. $t = 0$, all x

$$C_1 = C_2 = C_3 = \ldots = 0$$

II. $0 < t < \tau$, $x = 0$

$$C_1 = \frac{N_1(0)}{Q\tau} e^{-\lambda_1 t}$$

$$C_2 = \frac{N_2(0)}{Q\tau} e^{-\lambda_2 t} + \frac{\lambda_1}{\lambda_2 - \lambda_1} \frac{N_1(0)}{Q\tau} \left(e^{-\lambda_1 t} - e^{-\lambda_2 t} \right)$$

$$C_3 = \frac{N_3(0)}{Q\tau} e^{-\lambda_3 t} + \frac{\lambda_2}{\lambda_3 - \lambda_2} \frac{N_2(0)}{Q\tau} \left(e^{-\lambda_2 t} - e^{-\lambda_3 t} \right)$$

$$+ \lambda_1 \lambda_2 \frac{N_1(0)}{Q\tau} \left(\frac{e^{-\lambda_1 t}}{(\lambda_2 - \lambda_1)(\lambda_3 - \lambda_1)} + \frac{e^{-\lambda_2 t}}{(\lambda_1 - \lambda_2)(\lambda_3 - \lambda_2)} + \frac{e^{-\lambda_3 t}}{(\lambda_1 - \lambda_3)(\lambda_2 - \lambda_3)} \right)$$

$\vdots$

III. $t > \tau$, $x = 0$

$$C_1 = C_2 = C_3 = \ldots = 0$$

IV. $t > 0$, $x \to \infty$

$C_1, C_2, C_3, \ldots$ = finite

where

$N_i(0)$ = initial inventory of species i

Q = fluid flow rate

τ = leach time for a constant leach rate model

$$S(z) = 0 \qquad z < 0$$

$$S(z) = 1 \qquad z \geq 0$$

and the function G(t) is

$$G(t) = \text{erfc}\left(\frac{x - \bar{u}t}{\sqrt{4\alpha t\bar{u}}}\right) + e^{\frac{x}{\alpha}} \text{erfc}\left(\frac{x + \bar{u}t}{\sqrt{2\alpha t\bar{u}}}\right)$$

where

$\bar{u}$ = average isotope velocity accounting for retardation

erfc = complementary error function

x = distance from source to discharge location

Let ℓ_i be the leg number of the i^{th} leg in the radionuclide migration path. For example, if the migration path is along Legs 10, 6 and 11, then

$$\ell_1 = 10$$

$$\ell_2 = 6$$

$$\ell_3 = 11$$

Then the total migration path is

$$x = \sum_{i=1}^{N_L} L_{\ell i}$$

where

N_L = number of legs along the migration path.

The total migration time is

$$T_m = \sum_{i=1}^{N_L} \frac{L_i R_i}{v}$$

The average isotopic velocity is

$$\bar{u} = x/T_m$$

Thus the path length (x) and the average isotopic velocity ($\bar{u}$) are determined from the earlier flow calculations. Time dependent radionuclide discharge rates are then determined from Equation 11.

INSERT / STC

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NOTEBOOK DIVIDER SHOULD READ: Sample Problem 5

Problem 5. Transport a 3-Isotope Decay Chain Over the Paths Caused by the Disruptions of Problem 2

Problem 5A

Problem 5A simulates a borehole release scenario with downward flow. Discharge rates (ci/day) are calculated using the resultant migration path for the decay chain

Pu 240 U 236 Th 232

The additional input information is described in the appropriate order. For a summary of input data changes see Figure 19.

(i) Number of isotopes

Clearly 3.

(ii) Isotope names, half-lives (y), initial inventory (ci)

Name	Half Life	Initial Inventory
Pu 240	6.76×10^3	8.63×10^5
U 236	2.39×10^7	7.17×10^1
Th 232	1.41×10^{10}	0.

The initial inventory is taken from the reference depository radionuclide inventory. For this example, it is assumed that water from the drill hole accesses the entire high-level waste inventory.

	LEGS										
	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	40	1 E-6	50	1E-6	50	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.3	.03	.3	.3
DISTRIBUTION COEF.	1.6	1.6	1.6	1.6	1.6	1.6	0	0	0	0	1.6

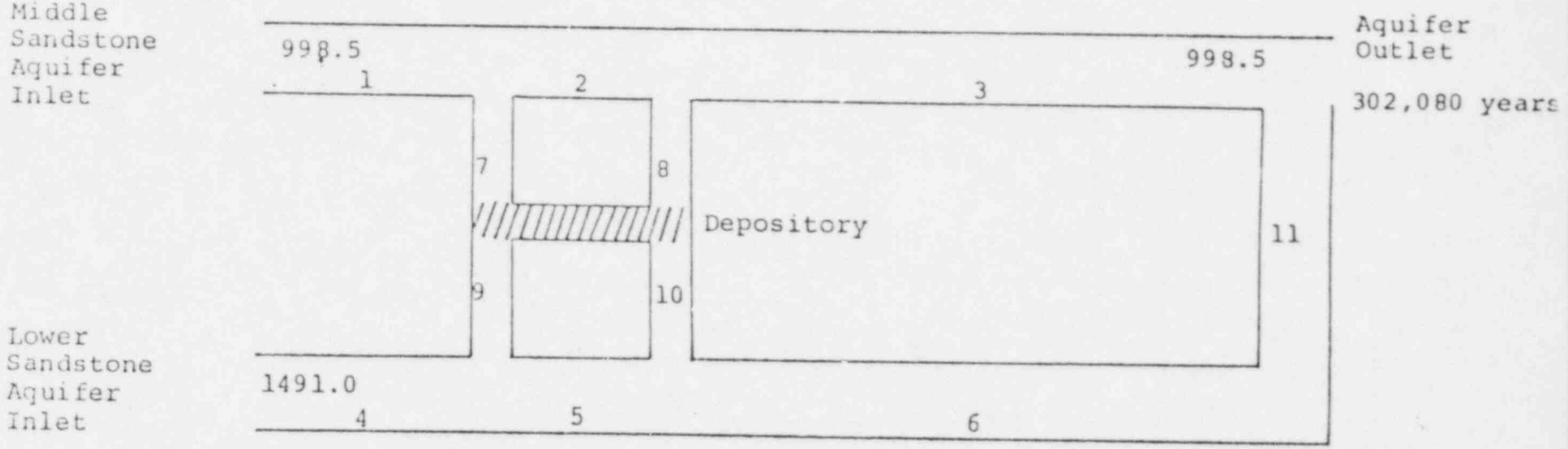


Figure 19

Problem 5A

3 ISOTOPE DECAY CHAIN TRANSPORT

OVER FLOW PATH OF 2A

$Pu240 \rightarrow U236 \rightarrow Th232$

(iii) Leach time (y), dispersivity (ft)

Leach time is taken to be 1000 y and dispersivity 100 ft.

(iv) Distribution coefficients (ft^3/lb)

NWFT does not convert KD from the normally observed units cm^3/g to ft^3/lb. This is user responsibility. In this problem we set KD = 0 in Legs 7 through 10 to account for the poor sorptive characteristics of salt and the influence of brine on sorption. For those legs representing flow in sandstone we use the physically reasonable value KD = 100 cm^3/g (1.6 ft^3/lb). That is,

for Legs 1 → 6, 11	KD = 1.6 ft^3/lb
Legs 7 →10	KD = 0 ft^3/lb

(v) NOVEC, TUB, NOSKIP

NOVEC and NOSKIP are used for multiple runs with input vectors and should be left blank here. TUB is the upper bound cutoff time for calculating radionuclide discharge rates. A value of 10^6 years is input (which is also the default value if left blank).

However, NWFT has the capability to reduce TUB (to say TUB') if there is insignificant discharge for times between TUB' and TUB. Input data are given in Table 19.

On output (Table 20) notice that TUB' is set to 5.75×10^5 years and calculations begin at 3.02×10^4 years. Further note that if the discharge rate of an isotope is less than 1 atom/day, then ci/day is set to exact zero.

Problem 5B

This part of Problem 5 transports the 3-isotope chain given in Part A according to the migration path/flow values of Problem 2B. Input is that of 2B for the network properties and that of 5A for the decay chain. (Summary of data changes is given in Figure 20, data input in Table 21).

Discharge rates are calculated from 1.11×10^4 years to 2.13×10^5 years. With the shortened migration time, considerably higher discharge rates are found for Pu 240. Those of U 236 and Th 230 are of comparable size to Part A but are shifted in time (Table 22).

NWFT

```
**********INPUT FOR PRCBLEM 5-A**********
                                      ---
     998.5     1491.0      998.5
50.0      50.0      50.0      40.0      40.0      40.0           1.E-6       50.
   1.0E-6         50.  2.5
     6.0E6      6.0E6      6.0E6     1.8E6     1.8E6     1.8E6       1.0       1.0
       1.0        1.0      1.2E8
   14500.0     8000.0   138000.0   14500.0    8000.0  138000.0     625.0     521.5
     475.0      578.5     1100.0
   3602.41    3414.81    3311.31   2739.31   2789.81   2502.41   2314.81   2211.31
    425.83    1525.83
0.3       0.3       0.3       0.3       0.3       0.3       0.03      .3
.03       .3        .3
    3
 PU240          6.76E3    8.63E5
  U236          2.39E7    7.17E1
 TH232          1.41E10       0.
    1.0E3        100.
       1.6        1.6        1.6       1.6       1.6       1.6        0.        0.
        0.         0.        1.6
              1.E6
          **********          END          **********
```

Table 19.

OPTIONS 1 0 2 0 3 0 4 0 5 0 6 0 7 0 8 0 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

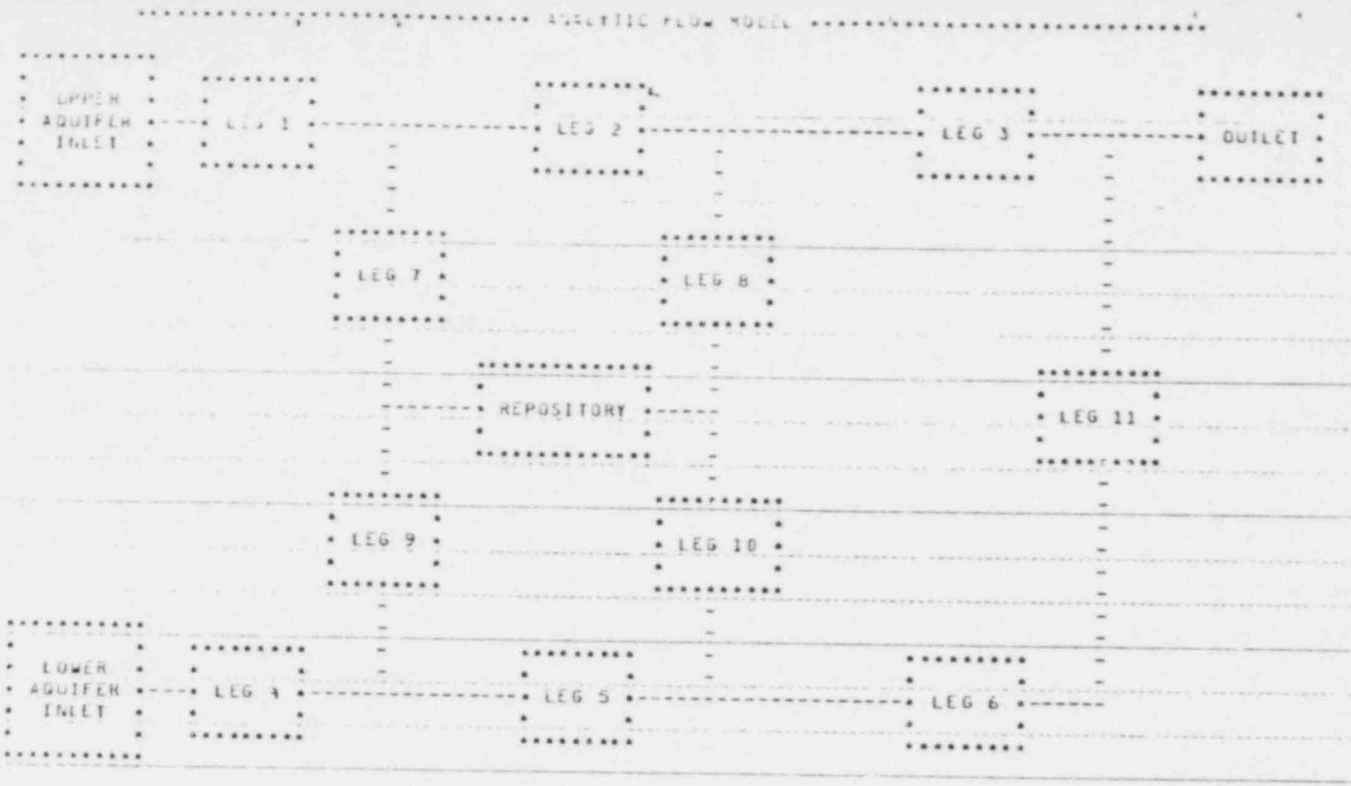
NUMBER OF ISOTOPES 3

ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
PU239	6.760E+03	8.530E+05
U235	2.391E+07	7.170E+01
TH232	1.410E+10	0.

REACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 0 TIME UPPER BOUND = 1.11E+06

Table 20: NWFT Output for Problem 5A



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 1491.00 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02

Table 20: (cont'd)

LEG PROPERTIES

LEG 2
LENGTH = 8.00E+03 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 3
LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 4
LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 5
LENGTH = 8.00E+03 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 6
LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.46E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 7
LENGTH = 6.25E+02 FT
AREA = 1.00E+09 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 8
LENGTH = 5.22E+02 FT
AREA = 1.00E+09 FT**2

Table 20; (cont'd)

CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
LENGTH = 1.10E+03 FT
AREA = 1.20E+08 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 1.4910E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 1.5461E+03 FT
JUNCTION LEGS 5-10-6 = 1.5765E+03 FT
JUNCTION LEGS 7-8-DEPOSITORY = 1.2725E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.2725E+03 FT
JUNCTION LEGS 6-11 = 2.1039E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.44E+06	6.47E-01	2.16E+00
2	3.44E+06	6.47E-01	2.16E+00
3	3.44E+06	6.47E-01	2.16E+00
4	6.58E+05	3.65E-01	1.22E+00
5	6.58E+05	3.65E-01	1.22E+00
6	6.58E+05	3.66E-01	1.22E+00
7	-3.62E-07	-5.02E-07	-1.67E-05
8	-2.37E+01	-2.37E+01	-7.91E-01
9	-4.24E-07	-4.24E-07	-1.41E-05
10	-2.37E+01	-2.37E+01	-7.91E-01
11	3.44E+06	5.83E-01	1.95E-02

Table 20 (cont'd)

RADIONUCLIDE MIGRATION PATH-----LEGS 10 6 11

PATH LENGTH (FT) = 1.396BE+05
ISOTOPE VEL. (FT/DAY) = 1.2668E-03
MIGRATION TIME (YEARS) = 3.0208E+05

Table 20 (cont'd)

TIME (YEARS)	[illegible]	U235	Th232
[illegible]	[illegible]	[illegible]	[illegible]
3.2942E+04	0.	0.	0.
3.5436E+04	0.	0.	0.
3.8379E+04	0.	0.	0.
4.11 3E+04	0.	0.	0.
4.3827E+04	0.	0.	0.
4.6552E+04	0.	0.	0.
4.9274E+04	0.	0.	0.
5.1998E+04	0.	0.	0.
5.4722E+04	0.	0.	0.
5.7445E+04	0.	0.	0.
6.0169E+04	0.	0.	0.
6.2893E+04	0.	0.	0.
6.5617E+04	0.	0.	0.
6.8340E+04	0.	0.	0.
7.1064E+04	0.	0.	0.
7.3788E+04	0.	0.	0.
7.6511E+04	0.	0.	0.
7.9235E+04	0.	0.	0.
8.1959E+04	0.	0.	0.
8.4683E+04	0.	0.	0.
8.7406E+04	0.	0.	0.
9.0130E+04	0.	0.	0.
9.2854E+04	0.	0.	0.
9.5578E+04	0.	0.	0.
9.83 1E+04	0.	0.	0.
1.01 3E+05	0.	0.	0.
1.0375E+05	0.	0.	0.
1.0647E+05	0.	0.	0.
1.0920E+05	0.	0.	0.
1.1192E+05	0.	0.	0.
1.1464E+05	0.	0.	0.
1.1737E+05	0.	0.	0.
1.2009E+05	0.	0.	0.
1.2281E+05	0.	0.	0.
1.2554E+05	0.	0.	0.
1.2826E+05	0.	0.	0.
1.3099E+05	0.	0.	0.
1.3371E+05	0.	0.	0.
1.3643E+05	0.	0.	0.
1.3916E+05	0.	0.	0.
1.4188E+05	0.	0.	0.
1.4460E+05	0.	0.	0.
1.4733E+05	0.	0.	0.
1.5005E+05	0.	0.	0.
1.5278E+05	0.	0.	0.
1.5550E+05	0.	0.	0.
1.5822E+05	0.	0.	0.
1.6095E+05	0.	0.	0.
1.6367E+05	0.	0.	0.
1.6639E+05	0.	0.	0.
1.6912E+05	0.	0.	0.
1.7184E+05	0.	0.	0.
1.7457E+05	0.	0.	0.
1.7729E+05	0.	0.	0.
1.8001E+05	0.	0.	0.
1.8274E+05	0.	0.	0.
1.8546E+05	0.	0.	0.
1.8818E+05	0.	0.	0.
1.9091E+05	0.	0.	0.
1.9363E+05	0.	0.	0.

Table 20 (cont'd)

[illegible]	[illegible]	[illegible]	[illegible]
2.9184E+05	[illegible]	[illegible]	[illegible]
2.8953E+05	[illegible]	[illegible]	[illegible]
2.8725E+05	[illegible]	1.3481E-24	[illegible]
2.8997E+05	[illegible]	5.1[illegible]5E-27	[illegible]
2.1271E+05	[illegible]	[illegible]	1.6149E-30
2.1542E+05	[illegible]	4.3324E-24	4.3824E-29
2.1815E+05	0.	9.8536E-23	1.0102E-27
2.2087E+05	[illegible]	1.9169E-21	1.9902E-26
2.2359E+05	0.	3.2138E-20	3.3702E-25
2.2632E+05	[illegible]	4.6303E-19	4.9333E-24
2.2904E+05	1.3361E-24	5.8158E-18	6.2747E-23
2.3176E+05	1.1087E-23	6.3833E-17	6.9697E-22
2.3449E+05	8.0743E-23	6.1429E-16	6.7932E-21
2.3721E+05	5.1843E-22	5.2142E-15	5.8365E-20
2.3994E+05	2.9471E-21	3.9193E-14	4.4395E-19
2.4266E+05	1.4897E-20	2.6189E-13	3.0021E-18
2.4538E+05	6.7216E-20	1.5623E-12	1.8119E-17
2.4811E+05	2.7176E-19	8.3503E-12	9.7978E-17
2.5083E+05	9.8813E-19	4.0143E-11	4.7639E-16
2.5355E+05	3.2420E-18	1.7413E-10	2.0900E-15
2.5628E+05	9.6312E-18	6.8391E-10	8.3007E-15
2.5900E+05	2.5937E-17	2.4397E-09	2.9940E-14
2.6173E+05	6.3883E-17	7.9286E-09	9.8369E-14
2.6445E+05	1.4397E-16	2.3543E-08	2.9527E-13
2.6717E+05	2.9524E-16	6.4051E-08	8.1195E-13
2.6990E+05	5.5816E-16	1.6709E-07	2.0510E-12
2.7262E+05	9.7188E-16	3.6853E-07	4.7711E-12
2.7534E+05	1.5625E-15	7.8329E-07	1.0246E-11
2.7807E+05	2.3248E-15	1.5948E-06	2.0364E-11
2.8079E+05	3.2085E-15	2.8115E-06	3.7536E-11
2.8351E+05	4.1165E-15	4.7689E-06	6.4314E-11
2.8624E+05	4.9203E-15	7.5358E-06	1.0265E-10
2.8896E+05	5.4895E-15	1.1116E-05	1.5291E-10
2.9169E+05	5.7283E-15	1.5335E-05	2.1302E-10
2.9441E+05	5.6012E-15	1.9829E-05	2.7805E-10
2.9713E+05	5.1414E-15	2.4057E-05	3.4068E-10
2.9986E+05	4.4379E-15	2.7454E-05	3.9248E-10
3.0258E+05	3.6083E-15	2.9511E-05	4.2588E-10
3.0530E+05	2.7680E-15	2.9929E-05	4.3596E-10
3.0803E+05	2.0064E-15	2.8682E-05	4.2167E-10
3.1075E+05	1.3764E-15	2.6014E-05	3.8594E-10
3.1348E+05	8.9489E-16	2.2363E-05	3.3476E-10
3.1620E+05	5.5219E-16	1.8241E-05	2.7555E-10
3.1892E+05	3.2381E-16	1.4142E-05	2.1554E-10
3.2165E+05	1.8269E-16	1.0433E-05	1.6043E-10
3.2437E+05	9.6073E-17	7.3338E-06	1.1376E-10
3.2709E+05	4.8728E-17	4.9178E-06	7.6948E-11
3.2982E+05	2.3606E-17	3.1496E-06	4.9707E-11
3.3254E+05	1.0934E-17	1.9283E-06	3.0702E-11
3.3527E+05	4.8481E-18	1.1306E-06	1.8149E-11
3.3799E+05	2.0598E-18	6.3510E-07	1.0281E-11
3.4071E+05	8.3953E-19	3.4221E-07	5.5858E-12
3.4344E+05	3.2855E-19	1.7706E-07	2.9140E-12
3.4616E+05	1.2358E-19	8.8051E-08	1.4610E-12
3.4888E+05	4.4721E-20	4.2126E-08	7.0469E-13
3.5161E+05	1.5584E-20	1.9407E-08	3.2727E-13
3.5433E+05	5.2336E-21	8.5167E-09	1.4647E-13
3.5706E+05	1.6954E-21	3.[illegible]905E-09	6.3232E-14
3.5978E+05	5.3024E-22	1.5259E-09	2.6351E-14
3.6250E+05	1.6122E-22	6.3959E-10	1.0610E-14
3.6523E+05	4.6814E-23	2.3548E-10	4.1302E-15
3.6795E+05	1.3236E-23	8.8019E-11	1.5557E-15
3.7067E+05	3.6239E-24	3.1861E-11	5.6745E-16
3.7340E+05	9.6163E-25	1.1178E-11	2.0056E-16
	2.4739E-25	3.8316E-12	6.8737E-17

Table 20 (cont'd)

3.78[illegible]E+05	0.	[illegible]	[illegible]
3.8157E+05	0.	4.[illegible]21E-13	7.38[illegible]E-14
3.8429E+05	0.	1.35[illegible]E-13	2.3156E-16
3.87[illegible]2E+05	0.	3.79[illegible]E-14	7.0626E-19
3.8974E+05	0.	1.11[illegible]E-14	2.2951E-19
3.9246E+05	0.	3.19[illegible]E-15	6.042[illegible]E-20
3.9519E+05	0.	8.9366E-16	1.7005E-20
3.9791E+05	0.	2.4519E-16	4.7180E-21
4.0064E+05	0.	6.6862E-17	1.2904E-21
4.0336E+05	0.	1.5195E-17	2.9530E-22
4.06[illegible]8E+05	0.	6.3774E-18	1.1894E-22
4.0881E+05	0.	0.	0.
4.1153E+05	0.	0.	0.
4.1425E+05	0.	0.	0.
4.1698E+05	0.	0.	0.
4.1970E+05	0.	0.	0.
4.2243E+05	0.	0.	0.
4.2515E+05	0.	0.	0.
4.2787E+05	0.	0.	0.
4.3060E+05	0.	0.	0.
4.3332E+05	0.	0.	0.
4.3604E+05	0.	0.	0.
4.3877E+05	0.	0.	0.
4.4149E+05	0.	0.	0.
4.4421E+05	0.	0.	0.
4.4694E+05	0.	0.	0.
4.4966E+05	0.	0.	0.
4.5239E+05	0.	0.	0.
4.5511E+05	0.	0.	0.
4.5783E+05	0.	0.	0.
4.6056E+05	0.	0.	0.
4.6328E+05	0.	6.0673E-18	1.3601E-22
4.6600E+05	0.	0.	0.
4.6873E+05	0.	0.	0.
4.7145E+05	0.	0.	0.
4.7418E+05	0.	0.	0.
4.7690E+05	0.	0.	0.
4.7962E+05	0.	0.	0.
4.8235E+05	0.	0.	0.
4.85[illegible]7E+05	0.	0.	0.
4.8779E+05	0.	0.	0.
4.9052E+05	0.	0.	0.
4.9324E+05	0.	0.	0.
4.9597E+05	0.	0.	0.
4.9869E+05	0.	0.	0.
5.0141E+05	0.	0.	0.
5.0414E+05	0.	0.	0.
5.0686E+05	0.	0.	0.
5.0958E+05	0.	0.	0.
5.1231E+05	0.	0.	0.
5.15[illegible]3E+05	0.	0.	0.
5.1776E+05	0.	0.	0.
5.2048E+05	0.	0.	0.
5.2320E+05	0.	0.	0.
5.2593E+05	0.	0.	0.
5.2865E+05	0.	0.	0.
5.3137E+05	0.	0.	0.
5.3410E+05	0.	0.	0.
5.3682E+05	0.	0.	0.
5.3955E+05	0.	0.	0.
5.4227E+05	0.	0.	0.
5.4499E+05	0.	0.	0.
5.4772E+05	0.	0.	0.
5.5044E+05	0.	0.	0.
5.5316E+05	0.	0.	0.

Table 20 (cont'd)

5.[illegible]E+05	0.	0.	0.
5.58618+05	0.	0.	0.
5.61[illegible]E+05	0.	0.	0.
5.64[illegible]E+05	0.	0.	0.
5.66[illegible]E+05	0.	0.	0.
5.69[illegible]E+05	0.	0.	0.
5.72[illegible]E+05	0.	0.	0.
5.74[illegible]E+05	0.	0.	0.

Table 20 (cont'd)

NWFT

```
**********INPUT FOR PROBLEM 5-8**********
                                   ---
     998.5      2324.1       998.5
50.0        50.0        50.0        40.0        40.0        10.3            1.E-6        50.
   1.0E-6          50.   2.5
     6.0E6       6.0E6       6.0E6      1.8E6       1.8E6       1.8E6          1.0          1.0
       1.0         1.0       1.2E8
   14500.0      8000.0    138000.0    14500.0      8000.0    138000.0        625.0        521.5
     475.0       578.5      1100.0
   3602.41     3414.81     3311.31    2789.81     2789.81     2502.41      2314.81      2211.31
    425.89     1525.89
0.3         0.3         0.3         0.3         0.3         0.3         0.03         .3
.03     .   .3          .3
   3
PU240           6.76E3      8.63E5
 U236           2.39E7      7.17E1
TH232           1.41E10         0.
    1.0E3         100.
       1.6         1.6         1.6        1.6         1.6         1.6           0.           0.
        0.          0.         1.6
                  1.E6
**********             END              **********
```

Table 21:

OPTIONS 1 0 2 1 3 1 4 0 5 0 6 3 7 1 8 1 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

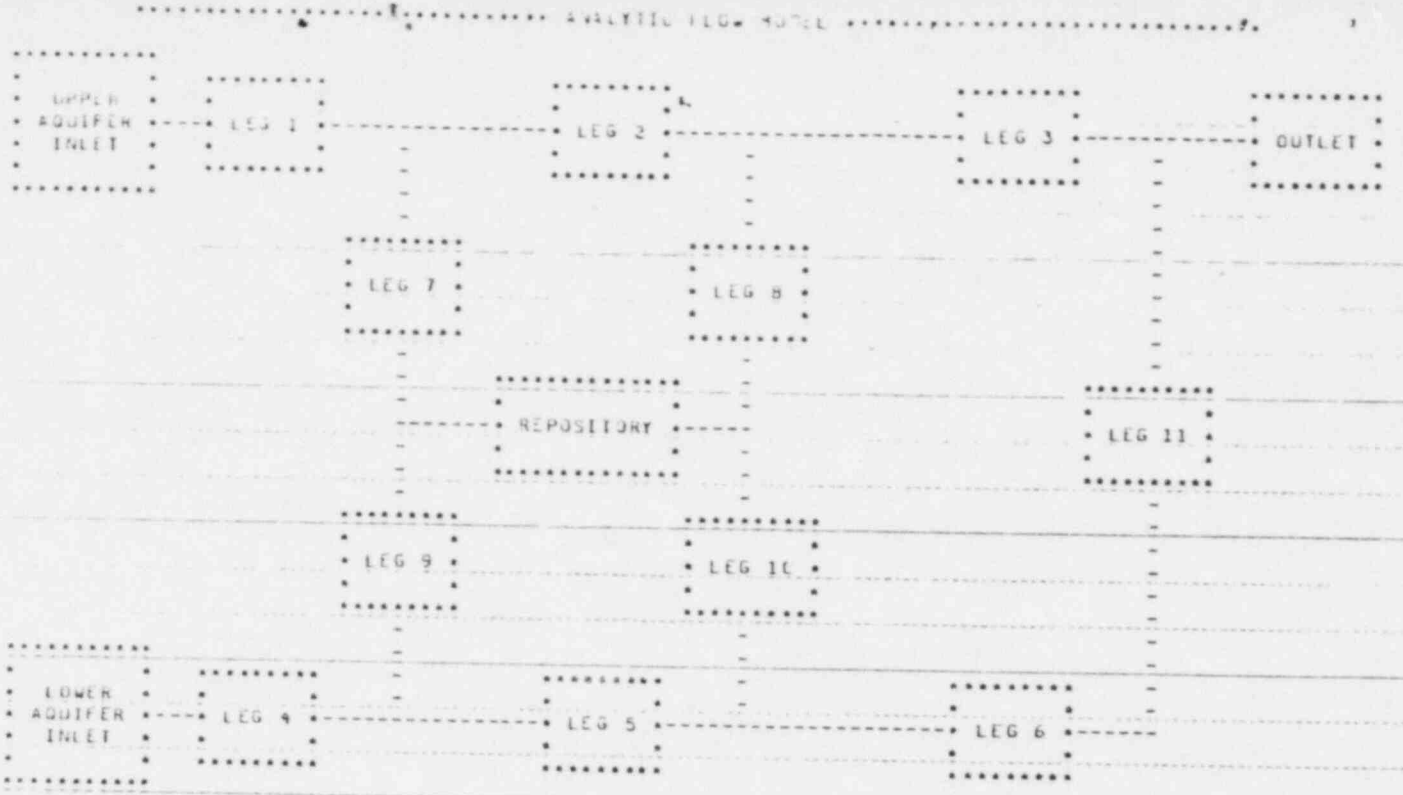
NUMBER OF ISOTOPES 3

ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
Pu239	6.760E+03	8.530E+05
U238	2.390E+07	7.170E+01
Th232	1.410E+10	0.

LEACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 3 TIME UPPER BOUND = 1.00E+36

Table 22: NWFT Output for Problem 5B



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 2324.10 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.81 FT
JUNCTION LEGS 8-10-REPOSITORY = 2789.81 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.0CE+06 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02

Table 22 (cont'd)

LEG PROPERTIES

LEG 2 ********

LENGTH =	8.00E+03 FT
AREA =	6.00E+06 FT**2
CONDUCTIVITY =	1.83E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	6.36E+02
DISTRIBUTION COEFFICIENT =	1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 3 ********

LENGTH =	1.38E+05 FT
AREA =	6.00E+06 FT**2
CONDUCTIVITY =	1.83E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	6.36E+02
DISTRIBUTION COEFFICIENT =	1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 4 ********

LENGTH =	1.45E+04 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	1.46E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	6.36E+02
DISTRIBUTION COEFFICIENT =	1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 5 ********

LENGTH =	8.00E+03 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	1.46E+04 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	6.36E+02
DISTRIBUTION COEFFICIENT =	1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 6 ********

LENGTH =	1.38E+05 FT
AREA =	1.80E+06 FT**2
CONDUCTIVITY =	3.76E+03 FT/YR
POROSITY =	.3000
DENSITY =	1.19E+02 LB/FT**3
RETARDATION FACTOR =	6.36E+02
DISTRIBUTION COEFFICIENT =	1.60E+00 FT**3/LB

LEG PROPERTIES

LEG 7 ********

LENGTH =	6.25E+02 FT
AREA =	1.00E+00 FT**2
CONDUCTIVITY =	3.65E-04 FT/YR
POROSITY =	.0300
DENSITY =	1.65E+02 LB/FT**3
RETARDATION FACTOR =	1.00E+00
DISTRIBUTION COEFFICIENT =	0. FT**3/LB

LEG PROPERTIES

LEG 8 ********

LENGTH =	5.22E+02 FT
AREA =	1.00E+00 FT**2

Table 22 (cont'd)

CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 1.83E+04 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
LENGTH = 1.10E+03 FT
AREA = 1.20E+08 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 6.36E+02
DISTRIBUTION COEFFICIENT = 1.60E+00 FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 2.5241E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 2.4519E+03 FT
JUNCTION LEGS 5-10-6 = 2.5225E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.7210E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.7210E+03 FT
JUNCTION LEGS 6-11 = 2.5396E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	3.88E+06	6.47E-01	2.16E+00
2	3.88E+06	6.47E-01	2.16E+00
3	3.88E+06	6.47E-01	2.16E+00
4	2.97E+05	1.65E-01	5.49E-01
5	2.97E+05	1.65E-01	5.49E-01
6	2.97E+05	1.65E-01	5.49E-01
7	1.56E-07	1.56E-07	5.20E-08
8	1.93E+01	1.93E+01	6.42E+01
9	5.59E-07	5.59E-07	1.86E-07
10	1.93E+01	1.93E+01	6.42E+01
11	3.47E+06	2.47E-03	8.24E-03

Table 22 (cont'd)

RADIONUCLIDE MIGRATION PATH-----LEGS 8 3

PATH LENGTH (FT) = 1.3852E+05
GROUND VEL. (FT/DAY) = 3.4055E-03
MIGRATION TIME (YEARS) = 1.1146E+05

Table 22 (cont'd)

RADIONUCLIDE DISCHARGE RATE (CI/YR)

TIME (YEARS)	PU24[illegible]	U236	TH232
1.1146E+04	0.	0.	0.
1.2154E+04	0.	0.	0.
1.3162E+04	0.	0.	0.
1.4170E+04	0.	0.	0.
1.5178E+04	0.	0.	0.
1.6186E+04	0.	0.	0.
1.7194E+04	0.	0.	0.
1.8202E+04	0.	0.	0.
1.9210E+04	0.	0.	0.
2.0219E+04	0.	0.	0.
2.1227E+04	0.	0.	0.
2.2235E+04	0.	0.	0.
2.3243E+04	0.	0.	0.
2.4251E+04	0.	0.	0.
2.5259E+04	0.	0.	0.
2.6267E+04	0.	0.	0.
2.7275E+04	0.	0.	0.
2.8283E+04	0.	0.	0.
2.9291E+04	0.	0.	0.
3.0300E+04	0.	0.	0.
3.1308E+04	0.	0.	0.
3.2316E+04	0.	0.	0.
3.3324E+04	0.	0.	0.
3.4332E+04	0.	0.	0.
3.5340E+04	0.	0.	0.
3.6348E+04	0.	0.	0.
3.7356E+04	0.	0.	0.
3.8364E+04	0.	0.	0.
3.9373E+04	0.	0.	0.
4.0381E+04	0.	0.	0.
4.1389E+04	0.	0.	0.
4.2397E+04	0.	0.	0.
4.3405E+04	0.	0.	0.
4.4413E+04	0.	0.	0.
4.5421E+04	0.	0.	0.
.6429E+04	0.	0.	0.
7437E+04	0.	0.	0.
4.8445E+04	0.	0.	0.
4.9454E+04	0.	0.	0.
5.0462E+04	0.	0.	0.
5.1470E+04	0.	0.	0.
5.2478E+04	0.	0.	0.
5.3486E+04	0.	0.	0.
5.4494E+04	0.	0.	0.
5.5502E+04	0.	0.	0.
5.6510E+04	0.	0.	0.
5.7518E+04	0.	0.	0.
5.8526E+04	0.	0.	0.
5.9535E+04	0.	0.	0.
6.0543E+04	0.	0.	0.
6.1551E+04	0.	0.	0.
6.2559E+04	0.	0.	0.
6.3567E+04	0.	0.	0.
6.4575E+04	0.	0.	0.
6.5583E+04	0.	0.	0.
6.6591E+04	0.	0.	0.
6.7599E+04	0.	0.	0.
6.8607E+04	0.	0.	0.
6.9616E+04	0.	0.	0.
7.0624E+04	0.	0.	0.
7.1632E+04	0.	0.	0.

Table 22 (cont'd)

[illegible]	.	.	.
7.4[illegible]6E+04	.	.	.
7.5[illegible]E+04	.	5.7371E-28	.
7.6672E+04	.	2.1154E-2[illegible]	.
7.76[illegible]E+04	6.1719E-25	6.4[illegible]E-25	2.2395E-30
7.8692E+04	1.4436E-23	1.6[illegible]E-23	5.8922E-29
7.9697E+04	2.5745E-22	3.7147E-22	1.3194E-27
8.07[illegible]5E+04	4.9216E-21	7.0242E-21	2.5297E-26
8.1713E+04	7.1991E-20	1.1440E-19	4.1767E-25
8.2721E+04	9.1556E-19	1.5135E-18	5.9708E-24
8.3729E+04	1.0133E-17	1.981[illegible]E-17	7.429[illegible]E-23
8.4737E+04	9.8155E-17	2.1276E-16	8.0845E-22
8.5745E+04	8.3581E-16	2.0084E-15	7.7311E-21
8.6753E+04	6.2823E-15	1.5738E-14	6.5260E-20
8.7762E+04	4.1852E-14	1.2367E-13	4.8834E-19
8.8770E+04	2.4833E-13	8.1352E-13	3.2527E-18
8.9778E+04	1.3165E-12	4.7826E-12	1.9360E-17
9.0786E+04	6.2614E-12	2.5222E-11	1.0335E-16
9.1794E+04	2.6818E-11	1.1974E-10	4.9660E-16
9.28[illegible]2E+04	1.0358E-10	5.1352E-10	2.1552E-15
9.3810E+04	3.6338E-10	1.9958E-09	8.4752E-15
9.4818E+04	1.1578E-09	7.0515E-09	3.0295E-14
9.5826E+04	3.3638E-09	2.2716E-08	9.8723E-14
9.6834E+04	8.9361E-09	6.6918E-08	2.9414E-13
9.7843E+04	2.1767E-08	1.8175E-07	8.0348E-13
9.8851E+04	4.8745E-08	4.4384E-07	2.0175E-12
9.9859E+04	1.0051E-07	1.0272E-06	4.6683E-12
1.0087E+05	1.9185E-07	2.1721E-06	9.9789E-12
1.0187E+05	3.3877E-07	4.2531E-06	1.9751E-11
1.0288E+05	5.5522E-07	7.7294E-06	3.6279E-11
1.0389E+05	8.4638E-07	1.3065E-05	6.1973E-11
1.049[illegible]E+05	1.2026E-06	2.0585E-05	9.8662E-11
1.0591E+05	1.5957E-06	3.0298E-05	1.4668E-10
1.0692E+05	1.9813E-06	4.1701E-05	2.0402E-10
1.0792E+05	2.3062E-06	5.3823E-05	2.6600E-10
1.0893E+05	2.5209E-06	6.5241E-05	3.2567E-10
1.0994E+05	2.5924E-06	7.4394E-05	3.7505E-10
1.1095E+05	2.5121E-06	7.9937E-05	4.0697E-10
1.1196E+05	2.2975E-06	8.1067E-05	4.1675E-10
1.1296E+05	1.9862E-06	7.7713E-05	4.0337E-10
1.1397E+05	1.6255E-06	7.0525E-05	3.6957E-10
1.1498E+05	1.2612E-06	6.0677E-05	3.2098E-10
1.1599E+05	9.2838E-07	4.9559E-05	2.6463E-10
1.17[illegible]0E+05	6.5049E-07	3.8430E-05	2.0738E-10
1.18[illegible]0E+05	4.3355E-07	2.8439E-05	1.5468E-10
1.19[illegible]1E+05	2.7539E-07	2.0031E-05	1.0995E-10
1.20[illegible]2E+05	1.6692E-07	1.3463E-05	7.4565E-11
1.21[illegible]3E+05	9.6650E-08	8.6440E-06	4.8305E-11
1.22[illegible]4E+05	5.3522E-08	5.3079E-06	2.9926E-11
1.23[illegible]5E+05	2.8378E-08	3.1206E-06	1.7749E-11
1.24[illegible]5E+05	1.4421E-08	1.7585E-06	1.0089E-11
1.25[illegible]6E+05	7.0311E-09	9.5072E-07	5.5019E-12
1.26[illegible]7E+05	3.2923E-09	4.9364E-07	2.8813E-12
1.27[illegible]8E+05	1.4800E-09	2.4540E-07	1.4505E-12
1.28[illegible]9E+05	6.4194E-10	1.1835E-07	7.0255E-13
1.29[illegible]9E+05	2.6779E-10	5.4744E-08	3.2770E-13
1.3010E+05	1.0768E-10	2.4410E-08	1.4734E-13
1.3111E+05	4.1775E-11	1.0501E-08	6.3903E-14
1.3212E+05	1.5648E-11	4.3617E-09	2.6760E-14
1.3313E+05	5.6643E-12	1.7527E-09	1.0828E-14
1.3413E+05	1.9828E-12	6.7955E-10	4.2368E-15
1.3514E+05	6.7174E-13	2.5529E-10	1.6043E-15
1.3615E+05	2.2041E-13	9.2882E-11	5.8834E-16
1.3716E+05	7.0092E-14	3.2753E-11	2.0959E-16
1.3817E+05	2.1618E-14	1.1231E-11	7.2067E-17

Table 22 (cont'd)

1.3917E+05	5.4734E-15	3.7179E-12	2.4105E-17
1.4218E+05	1.3813E-15	1.1984E-12	7.8294E-18
1.4119E+05	5.3133E-16	3.7537E-13	2.4711E-18
1.4321E+05	1.4593E-16	1.1432E-13	7.5826E-19
1.4321E+05	3.9601E-17	3.3378E-14	2.2639E-19
1.4422E+05	1.0146E-17	8.7727E-15	6.5792E-20
1.4522E+05	2.5711E-18	2.7462E-15	1.8625E-20
1.4623E+05	6.3323E-19	7.5105E-16	5.1242E-21
1.4724E+05	1.5618E-19	2.0511E-15	1.4115E-21
1.4823E+05	3.5735E-20	5.3741E-17	3.6071E-22
1.4926E+05	9.4782E-21	1.5336E-17	1.0685E-22
1.5029E+05	0.	0.	0.
1.5127E+05	0.	0.	0.
1.5228E+05	0.	0.	0.
1.5329E+05	0.	0.	0.
1.5430E+05	0.	0.	0.
1.5531E+05	0.	0.	0.
1.5632E+05	0.	0.	0.
1.5733E+05	0.	0.	0.
1.5834E+05	0.	0.	0.
1.5934E+05	0.	0.	0.
1.6034E+05	0.	0.	0.
1.6135E+05	0.	0.	0.
1.6236E+05	0.	0.	0.
1.6337E+05	0.	0.	0.
1.6438E+05	0.	0.	0.
1.6539E+05	0.	0.	0.
1.6639E+05	0.	0.	0.
1.6741E+05	0.	0.	0.
1.6841E+05	0.	0.	0.
1.6942E+05	0.	0.	0.
1.7043E+05	4.3257E-22	6.1185E-18	4.9110E-23
1.7143E+05	0.	0.	0.
1.7244E+05	0.	0.	0.
1.7345E+05	0.	0.	0.
1.7446E+05	0.	0.	0.
1.7547E+05	0.	0.	0.
1.7647E+05	0.	0.	0.
1.7748E+05	0.	0.	0.
1.7849E+05	0.	0.	0.
1.7950E+05	0.	0.	0.
1.8051E+05	0.	0.	0.
1.8152E+05	0.	0.	0.
1.8252E+05	0.	0.	0.
1.8353E+05	0.	0.	0.
1.8454E+05	0.	0.	0.
1.8555E+05	0.	0.	0.
1.8656E+05	0.	0.	0.
1.8756E+05	0.	0.	0.
1.8857E+05	0.	0.	0.
1.8958E+05	0.	0.	0.
1.9058E+05	0.	0.	0.
1.9159E+05	0.	0.	0.
1.9260E+05	0.	0.	0.
1.9361E+05	0.	0.	0.
1.9462E+05	0.	0.	0.
1.9563E+05	0.	0.	0.
1.9663E+05	0.	0.	0.
1.9764E+05	0.	0.	0.
1.9865E+05	0.	0.	0.
1.9966E+05	0.	0.	0.
2.0067E+05	0.	0.	0.
2.0167E+05	0.	0.	0.
2.0268E+05	0.	0.	0.
2.0369E+05	0.	0.	0.
2.0470E+05	0.	0.	0.
2.0571E+05	0.	0.	0.
2.0671E+05	0.	0.	0.
2.0772E+05	0.	0.	0.
2.0873E+05	0.	0.	0.
2.0974E+05	0.	0.	0.

Table 22 (cont'd)

2.[illegible]	[illegible]	0.	0.
2.[illegible]	0.	0.	0.
2.[illegible]	0.	0.	0.
2.[illegible]	0.	0.	0.
2.[illegible]	0.	0.	0.
2.[illegible]	[illegible]	[illegible]	[illegible]
2.[illegible]	0.	0.	0.
2.[illegible]	[illegible]	[illegible]	[illegible]

Table 22 (cont'd)

NWFT/STC

New Right Hand Page

NOTEBOOK DIVIDER SHOULD READ: Sample Problem 6

Problem 6. Generate a Distribution of NWFT Output

This problem is identical to Problem 5B (see Figure 20) except that, instead of a single transport calculation, we will run a series of 25 calculations. The quantities to be varied in the calculations and their ranges and distributions are listed in Table 23. The data in Table 23 were used as input to the Latin Hypercube sampling program* which was used to form a series of 25 input vectors which are listed in Table 24. The input variables listed in Tables 23 and 24 are assigned to the legs in NWFT as shown in Table 25. Notice that the hydraulic conductivity and porosity of Leg 11 are not varied. The reason is that radionuclide migration is along Legs 8 and 3. Furthermore, while the resistance of the lower aquifer can affect the fluid velocity in the borehole, the resistance of Leg 11, because of its large cross-sectional area, is small compared to the combined resistance of Legs 4, 5 and 6.

The input of problem 5B serves as a basis for the 25 calculations of Problem 6. That is, for each calculation the input is that of 5B except

*The Latin Hypercube sampling program has been documented in Iman, R. L., J. M. Davenport and D. K. Zeigler: Latin Hypercube Sampling (Program User's Guide), SAND79-1473, January 1980.

LEGS

	1	2	3	4	5	6	7	8	9	10	11
CONDUCTIVITY	50	50	50	40	40	10.3	1 E-6	50	1E-6	50	2.5
AREA	6E6	6E6	6E6	1.8E6	1.8E6	1.8E6	1	1	1	1	1.2E8
LENGTH	14500	8000	1.38E5	14500	8000	1.38E5	625	521.5	475	578.5	1100
POROSITY	.3	.3	.3	.3	.3	.3	.03	.3	.03	.3	.3
DISTRIBUTION COEF.	1.6	1.6	1.6	1.6	1.6	1.6	0	0	0	0	1.6

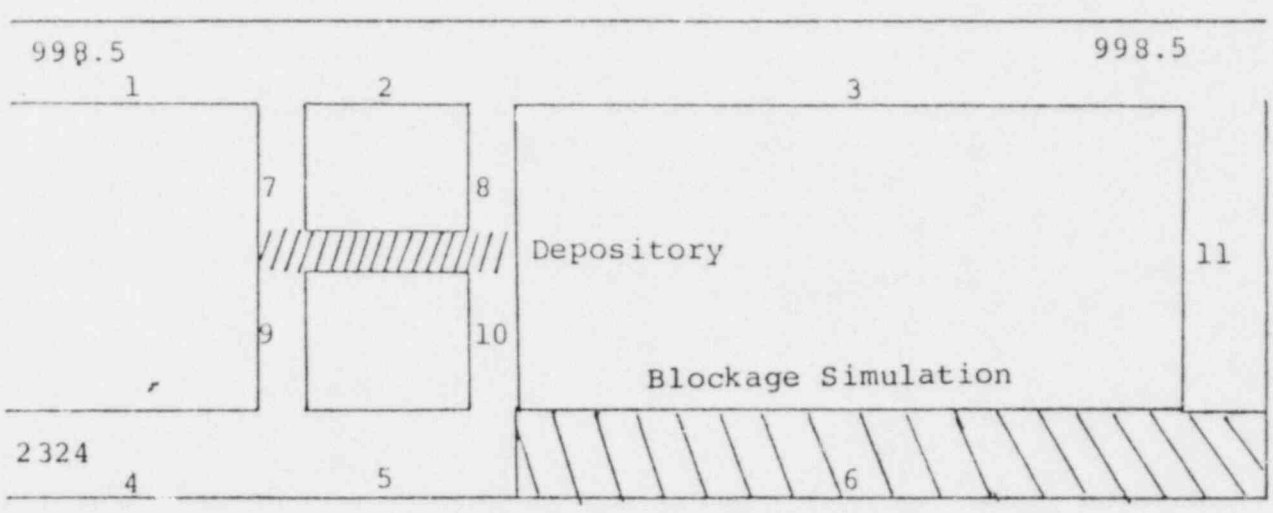


Figure 20

Problem 5B & 6

3 ISOTOPE DECAY CHAIN TRANSPORT

OVER FLOW PATH OF 2A

Pu240 → U236 → Th232

for the variable quantities listed in Table 23. Those quantities are entered from a file (TAPE10) to their appropriate locations by subroutine GETRV, Table 26. Access to this routine is assured by setting option 3 nonzero. The FORTRAN logic in GETRV which assigns values from the input vectors to leg properties must be written by the user. For example, variable 3 from Table 23 is the middle sandstone porosity. Therefore in GETRV, PHI(1), PHI(2) and PHI(3) (the porosities of Legs 1, 2 and 3) are set equal to RV(3). The conductivity of Leg 6 is treated in a manner similar to the way conductivity of Leg 11 was found in problem 1A part (ii). In SWIFT one 4000-ft grid block (53,12) in the lower aquifer is assigned .01 of the conductivity of the remaining down dip lower aquifer blocks. Resistance is then added in series.

$$\frac{138000}{K_6} = \frac{134000}{K_{1s}} + \frac{4000}{.01K_{1s}}$$

Thus, $K_6 = .258\, K_{1s}$.

Now, for any other release scenario subroutine GETRV must be changed. Problem 6 suggests one way the user can verify the accuracy of the FORTRAN changes (see input data in Table 27). By setting NOVEC = 1 and utilizing the default print options, the initial input vector is run through NWFT and the corresponding output is available for user comparison to intended input. Upon returning to FLOWIN a new option card is read. This card is geared to suppress much of the output for the remaining 24 calculations. The second read of the NOVEC, TUB, ... card has NOVEC = 25. The entire output then consists of the network properties for the first vector only and the radionuclide discharge rates for all 25 vectors (Table 28).

Sensitivity analyses can make use of peak or total (integrated) discharge for each calculation and for each isotope. Here we find total discharge by setting options 2 and 5 to zero. At the end of the 25 calculations the integrated discharges are sorted into ascending order. In this manner each vector is assigned a rank for each isotope.

Table 23
Variable Ranges and Distributions

Variable	Range	Distribution
1. ϕ_b	0.003 - 0.20	Log Normal
2. $\phi_{\ell s}$	0.05 - 0.30	Normal
3. ϕ_{ms}	0.05 - 0.30	Normal
4. K_b	0.01 - 50 ft/day	Log Normal
5. $K_{\ell s}$	1.0 - 40 ft/day	Log Normal
6. K_{ms}	1.0 - 50 ft/day	Log Normal
7. α	50 - 500 ft	Uniform
8. Kd	10^{-2} - 10^{5} cm ^{3}/gm	Log Uniform
9. τ	10^3 - 10^7 y	Log Uniform

Definitions		Subscripts	
ϕ = Porosity		b = Borehole	
K = Hydraulic Conductivity		ms = Middle Sandstone Aquifer	
α = Dispersivity		ℓs = Lower Sandstone Aquifer	
KD = Distribution coefficient			
τ = Leach Time			

Conversion factor for KD

$$1 \text{ cm}^3/\text{gm} = 0.016 \text{ ft}^3/\text{lb}$$

TITLE-CAMPBELL RUN

LATIN HYPERCUBE SAMPLE INPUT VECTORS

RUN NO.	X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	X(9)
1	1.3[illegible]E-02	.162	.[illegible]	.39	[illegible]	8.54	411.	521.	1.126E+03
2	2.667E-02	.154	.127	8.843E-02	[illegible]	8.10	265.	7.17	1.997E+03
3	1.879E-02	.133	.193	5.28	2.91	11.9	89.7	.810	6.315E+04
4	1.672E-02	.226	.162	1.74	7.84	12.9	196.	1.24[illegible]E-02	1.279E+05
5	2.412E-02	.238	.246	.278	2.17	2.75	248.	21.4	5.823E+06
6	1.1[illegible]E-02	.139	.2[illegible]	1.[illegible]	5.26	7.41	371.	42.8	3.480E+03
7	3.162E-02	.174	.213	.454	16.2	37.2	288.	1.27	3.667E+04
8	1.[illegible]0E-02	.113	.144	.792	11.1	1.73	453.	1.243E+03	1.559E+06
9	4.8[illegible]5E-03	.183	.195	.336	2.[illegible]8	7.0[illegible]	110.	3.167E+04	2.[illegible]21E+04
10	1.390E-02	.159	.187	2.15	2.70	2[illegible].3	231.	2.78	2.364E+05
11	2.854[illegible]E-02	.215	7.563E-[illegible]2	1.[illegible]	[illegible].42	9.2	327.	1.656E+04	8.[illegible]43E+03
12	[illegible].485E-02	.134	.173	.15[illegible]	12.7	9.97	473.	2.238E-02	6.[illegible]25E+06
13	3.683E-02	.22	.13[illegible]	8.87	13.6	5.66	381.	217.	7.174E+05
14	3.37[illegible]E-02	.2[illegible]	.26[illegible]	2.73	9.[illegible]	3.3[illegible]	495.	.132	1.[illegible]56E+04
15	8.849E-03	.2[illegible]9	.140	3.21	6.21	3.4[illegible]	213.	[illegible].41	9.877E+05
16	2.017E-02	8.831E-[illegible]2	.187	.187	3.53	[illegible].01	164.	.474	3.727E+05
17	2.[illegible]9E-02	.193	.153	.119	5.85	16.1	152.	713.	2.766E+06
18	8.[illegible]2E-02	.146	.157	.529	8.64	[illegible].83	64.9	147.	5.282E+04
19	3.[illegible]8E-[illegible]2	.178	.114	1.[illegible]5	3.47	5.37	402.	3.119E+03	9.401E+[illegible]4
20	6.346E-02	.168	.148	.767	7.26	6.35	319.	[illegible].006E-02	3.623E+05
21	5.124[illegible]E-02	.191	.179	3.64	7.77	6.8[illegible]	139.	57.	5.3[illegible]2E+03
22	1.292E-02	.157	.193	.629	5.47	13.9	344.	5.003E+03	3.477E+06
23	7.157[illegible]E-02	.199	.217	.666	[illegible].5	1[illegible].5	434.	9.831E+04	1.592E+04
24	2.1[illegible]3E-02	.286	.169	1.211E-02	6.85	[illegible].39	185.	8.294E-02	2.737E+03
25	[illegible].3368E-02	.169	.227	.921	5.89	5.01	85.8	7.637E+03	2.[illegible]06E+06

Table 24

Table 25

Assignment of Input Vectors

Variable Number	Variable Name	Assigned
1	ϕ_b	Legs 8, 10
2	ϕ_{ℓ_s}	Legs 4, 5, 6
3	ϕ_{ms}	Legs 1, 2, 3
4	K_b	Legs 8, 10
5	K_{ℓ_s}	Legs 4, 5, 6
6	K_{ms}	Legs 1, 2, 3
7	α	ALPHA
8	K_d	Leg 3
9	τ	LEACH

```
      SUBROUTINE GETRV(NOFILE)
C
C  THIS SUBROUTINE IS INTENDED FOR USER INTERACTION WHEN PERFORMING
C  SENSITIVITY ANALYSIS. GETRV ALLOWS THE USER TO ASSIGN VALUES FROM
C  INPUT VECTORS TO APPROPRIATE LEG PROPERTIES.
C
C
      READ(NOFILE)NOTV,NRV,(RV(I),I=1,NRV)
      IF(EOF(NOFILE) .NE. 0)STOP25
      IF(IOPT(12) .NE. 0)WRITE(6,9000)NOTV,NRV,(RV(I),I=1,NRV)
C POROSITIES
      PHI(8)=RV(1)
      PHI(10)=RV(1)
      PHI(4)=RV(2)
      PHI(5)=RV(2)
      PHI(6)=RV(2)
      PHI(1)=RV(3)
      PHI(2)=RV(3)
      PHI(3)=RV(3)
C CONDUCTIVITIES
C  CONVERT CONDUCTIVITIES TO FT/Y
      COND(8)=RV(4)*365.
      COND(10)=RV(4)*365.
      COND(4)=RV(5)*365.
      COND(5)=RV(5)*365.
      COND(6)=RV(5)*365.*.258
      COND(1)=RV(6)*365.
      COND(2)=RV(6)*365.
      COND(3)=RV(6)*365.
C DISPERSIVITY, LEACH TIME
C KD VALUES
      ALPHA=RV(7)
      LEACH=RV(9)
      KD(3)=RV(8)*0.016
      KD(8)=0.
      RETURN
 9000 FORMAT(...)
      END
```

Table 26

Subroutine GETRV

NWFT

```
***********INPUT FOR PROBLEM  6 **********
1 1        1
      998.5     2324.1     998.5
50.0        50.0       50.0       40.0       40.0       10.3            1.E-6      50.
    1.0E-6         50.  2..
     6.0E6      6.0E5      6.0E6     1.8E6      1.8E6      1.8E6        1.0        1.0
       1.0        1.0      1.2E8
   14500.0     8000.0   138000.0   14500.0     8000.0   138000.0      625.0      521.5
     475.0      578.5     1100.0
   3602.41    3414.81    3311.31   2789.81    2789.81    2502.41    2314.81    2211.31
    425.89    1525.89
0.3        0.3        0.3        0.3        0.3        0.3        0.03       .3
.03        .3         .3
   3
 PU240          6.76E3     8.63E5
  U236          2.39E7     7.17E1
 TH232         1.41E10         0.
    1.0E3        100.


         1        1.E6
1
 11  111    1
        25        1.E6
**********              END              **********
```

Table 27:

OPTIONS 1 1 2 1 3 1 4 1 5 0 6 0 7 1 8 0 9 0 10 0 11 0 12 0 13 0 14 0 15 0 16 0 17 0 18 0 19 0 20 0

NUMBER OF ISOTOPES 5

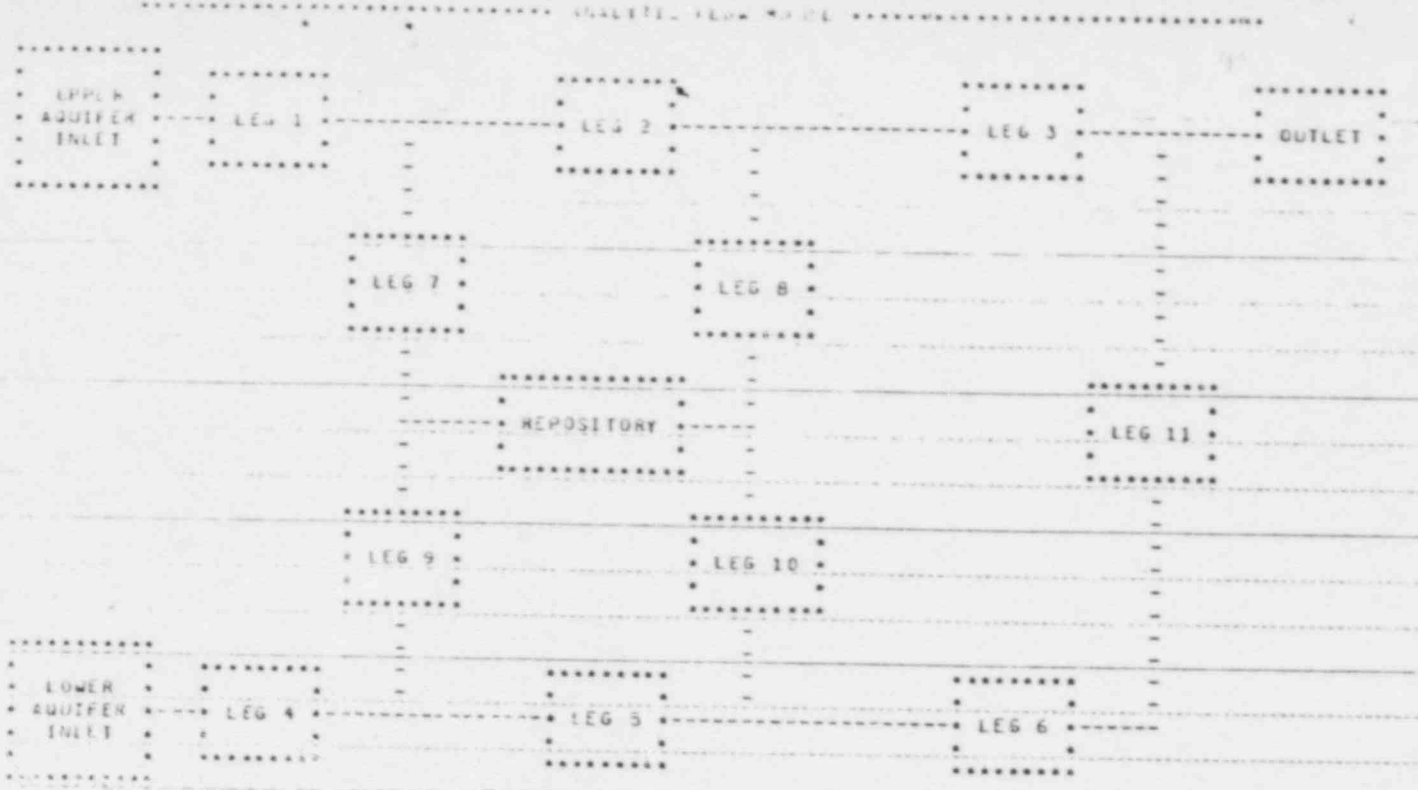
ISOTOPE NAME	HALF LIFE (YEARS)	INITIAL AMOUNT (CI)
PU242	6.761E+05	8.930E+05
U235	2.391E+07	7.170E+01
TH232	1.410E+10	0.

REACH TIME = 1.000E+03 YEARS DISPERSIVITY = 1.000E+02 FEET

NO OF VECTORS = 1 TIME UPPER BOUND = 1.01E+05

Table 28: NWFT Output for Problem 6

(Pages 126 through 192 Inclusive)



UPPER AQUIFER INLET
INLET HEAD = 998.50 FT
ELEVATION = 3602.41 FT

LOWER AQUIFER INLET
INLET HEAD = 2324.10 FT
ELEVATION = 2502.41 FT

OUTLET
OUTLET HEAD = 998.50 FT
ELEVATION = 1525.89 FT

ELEVATIONS OF OTHER POINTS
JUNCTION LEGS 1-7-2 = 3414.81 FT
JUNCTION LEGS 2-8-3 = 3311.31 FT
JUNCTION LEGS 4-9-5 = 2314.81 FT
JUNCTION LEGS 5-10-6 = 2211.31 FT
JUNCTION LEGS 7-9-REPOSITORY = 2789.21 FT
JUNCTION LEGS 8-10-REPOSITORY = 2739.91 FT
JUNCTION LEGS 6-11 = 425.89 FT

LEG PROPERTIES

LEG 1
LENGTH = 1.45E+04 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 3.12E+03 FT/YR
POROSITY = .2043
DENSITY = 1.35E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00

LEG PROPERTIES

LEG 2
****
LENGTH = 8.00E+03 FT
AREA = 6.60E+06 FT**2
CONDUCTIVITY = 3.12E+03 FT/YR
POROSITY = .2043
DENSITY = 1.35E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 3
****
LENGTH = 1.38E+05 FT
AREA = 6.00E+06 FT**2
CONDUCTIVITY = 3.12E+03 FT/YR
POROSITY = .2043
DENSITY = 1.35E+02 LB/FT**3
RETARDATION FACTOR = 5.52E+03
DISTRIBUTION COEFFICIENT = 8.33E+00 FT**3/LB

LEG PROPERTIES

LEG 4
****
LENGTH = 1.45E+04 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.47E+03 FT/YR
POROSITY = .1622
DENSITY = 1.42E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 5
****
LENGTH = 8.00E+03 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 1.47E+03 FT/YR
POROSITY = .1622
DENSITY = 1.42E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 6
****
LENGTH = 1.38E+05 FT
AREA = 1.80E+06 FT**2
CONDUCTIVITY = 3.79E+02 FT/YR
POROSITY = .1622
DENSITY = 1.42E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 7
****
LENGTH = 6.25E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .0300
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 8
****
LENGTH = 5.22E+02 FT
AREA = 1.00E+00 FT**2

CONDUCTIVITY = 1.42E+02 FT/YR
POROSITY = .015
DENSITY = 1.67E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 9
****
LENGTH = 4.75E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 3.65E-04 FT/YR
POROSITY = .030
DENSITY = 1.65E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 10
****
LENGTH = 5.79E+02 FT
AREA = 1.00E+00 FT**2
CONDUCTIVITY = 1.42E+02 FT/YR
POROSITY = .0156
DENSITY = 1.67E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

LEG PROPERTIES

LEG 11
****
LENGTH = 1.[illegible]E+03 FT
AREA = 1.[illegible]E+00 FT**2
CONDUCTIVITY = 9.13E+02 FT/YR
POROSITY = .3000
DENSITY = 1.19E+02 LB/FT**3
RETARDATION FACTOR = 1.00E+00
DISTRIBUTION COEFFICIENT = 0. FT**3/LB

PRESSURE HEADS AT LEG JUNCTIONS

UPPER AQUIFER INLET = 9.9850E+02 FT
LOWER AQUIFER INLET = 2.3241E+03 FT
AQUIFER OUTLET = 9.9850E+02 FT
JUNCTION LEGS 1-7-2 = 9.9850E+02 FT
JUNCTION LEGS 2-8-3 = 9.9850E+02 FT
JUNCTION LEGS 4-9-5 = 2.4518E+03 FT
JUNCTION LEGS 5-10-6 = 2.5223E+03 FT
JUNCTION LEGS 7-9-DEPOSITORY = 1.7219E+03 FT
JUNCTION LEGS 8-10-DEPOSITORY = 1.7219E+03 FT
JUNCTION LEGS 6-11 = 2.3986E+03 FT

LEG NO.	FLOW VOL. (CU FT)/DAY	DARCY VEL. FT/DAY	PORE VEL. FT/DAY
1	6.63E+03	1.13E-01	5.41E-01
2	6.63E+03	1.13E-01	5.41E-01
3	6.63E+03	1.10E-01	5.41E-01
4	2.99E+04	1.66E-02	1.03E-01
5	2.99E+04	1.66E-02	1.03E-01
6	2.99E+04	1.66E-02	1.03E-01
7	1.55E-07	1.55E-07	5.19E-06
8	1.51E-[illegible]	1.51E-03	9.61E-03
9	5.39E-07	5.39E-07	1.80E-05
10	1.[illegible]E-[illegible]	1.61E-01	9.60E-03
11	2.99E+04	2.91E-04	4.3[illegible]E-[illegible]

RADIONUCLIDE MIGRATION PATH-----LEGS 8 3

PATH LENGTH (FT) = 1.5852E+15
ISOTOPE VEL. (FT/DAY) = 9.8338E-05
MIGRATION TIME (YEARS) = 3.8592E+06

OPTIONS: 1 C 2 1 3 1 4 0 5 0 6 1 7 1 8 1 9 0 10.0 11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0 20.0

90 DE VECTORS = 25 TIME UPPER BOUND = 1.22E+06

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
3.4[illegible]E+05	0.	1.	1.
4.2[illegible]E+05	0.	1.	1.
4.3[illegible]E+05	0.	1.	0.
4.8[illegible]E+05	0.	1.	0.
5.2[illegible]E+05	0.	1.	0.
5.5[illegible]E+05	1.	1.	0.
5.9[illegible]E+05	0.	1.	0.
6.2[illegible]E+05	1.	0.	0.
6.6[illegible]E+05	1.	1.	0.
6.9[illegible]E+05	0.	0.	0.
7.3[illegible]E+05	1.	1.	0.
7.6[illegible]E+05	0.	0.	0.
8.0[illegible]E+05	1.	0.	0.
8.3[illegible]E+05	0.	0.	0.
8.7[illegible]E+05	1.	0.	0.
9.0[illegible]E+05	0.	1.	0.
9.4[illegible]E+05	0.	1.	0.
9.7[illegible]E+05	0.	0.	0.
1.0[illegible]E+06	0.	0.	0.

TIME (YEARS)	PU239	U236	TH232
6.1862E+03	0.	0.	0.
6.7529E+03	0.	0.	0.
7.3197E+03	0.	0.	0.
7.8864E+03	0.	0.	0.
8.4532E+03	0.	0.	0.
9.0199E+03	0.	0.	0.
9.5867E+03	0.	0.	0.
1.0153E+04	0.	0.	0.
1.0720E+04	0.	0.	0.
1.1287E+04	0.	0.	0.
1.1854E+04	0.	0.	0.
1.2420E+04	0.	0.	0.
1.2987E+04	0.	0.	0.
1.3554E+04	0.	0.	0.
1.4121E+04	0.	0.	0.
1.4687E+04	0.	0.	0.
1.5254E+04	0.	0.	0.
1.5821E+04	0.	0.	0.
1.6388E+04	0.	0.	0.
1.6954E+04	0.	0.	0.
1.7521E+04	0.	0.	0.
1.8088E+04	0.	0.	0.
1.8655E+04	0.	0.	0.
1.9221E+04	0.	0.	0.
1.9788E+04	0.	0.	0.
2.0355E+04	0.	0.	0.
2.0922E+04	0.	0.	0.
2.1488E+04	0.	0.	0.
2.2055E+04	0.	0.	0.
2.2622E+04	0.	0.	0.
2.3189E+04	0.	0.	0.
2.3755E+04	0.	0.	0.
2.4322E+04	0.	0.	0.
2.4889E+04	0.	0.	0.
2.5456E+04	0.	0.	0.
2.6022E+04	0.	0.	0.
2.6589E+04	0.	0.	0.
2.7156E+04	0.	0.	0.
2.7722E+04	0.	0.	0.
2.8289E+04	0.	0.	0.
2.8856E+04	0.	0.	0.
2.9423E+04	0.	0.	0.
2.9989E+04	0.	0.	0.
3.0556E+04	0.	0.	0.
3.1123E+04	0.	0.	0.
3.1690E+04	0.	0.	0.
3.2256E+04	0.	0.	0.
3.2823E+04	0.	0.	0.
3.3390E+04	2.4577E-25	1.3952E-28	0.
3.3957E+04	3.8832E-24	2.6878E-27	0.
3.4523E+04	5.4926E-23	4.5143E-26	0.
3.5090E+04	6.6301E-22	6.6952E-25	9.1078E-31
3.5657E+04	7.2317E-21	8.6673E-24	1.2087E-29
3.6224E+04	7.0471E-20	1.0033E-22	1.4250E-28
3.6790E+04	6.1739E-19	1.0372E-21	1.5008E-27
3.7357E+04	4.8767E-18	9.6395E-21	1.4195E-26
3.7924E+04	3.4958E-17	8.3788E-20	1.2116E-25
3.8491E+04	2.2826E-16	6.1435E-19	9.3756E-25
3.9057E+04	1.3632E-15	4.2552E-18	6.6066E-24
3.9624E+04	7.4745E-15	2.6955E-17	4.2566E-23
4.0191E+04	3.7766E-14	1.5677E-16	2.5173E-22
		8.4711E-16	1.3714E-21

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	3.2254E-15
[illegible]	[illegible]	[illegible]	1.4014E-19
[illegible]	[illegible]	[illegible]	5.8[illegible]E-19
[illegible]	[illegible]	[illegible]	2.1542E-18
[illegible]	[illegible]	[illegible]	7.6619E-18
4.4158E+04	4.1957E-10	1.4277E-11	2.5624E-17
4.4725E+04	1.2293E-09	4.3719E-11	8.0764E-17
4.5292E+04	3.4010E-09	1.2428E-10	2.4045E-16
4.5858E+04	8.9173E-09	3.5634E-10	6.7757E-16
4.6425E+04	2.2145E-08	9.3896E-10	1.8109E-15
4.6992E+04	5.2334E-08	2.3515E-09	4.5989E-15
4.7559E+04	1.1784E-07	5.6068E-09	1.1118E-14
4.8125E+04	2.5234E-07	1.2752E-08	2.5630E-14
4.8692E+04	5.1737E-07	2.7698E-08	5.6433E-14
4.9259E+04	1.0137E-06	5.7568E-08	1.1886E-13
4.9826E+04	1.9344E-06	1.1963E-07	2.3985E-13
5.0392E+04	3.6328E-06	2.4193E-07	4.6431E-13
5.0959E+04	5.9455E-06	4.3224E-07	8.6350E-13
5.1526E+04	9.9368E-06	7.1052E-07	1.5447E-12
5.2092E+04	1.5991E-05	1.2089E-06	2.6613E-12
5.2659E+04	2.4612E-05	1.9835E-06	4.4211E-12
5.3226E+04	3.6782E-05	3.1423E-06	7.0897E-12
5.3793E+04	5.3123E-05	4.8105E-06	1.0987E-11
5.4359E+04	7.4233E-05	7.1254E-06	1.6470E-11
5.4926E+04	1.0046E-04	1.0221E-05	2.3907E-11
5.5493E+04	1.3179E-04	1.4213E-05	3.3635E-11
5.6060E+04	1.6775E-04	1.9176E-05	4.5907E-11
5.6626E+04	2.0735E-04	2.5124E-05	6.0840E-11
5.7193E+04	2.4910E-04	3.1993E-05	7.8355E-11
5.7760E+04	2.9109E-04	3.9628E-05	9.8148E-11
5.8327E+04	3.3115E-04	4.7783E-05	1.1966E-10
5.8893E+04	3.6599E-04	5.5129E-05	1.4212E-10
5.9460E+04	3.9652E-04	6.4279E-05	1.6453E-10
6.0027E+04	4.1796E-04	7.1816E-05	1.8580E-10
6.0594E+04	4.3010E-04	7.8329E-05	2.0482E-10
6.1160E+04	4.3236E-04	8.3458E-05	2.2054E-10
6.1727E+04	4.2485E-04	8.6921E-05	2.3210E-10
6.2294E+04	4.0832E-04	8.8543E-05	2.3888E-10
6.2861E+04	3.8405E-04	8.8269E-05	2.4059E-10
6.3427E+04	3.5372E-04	8.6166E-05	2.3725E-10
6.3994E+04	3.1918E-04	8.2438E-05	2.2918E-10
6.4561E+04	2.8232E-04	7.7257E-05	2.1700E-10
6.5128E+04	2.4491E-04	7.1033E-05	2.0149E-10
6.5694E+04	2.0847E-04	6.4085E-05	1.8356E-10
6.6261E+04	1.7421E-04	5.6758E-05	1.6415E-10
6.6828E+04	1.4293E-04	4.9371E-05	1.4416E-10
6.7395E+04	1.1530E-04	4.2198E-05	1.2438E-10
6.7961E+04	9.1402E-05	3.5454E-05	1.0549E-10
6.8528E+04	7.1255E-05	2.9294E-05	8.7975E-11
6.9095E+04	5.4651E-05	2.3812E-05	7.2174E-11
6.9662E+04	4.1253E-05	1.9050E-05	5.8271E-11
7.0228E+04	3.0659E-05	1.5006E-05	4.6317E-11
7.0795E+04	2.2443E-05	1.1642E-05	3.6257E-11
7.1362E+04	1.6187E-05	8.8991E-06	2.7963E-11
7.1929E+04	1.1507E-05	6.7648E-06	2.1254E-11
7.2495E+04	8.0631E-06	4.9806E-06	1.5927E-11
7.3062E+04	5.5752E-06	3.6493E-06	1.1771E-11
7.3629E+04	3.8023E-06	2.6376E-06	8.5814E-12
7.4196E+04	2.5593E-06	1.8815E-06	6.1739E-12
7.4762E+04	1.7035E-06	1.3250E-06	4.3846E-12
7.5329E+04	1.1157E-06	9.2137E-07	3.0747E-12
7.5896E+04	7.2310E-07	6.3286E-07	2.1295E-12
7.6462E+04	4.6302E-07	4.2949E-07	1.4572E-12
7.7029E+04	2.9311E-07	2.8815E-07	9.8533E-13
7.7596E+04	1.8330E-07	1.9093E-07	6.5859E-13

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
8.2135E+04	2.9213E-09	4.8453E-09	2.8953E-14
8.2697E+04	1.6647E-09	2.9261E-09	1.7788E-14
8.3263E+04	9.3986E-10	1.7538E-09	1.0825E-14
8.3837E+04	5.2552E-10	1.0381E-09	6.5259E-15
8.4397E+04	2.9134E-10	6.1022E-10	3.8982E-15
[illegible]	1.6024E-10	3.5534E-10	2.3077E-15
[illegible]	8.7317E-11	2.0522E-10	1.3542E-15
[illegible]	4.7182E-11	1.1753E-10	7.8780E-16
[illegible]	2.5296E-11	6.6752E-11	4.5444E-16
8.7231E+04	1.3442E-11	3.7608E-11	2.5998E-16
[illegible]	7.0853E-12	2.1021E-11	1.4752E-16
8.8369E+04	3.7130E-12	1.1659E-11	8.3043E-17
8.8931E+04	1.9267E-12	6.4171E-12	4.6383E-17
8.9498E+04	9.9316E-13	3.5357E-12	2.5708E-17
9.0064E+04	5.0819E-13	1.9311E-12	1.4142E-17
9.0631E+04	2.5817E-13	1.0636E-12	7.7225E-18
9.1198E+04	1.3023E-13	5.8723E-13	4.1864E-18
9.1765E+04	6.5241E-14	2.9054E-13	2.2534E-18
9.2331E+04	3.2461E-14	1.5321E-13	1.2045E-18
9.2898E+04	1.6043E-14	8.0249E-14	6.3944E-19
9.3465E+04	7.8781E-15	4.1764E-14	3.3718E-19
9.4032E+04	3.8432E-15	2.1592E-14	1.7664E-19
9.4598E+04	1.8631E-15	1.1099E-14	9.1928E-20
9.5165E+04	8.9781E-16	5.6658E-15	4.7541E-20
9.5732E+04	4.2987E-16	2.8751E-15	2.4438E-20
9.6299E+04	2.0486E-16	1.4521E-15	1.2481E-20
9.6865E+04	9.6852E-17	7.2757E-16	6.3444E-21
9.7432E+04	4.5396E-17	3.6871E-16	3.1932E-21
9.7999E+04	2.1283E-17	1.7958E-16	1.5961E-21
9.8566E+04	9.6118E-18	8.5954E-17	7.9967E-22
9.9132E+04	4.5346E-18	4.2976E-17	3.8515E-22
9.9699E+04	2.2921E-18	2.3023E-17	1.9377E-22
1.0027E+05	8.6537E-19	9.2089E-18	1.0445E-22
1.0083E+05	4.0812E-19	4.6044E-18	4.2035E-23
1.0140E+05	2.9972E-19	3.0696E-18	2.1146E-23
1.0197E+05	0.	0.	1.4183E-23
1.0253E+05	0.	0.	0.
1.0310E+05	0.	0.	0.
1.0367E+05	0.	0.	0.
1.0423E+05	0.	0.	0.
1.0480E+05	0.	0.	0.
1.0537E+05	0.	0.	0.
1.0593E+05	0.	0.	0.
1.0650E+05	0.	0.	0.
1.0707E+05	0.	0.	0.
1.0763E+05	0.	0.	0.
1.0820E+05	0.	0.	0.
1.0877E+05	0.	0.	0.
1.0933E+05	0.	0.	0.
1.0990E+05	0.	0.	0.
1.1047E+05	0.	0.	0.
1.1103E+05	0.	0.	0.
1.1160E+05	0.	0.	0.
1.1217E+05	0.	0.	0.
1.1273E+05	0.	0.	0.
1.1330E+05	0.	0.	0.
1.1387E+05	0.	0.	0.
1.1443E+05	0.	0.	0.
1.1500E+05	0.	0.	0.

1.1558E+05	0.	0.	0.
1.1613E+05	0.	0.	0.
1.1673E+05	0.	0.	1.
1.1737E+05	0.	0.	0.
1.1793E+05	0.	0.	0.
1.1849E+05	0.	0.	0.
1.1897E+05	0.	0.	0.
1.1954E+05	0.	0.	0.

TIME (YEARS)	U234	U236	TH232
4.8225E+02	[illegible]	0.	0.
6.3490E+02	[illegible]	0.	0.
7.8759E+02	0.	0.	0.
9.4029E+02	0.	0.	0.
1.0933E+03	0.	0.	0.
1.2457E+03	0.	0.	0.
1.3984E+03	0.	0.	0.
1.5511E+03	0.	0.	0.
1.7038E+03	0.	0.	0.
1.8565E+03	0.	0.	0.
2.0092E+03	0.	0.	0.
2.1619E+03	0.	0.	0.
2.3146E+03	0.	0.	0.
2.4673E+03	0.	0.	0.
2.6200E+03	0.	0.	0.
2.7727E+03	0.	0.	0.
2.9253E+03	0.	0.	0.
3.0780E+03	0.	0.	0.
3.2307E+03	0.	0.	0.
3.3834E+03	6.9139E-25	1.6235E-28	0.
3.5361E+03	7.7367E-20	1.8799E-23	2.4869E-30
3.6888E+03	1.2269E-15	3.0829E-19	4.2354E-26
3.8415E+03	3.4984E-12	9.0858E-16	1.2944E-22
3.9942E+03	2.1987E-09	5.8785E-13	8.7025E-20
4.1469E+03	3.6331E-07	1.0063E-10	1.5356E-17
4.2996E+03	1.8447E-05	5.2723E-09	8.3125E-16
4.4523E+03	3.3178E-04	9.7799E-08	1.5915E-14
4.6050E+03	2.4249E-03	7.3689E-07	1.2365E-13
4.7577E+03	8.3213E-03	2.6057E-06	4.5041E-13
4.9104E+03	1.5849E-02	5.1106E-06	9.0929E-13
5.0631E+03	2.0398E-02	6.7741E-06	1.2396E-12
5.2158E+03	2.1629E-02	7.3928E-06	1.3903E-12
5.3685E+03	2.1563E-02	7.5826E-06	1.4644E-12
5.5212E+03	2.1254E-02	7.6869E-06	1.5236E-12
5.6739E+03	2.0926E-02	7.7809E-06	1.5818E-12
5.8266E+03	2.0601E-02	7.8728E-06	1.6405E-12
5.9793E+03	2.0281E-02	7.9633E-06	1.7000E-12
6.1320E+03	1.9965E-02	8.0524E-06	1.7601E-12
6.2847E+03	1.9655E-02	8.1401E-06	1.8209E-12
6.4374E+03	1.9350E-02	8.2264E-06	1.8823E-12
6.5901E+03	1.9049E-02	8.3114E-06	1.9444E-12
6.7428E+03	1.8753E-02	8.3953E-06	2.0071E-12
6.8955E+03	1.8462E-02	8.4774E-06	2.0704E-12
7.0482E+03	1.8175E-02	8.5585E-06	2.1343E-12
7.2009E+03	1.7893E-02	8.6383E-06	2.1989E-12
7.3535E+03	1.7615E-02	8.7169E-06	2.2640E-12
7.5062E+03	1.7341E-02	8.7943E-06	2.3297E-12
7.6589E+03	1.7072E-02	8.8704E-06	2.3960E-12
7.8116E+03	1.6807E-02	8.9454E-06	2.4629E-12
7.9643E+03	1.6546E-02	9.0192E-06	2.5303E-12
8.1170E+03	1.6289E-02	9.0919E-06	2.5983E-12
8.2697E+03	1.6036E-02	9.1634E-06	2.6668E-12
8.4224E+03	1.5786E-02	9.2338E-06	2.7359E-12
8.5751E+03	1.5541E-02	9.3031E-06	2.8055E-12
8.7278E+03	1.5300E-02	9.3714E-06	2.8755E-12
8.8805E+03	1.5062E-02	9.4386E-06	2.9461E-12
9.0332E+03	1.4828E-02	9.5047E-06	3.0172E-12
9.1859E+03	1.4598E-02	9.5698E-06	3.0888E-12
9.3386E+03	1.4371E-02	9.6339E-06	3.1609E-12
9.4913E+03	1.4148E-02	9.6970E-06	3.2335E-12
9.6440E+03	1.3928E-02	9.7592E-06	3.3065E-12

1.3313E+04	1.3119E-02	1.3121E-05	3.6317E-12
1.3442E+04	1.2143E-02	1.3254E-05	3.9652E-12
1.3550E+04	1.1338E-02	1.3491E-05	4.3065E-12
1.3719E+04	1.0586E-02	1.3733E-05	4.6549E-12
1.3988E+04	9.8838E-03	1.3902E-05	5.0101E-12
1.4057E+04	9.2296E-03	1.4187E-05	5.3717E-12
1.4326E+04	8.6179E-03	1.4263E-05	5.7391E-12
1.4495E+04	8.0457E-03	1.4421E-05	6.1119E-12
1.4563E+04	7.5153E-03	1.4572E-05	6.4900E-12
1.4832E+04	7.0153E-03	1.4712E-05	6.8728E-12
1.4901E+04	6.5504E-03	1.4844E-05	7.2600E-12
1.5070E+04	6.1162E-03	1.4965E-05	7.6515E-12
1.5339E+04	5.7108E-03	1.5081E-05	8.0468E-12
1.5508E+04	5.3323E-03	1.5187E-05	8.4458E-12
1.5675E+04	4.9789E-03	1.5287E-05	8.8482E-12
2.0345E+04	4.6488E-03	1.5381E-05	9.2537E-12
2.1014E+04	4.3417E-03	1.5467E-05	9.6622E-12
2.1643E+04	4.0553E-03	1.5548E-05	1.0073E-11
2.2352E+04	3.7884E-03	1.5624E-05	1.0487E-11
2.3021E+04	3.5396E-03	1.5695E-05	1.0904E-11
2.3689E+04	3.2934E-03	1.5761E-05	1.1322E-11
2.4358E+04	3.0817E-03	1.5822E-05	1.1743E-11
2.5027E+04	2.8765E-03	1.5881E-05	1.2165E-11
2.5696E+04	2.6858E-03	1.5933E-05	1.2590E-11
2.6365E+04	2.5078E-03	1.5984E-05	1.3016E-11
2.7034E+04	2.3416E-03	1.6030E-05	1.3443E-11
2.7702E+04	2.1864E-03	1.6074E-05	1.3872E-11
2.8371E+04	2.0415E-03	1.6113E-05	1.4303E-11
2.9040E+04	1.9062E-03	1.6153E-05	1.4735E-11
2.9709E+04	1.7798E-03	1.6188E-05	1.5168E-11
3.0378E+04	1.6619E-03	1.6221E-05	1.5602E-11
3.1047E+04	1.5517E-03	1.6252E-05	1.6037E-11
3.1715E+04	1.4489E-03	1.6281E-05	1.6473E-11
3.2384E+04	1.3528E-03	1.6308E-05	1.6911E-11
3.3053E+04	1.2632E-03	1.6333E-05	1.7348E-11
3.3722E+04	1.1794E-03	1.6356E-05	1.7787E-11
3.4391E+04	1.1013E-03	1.6378E-05	1.8227E-11
3.5059E+04	1.0283E-03	1.6399E-05	1.8667E-11
3.5728E+04	9.6012E-04	1.6418E-05	1.9108E-11
3.6397E+04	8.9648E-04	1.6435E-05	1.9549E-11
3.7066E+04	8.3716E-04	1.6452E-05	1.9991E-11
3.7735E+04	7.8183E-04	1.6467E-05	2.0434E-11
3.8404E+04	7.2978E-04	1.6482E-05	2.0877E-11
3.9072E+04	6.8141E-04	1.6495E-05	2.1320E-11
3.9741E+04	6.3624E-04	1.6508E-05	2.1764E-11
4.0410E+04	5.9407E-04	1.6519E-05	2.2209E-11
4.1079E+04	5.5470E-04	1.6530E-05	2.2653E-11
4.1748E+04	5.1793E-04	1.6540E-05	2.3098E-11
4.2417E+04	4.8360E-04	1.6550E-05	2.3544E-11
4.3085E+04	4.5155E-04	1.6559E-05	2.3989E-11
4.3754E+04	4.2162E-04	1.6567E-05	2.4435E-11
4.4423E+04	3.9367E-04	1.6575E-05	2.4881E-11
4.5092E+04	3.6758E-04	1.6582E-05	2.5328E-11
4.5761E+04	3.4322E-04	1.6588E-05	2.5775E-11
4.6430E+04	3.2047E-04	1.6594E-05	2.6221E-11
4.7098E+04	2.9923E-04	1.6600E-05	2.6668E-11
4.7767E+04	2.7939E-04	1.6605E-05	2.7116E-11
4.8436E+04	2.6088E-04	1.6610E-05	2.7563E-11
4.9105E+04	2.4359E-04	1.6615E-05	2.8011E-11
4.9774E+04	2.2744E-04	1.6619E-05	2.8458E-11
5.0443E+04	2.1237E-04	1.6623E-05	2.8906E-11
5.1112E+04	1.9827E-04	1.6627E-05	2.9354E-11
5.1780E+04	1.8510E-04	1.6631E-05	2.9802E-11
5.2449E+04	1.7278E-04	1.6634E-05	3.0251E-11
5.3118E+04	1.6131E-04	1.6637E-05	3.0699E-11

5.4455E+04	1.4273E-04	1.3642E-05	3.1536E-11
5.5124E+04	1.3140E-04	1.3644E-05	3.2044E-11
5.5793E+04	1.2269E-04	1.3647E-05	3.2493E-11
5.6462E+04	1.1456E-04	1.3649E-05	3.2942E-11
5.7131E+04	1.0697E-04	1.3651E-05	3.3391E-11
5.7801E+04	9.9877E-05	1.3652E-05	3.3839E-11
5.8468E+04	9.3257E-05	1.3654E-05	3.4288E-11
5.9137E+04	8.7076E-05	1.3655E-05	3.4737E-11
5.9806E+04	8.1304E-05	1.3657E-05	3.5186E-11
6.0475E+04	7.5915E-05	1.3658E-05	3.5635E-11
6.1144E+04	7.0884E-05	1.3659E-05	3.6084E-11
6.1813E+04	6.6185E-05	1.3661E-05	3.6534E-11
6.2481E+04	6.1799E-05	1.3661E-05	3.6983E-11
6.3150E+04	5.7703E-05	1.3662E-05	3.7432E-11
6.3819E+04	5.6806E-05	1.3662E-05	3.7534E-11
6.3956E+04	5.5924E-05	1.3663E-05	3.7637E-11
6.4093E+04	5.5055E-05	1.3663E-05	3.7740E-11
6.4231E+04	5.4200E-05	1.3663E-05	3.7842E-11
6.4368E+04	5.3358E-05	1.3663E-05	3.7945E-11
6.4506E+04	5.2529E-05	1.3663E-05	3.8047E-11
6.4643E+04	5.1713E-05	1.3663E-05	3.8150E-11
6.4780E+04	5.0909E-05	1.3664E-05	3.8252E-11
6.4918E+04	5.0118E-05	1.3664E-05	3.8355E-11
6.5055E+04	4.9340E-05	1.3664E-05	3.8458E-11
6.5193E+04	4.8573E-05	1.3664E-05	3.8560E-11
6.5330E+04	4.7819E-05	1.3664E-05	3.8663E-11
6.5468E+04	4.7076E-05	1.3664E-05	3.8765E-11
6.5605E+04	4.6345E-05	1.3665E-05	3.8868E-11
6.5743E+04	4.5625E-05	1.3665E-05	3.8970E-11
6.5880E+04	4.4916E-05	1.3665E-05	3.9073E-11
6.6017E+04	4.4218E-05	1.3665E-05	3.9176E-11
6.6155E+04	4.3531E-05	1.3665E-05	3.9278E-11
6.6292E+04	4.2855E-05	1.3665E-05	3.9381E-11
6.6430E+04	4.2189E-05	1.3665E-05	3.9483E-11
6.6567E+04	4.1534E-05	1.3665E-05	3.9586E-11
6.6705E+04	4.0888E-05	1.3665E-05	3.9688E-11
6.6842E+04	4.0253E-05	1.3666E-05	3.9791E-11
6.6979E+04	3.9628E-05	1.3666E-05	3.9894E-11
6.7117E+04	3.9012E-05	1.3666E-05	3.9996E-11
6.7254E+04	3.8406E-05	1.3666E-05	4.0099E-11
6.7392E+04	3.7809E-05	1.3666E-05	4.0201E-11
6.7529E+04	3.7222E-05	1.3666E-05	4.0286E-11
6.7578E+04	3.6239E-05	1.3534E-05	4.0026E-11
6.7731E+04	3.3193E-05	1.2575E-05	3.7273E-11
6.7884E+04	2.4485E-05	9.4227E-06	2.8001E-11
6.8037E+04	1.2231E-05	4.7634E-06	1.4209E-11
6.8189E+04	3.6779E-06	1.4614E-06	4.3615E-12
6.8342E+04	6.4532E-07	2.6032E-07	7.8002E-13
6.8495E+04	6.6337E-08	2.7178E-08	8.1577E-14
6.8647E+04	4.0737E-09	1.6994E-09	5.1014E-15
6.8800E+04	1.5403E-10	6.5113E-11	1.9641E-16
6.8953E+04	3.6982E-12	1.5860E-12	4.8023E-18
6.9105E+04	5.8124E-14	2.3353E-14	7.6858E-20
6.9258E+04	6.1545E-16	2.7259E-16	8.2871E-22
6.9411E+04	4.5312E-18	2.1334E-18	6.2129E-24
6.9564E+04	2.1292E-19	9.7113E-20	2.8658E-25
6.9716E+04	2.0912E-19	9.7114E-20	2.9731E-25
6.9869E+04	2.0547E-19	9.7114E-20	2.9804E-25
7.0022E+04	2.0267E-19	9.7115E-20	2.9877E-25
7.0174E+04	1.9992E-19	9.7115E-20	2.9950E-25
7.0327E+04	1.9643E-19	9.7115E-20	3.0023E-25
7.0480E+04	.	1.	0.
7.0633E+04	.	1.	1.
7.0786E+04	.	1.	.
7.0938E+04	.	.	.
7.1091E+04	.	1.	1.

7.1243E+04	0.	1.	0.
7.1346E+04	0.	0.	0.
7.1549E+04	0.	0.	0.
7.1751E+04	0.	0.	0.
7.1854E+04	0.	0.	0.
7.2057E+04	0.	1.	0.
7.2159E+04	0.	0.	0.
7.2312E+04	0.	0.	0.

TIME (YEARS)	PU239	U235	TH232
4.3170E+01	0.	0.	0.
5.6748E+01	0.	0.	0.
7.0397E+01	0.	0.	0.
8.4645E+01	0.	0.	0.
9.7693E+01	0.	0.	0.
1.1134E+02	0.	0.	0.
1.2499E+02	0.	0.	0.
1.3864E+02	0.	0.	0.
1.5229E+02	0.	0.	0.
1.6594E+02	0.	0.	0.
1.7958E+02	0.	0.	0.
1.9323E+02	0.	0.	0.
2.0688E+02	0.	0.	0.
2.2053E+02	0.	0.	0.
2.3418E+02	0.	0.	0.
2.4783E+02	0.	0.	0.
2.6147E+02	2.7163E-23	2.5265E-27	0.
2.7512E+02	2.0687E-19	1.9353E-23	2.5047E-31
2.8877E+02	9.3947E-16	8.8052E-20	5.1589E-28
3.0242E+02	2.4460E-13	2.3141E-17	3.2791E-25
3.1607E+02	5.3407E-11	5.0809E-15	7.5100E-23
3.2971E+02	4.7938E-09	4.5860E-13	7.0575E-21
3.4336E+02	1.9748E-07	1.8997E-11	3.0386E-19
3.5701E+02	4.1041E-06	3.9697E-10	6.5896E-18
3.7066E+02	4.6728E-05	4.5446E-09	7.8174E-17
3.8431E+02	3.1369E-04	3.0676E-08	5.4608E-16
3.9796E+02	1.3282E-03	1.3059E-07	2.4028E-15
4.1160E+02	3.7818E-03	3.7385E-07	7.1014E-15
4.2525E+02	7.7189E-03	7.6719E-07	1.5029E-14
4.3890E+02	1.2066E-02	1.2057E-06	2.4332E-14
4.5255E+02	1.5974E-02	1.5546E-06	3.2290E-14
4.6620E+02	1.7423E-02	1.7597E-06	3.7585E-14
4.7985E+02	1.8249E-02	1.8533E-06	4.0665E-14
4.9349E+02	1.8506E-02	1.9893E-06	4.2560E-14
5.0714E+02	1.8554E-02	1.9039E-06	4.4004E-14
5.2079E+02	1.8543E-02	1.9128E-06	4.5321E-14
5.3444E+02	1.8520E-02	1.9234E-06	4.6613E-14
5.4809E+02	1.8494E-02	1.9277E-06	4.7905E-14
5.6174E+02	1.8469E-02	1.9351E-06	4.9201E-14
5.7538E+02	1.8443E-02	1.9424E-06	5.0502E-14
5.8903E+02	1.8417E-02	1.9497E-06	5.1808E-14
6.0268E+02	1.8391E-02	1.9573E-06	5.3118E-14
6.1633E+02	1.8365E-02	1.9642E-06	5.4434E-14
6.2998E+02	1.8340E-02	1.9715E-06	5.5754E-14
6.4363E+02	1.8314E-02	1.9787E-06	5.7079E-14
6.5727E+02	1.8289E-02	1.9861E-06	5.8409E-14
6.7092E+02	1.8263E-02	1.9932E-06	5.9744E-14
6.8457E+02	1.8237E-02	2.0004E-06	6.1084E-14
6.9822E+02	1.8212E-02	2.0077E-06	6.2429E-14
7.1187E+02	1.8186E-02	2.0149E-06	6.3778E-14
7.2552E+02	1.8161E-02	2.0221E-06	6.5132E-14
7.3916E+02	1.8135E-02	2.0292E-06	6.6491E-14
7.5281E+02	1.8110E-02	2.0364E-06	6.7855E-14
7.6646E+02	1.8085E-02	2.0436E-06	6.9224E-14
7.8011E+02	1.8060E-02	2.0507E-06	7.0598E-14
7.9376E+02	1.8034E-02	2.0579E-06	7.1976E-14
8.0741E+02	1.8009E-02	2.0650E-06	7.3359E-14
8.2105E+02	1.7984E-02	2.0721E-06	7.4747E-14
8.3470E+02	1.7959E-02	2.0792E-06	7.6140E-14
8.4835E+02	1.7934E-02	2.0863E-06	7.7537E-14
8.6200E+02	1.7909E-02	2.0934E-06	7.8939E-14

[illegible]	[illegible]	[illegible]	9.9165E-13
[illegible]	[illegible]	[illegible]	7.6491E-13
[illegible]	[illegible]	[illegible]	1.0745E-12
8.3617E+03	8.3018E-03	9.8153E-06	1.4152E-12
8.8616E+03	7.1171E-03	5.1448E-06	1.7825E-12
1.1362E+04	6.1025E-03	5.4315E-06	2.1727E-12
1.2861E+04	5.2325E-03	5.6773E-06	2.5825E-12
1.4361E+04	4.4866E-03	5.8883E-06	3.0091E-12
1.5861E+04	3.8473E-03	6.0687E-06	3.4501E-12
1.7361E+04	3.2935E-03	6.2233E-06	3.9034E-12
1.8861E+04	2.8244E-03	6.3563E-06	4.3673E-12
2.0361E+04	2.4252E-03	6.4703E-06	4.8403E-12
2.1861E+04	2.0795E-03	6.5675E-06	5.3211E-12
2.3361E+04	1.7832E-03	6.6511E-06	5.8085E-12
2.4861E+04	1.5288E-03	6.7227E-06	6.3016E-12
2.6361E+04	1.3129E-03	6.7840E-06	6.7996E-12
2.7861E+04	1.1240E-03	6.8365E-06	7.3019E-12
2.9361E+04	9.6379E-04	6.8816E-06	7.8077E-12
3.0861E+04	8.2640E-04	6.9202E-06	8.3165E-12
3.2361E+04	7.0859E-04	6.9532E-06	8.8281E-12
3.3861E+04	6.0758E-04	6.9815E-06	9.3418E-12
3.5360E+04	5.2097E-04	7.0057E-06	9.8575E-12
3.6860E+04	4.4673E-04	7.0264E-06	1.0375E-11
3.8360E+04	3.8302E-04	7.0441E-06	1.0894E-11
3.9860E+04	3.2842E-04	7.0592E-06	1.1414E-11
4.1360E+04	2.8153E-04	7.0721E-06	1.1935E-11
4.2860E+04	2.4146E-04	7.0832E-06	1.2456E-11
4.4360E+04	2.0704E-04	7.0926E-06	1.2979E-11
4.5860E+04	1.7752E-04	7.1007E-06	1.3502E-11
4.7360E+04	1.5222E-04	7.1075E-06	1.4026E-11
4.8860E+04	1.3052E-04	7.1133E-06	1.4551E-11
5.0360E+04	1.1191E-04	7.1183E-06	1.5075E-11
5.1860E+04	9.5958E-05	7.1225E-06	1.5600E-11
5.3360E+04	8.2278E-05	7.1261E-06	1.6126E-11
5.4860E+04	7.0549E-05	7.1291E-06	1.6651E-11
5.6360E+04	6.0492E-05	7.1316E-06	1.7177E-11
5.7859E+04	5.1869E-05	7.1337E-06	1.7703E-11
5.9359E+04	4.4475E-05	7.1355E-06	1.8229E-11
6.0859E+04	3.8134E-05	7.1370E-06	1.8755E-11
6.2359E+04	3.2698E-05	7.1382E-06	1.9281E-11
6.3859E+04	2.8037E-05	7.1392E-06	1.9808E-11
6.5359E+04	2.4040E-05	7.1400E-06	2.0334E-11
6.6859E+04	2.0613E-05	7.1407E-06	2.0861E-11
6.8359E+04	1.7675E-05	7.1412E-06	2.1387E-11
6.9859E+04	1.5155E-05	7.1416E-06	2.1914E-11
7.1359E+04	1.2995E-05	7.1419E-06	2.2440E-11
7.2859E+04	1.1142E-05	7.1421E-06	2.2967E-11
7.4359E+04	9.5538E-06	7.1423E-06	2.3494E-11
7.5859E+04	8.1918E-06	7.1423E-06	2.4020E-11
7.7359E+04	7.0241E-06	7.1424E-06	2.4547E-11
7.8858E+04	6.0227E-06	7.1423E-06	2.5074E-11
8.0358E+04	5.1642E-06	7.1423E-06	2.5600E-11
8.1858E+04	4.4283E-06	7.1422E-06	2.6127E-11
8.3358E+04	3.7968E-06	7.1420E-06	2.6654E-11
8.4858E+04	3.2555E-06	7.1418E-06	2.7180E-11
8.6358E+04	2.7914E-06	7.1417E-06	2.7707E-11
8.7858E+04	2.3935E-06	7.1415E-06	2.8233E-11
8.9358E+04	2.0523E-06	7.1413E-06	2.8760E-11
9.0858E+04	1.7597E-06	7.1411E-06	2.9286E-11
9.2359E+04	1.5089E-06	7.1408E-06	2.9813E-11
9.3858E+04	1.2938E-06	7.1406E-06	3.0340E-11
9.5358E+04	1.1093E-06	7.1403E-06	3.0866E-11
9.6858E+04	9.5120E-07	7.1400E-06	3.1393E-11
9.8358E+04	8.1562E-07	7.1398E-06	3.1919E-11
9.9858E+04	6.9933E-07	7.1395E-06	3.2445E-11

1.2[illegible]E+05	[illegible]	[illegible]	3.[illegible]E-11
1.2[illegible]E+05	[illegible]	7.1387E-06	3.[illegible]E-11
1.[illegible]E+05	[illegible]	7.1385E-06	3.4025E-11
1.0736E+05	3.2413E-07	7.1383E-06	3.4551E-11
1.0846E+05	2.7761E-07	7.1381E-06	3.5077E-11
1.1036E+05	2.5833E-07	7.1378E-06	3.5604E-11
1.1186E+05	2.0433E-07	7.1375E-06	3.6130E-11
1.1336E+05	1.7522E-07	7.1372E-06	3.6656E-11
1.1486E+05	1.5023E-07	7.1369E-06	3.7182E-11
1.1636E+05	1.2891E-07	7.1365E-06	3.7709E-11
1.1786E+05	1.1045E-07	7.1362E-06	3.8235E-11
1.1936E+05	9.4734E-08	7.1359E-06	3.8761E-11
1.2086E+05	8.1273E-08	7.1356E-06	3.9287E-11
1.2087E+05	8.1090E-08	7.1353E-06	3.9813E-11
1.2088E+05	8.0976E-08	7.1353E-06	3.9818E-11
1.2090E+05	8.0863E-08	7.1353E-06	3.9823E-11
1.2091E+05	8.0750E-08	7.1353E-06	3.9828E-11
1.2092E+05	8.0637E-08	7.1353E-06	3.9833E-11
1.2094E+05	8.0524E-08	7.1353E-06	3.9837E-11
1.2095E+05	8.0412E-08	7.1353E-06	3.9842E-11
1.2097E+05	8.0299E-08	7.1353E-06	3.9847E-11
1.2098E+05	8.0187E-08	7.1353E-06	3.9852E-11
1.2099E+05	8.0075E-08	7.1353E-06	3.9856E-11
1.21.1E+05	7.9963E-08	7.1353E-06	3.9861E-11
1.2102E+05	7.9851E-08	7.1353E-06	3.9866E-11
1.2103E+05	7.9739E-08	7.1353E-06	3.9871E-11
1.2105E+05	7.9628E-08	7.1353E-06	3.9876E-11
1.2106E+05	7.9517E-08	7.1353E-06	3.9880E-11
1.2107E+05	7.9405E-08	7.1353E-06	3.9885E-11
1.2109E+05	7.9294E-08	7.1353E-06	3.9890E-11
1.2110E+05	7.9183E-08	7.1353E-06	3.9895E-11
1.2112E+05	7.9073E-08	7.1353E-06	3.9900E-11
1.2113E+05	7.8962E-08	7.1353E-06	3.9904E-11
1.2114E+05	7.8852E-08	7.1353E-06	3.9909E-11
1.2116E+05	7.8741E-08	7.1353E-06	3.9914E-11
1.2117E+05	7.8631E-08	7.1353E-06	3.9919E-11
1.2118E+05	7.8521E-08	7.1353E-06	3.9924E-11
1.2120E+05	7.8411E-08	7.1353E-06	3.9928E-11
1.2121E+05	7.8291E-08	7.1352E-06	3.9933E-11
1.2123E+05	7.8055E-08	7.1343E-06	3.9932E-11
1.2124E+05	7.7887E-08	7.1227E-06	3.9873E-11
1.2125E+05	7.3459E-08	7.0993E-06	3.9438E-11
1.2127E+05	6.4238E-08	6.7222E-06	3.7639E-11
1.2128E+05	4.8567E-08	5.8865E-06	3.2964E-11
1.2129E+05	3.0272E-08	4.4567E-06	2.4963E-11
1.2131E+05	1.5142E-08	2.7819E-06	1.5582E-11
1.2132E+05	6.0194E-09	1.3934E-06	7.8057E-12
1.2133E+05	1.9046E-09	5.5470E-07	3.1078E-12
1.2135E+05	4.8334E-10	1.7576E-07	9.8484E-13
1.2136E+05	9.9427E-11	4.4665E-08	2.5033E-13
1.2138E+05	1.6777E-11	9.2038E-09	5.1568E-14
1.2139E+05	2.3502E-12	1.5547E-09	8.7144E-15
1.2141E+05	2.7657E-13	2.1809E-10	1.2226E-15
1.2142E+05	2.7649E-14	2.5751E-11	1.4421E-16
1.2143E+05	2.3730E-15	2.5732E-12	1.4428E-17
1.2144E+05	1.7657E-16	2.2114E-13	1.2401E-18
1.2146E+05	1.1495E-17	1.6477E-14	9.2416E-20
1.2147E+05	6.6042E-19	1.0742E-15	6.0256E-21
1.2148E+05	3.4084E-20	6.1802E-17	3.4671E-22
1.2150E+05	1.6278E-21	3.1980E-18	1.7921E-23
1.2151E+05	5.3903E-22	1.5210E-19	8.5347E-25
1.2153E+05	5.3874E-22	5.0699E-20	2.8452E-25
1.2154E+05	5.3799E-22	5.0699E-20	2.8456E-25
1.2155E+05	5.3724E-22	5.0699E-20	2.8459E-25
1.2157E+05	5.3649E-22	5.0699E-20	2.8463E-25
			2.8466E-25

1.2158E+05	5.3574E-22	5.1633E-23	2.8469E-25
1.2159E+05	5.3439E-22	5.1578E-23	2.8473E-25
1.2161E+05	5.3424E-22	5.1538E-23	2.8476E-25
1.2162E+05	5.3549E-22	5.0578E-23	2.8480E-25
1.2163E+05	0.	0.	0.
1.2165E+05	0.	0.	0.
1.2166E+05	0.	0.	0.
1.2168E+05	0.	0.	0.

TIME (YEARS)	PU240	U235	TH232
9.6835E+04	0.	0.	0.
6.1651E+04	0.	0.	0.
7.0489E+04	0.	0.	0.
9.1319E+04	0.	0.	0.
1.0615E+05	0.	0.	0.
1.2098E+05	0.	0.	0.
1.3581E+05	0.	0.	0.
1.5064E+05	0.	0.	0.
1.6547E+05	0.	0.	0.
1.8030E+05	0.	0.	0.
1.9513E+05	0.	0.	0.
2.0996E+05	0.	0.	0.
2.2479E+05	0.	0.	0.
2.3962E+05	0.	0.	0.
2.5444E+05	0.	0.	0.
2.6927E+05	0.	7.8933E-28	0.
2.8410E+05	0.	3.2323E-24	4.4122E-29
2.9893E+05	0.	3.7913E-21	5.4535E-26
3.1376E+05	0.	1.5232E-18	2.3032E-23
3.2859E+05	0.	2.4292E-16	3.8519E-21
3.4342E+05	0.	1.7376E-14	2.8831E-19
3.5825E+05	0.	6.1772E-13	1.0704E-17
3.7308E+05	9.0044E-25	1.1908E-11	2.1512E-16
3.8791E+05	1.9721E-24	1.3416E-10	2.5225E-15
4.0274E+05	3.0321E-24	9.4329E-10	1.8430E-14
4.1757E+05	3.0837E-24	4.3868E-09	8.8952E-14
4.3240E+05	2.1885E-24	1.4237E-08	2.9918E-13
4.4723E+05	1.1398E-24	3.3907E-08	7.3759E-13
4.6206E+05	4.5775E-25	6.2269E-08	1.4005E-12
4.7689E+05	0.	9.2570E-08	2.1528E-12
4.9172E+05	0.	1.1753E-07	2.8172E-12
5.0655E+05	0.	1.3340E-07	3.2961E-12
5.2138E+05	0.	1.4145E-07	3.5997E-12
5.3621E+05	0.	1.4474E-07	3.7907E-12
5.5104E+05	0.	1.4583E-07	3.9270E-12
5.6587E+05	0.	1.4609E-07	4.0424E-12
5.8070E+05	0.	1.4611E-07	4.1512E-12
5.9553E+05	0.	1.4606E-07	4.2581E-12
6.1035E+05	0.	1.4603E-07	4.3647E-12
6.2518E+05	0.	1.4594E-07	4.4711E-12
6.4001E+05	0.	1.4588E-07	4.5775E-12
6.5484E+05	0.	1.4582E-07	4.6838E-12
6.6967E+05	0.	1.4575E-07	4.7901E-12
6.8450E+05	0.	1.4569E-07	4.8963E-12
6.9933E+05	0.	1.4563E-07	5.0025E-12
7.1416E+05	0.	1.4557E-07	5.1086E-12
7.2899E+05	0.	1.4551E-07	5.2147E-12
7.4382E+05	0.	1.4544E-07	5.3208E-12
7.5865E+05	0.	1.4538E-07	5.4268E-12
7.7348E+05	0.	1.4532E-07	5.5327E-12
7.8831E+05	0.	1.4525E-07	5.6386E-12
8.0314E+05	0.	1.4519E-07	5.7445E-12
8.1797E+05	0.	1.4513E-07	5.8503E-12
8.3280E+05	0.	1.4507E-07	5.9561E-12
8.4763E+05	0.	1.4501E-07	6.0618E-12
8.6245E+05	0.	1.4494E-07	6.1675E-12
8.7729E+05	0.	1.4488E-07	6.2731E-12
8.9212E+05	0.	1.4482E-07	6.3787E-12
9.0695E+05	0.	1.4475E-07	6.4843E-12
9.2178E+05	0.	1.4469E-07	6.5898E-12
9.3661E+05	0.	1.4463E-07	6.6952E-12

9.97695E+05	0.	1.4437E-37	7.1291E-12
1.00002E+06	0.	1.4936E-07	7.1455E-12

TIME (YEARS)	PU240	U236	TH232
3.6691E+ 4	0.	0.	0.
4.3013E+04	0.	0.	0.
4.3333E+04	0.	0.	0.
4.6649E+04	0.	0.	0.
4.9969E+04	0.	0.	0.
5.3288E+04	0.	0.	0.
5.6608E+04	0.	0.	0.
5.9927E+04	0.	0.	0.
6.3247E+04	0.	0.	0.
6.6566E+04	0.	0.	0.
6.9886E+04	0.	0.	0.
7.3205E+04	0.	0.	0.
7.6525E+04	0.	0.	0.
7.9845E+04	0.	0.	0.
8.3164E+04	0.	0.	0.
8.6484E+04	0.	0.	0.
8.9803E+04	0.	0.	0.
9.3123E+04	0.	0.	0.
9.6442E+04	0.	0.	0.
9.9762E+04	0.	0.	0.
1.0308E+05	0.	0.	0.
1.0640E+05	0.	0.	0.
1.0972E+05	0.	0.	0.
1.1304E+05	0.	0.	0.
1.1636E+05	0.	0.	0.
1.1968E+05	0.	0.	0.
1.2300E+05	0.	0.	0.
1.2632E+05	0.	0.	0.
1.2964E+05	0.	0.	0.
1.3296E+05	0.	0.	0.
1.3628E+05	0.	0.	0.
1.3960E+05	0.	0.	0.
1.4292E+05	0.	0.	0.
1.4624E+05	0.	0.	0.
1.4955E+05	0.	0.	0.
1.5287E+05	0.	0.	0.
1.5619E+05	0.	0.	0.
1.5951E+05	0.	0.	0.
1.6283E+05	0.	0.	0.
1.6615E+05	0.	0.	0.
1.6947E+05	0.	0.	0.
1.7279E+05	0.	0.	0.
1.7611E+05	0.	1.7695E-28	0.
1.7943E+05	0.	2.8161E-27	0.
1.8275E+05	0.	3.9297E-26	3.3934E-31
1.8607E+05	0.	4.8423E-25	4.2608E-30
1.8939E+05	0.	5.3832E-24	4.7534E-29
1.9271E+05	0.	5.1935E-23	4.7402E-28
1.9603E+05	0.	4.5737E-22	4.2495E-27
1.9935E+05	0.	3.6413E-21	3.4930E-26
2.0267E+05	0.	2.6337E-20	2.5335E-25
2.0599E+05	3.2099E-25	1.7387E-19	1.7011E-24
2.0931E+05	1.3822E-24	1.0522E-18	1.0467E-23
2.1263E+05	5.4783E-24	5.8625E-18	5.9261E-23
2.1595E+05	2.0061E-23	3.0159E-17	3.0992E-22
2.1927E+05	6.8114E-23	1.4391E-16	1.5024E-21
2.2258E+05	2.1517E-22	6.3887E-16	6.7749E-21
2.2590E+05	6.3443E-22	2.6471E-15	2.8506E-20
2.2922E+05	1.7510E-21	1.0268E-14	1.1226E-19
2.3254E+05	4.5368E-21	3.7[illegible]7E-14	4.1489E-19
2.3586E+05	1.1065E-20	1.2814E-13	1.4931E-18

[illegible]	[illegible]	[illegible]	[illegible]
2.4582E+05	1.1440E-19	1.2579E-12	1.4645E-17
2.4914E+05	3.2432E-19	3.5773E-12	4.3224E-17
2.5246E+05	4.1557E-19	1.3133E-11	1.2077E-16
2.5578E+05	7.4334E-19	2.6573E-11	3.2115E-16
2.5910E+05	1.2679E-18	5.6435E-11	8.1440E-16
2.6242E+05	2.0645E-18	1.5397E-10	1.9731E-15
2.6574E+05	3.2229E-18	3.5375E-10	4.5747E-15
2.6906E+05	4.8312E-18	7.9804E-10	1.0167E-14
2.7238E+05	6.9647E-18	1.6812E-09	2.1696E-14
2.7570E+05	9.6542E-18	3.4062E-09	4.4515E-14
2.7902E+05	1.2945E-17	6.6454E-09	8.7943E-14
2.8234E+05	1.6734E-17	1.2503E-08	1.6752E-13
2.8566E+05	2.0913E-17	2.2714E-08	3.0806E-13
2.8898E+05	2.5295E-17	3.9891E-08	5.4760E-13
2.9230E+05	2.9646E-17	6.7810E-08	9.4199E-13
2.9561E+05	3.3703E-17	1.1169E-07	1.5699E-12
2.9893E+05	3.7203E-17	1.7844E-07	2.5375E-12
3.0225E+05	3.9912E-17	2.7680E-07	3.9819E-12
3.0557E+05	4.1655E-17	4.1733E-07	6.0722E-12
3.0889E+05	4.2331E-17	6.1211E-07	9.0069E-12
3.1221E+05	4.1920E-17	8.7416E-07	1.3007E-11
3.1553E+05	4.0499E-17	1.2166E-06	1.8302E-11
3.1885E+05	3.8171E-17	1.6514E-06	2.5115E-11
3.2217E+05	3.5151E-17	2.1879E-06	3.3634E-11
3.2549E+05	3.1642E-17	2.8314E-06	4.3994E-11
3.2881E+05	2.7862E-17	3.5819E-06	5.6244E-11
3.3213E+05	2.4015E-17	4.4324E-06	7.0330E-11
3.3545E+05	2.0273E-17	5.3689E-06	8.6073E-11
3.3877E+05	1.6773E-17	6.3695E-06	1.0316E-10
3.4209E+05	1.3609E-17	7.4061E-06	1.2117E-10
3.4541E+05	1.0834E-17	8.4445E-06	1.3955E-10
3.4873E+05	8.4572E-18	9.4475E-06	1.5769E-10
3.5205E+05	6.5000E-18	1.0376E-05	1.7490E-10
3.5537E+05	4.9336E-18	1.1194E-05	1.9053E-10
3.5869E+05	3.6373E-18	1.1868E-05	2.0396E-10
3.6201E+05	2.6539E-18	1.2372E-05	2.1465E-10
3.6533E+05	1.9056E-18	1.2685E-05	2.2219E-10
3.6864E+05	1.3472E-18	1.2801E-05	2.2632E-10
3.7196E+05	9.3805E-19	1.2718E-05	2.2695E-10
3.7528E+05	6.4361E-19	1.2445E-05	2.2414E-10
3.7860E+05	4.3530E-19	1.2000E-05	2.1810E-10
3.8192E+05	2.9032E-19	1.1406E-05	2.0918E-10
3.8524E+05	1.9100E-19	1.0690E-05	1.9782E-10
3.8856E+05	1.2401E-19	9.8843E-06	1.8454E-10
3.9188E+05	7.9476E-20	9.0185E-06	1.6986E-10
3.9520E+05	5.0298E-20	8.1227E-06	1.5433E-10
3.9852E+05	3.1443E-20	7.2243E-06	1.3845E-10
4.0184E+05	1.9422E-20	6.3468E-06	1.2268E-10
4.0516E+05	1.1858E-20	5.5094E-06	1.0740E-10
4.0848E+05	7.1572E-21	4.7270E-06	9.2931E-11
4.1180E+05	4.2723E-21	4.0097E-06	7.9491E-11
4.1512E+05	2.5227E-21	3.3636E-06	6.7238E-11
4.1844E+05	1.4739E-21	2.7912E-06	5.6256E-11
4.2176E+05	8.5223E-22	2.2917E-06	4.6569E-11
4.2508E+05	4.8794E-22	1.8623E-06	3.8150E-11
4.2840E+05	2.7651E-22	1.4981E-06	3.0937E-11
4.3172E+05	1.5522E-22	1.1933E-06	2.4840E-11
4.3504E+05	8.6321E-23	9.4144E-07	1.9752E-11
4.3836E+05	4.7564E-23	7.3575E-07	1.5558E-11
4.4167E+05	2.5974E-23	5.6974E-07	1.2142E-11
4.4499E+05	1.4060E-23	4.3724E-07	9.3903E-12
4.4831E+05	7.5456E-24	3.3261E-07	7.1984E-12
4.5163E+05	4.0137E-24	2.5086E-07	5.4706E-12
4.5495E+05	2.1196E-24	1.8762E-07	4.1225E-12
		1.3917E-07	3.0810E-12

[illegible]	[illegible]	[illegible]	[illegible]
4.6491E+05	[illegible]	7.4169E-08	1.6794E-12
4.6823E+05	0.	5.4173E-08	1.2261E-12
4.7155E+05	0.	3.4352E-08	6.8806E-13
4.7487E+05	0.	2.7803E-08	6.3849E-13
4.7819E+05	0.	1.9703E-09	4.5573E-13
4.8151E+05	0.	1.3865E-08	3.2298E-13
4.8483E+05	0.	9.6891E-09	2.2731E-13
4.8815E+05	0.	6.7254E-09	1.5890E-13
4.9147E+05	0.	4.6374E-09	1.1033E-13
4.9479E+05	0.	3.1770E-09	7.6111E-14
4.9811E+05	0.	2.1627E-09	5.2169E-14
5.0143E+05	0.	1.4631E-09	3.5535E-14
5.0475E+05	0.	9.8374E-10	2.4556E-14
5.08 7E+05	0.	6.5751E-10	1.6187E-14
5.1139E+05	0.	4.3689E-10	1.0828E-14
5.1470E+05	0.	2.8863E-10	7.2015E-15
5.1802E+05	0.	1.8961E-10	4.7623E-15
5.2134E+05	0.	1.2388E-10	3.1318E-15
5.2466E+05	0.	8.0494E-11	2.0483E-15
5.2798E+05	0.	5.2026E-11	1.3325E-15
5.3130E+05	0.	3.3452E-11	8.6233E-16
5.3462E+05	0.	2.1399E-11	5.5517E-16
5.3794E+05	0.	1.3520E-11	3.5561E-16
5.4126E+05	0.	8.6263E-12	2.2666E-16
5.4458E+05	0.	5.4371E-12	1.4376E-16
5.4790E+05	0.	3.4108E-12	9.0751E-17
5.5122E+05	0.	2.1297E-12	5.7017E-17
5.5454E+05	0.	1.3237E-12	3.5658E-17
5.5786E+05	0.	8.1925E-13	2.2290E-17
5.6118E+05	0.	5.0456E-13	1.3759E-17
5.6450E+05	0.	3.0948E-13	8.4909E-18
5.6782E+05	0.	1.8902E-13	5.2172E-18
5.7114E+05	0.	1.1497E-13	3.1923E-18
5.7446E+05	0.	6.9637E-14	1.9452E-18
5.7778E+05	0.	4.2010E-14	1.1804E-18
5.8110E+05	0.	2.5243E-14	7.1350E-19
5.8442E+05	0.	1.5110E-14	4.2960E-19
5.8773E+05	0.	9.0099E-15	2.5765E-19
5.9105E+05	0.	5.3531E-15	1.5397E-19
5.9437E+05	0.	3.1674E-15	9.1630E-20
5.9769E+05	0.	1.8688E-15	5.4374E-20
6.0101E+05	0.	1.0967E-15	3.2091E-20
6.0433E+05	0.	6.4338E-16	1.8933E-20
6.0765E+05	0.	3.7679E-16	1.1150E-20
6.1097E+05	0.	2.1789E-16	6.4842E-21
6.1429E+05	0.	1.2573E-16	3.7923E-21
6.1761E+05	0.	7.2037E-17	2.1677E-21
6.2093E+05	0.	4.2524E-17	1.2867E-21
6.2425E+05	0.	2.3429E-17	7.1280E-22
6.2757E+05	0.	1.5618E-17	4.7775E-22
6.3089E+05	0.	8.6758E-18	2.6683E-22
6.3421E+05	0.	5.2050E-18	1.6095E-22
6.3753E+05	0.	2.6023E-18	8.0898E-23
6.4085E+05	0.	8.6733E-19	2.7108E-23
6.4417E+05	0.	1.7345E-18	5.4498E-23
6.4749E+05	0.	0.	0.
6.5081E+05	0.	0.	0.
6.5413E+05	0.	0.	0.
6.5745E+05	0.	0.	0.
6.6076E+05	0.	0.	0.
6.6408E+05	0.	0.	0.
6.6740E+05	0.	0.	0.
6.7072E+05	0.	0.	0.
6.7404E+05	0.	0.	0.

TIME (YEARS)	PU239	U235	TH232
2.3[illegible]E+02	.	3.	0.
3.9316E+02	.	0.	0.
3.7599E+02	.	0.	0.
4.4889E+02	0.	0.	0.
5.2179E+02	0.	0.	0.
5.9468E+02	0.	0.	0.
6.6758E+02	0.	0.	0.
7.4048E+02	.	0.	0.
8.1337E+02	0.	0.	0.
8.8627E+02	0.	0.	0.
9.5917E+02	0.	0.	0.
1.0321E+03	0.	0.	0.
1.1050E+03	.	0.	0.
1.1779E+03	0.	0.	0.
1.2508E+03	2.9274E-23	3.8979E-27	0.
1.3237E+03	1.3537E-19	1.8447E-23	1.0234E-30
1.3965E+03	1.7635E-16	2.4586E-20	1.4306E-27
1.4694E+03	7.8272E-14	1.1160E-17	6.7943E-25
1.5423E+03	1.3812E-11	2.0135E-15	1.2796E-22
1.6152E+03	1.1002E-09	1.6392E-13	1.0852E-20
1.6881E+03	4.3961E-08	6.6921E-12	4.6068E-19
1.7610E+03	9.6268E-07	1.4969E-10	1.0697E-17
1.8339E+03	1.2457E-05	1.9782E-09	1.4650E-16
1.9068E+03	1.0163E-04	1.6473E-08	1.2628E-15
1.9797E+03	5.5318E-04	9.1513E-08	7.2508E-15
2.0526E+03	2.1129E-03	3.5664E-07	2.9173E-14
2.1255E+03	5.9310E-03	1.0213E-06	8.6126E-14
2.1984E+03	1.2770E-02	2.2424E-06	1.9485E-13
2.2713E+03	2.2005E-02	3.9397E-06	3.5232E-13
2.3442E+03	3.1630E-02	5.7724E-06	5.3077E-13
2.4171E+03	3.9525E-02	7.3513E-06	6.9443E-13
2.4900E+03	4.4687E-02	8.4685E-06	8.2119E-13
2.5629E+03	4.7366E-02	9.1443E-06	9.0954E-13
2.6358E+03	4.8402E-02	9.5169E-06	9.7034E-13
2.7087E+03	4.8585E-02	9.7276E-06	1.0160E-12
2.7816E+03	4.8436E-02	9.8671E-06	1.0550E-12
2.8545E+03	4.8198E-02	9.9801E-06	1.0918E-12
2.9274E+03	4.7754E-02	1.0084E-05	1.1280E-12
3.0003E+03	4.7401E-02	1.0186E-05	1.1644E-12
3.0732E+03	4.7049E-02	1.0285E-05	1.2011E-12
3.1461E+03	4.6699E-02	1.0385E-05	1.2382E-12
3.2190E+03	4.6351E-02	1.0483E-05	1.2755E-12
3.2919E+03	4.6006E-02	1.0581E-05	1.3133E-12
3.3648E+03	4.5663E-02	1.0677E-05	1.3514E-12
3.4377E+03	4.5323E-02	1.0774E-05	1.3898E-12
3.5105E+03	4.4986E-02	1.0869E-05	1.4286E-12
3.5834E+03	4.4651E-02	1.0964E-05	1.4677E-12
3.6563E+03	4.4318E-02	1.1058E-05	1.5072E-12
3.7292E+03	4.3988E-02	1.1151E-05	1.5470E-12
3.8021E+03	4.3661E-02	1.1244E-05	1.5871E-12
3.8750E+03	4.3335E-02	1.1336E-05	1.6275E-12
3.9479E+03	4.3013E-02	1.1427E-05	1.6683E-12
4.0208E+03	4.2693E-02	1.1517E-05	1.7094E-12
4.0937E+03	4.2375E-02	1.1607E-05	1.7509E-12
4.1666E+03	4.2059E-02	1.1697E-05	1.7926E-12
4.2395E+03	4.1746E-02	1.1785E-05	1.8347E-12
4.3124E+03	4.1435E-02	1.1873E-05	1.8771E-12
4.3853E+03	4.1126E-02	1.1960E-05	1.9198E-12
4.4582E+03	4.0820E-02	1.2047E-05	1.9628E-12
4.5311E+03	4.0516E-02	1.2133E-05	2.0061E-12
4.6040E+03	4.0214E-02	1.2218E-05	2.0498E-12

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1.3115E-05	2.5542E-12
[illegible]	[illegible]	1.3537E-05	2.8118E-12
[illegible]	[illegible]	1.3942E-05	3.0826E-12
[illegible]	[illegible]	1.4333E-05	3.3611E-12
[illegible]	[illegible]	1.4733E-05	3.6472E-12
7.4198E+03	3.0160E-02	1.5061E-05	3.9405E-12
7.8106E+03	2.8946E-02	1.5404E-05	4.2406E-12
8.2115E+03	2.7783E-02	1.5734E-05	4.5474E-12
8.6123E+03	2.6652E-02	1.6053E-05	4.8606E-12
9.0131E+03	2.5598E-02	1.6353E-05	5.1799E-12
9.4139E+03	2.4558E-02	1.6645E-05	5.5050E-12
9.8148E+03	2.3569E-02	1.6924E-05	5.8357E-12
1.0216E+04	2.2620E-02	1.7192E-05	6.1719E-12
1.0616E+04	2.1729E-02	1.7450E-05	6.5132E-12
1.1017E+04	2.0835E-02	1.7697E-05	6.8595E-12
1.1418E+04	1.9996E-02	1.7934E-05	7.2105E-12
1.1819E+04	1.9191E-02	1.8161E-05	7.5662E-12
1.2220E+04	1.8418E-02	1.8380E-05	7.9262E-12
1.2621E+04	1.7676E-02	1.8589E-05	8.2904E-12
1.3021E+04	1.6965E-02	1.8793E-05	8.6587E-12
1.3422E+04	1.6282E-02	1.8983E-05	9.0309E-12
1.3823E+04	1.5626E-02	1.9169E-05	9.4068E-12
1.4224E+04	1.4997E-02	1.9346E-05	9.7862E-12
1.4625E+04	1.4393E-02	1.9517E-05	1.0169E-11
1.5026E+04	1.3813E-02	1.9681E-05	1.0555E-11
1.5426E+04	1.3257E-02	1.9838E-05	1.0945E-11
1.5827E+04	1.2723E-02	1.9988E-05	1.1337E-11
1.6228E+04	1.2211E-02	2.0133E-05	1.1732E-11
1.6629E+04	1.1719E-02	2.0272E-05	1.2130E-11
1.7030E+04	1.1247E-02	2.0405E-05	1.2531E-11
1.7431E+04	1.0795E-02	2.0533E-05	1.2935E-11
1.7831E+04	1.0363E-02	2.0656E-05	1.3340E-11
1.8232E+04	9.9427E-03	2.0773E-05	1.3746E-11
1.8633E+04	9.5424E-03	2.0886E-05	1.4159E-11
1.9034E+04	9.1581E-03	2.0995E-05	1.4572E-11
1.9435E+04	8.7894E-03	2.1099E-05	1.4986E-11
1.9835E+04	8.4354E-03	2.1199E-05	1.5403E-11
2.0236E+04	8.0958E-03	2.1295E-05	1.5822E-11
2.0637E+04	7.7698E-03	2.1387E-05	1.6242E-11
2.1038E+04	7.4569E-03	2.1475E-05	1.6665E-11
2.1439E+04	7.1567E-03	2.1560E-05	1.7089E-11
2.1840E+04	6.8685E-03	2.1641E-05	1.7514E-11
2.2240E+04	6.5919E-03	2.1719E-05	1.7941E-11
2.2641E+04	6.3265E-03	2.1794E-05	1.8370E-11
2.3042E+04	6.0717E-03	2.1865E-05	1.8800E-11
2.3443E+04	5.8273E-03	2.1934E-05	1.9232E-11
2.3844E+04	5.5926E-03	2.2000E-05	1.9665E-11
2.4245E+04	5.3674E-03	2.2064E-05	2.0099E-11
2.4645E+04	5.1513E-03	2.2125E-05	2.0534E-11
2.5046E+04	4.9439E-03	2.2183E-05	2.0971E-11
2.5447E+04	4.7448E-03	2.2239E-05	2.1408E-11
2.5848E+04	4.5537E-03	2.2293E-05	2.1847E-11
2.6249E+04	4.3703E-03	2.2345E-05	2.2287E-11
2.6650E+04	4.1944E-03	2.2394E-05	2.2728E-11
2.7052E+04	4.0255E-03	2.2442E-05	2.3169E-11
2.7451E+04	3.8634E-03	2.2487E-05	2.3612E-11
2.7852E+04	3.7078E-03	2.2531E-05	2.4056E-11
2.8253E+04	3.5585E-03	2.2573E-05	2.4500E-11
2.8654E+04	3.4153E-03	2.2613E-05	2.4945E-11
2.9055E+04	3.2777E-03	2.2652E-05	2.5391E-11
2.9455E+04	3.1458E-03	2.2689E-05	2.5838E-11
2.9856E+04	3.0191E-03	2.2724E-05	2.6285E-11
3.0257E+04	2.8975E-03	2.2759E-05	2.6733E-11
3.0658E+04	2.7818E-03	2.2791E-05	2.7182E-11
3.1059E+04	2.6689E-03	2.2823E-05	2.7631E-11

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	2.8973E-11
[illegible]	[illegible]	2.2435E-05	2.9435E-11
[illegible]	[illegible]	2.2702E-05	2.9887E-11
[illegible]	2.1731E-03	2.2966E-05	3.0345E-11
[illegible]	2.0506E-03	2.3215E-05	3.0793E-11
[illegible]	2.0716E-03	2.3032E-05	3.1247E-11
3.4265E+04	1.9210E-03	2.3054E-05	3.1701E-11
3.4666E+04	1.8437E-03	2.3074E-05	3.2155E-11
3.5067E+04	1.7674E-03	2.3094E-05	3.2610E-11
3.5468E+04	1.6982E-03	2.3113E-05	3.3065E-11
3.5869E+04	1.6298E-03	2.3132E-05	3.3521E-11
3.6269E+04	1.5642E-03	2.3149E-05	3.3977E-11
3.6670E+04	1.5012E-03	2.3152E-05	3.4060E-11
3.7071E+04	1.4903E-03	2.3155E-05	3.4143E-11
3.7472E+04	1.4789E-03	2.3158E-05	3.4226E-11
3.7873E+04	1.4679E-03	2.3161E-05	3.4309E-11
3.8274E+04	1.4570E-03	2.3165E-05	3.4392E-11
3.8675E+04	1.4461E-03	2.3168E-05	3.4475E-11
3.9076E+04	1.4354E-03	2.3170E-05	3.4558E-11
3.9477E+04	1.4247E-03	2.3173E-05	3.4641E-11
3.9878E+04	1.4141E-03	2.3176E-05	3.4724E-11
4.0279E+04	1.4035E-03	2.3179E-05	3.4807E-11
4.0680E+04	1.3931E-03	2.3182E-05	3.4890E-11
4.1081E+04	1.3827E-03	2.3185E-05	3.4973E-11
4.1482E+04	1.3724E-03	2.3188E-05	3.5056E-11
4.1883E+04	1.3622E-03	2.3191E-05	3.5139E-11
4.2284E+04	1.3523E-03	2.3193E-05	3.5222E-11
4.2685E+04	1.3420E-03	2.3196E-05	3.5305E-11
4.3086E+04	1.3320E-03	2.3199E-05	3.5389E-11
4.3487E+04	1.3221E-03	2.3202E-05	3.5472E-11
4.3888E+04	1.3122E-03	2.3204E-05	3.5555E-11
4.4289E+04	1.3024E-03	2.3207E-05	3.5638E-11
4.4690E+04	1.2927E-03	2.3210E-05	3.5721E-11
4.5091E+04	1.2831E-03	2.3212E-05	3.5804E-11
4.5492E+04	1.2736E-03	2.3215E-05	3.5888E-11
4.5893E+04	1.2641E-03	2.3217E-05	3.5970E-11
4.6294E+04	1.2547E-03	2.3217E-05	3.6048E-11
4.6695E+04	1.2451E-03	2.3193E-05	3.6086E-11
4.7096E+04	1.2343E-03	2.3034E-05	3.5922E-11
4.7497E+04	1.2167E-03	2.2452E-05	3.5091E-11
4.7898E+04	1.1770E-03	2.0933E-05	3.2789E-11
4.8299E+04	1.0891E-03	1.8050E-05	2.8334E-11
4.8700E+04	9.3201E-04	1.3940E-05	2.1929E-11
4.9101E+04	7.1434E-04	9.4219E-06	1.4854E-11
4.9502E+04	4.7918E-04	5.5038E-06	8.6960E-12
4.9903E+04	2.7780E-04	2.7669E-06	4.3812E-12
5.0304E+04	1.3860E-04	1.1988E-06	1.9023E-12
5.0705E+04	5.9597E-05	4.4971E-07	7.1516E-13
5.1106E+04	2.2188E-05	1.4703E-07	2.3432E-13
5.1507E+04	7.1995E-06	4.2199E-08	6.7397E-14
5.1908E+04	2.0508E-06	1.0713E-08	1.7147E-14
5.2309E+04	5.1671E-07	2.4237E-09	3.8875E-15
5.2710E+04	1.1602E-07	4.9213E-10	7.9105E-16
5.3111E+04	2.3379E-08	9.0237E-11	1.4545E-16
5.3512E+04	4.2573E-09	1.5067E-11	2.4321E-17
5.3913E+04	7.2499E-10	2.2337E-12	3.7202E-18
5.4314E+04	1.0693E-10	3.2289E-13	5.2343E-19
5.4715E+04	1.4882E-11	4.1915E-14	6.8092E-20
5.5116E+04	1.9173E-12	5.0546E-15	8.2287E-21
5.5517E+04	2.2946E-13	5.6891E-16	9.2879E-22
5.5918E+04	2.5631E-14	6.0038E-17	9.8150E-23
5.6319E+04	2.6845E-15	5.9547E-18	9.7553E-24
5.6720E+04	2.6425E-16	6.6169E-19	1.0863E-24
5.7121E+04	2.9143E-17	1.6544E-19	2.7216E-25
5.7522E+04	7.2315E-18		

4.0534E+04	7.1776E-18	1.6545E-19	2.7276E-25
4.0578E+04	7.1242E-18	1.6547E-19	2.7335E-25
4.0622E+04	7.0711E-18	1.6548E-19	2.7394E-25
4.0753E+04	7.0185E-18	1.6551E-19	2.7454E-25
4.0823E+04	6.9662E-18	1.6551E-19	2.7513E-25
4.0894E+04	6.9143E-18	1.6553E-19	2.7572E-25
4.0971E+04	6.8628E-18	1.6554E-19	2.7632E-25
4.1044E+04	6.8117E-18	1.6555E-19	2.7691E-25

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U235	TH232
9.0003E+05	0.	0.	0.
1.0003E+06	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U235	TH232
9.0610E+05	0.	0.	0.
1.0061E+06	0.	0.	0.

TIME (YEARS)	PU240	U235	TH232
9.1250E+02	0.	0.	0.
1.2315E+03	0.	0.	0.
1.4904E+03	0.	0.	0.
1.7794E+03	0.	0.	0.
2.0683E+03	0.	0.	0.
2.3573E+03	0.	0.	0.
2.6463E+03	0.	0.	0.
2.9352E+03	0.	0.	0.
3.2242E+03	0.	0.	0.
3.5131E+03	0.	0.	0.
3.8021E+03	0.	0.	0.
4.0910E+03	0.	0.	0.
4.3800E+03	0.	0.	0.
4.6690E+03	0.	0.	0.
4.9579E+03	0.	0.	0.
5.2469E+03	1.2090E-24	4.1563E-28	0.
5.5358E+03	8.7988E-21	3.1908E-24	6.3399E-31
5.8248E+03	1.6730E-17	6.3917E-21	1.3315E-27
6.1137E+03	1.0072E-14	4.0493E-18	8.8263E-25
6.4027E+03	2.2482E-12	9.5013E-16	2.1630E-22
6.6917E+03	2.1212E-10	9.4147E-14	2.2347E-20
6.9806E+03	9.4445E-09	4.3982E-12	1.0868E-18
7.2696E+03	2.1787E-07	1.0635E-10	2.7322E-17
7.5585E+03	2.8217E-06	1.4430E-09	3.8483E-16
7.8475E+03	2.2079E-05	1.1783E-08	3.2579E-15
8.1365E+03	1.1005E-04	6.1611E-08	1.7649E-14
8.4254E+03	3.7353E-04	2.1859E-07	6.4788E-14
8.7144E+03	9.0859E-04	5.5541E-07	1.7016E-13
9.0033E+03	1.6705E-03	1.0661E-06	3.3732E-13
9.2923E+03	2.4508E-03	1.6319E-06	5.3278E-13
9.5812E+03	3.0316E-03	2.1151E-06	7.0859E-13
9.8702E+03	3.3373E-03	2.4152E-06	8.3753E-13
1.0159E+04	3.4261E-03	2.5834E-06	9.2224E-13
1.0448E+04	3.3967E-03	2.6671E-06	9.7951E-13
1.0737E+04	3.3193E-03	2.7129E-06	1.0243E-12
1.1026E+04	3.2280E-03	2.7450E-06	1.0649E-12
1.1315E+04	3.1349E-03	2.7727E-06	1.1045E-12
1.1604E+04	3.0436E-03	2.7998E-06	1.1441E-12
1.1893E+04	2.9548E-03	2.8239E-06	1.1841E-12
1.2182E+04	2.8685E-03	2.8483E-06	1.2244E-12
1.2471E+04	2.7848E-03	2.8721E-06	1.2650E-12
1.2760E+04	2.7035E-03	2.8949E-06	1.3060E-12
1.3049E+04	2.6246E-03	2.9172E-06	1.3472E-12
1.3338E+04	2.5479E-03	2.9389E-06	1.3888E-12
1.3627E+04	2.4736E-03	2.9599E-06	1.4307E-12
1.3916E+04	2.4013E-03	2.9803E-06	1.4729E-12
1.4205E+04	2.3312E-03	3.0001E-06	1.5154E-12
1.4494E+04	2.2632E-03	3.0193E-06	1.5582E-12
1.4783E+04	2.1971E-03	3.0380E-06	1.6012E-12
1.5071E+04	2.1330E-03	3.0561E-06	1.6445E-12
1.5360E+04	2.0707E-03	3.0737E-06	1.6880E-12
1.5649E+04	2.0102E-03	3.0908E-06	1.7318E-12
1.5938E+04	1.9516E-03	3.1074E-06	1.7758E-12
1.6227E+04	1.8946E-03	3.1234E-06	1.8201E-12
1.6516E+04	1.8393E-03	3.1391E-06	1.8645E-12
1.6805E+04	1.7856E-03	3.1542E-06	1.9092E-12
1.7094E+04	1.7334E-03	3.1689E-06	1.9542E-12
1.7383E+04	1.6828E-03	3.1832E-06	1.9993E-12
1.7672E+04	1.6337E-03	3.1971E-06	2.0446E-12
1.7961E+04	1.5860E-03	3.2106E-06	2.0901E-12
1.8250E+04	1.5397E-03	3.2236E-06	2.1358E-12

		[illegible]	[illegible]
[illegible]	[illegible]	3.4[illegible]95E-06	3.[illegible]272E-12
2.6429E+04	[illegible]	3.47[illegible]1E-06	3.48[illegible]E-12
2.9156E+04	5.03[illegible]6E-04	3.5137E-06	[illegible].9567E-12
3.1882E+04	3.8[illegible]52E-04	3.55[illegible]1E-06	4.4303E-12
3.46[illegible]9E+04	2.8772E-04	3.57[illegible]1E-06	4.9080E-12
3.7335E+04	2.1755E-04	3.5957E-06	5.3887E-12
4.0062E+04	1.6449E-04	3.6104E-06	5.8716E-12
4.2788E+04	1.2439E-04	3.6215E-06	6.3563E-12
4.5515E+04	9.4042E-05	3.6298E-06	6.8423E-12
4.8241E+04	7.1107E-05	3.6360E-06	7.3292E-12
5.0967E+04	5.3765E-05	3.6406E-06	7.8169E-12
5.3694E+04	4.0652E-05	3.6440E-06	8.3051E-12
5.6420E+04	3.0738E-05	3.6465E-06	8.7936E-12
5.9147E+04	2.3241E-05	3.6483E-06	9.2825E-12
6.1873E+04	1.7573E-05	3.6497E-06	9.7716E-12
6.46[illegible]0E+04	1.3287E-05	3.6506E-06	1.0261E-11
6.7326E+04	1.0047E-05	3.6512E-06	1.0750E-11
7.0053E+04	7.5965E-06	3.6516E-06	1.1240E-11
7.2779E+04	5.7438E-06	3.6518E-06	1.1729E-11
7.55[illegible]6E+04	4.3430E-06	3.652[illegible]E-06	1.2218E-11
7.8232E+04	3.2838E-06	3.6520E-06	1.2708E-11
8.0958E+04	2.4829E-06	3.6519E-06	1.3197E-11
8.3685E+04	1.8774E-06	3.6518E-06	1.3687E-11
8.6411E+04	1.4195E-06	3.6516E-06	1.4176E-11
8.9138E+04	1.0733E-06	3.6514E-06	1.4666E-11
9.1864E+04	8.1156E-07	3.6512E-06	1.5155E-11
9.4591E+04	6.1363E-07	3.6510E-06	1.5644E-11
9.7317E+04	4.6393E-07	3.6507E-06	1.6134E-11
1.00[illegible]4E+05	3.5082E-07	3.6505E-06	1.6623E-11
1.0277E+05	2.6526E-07	3.6502E-06	1.7112E-11
1.0550E+05	2.0057E-07	3.6499E-06	1.7602E-11
1.0822E+05	1.5165E-07	3.6497E-06	1.8091E-11
1.1095E+05	1.1467E-07	3.6494E-06	1.8580E-11
1.1368E+05	8.6701E-08	3.6491E-06	1.9069E-11
1.164[illegible]E+05	6.5555E-08	3.6488E-06	1.9558E-11
1.1913E+05	4.9568E-08	3.6485E-06	2.0047E-11
1.2186E+05	3.7479E-08	3.6483E-06	2.0536E-11
1.2458E+05	2.8339E-08	3.6480E-06	2.1025E-11
1.2731E+05	2.1427E-08	3.6477E-06	2.1514E-11
1.30[illegible]3E+05	1.6201E-08	3.6474E-06	2.2003E-11
1.3276E+05	1.2250E-08	3.6471E-06	2.2492E-11
1.3549E+05	9.2625E-09	3.6468E-06	2.2981E-11
1.3821E+05	7.0035E-09	3.6465E-06	2.3469E-11
1.4094E+05	5.2955E-09	3.6463E-06	2.3958E-11
1.4367E+05	4.0040E-09	3.6460E-06	2.4447E-11
1.4639E+05	3.0275E-09	3.6457E-06	2.4935E-11
1.4912E+05	2.2991E-09	3.6454E-06	2.5424E-11
1.5185E+05	1.73[illegible]8E-09	3.6451E-06	2.5913E-11
1.5457E+05	1.3087E-09	3.6448E-06	2.6401E-11
1.5730E+05	9.8954E-10	3.6445E-06	2.6890E-11
1.60[illegible]3E+05	7.4821E-10	3.6442E-06	2.7378E-11
1.6275E+05	5.6573E-10	3.6440E-06	2.7866E-11
1.6548E+05	4.2776E-10	3.6437E-06	2.8355E-11
1.6820E+05	3.2344E-10	3.6434E-06	2.8843E-11
1.7093E+05	2.4455E-10	3.6431E-06	2.9331E-11
1.7366E+05	1.8491E-10	3.6428E-06	2.9820E-11
1.7638E+05	1.3981E-10	3.6425E-06	3.0308E-11
1.7911E+05	1.0572E-10	3.6422E-06	3.0796E-11
1.8184E+05	7.9933E-11	3.6419E-06	3.1284E-11
1.8456E+05	6.0439E-11	3.6416E-06	3.1772E-11
1.8729E+05	4.5699E-11	3.6414E-06	3.2260E-11
1.9002E+05	3.4554E-11	3.6411E-06	3.2748E-11
1.9274E+05	2.6126E-11	3.6408E-06	3.3236E-11
1.9547E+05	1.9755E-11	3.6405E-06	3.3724E-11
1.9820E+05	1.4937E-11	3.6402E-06	3.4212E-11

2.[illegible]E+05	1.1[illegible]E-11	3.[illegible]E-06	3.47[illegible]E-11
2.3[illegible]E+05	9.8[illegible]E-12	3.[illegible]E-06	3.5[illegible]E-11
2.3638E+05	8.4568E-12	3.6333E-06	3.5676E-11
2.[illegible]E+05	7.8421E-12	3.6391E-06	3.6[illegible]E-11
2.1183E+05	3.6915E-12	3.6388E-06	3.6651E-11
2.1455E+05	2.7912E-12	3.6385E-06	3.7139E-11
2.1728E+05	2.1104E-12	3.6382E-06	3.7627E-11
2.2001E+05	1.5957E-12	3.6379E-06	3.8114E-11
2.2273E+05	1.2066E-12	3.6376E-06	3.8602E-11
2.2546E+05	9.1233E-13	3.6373E-06	3.9089E-11
2.2819E+05	6.8983E-13	3.6370E-06	3.9577E-11
2.3091E+05	5.2157E-13	3.6368E-06	4.0[illegible]E-11
2.3364E+05	3.9437E-13	3.6365E-06	4.0552E-11
2.3637E+05	2.9819E-13	3.6362E-06	4.1039E-11
2.3666E+05	2.8948E-13	3.6361E-06	4.1091E-11
2.3694E+05	2.8103E-13	3.6361E-06	4.1142E-11
2.3723E+05	2.7283E-13	3.6361E-06	4.1194E-11
2.3752E+05	2.6486E-13	3.6361E-06	4.1246E-11
2.3781E+05	2.5713E-13	3.6360E-06	4.1297E-11
2.3810E+05	2.4962E-13	3.6360E-06	4.1349E-11
2.3839E+05	2.4234E-13	3.6360E-06	4.1401E-11
2.3868E+05	2.3526E-13	3.6359E-06	4.1452E-11
2.3897E+05	2.2839E-13	3.6359E-06	4.1504E-11
2.3926E+05	2.2172E-13	3.6359E-06	4.1556E-11
2.3954E+05	2.1525E-13	3.6358E-06	4.1607E-11
2.3983E+05	2.0897E-13	3.6358E-06	4.1659E-11
2.4012E+05	2.0287E-13	3.6358E-06	4.1711E-11
2.4041E+05	1.9694E-13	3.6358E-06	4.1762E-11
2.407[illegible]E+05	1.9119E-13	3.6357E-06	4.1814E-11
2.4099E+05	1.8561E-13	3.6357E-06	4.1865E-11
2.4128E+05	1.8019E-13	3.6357E-06	4.1917E-11
2.4157E+05	1.7493E-13	3.6356E-06	4.1969E-11
2.4186E+05	1.6983E-13	3.6356E-06	4.2020E-11
2.4215E+05	1.6487E-13	3.6356E-06	4.2072E-11
2.4243E+05	1.6006E-13	3.6355E-06	4.2124E-11
2.4272E+05	1.5538E-13	3.6355E-06	4.2175E-11
2.4301E+05	1.5085E-13	3.6355E-06	4.2227E-11
2.4330E+05	1.4644E-13	3.6354E-06	4.2279E-11
2.4359E+05	1.4216E-13	3.6353E-06	4.2329E-11
2.4388E+05	1.3796E-13	3.6339E-06	4.2364E-11
2.4417E+05	1.3350E-13	3.6221E-06	4.2279E-11
2.4446E+05	1.2746E-13	3.5623E-06	4.1631E-11
2.4475E+05	1.1688E-13	3.3647E-06	3.9371E-11
2.4504E+05	9.8573E-14	2.9232E-06	3.4246E-11
2.4532E+05	7.3032E-14	2.2307E-06	2.6166E-11
2.4561E+05	4.5889E-14	1.4438E-06	1.6956E-11
2.4590E+05	2.3981E-14	7.7719E-07	9.1384E-12
2.4619E+05	1.0351E-14	3.4556E-07	4.0681E-12
2.4648E+05	3.6957E-15	1.2708E-07	1.4979E-12
2.4677E+05	1.0981E-15	3.8837E-08	4.5903E-13
2.47[illegible]E+05	2.7391E-16	9.9936E-09	1.1808E-13
2.4735E+05	5.7902E-17	2.1761E-09	2.5743E-14
2.4764E+05	1.0476E-17	4.0557E-10	4.8036E-15
2.4792E+05	1.6382E-18	6.5325E-11	7.7465E-16
2.4821E+05	2.2344E-19	9.1773E-12	1.0896E-16
2.4850E+05	2.6815E-20	1.1345E-12	1.3486E-17
2.4879E+05	2.8547E-21	1.2441E-13	1.4807E-18
2.49[illegible]E+05	2.7164E-22	1.2194E-14	1.4530E-19
2.4937E+05	2.3256E-23	1.0759E-15	1.2835E-20
2.4966E+05	1.8056E-24	8.6033E-17	1.0272E-21
2.4995E+05	0.	6.2758E-18	7.5058E-23
2.5024E+05	0.	4.3935E-19	5.2566E-24
2.5053E+05	0.	2.9652E-20	6.1916E-25
2.5081E+05	0.	2.5826E-20	3.0995E-25
2.5110E+05	0.	2.5826E-20	3.1031E-25
2.5139E+05	0.	2.5925E-20	3.1068E-25

2.5189E+05	0.	2.5823E-20	3.1105E-25
2.5197E+05	0.	2.5825E-20	3.1141E-25
2.5205E+05	0.	2.5825E-20	3.1178E-25
2.5253E+05	0.	3.5824E-20	3.1215E-25
2.5289E+05	0.	2.5824E-20	3.1251E-25
2.5315E+05	0.	2.5824E-20	3.1288E-25
2.5341E+05	0.	2.5824E-20	3.1325E-25
2.5373E+05	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
9.0000E+05	0.	0.	0.
1.0000E+06	1.	0.	0.

TIME (YEARS)	PU239	U236	TH232
8.5512E+01	0.	0.	0.
8.5242E+01	0.	0.	0.
1.0698E+02	0.	0.	0.
1.2773E+02	0.	0.	0.
1.4897E+02	0.	0.	0.
1.6921E+02	0.	0.	0.
1.8935E+02	0.	0.	0.
2.1069E+02	0.	0.	0.
2.3143E+02	0.	0.	0.
2.5218E+02	0.	0.	0.
2.7292E+02	0.	0.	0.
2.9366E+02	0.	0.	0.
3.1440E+02	2.3998E-23	2.2340E-27	0.
3.3514E+02	3.1296E-20	3.0005E-24	0.
3.5588E+02	1.3891E-17	1.3430E-21	2.2227E-29
3.7662E+02	2.4667E-15	2.4047E-19	4.1997E-27
3.9737E+02	2.0250E-13	1.9906E-17	3.6574E-25
4.1811E+02	8.6325E-12	8.3557E-16	1.6494E-23
4.3885E+02	2.1002E-10	2.0986E-14	4.2347E-22
4.5959E+02	3.1516E-09	3.1749E-13	6.6910E-21
4.8033E+02	3.1113E-08	3.1603E-12	6.9420E-20
5.0107E+02	2.1347E-07	2.1854E-11	4.9945E-19
5.2182E+02	1.0656E-06	1.0996E-10	2.6102E-18
5.4256E+02	4.0278E-06	4.1835E-10	1.0313E-17
5.6330E+02	1.1938E-05	1.2516E-09	3.1905E-17
5.8404E+02	2.8616E-05	3.0237E-09	7.9716E-17
6.0478E+02	5.7055E-05	6.0759E-09	1.6545E-16
6.2552E+02	9.7093E-05	1.0420E-08	2.9275E-16
6.4627E+02	1.4948E-04	1.5625E-08	4.5245E-16
6.6701E+02	1.9238E-04	2.0966E-08	6.2504E-16
6.8775E+02	2.3429E-04	2.5729E-08	7.8901E-16
7.0849E+02	2.6641E-04	2.9479E-08	9.2905E-16
7.2923E+02	2.8815E-04	3.2126E-08	1.0397E-15
7.4997E+02	3.0121E-04	3.3835E-08	1.1235E-15
7.7072E+02	3.0815E-04	3.4874E-08	1.1873E-15
7.9146E+02	3.1133E-04	3.5495E-08	1.2382E-15
8.1220E+02	3.1244E-04	3.5887E-08	1.2818E-15
8.3294E+02	3.1254E-04	3.6163E-08	1.3217E-15
8.5368E+02	3.1218E-04	3.6386E-08	1.3600E-15
8.7442E+02	3.1163E-04	3.6586E-08	1.3977E-15
8.9517E+02	3.1100E-04	3.6778E-08	1.4353E-15
9.1591E+02	3.1036E-04	3.6967E-08	1.4729E-15
9.3665E+02	3.0973E-04	3.7154E-08	1.5107E-15
9.5739E+02	3.0909E-04	3.7340E-08	1.5487E-15
9.7813E+02	3.0839E-04	3.7526E-08	1.5869E-15
9.9887E+02	3.0773E-04	3.7711E-08	1.6252E-15
1.0196E+03	3.0708E-04	3.7896E-08	1.6638E-15
1.0404E+03	3.0643E-04	3.8080E-08	1.7025E-15
1.0611E+03	3.0578E-04	3.8265E-08	1.7414E-15
1.0818E+03	3.0513E-04	3.8448E-08	1.7806E-15
1.1026E+03	3.0448E-04	3.8632E-08	1.8199E-15
1.1233E+03	3.0383E-04	3.8815E-08	1.8593E-15
1.1441E+03	3.0319E-04	3.8997E-08	1.8990E-15
1.1648E+03	3.0254E-04	3.9179E-08	1.9389E-15
1.1855E+03	3.0190E-04	3.9361E-08	1.9789E-15
1.2063E+03	3.0126E-04	3.9542E-08	2.0191E-15
1.2270E+03	3.0062E-04	3.9723E-08	2.0595E-15
1.2478E+03	2.9998E-04	3.9904E-08	2.1001E-15
1.2685E+03	2.9934E-04	4.0084E-08	2.1409E-15
1.2893E+03	2.9871E-04	4.0264E-08	2.1819E-15
1.3100E+03	2.9807E-04	4.0444E-08	2.2230E-15

1.7984E+04	4.1179E-08	1.2445E-07	4.9278E-13
1.7456E+05	5.6875E-12	1.2413E-07	1.0224E-12
2.6135E+05	7.8565E-16	1.2384E-07	1.5507E-12
3.4871E+05	1.0852E-19	1.2363E-07	2.0777E-12
4.3404E+05	1.4391E-23	1.2322E-07	2.6034E-12
5.2156E+05	0.	1.2291E-07	3.1277E-12
6.0865E+05	0.	1.2260E-07	3.6507E-12
6.9470E+05	0.	1.2229E-07	4.1724E-12
7.8138E+05	0.	1.2198E-07	4.6928E-12
8.6805E+05	0.	1.2168E-07	5.2119E-12
9.5473E+05	0.	1.2137E-07	5.7297E-12
1.0070E+06	0.	1.2121E-07	5.9996E-12

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
2.6418E+05	0.	0.	0.
2.9235E+05	0.	0.	0.
3.1773E+05	0.	0.	0.
3.4713E+05	0.	0.	0.
3.7458E+05	0.	0.	0.
4.0260E+05	0.	0.	0.
4.2843E+05	0.	0.	0.
4.5685E+05	0.	0.	0.
4.8428E+05	0.	0.	0.
5.1171E+05	0.	0.	0.
5.3913E+05	0.	0.	0.
5.6655E+05	0.	0.	0.
5.9398E+05	0.	0.	0.
6.2141E+05	0.	0.	0.
6.4883E+05	0.	0.	0.
6.7626E+05	0.	0.	0.
7.0369E+05	0.	0.	0.
7.3111E+05	0.	0.	0.
7.5854E+05	0.	0.	0.
7.8596E+05	0.	0.	0.
8.1339E+05	0.	0.	0.
8.4081E+05	0.	0.	0.
8.6824E+05	0.	0.	0.
8.9567E+05	0.	0.	0.
9.2309E+05	0.	0.	0.
9.5052E+05	0.	0.	0.
9.7794E+05	0.	0.	0.
1.0054E+06	0.	0.	0.

TIME (YEARS)	PU239	U236	TH232
4.6547E+02	0.	0.	0.
5.6013E+02	0.	0.	0.
6.5481E+02	0.	0.	0.
7.4951E+02	0.	0.	0.
8.4421E+02	0.	0.	0.
9.3892E+02	0.	0.	0.
1.0336E+03	0.	0.	0.
1.1283E+03	0.	0.	0.
1.2230E+03	0.	0.	0.
1.3177E+03	0.	0.	0.
1.4124E+03	0.	0.	0.
1.5071E+03	0.	0.	0.
1.6018E+03	0.	0.	0.
1.6965E+03	0.	0.	0.
1.7912E+03	0.	0.	0.
1.8859E+03	0.	0.	0.
1.9806E+03	0.	0.	0.
2.0754E+03	1.2563E-23	2.1339E-27	0.
2.1701E+03	2.9413E-21	5.1257E-25	0.
2.2648E+03	3.8869E-19	6.9468E-23	6.1965E-30
2.3595E+03	3.1967E-17	5.6923E-21	5.2641E-28
2.4542E+03	1.5923E-15	2.8300E-19	2.8626E-26
2.5489E+03	5.5008E-14	1.0582E-17	1.0475E-24
2.6436E+03	1.3367E-12	2.6334E-16	2.6920E-23
2.7383E+03	2.3705E-11	4.7811E-15	5.0416E-22
2.8330E+03	3.1676E-10	6.5384E-14	7.1050E-21
2.9277E+03	3.2793E-09	6.9255E-13	7.7475E-20
3.0224E+03	2.6952E-08	5.8218E-12	6.6989E-19
3.1171E+03	1.7967E-07	3.9684E-11	4.6929E-18
3.2118E+03	9.9013E-07	2.2356E-10	2.7149E-17
3.3065E+03	4.5875E-06	1.0586E-09	1.3191E-16
3.4012E+03	1.8141E-05	4.2771E-09	5.4653E-16
3.4959E+03	6.2064E-05	1.4996E-08	1.9572E-15
3.5906E+03	1.8594E-04	4.5729E-08	6.1326E-15
3.6853E+03	4.9325E-04	1.2385E-07	1.7000E-14
3.7800E+03	1.1702E-03	2.9993E-07	4.2116E-14
3.8747E+03	2.5061E-03	6.5549E-07	9.4107E-14
3.9694E+03	4.8856E-03	1.3038E-06	1.9129E-13
4.0641E+03	8.7387E-03	2.3793E-06	3.5651E-13
4.1588E+03	1.4447E-02	4.0113E-06	6.1374E-13
4.2535E+03	2.2233E-02	6.2937E-06	9.8273E-13
4.3482E+03	3.2045E-02	9.2494E-06	1.4733E-12
4.4429E+03	4.3548E-02	1.2812E-05	2.0811E-12
4.5376E+03	5.6129E-02	1.6830E-05	2.7865E-12
4.6323E+03	6.9518E-02	2.1087E-05	3.5575E-12
4.7270E+03	8.1421E-02	2.5344E-05	4.3552E-12
4.8217E+03	9.2657E-02	2.9579E-05	5.1498E-12
4.9164E+03	1.0225E-01	3.3723E-05	5.8816E-12
5.0111E+03	1.0937E-01	3.6163E-05	6.5551E-12
5.1059E+03	1.1581E-01	3.8772E-05	7.1499E-12
5.2006E+03	1.1991E-01	4.0869E-05	7.6650E-12
5.2953E+03	1.2255E-01	4.2512E-05	8.1070E-12
5.3900E+03	1.2401E-01	4.3782E-05	8.4868E-12
5.4847E+03	1.2459E-01	4.4759E-05	8.8173E-12
5.5794E+03	1.2454E-01	4.5521E-05	9.1108E-12
5.6741E+03	1.2426E-01	4.6130E-05	9.3782E-12
5.7688E+03	1.2330E-01	4.6635E-05	9.6279E-12
5.8635E+03	1.2236E-01	4.7071E-05	9.8666E-12
5.9582E+03	1.2133E-01	4.7463E-05	1.0099E-11
6.0529E+03	1.2024E-01	4.7827E-05	1.0328E-11
6.1476E+03	1.1912E-01	4.8173E-05	1.0555E-11

6.2923E+03	1.1793E-01	4.8538E-05	1.0782E-11
6.3376E+03	1.1686E-01	4.8836E-05	1.1010E-11
6.4317E+03	1.1574E-01	4.9158E-05	1.1238E-11
6.5264E+03	1.1462E-01	4.9475E-05	1.1468E-11
6.6211E+03	1.1352E-01	4.9789E-05	1.1700E-11
6.7158E+03	1.1242E-01	5.0139E-05	1.1932E-11
6.8105E+03	1.1134E-01	5.0437E-05	1.2166E-11
6.9052E+03	1.1026E-01	5.0711E-05	1.2402E-11
6.9999E+03	1.0919E-01	5.1012E-05	1.2638E-11
7.0946E+03	1.0814E-01	5.1310E-05	1.2877E-11
7.1893E+03	1.0709E-01	5.1636E-05	1.3116E-11
7.2841E+03	1.0606E-01	5.1878E-05	1.3357E-11
7.3787E+03	1.0503E-01	5.2188E-05	1.3599E-11
7.4734E+03	1.0402E-01	5.2475E-05	1.3843E-11
7.5681E+03	1.0301E-01	5.2759E-05	1.4088E-11
7.6628E+03	1.0202E-01	5.3041E-05	1.4334E-11
7.7575E+03	1.0103E-01	5.3319E-05	1.4582E-11
7.8522E+03	1.0006E-01	5.3595E-05	1.4831E-11
7.9469E+03	9.9089E-02	5.3869E-05	1.5081E-11
8.0416E+03	9.8132E-02	5.4139E-05	1.5332E-11
8.1364E+03	9.7194E-02	5.4408E-05	1.5585E-11
8.2311E+03	9.6244E-02	5.4673E-05	1.5839E-11
8.3258E+03	9.5314E-02	5.4936E-05	1.6094E-11
8.4205E+03	9.4393E-02	5.5196E-05	1.6350E-11
8.5152E+03	9.3481E-02	5.5454E-05	1.6608E-11
8.6099E+03	9.2578E-02	5.5709E-05	1.6867E-11
8.7046E+03	9.1683E-02	5.5962E-05	1.7127E-11
8.7993E+03	9.0797E-02	5.6213E-05	1.7388E-11
8.8940E+03	8.9920E-02	5.6461E-05	1.7650E-11
8.9887E+03	8.9051E-02	5.6706E-05	1.7913E-11
9.0834E+03	8.8193E-02	5.6950E-05	1.8178E-11
9.1781E+03	8.7338E-02	5.7191E-05	1.8444E-11
9.2728E+03	8.6494E-02	5.7429E-05	1.8711E-11
9.3675E+03	8.5658E-02	5.7665E-05	1.8978E-11
9.4622E+03	8.4830E-02	5.7899E-05	1.9247E-11
9.5569E+03	8.4011E-02	5.8131E-05	1.9518E-11
9.6516E+03	8.3199E-02	5.8361E-05	1.9789E-11
9.7463E+03	8.2395E-02	5.8588E-05	2.0061E-11
9.8410E+03	8.1599E-02	5.8813E-05	2.0334E-11
9.9357E+03	8.0813E-02	5.9036E-05	2.0609E-11
1.0030E+04	8.0034E-02	5.9255E-05	2.0885E-11
1.0125E+04	7.9256E-02	5.9475E-05	2.1160E-11
1.0220E+04	7.8493E-02	5.9691E-05	2.1438E-11
1.0315E+04	7.7731E-02	5.9905E-05	2.1716E-11
1.0410E+04	7.6983E-02	6.0118E-05	2.1995E-11
1.0505E+04	7.6235E-02	6.0328E-05	2.2276E-11
1.0599E+04	7.5500E-02	6.0537E-05	2.2557E-11
1.0693E+04	7.4773E-02	6.0743E-05	2.2839E-11
1.0788E+04	7.4048E-02	6.0947E-05	2.3123E-11
1.0883E+04	7.3332E-02	6.1149E-05	2.3407E-11
1.0977E+04	7.2623E-02	6.1349E-05	2.3692E-11
1.1072E+04	7.1922E-02	6.1548E-05	2.3978E-11
1.1167E+04	7.1227E-02	6.1744E-05	2.4265E-11
1.1262E+04	7.0534E-02	6.1938E-05	2.4553E-11
1.1356E+04	6.9857E-02	6.2131E-05	2.4842E-11
1.1451E+04	6.9182E-02	6.2322E-05	2.5132E-11
1.1546E+04	6.8513E-02	6.2511E-05	2.5422E-11
1.1640E+04	6.7851E-02	6.2698E-05	2.5714E-11
1.1735E+04	6.7195E-02	6.2883E-05	2.6006E-11
1.1830E+04	6.6546E-02	6.3067E-05	2.6299E-11
1.1924E+04	6.5903E-02	6.3249E-05	2.6593E-11
1.2019E+04	6.5266E-02	6.3429E-05	2.6888E-11
1.2114E+04	6.4635E-02	6.3607E-05	2.7184E-11
[illegible]	[illegible]	6.3784E-05	2.7480E-11
[illegible]	[illegible]	[illegible]	2.7778E-11

[illegible]	[illegible]	[illegible]	[illegible]
1.2682E+04	6.0977E-02	6.4543E-05	2.8670E-11
1.2777E+04	6.0348E-02	6.4632E-05	2.8973E-11
1.2872E+04	5.9914E-02	6.4932E-05	2.9276E-11
1.2966E+04	5.9226E-02	6.4972E-05	2.9579E-11
1.3061E+04	5.9654E-02	6.5135E-05	2.7881E-11
1.3156E+04	5.8087E-02	6.5297E-05	3.0185E-11
1.3250E+04	5.7526E-02	6.5457E-05	3.0489E-11
1.3345E+04	5.6972E-02	6.5516E-05	3.0794E-11
1.3440E+04	5.6419E-02	6.5773E-05	3.1100E-11
1.3534E+04	5.5974E-02	6.5928E-05	3.1407E-11
1.3629E+04	5.5334E-02	6.5082E-05	3.1714E-11
1.3724E+04	5.4799E-02	6.5235E-05	3.2022E-11
1.3819E+04	5.4269E-02	6.6386E-05	3.2331E-11
1.3913E+04	5.3743E-02	6.6535E-05	3.2640E-11
1.4008E+04	5.3215E-02	6.6680E-05	3.2949E-11
1.4103E+04	5.2677E-02	6.6816E-05	3.3254E-11
1.4197E+04	5.2103E-02	6.6931E-05	3.3550E-11
1.4292E+04	5.1447E-02	6.6991E-05	3.3820E-11
1.4387E+04	5.0630E-02	6.6935E-05	3.4031E-11
1.4481E+04	4.9539E-02	6.6555E-05	3.4128E-11
1.4576E+04	4.8033E-02	6.5992E-05	3.4025E-11
1.4671E+04	4.5970E-02	6.4743E-05	3.3614E-11
1.4766E+04	4.3240E-02	6.2593E-05	3.2776E-11
1.4860E+04	3.9807E-02	5.9564E-05	3.1408E-11
1.4955E+04	3.5731E-02	5.5573E-05	2.9455E-11
1.5050E+04	3.1173E-02	5.0468E-05	2.6931E-11
1.5144E+04	2.6370E-02	4.4546E-05	2.3932E-11
1.5239E+04	2.1592E-02	3.8123E-05	2.0620E-11
1.5334E+04	1.7096E-02	3.1580E-05	1.7196E-11
1.5428E+04	1.3082E-02	2.5295E-05	1.3865E-11
1.5523E+04	9.6745E-03	1.9581E-05	1.0805E-11
1.5618E+04	6.9163E-03	1.4698E-05	8.1363E-12
1.5713E+04	4.7825E-03	1.0593E-05	5.9227E-12
1.5807E+04	3.2009E-03	7.4097E-06	4.1698E-12
1.5902E+04	2.0755E-03	5.0166E-06	2.8415E-12
1.5997E+04	1.3050E-03	3.2903E-06	1.8757E-12
1.6091E+04	7.9649E-04	2.0926E-06	1.2006E-12
1.6186E+04	4.7234E-04	1.2918E-06	7.4593E-13
1.6281E+04	2.7246E-04	7.7487E-07	4.5028E-13
1.6376E+04	1.5302E-04	4.5207E-07	2.6437E-13
1.6470E+04	8.3765E-05	2.5530E-07	1.5112E-13
1.6565E+04	4.4735E-05	1.4218E-07	8.4194E-14
1.6660E+04	2.3331E-05	7.6794E-08	4.5761E-14
1.6754E+04	1.1894E-05	4.0516E-08	2.4287E-14
1.6849E+04	5.9319E-06	2.0884E-08	1.2599E-14
1.6944E+04	2.8968E-06	1.0533E-08	6.3940E-15
1.7038E+04	1.3863E-06	5.2021E-09	3.1772E-15
1.7133E+04	6.5069E-07	2.5177E-09	1.5470E-15
1.7228E+04	2.9976E-07	1.1950E-09	7.3877E-16
1.7323E+04	1.3563E-07	5.5672E-10	3.4624E-16
1.7417E+04	6.0319E-08	2.5473E-10	1.5938E-16
1.7512E+04	2.6383E-08	1.1456E-10	7.2104E-17
1.7607E+04	1.1357E-08	5.0669E-11	3.2081E-17
1.7701E+04	4.8140E-09	2.2055E-11	1.4047E-17
1.7796E+04	2.0105E-09	9.4531E-12	6.0564E-18
1.7891E+04	8.2779E-10	3.9921E-12	2.5727E-18
1.7985E+04	3.3617E-10	1.6620E-12	1.0773E-18
1.8080E+04	1.3472E-10	6.8245E-13	4.4494E-19
1.8175E+04	5.3305E-11	2.7653E-13	1.8134E-19
1.8270E+04	2.0832E-11	1.1063E-13	7.2965E-20
1.8364E+04	8.0453E-12	4.3715E-14	2.8997E-20
1.8459E+04	3.0715E-12	1.7069E-14	1.1387E-20
1.8554E+04	1.1597E-12	6.5889E-15	4.4206E-21
1.8648E+04	4.3311E-13	2.5151E-15	1.6970E-21
		9.4968E-16	6.4438E-22

1.8745E+04	1.6035E-13	3.5543E-16	2.4255E-22
1.[illegible]E+04	5.8773E-14	1.3172E-16	9.0382E-23
1.8[illegible]E+04	2.1228E-14	4.8399E-17	3.3187E-23
1.9027E+04	7.6857E-15	1.7656E-17	1.2215E-23
1.9122E+04	2.9132E-15	6.7397E-18	4.7017E-24
1.9217E+04	1.1085E-15	2.5952E-18	1.8204E-24
1.9311E+04	4.3912E-16	1.0393E-18	7.3500E-25
1.9407E+04	2.1794E-16	5.2025E-19	3.6892E-25

TIME (YEARS)	PU240	U235	TH232
9.9873E+03	0.	0.	0.
1.1872E+04	0.	0.	0.
1.4847E+04	0.	0.	0.
1.7486E+04	0.	0.	0.
2.0326E+04	0.	0.	0.
2.3166E+04	0.	0.	0.
2.6005E+04	0.	0.	0.
2.8845E+04	0.	0.	0.
3.1684E+04	0.	0.	0.
3.4524E+04	0.	0.	0.
3.7364E+04	0.	0.	0.
4.0203E+04	0.	0.	0.
4.3043E+04	0.	0.	0.
4.5883E+04	0.	0.	0.
4.8722E+04	0.	0.	0.
5.1562E+04	0.	0.	0.
5.4402E+04	5.3147E-25	5.1236E-26	1.1853E-31
5.7241E+04	1.4711E-21	1.8988E-22	4.6549E-28
6.0081E+04	1.1695E-18	2.0189E-19	5.2287E-25
6.2921E+04	3.1607E-16	7.3092E-17	1.9944E-22
6.5760E+04	3.3564E-14	1.0338E-14	2.9787E-20
6.8600E+04	1.5766E-12	6.5296E-13	1.9633E-18
7.1439E+04	3.6251E-11	2.0089E-11	6.3201E-17
7.4279E+04	4.4507E-10	3.3002E-10	1.0843E-15
7.7119E+04	3.1481E-09	3.1233E-09	1.0698E-14
7.9958E+04	1.3726E-08	1.8221E-08	6.4952E-14
8.2798E+04	3.9259E-08	6.9718E-08	2.5826E-13
8.5638E+04	7.8093E-08	1.8556E-07	7.1333E-13
8.8477E+04	1.1455E-07	3.6423E-07	1.4509E-12
9.1317E+04	1.3154E-07	5.5953E-07	2.3074E-12
9.4157E+04	1.2574E-07	7.1557E-07	3.0509E-12
9.6996E+04	1.0627E-07	8.0910E-07	3.5629E-12
9.9836E+04	8.3656E-08	8.5215E-07	3.8717E-12
1.0268E+05	6.3667E-08	8.6767E-07	4.0636E-12
1.0552E+05	4.7832E-08	8.7212E-07	4.2065E-12
1.0836E+05	3.5792E-08	8.7311E-07	4.3335E-12
1.1119E+05	2.6757E-08	8.7325E-07	4.4565E-12
1.1403E+05	1.9939E-08	8.7321E-07	4.5785E-12
1.1687E+05	1.4947E-08	8.7315E-07	4.7004E-12
1.1971E+05	1.1171E-08	8.7309E-07	4.8223E-12
1.2255E+05	8.3493E-09	8.7301E-07	4.9442E-12
1.2539E+05	6.2422E-09	8.7293E-07	5.0661E-12
1.2823E+05	4.6639E-09	8.7286E-07	5.1879E-12
1.3107E+05	3.4857E-09	8.7279E-07	5.3098E-12
1.3391E+05	2.6052E-09	8.7272E-07	5.4316E-12
1.3675E+05	1.9471E-09	8.7265E-07	5.5534E-12
1.3959E+05	1.4552E-09	8.7258E-07	5.6752E-12
1.4243E+05	1.0876E-09	8.7251E-07	5.7970E-12
1.4527E+05	8.1289E-10	8.7243E-07	5.9188E-12
1.4811E+05	6.0755E-10	8.7236E-07	6.0406E-12
1.5095E+05	4.5407E-10	8.7229E-07	6.1624E-12
1.5379E+05	3.3937E-10	8.7222E-07	6.2841E-12
1.5663E+05	2.5364E-10	8.7215E-07	6.4059E-12
1.5947E+05	1.8957E-10	8.7207E-07	6.5276E-12
1.6231E+05	1.4168E-10	8.7200E-07	6.6494E-12
1.6515E+05	1.0589E-10	8.7193E-07	6.7711E-12
1.6799E+05	7.9143E-11	8.7186E-07	6.8928E-12
1.7083E+05	5.9151E-11	8.7179E-07	7.0145E-12
1.7367E+05	4.4219E-11	8.7171E-07	7.1362E-12
1.7651E+05	3.3041E-11	8.7164E-07	7.2579E-12
1.7935E+05	2.4695E-11	8.7157E-07	7.3795E-12

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	8.2402E-12
[illegible]	[illegible]	[illegible]	8.5778E-12
[illegible]	[illegible]	[illegible]	9.1113E-12
[illegible]	[illegible]	[illegible]	9.5427E-12
[illegible]	[illegible]	[illegible]	9.9750E-12
2.5078E+05	1.7486E-14	8.6978E-07	1.0497E-11
2.6719E+05	6.2044E-15	8.5953E-07	1.0839E-11
2.7029E+05	2.2015E-15	8.6927E-07	1.1271E-11
2.8040E+05	7.8113E-16	8.6902E-07	1.1703E-11
2.9058E+05	2.7715E-16	8.6877E-07	1.2134E-11
3.0061E+05	9.8345E-17	8.6851E-07	1.2566E-11
3.1071E+05	3.4895E-17	8.6826E-07	1.2997E-11
3.2082E+05	1.2382E-17	8.6801E-07	1.3428E-11
3.3092E+05	4.3933E-18	8.6775E-07	1.3860E-11
3.4103E+05	1.5588E-18	8.6749E-07	1.4291E-11
3.5113E+05	5.5311E-19	8.6724E-07	1.4721E-11
3.6124E+05	1.9626E-19	8.6699E-07	1.5152E-11
3.7134E+05	6.9636E-20	8.6673E-07	1.5583E-11
3.8145E+05	2.4709E-20	8.6648E-07	1.6013E-11
3.9155E+05	8.7672E-21	8.6622E-07	1.6444E-11
4.0166E+05	3.1108E-21	8.6597E-07	1.6874E-11
4.1176E+05	1.1038E-21	8.6572E-07	1.7304E-11
4.2187E+05	3.9165E-22	8.6546E-07	1.7734E-11
4.3197E+05	1.3897E-22	8.6521E-07	1.8164E-11
4.4208E+05	4.9308E-23	8.6495E-07	1.8594E-11
4.5218E+05	1.7496E-23	8.6471E-07	1.9023E-11
4.6229E+05	6.2079E-24	8.6446E-07	1.9453E-11
4.7239E+05	2.2027E-24	8.6419E-07	1.9882E-11
4.8250E+05	7.8157E-25	8.6394E-07	2.0311E-11
4.9260E+05	2.7732E-25	8.6369E-07	2.0740E-11
5.0271E+05	0.	8.6344E-07	2.1169E-11
5.1281E+05	0.	8.6318E-07	2.1598E-11
5.2292E+05	0.	8.6293E-07	2.2027E-11
5.3302E+05	0.	8.6268E-07	2.2455E-11
5.4313E+05	0.	8.6242E-07	2.2884E-11
5.5323E+05	0.	8.6217E-07	2.3312E-11
5.6334E+05	0.	8.6192E-07	2.3740E-11
5.7344E+05	0.	8.6167E-07	2.4168E-11
5.8355E+05	0.	8.6141E-07	2.4596E-11
5.9365E+05	0.	8.6116E-07	2.5024E-11
6.0376E+05	0.	8.6091E-07	2.5452E-11
6.1386E+05	0.	8.6065E-07	2.5880E-11
6.2397E+05	0.	8.6040E-07	2.6307E-11
6.3407E+05	0.	8.6015E-07	2.6734E-11
6.4418E+05	0.	8.5990E-07	2.7162E-11
6.5428E+05	0.	8.5965E-07	2.7589E-11
6.6439E+05	0.	8.5940E-07	2.8016E-11
6.7449E+05	0.	8.5914E-07	2.8442E-11
6.8460E+05	0.	8.5889E-07	2.8869E-11
6.9470E+05	0.	8.5864E-07	2.9296E-11
7.0481E+05	0.	8.5839E-07	2.9722E-11
7.1491E+05	0.	8.5814E-07	3.0149E-11
7.2502E+05	0.	8.5789E-07	3.0575E-11
7.3512E+05	0.	8.5763E-07	3.1001E-11
7.4523E+05	0.	8.5738E-07	3.1427E-11
7.5533E+05	0.	8.5713E-07	3.1853E-11
7.6544E+05	0.	8.5688E-07	3.2278E-11
7.7554E+05	0.	8.5663E-07	3.2704E-11
7.8565E+05	0.	8.5638E-07	3.3129E-11
7.9575E+05	0.	8.5613E-07	3.3555E-11
8.0586E+05	0.	8.5588E-07	3.3980E-11
8.1596E+05	0.	8.5563E-07	3.4405E-11
8.2607E+05	0.	8.5538E-07	3.4830E-11
8.3617E+05	0.	8.5513E-07	3.5255E-11
8.4628E+05	0.	8.5487E-07	3.5680E-11

9.5616E+05	.	8.5452E-07	3.6104E-11
9.5649E+05	0.	8.5437E-07	3.6529E-11
9.7659E+05	0.	8.5412E-07	3.6953E-11
9.8673E+05	0.	8.5387E-07	3.7377E-11
9.9649E+05	0.	8.5362E-07	3.7801E-11
9.0681E+05	0.	8.5337E-07	3.8225E-11
9.1701E+05	0.	8.5312E-07	3.8649E-11
9.2712E+05	0.	8.5287E-07	3.9073E-11
9.3722E+05	0.	8.5262E-07	3.9496E-11
9.4733E+05	0.	8.5237E-07	3.9920E-11
9.5743E+05	0.	8.5212E-07	4.0343E-11
9.6754E+05	0.	8.5187E-07	4.0766E-11
9.7764E+05	0.	8.5162E-07	4.1189E-11
9.8775E+05	0.	8.5137E-07	4.1612E-11
9.9785E+05	0.	8.5113E-07	4.1731E-11
9.0796E+05	0.	8.5123E-07	4.1850E-11
9.1806E+05	0.	8.5115E-07	4.1969E-11
9.2817E+05	0.	8.5103E-07	4.2088E-11
1.0082E+06	.	8.5107E-07	4.2125E-11

NUCLIDE DISCHARGE RATE (CI/YR)

TIME (YEARS)	PU241	U236	TH232
9.5226E+02	0.	0.	0.
1.1884E+03	0.	0.	0.
1.4742E+03	0.	0.	0.
1.7601E+03	0.	0.	0.
2.0459E+03	0.	0.	0.
2.3317E+03	0.	0.	0.
2.6175E+03	0.	0.	0.
2.9034E+03	0.	0.	0.
3.1892E+03	0.	0.	0.
3.4750E+03	0.	0.	0.
3.7608E+03	0.	0.	0.
4.0467E+03	0.	0.	0.
4.3325E+03	0.	0.	0.
4.6183E+03	0.	0.	0.
4.9041E+03	0.	0.	0.
5.1899E+03	0.	0.	0.
5.4758E+03	0.	0.	0.
5.7616E+03	3.2878E-23	1.2419E-26	0.
6.0474E+03	2.6455E-19	1.0513E-22	2.2682E-29
6.3332E+03	5.2447E-16	2.1903E-19	4.9351E-26
6.6191E+03	3.0802E-13	1.3505E-16	3.1726E-23
6.9049E+03	6.2548E-11	2.8766E-14	7.0345E-21
7.1907E+03	5.0062E-09	2.4123E-12	6.1337E-19
7.4765E+03	1.7671E-07	8.9191E-11	2.3538E-17
7.7624E+03	3.0340E-06	1.6029E-09	4.3848E-16
8.0482E+03	2.7642E-05	1.5266E-08	4.3267E-15
8.3340E+03	1.4476E-04	8.3538E-08	2.4497E-14
8.6198E+03	4.7033E-04	2.8345E-07	8.5915E-14
8.9057E+03	1.0242E-03	6.4923E-07	2.0164E-13
9.1915E+03	1.6218E-03	1.0641E-06	3.4366E-13
9.4773E+03	2.0376E-03	1.3937E-06	4.6406E-13
9.7631E+03	2.2141E-03	1.5782E-06	5.4132E-13
1.0049E+04	2.2354E-03	1.6595E-06	5.8596E-13
1.0335E+04	2.1934E-03	1.6952E-06	6.1574E-13
1.0621E+04	2.1345E-03	1.7167E-06	6.4102E-13
1.0907E+04	2.0735E-03	1.7347E-06	6.6548E-13
1.1192E+04	2.0137E-03	1.7517E-06	6.9000E-13
1.1478E+04	1.9556E-03	1.7681E-06	7.1474E-13
1.1764E+04	1.8991E-03	1.7841E-06	7.3969E-13
1.2050E+04	1.8442E-03	1.7996E-06	7.6487E-13
1.2336E+04	1.7913E-03	1.8146E-06	7.9026E-13
1.2621E+04	1.7393E-03	1.8293E-06	8.1586E-13
1.2907E+04	1.6893E-03	1.8434E-06	8.4167E-13
1.3193E+04	1.6422E-03	1.8572E-06	8.6766E-13
1.3479E+04	1.5929E-03	1.8706E-06	8.9385E-13
1.3765E+04	1.5469E-03	1.8836E-06	9.2023E-13
1.4050E+04	1.5022E-03	1.8962E-06	9.4679E-13
1.4336E+04	1.4588E-03	1.9085E-06	9.7352E-13
1.4622E+04	1.4167E-03	1.9204E-06	1.0004E-12
1.4908E+04	1.3757E-03	1.9319E-06	1.0275E-12
1.5194E+04	1.3360E-03	1.9432E-06	1.0547E-12
1.5480E+04	1.2974E-03	1.9541E-06	1.0821E-12
1.5765E+04	1.2600E-03	1.9646E-06	1.1096E-12
1.6051E+04	1.2236E-03	1.9749E-06	1.1373E-12
1.6337E+04	1.1882E-03	1.9849E-06	1.1651E-12
1.6623E+04	1.1539E-03	1.9946E-06	1.1931E-12
1.6909E+04	1.1206E-03	2.0041E-06	1.2212E-12
1.7195E+04	1.0882E-03	2.0131E-06	1.2494E-12
1.7480E+04	1.0568E-03	2.0220E-06	1.2777E-12
1.7766E+04	1.0263E-03	2.0306E-06	1.3062E-12
1.8052E+04	9.9662E-04	2.0390E-06	1.3348E-12

[illegible]	[illegible]	[illegible]	[illegible]
3.13[illegible]E+04	2.5[illegible]E-04	2.24[illegible]E-06	2.7511E-12
3.5782E+04	[illegible]	2.274[illegible]E-06	3.24[illegible]E-12
4.0235E+04	1.2271E-04	2.2924E-06	3.7415E-12
4.4648E+04	6.5143E-05	2.3[illegible]7[illegible]E-06	4.2418E-12
4.90[illegible]E+04	4.1332E-05	2.3072E-06	4.7439E-12
5.3513E+04	2.6258E-05	2.3111E-06	5.2471E-12
5.7945E+04	1.6674E-05	2.3135E-06	5.7510E-12
6.2378E+04	1.0584E-05	2.3150E-06	6.2553E-12
6.6811E+04	6.7184E-06	2.3158E-06	6.7598E-12
7.1243E+04	4.2649E-06	2.3162E-06	7.2645E-12
7.5676E+04	2.7071E-06	2.3163E-06	7.7692E-12
8.0108E+04	1.7183E-06	2.3163E-06	8.2739E-12
8.4541E+04	1.0937E-06	2.3162E-06	8.7786E-12
8.8973E+04	6.9233E-07	2.3160E-06	9.2833E-12
9.3406E+04	4.3948E-07	2.3158E-06	9.7879E-12
9.7839E+04	2.7895E-07	2.3155E-06	1.0293E-11
1.0227E+05	1.7708E-07	2.3153E-06	1.0797E-11
1.0670E+05	1.1240E-07	2.3150E-06	1.1302E-11
1.1114E+05	7.1348E-08	2.3147E-06	1.1806E-11
1.1557E+05	4.5289E-08	2.3144E-06	1.2310E-11
1.20[illegible]E+05	2.8748E-08	2.3141E-06	1.2815E-11
1.2443E+05	1.8248E-08	2.3138E-06	1.3319E-11
1.2887E+05	1.1583E-08	2.3135E-06	1.3823E-11
1.3330E+05	7.3525E-09	2.3132E-06	1.4327E-11
1.3773E+05	4.6672E-09	2.3129E-06	1.4831E-11
1.4216E+05	2.9625E-09	2.3126E-06	1.5335E-11
1.4660E+05	1.8805E-09	2.3123E-06	1.5839E-11
1.5103E+05	1.1937E-09	2.3120E-06	1.6343E-11
1.5546E+05	7.5771E-10	2.3117E-06	1.6846E-11
1.5989E+05	4.8097E-10	2.3114E-06	1.7350E-11
1.6433E+05	3.0530E-10	2.3111E-06	1.7854E-11
1.6876E+05	1.9379E-10	2.3108E-06	1.8357E-11
1.7319E+05	1.2301E-10	2.3105E-06	1.8861E-11
1.7763E+05	7.8084E-11	2.3102E-06	1.9364E-11
1.8206E+05	4.9565E-11	2.3100E-06	1.9868E-11
1.8649E+05	3.1462E-11	2.3097E-06	2.0371E-11
1.9092E+05	1.9971E-11	2.3094E-06	2.0874E-11
1.9536E+05	1.2677E-11	2.3091E-06	2.1377E-11
1.9979E+05	8.0469E-12	2.3088E-06	2.1881E-11
2.0422E+05	5.1078E-12	2.3085E-06	2.2384E-11
2.0865E+05	3.2422E-12	2.3082E-06	2.2887E-11
2.1309E+05	2.0581E-12	2.3079E-06	2.3390E-11
2.1752E+05	1.3064E-12	2.3076E-06	2.3892E-11
2.2195E+05	8.2924E-13	2.3073E-06	2.4395E-11
2.2638E+05	5.2637E-13	2.3070E-06	2.4898E-11
2.3082E+05	3.3412E-13	2.3067E-06	2.5401E-11
2.3525E+05	2.1209E-13	2.3064E-06	2.5903E-11
2.3968E+05	1.3463E-13	2.3061E-06	2.6406E-11
2.4411E+05	8.5456E-14	2.3058E-06	2.6908E-11
2.4855E+05	5.4244E-14	2.3055E-06	2.7411E-11
2.5298E+05	3.4432E-14	2.3052E-06	2.7913E-11
2.5741E+05	2.1856E-14	2.3049E-06	2.8415E-11
2.6184E+05	1.3874E-14	2.3046E-06	2.8917E-11
2.6628E+05	8.8065E-15	2.3043E-06	2.9420E-11
2.7071E+05	5.5900E-15	2.3040E-06	2.9922E-11
2.7514E+05	3.5483E-15	2.3037E-06	3.0424E-11
2.7957E+05	2.2524E-15	2.3034E-06	3.0926E-11
2.8401E+05	1.4297E-15	2.3031E-06	3.1427E-11
2.8844E+05	9.0753E-16	2.3028E-06	3.1929E-11
2.9287E+05	5.7607E-16	2.3025E-06	3.2431E-11
2.9731E+05	3.6567E-16	2.3022E-06	3.2933E-11
3.0174E+05	2.3211E-16	2.3019E-06	3.3434E-11
3.0617E+05	1.4734E-16	2.3017E-06	3.3936E-11
3.1060E+05	9.3524E-17	2.3014E-06	3.4437E-11

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	3.5902E-11
[illegible]	[illegible]	[illegible]	3.6044E-11
[illegible]	[illegible]	[illegible]	3.6944E-11
[illegible]	[illegible]	[illegible]	3.7445E-11
[illegible]	[illegible]	2.2991E-06	3.7946E-11
[illegible]	[illegible]	2.2987E-06	3.8447E-11
[illegible]	[illegible]	2.2984E-06	3.8948E-11
[illegible]	[illegible]	2.2981E-06	3.9449E-11
[illegible]	[illegible]	2.2978E-06	3.9950E-11
3.6823E+05	3.5432E-19	2.2975E-06	4.0450E-11
3.7266E+05	1.6125E-19	2.2972E-06	4.0951E-11
3.7295E+05	1.5659E-19	2.2972E-06	4.1452E-11
3.7323E+05	1.5207E-19	2.2972E-06	4.1484E-11
3.7352E+05	1.4767E-19	2.2972E-06	4.1516E-11
3.7380E+05	1.4341E-19	2.2972E-06	4.1548E-11
3.7409E+05	1.3927E-19	2.2971E-06	4.1581E-11
3.7437E+05	1.3526E-19	2.2971E-06	4.1613E-11
3.7466E+05	1.3134E-19	2.2971E-06	4.1645E-11
3.7495E+05	1.2755E-19	2.2971E-06	4.1678E-11
3.7523E+05	1.2386E-19	2.2971E-06	4.1710E-11
3.7552E+05	1.2028E-19	2.2970E-06	4.1742E-11
3.7580E+05	1.1681E-19	2.2970E-06	4.1774E-11
3.7609E+05	1.1344E-19	2.2970E-06	4.1807E-11
3.7638E+05	1.1016E-19	2.2970E-06	4.1839E-11
3.7666E+05	1.0698E-19	2.2970E-06	4.1871E-11
3.7695E+05	1.0389E-19	2.2970E-06	4.1903E-11
3.7723E+05	1.0088E-19	2.2969E-06	4.1936E-11
3.7752E+05	9.7974E-20	2.2969E-06	4.1968E-11
3.7780E+05	9.5145E-20	2.2969E-06	4.2000E-11
3.7809E+05	9.2397E-20	2.2969E-06	4.2033E-11
3.7838E+05	8.9728E-20	2.2969E-06	4.2065E-11
3.7866E+05	8.7136E-20	2.2968E-06	4.2097E-11
3.7895E+05	8.4620E-20	2.2968E-06	4.2129E-11
3.7923E+05	8.2176E-20	2.2968E-06	4.2162E-11
3.7952E+05	7.9802E-20	2.2968E-06	4.2194E-11
3.7980E+05	7.7497E-20	2.2968E-06	4.2226E-11
3.8009E+05	7.5257E-20	2.2967E-06	4.2258E-11
3.8038E+05	7.3084E-20	2.2966E-06	4.2289E-11
3.8066E+05	7.0976E-20	2.2951E-06	4.2293E-11
3.8095E+05	6.8932E-20	2.2800E-06	4.2048E-11
3.8123E+05	6.6722E-20	2.1990E-06	4.0586E-11
3.8152E+05	4.1438E-20	1.9463E-06	3.5948E-11
3.8181E+05	2.4108E-20	1.4641E-06	2.7063E-11
3.8209E+05	1.3758E-20	8.7712E-07	1.6226E-11
3.8238E+05	3.6331E-21	4.0335E-07	7.4617E-12
3.8266E+05	9.2955E-22	1.4016E-07	2.5967E-12
3.8295E+05	1.8217E-22	3.6943E-08	6.8497E-13
3.8323E+05	2.7676E-23	7.4518E-09	1.3827E-13
3.8352E+05	3.3035E-24	1.1658E-09	2.1648E-14
3.8381E+05	3.1619E-25	1.4355E-10	2.6678E-15
3.8409E+05	0.	1.4123E-11	2.6266E-16
3.8438E+05	0.	1.1262E-12	2.0962E-17
3.8466E+05	0.	7.3804E-14	1.3747E-18
3.8495E+05	0.	4.0257E-15	7.5042E-20
3.8524E+05	0.	1.8998E-16	3.4509E-21
3.8552E+05	0.	7.2946E-18	1.3525E-22
3.8581E+05	0.	2.4975E-19	4.5727E-24
3.8609E+05	0.	1.6316E-20	3.0508E-25
3.8638E+05	0.	1.6316E-20	3.0531E-25
3.8666E+05	0.	1.6316E-20	3.0554E-25
3.8695E+05	0.	1.6316E-20	3.0577E-25
3.8724E+05	0.	1.6316E-20	3.0600E-25
3.8752E+05	0.	1.6316E-20	3.0623E-25
		1.6316E-20	3.0645E-25

3.6[illegible]E+05	1.	1.6315E-20	3.0668E-25
3.[illegible]E+05	0.	1.6315E-20	3.0691E-25
3.[illegible]E+05	0.	1.	0.
3.[illegible]E+05	1.	0.	0.
3.[illegible]E+05	0.	1.	0.
3.[illegible]E+05	1.	0.	0.
3.[illegible]E+05	0.	0.	0.
3.[illegible]E+05	1.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
2.[illegible]E+05	0.	0.	0.
3.[illegible]E+05	0.	0.	0.
3.[illegible]E+05	0.	0.	0.
4.[illegible]E+05	0.	0.	0.
4.[illegible]E+05	0.	0.	0.
5.[illegible]E+05	0.	0.	0.
5.[illegible]E+05	0.	0.	0.
5.[illegible]E+05	0.	0.	0.
6.[illegible]E+05	0.	0.	0.
6.[illegible]E+05	0.	0.	0.
7.[illegible]E+05	0.	0.	0.
7.[illegible]E+05	0.	0.	0.
8.[illegible]E+05	0.	0.	0.
8.[illegible]E+05	0.	0.	0.
8.[illegible]E+05	0.	0.	0.
9.[illegible]E+05	0.	0.	0.
9.[illegible]E+05	0.	0.	0.
1.[illegible]E+06	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
2.0374E+05	0.	0.	0.
2.2234E+05	0.	0.	0.
2.4094E+05	0.	0.	0.
2.5955E+05	0.	0.	0.
2.7815E+05	0.	0.	0.
2.9675E+05	0.	0.	0.
3.1535E+05	0.	0.	0.
3.3395E+05	0.	0.	0.
3.5255E+05	0.	0.	0.
3.7115E+05	0.	0.	0.
3.8975E+05	0.	0.	0.
4.0835E+05	0.	0.	0.
4.2695E+05	0.	0.	0.
4.4555E+05	0.	0.	0.
4.6416E+05	0.	0.	0.
4.8276E+05	0.	0.	0.
5.0136E+05	0.	0.	0.
5.1996E+05	0.	0.	0.
5.3856E+05	0.	0.	0.
5.5716E+05	0.	0.	0.
5.7576E+05	0.	0.	0.
5.9436E+05	0.	0.	0.
6.1296E+05	0.	0.	0.
6.3156E+05	0.	0.	0.
6.5016E+05	0.	0.	0.
6.6877E+05	0.	0.	0.
6.8737E+05	0.	0.	0.
7.0597E+05	0.	0.	0.
7.2457E+05	0.	0.	0.
7.4317E+05	0.	0.	0.
7.6177E+05	0.	0.	0.
7.8037E+05	0.	0.	0.
7.9897E+05	0.	0.	0.
8.1757E+05	0.	0.	0.
8.3617E+05	0.	0.	0.
8.5477E+05	0.	0.	0.
8.7338E+05	0.	0.	0.
8.9198E+05	0.	0.	0.
9.1058E+05	0.	0.	0.
9.2918E+05	0.	0.	0.
9.4778E+05	0.	0.	0.
9.6638E+05	0.	0.	0.
9.8498E+05	0.	0.	0.
1.0000E+06	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
9.0000E+05	0.	0.	0.
1.0000E+06	0.	0.	0.

TIME (YEARS)	PU242	U235	TH232
1.1100E+02	0.	0.	0.
1.4615E+02	0.	0.	0.
1.8132E+02	0.	0.	0.
2.1645E+02	0.	0.	0.
2.5160E+02	0.	0.	0.
2.8675E+02	0.	0.	0.
3.2190E+02	0.	0.	0.
3.5705E+02	0.	0.	0.
3.9220E+02	0.	0.	0.
4.2735E+02	0.	0.	0.
4.6250E+02	0.	0.	0.
4.9765E+02	0.	0.	0.
5.3280E+02	0.	0.	0.
5.6795E+02	0.	0.	0.
6.0310E+02	2.6260E-22	2.7947E-26	0.
6.3825E+02	5.4932E-19	5.9232E-23	1.6954E-30
6.7340E+02	3.6546E-16	3.9323E-20	1.2007E-27
7.0855E+02	9.1845E-14	1.0163E-17	3.2032E-25
7.4370E+02	1.0027E-11	1.1238E-15	3.7029E-23
7.7885E+02	5.3338E-10	6.0540E-14	2.0810E-21
8.1400E+02	1.5211E-08	1.7482E-12	6.2569E-20
8.4915E+02	2.5197E-07	2.9322E-11	1.0907E-18
8.8430E+02	2.5956E-06	3.0579E-10	1.1802E-17
9.1945E+02	1.7635E-05	2.1028E-09	8.4079E-17
9.5460E+02	1.1535E-05	1.0037E-08	4.1519E-16
9.8975E+02	2.8493E-04	3.4808E-08	1.4878E-15
1.0249E+03	7.3966E-04	9.1442E-08	4.0334E-15
1.0601E+03	1.5124E-03	1.8920E-07	8.6029E-15
1.0952E+03	2.5291E-03	3.2010E-07	1.4989E-14
1.1304E+03	3.5883E-03	4.5947E-07	2.2133E-14
1.1655E+03	4.4792E-03	5.8013E-07	2.8727E-14
1.2007E+03	5.0934E-03	6.6733E-07	3.3933E-14
1.2358E+03	5.4434E-03	7.2132E-07	3.7637E-14
1.2710E+03	5.6068E-03	7.5138E-07	4.0200E-14
1.3061E+03	5.6650E-03	7.6770E-07	4.2085E-14
1.3413E+03	5.6738E-03	7.7746E-07	4.3641E-14
1.3764E+03	5.6629E-03	7.8456E-07	4.5066E-14
1.4116E+03	5.6454E-03	7.9072E-07	4.6450E-14
1.4467E+03	5.6258E-03	7.9656E-07	4.7827E-14
1.4818E+03	5.6057E-03	8.0231E-07	4.9210E-14
1.5170E+03	5.5856E-03	8.0802E-07	5.0602E-14
1.5521E+03	5.5655E-03	8.1370E-07	5.2003E-14
1.5873E+03	5.5455E-03	8.1937E-07	5.3414E-14
1.6224E+03	5.5255E-03	8.2501E-07	5.4835E-14
1.6576E+03	5.5056E-03	8.3063E-07	5.6265E-14
1.6927E+03	5.4858E-03	8.3623E-07	5.7705E-14
1.7279E+03	5.4661E-03	8.4181E-07	5.9155E-14
1.7630E+03	5.4464E-03	8.4738E-07	6.0614E-14
1.7982E+03	5.4268E-03	8.5292E-07	6.2083E-14
1.8333E+03	5.4073E-03	8.5844E-07	6.3562E-14
1.8685E+03	5.3879E-03	8.6394E-07	6.5050E-14
1.9036E+03	5.3685E-03	8.6942E-07	6.6548E-14
1.9388E+03	5.3492E-03	8.7488E-07	6.8055E-14
1.9739E+03	5.3299E-03	8.8033E-07	6.9571E-14
2.0091E+03	5.3107E-03	8.8575E-07	7.1097E-14
2.0442E+03	5.2916E-03	8.9115E-07	7.2632E-14
2.0794E+03	5.2726E-03	8.9654E-07	7.4177E-14
2.1145E+03	5.2536E-03	9.0190E-07	7.5731E-14
2.1497E+03	5.2347E-03	9.0725E-07	7.7294E-14
2.1848E+03	5.2159E-03	9.1257E-07	7.8866E-14
2.2200E+03	5.1971E-03	9.1788E-07	8.0447E-14

[illegible]	[illegible]	[illegible]	[illegible]
1.5724E+04	[illegible]	2.3191E-06	1.1371E-12
2.0225E+04	[illegible]	2.1549E-06	[illegible]
2.4726E+04	[illegible]	[illegible]	2.0872E-12
2.9228E+04	3.2593E-04	2.2942E-06	2.5893E-12
3.3729E+04	2.0542E-04	2.3280E-06	3.1010E-12
3.8230E+04	1.2948E-04	2.3492E-06	3.6187E-12
4.2732E+04	8.1610E-05	2.3624E-06	4.1401E-12
4.7233E+04	5.1440E-05	2.3706E-06	4.6638E-12
5.1734E+04	3.2423E-05	2.3757E-06	5.1890E-12
5.6235E+04	2.0436E-05	2.3788E-06	5.7150E-12
6.0737E+04	1.2881E-05	2.3806E-06	6.2416E-12
6.5238E+04	8.1191E-06	2.3816E-06	6.7685E-12
6.9739E+04	5.1176E-06	2.3822E-06	7.2956E-12
7.4240E+04	3.2256E-06	2.3824E-06	7.8227E-12
7.8742E+04	2.0332E-06	2.3824E-06	8.3499E-12
8.3243E+04	1.2815E-06	2.3823E-06	8.8771E-12
8.7744E+04	8.0775E-07	2.3821E-06	9.4042E-12
9.2246E+04	5.0913E-07	2.3819E-06	9.9313E-12
9.6747E+04	3.2091E-07	2.3816E-06	1.0458E-11
1.0125E+05	2.0227E-07	2.3814E-06	1.0985E-11
1.0575E+05	1.2749E-07	2.3811E-06	1.1512E-11
1.1025E+05	8.0361E-08	2.3808E-06	1.2039E-11
1.1475E+05	5.0652E-08	2.3805E-06	1.2566E-11
1.1925E+05	3.1926E-08	2.3802E-06	1.3093E-11
1.2375E+05	2.0123E-08	2.3799E-06	1.3619E-11
1.2826E+05	1.2684E-08	2.3796E-06	1.4146E-11
1.3276E+05	7.9948E-09	2.3793E-06	1.4672E-11
1.3726E+05	5.0392E-09	2.3789E-06	1.5199E-11
1.4176E+05	3.1763E-09	2.3785E-06	1.5725E-11
1.4626E+05	2.0020E-09	2.3783E-06	1.6251E-11
1.5076E+05	1.2619E-09	2.3780E-06	1.6778E-11
1.5526E+05	7.9538E-10	2.3777E-06	1.7304E-11
1.5976E+05	5.0134E-10	2.3774E-06	1.7830E-11
1.6427E+05	3.1600E-10	2.3771E-06	1.8356E-11
1.6877E+05	1.9918E-10	2.3768E-06	1.8882E-11
1.7327E+05	1.2554E-10	2.3765E-06	1.9408E-11
1.7777E+05	7.9130E-11	2.3761E-06	1.9934E-11
1.8227E+05	4.9876E-11	2.3758E-06	2.0459E-11
1.8677E+05	3.1433E-11	2.3755E-06	2.0985E-11
1.9127E+05	1.9815E-11	2.3752E-06	2.1511E-11
1.9577E+05	1.2490E-11	2.3749E-06	2.2036E-11
2.0028E+05	7.8724E-12	2.3746E-06	2.2562E-11
2.0478E+05	4.9621E-12	2.3743E-06	2.3087E-11
2.0928E+05	3.1276E-12	2.3740E-06	2.3613E-11
2.1378E+05	1.9714E-12	2.3737E-06	2.4138E-11
2.1828E+05	1.2426E-12	2.3734E-06	2.4663E-11
2.2278E+05	7.8320E-13	2.3730E-06	2.5188E-11
2.2728E+05	4.9366E-13	2.3727E-06	2.5713E-11
2.3179E+05	3.1116E-13	2.3724E-06	2.6238E-11
2.3629E+05	1.9613E-13	2.3721E-06	2.6763E-11
2.4079E+05	1.2362E-13	2.3718E-06	2.7288E-11
2.4529E+05	7.7919E-14	2.3715E-06	2.7813E-11
2.4979E+05	4.9113E-14	2.3712E-06	2.8338E-11
2.5429E+05	3.0956E-14	2.3709E-06	2.8862E-11
2.5879E+05	1.9512E-14	2.3706E-06	2.9387E-11
2.6329E+05	1.2299E-14	2.3703E-06	2.9911E-11
2.6780E+05	7.7519E-15	2.3700E-06	3.0436E-11
2.7230E+05	4.8861E-15	2.3696E-06	3.0960E-11
2.7680E+05	3.0797E-15	2.3693E-06	3.1484E-11
2.8130E+05	1.9412E-15	2.3690E-06	3.2009E-11
2.8582E+05	1.2235E-15	2.3687E-06	3.2533E-11
2.9030E+05	7.7121E-16	2.3684E-06	3.3057E-11
2.9480E+05	4.8610E-16	2.3681E-06	3.3581E-11
2.9930E+05	3.0635E-16	2.3678E-06	3.4105E-11

3.12[illegible]E+05	7.[illegible]E-17	[illegible]	[illegible]-11
3.1751E+05	4.8361E-17	2.3659E-06	3.5676E-11
3.2181E+05	[illegible].0442E-17	2.3660E-06	3.6220E-11
3.2631E+05	1.9[illegible]13E-17	2.3662E-06	3.6724E-11
3.3081E+05	1.2110E-17	2.3659E-06	3.7247E-11
3.3531E+05	7.6332E-18	2.3656E-06	3.7771E-11
3.3982E+05	4.8113E-18	2.3653E-06	3.8294E-11
3.4432E+05	3.0325E-18	2.3650E-06	3.8818E-11
3.4882E+05	1.9115E-18	2.3647E-06	3.9341E-11
3.5332E+05	1.2[illegible]43E-18	2.3644E-06	3.9864E-11
3.5782E+05	7.5941E-19	2.3641E-06	4.0387E-11
3.6232E+05	4.7865E-19	2.3638E-06	4.0910E-11
3.6236E+05	4.7694E-19	2.3635E-06	4.1433E-11
3.6239E+05	4.7522E-19	2.3635E-06	4.1437E-11
3.6243E+05	4.7351E-19	2.3635E-06	4.1442E-11
3.6246E+05	4.7181E-19	2.3635E-06	4.1446E-11
3.6250E+05	4.7011E-19	2.3635E-06	4.1450E-11
3.6253E+05	4.6842E-19	2.3635E-06	4.1454E-11
3.6257E+05	4.6673E-19	2.3635E-06	4.1458E-11
3.6260E+05	4.6506E-19	2.3634E-06	4.1462E-11
3.6264E+05	4.6338E-19	2.3634E-06	4.1466E-11
3.6267E+05	4.6172E-19	2.3634E-06	4.1470E-11
3.6271E+05	4.6005E-19	2.3634E-06	4.1474E-11
3.6274E+05	4.5840E-19	2.3634E-06	4.1478E-11
3.6278E+05	4.5675E-19	2.3634E-06	4.1482E-11
3.6281E+05	4.5511E-19	2.3634E-06	4.1486E-11
3.6285E+05	4.5347E-19	2.3634E-06	4.1491E-11
3.6288E+05	4.5184E-19	2.3634E-06	4.1495E-11
3.6292E+05	4.5021E-19	2.3634E-06	4.1499E-11
3.6295E+05	4.4859E-19	2.3634E-06	4.1503E-11
3.6299E+05	4.4698E-19	2.3634E-06	4.1507E-11
3.6303E+05	4.4537E-19	2.3634E-06	4.1511E-11
3.6306E+05	4.4377E-19	2.3634E-06	4.1515E-11
3.6310E+05	4.4217E-19	2.3634E-06	4.1519E-11
3.6313E+05	4.4058E-19	2.3634E-06	4.1523E-11
3.6317E+05	4.3898E-19	2.3634E-06	4.1527E-11
3.6320E+05	4.3728E-19	2.3633E-06	4.1530E-11
3.6324E+05	4.3485E-19	2.3627E-06	4.1523E-11
3.6327E+05	4.2939E-19	2.3581E-06	4.1446E-11
3.6331E+05	4.1517E-19	2.3368E-06	4.1077E-11
3.6334E+05	3.8359E-19	2.2676E-06	3.9863E-11
3.6338E+05	3.2908E-19	2.1032E-06	3.6978E-11
3.6341E+05	2.5497E-19	1.8134E-06	3.1833E-11
3.6345E+05	1.7510E-19	1.4077E-06	2.4755E-11
3.6348E+05	1.0549E-19	9.7024E-07	1.7063E-11
3.6352E+05	5.5571E-20	5.8665E-07	1.0318E-11
3.6355E+05	2.5630E-20	3.1015E-07	5.9556E-12
3.6359E+05	1.0393E-20	1.4356E-07	2.5256E-12
3.6362E+05	3.7265E-21	5.8426E-08	1.0279E-12
3.6366E+05	1.1891E-21	2.1025E-08	3.6994E-13
3.6369E+05	3.3991E-22	6.7329E-09	1.1848E-13
3.6373E+05	8.7622E-23	1.9316E-09	3.3994E-14
3.6376E+05	2.0498E-23	4.9972E-10	8.1954E-15
3.6380E+05	4.3782E-24	1.1733E-10	2.0552E-15
3.6383E+05	8.5863E-25	2.5150E-11	4.4275E-16
3.6387E+05	0.	4.9571E-12	8.7151E-17
3.6390E+05	0.	8.9934E-13	1.5835E-17
3.6394E+05	0.	1.5157E-13	2.6690E-18
3.6397E+05	0.	2.3904E-14	4.1922E-19
3.6401E+05	0.	3.4987E-15	6.1622E-20
3.6404E+05	0.	4.8314E-16	8.5103E-21
3.6408E+05	0.	6.2922E-17	1.1085E-21
3.6411E+05	0.	7.7582E-18	1.3658E-22
3.6415E+05	0.	9.3681E-19	1.5978E-23

3.6919E+05	1.	1.6793E-20	2.9594E-25
3.6922E+05	0.	1.6793E-20	2.9597E-25
3.6926E+05	0.	1.6792E-20	2.9600E-25
3.6929E+05	1.	1.6792E-20	2.9603E-25
3.6933E+05	0.	1.6792E-20	2.9606E-25
3.6936E+05	1.	1.6792E-20	2.9608E-25
3.6940E+05	1.	1.6792E-20	2.9611E-25
3.6943E+05	1.	1.6792E-20	2.9614E-25

TIME (YEARS)	PU240	U236	TH232
5.5[illegible]E+04	0.	0.	0.
6.0138E+04	0.	0.	0.
6.5120E+04	0.	0.	0.
7.0[illegible]1E+04	0.	0.	0.
7.4983E+04	0.	0.	0.
7.9964E+04	0.	0.	0.
8.4945E+04	0.	0.	0.
8.9927E+04	0.	0.	0.
9.49[illegible]9E+04	0.	0.	0.
9.9891E+04	0.	0.	0.
1.0487E+05	0.	0.	0.
1.0985E+05	0.	0.	0.
1.1484E+05	0.	0.	0.
1.1982E+05	0.	0.	0.
1.2480E+05	0.	0.	0.
1.2978E+05	0.	0.	0.
1.3476E+05	0.	0.	0.
1.3974E+05	0.	0.	0.
1.4472E+05	0.	0.	0.
1.4971E+05	0.	0.	0.
1.5469E+05	0.	0.	0.
1.5967E+05	0.	0.	0.
1.6465E+05	0.	0.	0.
1.6963E+05	0.	0.	0.
1.7461E+05	0.	0.	0.
1.7960E+05	0.	0.	0.
1.8458E+05	0.	0.	0.
1.8956E+05	0.	0.	0.
1.9454E+05	0.	0.	0.
1.9952E+05	0.	0.	0.
2.0450E+05	0.	0.	0.
2.0949E+05	0.	0.	0.
2.1447E+05	0.	0.	0.
2.1945E+05	0.	0.	0.
2.2443E+05	0.	0.	0.
2.2941E+05	0.	0.	0.
2.3439E+05	0.	0.	0.
2.3938E+05	0.	0.	0.
2.4436E+05	0.	0.	0.
2.4934E+05	0.	0.	0.
2.5432E+05	0.	0.	0.
2.5930E+05	0.	0.	0.
2.6428E+05	0.	0.	0.
2.6926E+05	0.	0.	0.
2.7425E+05	0.	0.	0.
2.7923E+05	0.	0.	0.
2.8421E+05	0.	0.	0.
2.8919E+05	0.	0.	0.
2.9417E+05	0.	0.	0.
2.9915E+05	0.	0.	0.
3.0414E+05	0.	0.	0.
3.0912E+05	0.	0.	0.
3.1410E+05	0.	0.	0.
3.19[illegible]8E+05	0.	0.	0.
3.2406E+05	0.	0.	0.
3.29[illegible]4E+05	0.	0.	0.
3.34[illegible]3E+05	0.	0.	0.
3.39[illegible]1E+05	0.	0.	0.
3.4399E+05	0.	0.	0.
3.4897E+05	0.	9.7393E-29	0.
3.5395E+05	0.	2.6314E-27	0.

3.639[illegible]E+05	.	1.22[illegible]2E-24	[illegible]
3.689[illegible]E+05	.	2.1344E-23	3.3114E-2[illegible]
3.7388E+05	.	3.2432E-22	5.8714E-27
3.7886E+05	.	4.3244E-21	7.9363E-26
3.8384E+05	.	5.2362E-20	9.4013E-25
3.8882E+05	.	5.3321E-19	9.9931E-24
3.9380E+05	.	4.9210E-18	9.3967E-23
3.9879E+05	0.	4.3941E-17	7.8998E-22
4.0377E+05	0.	3.9435E-16	5.9623E-21
4.0875E+05	0.	2.5444E-15	4.0557E-20
4.1373E+05	0.	1.2423E-14	2.4957E-19
4.1871E+05	0.	6.8569E-14	1.3943E-18
4.2369E+05	0.	3.4476E-13	7.0956E-18
4.2868E+05	0.	1.5344E-12	3.3001E-17
4.3366E+05	0.	6.6755E-12	1.4079E-16
4.3864E+05	0.	2.5864E-11	5.5156E-16
4.4362E+05	0.	9.2416E-11	1.9935E-15
4.4860E+05	0.	3.0525E-10	6.6610E-15
4.5358E+05	0.	9.3473E-10	2.0629E-14
4.5856E+05	.	2.6598E-09	5.9361E-14
4.6355E+05	0.	7.0499E-09	1.59[illegible]9E-13
4.6853E+05	0.	1.7444E-08	3.9796E-13
4.7351E+05	0.	4.0381E-08	9.3127E-13
4.7849E+05	0.	8.7615E-08	2.0428E-12
4.8347E+05	0.	1.7865E-07	4.2087E-12
4.8845E+05	0.	3.4276E-07	8.1600E-12
4.9344E+05	0.	6.2703E-07	1.4915E-11
4.9842E+05	0.	1.0594E-06	2.5747E-11
5.0340E+05	0.	1.7125E-06	4.2044E-11
5.0838E+05	0.	2.6232E-06	6.5057E-11
5.1336E+05	0.	3.8139E-06	9.5534E-11
5.1834E+05	0.	5.2737E-06	1.3334E-10
5.2333E+05	0.	6.9338E-06	1.7713E-10
5.2831E+05	0.	8.6951E-06	2.2429E-10
5.3329E+05	0.	1.0408E-05	2.7105E-10
5.3827E+05	0.	1.1937E-05	3.1305E-10
5.4325E+05	0.	1.3035E-05	3.4595E-10
5.4823E+05	0.	1.3671E-05	3.6625E-10
5.5321E+05	0.	1.3754E-05	3.7188E-10
5.5820E+05	0.	1.3287E-05	3.6256E-10
5.6318E+05	0.	1.2339E-05	3.3977E-10
5.6816E+05	0.	1.1027E-05	3.0637E-10
5.7314E+05	0.	9.4917E-06	2.6609E-10
5.7812E+05	0.	7.8777E-06	2.2280E-10
5.8310E+05	0.	6.3099E-06	1.8003E-10
5.88[illegible]9E+05	.	4.8829E-06	1.4051E-10
5.93[illegible]7E+05	0.	3.6518E-06	1.0601E-10
5.98[illegible]5E+05	0.	2.6431E-06	7.7387E-11
6.0303E+05	0.	1.8526E-06	5.47[illegible]4E-11
6.08[illegible]1E+05	0.	1.2585E-06	3.7474E-11
6.1299E+05	0.	8.2916E-07	2.4896E-1[illegible]
6.1798E+05	0.	5.3024E-07	1.6053E-11
6.2296E+05	0.	3.2937E-07	1.0054E-11
6.2794E+05	0.	1.9886E-07	6.1197E-12
6.3292E+05	0.	1.1679E-07	3.6229E-12
6.3790E+05	0.	6.6746E-08	2.0873E-12
6.4288E+05	0.	3.7154E-08	1.1712E-12
6.4787E+05	0.	2.0154E-08	6.4032E-13
6.5285E+05	0.	1.0660E-08	3.4135E-13
6.5783E+05	0.	5.5019E-09	1.7752E-13
6.6281E+05	0.	2.7712E-09	9.0118E-14
6.6779E+05	0.	1.3535E-09	4.4681E-14
6.7277E+05	0.	6.5558E-10	2.1647E-14
6.7775E+05	0.	3.0819E-10	1.0253E-14
6.8274E+05	0.	1.4173E-10	4.7506E-15

6.8772E+05	0.	6.3797E-11	2.1546E-15
6.9270E+05	0.	2.8103E-11	9.5622E-16
6.9768E+05	0.	1.2134E-11	4.1581E-16
7.0266E+05	0.	5.1333E-12	1.7719E-16
7.0764E+05	0.	2.1291E-12	7.4026E-17
7.1263E+05	0.	8.6619E-13	3.0332E-17
7.1761E+05	0.	3.4577E-13	1.2195E-17
7.2259E+05	0.	1.3549E-13	4.8124E-18
7.2757E+05	0.	5.2139E-14	1.8649E-18
7.3255E+05	0.	1.9789E-14	7.1989E-19
7.3753E+05	0.	7.3211E-15	2.6552E-19
7.4252E+05	0.	2.6731E-15	9.7616E-20
7.4750E+05	0.	9.6073E-16	3.5323E-20
7.5248E+05	0.	3.3929E-16	1.2560E-20
7.5746E+05	0.	1.1743E-16	4.3764E-21
7.6244E+05	0.	4.0272E-17	1.5110E-21
7.6742E+05	0.	1.3611E-17	5.1418E-22
7.7240E+05	0.	4.5363E-18	1.7247E-22
7.7739E+05	0.	2.2678E-18	8.6791E-23
7.8237E+05	0.	0.	0.
7.8735E+05	0.	0.	0.
7.9233E+05	0.	0.	0.
7.9731E+05	0.	0.	0.
8.0229E+05	0.	0.	0.
8.0728E+05	0.	0.	0.
8.1226E+05	0.	0.	0.
8.1724E+05	0.	0.	0.
8.2222E+05	0.	0.	0.
8.2720E+05	0.	0.	0.
8.3218E+05	0.	0.	0.
8.3717E+05	0.	0.	0.
8.4215E+05	0.	0.	0.
8.4713E+05	0.	0.	0.
8.5211E+05	0.	0.	0.
8.5709E+05	0.	0.	0.
8.6207E+05	0.	0.	0.
8.6705E+05	0.	0.	0.
8.7204E+05	0.	0.	0.
8.7702E+05	0.	0.	0.
8.8200E+05	0.	0.	0.
8.8698E+05	0.	0.	0.
8.9196E+05	0.	0.	0.
8.9694E+05	0.	0.	0.
9.0193E+05	0.	0.	0.
9.0691E+05	0.	1.1297E-18	5.0671E-23
9.1189E+05	0.	0.	0.
9.1687E+05	0.	0.	0.
9.2185E+05	0.	0.	0.
9.2683E+05	0.	0.	0.
9.3182E+05	0.	0.	0.
9.3680E+05	0.	0.	0.
9.4178E+05	0.	0.	0.
9.4676E+05	0.	0.	0.
9.5174E+05	0.	0.	0.
9.5672E+05	0.	0.	0.
9.6171E+05	0.	0.	0.
9.6669E+05	0.	0.	0.
9.7167E+05	0.	0.	0.
9.7665E+05	0.	0.	0.
9.8163E+05	0.	0.	0.
9.8661E+05	0.	0.	0.
9.9160E+05	0.	0.	0.
9.9658E+05	0.	0.	0.
1.0016E+06	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
[illegible]	0.	0.	0.
[illegible]	.	1.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U235	TH232
[illegible]	0.	0.	0.
1.00000E+06	0.	0.	0.

TIME (YEARS)	PU240	U235	TH230
2.3770E+02	0.	0.	0.
2.7278E+02	0.	0.	0.
3.0785E+02	0.	0.	0.
3.4293E+02	0.	0.	0.
3.7801E+02	0.	0.	0.
4.1309E+02	0.	0.	0.
4.4816E+02	0.	0.	0.
4.8324E+02	0.	0.	0.
5.1832E+02	0.	0.	0.
5.5339E+02	0.	0.	0.
5.8847E+02	0.	0.	0.
6.2355E+02	0.	0.	0.
6.5862E+02	0.	0.	0.
6.9370E+02	0.	0.	0.
7.2878E+02	0.	0.	0.
7.6386E+02	0.	0.	0.
7.9893E+02	0.	0.	0.
8.3401E+02	0.	0.	0.
8.6909E+02	0.	0.	0.
9.0416E+02	0.	0.	0.
9.3924E+02	0.	0.	0.
9.7432E+02	0.	0.	0.
1.0094E+03	0.	0.	0.
1.0445E+03	0.	0.	0.
1.0795E+03	0.	0.	0.
1.1146E+03	0.	0.	0.
1.1497E+03	0.	0.	0.
1.1848E+03	0.	0.	0.
1.2199E+03	0.	0.	0.
1.2549E+03	0.	0.	0.
1.2900E+03	0.	0.	0.
1.3251E+03	0.	0.	0.
1.3602E+03	0.	0.	0.
1.3952E+03	0.	0.	0.
1.4303E+03	1.2562E-23	1.7697E-27	0.
1.4654E+03	1.4216E-21	2.0245E-25	0.
1.5005E+03	1.1363E-19	1.6356E-23	1.0144E-30
1.5355E+03	6.5718E-18	9.5604E-22	6.0520E-29
1.5706E+03	2.8108E-16	4.1323E-20	2.6688E-27
1.6057E+03	9.0700E-15	1.3475E-18	8.8745E-26
1.6408E+03	3.2491E-13	3.3764E-17	2.2665E-24
1.6759E+03	4.3583E-12	6.6108E-16	4.5216E-23
1.7109E+03	6.7029E-11	1.0272E-14	7.1556E-22
1.7460E+03	8.2993E-10	1.2849E-13	9.1125E-21
1.7811E+03	8.3824E-09	1.3110E-12	9.4623E-20
1.8162E+03	6.9913E-08	1.1045E-11	8.1102E-19
1.8512E+03	4.8699E-07	7.7708E-11	5.8033E-18
1.8863E+03	2.8633E-06	4.6144E-10	3.5036E-17
1.9214E+03	1.4350E-05	2.3356E-09	1.8024E-16
1.9565E+03	6.1875E-05	1.0171E-08	7.9745E-16
1.9916E+03	2.3154E-04	3.8429E-08	3.0609E-15
2.0266E+03	7.5813E-04	1.2736E-07	1.0277E-14
2.0617E+03	2.1892E-03	3.7044E-07	3.0419E-14
2.0968E+03	5.6166E-03	9.5956E-07	7.9976E-14
2.1319E+03	1.2896E-02	2.2243E-06	1.8811E-13
2.1669E+03	2.6685E-02	4.6463E-06	3.9864E-13
2.2020E+03	5.0133E-02	8.8768E-06	7.6636E-13
2.2371E+03	8.5956E-02	1.5250E-05	1.3457E-12
2.2722E+03	1.3564E-01	2.4291E-05	2.1730E-12
2.3072E+03	1.9828E-01	3.5837E-05	3.2494E-12
2.3423E+03	2.7037E-01	4.9318E-05	4.5316E-12

2.3774E+03	3.4693E-01	6.3771E-05	5.9368E-12
2.4125E+03	4.2033E-01	7.4161E-05	7.3615E-12
2.4476E+03	4.8622E-01	9.1145E-05	8.7054E-12
2.4826E+03	5.4031E-01	1.0231E-04	9.8937E-12
2.5177E+03	5.8238E-01	1.1119E-04	1.0888E-11
2.5528E+03	6.1215E-01	1.1787E-04	1.1684E-11
2.5879E+03	6.3135E-01	1.2263E-04	1.2305E-11
2.6229E+03	6.4269E-01	1.2595E-04	1.2788E-11
2.6582E+03	6.4851E-01	1.2822E-04	1.3170E-11
2.6931E+03	6.5074E-01	1.2979E-04	1.3487E-11
2.7282E+03	6.5083E-01	1.3134E-04	1.3762E-11
2.7632E+03	6.4972E-01	1.3185E-04	1.4015E-11
2.7983E+03	6.4787E-01	1.3263E-04	1.4256E-11
2.8334E+03	6.4591E-01	1.3334E-04	1.4491E-11
2.8685E+03	6.4370E-01	1.3402E-04	1.4724E-11
2.9036E+03	6.4144E-01	1.3468E-04	1.4957E-11
2.9386E+03	6.3916E-01	1.3534E-04	1.5190E-11
2.9737E+03	6.3687E-01	1.3599E-04	1.5424E-11
3.0088E+03	6.3458E-01	1.3663E-04	1.5659E-11
3.0439E+03	6.3231E-01	1.3728E-04	1.5895E-11
3.0789E+03	6.3004E-01	1.3792E-04	1.6133E-11
3.1140E+03	6.2777E-01	1.3856E-04	1.6371E-11
3.1491E+03	6.2552E-01	1.3920E-04	1.6611E-11
3.1842E+03	6.2327E-01	1.3983E-04	1.6851E-11
3.2192E+03	6.2104E-01	1.4047E-04	1.7093E-11
3.2543E+03	6.1881E-01	1.4111E-04	1.7336E-11
3.2894E+03	6.1659E-01	1.4172E-04	1.7579E-11
3.3245E+03	6.1437E-01	1.4235E-04	1.7824E-11
3.3596E+03	6.1217E-01	1.4297E-04	1.8070E-11
3.3946E+03	6.0997E-01	1.4359E-04	1.8317E-11
3.4297E+03	6.0778E-01	1.4421E-04	1.8566E-11
3.4648E+03	6.0560E-01	1.4483E-04	1.8815E-11
3.4999E+03	6.0342E-01	1.4545E-04	1.9065E-11
3.5349E+03	6.0126E-01	1.4606E-04	1.9316E-11
3.5700E+03	5.9910E-01	1.4667E-04	1.9569E-11
3.6051E+03	5.9695E-01	1.4728E-04	1.9822E-11
3.6402E+03	5.9480E-01	1.4788E-04	2.0077E-11
3.6752E+03	5.9267E-01	1.4849E-04	2.0332E-11
3.7103E+03	5.9054E-01	1.4909E-04	2.0589E-11
3.7454E+03	5.8842E-01	1.4969E-04	2.0846E-11
3.7805E+03	5.8631E-01	1.5029E-04	2.1105E-11
3.8156E+03	5.8420E-01	1.5088E-04	2.1365E-11
3.8506E+03	5.8211E-01	1.5147E-04	2.1625E-11
3.8857E+03	5.8002E-01	1.5207E-04	2.1887E-11
3.9208E+03	5.7793E-01	1.5265E-04	2.2150E-11
3.9559E+03	5.7586E-01	1.5324E-04	2.2414E-11
3.9909E+03	5.7378E-01	1.5383E-04	2.2678E-11
4.0260E+03	5.7173E-01	1.5441E-04	2.2944E-11
4.0611E+03	5.6968E-01	1.5499E-04	2.3211E-11
4.0962E+03	5.6763E-01	1.5557E-04	2.3479E-11
4.1312E+03	5.6559E-01	1.5614E-04	2.3747E-11
4.1663E+03	5.6356E-01	1.5672E-04	2.4017E-11
4.2014E+03	5.6154E-01	1.5729E-04	2.4288E-11
4.2365E+03	5.5952E-01	1.5786E-04	2.4560E-11
4.2716E+03	5.5752E-01	1.5843E-04	2.4832E-11
4.3066E+03	5.5551E-01	1.5899E-04	2.5106E-11
4.3417E+03	5.5352E-01	1.5956E-04	2.5381E-11
4.3768E+03	5.5153E-01	1.6012E-04	2.5656E-11
4.4119E+03	5.4955E-01	1.6068E-04	2.5933E-11
4.4469E+03	5.4754E-01	1.6124E-04	2.6210E-11
4.4820E+03	5.4561E-01	1.6179E-04	2.6489E-11
4.5171E+03	5.4366E-01	1.6235E-04	2.6768E-11
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

4.6925E+03	5.3332E-01	1.6537E-04	2.8177E-11
4.7276E+03	5.3148E-01	1.6558E-04	2.8456E-11
4.7626E+03	5.2956E-01	1.6579E-04	2.8721E-11
4.7977E+03	5.2662E-01	1.6523E-04	2.8949E-11
4.8328E+03	5.2218E-01	1.6532E-04	2.9094E-11
4.8678E+03	5.1484E-01	1.6472E-04	2.9074E-11
4.9029E+03	5.0272E-01	1.6192E-04	2.8769E-11
4.9380E+03	4.8334E-01	1.6573E-04	2.8730E-11
4.9731E+03	4.5463E-01	1.4341E-04	2.6715E-11
5.0082E+03	4.1547E-01	1.3654E-04	2.4737E-11
5.0433E+03	3.6651E-01	1.2126E-04	2.2109E-11
5.0783E+03	3.1033E-01	1.0339E-04	1.8965E-11
5.1134E+03	2.5106E-01	8.4174E-05	1.5543E-11
5.1485E+03	1.9343E-01	6.5274E-05	1.2130E-11
5.1836E+03	1.4154E-01	4.8037E-05	8.9917E-12
5.2186E+03	9.8270E-02	3.3607E-05	6.3231E-12
5.2537E+03	6.4682E-02	2.2266E-05	4.2153E-12
5.2888E+03	4.0358E-02	1.3984E-05	2.6637E-12
5.3239E+03	2.3879E-02	8.3281E-06	1.5960E-12
5.3589E+03	1.3407E-02	4.7063E-06	9.0743E-13
5.3940E+03	7.1493E-03	2.5261E-06	4.8999E-13
5.4291E+03	3.6248E-03	1.2993E-06	2.5155E-13
5.4642E+03	1.7495E-03	6.2617E-07	1.2292E-13
5.4993E+03	8.0481E-04	2.8331E-07	5.7251E-14
5.5343E+03	3.5333E-04	1.2910E-07	2.5446E-14
5.5694E+03	1.4824E-04	5.4386E-08	1.0807E-14
5.6045E+03	5.9511E-05	2.1852E-08	4.3918E-15
5.6396E+03	2.2891E-05	8.4589E-09	1.7100E-15
5.6746E+03	8.4470E-06	3.1413E-09	6.3868E-16
5.7097E+03	2.9942E-06	1.1236E-09	2.2914E-16
5.7448E+03	1.0208E-06	3.8443E-10	7.9060E-17
5.7799E+03	3.3509E-07	1.2599E-10	2.6265E-17
5.8149E+03	1.0604E-07	4.0442E-11	8.4117E-18
5.8500E+03	3.2383E-08	1.2430E-11	2.5998E-18
5.8851E+03	9.5577E-09	3.6903E-12	7.7631E-19
5.9202E+03	2.7279E-09	1.0503E-12	2.2419E-19
5.9553E+03	7.5577E-10	2.9473E-13	6.2682E-20
5.9903E+03	2.0186E-10	7.9417E-14	1.6983E-20
6.0254E+03	5.2440E-11	2.1759E-14	4.4636E-21
6.0605E+03	1.3226E-11	5.2681E-15	1.1389E-21
6.0956E+03	3.2427E-12	1.2935E-15	2.8249E-22
6.1306E+03	7.7591E-13	3.1286E-16	6.8372E-23
6.1657E+03	1.7942E-13	7.2788E-17	1.5992E-23
6.2008E+03	3.9005E-14	1.5921E-17	3.5166E-24
6.2359E+03	8.7162E-15	3.9301E-18	8.8603E-25
6.2709E+03	3.2271E-15	1.5333E-18	2.9764E-25
6.3060E+03	3.2155E-15	1.5306E-18	2.9994E-25
6.3411E+03	3.2040E-15	1.5279E-18	3.0225E-25
6.3762E+03	3.1925E-15	1.5251E-18	3.0456E-25
6.4113E+03	3.1811E-15	1.5224E-18	3.0688E-25
6.4463E+03	3.1696E-15	1.5196E-18	3.0920E-25
6.4814E+03	3.1582E-15	1.5169E-18	3.1153E-25
6.5165E+03	3.1469E-15	1.5141E-18	3.1387E-25
6.5516E+03	3.1356E-15	1.5114E-18	3.1621E-25
6.5866E+03	3.1243E-15	1.5086E-18	3.1856E-25
6.6217E+03	3.1131E-15	1.5059E-18	3.2091E-25
6.6568E+03	3.1018E-15	1.5031E-18	3.2327E-25
6.6919E+03	3.0906E-15	1.5004E-18	3.2563E-25
6.7269E+03	3.0794E-15	1.4976E-18	3.2800E-25
6.7620E+03	3.0683E-15	1.4949E-18	3.3037E-25
6.7971E+03	3.0572E-15	1.4921E-18	3.3275E-25
6.8322E+03	3.0461E-15	1.4894E-18	3.3513E-25
6.8673E+03	3.0351E-15	1.4867E-18	3.3752E-25
6.9023E+03	3.0240E-15	1.4839E-18	3.3992E-25
6.9374E+03	3.0130E-15	1.4812E-18	3.4232E-25

7.3076E+03	0.	0.	0.
7.3426E+03	0.	0.	0.
7.3777E+03	0.	0.	0.
7.4128E+03	0.	0.	0.
7.4479E+03	0.	0.	0.
7.4831E+03	0.	0.	0.
7.5182E+03	0.	0.	0.
7.5533E+03	0.	0.	0.

RADIONUCLIDE DISCHARGE RATE (CI/DAY)

TIME (YEARS)	PU240	U236	TH232
9.0000E+03	0.	0.	0.
1.0000E+04	0.	0.	0.

INTEGRATED DISCHARGE IS SORTED INTO ASCENDING ORDER AND IS RANKED BY POSITION. RVECTOR IS THE ORIGINAL NUMBER OF THE RANDOM VECTOR
FOR ISOTOPE PU240

RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE
1	1.	0.	2	17.	0.	3	13.	0.	4	18.	0.	5	19.	0.
6	21.	0.	7	23.	0.	8	22.	0.	9	11.	0.	10	25.	0.
11	9.	0.	12	8.	0.	13	5.	.6860E-16	14	6.	.8033E-09	15	15.	.9843E+00
16	12.	.7618E+02	17	2.	.1489E+04	18	16.	.8962E+04	19	10.	.1399E+05	20	20.	.2073E+05
21	4.	.6653E+05	22	3.	.8116E+05	23	7.	.1771E+06	24	14.	.3273E+06	25	24.	.5898E+06

INTEGRATED DISCHARGE IS SORTED INTO ASCENDING ORDER AND IS RANKED BY POSITION. RVECTOR IS THE ORIGINAL NUMBER OF THE RANDOM VECTOR
FOR ISOTOPE U236

RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE
1	1.	0.	2	13.	0.	3	11.	0.	4	17.	0.	5	18.	0.
6	19.	0.	7	23.	0.	8	22.	0.	9	25.	0.	10	9.	0.
11	8.	0.	12	5.	.2824E+02	13	12.	.4548E+02	14	24.	.1490E+03	15	14.	.2232E+03
16	7.	.2655E+03	17	15.	.2866E+03	18	3.	.2926E+03	19	4.	.2965E+03	20	23.	.3083E+03
21	10.	.3137E+03	22	21.	.3103E+03	23	16.	.3115E+03	24	6.	.3125E+03	25	2.	.3149E+03

INTEGRATED DISCHARGE IS SORTED INTO ASCENDING ORDER AND IS RANKED BY POSITION. RVECTOR IS THE ORIGINAL NUMBER OF THE RANDOM VECTOR
FOR ISOTOPE TH232

RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE	RANK	RVECTOR	DISCHARGE
1	1.	0.	2	13.	0.	3	11.	0.	4	17.	0.	5	18.	0.
6	19.	0.	7	23.	0.	8	22.	0.	9	25.	0.	10	9.	0.
11	8.	0.	12	24.	.2109E-04	13	14.	.8158E-04	14	7.	.2273E-03	15	3.	.4587E-03
16	4.	.8359E-03	17	2.	.8581E-03	18	5.	.1018E-02	19	12.	.1092E-02	20	10.	.1857E-02
21	20.	.2776E-02	22	16.	.2906E-02	23	6.	.5575E-02	24	15.	.7613E-02	25	21.	.8403E-02

NWFT/STC

New Right Hand Page

Notebook Divider Should Read: App. A : NWFT User's Manual

ON NOTEBOOK DIVIDER ITSELF, PLEASE PRINT THE FOLLOWING:

THIS SPACE FOR READER TO INCLUDE A COPY

OF THE NWFT USER'S MANUAL

APPENDIX I

SAND79-1920

NUREG/CR-1190

(To be supplied by reader)

NWPT/STC

New Right Hand Page

INTERNAL DIVIDER SHOULD READ: App. 2: Flow Charts, NWPT

APPENDIX 2

Flow Charts for NWFT

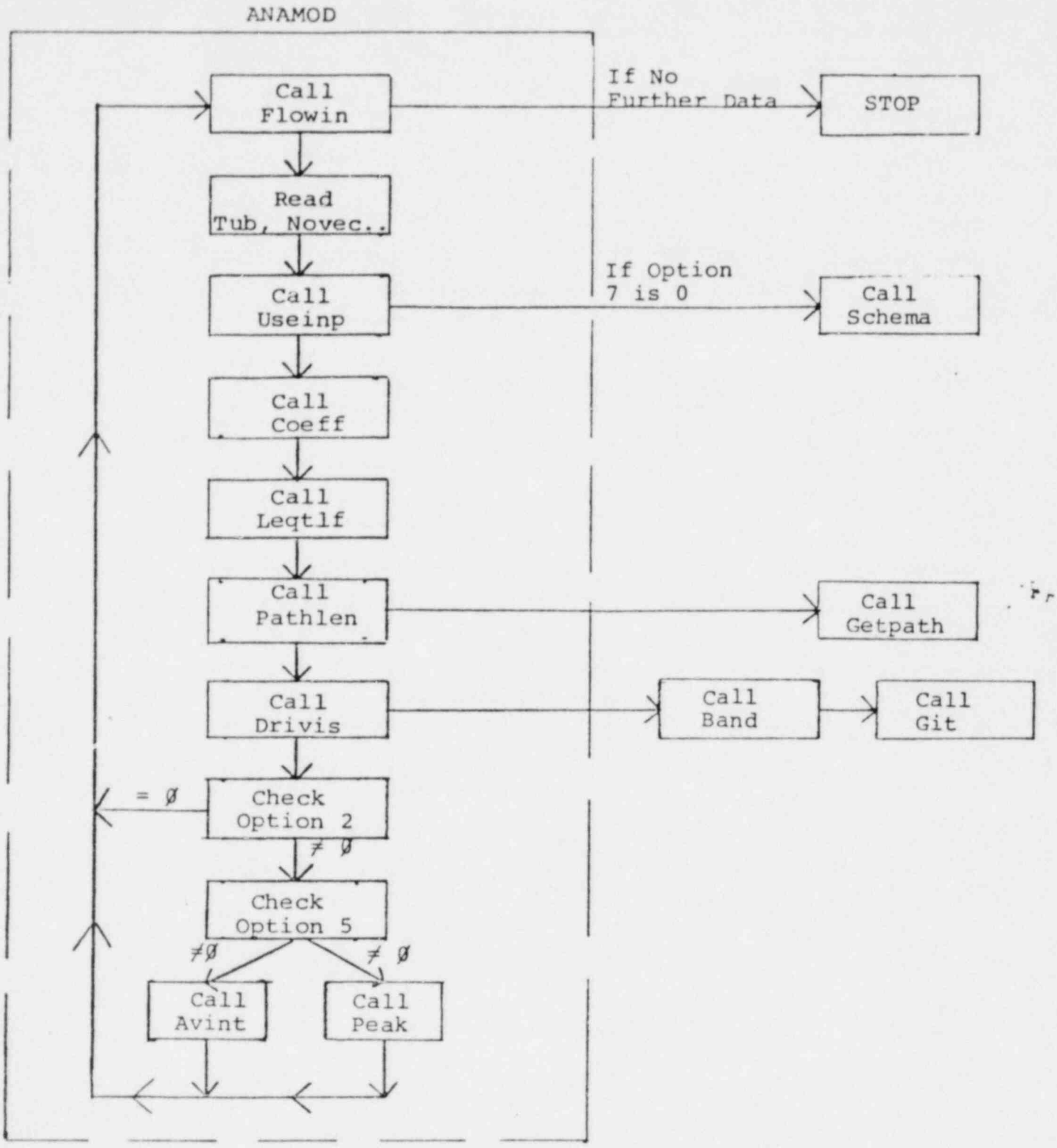
In this section two flow charts are presented. Their purpose is to show an overview of the NWFT logic. For descriptions of the individual subroutines appearing in the calling sequence see the NWFT users manual (Appendix 1).

The first flow chart is simplified as it doesn't show the vector looping capability of NWFT. However, it does include all of the flow and transport routines and it indicates the path for multiple data set runs. The sequence inside the dashed lines is the logic to be found in the main program, ANAMOD. The subroutines outside the rectangle are not directly accessed by ANAMOD. For example the call to GETPATH is found in PATHLEN.

All program input is read by FLOWIN and the READ statement immediately following. Subroutines USEINP and SCHEMA convert units and regurgitate input. Together COEFF, LEQTIF, PATHLEN, and GETPATH solve the flow system and determine the properties of the migration path necessary to perform a radionuclide transport (i.e., its length and average nuclide velocities). The radionuclide transport problem is solved by routines DRIVIS, BAND, and GIT. AVINT and PEAK are used to find integrated and peak discharge respectively. The program returns to FLOWIN which attempts to read more input. In this fashion the user may insert multiple data sets. Execution stops when FLOWIN tries to read beyond the last data set.

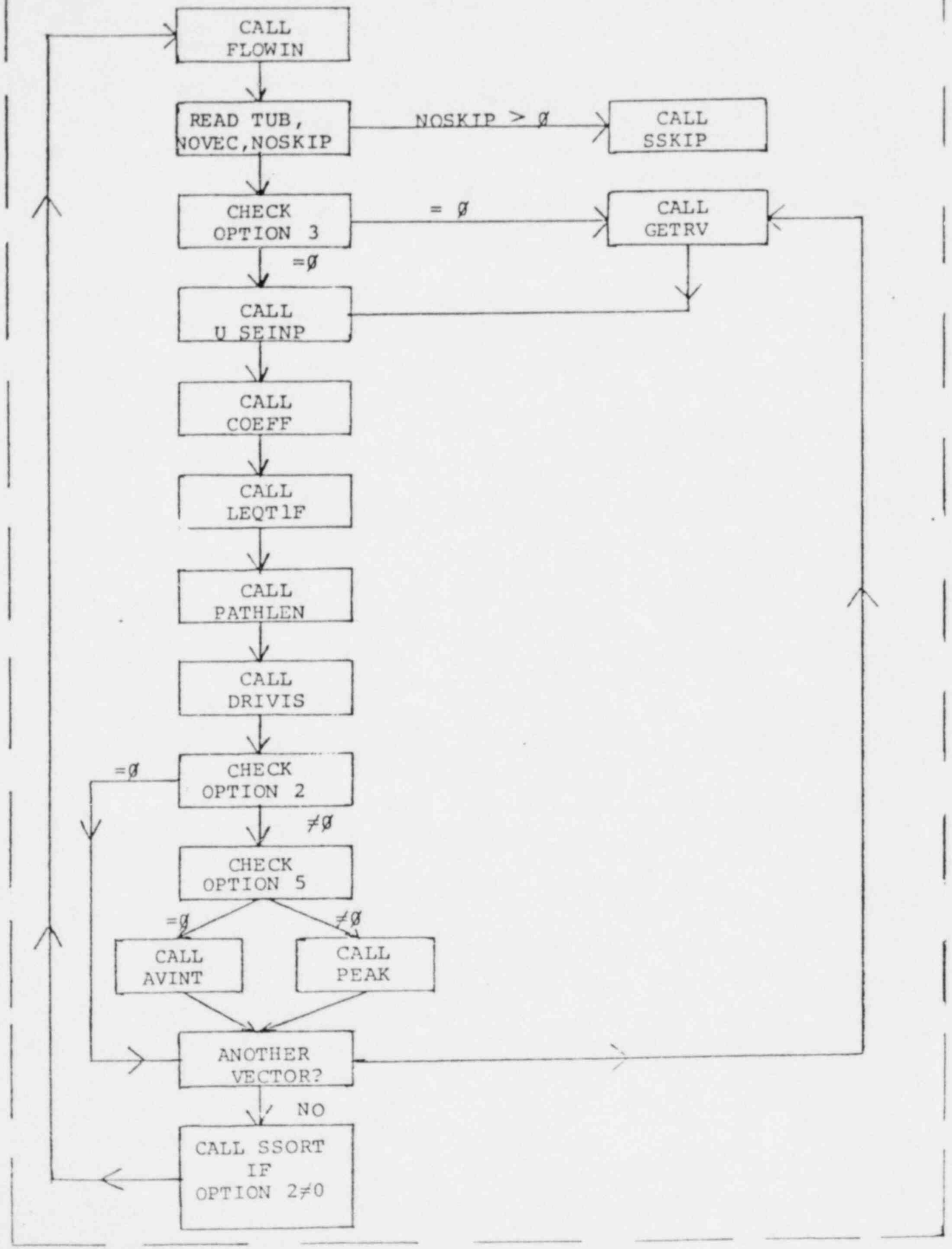
The second flow chart shows the vector looping capability of NWFT. Calls to routines outside of ANAMOD are not shown. However, three additional routines, which can be of use in statistical studies, are indicated.

As before, input is read by FLOWIN and the READ statement that follows. It is possible to skip some number (NOSKIP) of vectors on the input vector file. This skipping is performed in SSKIP. Option 3 must be set nonzero when input vectors are used. Subroutine GETRV is used to replace quantities read by FLOWIN with values from a given input vector. The flow and transport equations are solved with the replaced values. After the option 2 and 5 checks the program returns to GETRV for a new vector. Looping continues over the number (NOVEC) of input vectors so that there are NOVEC separate flow and transport problems solved. If peak or integrated discharge is generated (option $2 \neq 0$), it is sorted by vector for each isotope into ascending order. Subroutine SSORT helps accomplish this.



NWFT

SIMPLIFIED FLOW CHART


CALL FLOWIN
READ TUB, NOVEC, NOSKIP
NOSKIP > ø
CALL SSKIP
CHECK OPTION 3
= ø
CALL GETRV
=ø
CALL U SEINP
CALL COEFF
CALL LEQT1F
CALL PATHLEN
CALL DRIVIS
CHECK OPTION 2
=ø
≠ø
CHECK OPTION 5
=ø
≠ø
CALL AVINT
CALL PEAK
ANOTHER VECTOR?
NO
CALL SSORT IF OPTION 2≠0