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**SIMULATION OF ^{90}Sr TRANSPORT THROUGH SOILS
EVALUATION OF PARAMETERS**

by

M.J. FRISSEL, P. POELSTRA and P. REINIGER

1969



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Association No. 003-61-4 BIAN
Luxembourg, August 1969 - 64 Pages - 4 Figures - FB 85

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Calculations on 72 combinations of parameters are performed. To make possible a general application of the results two coefficients are used: the ^{90}Sr leaching indicator and the mean apparent diffusion coefficient. Both coefficients can be calculated from soil and climatic characteristics. The results are presented in the form of 4 schemes and 42 figures.

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ABSTRACT

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Calculations on 72 combinations of parameters are performed. To make possible a general application of the results two coefficients are used: the ^{90}Sr leaching indicator and the mean apparent diffusion coefficient. Both coefficients can be calculated from soil and climatic characteristics. The results are presented in the form of 4 schemes and 42 figures.

KEYWORDS

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DIFFUSION
WEATHER

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Introduction (*)

The uptake of the fission product ^{90}Sr by crops from a contaminated soil depends mainly on the location of the nuclide in the soil relative to the zone of most intense root activity. In general, therefore, the contribution from the top layers to the total uptake will be greater than that from the deeper layers of the soil profile.

In assessing the hazards from agricultural areas contaminated by ^{90}Sr it is essential to know how long, and to what extent, the radioisotope will remain in that part of the root zone where most of the uptake is occurring. Consequently, the distribution of the nuclide over the depth and the change of this distribution pattern with time due to the migration of the nuclide have to be predicted and calculated within reasonable limits.

The migration, or transport, of ^{90}Sr , as of any other ion in soil, is determined by factors depending on soil management, soil type, climate and the supply of ^{90}Sr to the soil.

These factors are reflected as parameters in three transport mechanisms which are together responsible for ion transport, i.e. :

1. Mechanical mixing (ploughing)
2. Chromatographic transport
3. Biological transport

Whereas ploughing displaces ^{90}Sr both in solution and in adsorbed form, chromatographic transport is essentially movement via the liquid phase. In this form of transport the speed of the ^{90}Sr will be determined by climatic and soil factors, e.g. the amount of effective rainfall and the reversible adsorption on the exchange sites of soil colloids, according to soil type and the concentration of competing cations in solution. The transport or concentration pattern will be spread out by diffusion in the liquid phase and by dispersion, a mixing phenomenon due to the irregular size and arrangement of the soil pores. Fixation of a small fraction of ^{90}Sr in a very strongly adsorbed form will spread the concentration profile further, though only to a slight extent.

(*) Manuscript received on 18 June 1969.

Biological transport which is much less well understood, seems to consist mainly in the action of the soil fauna mixing and redistributing soil particles and solution. A redistribution is also possible via the root system of plants.

From theoretical considerations and published experimental evidence, including research carried out at the Association's Institute, it may be concluded that ploughing and chromatographic transport are the main mechanisms of ^{90}Sr movement in soil. Only those factors or parameters which determine these two forms of transport will need to be considered.

The purpose of this report is to assess the importance of these parameters in ^{90}Sr transport with the aid of a simulation model of the process.

The results of the assessment should be useful both as a guide for further research in this field and as a first evaluation of emergency situations.

The simulation model chosen

For a quantitative evaluation of the influence of ploughing and chromatographic transport, a simulation model is set up.

The soil depth considered is divided into a number of layers, and to each layer an initial amount of ^{90}Sr is attributed. Then, with time as the independent variable, the material balance or integral of ^{90}Sr is made up for each layer independently, according to the formula :

$$C_t = \int_0^t (C_o + \Delta C) dt.$$

where : C_t = ^{90}Sr concentration at time t

C_o = Initial ^{90}Sr concentration at beginning of time-step

ΔC = Change in ^{90}Sr concentration

The integration is done numerically ; moreover, the time is split into many time-steps, and for each time-step the concentration variations ΔC are calculated.

In the calculation of ΔC the following processes are considered :

1. The supply of fall-out ^{90}Sr to the upper layer.
2. The transfer of ^{90}Sr between the layers due to diffusion, dispersion and mass flow, i.e. chromatographic transport.
3. Mixing due to ploughing.

The calculations are performed on an I.B.M. 360/50 computer. The program is written in C.S.M.P. (Continuous System Modelling Program), which is appended to this report together with some relevant comments.

Parameters considered

The model explained above was used to test a number of combinations of certain parameters which determine the three processes just described.

Four main groups of calculations were carried out, additional parameters being varied within each group.

Group 1 : Contaminated once, not ploughed

Group 2 : Contaminated once, ploughed

Group 3 : Continuous contamination, not ploughed

Group 4 : Continuous contamination, ploughed

Ploughing was simulated as complete mixing of the top 20 cm of soil, this being the average ploughing depth.

If the contamination occurred once, 100 arbitrary ^{90}Sr units were assumed to be present in the top 2 cm at the start of the calculations : if continuous contamination was assumed, the fall-out rate was 10 arbitrary ^{90}Sr units per year. In both cases 100 arbitrary ^{90}Sr units were present at the end of a 10-year period, since in order to facilitate comparison radioactive decay was not included in the model. Hence the amount present in a certain layer is at the same time the percentage ^{90}Sr recovery.

Within each group the following parameters were varied :

a. Amount of rain.

Two amounts of effective rain fall, i.e. quantity of drainage water from the top 20 cm of soil, were considered : 5 cm per year and 30 cm per year. The rainfall intensity varied during the year ; for the 30 cm per year case it was :

25 cm per year on 1 Oct, increasing to 45 cm per year on 1 Jan, then decreasing to 25 cm per year on 1 April and remaining at 25 cm per year till 1 Oct ;

for the 5 cm per year case it was :

0 cm per year on 1 Oct, increasing to 20 cm per year on 1 Jan, then decreasing to 0 cm per year on 1 April and remaining at 0 till 1 Oct.

- b. Calcium concentration in the soil solution ; two concentrations were considered : 0.01 N Ca and 0.05 N Ca.
- c. Exchangeable Ca in soil ; two amounts were considered : 0.1 me per cm^3 soil and 0.7 me per cm^3 soil.
- d. Exchange equilibrium constant of the exchange reaction between Ca and Sr ; two values were considered $K = 1.1$ and $K = 1.6$ ($K > 1$ means that Sr is the preferentially adsorbed ion).
- e. Dispersion coefficient ; two values were considered, namely 4 cm and 12 cm.

The physical meaning of the dispersion coefficient is the effective diameter of the soil aggregates at water saturation. For a sandy soil (podzol) without stones, under normal conditions (not water-saturated), the dispersion coefficient is about 0.5 ; for a löss soil (grey-brown podzol) it is about 6 ; for stony soils it is still higher. Big stones which hardly affect the soil pore configuration have practically no influence on the value of the dispersion coefficient.

If no information on the soil is available, a dispersion coefficient of 4 is recommended.

Within each group all combinations of the parameters mentioned under a - d were calculated, whereas the influence of the dispersion coefficient was considered only in a few combinations. A survey of the 72 cases is given in schemes 1, 2, 3 and 4.

More involved simulation models

CSMP lends it self fairly well to the introduction of complications, e.g. an irregular supply of fall-out ⁹⁰Sr, a variation of the Ca concentration in the soil with the depth, a water regime which takes into account the water consumption by the plant and capillary rise, or a more sophisticated simulation of ploughing.

A few such complications have in fact already been introduced in an extended version of the program. However, the number of parameters, functions and tables needed for such an extended version increases enormously, and calculation for all their possible combinations would be a time-consuming task.

At present, therefore, the use of such an extended version seems justified only for specific calculations in respect of sites where more extensive investigations are carried out. This is being done at the Association's Institute for various European soils. The results will be published elsewhere.

Coefficients for the description of the ^{90}Sr migration

- a. The ^{90}Sr leaching indicator
- b. The mean apparent diffusion coefficient

For a description of chromatographic transport two main processes have to be considered.

The first is the velocity of the compound considered ; the mean value of this velocity is called the ^{90}Sr leaching indicator.

The second is the spread which occurs ; the mean apparent diffusion coefficient is a good measure for this spread.

Both the leaching indicator and mean apparent diffusion coefficient are calculated for all the 72 cases (See Table 1). From the results, which will be discussed in the next section, it appears that the eventual distribution for cases which have corresponding values for both parameters is more or less the same.

This means that for unknown cases a reasonable approximation can be achieved by calculating the leaching indicator and apparent diffusion coefficient and then by interpolating.

The ^{90}Sr leaching indicator (SLI, cm/y) is calculated from :

$$\text{SLI} = \text{RAIN} \cdot \frac{\text{SALT}}{\text{TETA} \cdot \text{SALT} + \text{SOILCA} \cdot \text{K}}$$

in which :

RAIN = Mean rainfall (cm/y)

SALT = Ca normality of soil solution (me/cm³ soil solution)

TETA = Moisture content (cm³/cm³ soil)

SOILCA = Exchangeable Ca (me/cm³ soil)

K = Equilibrium constant exchange reaction Ca-Sr (-)

The mean apparent diffusion coefficient (MAD, cm^2/y) follows from :

$$\text{MAD} = \text{TETA} \cdot \text{GAM} \cdot \text{D} + \text{DISP} \cdot \text{RAIN}$$

in which :

GAM = Tortuosity (-)

D = Diffusion constant in water (cm^2/y)

DISP = Dispersion factor (cm).

NOTE : This unusual way of defining the symbols for the parameters is chosen in order to facilitate tracing of the computer program.

Results

The results are shown in three ways :

1. Schematically in schemes 1 - 4
2. Graphically, according to the four main groups of calculations, in graphs group 1 - 4
3. In print-plots showing the concentration in a certain layer as a function of time.

1. Schemes

In schemes 1 - 4 the percentage recovery at the end of a 10-year period is shown for each case. For situations without ploughing, the result is given for the layers 0 - 6 cm, 0 - 20 cm and 20 - 40 cm ; for situations with ploughing it is given for the layers 0 - 20 cm and 20 - 40 cm. Results represented also in print-plot form are indicated by an asterisk.

From scheme 1 (contaminated once, not ploughed) it appears that cases 1 - 16 cover the whole range of situations : In case 1 all the ^{90}Sr is leached out ; in case 16 no ^{90}Sr has yet reached the 20 - 40 cm layer, 89 per cent still being present in the top 6 cm.

Scheme 2 (contaminated once, ploughed) likewise covers almost the whole range ; in case 32 only 12 per cent has reached the 20 - 40 cm layer.

In schemes 3 and 4 (continuous contamination, not ploughed and ploughed, respectively) the situation in which all the ^{90}Sr is leached out never occurs, since the supply is continuous.

2. Graphs : Group 1 - group 4

In the graphs, group 1 - group 4, the Sr recovery at the end of the 10-year period is plotted as a function of the ^{90}Sr leaching indicator. To make possible a comparison between the groups, the layers 0 - 6 cm, 0 - 20 cm and 20 - 40 cm are shown for all groups. For the 0 - 6 cm layer in particular the effect of ploughing is remarkable as regards both continuous contamination and the cases where the contamination occurred only once. In all the graphs of groups 1 - 4 there is a certain scatter of the calculated points around the mean line. This shows that the leaching indicator (which is a mean value of velocities) gives only a rough indication of the leaching, which is modified by the mean apparent diffusion coefficient.

3. The print-plots

In the print-plot graphs the history of the leaching can be traced.

The first column gives the time in years. Numbers are in exponential form, as required for the standard CSMP format used. The notation E-01 means power of 10 with exponent - 1 ; thus 2.5000 E-01 equals 0.25 year ; similarly, 1.0000 E 00 means 1 year and 1.0000 E 01 means 10 years. The time scale therefore ranges from 0 - 10 years, with intervals of a quarter of a year.

The second column gives the ^{90}Sr recovery in the layer considered. The column heading represents the computer code for the layer ; thus LOT6 denotes the 0 - 6 cm layer. In the heading of the figure the layer considered is mentioned in the conventional way.

In the printed graph the full scale is 100 per cent. A glance at the first plot (case 1, 0 - 6 cm layer) immediately reveals that in case 1 after 2 years all the ^{90}Sr has disappeared. The second print-plot (case 1, 6 - 20 cm layer) shows that after half a year a maximum

⁹⁰Sr concentration amounting to 64 per cent of the total is reached in this layer. After 4 - 5 years this layer too is leached out.

If the 0 - 6 and 6 - 20 layers are leached out, it is clear that the 0 - 20 cm layer must likewise be empty ; this is shown by the third print-plot (case 1, 0 - 20 cm layer).

A steady state is shown in case 33 ; this is reached after 1.75 years for the 0 - 6 cm layer, after 3.25 years for the 6 - 20 cm layer and after 6.5 years for the 20 - 40 cm layer.

The effect of ploughing combined with continuous contamination is nicely demonstrated in case 52 (0 - 6 cm layer). The contamination increases gradually during the year, decreases sharply after plowing at the end of the year and starts to increase again gradually in the spring.

Further print-plots are added for reference but will not be discussed separately.

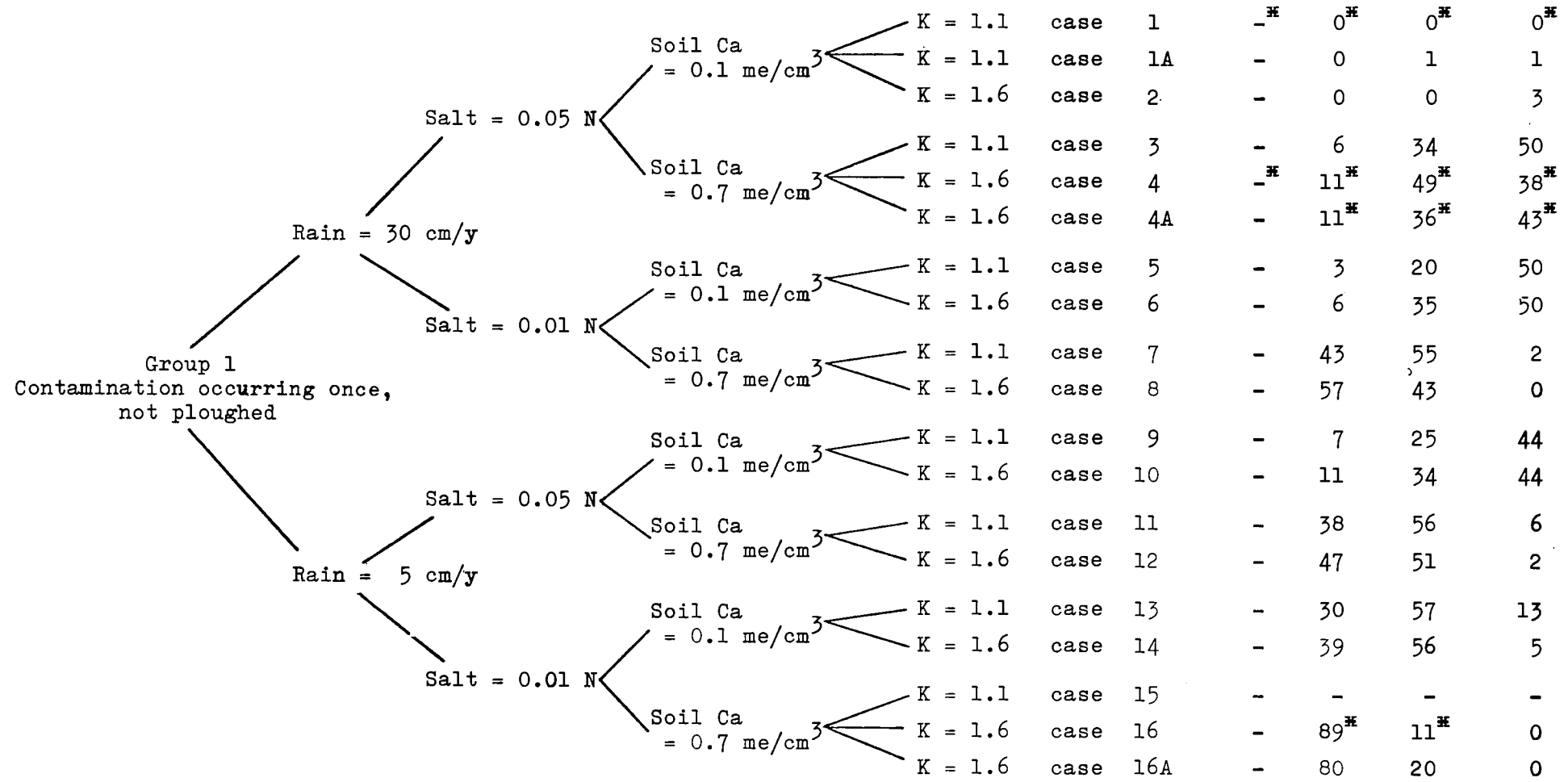
CASE NUMBERS				⁹⁰ Sr LEACHING INDICATOR	APPARENT DIFF. COEFF. Case numbers marked A Dispersion = 12 cm	APPARENT DIFF. COEFF. other case numbers Dispersion = 4 cm
1	17	33	49	13.6	406.	166.
2	18	34	50	9.37	-	166.
3	19	35	51	1.95	-	166.
4	20	36	52	1.34	406.	166.
5	21	37	53	2.73	-	166.
6	22	38	54	1.87	-	166.
7	23	39	55	0.390	-	166.
8	24	40	56	0.268	-	166.
9	25	41	57	2.27	-	66.
10	26	42	58	1.56	-	66.
11	27	43	59	0.325	-	66.
12	28	44	60	0.223	-	66.
13	29	45	61	0.455	-	66.
14	30	46	62	0.312	-	66.
15	31	47	63	-	-	-
16	32	48	64	0.045	106.	66.

TABLE 1.

Group 1 Contamination occurring once, not ploughed
 Group 2 ' ' ' , ploughed
 Group 3 Continuous contamination , not ploughed
 Group 4 ' ' ' , ploughed

Recovery of Sr-90 at the end
 of a 10-year period in layer:

0-20 cm 0-6 cm 6-20 cm 20-40 cm



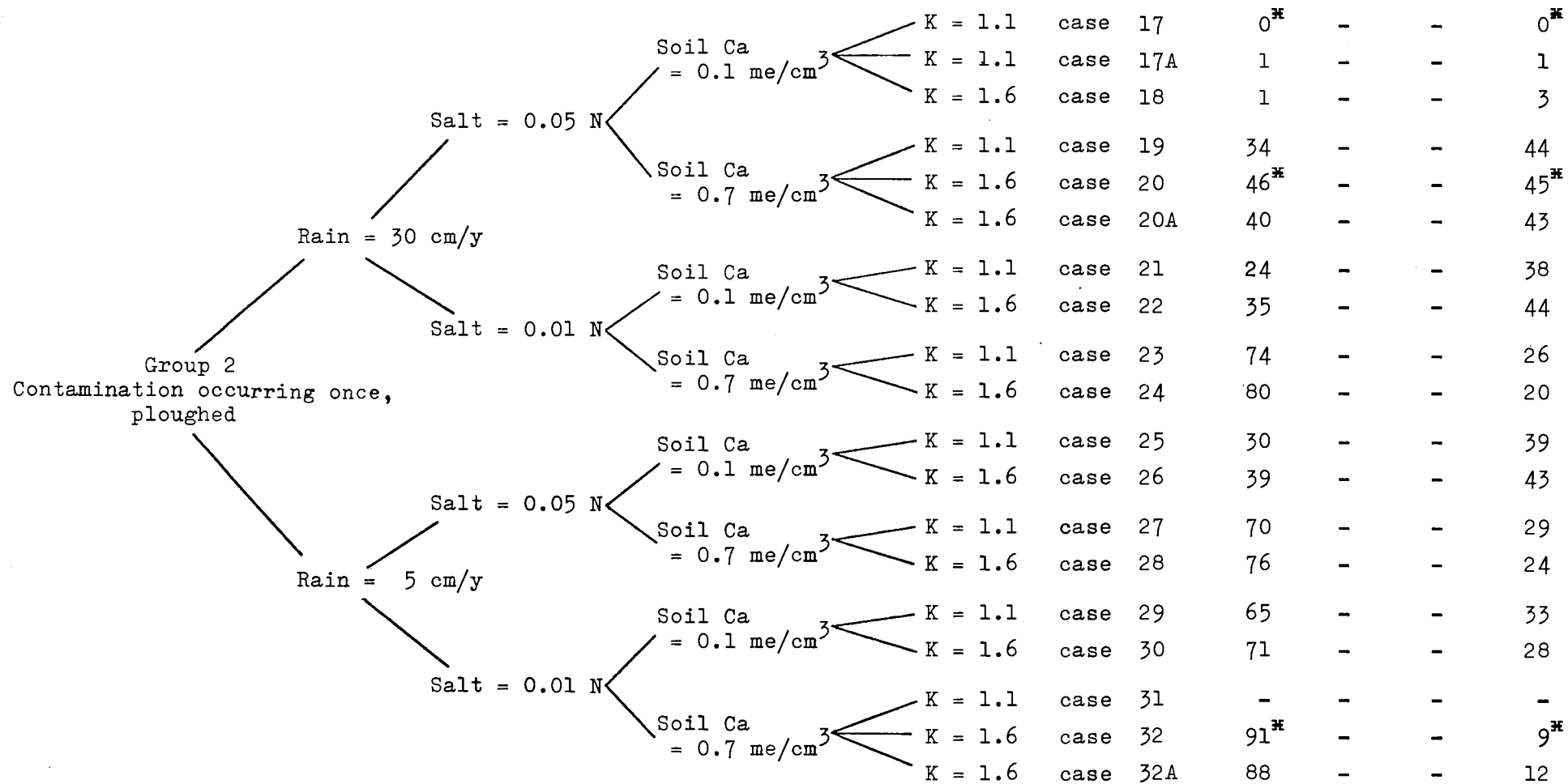
The dispersion in the cases marked A is 12,
 in the other cases 4.

SCHEME I

Group 1 Contamination occurring once, not ploughed
 Group 2 ' ' ' , ploughed
 Group 3 Continuous contamination , not ploughed
 Group 4 ' ' ' , ploughed

Recovery of Sr-90 at the end
 of a 10-year period in layer:

0-20 cm 0-6 cm 6-20 cm 20-40 cm



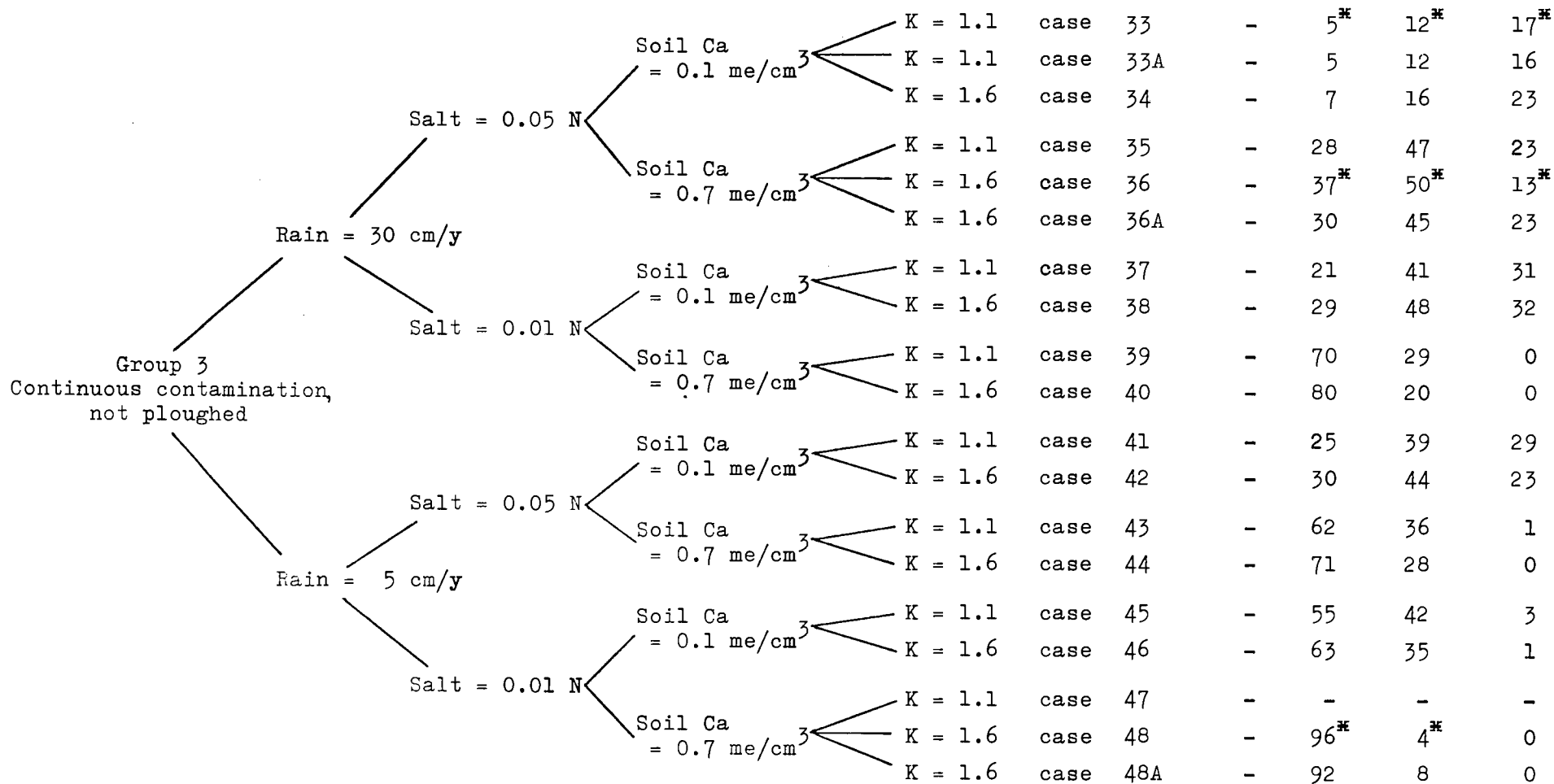
The dispersion in the cases marked A is 12,
 in the other cases 4.

SCHEME 2

Group 1 Contamination occurring once, not ploughed
 Group 2 ' ' ' , ploughed
 Group 3 Continuous contamination , not ploughed
 Group 4 ' ' ' , ploughed

Recovery of Sr-90 at the end
 of a 10-year period in layer:

0-20 cm 0-6 cm 6-20 cm 20-40 cm



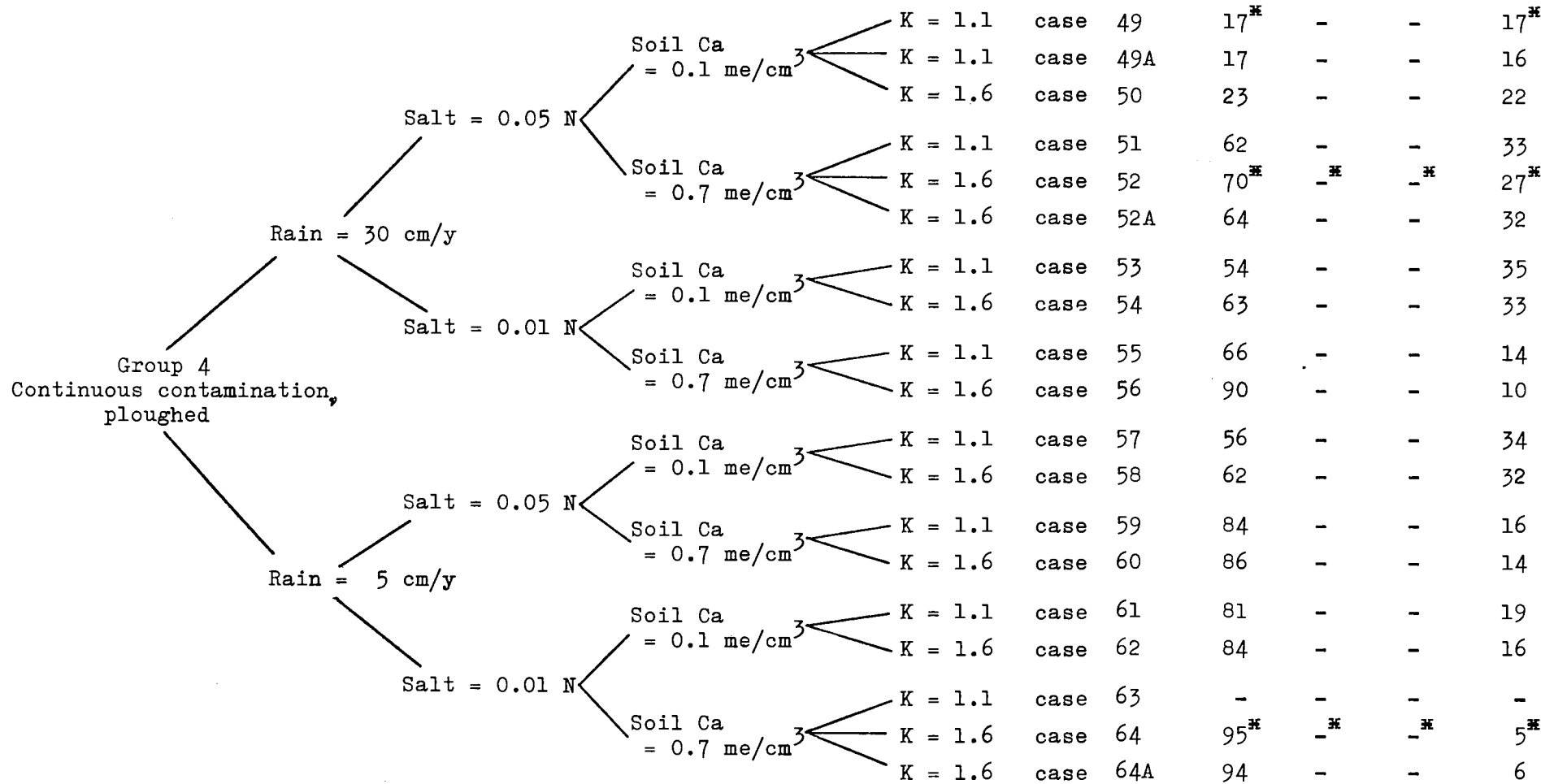
The dispersion in the cases marked A is 12,
 in the other cases 4.

SCHEME 3

Group 1 Contamination occurring once, not ploughed
 Group 2 ' ' ' , ploughed
 Group 3 Continuous contamination , not ploughed
 Group 4 ' ' , ploughed

Recovery of Sr-90 at the end
 of a 10-year period in layer:

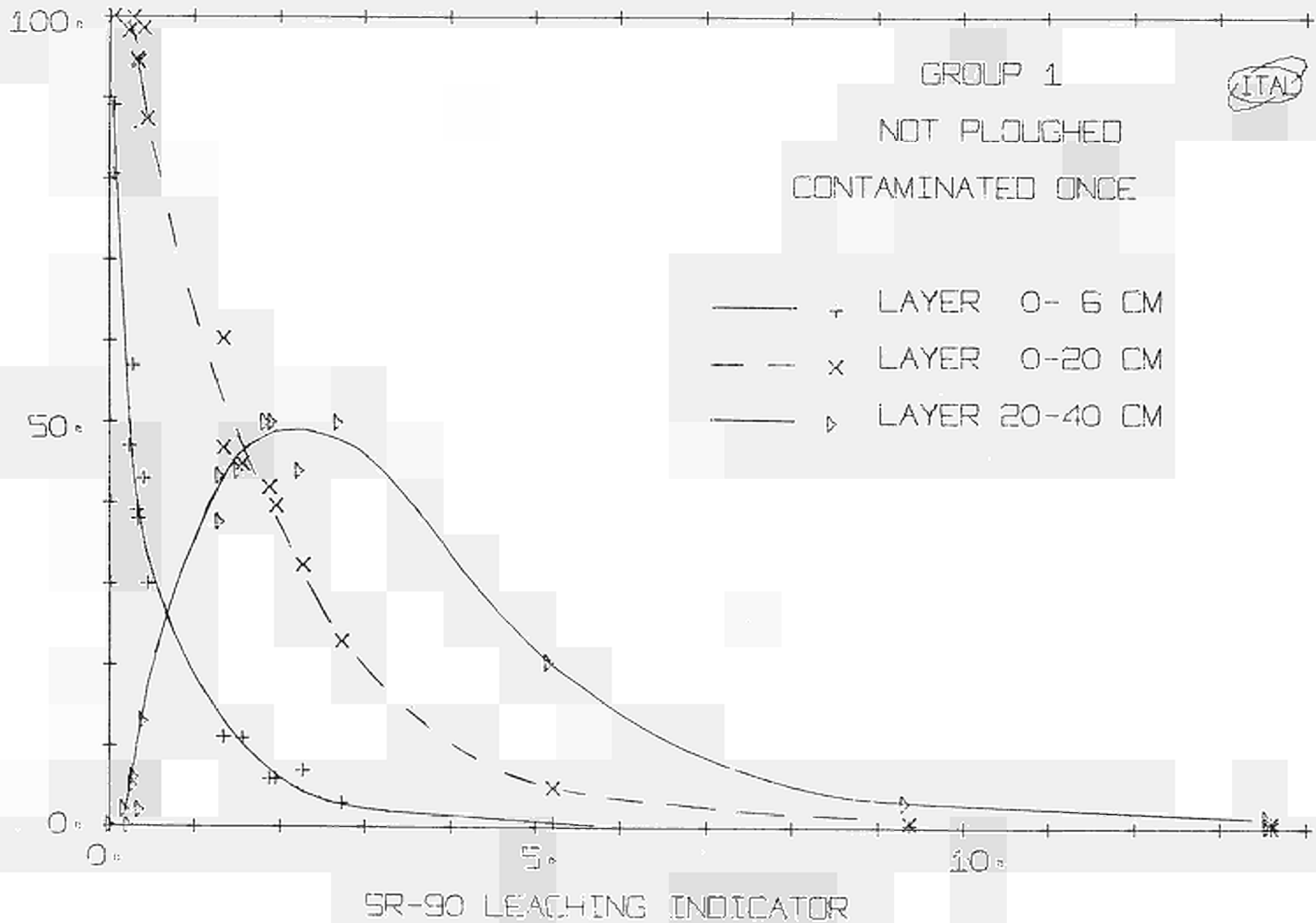
0-20 cm 0-6 cm 6-20 cm 20-40 cm

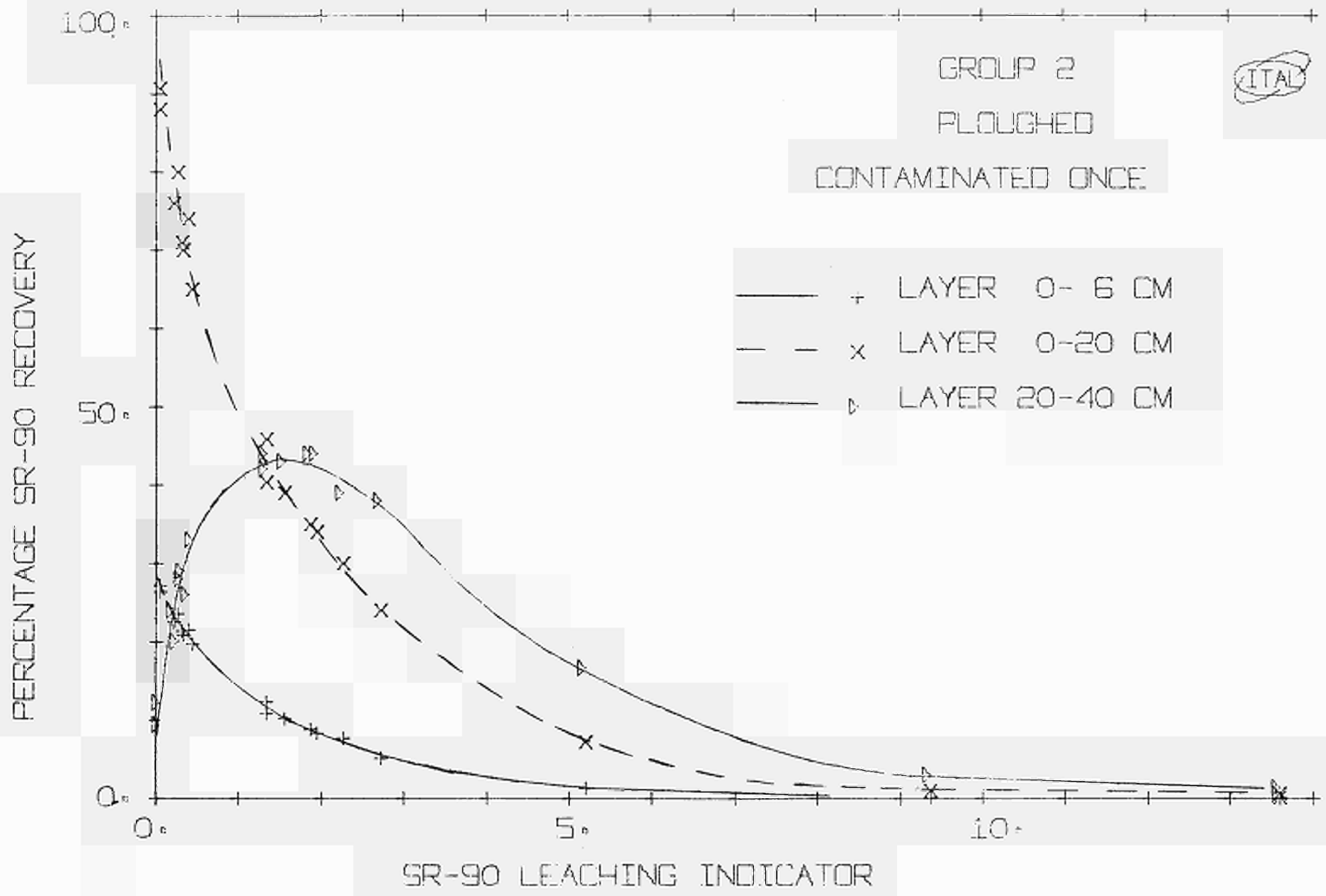


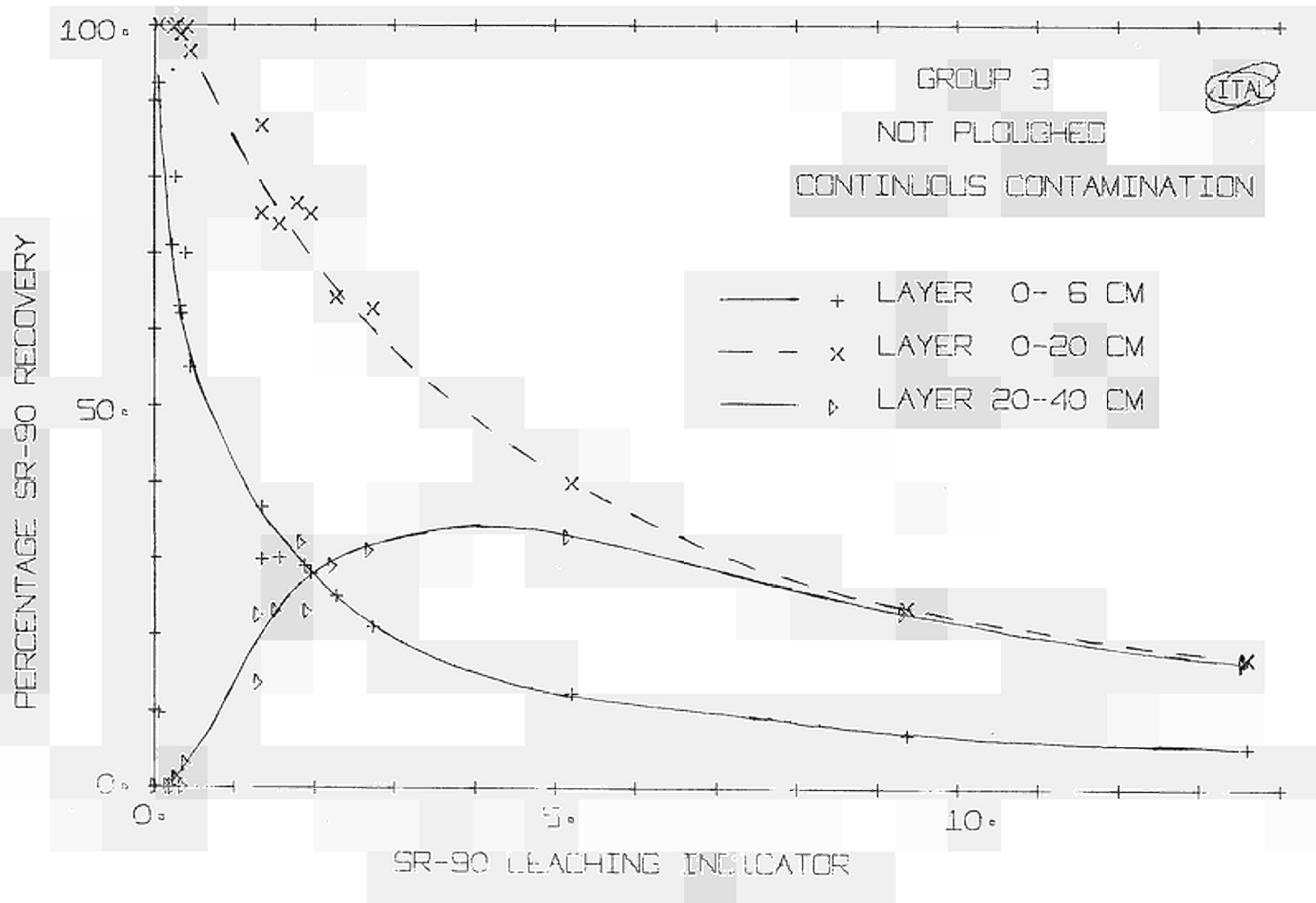
The dispersion in the cases marked A is 12,
 in the other cases 4.

SCHEME 4

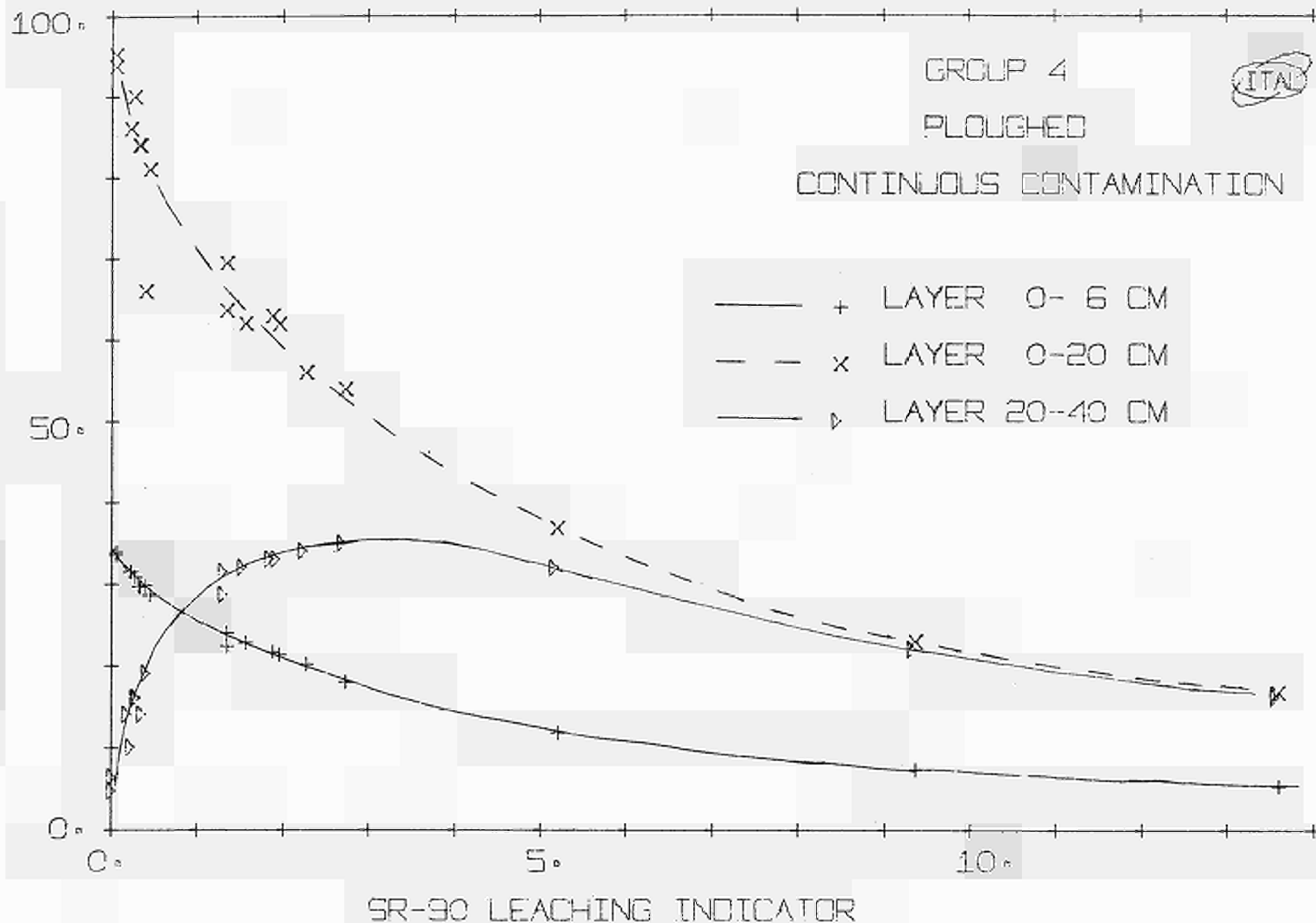
PERCENTAGE SR-90 RECOVERY







PERCENTAGE SR-90 RECOVERY



TIME	LOT6	MINIMUM 0.0	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	1.0000E 02	I	-----+-----	I
2.5000E-01	4.7476E 01		-----+-----	
5.0000E-01	2.5207E 01		-----+-----	
7.5000E-01	1.7749E 01		-----+-----	
1.0000E 00	1.3022E 01		-----+-----	
1.2500E 00	8.5562E 00		-----+-----	
1.5000E 00	5.9338E 00		-----+-----	
1.7500E 00	4.7804E 00		-----+-----	
2.0000E 00	3.8654E 00		-----+-----	
2.2500E 00	2.7723E 00		-----+-----	
2.5000E 00	2.0524E 00		-----+-----	
2.7500E 00	1.7253E 00		-----+-----	
3.0000E 00	1.4462E 00		-----+-----	
3.2500E 00	1.0762E 00		-----+-----	
3.5000E 00	8.2188E-01		-----+-----	
3.7500E 00	7.0609E-01		-----+-----	
4.0000E 00	6.0349E-01		-----+-----	
4.2500E 00	4.5837E-01		-----+-----	
4.5000E 00	3.5674E-01		-----+-----	
4.7500E 00	3.1055E-01		-----+-----	
5.0000E 00	2.6863E-01		-----+-----	
5.2500E 00	2.0641E-01		-----+-----	
5.5000E 00	1.6608E-01		-----+-----	
5.7500E 00	1.4504E-01		-----+-----	
6.0000E 00	1.2607E-01		-----+-----	
6.2500E 00	9.6222E-02		-----+-----	
6.5000E 00	7.8834E-02		-----+-----	
6.7500E 00	6.9201E-02		-----+-----	
7.0000E 00	6.0444E-02		-----+-----	
7.2500E 00	4.5794E-02		-----+-----	
7.5000E 00	3.8173E-02		-----+-----	
7.7500E 00	3.3645E-02		-----+-----	
8.0000E 00	2.9504E-02		-----+-----	
8.2500E 00	2.2058E-02		-----+-----	
8.5000E 00	1.8795E-02		-----+-----	
8.7500E 00	1.6629E-02		-----+-----	
9.0000E 00	1.4642E-02		-----+-----	
9.2500E 00	1.0699E-02		-----+-----	
9.5000E 00	9.4186E-03		-----+-----	
9.7500E 00	8.3728E-03		-----+-----	
1.0000E 01	7.4102E-03		-----+-----	

TIME	MINIMUM		L6T20	VERSUS TIME	MAXIMUM	
	0.0	I			1.0000E 02	I
0.0	0.0	+				
2.5000E-01	5.1682E 01	-----+				
5.0000E-01	6.4095E 01	-----+				
7.5000E-01	5.9761E 01	-----+				
1.0000E 00	5.2677E 01	-----+				
1.2500E 00	4.2848E 01	-----+				
1.5000E 00	3.3865E 01	-----+				
1.7500E 00	2.8398E 01	-----+				
2.0000E 00	2.3875E 01	-----+				
2.2500E 00	1.8770E 01	-----+				
2.5000E 00	1.4705E 01	-----+				
2.7500E 00	1.2413E 01	-----+				
3.0000E 00	1.0520E 01	-----+				
3.2500E 00	8.3238E 00	-----+				
3.5000E 00	6.5735E 00	-----+				
3.7500E 00	5.6033E 00	-----+				
4.0000E 00	4.7917E 00	-----+				
4.2500E 00	3.8217E 00	-----+				
4.5000E 00	3.0377E 00	-----+				
4.7500E 00	2.6073E 00	-----+				
5.0000E 00	2.2432E 00	-----+				
5.2500E 00	1.8008E 00	-----+				
5.5000E 00	1.4327E 00	-----+				
5.7500E 00	1.2350E 00	-----+				
6.0000E 00	1.0659E 00	-----+				
6.2500E 00	8.6222E-01	-----+				
6.5000E 00	6.8352E-01	-----+				
6.7500E 00	5.9015E-01	-----+				
7.0000E 00	5.0999E-01	-----+				
7.2500E 00	4.1676E-01	-----+				
7.5000E 00	3.2726E-01	-----+				
7.7500E 00	2.8253E-01	-----+				
8.0000E 00	2.4404E-01	-----+				
8.2500E 00	2.0253E-01	-----+				
8.5000E 00	1.5612E-01	-----+				
8.7500E 00	1.3452E-01	-----+				
9.0000E 00	1.1590E-01	-----+				
9.2500E 00	9.8720E-02	-----+				
9.5000E 00	7.3538E-02	-----+				
9.7500E 00	6.3062E-02	-----+				
1.0000E 01	5.4030E-02	-----+				

TIME	MINIMUM 0.0	L20T40	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	0.0	0.0	+	1
2.5000E-01	8.4122E-01	8.4122E-01	+	
5.0000E-01	1.0676E 01	1.0676E 01	-----+	
7.5000E-01	2.2226E 01	2.2226E 01	-----+-----+	
1.0000E 00	3.3102E 01	3.3102E 01	-----+-----+	
1.2500E 00	4.4293E 01	4.4293E 01	-----+-----+-----+	
1.5000E 00	5.0466E 01	5.0466E 01	-----+-----+-----+-----+	
1.7500E 00	5.1921E 01	5.1921E 01	-----+-----+-----+-----+	
2.0000E 00	5.1506E 01	5.1506E 01	-----+-----+-----+-----+	
2.2500E 00	4.8955E 01	4.8955E 01	-----+-----+-----+-----+	
2.5000E 00	4.4872E 01	4.4872E 01	-----+-----+-----+-----+	
2.7500E 00	4.1366E 01	4.1366E 01	-----+-----+-----+-----+	
3.0000E 00	3.7732E 01	3.7732E 01	-----+-----+-----+-----+	
3.2500E 00	3.2796E 01	3.2796E 01	-----+-----+-----+-----+	
3.5000E 00	2.8117E 01	2.8117E 01	-----+-----+-----+-----+	
3.7500E 00	2.4985E 01	2.4985E 01	-----+-----+-----+-----+	
4.0000E 00	2.2113E 01	2.2113E 01	-----+-----+-----+-----+	
4.2500E 00	1.8566E 01	1.8566E 01	-----+-----+-----+-----+	
4.5000E 00	1.5485E 01	1.5485E 01	-----+-----+-----+-----+	
4.7500E 00	1.3545E 01	1.3545E 01	-----+-----+-----+-----+	
5.0000E 00	1.1830E 01	1.1830E 01	-----+-----+-----+-----+	
5.2500E 00	9.7769E 00	9.7769E 00	-----+-----+-----+-----+	
5.5000E 00	8.0496E 00	8.0496E 00	-----+-----+-----+-----+	
5.7500E 00	6.9890E 00	6.9890E 00	-----+-----+-----+-----+	
6.0000E 00	6.0651E 00	6.0651E 00	-----+-----+-----+-----+	
6.2500E 00	4.9722E 00	4.9722E 00	-----+-----+-----+-----+	
6.5000E 00	4.0691E 00	4.0691E 00	-----+-----+-----+-----+	
6.7500E 00	3.5195E 00	3.5195E 00	-----+-----+-----+-----+	
7.0000E 00	3.0441E 00	3.0441E 00	-----+-----+-----+-----+	
7.2500E 00	2.4840E 00	2.4840E 00	-----+-----+-----+-----+	
7.5000E 00	2.0269E 00	2.0269E 00	-----+-----+-----+-----+	
7.7500E 00	1.7496E 00	1.7496E 00	-----+-----+-----+-----+	
8.0000E 00	1.5106E 00	1.5106E 00	-----+-----+-----+-----+	
8.2500E 00	1.2293E 00	1.2293E 00	-----+-----+-----+-----+	
8.5000E 00	1.0015E 00	1.0015E 00	-----+-----+-----+-----+	
8.7500E 00	8.6359E-01	8.6359E-01	-----+-----+-----+-----+	
9.0000E 00	7.4495E-01	7.4495E-01	-----+-----+-----+-----+	
9.2500E 00	6.0523E-01	6.0523E-01	-----+-----+-----+-----+	
9.5000E 00	4.9267E-01	4.9267E-01	-----+-----+-----+-----+	
9.7500E 00	4.2462E-01	4.2462E-01	-----+-----+-----+-----+	
1.0000E 01	3.6613E-01	3.6613E-01	-----+-----+-----+-----+	

TIME	LOT6	MINIMUM 0.0	LOT6	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	1.0000E 02	I			I
2.5000E-01	9.8163E 01	-----+			-----+
5.0000E-01	9.2032E 01	-----+			-----+
7.5000E-01	8.6076E 01	-----+			-----+
1.0000E 00	8.0044E 01	-----+			-----+
1.2500E 00	7.2535E 01	-----+			-----+
1.5000E 00	6.5790E 01	-----+			-----+
1.7500E 00	6.1315E 01	-----+			-----+
2.0000E 00	5.7295E 01	-----+			-----+
2.2500E 00	5.2446E 01	-----+			-----+
2.5000E 00	4.8175E 01	-----+			-----+
2.7500E 00	4.5397E 01	-----+			-----+
3.0000E 00	4.2872E 01	-----+			-----+
3.2500E 00	3.9710E 01	-----+			-----+
3.5000E 00	3.6878E 01	-----+			-----+
3.7500E 00	3.5045E 01	-----+			-----+
4.0000E 00	3.3354E 01	-----+			-----+
4.2500E 00	3.1162E 01	-----+			-----+
4.5000E 00	2.9169E 01	-----+			-----+
4.7500E 00	2.7887E 01	-----+			-----+
5.0000E 00	2.6591E 01	-----+			-----+
5.2500E 00	2.5094E 01	-----+			-----+
5.5000E 00	2.3626E 01	-----+			-----+
5.7500E 00	2.2688E 01	-----+			-----+
6.0000E 00	2.1806E 01	-----+			-----+
6.2500E 00	2.0599E 01	-----+			-----+
6.5000E 00	1.9480E 01	-----+			-----+
6.7500E 00	1.8771E 01	-----+			-----+
7.0000E 00	1.8100E 01	-----+			-----+
7.2500E 00	1.7162E 01	-----+			-----+
7.5000E 00	1.6286E 01	-----+			-----+
7.7500E 00	1.5735E 01	-----+			-----+
8.0000E 00	1.5212E 01	-----+			-----+
8.2500E 00	1.4466E 01	-----+			-----+
8.5000E 00	1.3767E 01	-----+			-----+
8.7500E 00	1.3331E 01	-----+			-----+
9.0000E 00	1.2914E 01	-----+			-----+
9.2500E 00	1.2311E 01	-----+			-----+
9.5000E 00	1.1743E 01	-----+			-----+
9.7500E 00	1.1392E 01	-----+			-----+
1.0000E 01	1.1055E 01	-----+			-----+

TIME	MINIMUM 0.0	L6T20	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	0.0	I		I
2.5000E-01	1.8370E 00	+		
5.0000E-01	7.9683E 00	---	+	
7.5000E-01	1.3923E 01	-----	+	
1.0000E 00	1.9953E 01	-----	+	
1.2500E 00	2.7449E 01	-----	+	
1.5000E 00	3.4152E 01	-----	+	
1.7500E 00	3.8561E 01	-----	+	
2.0000E 00	4.2471E 01	-----	+	
2.2500E 00	4.7087E 01	-----	+	
2.5000E 00	5.1003E 01	-----	+	
2.7500E 00	5.3419E 01	-----	+	
3.0000E 00	5.5496E 01	-----	+	
3.2500E 00	5.7933E 01	-----	+	
3.5000E 00	5.9888E 01	-----	+	
3.7500E 00	6.0962E 01	-----	+	
4.0000E 00	6.1815E 01	-----	+	
4.2500E 00	6.2782E 01	-----	+	
4.5000E 00	6.3432E 01	-----	+	
4.7500E 00	6.3639E 01	-----	+	
5.0000E 00	6.3711E 01	-----	+	
5.2500E 00	6.3733E 01	-----	+	
5.5000E 00	6.3558E 01	-----	+	
5.7500E 00	6.3236E 01	-----	+	
6.0000E 00	6.2836E 01	-----	+	
6.2500E 00	6.2285E 01	-----	+	
6.5000E 00	6.1617E 01	-----	+	
6.7500E 00	6.0993E 01	-----	+	
7.0000E 00	6.0328E 01	-----	+	
7.2500E 00	5.9451E 01	-----	+	
7.5000E 00	5.8511E 01	-----	+	
7.7500E 00	5.7731E 01	-----	+	
8.0000E 00	5.6933E 01	-----	+	
8.2500E 00	5.5889E 01	-----	+	
8.5000E 00	5.4816E 01	-----	+	
8.7500E 00	5.3972E 01	-----	+	
9.0000E 00	5.3123E 01	-----	+	
9.2500E 00	5.2013E 01	-----	+	
9.5000E 00	5.0896E 01	-----	+	
9.7500E 00	5.0041E 01	-----	+	
1.0000E 01	4.9191E 01	-----	+	

	MINIMUM	LOT20	VERSUS	TIME	MAXIMUM
	0.0				1.0000E 02
TIME	LOT20	I			I
0.0	1.0000E 02	-----			+
2.5000E-01	1.0000E 02	-----			+
5.0000E-01	1.0000E 02	-----			+
7.5000E-01	9.9999E 01	-----			+
1.0000E 00	9.9997E 01	-----			+
1.2500E 00	9.9984E 01	-----			+
1.5000E 00	9.9942E 01	-----			+
1.7500E 00	9.9876E 01	-----			+
2.0000E 00	9.9766E 01	-----			+
2.2500E 00	9.9533E 01	-----			+
2.5000E 00	9.9179E 01	-----			+
2.7500E 00	9.8816E 01	-----			+
3.0000E 00	9.8368E 01	-----			+
3.2500E 00	9.7644E 01	-----			+
3.5000E 00	9.6766E 01	-----			+
3.7500E 00	9.6006E 01	-----			+
4.0000E 00	9.5169E 01	-----			+
4.2500E 00	9.3945E 01	-----			+
4.5000E 00	9.2601E 01	-----			+
4.7500E 00	9.1526E 01	-----			+
5.0000E 00	9.0401E 01	-----			+
5.2500E 00	8.8827E 01	-----			+
5.5000E 00	8.7184E 01	-----			+
5.7500E 00	8.5924E 01	-----			+
6.0000E 00	8.4642E 01	-----			+
6.2500E 00	8.2884E 01	-----			+
6.5000E 00	8.1097E 01	-----			+
6.7500E 00	7.9765E 01	-----			+
7.0000E 00	7.8428E 01	-----			+
7.2500E 00	7.6613E 01	-----			+
7.5000E 00	7.4796E 01	-----			+
7.7500E 00	7.3466E 01	-----			+
8.0000E 00	7.2145E 01	-----			+
8.2500E 00	7.0355E 01	-----			+
8.5000E 00	6.8583E 01	-----			+
8.7500E 00	6.7303E 01	-----			+
9.0000E 00	6.6037E 01	-----			+
9.2500E 00	6.4324E 01	-----			+
9.5000E 00	6.2639E 01	-----			+
9.7500E 00	6.1433E 01	-----			+
1.0000E 01	6.0247E 01	-----			+

TIME	MINIMUM		L20T40 VFRSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0				
2.5000E-01	5.8625E-08				
5.0000E-01	3.0794E-05				
7.5000E-01	4.5059E-04				
1.0000E 00	2.8575E-03				
1.2500E 00	1.6109E-02				
1.5000E 00	5.7390E-02				
1.7500E 00	1.2362E-01				
2.0000E 00	2.3390E-01				
2.2500E 00	4.6608E-01				
2.5000E 00	8.2079E-01				
2.7500E 00	1.1835E 00				
3.0000E 00	1.6311E 00				
3.2500E 00	2.3555E 00				
3.5000E 00	3.2328E 00				
3.7500E 00	3.9920E 00				
4.0000E 00	4.8281E 00				
4.2500E 00	6.0512E 00				
4.5000E 00	7.3916E 00				
4.7500E 00	8.4629E 00				
5.0000E 00	9.5821E 00				
5.2500E 00	1.1146E 01				
5.5000E 00	1.2775E 01				
5.7500E 00	1.4020E 01				
6.0000E 00	1.5233E 01				
6.2500E 00	1.7009E 01				
6.5000E 00	1.8754E 01				
6.7500E 00	2.0048E 01				
7.0000E 00	2.1338E 01				
7.2500E 00	2.3079E 01				
7.5000E 00	2.4805E 01				
7.7500E 00	2.6056E 01				
8.0000E 00	2.7288E 01				
8.2500E 00	2.8939E 01				
8.5000E 00	3.0551E 01				
8.7500E 00	3.1698E 01				
9.0000E 00	3.2817E 01				
9.2500E 00	3.4309E 01				
9.5000E 00	3.5747E 01				
9.7500E 00	3.6753E 01				
1.0000E 01	3.7725E 01				

TIME	LOT6	MINIMUM		LOT6		VERSUS TIME		MAXIMUM	
		0.0	I					1.0000E 02	I
0.0	1.0000E 02								
2.5000E-01	9.1147E 01								
5.0000E-01	7.6659E 01								
7.5000E-01	6.8063E 01								
1.0000E 00	6.1185E 01								
1.2500E 00	5.3801E 01								
1.5000E 00	4.8056E 01								
1.7500E 00	4.4628E 01								
2.0000E 00	4.1675E 01								
2.2500E 00	3.8185E 01								
2.5000E 00	3.5238E 01								
2.7500E 00	3.3390E 01								
3.0000E 00	3.1726E 01								
3.2500E 00	2.9649E 01								
3.5000E 00	2.7819E 01								
3.7500E 00	2.6647E 01								
4.0000E 00	2.5565E 01								
4.2500E 00	2.4167E 01								
4.5000E 00	2.2905E 01								
4.7500E 00	2.2089E 01								
5.0000E 00	2.1324E 01								
5.2500E 00	2.0310E 01								
5.5000E 00	1.9380E 01								
5.7500E 00	1.8776E 01								
6.0000E 00	1.8204E 01								
6.2500E 00	1.7432E 01								
6.5000E 00	1.6715E 01								
6.7500E 00	1.6249E 01								
7.0000E 00	1.5805E 01								
7.2500E 00	1.5195E 01								
7.5000E 00	1.4624E 01								
7.7500E 00	1.4254E 01								
8.0000E 00	1.3898E 01								
8.2500E 00	1.3403E 01								
8.5000E 00	1.2937E 01								
8.7500E 00	1.2636E 01								
9.0000E 00	1.2345E 01								
9.2500E 00	1.1935E 01								
9.5000E 00	1.1548E 01								
9.7500E 00	1.1297E 01								
1.0000E 01	1.1055E 01								

TIME	L6T20	MINIMUM 0.0	I	MAXIMUM 1.0000E 02
0.0	0.0		+	
2.5000E-01	8.8525E 00		-----+	
5.0000E-01	2.3330E 01		-----+-----+	
7.5000E-01	3.1861E 01		-----+-----+	
1.0000E 00	3.8553E 01		-----+-----+-----+	
1.2500E 00	4.5385E 01		-----+-----+-----+	
1.5000E 00	5.0177E 01		-----+-----+-----+	
1.7500E 00	5.2656E 01		-----+-----+-----+	
2.0000E 00	5.4478E 01		-----+-----+-----+	
2.2500E 00	5.6191E 01		-----+-----+-----+	
2.5000E 00	5.7153E 01		-----+-----+-----+	
2.7500E 00	5.7453E 01		-----+-----+-----+	
3.0000E 00	5.7517E 01		-----+-----+-----+	
3.2500E 00	5.7358E 01		-----+-----+-----+	
3.5000E 00	5.6924E 01		-----+-----+-----+	
3.7500E 00	5.6441E 01		-----+-----+-----+	
4.0000E 00	5.5878E 01		-----+-----+-----+	
4.2500E 00	5.5051E 01		-----+-----+-----+	
4.5000E 00	5.4128E 01		-----+-----+-----+	
4.7500E 00	5.3385E 01		-----+-----+-----+	
5.0000E 00	5.2621E 01		-----+-----+-----+	
5.2500E 00	5.1584E 01		-----+-----+-----+	
5.5000E 00	5.0525E 01		-----+-----+-----+	
5.7500E 00	4.9723E 01		-----+-----+-----+	
6.0000E 00	4.8925E 01		-----+-----+-----+	
6.2500E 00	4.7863E 01		-----+-----+-----+	
6.5000E 00	4.6806E 01		-----+-----+-----+	
6.7500E 00	4.6027E 01		-----+-----+-----+	
7.0000E 00	4.5260E 01		-----+-----+-----+	
7.2500E 00	4.4245E 01		-----+-----+-----+	
7.5000E 00	4.3248E 01		-----+-----+-----+	
7.7500E 00	4.2521E 01		-----+-----+-----+	
8.0000E 00	4.1809E 01		-----+-----+-----+	
8.2500E 00	4.0869E 01		-----+-----+-----+	
8.5000E 00	3.9950E 01		-----+-----+-----+	
8.7500E 00	3.9286E 01		-----+-----+-----+	
9.0000E 00	3.8636E 01		-----+-----+-----+	
9.2500E 00	3.7777E 01		-----+-----+-----+	
9.5000E 00	3.6940E 01		-----+-----+-----+	
9.7500E 00	3.6338E 01		-----+-----+-----+	
1.0000E 01	3.5749E 01		-----+-----+-----+	

TIME	MINIMUM		L20T40 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	6.7968E-05	+			
5.0000E-01	1.1560E-02	+			
7.5000E-01	7.5893E-02	+			
1.0000E 00	2.6218E-01	+			
1.2500E 00	8.1393E-01	+			
1.5000E 00	1.7666E 00	+			
1.7500E 00	2.7153E 00	-+			
2.0000E 00	3.8450E 00	-+			
2.2500E 00	5.6172E 00	--+			
2.5000E 00	7.5913E 00	---+			
2.7500E 00	9.1259E 00	----+			
3.0000E 00	1.0704E 01	-----+			
3.2500E 00	1.2896E 01	-----+			
3.5000E 00	1.5095E 01	-----+			
3.7500E 00	1.6687E 01	-----+			
4.0000E 00	1.8252E 01	-----+			
4.2500E 00	2.0342E 01	-----+			
4.5000E 00	2.2358E 01	-----+			
4.7500E 00	2.3773E 01	-----+			
5.0000E 00	2.5137E 01	-----+			
5.2500E 00	2.6929E 01	-----+			
5.5000E 00	2.8623E 01	-----+			
5.7500E 00	2.9789E 01	-----+			
6.0000E 00	3.0902E 01	-----+			
6.2500E 00	3.2350E 01	-----+			
6.5000E 00	3.3701E 01	-----+			
6.7500E 00	3.4619E 01	-----+			
7.0000E 00	3.5487E 01	-----+			
7.2500E 00	3.6607E 01	-----+			
7.5000E 00	3.7640E 01	-----+			
7.7500E 00	3.8332E 01	-----+			
8.0000E 00	3.8981E 01	-----+			
8.2500E 00	3.9812E 01	-----+			
8.5000E 00	4.0567E 01	-----+			
8.7500E 00	4.1064E 01	-----+			
9.0000E 00	4.1525E 01	-----+			
9.2500E 00	4.2108E 01	-----+			
9.5000E 00	4.2627E 01	-----+			
9.7500E 00	4.2961E 01	-----+			
1.0000E 01	4.3264E 01	-----+			

	MINIMUM	LOT6	VERSUS TIME	MAXIMUM
TIME	0.0		I	1.0000E 02
0.0	1.0000E 02			
2.5000E-01	9.9998E 01			
5.0000E-01	9.9962E 01			
7.5000E-01	9.9968E 01			
1.0000E 00	9.9948E 01			
1.2500E 00	9.9383E 01			
1.5000E 00	9.9784E 01			
1.7500E 00	9.9725E 01			
2.0000E 00	9.9659E 01			
2.2500E 00	9.9489E 01			
2.5000E 00	9.9280E 01			
2.7500E 00	9.9171E 01			
3.0000E 00	9.9055E 01			
3.2500E 00	9.8775E 01			
3.5000E 00	9.8460E 01			
3.7500E 00	9.8305E 01			
4.0000E 00	9.8143E 01			
4.2500E 00	9.7766E 01			
4.5000E 00	9.7359E 01			
4.7500E 00	9.7167E 01			
5.0000E 00	9.6971E 01			
5.2500E 00	9.6515E 01			
5.5000E 00	9.6035E 01			
5.7500E 00	9.5816E 01			
6.0000E 00	9.5593E 01			
6.2500E 00	9.5077E 01			
6.5000E 00	9.4543E 01			
6.7500E 00	9.4305E 01			
7.0000E 00	9.4066E 01			
7.2500E 00	9.3506E 01			
7.5000E 00	9.2934E 01			
7.7500E 00	9.2685E 01			
8.0000E 00	9.2436E 01			
8.2500E 00	9.1847E 01			
8.5000E 00	9.1250E 01			
8.7500E 00	9.0996E 01			
9.0000E 00	9.0742E 01			
9.2500E 00	9.0136E 01			
9.5000E 00	3.9525E 01			
9.7500E 00	8.9270E 01			
1.0000E 01	8.9017E 01			

TIME	MINIMUM		L6T20	VERSUS	TIME	MAXIMUM	
	0.0	I				1.0000E 02	I
0.0	0.0	+					
2.5000E-01	2.3491E-03	+					
5.0000E-01	1.7518E-02	+					
7.5000E-01	3.2050E-02	+					
1.0000E 00	5.2360E-02	+					
1.2500E 00	1.1732E-01	+					
1.5000E 00	2.1590E-01	+					
1.7500E 00	2.7441E-01	+					
2.0000E 00	3.4084E-01	+					
2.2500E 00	5.1085E-01	+					
2.5000E 00	7.1925E-01	+					
2.7500E 00	8.2835E-01	+					
3.0000E 00	9.4499E-01	+					
3.2500E 00	1.2246E 00	+					
3.5000E 00	1.5399E 00	+					
3.7500E 00	1.6949E 00	+					
4.0000E 00	1.8561E 00	+					
4.2500E 00	2.2330E 00	-+					
4.5000E 00	2.6401E 00	-+					
4.7500E 00	2.8320E 00	-+					
5.0000E 00	3.0285E 00	-+					
5.2500E 00	3.4846E 00	-+					
5.5000E 00	3.9644E 00	-+					
5.7500E 00	4.1836E 00	---+					
6.0000E 00	4.4058E 00	---+					
6.2500E 00	4.9222E 00	---+					
6.5000E 00	5.4564E 00	---+					
6.7500E 00	5.6941E 00	---+					
7.0000E 00	5.9334E 00	---+					
7.2500E 00	6.4931E 00	----+					
7.5000E 00	7.0655E 00	----+					
7.7500E 00	7.3142E 00	----+					
8.0000E 00	7.5635E 00	----+					
8.2500E 00	8.1522E 00	-----+					
8.5000E 00	8.7493E 00	-----+					
8.7500E 00	9.0030E 00	-----+					
9.0000E 00	9.2567E 00	-----+					
9.2500E 00	9.8628E 00	-----+					
9.5000E 00	1.0474E 01	-----+					
9.7500E 00	1.0728E 01	-----+					
1.0000E 01	1.0982E 01	-----+					

TIME	MINIMUM		LGT20 VERSUS TIME		MAXIMUM	
	0.0	0.0	I	I	1.0000E 02	I
0.0	1.0000E 02	0.0	-----	-----	1.0000E 02	+
2.5000E-01	7.7357E 01	0.0	-----	-----	1.0000E 02	+
5.0000E-01	6.0926E 01	0.0	-----	-----	1.0000E 02	+
7.5000E-01	5.0833E 01	0.0	-----	-----	1.0000E 02	+
1.0000E 00	4.2390E 01	0.0	-----	-----	1.0000E 02	+
1.2500E 00	3.5909E 01	0.0	-----	-----	1.0000E 02	+
1.5000E 00	2.8858E 01	0.0	-----	-----	1.0000E 02	+
1.7500E 00	2.4410E 01	0.0	-----	-----	1.0000E 02	+
2.0000E 00	2.0588E 01	0.0	-----	-----	1.0000E 02	+
2.2500E 00	1.7887E 01	0.0	-----	-----	1.0000E 02	+
2.5000E 00	1.4533E 01	0.0	-----	-----	1.0000E 02	+
2.7500E 00	1.2385E 01	0.0	-----	-----	1.0000E 02	+
3.0000E 00	1.0520E 01	0.0	-----	-----	1.0000E 02	+
3.2500E 00	9.0616E 00	0.0	-----	-----	1.0000E 02	+
3.5000E 00	7.5304E 00	0.0	-----	-----	1.0000E 02	+
3.7500E 00	6.4922E 00	0.0	-----	-----	1.0000E 02	+
4.0000E 00	5.5336E 00	0.0	-----	-----	1.0000E 02	+
4.2500E 00	4.8960E 00	0.0	-----	-----	1.0000E 02	+
4.5000E 00	4.0118E 00	0.0	-----	-----	1.0000E 02	+
4.7500E 00	3.4419E 00	0.0	-----	-----	1.0000E 02	+
5.0000E 00	2.9394E 00	0.0	-----	-----	1.0000E 02	+
5.2500E 00	2.6110E 00	0.0	-----	-----	1.0000E 02	+
5.5000E 00	2.1426E 00	0.0	-----	-----	1.0000E 02	+
5.7500E 00	1.8409E 00	0.0	-----	-----	1.0000E 02	+
6.0000E 00	1.5741E 00	0.0	-----	-----	1.0000E 02	+
6.2500E 00	1.4017E 00	0.0	-----	-----	1.0000E 02	+
6.5000E 00	1.1509E 00	0.0	-----	-----	1.0000E 02	+
6.7500E 00	9.8951E-01	0.0	-----	-----	1.0000E 02	+
7.0000E 00	8.4662E-01	0.0	-----	-----	1.0000E 02	+
7.2500E 00	7.5490E-01	0.0	-----	-----	1.0000E 02	+
7.5000E 00	6.1988E-01	0.0	-----	-----	1.0000E 02	+
7.7500E 00	5.3309E-01	0.0	-----	-----	1.0000E 02	+
8.0000E 00	4.5621E-01	0.0	-----	-----	1.0000E 02	+
8.2500E 00	4.0722E-01	0.0	-----	-----	1.0000E 02	+
8.5000E 00	3.3497E-01	0.0	-----	-----	1.0000E 02	+
8.7500E 00	2.8800E-01	0.0	-----	-----	1.0000E 02	+
9.0000E 00	2.4663E-01	0.0	-----	-----	1.0000E 02	+
9.2500E 00	2.1501E-01	0.0	-----	-----	1.0000E 02	+
9.5000E 00	1.8015E-01	0.0	-----	-----	1.0000E 02	+
9.7500E 00	1.5585E-01	0.0	-----	-----	1.0000E 02	+
1.0000E 01	1.3378E-01	0.0	-----	-----	1.0000E 02	+

TIME	L20T40	MINIMUM	L20T40 VERSUS TIME	MAXIMUM
		0.0		1.0000E 02
0.0	0.0	I		I
2.5000E-01	2.2599E 01	+	-----+	
5.0000E-01	3.7895E 01	+	-----+	
7.5000E-01	4.5549E 01	+	-----+	
1.0000E 00	5.0166E 01	+	-----+	
1.2500E 00	4.9570E 01	+	-----+	
1.5000E 00	4.8360E 01	+	-----+	
1.7500E 00	4.6688E 01	+	-----+	
2.0000E 00	4.4439E 01	+	-----+	
2.2500E 00	3.8896E 01	+	-----+	
2.5000E 00	3.4563E 01	+	-----+	
2.7500E 00	3.1727E 01	+	-----+	
3.0000E 00	2.9018E 01	+	-----+	
3.2500E 00	2.4659E 01	+	-----+	
3.5000E 00	2.1058E 01	+	-----+	
3.7500E 00	1.8909E 01	+	-----+	
4.0000E 00	1.7003E 01	+	-----+	
4.2500E 00	1.4118E 01	+	-----+	
4.5000E 00	1.1986E 01	+	-----+	
4.7500E 00	1.0713E 01	+	-----+	
5.0000E 00	9.5845E 00	+	-----+	
5.2500E 00	7.9083E 00	+	-----+	
5.5000E 00	6.6759E 00	+	-----+	
5.7500E 00	5.9428E 00	+	-----+	
6.0000E 00	5.2976E 00	+	-----+	
6.2500E 00	4.3541E 00	+	-----+	
6.5000E 00	3.6639E 00	+	-----+	
6.7500E 00	3.2548E 00	+	-----+	
7.0000E 00	2.8962E 00	+	-----+	
7.2500E 00	2.3757E 00	+	-----+	
7.5000E 00	1.9959E 00	+	-----+	
7.7500E 00	1.7712E 00	+	-----+	
8.0000E 00	1.5746E 00	+	-----+	
8.2500E 00	1.2903E 00	+	-----+	
8.5000E 00	1.0921E 00	+	-----+	
8.7500E 00	9.6000E-01	+	-----+	
9.0000E 00	8.5302E-01	+	-----+	
9.2500E 00	7.0393E-01	+	-----+	
9.5000E 00	5.8603E-01	+	-----+	
9.7500E 00	5.1817E-01	+	-----+	
1.0000E 01	4.5961E-01	+	-----+	

TIME	LOT20	MINIMUM	LCT20	VERSUS	TIME	MAXIMUM
		0.0				1.0000E 02
0.0	1.0000E 02	I				I
2.5000E-01	9.5560E 01	-----				-----+
5.0000E-01	9.2579E 01	-----				-----+
7.5000E-01	9.0673E 01	-----				-----+
1.0000E 00	8.8921E 01	-----				-----+
1.2500E 00	8.6708E 01	-----				-----+
1.5000E 00	8.4191E 01	-----				-----+
1.7500E 00	8.2575E 01	-----				-----+
2.0000E 00	8.1076E 01	-----				-----+
2.2500E 00	7.9138E 01	-----				-----+
2.5000E 00	7.7183E 01	-----				-----+
2.7500E 00	7.5862E 01	-----				-----+
3.0000E 00	7.4591E 01	-----				-----+
3.2500E 00	7.2896E 01	-----				-----+
3.5000E 00	7.1272E 01	-----				-----+
3.7500E 00	7.0141E 01	-----				-----+
4.0000E 00	6.9030E 01	-----				-----+
4.2500E 00	6.7517E 01	-----				-----+
4.5000E 00	6.6121E 01	-----				-----+
4.7500E 00	6.5127E 01	-----				-----+
5.0000E 00	6.4138E 01	-----				-----+
5.2500E 00	6.2771E 01	-----				-----+
5.5000E 00	6.1545E 01	-----				-----+
5.7500E 00	6.0658E 01	-----				-----+
6.0000E 00	5.9766E 01	-----				-----+
6.2500E 00	5.8520E 01	-----				-----+
6.5000E 00	5.7427E 01	-----				-----+
6.7500E 00	5.6628E 01	-----				-----+
7.0000E 00	5.5816E 01	-----				-----+
7.2500E 00	5.4673E 01	-----				-----+
7.5000E 00	5.3689E 01	-----				-----+
7.7500E 00	5.2962E 01	-----				-----+
8.0000E 00	5.2219E 01	-----				-----+
8.2500E 00	5.1166E 01	-----				-----+
8.5000E 00	5.0273E 01	-----				-----+
8.7500E 00	4.9608E 01	-----				-----+
9.0000E 00	4.8924E 01	-----				-----+
9.2500E 00	4.7950E 01	-----				-----+
9.5000E 00	4.7135E 01	-----				-----+
9.7500E 00	4.6524E 01	-----				-----+
1.0000E 01	4.5893E 01	-----				-----+

TIME	MINIMUM		L20T40 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	4.4396E 00	---			
5.0000E-01	7.4206E 00	----			
7.5000E-01	9.3266E 00	-----			
1.0000E 00	1.1079E 01	-----+			
1.2500E 00	1.3292E 01	-----+			
1.5000E 00	1.5807E 01	-----+			
1.7500E 00	1.7420E 01	-----+			
2.0000E 00	1.8914E 01	-----+			
2.2500E 00	2.0840E 01	-----+			
2.5000E 00	2.2773E 01	-----+			
2.7500E 00	2.4070E 01	-----+			
3.0000E 00	2.5308E 01	-----+			
3.2500E 00	2.6944E 01	-----+			
3.5000E 00	2.8488E 01	-----+			
3.7500E 00	2.9543E 01	-----+			
4.0000E 00	3.0564E 01	-----+			
4.2500E 00	3.1933E 01	-----+			
4.5000E 00	3.3157E 01	-----+			
4.7500E 00	3.4002E 01	-----+			
5.0000E 00	3.4827E 01	-----+			
5.2500E 00	3.5944E 01	-----+			
5.5000E 00	3.6890E 01	-----+			
5.7500E 00	3.7548E 01	-----+			
6.0000E 00	3.8195E 01	-----+			
6.2500E 00	3.9081E 01	-----+			
6.5000E 00	3.9783E 01	-----+			
6.7500E 00	4.0276E 01	-----+			
7.0000E 00	4.0765E 01	-----+			
7.2500E 00	4.1443E 01	-----+			
7.5000E 00	4.1934E 01	-----+			
7.7500E 00	4.2283E 01	-----+			
8.0000E 00	4.2635E 01	-----+			
8.2500E 00	4.3130E 01	-----+			
8.5000E 00	4.3440E 01	-----+			
8.7500E 00	4.3666E 01	-----+			
9.0000E 00	4.3899E 01	-----+			
9.2500E 00	4.4236E 01	-----+			
9.5000E 00	4.4392E 01	-----+			
9.7500E 00	4.4514E 01	-----+			
1.0000E 01	4.4646E 01	-----+			

TIME	MINIMUM		LOT20 VERSUS TIME		MAXIMUM	
	0.0				1.0000E 02	
0.0	1.0000E 02	02	I	-----+		
2.5000E-01	9.9490E 01	01		-----+		
5.0000E-01	9.9017E 01	01		-----+		
7.5000E-01	9.8810E 01	01		-----+		
1.0000E 00	9.8612E 01	01		-----+		
1.2500E 00	9.8205E 01	01		-----+		
1.5000E 00	9.7773E 01	01		-----+		
1.7500E 00	9.7585E 01	01		-----+		
2.0000E 00	9.7405E 01	01		-----+		
2.2500E 00	9.7024E 01	01		-----+		
2.5000E 00	9.6631E 01	01		-----+		
2.7500E 00	9.6465E 01	01		-----+		
3.0000E 00	9.6306E 01	01		-----+		
3.2500E 00	9.5956E 01	01		-----+		
3.5000E 00	9.5596E 01	01		-----+		
3.7500E 00	9.5447E 01	01		-----+		
4.0000E 00	9.5305E 01	01		-----+		
4.2500E 00	9.4981E 01	01		-----+		
4.5000E 00	9.4646E 01	01		-----+		
4.7500E 00	9.4512E 01	01		-----+		
5.0000E 00	9.4383E 01	01		-----+		
5.2500E 00	9.4080E 01	01		-----+		
5.5000E 00	9.3767E 01	01		-----+		
5.7500E 00	9.3645E 01	01		-----+		
6.0000E 00	9.3527E 01	01		-----+		
6.2500E 00	9.3241E 01	01		-----+		
6.5000E 00	9.2946E 01	01		-----+		
6.7500E 00	9.2834E 01	01		-----+		
7.0000E 00	9.2725E 01	01		-----+		
7.2500E 00	9.2455E 01	01		-----+		
7.5000E 00	9.2175E 01	01		-----+		
7.7500E 00	9.2071E 01	01		-----+		
8.0000E 00	9.1970E 01	01		-----+		
8.2500E 00	9.1713E 01	01		-----+		
8.5000E 00	9.1446E 01	01		-----+		
8.7500E 00	9.1350E 01	01		-----+		
9.0000E 00	9.1256E 01	01		-----+		
9.2500E 00	9.1009E 01	01		-----+		
9.5000E 00	9.0754E 01	01		-----+		
9.7500E 00	9.0664E 01	01		-----+		
1.0000E 01	9.0576E 01	01		-----+		

TIME	MINIMUM		I	MAXIMUM	
	L20T40	0.0		L20T40	1.0000E 02
0.C	0.0		+		I
2.5000E-01	5.1010E-01		+		
5.0000E-01	9.8248E-01		+		
7.5000E-01	1.1899E 00		+		
1.0000E 00	1.3882E 00		+		
1.2500E 00	1.7947E 00		+		
1.5000E 00	2.2264E 00		-+		
1.7500E 00	2.4143E 00		-+		
2.0000E 00	2.5943E 00		-+		
2.2500E 00	2.9759E 00		-+		
2.5000E 00	3.3687E 00		-+		
2.7500E 00	3.5344E 00		-+		
3.0000E 00	3.6937E 00		-+		
3.2500E 00	4.0434E 00		---+		
3.5000E 00	4.4040E 00		---+		
3.7500E 00	4.5521E 00		---+		
4.0000E 00	4.6948E 00		---+		
4.2500E 00	5.0189E 00		---+		
4.5000E 00	5.3534E 00		---+		
4.7500E 00	5.4873E 00		---+		
5.0000E 00	5.6165E 00		---+		
5.2500E 00	5.9196E 00		---+		
5.5000E 00	6.2325E 00		----+		
5.7500E 00	6.3546E 00		----+		
6.0000E 00	6.4727E 00		----+		
6.2500E 00	6.7582E 00		----+		
6.5000E 00	7.0531E 00		----+		
6.7500E 00	7.1653E 00		----+		
7.0000E 00	7.2740E 00		----+		
7.2500E 00	7.5446E 00		----+		
7.5000E 00	7.8241E 00		----+		
7.7500E 00	7.9280E 00		----+		
8.0000E 00	8.0287E 00		-----+		
8.2500E 00	8.2864E 00		-----+		
8.5000E 00	8.5527E 00		-----+		
8.7500E 00	8.6494E 00		-----+		
9.0000E 00	8.7433E 00		-----+		
9.2500E 00	8.9898E 00		-----+		
9.5000E 00	9.2445E 00		-----+		
9.7500E 00	9.3350E 00		-----+		
1.0000E 01	9.4228E 00		-----+		

TIME	MINIMUM		LOT6	VERSUS TIME	MAXIMUM	
	0.0	I			1.0000E 02	I
0.0	0.0	+				
2.5000E-01	1.7847E 00	+				
5.0000E-01	2.7558E 00	-+				
7.5000E-01	3.6404E 00	-+				
1.0000E 00	4.2065E 00	---+				
1.2500E 00	3.9540E 00	-+				
1.5000E 00	4.0795E 00	---+				
1.7500E 00	4.6449E 00	---+				
2.0000E 00	4.9786E 00	---+				
2.2500E 00	4.4866E 00	---+				
2.5000E 00	4.4579E 00	---+				
2.7500E 00	4.9557E 00	---+				
3.0000E 00	5.2319E 00	---+				
3.2500E 00	4.6696E 00	---+				
3.5000E 00	4.5900E 00	---+				
3.7500E 00	5.0678E 00	---+				
4.0000E 00	5.3289E 00	---+				
4.2500E 00	4.7442E 00	---+				
4.5000E 00	4.6526E 00	---+				
4.7500E 00	5.1218E 00	---+				
5.0000E 00	5.3730E 00	---+				
5.2500E 00	4.7761E 00	---+				
5.5000E 00	4.6723E 00	---+				
5.7500E 00	5.1392E 00	---+				
6.0000E 00	5.3904E 00	---+				
6.2500E 00	4.7914E 00	---+				
6.5000E 00	4.6896E 00	---+				
6.7500E 00	5.1542E 00	---+				
7.0000E 00	5.4011E 00	---+				
7.2500E 00	4.7979E 00	---+				
7.5000E 00	4.6895E 00	---+				
7.7500E 00	5.1543E 00	---+				
8.0000E 00	5.4036E 00	---+				
8.2500E 00	4.8017E 00	---+				
8.5000E 00	4.6978E 00	---+				
8.7500E 00	5.1614E 00	---+				
9.0000E 00	5.4074E 00	---+				
9.2500E 00	4.8029E 00	---+				
9.5000E 00	4.6934E 00	---+				
9.7500E 00	5.1578E 00	---+				
1.0000E 01	5.4067E 00	---+				

TIME	MINIMUM		L6T20 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	7.1120E-01	+			
5.0000E-01	2.1102E 00	-+			
7.5000E-01	3.4191E 00	-+			
1.0000E 00	4.8209E 00	---+			
1.2500E 00	6.4276E 00	----+			
1.5000E 00	7.2378E 00	----+			
1.7500E 00	7.8514E 00	----+			
2.0000E 00	8.5953E 00	-----+			
2.2500E 00	9.4397E 00	-----+			
2.5000E 00	9.5896E 00	-----+			
2.7500E 00	9.8245E 00	-----+			
3.0000E 00	1.0264E 01	-----+			
3.2500E 00	1.0759E 01	-----+			
3.5000E 00	1.0638E 01	-----+			
3.7500E 00	1.0715E 01	-----+			
4.0000E 00	1.1016E 01	-----+			
4.2500E 00	1.1351E 01	-----+			
4.5000E 00	1.1095E 01	-----+			
4.7500E 00	1.1104E 01	-----+			
5.0000E 00	1.1355E 01	-----+			
5.2500E 00	1.1627E 01	-----+			
5.5000E 00	1.1328E 01	-----+			
5.7500E 00	1.1306E 01	-----+			
6.0000E 00	1.1523E 01	-----+			
6.2500E 00	1.1757E 01	-----+			
6.5000E 00	1.1420E 01	-----+			
6.7500E 00	1.1383E 01	-----+			
7.0000E 00	1.1596E 01	-----+			
7.2500E 00	1.1821E 01	-----+			
7.5000E 00	1.1483E 01	-----+			
7.7500E 00	1.1440E 01	-----+			
8.0000E 00	1.1639E 01	-----+			
8.2500E 00	1.1850E 01	-----+			
8.5000E 00	1.1494E 01	-----+			
8.7500E 00	1.1448E 01	-----+			
9.0000E 00	1.1652E 01	-----+			
9.2500E 00	1.1366E 01	-----+			
9.5000E 00	1.1519E 01	-----+			
9.7500E 00	1.1472E 01	-----+			
1.0000E 01	1.1667E 01	-----+			

TIME	MINIMUM		L20T40 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0				
2.5000E-01	4.0963E-03	+			
5.0000E-01	1.3385E-01	+			
7.5000E-01	4.3811E-01	+			
1.0000E 00	9.5722E-01	+			
1.2500E 00	2.0276E 00	-+			
1.5000E 00	3.4266E 00	-+			
1.7500E 00	4.5096E 00	---+			
2.0000E 00	5.5768E 00	---+			
2.2500E 00	7.0245E 00	----+			
2.5000E 00	8.4519E 00	-----+			
2.7500E 00	9.3751E 00	-----+			
3.0000E 00	1.0186E 01	-----+			
3.2500E 00	1.1204E 01	-----+			
3.5000E 00	1.2150E 01	-----+			
3.7500E 00	1.2721E 01	-----+			
4.0000E 00	1.3197E 01	-----+			
4.2500E 00	1.3778E 01	-----+			
4.5000E 00	1.4332E 01	-----+			
4.7500E 00	1.4647E 01	-----+			
5.0000E 00	1.4887E 01	-----+			
5.2500E 00	1.5185E 01	-----+			
5.5000E 00	1.5494E 01	-----+			
5.7500E 00	1.5658E 01	-----+			
6.0000E 00	1.5771E 01	-----+			
6.2500E 00	1.5915E 01	-----+			
6.5000E 00	1.6098E 01	-----+			
6.7500E 00	1.6183E 01	-----+			
7.0000E 00	1.6222E 01	-----+			
7.2500E 00	1.6282E 01	-----+			
7.5000E 00	1.6393E 01	-----+			
7.7500E 00	1.6436E 01	-----+			
8.0000E 00	1.6445E 01	-----+			
8.2500E 00	1.6466E 01	-----+			
8.5000E 00	1.6547E 01	-----+			
8.7500E 00	1.6571E 01	-----+			
9.0000E 00	1.6557E 01	-----+			
9.2500E 00	1.6556E 01	-----+			
9.5000E 00	1.6615E 01	-----+			
9.7500E 00	1.6628E 01	-----+			
1.0000E 01	1.6610E 01	-----+			

TIME	MINIMUM		LOT6	VERSUS TIME	MAXIMUM	
	0.0	I			1.0000E 02	I
0.0	0.0	+				
2.5000E-01	2.4849E 00	-+				
5.0000E-01	4.8665E 00	--+				
7.5000E-01	7.1579E 00	---+				
1.0000E 00	9.3198E 00	----+				
1.2500E 00	1.1163E 01	-----+				
1.5000E 00	1.2797E 01	-----+				
1.7500E 00	1.4533E 01	-----+				
2.0000E 00	1.6179E 01	-----+				
2.2500E 00	1.7400E 01	-----+				
2.5000E 00	1.8484E 01	-----+				
2.7500E 00	1.9860E 01	-----+				
3.0000E 00	2.1181E 01	-----+				
3.2500E 00	2.2004E 01	-----+				
3.5000E 00	2.2735E 01	-----+				
3.7500E 00	2.3882E 01	-----+				
4.0000E 00	2.4993E 01	-----+				
4.2500E 00	2.5550E 01	-----+				
4.5000E 00	2.6040E 01	-----+				
4.7500E 00	2.7032E 01	-----+				
5.0000E 00	2.7999E 01	-----+				
5.2500E 00	2.8366E 01	-----+				
5.5000E 00	2.8684E 01	-----+				
5.7500E 00	2.9564E 01	-----+				
6.0000E 00	3.0428E 01	-----+				
6.2500E 00	3.0655E 01	-----+				
6.5000E 00	3.0843E 01	-----+				
6.7500E 00	3.1641E 01	-----+				
7.0000E 00	3.2427E 01	-----+				
7.2500E 00	3.2547E 01	-----+				
7.5000E 00	3.2635E 01	-----+				
7.7500E 00	3.3370E 01	-----+				
8.0000E 00	3.4097E 01	-----+				
8.2500E 00	3.4132E 01	-----+				
8.5000E 00	3.4141E 01	-----+				
8.7500E 00	3.4827E 01	-----+				
9.0000E 00	3.5506E 01	-----+				
9.2500E 00	3.5474E 01	-----+				
9.5000E 00	3.5420E 01	-----+				
9.7500E 00	3.6066E 01	-----+				
1.0000E 01	3.6708E 01	-----+				

TIME	MINIMUM		L6T20 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	1.5048E-02	+			
5.0000E-01	1.3352E-01	+			
7.5000E-01	3.4204E-01	+			
1.0000E 00	6.8018E-01	+			
1.2500E 00	1.3365E 00	+			
1.5000E 00	2.2020E 00	-+			
1.7500E 00	2.9638E 00	-+			
2.0000E 00	3.8144E 00	-+			
2.2500E 00	5.0846E 00	---+			
2.5000E 00	6.4837E 00	----+			
2.7500E 00	7.5871E 00	----+			
3.0000E 00	8.7372E 00	-----+			
3.2500E 00	1.0360E 01	-----+			
3.5000E 00	1.2053E 01	-----+			
3.7500E 00	1.3331E 01	-----+			
4.0000E 00	1.4627E 01	-----+			
4.2500E 00	1.6420E 01	-----+			
4.5000E 00	1.8243E 01	-----+			
4.7500E 00	1.9584E 01	-----+			
5.0000E 00	2.0926E 01	-----+			
5.2500E 00	2.2768E 01	-----+			
5.5000E 00	2.4614E 01	-----+			
5.7500E 00	2.5949E 01	-----+			
6.0000E 00	2.7274E 01	-----+			
6.2500E 00	2.9089E 01	-----+			
6.5000E 00	3.0892E 01	-----+			
6.7500E 00	3.2179E 01	-----+			
7.0000E 00	3.3450E 01	-----+			
7.2500E 00	3.5193E 01	-----+			
7.5000E 00	3.6915E 01	-----+			
7.7500E 00	3.8132E 01	-----+			
8.0000E 00	3.9329E 01	-----+			
8.2500E 00	4.0976E 01	-----+			
8.5000E 00	4.2596E 01	-----+			
8.7500E 00	4.3731E 01	-----+			
9.0000E 00	4.4846E 01	-----+			
9.2500E 00	4.6385E 01	-----+			
9.5000E 00	4.7895E 01	-----+			
9.7500E 00	4.8945E 01	-----+			
1.0000E 01	4.9975E 01	-----+			

	MINIMUM 0.0	L20T40 VERSUS TIME	MAXIMUM 1.0000E 02
TIME	L20T40	I	I
0.0	0.0	+	
2.5000E-01	1.4732E-10	+	
5.0000E-01	1.7541E-07	+	
7.5000E-01	3.8127E-06	+	
1.0000E 00	3.1959E-05	+	
1.2500E 00	2.4067E-04	+	
1.5000E 00	1.1019E-03	+	
1.7500E 00	2.8316E-03	+	
2.0000E 00	6.3121E-03	+	
2.2500E 00	1.5291E-02	+	
2.5000E 00	3.2153E-02	+	
2.7500E 00	5.2563E-02	+	
3.0000E 00	8.1430E-02	+	
3.2500E 00	1.3540E-01	+	
3.5000E 00	2.1167E-01	+	
3.7500E 00	2.8701E-01	+	
4.0000E 00	3.7925E-01	+	
4.2500E 00	5.2986E-01	+	
4.5000E 00	7.1673E-01	+	
4.7500E 00	8.8366E-01	+	
5.0000E 00	1.0739E 00	+	
5.2500E 00	1.3643E 00	+	
5.5000E 00	1.7002E 00	+	
5.7500E 00	1.9835E 00	+	
6.0000E 00	2.2935E 00	-+	
6.2500E 00	2.7492E 00	-+	
6.5000E 00	3.2548E 00	-+	
6.7500E 00	3.6657E 00	-+	
7.0000E 00	4.1041E 00	---+	
7.2500E 00	4.7342E 00	---+	
7.5000E 00	5.4143E 00	---+	
7.7500E 00	5.9532E 00	---+	
8.0000E 00	6.5185E 00	----+	
8.2500E 00	7.3192E 00	----+	
8.5000E 00	8.1672E 00	----+	
8.7500E 00	8.8268E 00	----+	
9.0000E 00	9.5103E 00	----+	
9.2500E 00	1.0469E 01	-----+	
9.5000E 00	1.1471E 01	-----+	
9.7500E 00	1.2238E 01	-----+	
1.0000E 01	1.3027E 01	-----+	

TIME	LOT6	MINIMUM	I	MAXIMUM
		0.0		1.0000E 02
0.0	0.0		+	
2.5000E-01	2.5000E 00		-+	
5.0000E-01	4.9997E 00		---+	
7.5000E-01	7.4994E 00		----+	
1.0000E 00	9.9989E 00		-----+	
1.2500E 00	1.2497E 01		-----+	
1.5000E 00	1.4992E 01		-----+	
1.7500E 00	1.7488E 01		-----+	
2.0000E 00	1.9984E 01		-----+	
2.2500E 00	2.2471E 01		-----+	
2.5000E 00	2.4952E 01		-----+	
2.7500E 00	2.7441E 01		-----+	
3.0000E 00	2.9927E 01		-----+	
3.2500E 00	3.2393E 01		-----+	
3.5000E 00	3.4848E 01		-----+	
3.7500E 00	3.7324E 01		-----+	
4.0000E 00	3.9798E 01		-----+	
4.2500E 00	4.2231E 01		-----+	
4.5000E 00	4.4651E 01		-----+	
4.7500E 00	4.7110E 01		-----+	
5.0000E 00	4.9565E 01		-----+	
5.2500E 00	5.1958E 01		-----+	
5.5000E 00	5.4334E 01		-----+	
5.7500E 00	5.6772E 01		-----+	
6.0000E 00	5.9207E 01		-----+	
6.2500E 00	6.1551E 01		-----+	
6.5000E 00	6.3877E 01		-----+	
6.7500E 00	6.6293E 01		-----+	
7.0000E 00	6.8705E 01		-----+	
7.2500E 00	7.0995E 01		-----+	
7.5000E 00	7.3266E 01		-----+	
7.7500E 00	7.5657E 01		-----+	
8.0000E 00	7.8045E 01		-----+	
8.2500E 00	8.0278E 01		-----+	
8.5000E 00	8.2490E 01		-----+	
8.7500E 00	8.4856E 01		-----+	
9.0000E 00	8.7219E 01		-----+	
9.2500E 00	8.9392E 01		-----+	
9.5000E 00	9.1545E 01		-----+	
9.7500E 00	9.3885E 01		-----+	
1.0000E 01	9.6222E 01		-----+	

TIME	MINIMUM		L6T20 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	2.0404E-05	+			
5.0000E-01	2.5591E-04	+			
7.5000E-01	5.5707E-04	+			
1.0000E 00	1.0737E-03	+			
1.2500E 00	3.3498E-03	+			
1.5000E 00	8.1491E-03	+			
1.7500E 00	1.1589E-02	+			
2.0000E 00	1.5938E-02	+			
2.2500E 00	2.8886E-02	+			
2.5000E 00	4.7999E-02	+			
2.7500E 00	5.9375E-02	+			
3.0000E 00	7.2450E-02	+			
3.2500E 00	1.0695E-01	+			
3.5000E 00	1.5139E-01	+			
3.7500E 00	1.7562E-01	+			
4.0000E 00	2.0225E-01	+			
4.2500E 00	2.6885E-01	+			
4.5000E 00	3.4873E-01	+			
4.7500E 00	3.9005E-01	+			
5.0000E 00	4.3432E-01	+			
5.2500E 00	5.4202E-01	+			
5.5000E 00	6.6574E-01	+			
5.7500E 00	7.2745E-01	+			
6.0000E 00	7.9250E-01	+			
6.2500E 00	9.4842E-01	+			
6.5000E 00	1.1225E 00	+			
6.7500E 00	1.2069E 00	+			
7.0000E 00	1.2950E 00	+			
7.2500E 00	1.5044E 00	+			
7.5000E 00	1.7336E 00	+			
7.7500E 00	1.8423E 00	+			
8.0000E 00	1.9548E 00	+			
8.2500E 00	2.2215E 00	-+			
8.5000E 00	2.5090E 00	-+			
8.7500E 00	2.6428E 00	-+			
9.0000E 00	2.7804E 00	-+			
9.2500E 00	3.1068E 00	-+			
9.5000E 00	3.4547E 00	-+			
9.7500E 00	3.6140E 00	-+			
1.0000E 01	3.7769E 00	-+			

	MINIMUM	LOT20	VERSUS	TIME	MAXIMUM
TIME	0.0				1.0000E 02
		LOT20		I	I
0.0		0.0		+	
2.5000E-01		2.4959E 00		-+	
5.0000E-01		4.8660E 00		---+	
7.5000E-01		7.0595E 00		----+	
1.0000E 00		9.0274E 00		-----+	
1.2500E 00		9.6190E 00		-----+	
1.5000E 00		1.0455E 01		-----+	
1.7500E 00		1.1722E 01		-----+	
2.0000E 00		1.2916E 01		-----+	
2.2500E 00		1.2927E 01		-----+	
2.5000E 00		1.3123E 01		-----+	
2.7500E 00		1.3976E 01		-----+	
3.0000E 00		1.4818E 01		-----+	
3.2500E 00		1.4665E 01		-----+	
3.5000E 00		1.4510E 01		-----+	
3.7500E 00		1.5160E 01		-----+	
4.0000E 00		1.5823E 01		-----+	
4.2500E 00		1.5464E 01		-----+	
4.5000E 00		1.5193E 01		-----+	
4.7500E 00		1.5748E 01		-----+	
5.0000E 00		1.6326E 01		-----+	
5.2500E 00		1.5907E 01		-----+	
5.5000E 00		1.5553E 01		-----+	
5.7500E 00		1.6057E 01		-----+	
6.0000E 00		1.6589E 01		-----+	
6.2500E 00		1.6144E 01		-----+	
6.5000E 00		1.5744E 01		-----+	
6.7500E 00		1.6220E 01		-----+	
7.0000E 00		1.6728E 01		-----+	
7.2500E 00		1.6272E 01		-----+	
7.5000E 00		1.5844E 01		-----+	
7.7500E 00		1.6306E 01		-----+	
8.0000E 00		1.6801E 01		-----+	
8.2500E 00		1.6340E 01		-----+	
8.5000E 00		1.5895E 01		-----+	
8.7500E 00		1.6349E 01		-----+	
9.0000E 00		1.6838E 01		-----+	
9.2500E 00		1.6376E 01		-----+	
9.5000E 00		1.5935E 01		-----+	
9.7500E 00		1.6383E 01		-----+	
1.0000E 01		1.6869E 01		-----+	

TIME	MINIMUM 0.0	L20T40 VERSUS TIME	MAXIMUM 1.0000E 02
0.0	0.0	I	I
2.5000E-01	4.0963E-03	+	
5.0000E-01	1.3385E-01	+	
7.5000E-01	4.3811E-01	+	
1.0000E 00	9.5722E-01	+	
1.2500E 00	2.7992E 00	-+	
1.5000E 00	4.2478E 00	---+	
1.7500E 00	5.1686E 00	---+	
2.0000E 00	6.0278E 00	----+	
2.2500E 00	7.6988E 00	----+	
2.5000E 00	8.9454E 00	-----+	
2.7500E 00	9.6734E 00	-----+	
3.0000E 00	1.0289E 01	-----+	
3.2500E 00	1.1324E 01	-----+	
3.5000E 00	1.2193E 01	-----+	
3.7500E 00	1.2655E 01	-----+	
4.0000E 00	1.3022E 01	-----+	
4.2500E 00	1.3715E 01	-----+	
4.5000E 00	1.4212E 01	-----+	
4.7500E 00	1.4461E 01	-----+	
5.0000E 00	1.4638E 01	-----+	
5.2500E 00	1.5052E 01	-----+	
5.5000E 00	1.5347E 01	-----+	
5.7500E 00	1.5472E 01	-----+	
6.0000E 00	1.5540E 01	-----+	
6.2500E 00	1.5790E 01	-----+	
6.5000E 00	1.5971E 01	-----+	
6.7500E 00	1.6027E 01	-----+	
7.0000E 00	1.6034E 01	-----+	
7.2500E 00	1.6193E 01	-----+	
7.5000E 00	1.6312E 01	-----+	
7.7500E 00	1.6329E 01	-----+	
8.0000E 00	1.6302E 01	-----+	
8.2500E 00	1.6412E 01	-----+	
8.5000E 00	1.6496E 01	-----+	
8.7500E 00	1.6492E 01	-----+	
9.0000E 00	1.6447E 01	-----+	
9.2500E 00	1.6530E 01	-----+	
9.5000E 00	1.6589E 01	-----+	
9.7500E 00	1.6574E 01	-----+	
1.0000E 01	1.6513E 01	-----+	

TIME	LOT6	MINIMUM 0.0	LOT6	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	0.0			I	
2.5000E-01	2.4849E 00			+	
5.0000E-01	4.8665E 00			-+	
7.5000E-01	7.1579E 00			---	
1.0000E 00	9.3198E 00			----	
1.2500E 00	3.7499E 00			-----	
1.5000E 00	5.9644E 00			-----	
1.7500E 00	8.2261E 00			-----	
2.0000E 00	1.0384E 01			-----	
2.2500E 00	6.3385E 00			-----	
2.5000E 00	8.3957E 00			-----	
2.7500E 00	1.0543E 01			-----	
3.0000E 00	1.2593E 01			-----	
3.2500E 00	8.7088E 00			-----	
3.5000E 00	1.0616E 01			-----	
3.7500E 00	1.2659E 01			-----	
4.0000E 00	1.4611E 01			-----	
4.2500E 00	1.0895E 01			-----	
4.5000E 00	1.2663E 01			-----	
4.7500E 00	1.4611E 01			-----	
5.0000E 00	1.6472E 01			-----	
5.2500E 00	1.2920E 01			-----	
5.5000E 00	1.4539E 01			-----	
5.7500E 00	1.6396E 01			-----	
6.0000E 00	1.8174E 01			-----	
6.2500E 00	1.4807E 01			-----	
6.5000E 00	1.6307E 01			-----	
6.7500E 00	1.8082E 01			-----	
7.0000E 00	1.9782E 01			-----	
7.2500E 00	1.6566E 01			-----	
7.5000E 00	1.7956E 01			-----	
7.7500E 00	1.9654E 01			-----	
8.0000E 00	2.1280E 01			-----	
8.2500E 00	1.8209E 01			-----	
8.5000E 00	1.9497E 01			-----	
8.7500E 00	2.1122E 01			-----	
9.0000E 00	2.2680E 01			-----	
9.2500E 00	1.9747E 01			-----	
9.5000E 00	2.0938E 01			-----	
9.7500E 00	2.2496E 01			-----	
1.0000E 01	2.3990E 01			-----	

TIME	MINIMUM		L6T20	VERSUS TIME		MAXIMUM	
	0.0	I		0.0	I	1.0000E 02	I
0.0	0.0	+					
2.5000E-01	1.5048E-02	+					
5.0000E-01	1.3352E-01	+					
7.5000E-01	3.4204E-01	+					
1.0000E 00	6.8018E-01	+					
1.2500E 00	8.7498E 00	-----+					
1.5000E 00	8.5015E 00	-----+					
1.7500E 00	8.4464E 00	-----+					
2.0000E 00	8.5410E 00	-----+					
2.2500E 00	1.4790E 01	-----+					
2.5000E 00	1.4465E 01	-----+					
2.7500E 00	1.4370E 01	-----+					
3.0000E 00	1.4425E 01	-----+					
3.2500E 00	2.0321E 01	-----+					
3.5000E 00	1.9955E 01	-----+					
3.7500E 00	1.9834E 01	-----+					
4.0000E 00	1.9862E 01	-----+					
4.2500E 00	2.5421E 01	-----+					
4.5000E 00	2.5034E 01	-----+					
4.7500E 00	2.4896E 01	-----+					
5.0000E 00	2.4905E 01	-----+					
5.2500E 00	3.0147E 01	-----+					
5.5000E 00	2.9790E 01	-----+					
5.7500E 00	2.9639E 01	-----+					
6.0000E 00	2.9629E 01	-----+					
6.2500E 00	3.4550E 01	-----+					
6.5000E 00	3.4187E 01	-----+					
6.7500E 00	3.4030E 01	-----+					
7.0000E 00	3.4010E 01	-----+					
7.2500E 00	3.8654E 01	-----+					
7.5000E 00	3.8292E 01	-----+					
7.7500E 00	3.8132E 01	-----+					
8.0000E 00	3.8103E 01	-----+					
8.2500E 00	4.2498E 01	-----+					
8.5000E 00	4.2130E 01	-----+					
8.7500E 00	4.1970E 01	-----+					
9.0000E 00	4.1935E 01	-----+					
9.2500E 00	4.6076E 01	-----+					
9.5000E 00	4.5725E 01	-----+					
9.7500E 00	4.5565E 01	-----+					
1.0000E 01	4.5526E 01	-----+					

TIME	LOT20	MINIMUM	I	MAXIMUM
		0.0		1.0000E 02
0.0	0.0			
2.5000E-01	2.5000E 00		+	
5.0000E-01	5.0000E 00		-+	
7.5000E-01	7.5000E 00		---+	
1.0000E 00	1.0000E 01		----+	
1.2500E 00	1.2500E 01		-----+	
1.5000E 00	1.4466E 01		-----+	
1.7500E 00	1.6673E 01		-----+	
2.0000E 00	1.8925E 01		-----+	
2.2500E 00	2.1128E 01		-----+	
2.5000E 00	2.2861E 01		-----+	
2.7500E 00	2.4913E 01		-----+	
3.0000E 00	2.7018E 01		-----+	
3.2500E 00	2.9029E 01		-----+	
3.5000E 00	3.0571E 01		-----+	
3.7500E 00	3.2493E 01		-----+	
4.0000E 00	3.4473E 01		-----+	
4.2500E 00	3.6315E 01		-----+	
4.5000E 00	3.7697E 01		-----+	
4.7500E 00	3.9507E 01		-----+	
5.0000E 00	4.1376E 01		-----+	
5.2500E 00	4.3068E 01		-----+	
5.5000E 00	4.4328E 01		-----+	
5.7500E 00	4.6035E 01		-----+	
6.0000E 00	4.7803E 01		-----+	
6.2500E 00	4.9357E 01		-----+	
6.5000E 00	5.0495E 01		-----+	
6.7500E 00	5.2112E 01		-----+	
7.0000E 00	5.3791E 01		-----+	
7.2500E 00	5.5220E 01		-----+	
7.5000E 00	5.6248E 01		-----+	
7.7500E 00	5.7785E 01		-----+	
8.0000E 00	5.9383E 01		-----+	
8.2500E 00	6.0697E 01		-----+	
8.5000E 00	6.1627E 01		-----+	
8.7500E 00	6.3091E 01		-----+	
9.0000E 00	6.4615E 01		-----+	
9.2500E 00	6.5823E 01		-----+	
9.5000E 00	6.6663E 01		-----+	
9.7500E 00	6.8061E 01		-----+	
1.0000E 01	6.9516E 01		-----+	

TIME	MINIMUM		L20T40 VERSUS TIME	MAXIMUM	
	0.0	I		1.0000E 02	I
0.0	0.0	+			
2.5000E-01	1.4732E-10	+			
5.0000E-01	1.7541E-07	+			
7.5000E-01	3.8127E-06	+			
1.0000E 00	3.1959E-05	+			
1.2500E 00	2.4067E-04	+			
1.5000E 00	5.3406E-01	+			
1.7500E 00	8.2740E-01	+			
2.0000E 00	1.0747E 00	+			
2.2500E 00	1.3714E 00	+			
2.5000E 00	2.1390E 00	-+			
2.7500E 00	2.5870E 00	-+			
3.0000E 00	2.9809E 00	-+			
3.2500E 00	3.4693E 00	-+			
3.5000E 00	4.4258E 00	--+			
3.7500E 00	5.0019E 00	--+			
4.0000E 00	5.5190E 00	--+			
4.2500E 00	6.1710E 00	----+			
4.5000E 00	7.2807E 00	----+			
4.7500E 00	7.9622E 00	----+			
5.0000E 00	8.5815E 00	-----+			
5.2500E 00	9.3708E 00	-----+			
5.5000E 00	1.0585E 01	-----+			
5.7500E 00	1.1355E 01	-----+			
6.0000E 00	1.2059E 01	-----+			
6.2500E 00	1.2962E 01	-----+			
6.5000E 00	1.4271E 01	-----+			
6.7500E 00	1.5108E 01	-----+			
7.0000E 00	1.5877E 01	-----+			
7.2500E 00	1.6869E 01	-----+			
7.5000E 00	1.8249E 01	-----+			
7.7500E 00	1.9135E 01	-----+			
8.0000E 00	1.9954E 01	-----+			
8.2500E 00	2.1014E 01	-----+			
8.5000E 00	2.2443E 01	-----+			
8.7500E 00	2.3365E 01	-----+			
9.0000E 00	2.4219E 01	-----+			
9.2500E 00	2.5329E 01	-----+			
9.5000E 00	2.6790E 01	-----+			
9.7500E 00	2.7734E 01	-----+			
1.0000E 01	2.8611E 01	-----+			

TIME	LOT6	MINIMUM 0.0	LOT6	VERSUS TIME	MAXIMUM 1.0000E 02
0.0	0.0			I	I
2.5000E-01	2.5000E 00			+	
5.0000E-01	4.9997E 00			-+	
7.5000E-01	7.4994E 00			---+	
1.0000E 00	9.9989E 00			-----+	
1.2500E 00	3.7500E 00			-+	
1.5000E 00	6.2376E 00			---+	
1.7500E 00	8.7373E 00			-----+	
2.0000E 00	1.1237E 01			-----+	
2.2500E 00	6.6999E 00			---+	
2.5000E 00	9.1763E 00			-----+	
2.7500E 00	1.1676E 01			-----+	
3.0000E 00	1.4176E 01			-----+	
3.2500E 00	9.6137E 00			-----+	
3.5000E 00	1.2079E 01			-----+	
3.7500E 00	1.4579E 01			-----+	
4.0000E 00	1.7079E 01			-----+	
4.2500E 00	1.2495E 01			-----+	
4.5000E 00	1.4950E 01			-----+	
4.7500E 00	1.7450E 01			-----+	
5.0000E 00	1.9950E 01			-----+	
5.2500E 00	1.5347E 01			-----+	
5.5000E 00	1.7792E 01			-----+	
5.7500E 00	2.0291E 01			-----+	
6.0000E 00	2.2791E 01			-----+	
6.2500E 00	1.8172E 01			-----+	
6.5000E 00	2.0606E 01			-----+	
6.7500E 00	2.3106E 01			-----+	
7.0000E 00	2.5605E 01			-----+	
7.2500E 00	2.0972E 01			-----+	
7.5000E 00	2.3395E 01			-----+	
7.7500E 00	2.5895E 01			-----+	
8.0000E 00	2.8395E 01			-----+	
8.2500E 00	2.3748E 01			-----+	
8.5000E 00	2.6161E 01			-----+	
8.7500E 00	2.8661E 01			-----+	
9.0000E 00	3.1160E 01			-----+	
9.2500E 00	2.6501E 01			-----+	
9.5000E 00	2.8904E 01			-----+	
9.7500E 00	3.1404E 01			-----+	
1.0000E 01	3.3904E 01			-----+	

TIME C.C	MINIMUM 0.0		L6T20	VERSUS TIME	I	MAXIMUM 1.0000E 02	
2.5000E-01	2.0404E-05	+					
5.0000E-01	2.5591E-04	+					
7.5000E-01	5.5707E-04	+					
1.0000E 00	1.0737E-03	+					
1.2500E 00	8.7500E 00	-----+					
1.5000E 00	8.7063E 00	-----+					
1.7500E 00	8.6779E 00	-----+					
2.0000E 00	8.6510E 00	-----+					
2.2500E 00	1.5633E 01	-----+					
2.5000E 00	1.5556E 01	-----+					
2.7500E 00	1.5508E 01	-----+					
3.0000E 00	1.5463E 01	-----+					
3.2500E 00	2.2432E 01	-----+					
3.5000E 00	2.2326E 01	-----+					
3.7500E 00	2.2262E 01	-----+					
4.0000E 00	2.2200E 01	-----+					
4.2500E 00	2.9155E 01	-----+					
4.5000E 00	2.9024E 01	-----+					
4.7500E 00	2.8945E 01	-----+					
5.0000E 00	2.8869E 01	-----+					
5.2500E 00	3.5810E 01	-----+					
5.5000E 00	3.5655E 01	-----+					
5.7500E 00	3.5563E 01	-----+					
6.0000E 00	3.5475E 01	-----+					
6.2500E 00	4.2402E 01	-----+					
6.5000E 00	4.2226E 01	-----+					
6.7500E 00	4.2121E 01	-----+					
7.0000E 00	4.2021E 01	-----+					
7.2500E 00	4.8934E 01	-----+					
7.5000E 00	4.8739E 01	-----+					
7.7500E 00	4.8623E 01	-----+					
8.0000E 00	4.8512E 01	-----+					
8.2500E 00	5.5412E 01	-----+					
8.5000E 00	5.5199E 01	-----+					
8.7500E 00	5.5072E 01	-----+					
9.0000E 00	5.4951E 01	-----+					
9.2500E 00	6.1837E 01	-----+					
9.5000E 00	6.1607E 01	-----+					
9.7500E 00	6.1471E 01	-----+					
1.0000E 01	6.1340E 01	-----+					

TIME	LOT20	MINIMUM	VERSUS TIME	MAXIMUM
		0.0		1.0000E 02
0.0	0.0	I		I
2.5000E-01	2.5000E 00	+		
5.0000E-01	5.0000E 00	-+		
7.5000E-01	7.5000E 00	---+		
1.0000E 00	1.0000E 01	-----+		
1.2500E 00	1.2500E 01	-----+		
1.5000E 00	1.4944E 01	-----+		
1.7500E 00	1.7415E 01	-----+		
2.0000E 00	1.9888E 01	-----+		
2.2500E 00	2.2333E 01	-----+		
2.5000E 00	2.4732E 01	-----+		
2.7500E 00	2.7184E 01	-----+		
3.0000E 00	2.9639E 01	-----+		
3.2500E 00	3.2045E 01	-----+		
3.5000E 00	3.4405E 01	-----+		
3.7500E 00	3.6841E 01	-----+		
4.0000E 00	3.9279E 01	-----+		
4.2500E 00	4.1651E 01	-----+		
4.5000E 00	4.3974E 01	-----+		
4.7500E 00	4.6395E 01	-----+		
5.0000E 00	4.8819E 01	-----+		
5.2500E 00	5.1158E 01	-----+		
5.5000E 00	5.3447E 01	-----+		
5.7500E 00	5.5854E 01	-----+		
6.0000E 00	5.8266E 01	-----+		
6.2500E 00	6.0574E 01	-----+		
6.5000E 00	6.2832E 01	-----+		
6.7500E 00	6.5227E 01	-----+		
7.0000E 00	6.7626E 01	-----+		
7.2500E 00	6.9906E 01	-----+		
7.5000E 00	7.2135E 01	-----+		
7.7500E 00	7.4518E 01	-----+		
8.0000E 00	7.6907E 01	-----+		
8.2500E 00	7.9159E 01	-----+		
8.5000E 00	8.1360E 01	-----+		
8.7500E 00	8.3733E 01	-----+		
9.0000E 00	8.6111E 01	-----+		
9.2500E 00	8.8338E 01	-----+		
9.5000E 00	9.0511E 01	-----+		
9.7500E 00	9.2875E 01	-----+		
1.0000E 01	9.5244E 01	-----+		

	MINIMUM	L20T40 VERSUS TIME	MAXIMUM
TIME	0.0		1.0000E 02
	L20T40	I	I
0.0	0.0	+	
2.5000E-01	6.9730E-21	+	
5.0000E-01	1.9798E-17	+	
7.5000E-01	2.3700E-16	+	
1.0000E 00	1.6443E-15	+	
1.2500E 00	3.6171E-14	+	
1.5000E 00	5.6101E-02	+	
1.7500E 00	8.4703E-02	+	
2.0000E 00	1.1198E-01	+	
2.2500E 00	1.6692E-01	+	
2.5000E 00	2.6809E-01	+	
2.7500E 00	3.1560E-01	+	
3.0000E 00	3.6100E-01	+	
3.2500E 00	4.5426E-01	+	
3.5000E 00	5.9495E-01	+	
3.7500E 00	6.5916E-01	+	
4.0000E 00	7.2059E-01	+	
4.2500E 00	8.4902E-01	+	
4.5000E 00	1.0260E 00	+	
4.7500E 00	1.1051E 00	+	
5.0000E 00	1.1809E 00	+	
5.2500E 00	1.3419E 00	+	
5.5000E 00	1.5525E 00	+	
5.7500E 00	1.6451E 00	+	
6.0000E 00	1.7339E 00	+	
6.2500E 00	1.9253E 00	+	
6.5000E 00	2.1673E 00	-+	
6.7500E 00	2.2722E 00	-+	
7.0000E 00	2.3729E 00	-+	
7.2500E 00	2.5931E 00	-+	
7.5000E 00	2.8647E 00	-+	
7.7500E 00	2.9809E 00	-+	
8.0000E 00	3.0925E 00	-+	
8.2500E 00	3.3398E 00	-+	
8.5000E 00	3.6395E 00	-+	
8.7500E 00	3.7662E 00	-+	
9.0000E 00	3.3879E 00	-+	
9.2500E 00	4.1611E 00	---+	
9.5000E 00	4.4875E 00	---+	
9.7500E 00	4.6239E 00	---+	
1.0000E 01	4.7551E 00	---+	

Some Remarks on the Program

The program is written in the "System /360 Continuous System Modelling Program". For details the reader is referred to the Application Description of IBM (H20 - 0240 - 1). A detailed explanation of a CSMP program, written by the senior author, for the calculation of breakthrough curves of tritiated water is available on request. With the aid of this explanation it will certainly be possible to understand the gist of the Sr program.

The meaning of all variables is explained in the program. One feature employed is not described in the Application Description. If the INTGRL integration routine is used, it is not permissible to use subscripted variables on the left side of an equals sign. For every layer, therefore, the INTGRL routine is called again. When DO loops are employed, however, subscripted variables are essential. This problem is solved by the use of the FORTRAN statement

EQUIVALENCE (B1, CONCT (1)).

This allows the use of the INTGRL routine with the symbols B1, B2, B3 etc. ; the symbol CONCT(N) can be used in the DO loops.

(The CSMP routine MACRO is not used because it makes the program less traceable ; nevertheless, if a large number of layers, say 100, are required, this routine is recommended).

TITLE LEACHING OF SR-90, SURVEY OF PARAMETER IMPORTANCE

* =====

INITIAL

NOSORT
FIXED N

PARAMETER CASENR = 1.
* CASE NUMBER

PARAMETER CONC1 = 100.
* SR-90 IN UPPER 2 CM (UNITS PER UNIT AREA)
CONCN = 0.
* SR-90 IN OTHER LAYERS

PARAMETER FALOUT = 0.
* FALL OUT RATE IN UNITS PER YEAR PER UNIT AREA

PARAMETER SALT = 0.05
* NORMALITY OF CA IN SOIL SOLUTION

PARAMETER SOILCA = 0.1
* EXCHANGEABLE CA IN SOIL (ME/CM**3)

PARAMETER K = 1.1
* EXCHANGE CONST (1.1 = SR PREFERENTIALLY ADSORBED)
MOIST = 0.3
D = 762.
DISP = 4.
TORT = 0.2

* MOISTURE, DIFF COEF (CM**2/Y), DISPERSION COEF (CM), TORTUOSITY COEF

* START CALCULATION 1 OCT, SIMULATED 10 YEAR

PARAMETER PLOUGH = -1.

* PLOUGH = 1 YEARLY PLOUGHED AT 1 OCT, PLOUGH = -1 NOT PLOUGHED
PLTIME = 0.

* PLOUGH TIME INDICATOR

STORAGE RDOUT(21), RFOUT(21), RTOUT(21), CONCS(21)
* RATE OUT BY DIFF, MASS FLOW TOTAL CONC IN SOLUTION
/ REAL CONCT(21)
* TOTAL QUANTITY PER LAYER

DYNAMIC

NOSORT

FUNCTION RAINTB = (0. ,25.),(0.25,45.),(0.5 ,25.), ...
(1. ,25.),(1.25,45.),(1.5 ,25.), ...
(2. ,25.),(2.25,45.),(2.5 ,25.), ...
(3. ,25.),(3.25,45.),(3.5 ,25.), ...
(4. ,25.),(4.25,45.),(4.5 ,25.), ...
(5. ,25.),(5.25,45.),(5.5 ,25.), ...
(6. ,25.),(6.25,45.),(6.5 ,25.), ...
(7. ,25.),(7.25,45.),(7.5 ,25.), ...
(8. ,25.),(8.25,45.),(8.5 ,25.), ...
(9. ,25.),(9.25,45.),(9.5 ,25.), ...
(10. ,25.)

* RAIN CM/YEAR AT 1 OCT, 1 JAN, 1 APRIL
* RESULT OF RAIN TABLE IS 30 CM/Y WITH AN INTENSITY PEAK AT 1 JAN

IF(TIME.GT.0.) GO TO 101


```
CONCT(1) = CONCL
DO 100 N=2,21
100 CONCT(N) = CONCN
101 CONTINUE
```

```
* CALCULATION APPARENT DIFFUSION COEFFICIENT
AD = MOIST*TORT*D + DISP*AFGEN(RAINTB,TIME)
```

```
* RATES IN SR-90 UNITS PER YEAR
RTIN = FALOUT
```

```
* CALCULATION CONCENTRATION IN SOLUTION
DO 130 N=1,21
130 CONCS(N) = (CONCT(N)/2.) * (SALT/(SOILCA*K + SALT*MOIST) )
```

```
* CALCULATION DIFFUSION RATES
DO 131 N=1,20
131 RDOUT(N) = AD* (CONCS(N)-CONCS(N+1) )/2.
```

```
* CALCULATION MASS FLOW RATES
DO 132 N=1,20
132 RFOUT(N) = (CONCS(N)+CONCS(N+1))*AFGEN(RAINTB,TIME)/2.
```

```
* CALCULATION TOTAL RATES
DO 133 N=1,20
133 RTOUT(N) = RFOUT(N) + RDOUT(N)
RTOUT(21) = CONCS(21) * AFGEN(RAINTB,TIME)
```

```
* CALCULATION OF THE MATERIAL BALANCE FOR EACH LAYER
```

```
B1 = INTGRL (0., RTIN -RTOUT( 1) )
B2 = INTGRL (0.,RTOUT( 1)-RTOUT( 2) )
B3 = INTGRL (0.,RTOUT( 2)-RTOUT( 3) )
B4 = INTGRL (0.,RTOUT( 3)-RTOUT( 4) )
B5 = INTGRL (0.,RTOUT( 4)-RTOUT( 5) )
B6 = INTGRL (0.,RTOUT( 5)-RTOUT( 6) )
B7 = INTGRL (0.,RTOUT( 6)-RTOUT( 7) )
B8 = INTGRL (0.,RTOUT( 7)-RTOUT( 8) )
B9 = INTGRL (0.,RTOUT( 8)-RTOUT( 9) )
B10 = INTGRL (0.,RTOUT( 9)-RTOUT(10) )
B11 = INTGRL (0.,RTOUT(10)-RTOUT(11) )
B12 = INTGRL (0.,RTOUT(11)-RTOUT(12) )
B13 = INTGRL (0.,RTOUT(12)-RTOUT(13) )
B14 = INTGRL (0.,RTOUT(13)-RTOUT(14) )
B15 = INTGRL (0.,RTOUT(14)-RTOUT(15) )
B16 = INTGRL (0.,RTOUT(15)-RTOUT(16) )
B17 = INTGRL (0.,RTOUT(16)-RTOUT(17) )
B18 = INTGRL (0.,RTOUT(17)-RTOUT(18) )
B19 = INTGRL (0.,RTOUT(18)-RTOUT(19) )
B20 = INTGRL (0.,RTOUT(19)-RTOUT(20) )
B21 = INTGRL (0.,RTOUT(20)-RTOUT(21) )
```

```
* IN FACT B1 HAS THE SAME MEANING AS CONCT(1), B2 AS CONCT(2), ETC
/ EQUIVALENCE (B1,CONCT(1) )
```

```
* PLOUGHING
IF (PLOUGH.LT. 0.) GO TO 114
IF (KEEP.NE.1) GO TO 114
IF (TIME.LT.PLTIME) GO TO 114
SUMSR = 0.
DO 112 N=1,10
112 SUMSR = SUMSR + CONCT(N)

DO 113 N=1,10
```

```
113          CONCT(N) = SUMSR/10.
              PLTIME = PLTIME+1.
114 CONTINUE

          LOT6   = B1+B2+B3
          L6T20  = B4+B5+B6+B7+B8+B9+B10
          LOT20  = LOT6 + L6T20
          L20T40 = B11+B12+B13+B14+B15+B16+B17+B18+B19+B20

RELERR  B2 = 0.01
ABSERR  B2 = 0.1
METHOD  RKS

FINISH  B1 = -10. , B2 = -10. , B1 = 110.

TIMER   FINTIM = 10. , OUTDEL = 0.25

PRTPLT LOT6   (0.,100.)
LABEL RECOVERY SR-90 LAYER 0- 6 CM (FULL SCALE IS 100 PERCENT) CASE 1

PRTPLT L6T20  (0.,100.)
LABEL RECOVERY SR-90 LAYER 6-20 CM (FULL SCALE IS 100 PERCENT) CASE 1

PRTPLT LOT20  (0.,100.)
LABEL RECOVERY SR-90 LAYER 0-20 CM (FULL SCALE IS 100 PERCENT) CASE 1

PRTPLT L20T40 (0.,100.)
LABEL RECOVERY SR-90 LAYER 20-40 CM (FULL SCALE IS 100 PERCENT) CASE 1

TERMINAL
*****

RAIN = (AFGEN(RAINTB,0.)+AFGEN(RAINTB,0.25)+AFGEN(RAINTB,0.5)+ ...
              AFGEN(RAINTB,0.75) )/4.

MERIT = RAIN*SALT/(SOILCA*K)
* SR-90 LEACHING INDICATOR (SLI)

MAD = MOIST*TORT*D + DISP*RAIN
* MEAN APPARENT DIFFUSION CONSTANT

          WRITE(6,2)
2  FORMAT(1H095H CASE NR          LOT6          L6T20          LOT20
          $          L20T40          MERIT          MAD)
          WRITE(6,1)CASENR,LOT6,L6T20,LOT20,L20T40,MERIT,MAD
1  FORMAT(1H F5.0,4(5X,F10.2),F20.10,5X,E10.4)
          END
```

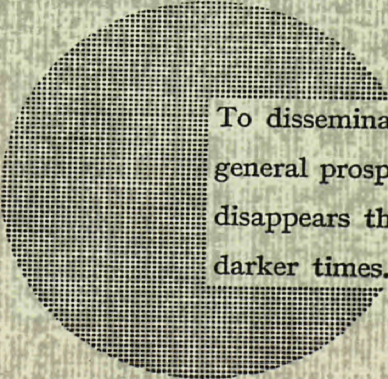

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Alfred Nobel

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