**Assessment of Effectiveness of
Geologic Isolation Systems**

**PABLM - A Computer Program to
Calculate Accumulated Radiation
Doses From Radionuclides in the
Environment**

**B. A. Napier
W. E. Kennedy, Jr.
J. K. Soldat**

March 1980

**Prepared for the
Office of Nuclear Waste Isolation
Under its Contract with the
U.S. Department of Energy**

**Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
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SUMMARY

A computer program, PABLM, was written to facilitate the calculation of internal radiation doses to man from radionuclides in food products and external radiation doses from radionuclides in the environment. This report contains details of mathematical models used and calculational procedures required to run the computer program. Characteristics of the PABLM models are:

- Radiation doses from radionuclides in the environment may be calculated from deposition on the soil or plants during an atmospheric or liquid release, or from exposure to residual radionuclides in the environment after the releases have ended.
- Radioactive decay is considered during the release of radionuclides, after they are deposited on the plants or ground, and during holdup of food after harvest. A chain decay scheme is used; it includes branching to account for transitions to and from isomeric states.
- The radiation dose models consider several exposure pathways. They include exposure to radionuclides deposited on the ground or crops from contaminated air, radionuclides on the ground or crops from contaminated irrigation water, radionuclides in contaminated drinking water, radionuclides in aquatic foods raised in contaminated water, and radionuclides in bodies of water and sediments where people might fish, boat, or swim. For vegetation, the radiation dose model considers both direct deposition on leaves and uptake through roots.
- Doses may be calculated for either a maximum-exposed individual or for a population group. The doses calculated are accumulated doses from continuous chronic exposure. A first-year committed dose is calculated as well as an integrated dose for a selected number of years.
- The equations for calculating internal radiation doses are derived from those given by the International Commission on Radiological Protection (ICRP) for body burdens and MPC's of each radionuclide.

- The radiation doses from external exposure to contaminated water and soil are calculated using the basic assumption that the contaminated medium is large enough to be considered an "infinite" volume or plane relative to the range of the emitted radiations.
- The equations for calculations of the radiation dose from external exposure to shoreline sediments include a correction for the finite width of the contaminated beach.

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INTRODUCTION

The computer program PABLM was written as an enhancement of the dose calculation capabilities of the Environmental Analysis Section of the Ecological Sciences Department at Pacific Northwest Laboratory. The report contains details of the program for use in calculating accumulated radiation doses from radionuclides found in food products and from radionuclides in the environment. PABLM permits rapid and consistent estimates of the accumulated radiation dose to man resulting from radioactive materials released to the environment. The program is designed to calculate accumulated radiation doses from the chronic ingestion of food products that contain radionuclides, and doses from the external exposure to radionuclides in the environment.

A total of 19 ingestion pathways (or food products) may be selected with corresponding consumption rates, growing periods, and air or water concentrations and deposition rates. A total of 4 external exposure pathways may also be selected with corresponding exposure times and soil or water concentrations. For all exposure pathways chosen, radionuclides in the soil may continue to be deposited for the life of the releasing facility. After the facility is shut down, the nuclides remain in the soil and are assumed to be removed only by radioactive decay. The type and amount of crops grown around the site of a nuclear facility determines which terrestrial pathways are considered. The presence of liquid effluents determines which, if any, of the aquatic pathways or irrigation pathways are activated.

Dose factors for persons swimming in contaminated water are calculated using the water concentration of radionuclides, and the assumption that the water is an infinite medium with respect to the range of the emitted radiations. The radiation dose rate to people boating on this water is assumed to be half that for swimmers.

The computer program can be used to calculate accumulated doses to 23 possible body organs or tissues for any one or combination of radionuclides. A maximum of 5 organs and 100 radionuclides may be selected in a mixture in any one case.

The computer output consists of radiation dose summaries to all chosen organs listed by exposure pathway and by radionuclide. Dose summaries may be chosen for all terrestrial food pathways and all aquatic food pathways. In addition, an option exists for a complete listing of dose contributions by radionuclide in each pathway. The complete listing includes radionuclide concentrations in all ingested plant and animal material.

MODELS AND METHODS

The model for estimating the transfer of radionuclides (except for ^3H and ^{14}C) from air or irrigation water to plants through both leaves and soil to food products was derived by Soldat and Harr for a study of the potential doses to people from a nuclear power complex in the year 2001.

The source of contamination on farm land or garden plots may be from acute or chronic airborne or waterborne radionuclide releases or from residual environmental contamination after a release. In the absence of specific data for sites where irrigation is used, sprinkler irrigation is normally assumed, rather than surface irrigation, because the aerial spray produced leads to foliar deposition resulting in an additional source of radionuclide contamination in the plants. Trickle or flood irrigation systems can be simulated, if desired, by setting the foliar retention factor in the program to zero. For atmospheric contamination, a deposition velocity is assumed for the airborne radionuclides onto the plant foliage and ground. If the initial deposition model is selected, the foliar contamination terms are automatically zeroed, and all plant concentrations are derived from the soil concentration only.

Concentration of radionuclides in plants depends on the concentrations in the soil, air, and water. A plant accumulation factor is used to relate these concentrations. Concentration of radionuclides in farm animal products, such as milk, meat, or eggs, depends on the animals' consumption of feed, forage, and water containing radionuclides.

Two radionuclides, ^3H and ^{14}C , are treated differently than the others. These two are assumed to be in equilibrium with their surroundings. Thus the concentration of tritium or carbon-14 in the hydrogen or carbon in environmental media (soil, plants, and animal products) is assumed to have the same specific

activity (pCi of nuclide per kg of stable element) as in the contaminating medium (air or water). The fractional content of hydrogen or carbon in a plant or animal product is then used to compute the concentration of tritium or carbon-14 in the food product under consideration.

Radionuclide concentrations in aquatic food products are based on the radionuclide concentrations in the contaminated water.⁽²⁾ The water concentration is based on the release rate of radioactive contamination from the operating nuclear facility and the characteristics of the receiving water body. Formulae for the three most common reconcentration situations for receiving water bodies are included in the computer program.

If there is no water reconcentration, for example, if the cooling water for a nuclear facility is drawn from a river in which the outfall is downstream of the inlet, the reconcentration factor is set to unity. A second option is available for the case where the inlet is downstream of the outfall or so arranged on a lake or ocean site that recirculation occurs. The third option models cooling water drawn from a pond, lake, or reservoir which is connected to a larger body of water or is fed by a stream.

A simple model is used to predict the radionuclide concentration in the sediments of a river or lake downstream from a nuclear facility. The model is based on the assumption that there is a constant water concentration for each year of the release. The deposition rate to the sediment is assumed to be dependent only on the water concentration. Daughter radionuclides occur in the sediment from buildup in the decay of the parents in the sediment, and direct deposition from daughter radionuclides in the water.

The concentrations of radionuclides in aquatic foods are directly related to the concentration in water. They are calculated using equilibrium ratios between the two concentrations, called bioaccumulation factors. Radionuclide concentrations in drinking water downstream from a water treatment plant are calculated assuming element-specific removal in the treatment plant.

External doses from radionuclides deposited in farm fields are calculated assuming an infinite flat plane source model. A factor of two is included for self-shielding by surface roughness. For a person standing next to a body of

contaminated water, the dose from nuclides deposited in the shoreline sediments is calculated using the same model as that used for farm fields, modified to include a shore-width factor. For persons swimming in contaminated water, the dose is calculated using the basic assumption that the body of contaminated water is large enough to be considered an "infinite medium" relative to the range of emitted radiations. Persons boating on the water are assumed to be exposed to a dose rate half that to which swimmers are exposed.

Internal doses are calculated as a function of radionuclide concentration in food products (as described above), ingestion rates, and a radionuclide-specific dose-commitment factor. The concentration in foods varies with time, release rate, and buildup and decay in the soil. The ingestion rate of food products are assumed to be constant. The dose commitment is calculated for each year of intake, to the end of the dose period. It is based on the model of ICRP Publication 2 for internally deposited radionuclides.⁽³⁾ The accumulated dose is then the sum of the series of annual dose commitments from each year of ingestion to the end of the dose period.

The details of the mathematical models, computer code, data libraries, and input preparation are given in Appendices A through F. A sample problem and example input and output is given in Appendix G.

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- 1) Soldat, J. K., and R. D. Harr, "Radiation Dose Model," pp. 81-175. In: HERMES--A Digital Computer Code for Estimating Regional Radiological Effects from the Nuclear Power Industry, USAEC Report HEDL-TME-71-168, Hanford Engineering Development Laboratory, Richland, WA, 1971.
- 2) Soldat, J. K., N. M. Robinson and D. A. Baker, Models and Computer Codes for Evaluating Environmental Radiation Doses, USAEC Report BNWL-1754, Pacific Northwest Laboratory, Richland, WA, 1974.
- 3) International Commission on Radiological Protection, Report of ICRP Committee II on Permissible Dose for Internal Radiation, ICRP Publication 2, Pergamon Press, New York, 1959.

APPENDIX A
DESCRIPTION OF MATHEMATICAL MODELS

APPENDIX A

DESCRIPTION OF MATHEMATICAL MODELS

This appendix describes the mathematical models used in the computer program PABLM to calculate the external exposures and accumulated internal doses from releases of radionuclides to the environment. The models presented for estimating the transfer of radionuclides from irrigation water or air to plants through both leaves and soil to food products were derived by Soldat and Harr for a study of the potential doses to people from a nuclear power complex.⁽¹⁾ Aquatic food parameters are adapted from the computer program ARRRG.⁽²⁾ Other parameters are adapted from the computer program FOOD.⁽³⁾ PABLM is designed to be compatible with the present FORTRAN versions of both FOOD and ARRRG.

A.1 BASIC DOSE COMMITMENT EQUATION

The fundamental equation for calculation of accumulated radiation dose to man from radionuclides in the environment is:

$$D_{ipr} = \sum_{T=1}^{\text{No. of yrs}} C_{ip}(T) U_p F_{ipr}(T) \quad (\text{A.1})$$

where:

- D_{ipr} • the dose commitment to organ r from radionuclide i via pathway p, rem,
- $C_{ip}(T)$ • the concentration of nuclide i in the medium of pathway p at time T, pCi/kg, pCi/l, or pCi/m²
- U_p • the usage, i.e. exposure or intake rate associated with pathway p, kg/yr, l/yr, or hrs/year
- $F_{ipr}(T)$ • a dose factor, a value specific to a given nuclide i, pathway p and organ r which is used to calculate radiation dose commitments, from exposure to a given radionuclide concentration or intake in a particular year to the end of the dose period.

The three terms on the right of Equation A.1 are discussed in the following sections. Equations tailored to each specific exposure pathway are derived from Equation A.1. The principle difference between pathways is the manner in which the radionuclide concentrations are calculated.

A.2 CONCENTRATIONS OF NUCLIDES IN ENVIRONMENTAL MEDIA

Concentrations of radionuclides in air, water, soil, and foods are calculated as intermediate steps in the computer program PABLM for each year of exposure. The concentrations in air and water are based on the annual releases from the nuclear facility. Radionuclide concentrations in soil and sediment are accumulated from the annual air and water deposition and are removed by radioactive decay after the facility shuts down.

A.2.1 Concentration in Terrestrial Food Products

The source of the radionuclide contamination of terrestrial foods is, either directly or indirectly, uptake through roots from contaminated ground and either deposition from the atmosphere or from water used for sprinkler irrigation. Local air concentrations are based on a factor which has units of concentration per unit release rate ($\bar{\chi}/Q'$) and which must be calculated separately and input to the computer program. Water concentrations are calculated internally as described below. In the absence of site-specific data for cases where irrigation is used, sprinkler irrigation is assumed, rather than surface irrigation, because the aerial spray leads to the foliar deposition of radionuclides. This results in a higher radionuclide concentration in the plants (and in the animals consuming them) than from trickle or surface irrigation. Surface-irrigation systems can be simulated by setting the foliar retention factor in the program to zero.

A.2.1.1 Soil

Radionuclides accumulate in the soil from continuous deposition from air or irrigation water. The deposition rate from air is given by

$$d_i = 3.15 \times 10^7 \bar{\chi}_i v_{di} \quad (A.2)$$

where:

- d_i • the deposition rate of radionuclide i , $\text{pCi} \cdot \text{m}^{-2} \cdot \text{yr}^{-1}$,
- 3.15×10^7 • a conversion factor of $\text{sec} \cdot \text{yr}^{-1}$,
- $\bar{X}_i$ • the annual average air concentration, $\text{pCi} \cdot \text{m}^{-3}$, and
- V_{di} • the deposition velocity of nuclide i , $\text{m} \cdot \text{sec}^{-1}$.

For irrigation water the deposition rate is

$$d_i = C_{iw}I \quad (\text{A.3})$$

where:

- C_{iw} • the water concentration of nuclide i in pCi/ℓ , and
- I • the average annual irrigation rate, $\ell \cdot \text{m}^{-2} \text{ yr}^{-1}$.

The concentration of radionuclides in soil, C_{is} , at the end of one year of deposition from either air or water is:

$$C_{is} = d_i(1 - e^{-\lambda_i \cdot 1})/\lambda_i \quad (\text{A.4})$$

where:

- C_{is} • the soil concentration of nuclide i , $\text{pCi} \cdot \text{m}^{-2}$,
- λ_i • the decay constant of nuclide i , yr^{-1} , (1 is for one year).

This soil concentration value is added to the residual soil concentration from previous years' deposition. Chain decay with daughter buildup is handled using a modified Bateman equation.⁽⁴⁾

A.2.1.2 Vegetation

The concentration of radionuclides at the time of harvest in terrestrial vegetation from direct deposition during a chronic release is:

$$C_{id} = d_i r T_V (1 - e^{-\lambda_{Ei} t_e}) / \lambda_{Ei} Y_V \quad (\text{A.5})$$

and the concentration at harvest from root uptake is:

$$C_{ir} = C_{is} B_{iv} / P \quad (A.6)$$

where:

- C_{id} • the vegetation concentration from direct deposition, pCi/kg,
- C_{ir} • the vegetation concentration from root uptake, pCi/kg,
- r • the fraction of direct deposition retained on the plant leaves (dimensionless), taken to be 0.25,
- T_v • the factor for translocation of externally deposited radionuclides to edible parts of plants (dimensionless). For simplicity it is taken to be independent of radionuclide and set to 1.0 for leafy vegetables and fresh forage, and to 0.1 for all other produce including grain.
- t_e • the growing period during which the plant is above ground, days,
- λ_{Ei} • the effective environmental removal constant for radionuclides from plants in day^{-1} . $\lambda_{Ei} = \lambda_i + \lambda_w$, where λ_w is the weathering removal constant, taken to be 0.693/14 days.
- Y_v • the plant yield, kg(wet weight)/ m^2 .
- B_{iv} • the concentration ratio for plant uptake of radionuclide i , pCi/kg(wet weight) per pCi/kg(dry weight soil).
- P • the soil "surface density," $\text{kg}(\text{dry soil})/\text{m}^2$. Taken to be $224 \text{ kg}/\text{m}^2$. (1)

The PABLM program is designed to handle continuous chronic releases. However PABLM can also be used for an acute release followed by continuous environmental exposure. Because the continued exposure is only to radionuclides left in the soil by the release, the deposition must be modified to provide proper soil concentration. Instead of a release in curies per year, the release is taken to be in curies. The facility life is still taken to be one year. This allows the foliar concentration to be modeled correctly. Equation A.5 is modified so that decay and weathering after deposition is eliminated. This

modification does not affect the continuous annual release methodology in the remainder of the code (e.g. uptake from soil via roots). The resultant foliar contamination is equivalent to an instantaneous deposition on the crops just prior to harvest. This is felt to be the most conservative approximation of foliar contamination after an accident involving an acute release.

The concentration in farm- or garden-grown crops, C_{iv} , is:

$$C_{iv} = \left[C_{id} + C_{ir} \right] e^{-\lambda_i t_h} \quad (A.7)$$

where t_h is the holdup time between harvest and consumption. The first term in the bracketed expression represents the concentration in the plant derived from direct deposition during the growing season (zero after facility shut-down). The second term in the bracketed expression represents uptake from the soil by plant roots and reflects the total accumulated soil concentration corrected for radioactive decay between the time of deposition and harvest.

A.2.1.3 Animal Products

The radionuclide concentration in an animal product such as meat, milk or eggs is dependent on the amount of contaminated water, feed or forage consumed by the animal. The following equation describes this calculation.⁽⁸⁾

$$C_{ia} = S_{ia} \left[C_{iF} Q_F + C_{iaw} Q_{aw} \right] \quad (A.8)$$

where:

- C_{ia} • the concentration in animal product, pCi/l or pCi/kg,
- S_{ia} • the transfer coefficient of radionuclide i from daily intake of animal to edible portion of animal product, pCi/l (milk) per pCi/d or pCi/kg (animal product) per pCi/d,
- C_{iF} • the concentration of nuclide i in feed or forage, pCi/kg, calculated from Equation A.7, above,
- Q_F • the consumption rate of nuclide i in feed or forage by animal, kg/d,

C_{iaw} • the concentration of nuclide i in water consumed by animals, pCi/ℓ , assumed to be equal to C_{iw} , and

Q_{aw} • the consumption rate of contaminated water by the animal, ℓ/d ,

The second term in the brackets of Equation A.8 is omitted if the animal does not drink contaminated water. Default values of the animal consumption rates in the program PABLM are listed in Table A-1.

TABLE A-1. Generic Consumption Rates⁽²⁾ of Feed and Water by Farm Animals

| | Feed or Forage ^(a)
(kg/day)
Q_F | Water
(ℓ/day)
Q_{aw} |
|--------------------|--|--|
| Milk Cow | 55 (fresh forage) | 60 |
| Beef Cattle | 68 (dry feed) | 50 |
| Pig | 4.2 (dry feed) | 10 |
| Poultry (chickens) | 0.12 (dry feed) | 0.3 |

(a) Equivalent fresh weight required to ensure proper calculation of radionuclide intake by animal.

A.2.1.4 Transfer Parameters

Values for plant concentration ratios and animal product transfer coefficients are given by element in the PABLM input file FTRANSLIB, described in Appendix D and listed in Appendix E.

Plant concentration factors are taken from UCRL-50163, part IV⁽⁵⁾ and supplemented with radionuclide data as explained in Reference 1. The literature yielded coefficients of transfer from feed to animal products for only a limited number of radionuclides. For those radionuclides lacking data, comparisons were made with the behavior of chemically similar elements in man⁽⁶⁾ and animals. In some instances where other data is lacking, transfer coefficients are set to a "default" value of 9.9×10^{-4} . The most complete listing of transfer coefficients to be found is that for milk in Reference 5. The milk transfer coefficients given in that reference were intended to be maximum or "worst case"

values. The authors imply, by reference to ^{131}I , that average values would be about one-half of their listed values. As a result, the milk transfer values in FTRANSLIB for elements lacking specific radionuclide data are one-half of those found in Reference 5.

Some experimental data are available on the transfer of several radionuclides for chicken, meat and eggs.⁽⁷⁾ Some of these literature sources were referenced in HERMES.⁽¹⁾ Unfortunately very little data are currently available on the transfer of radionuclides to beef and pork. Uncontrolled studies have been performed on the principal constituents of fallout ^{90}Sr , ^{131}I and ^{137}Cs .⁽¹⁾

A.2.1.5 Tritium and C-14

The radionuclides tritium and carbon-14 are handled in a special manner. The concentrations of tritium or carbon-14 in environmental media (soil, plants and animal products) are assumed to have the same specific activity (pCi of radionuclide per kg of soluble element) as the contaminating medium (air or water). The fractional content of hydrogen or carbon in a plant or animal product is then used to compute the concentration of tritium or carbon-14 in the food product under consideration. Hydrogen contents in both the water and the nonwater (dry) portion of the food product are used when calculating the tritium concentration. It is assumed that plants obtain all their carbon from airborne carbon dioxide and that animals obtain all their carbon through ingestion of plants.

When carbon-14 is present only in the water used for irrigation it is difficult to model its transfer to vegetation, because plants acquire most of their carbon from the air. At this time we have not yet determined the transfer of carbon from the water to the air or soil. We have therefore conservatively assumed that plants obtain all their carbon from the irrigation water. Such an assumption could lead to plant concentrations which are high by about an order of magnitude or more. To date no operating nuclear facilities have been identified which specify releases of carbon-14 in their liquid effluents. However, this pathway can be postulated to exist from migration of carbon-14 into the ground water from long-term storage of nuclear wastes.

The concentration of tritium in vegetation, C_{Hv} , is calculated as:

$$C_{Hv} = 9C_{Hw}F_{hv} \quad (A.9)$$

where:

- C_{Hw} • the concentration of tritium in the environmental water (pCi/l); for a water release C_{Hw} represents concentration in irrigation water. For an airborne release C_{Hw} represents concentration in airborne moisture, hence $C_{Hw} = \text{air concentration in pCi}(^3\text{H})/\text{m}^3 \div \text{absolute humidity in } \ell \cdot \text{m}^{-3}$,
- F_{hv} • the fraction of hydrogen in total vegetation (see Table A-2). The coefficient 9 converts tritium concentration in environmental water to concentration in hydrogen.

The concentration of tritium in the animal product, C_{Ha} , is:

$$C_{Ha} = \left[\frac{C_{HF}Q_F + C_{Haw}Q_{aw}}{F_{hf}Q_F + Q_{aw}/9} \right] F_{ha} \quad (A.10)$$

where

- C_{HF} • the concentration of tritium in feed or forage (pCi/kg) calculated by Eq. A.9 above, where now $C_{HF} = C_{Hv}$
- F_{hf} • the fraction of hydrogen in animal feed, where now $F_{hf} = F_{hv}$ (grain),
- F_{ha} • the fraction of hydrogen in animal product (see Table A-2), and
- C_{Haw} • the concentration of tritium in animal drinking water (set to 0 unless there is a release of water).

Similarly, the concentration of ^{14}C in vegetation, C_{14Cv} , is:

$$C_{14Cv} = C_{14Cw}F_{cv} \quad (A.11)$$

where

C_{14Cw} • the concentration of ^{14}C in the environmental medium $\div$ carbon concentration in that medium ($pCi\ ^{14}C/kg\ C$). C_{14Cw} represents $pCi\ ^{14}C/\ell \div$ carbon concentration in irrigated water (kg/ℓ) for water release and $pCi\ ^{14}C/m^3 \div$ carbon concentration in air (kg/m^3) for air release, and

F_{cv} • is the fraction of carbon in total vegetation.

The concentration of ^{14}C in the animal product is:

$$C_{14Ca} = \left[\frac{C_{14CF} Q_F + C_{14Caw} Q_{aw}}{F_{cF} Q_F + F_{cw} Q_{aw}} \right] F_{ca} \quad (A.12)$$

For an air release $C_{14Caw} = 0$, and since F_{cw} is very small compared to F_{cf} , Equation A.12 reduces to:

$$C_{14Ca} = C_{14CF} \left(\frac{F_{ca}}{F_{cF}} \right) \quad (A.13)$$

Table A-2 contains the various parameters and fractions needed for Equations A.9 through A.13 that are used in PABLM.

A.2.2 Concentration in Water, Sediment, and Aquatic Food

Concentration of radionuclides in water, in aquatic foods, and on shoreline sediments are calculated from the annual radionuclide release rate from the nuclear facility, the effluent flow rate, the mixing and dilution in the receiving waters, and bioaccumulation factors for aquatic foods.

A.2.2.1 Water Concentrations

Mixing and dilution are characterized by a mixing ratio and a reconcentration factor. The mixing ratio, M_p , accounts for the dilution of the liquid effluent between the point of discharge and the point of exposure, and is best determined from site-specific hydrological studies. If the temperature increase

TABLE A-2. Generic Fractions and Concentrations of Hydrogen and Carbon in Environmental Media, Vegetation, and Animal Products

A. Fractions in Food

| Food or Fodder | Water
f_w | Carbon
(dry)
f_c | Hydrogen
(dry)
f_h | Carbon ^(a)
(wet)
F_{cv}, F_{ca} | Hydrogen ^(b)
(wet)
F_{hv}, F_{ha} |
|------------------------------------|----------------|--------------------------|----------------------------|--|--|
| Fresh Fruits, Vegetables and Grass | 0.80 | 0.45 | 0.062 | 0.090 | 0.10 |
| Grain and Stored Animal Feed | 0.12 | 0.45 | 0.062 | 0.40 | 0.068 |
| Eggs | 0.75 | 0.60 | 0.092 | 0.15 | 0.11 |
| Milk | 0.88 | 0.58 | 0.083 | 0.070 | 0.11 |
| Beef | 0.60 | 0.60 | 0.094 | 0.24 | 0.10 |
| Pork | 0.50 | 0.66 | 0.10 | 0.33 | 0.11 |
| Poultry | 0.70 | 0.67 | 0.087 | 0.20 | 0.10 |

B. Concentrations in media

Absolute Humidity	0.008 ℓ/m^3
Concentrations of carbon in water	2.0×10^{-5} kg/ ℓ (c)
Concentrations of carbon in air	1.6×10^{-4} kg/ m^3 (d)
Fraction of soil which is carbon	0.03
Soil moisture	0.1 ℓ/kg

(a) F_{cv} or $F_{ca} = f_c (1 - f_w)$

(b) F_{hv} or $F_{ha} = f_w/9 + f_h(1 - f_w)$

(c) Assumes a typical bicarbonate concentration of 100 mg/ ℓ

(d) Assumes a typical atmospheric CO_2 concentration of 320 ppm_v.

which results solely from mixing is known at point of exposure, then the mixing ratio is estimated from:

$$M_p = \frac{T_p - T_A}{T_0 - T_A} \quad (A.14)$$

where:

- T_A • ambient temperature of the receiving sink,
- T_p • temperature which would exist at the point of exposure for pathway p if no evaporation or best radiation effects were present.
- T_0 • temperature of the effluent at the outlet.

The value for T_p can be estimated from a plot of isotherms due to mixing only in the receiving waters if they are available. ✓

The reconcentration factor, N_i , accounts for the extent to which the effluent is recycled through the nuclear facility. The computer program PABLM is designed to allow the user a choice of the following reconcentration models:

- (1) If the cooling water is drawn from a cooling pond, small lake or reservoir which is connected to a larger body of water or is fed by a stream, then:

$$N_i = \left[1 - \frac{(F - L)e^{-\lambda_i t_c}}{F + V\lambda_T} \right]^{-1} \quad (A.15)$$

- (2) If the cooling water intake is downriver from the outfall or on a lake or ocean site and arranged such the recirculation occurs, then:

$$N_i = \frac{1 - \left[g e^{-\lambda_i t_c} \right]^{n+1}}{1 - g e^{-\lambda_i t_c}} \quad (A.16)$$

- (3) If there is no reconcentration, for example, if the cooling water is drawn from a river in which the outfall is below the intake, then:

$$N_i = 1.0 \quad (A.17)$$

where:

- g • recycle fraction (the mixing ratio at the point of intake), unitless
- F • coolant flow, ft^3/sec ,
- L • makeup flow (water drawn into the intake to replace losses), ft^3/sec ,
- V • pond volume, ft^3 ,
- λ_T • pond turnover rate, sec^{-1} ,
- t_c • cycle time, hr,
- λ_i • decay constant, hr^{-1} ,
- n • number of cycles during facility lifetime = $\frac{\text{plant life (hr)}}{t_c}$.

These three models were chosen for the program because they apply to the most common reconcentration situations. Unusual cases could require that special reconcentration formulas be added to the program.

Equation A.16 is the closed form of the series

$$N_i = 1 + G_i + G_i^2 + G_i^3 + \dots + G_i^n$$

where $G_i = g \exp(-\lambda_i t_c)$ for nuclide i .

Equation A.15, the most complex of the reconcentration models, is used for sites on a cooling pond, lake or reservoir where the water is exchanged by stream flow or connection with a larger body of water such as the ocean. It can also be used for a system of cooling canals where a fresh dilution stream (makeup) is injected into the inlet pipe along with the recycled water from the cooling pond. From elementary considerations of mass balance, assuming steady-state conditions and instantaneous mixing in the cooling pond, Equation A.15 is of the form of Equation A.16 with $n \rightarrow \infty$ and with the recycle fraction a function of hydrological parameters and the radionuclide decay constant (see Figure A-1). Thus:

$$N_i = \left[1 - \frac{(F - L) e^{-\lambda_i t_c}}{(F - L) + V(\lambda_T + \frac{L}{V})} \right]^{-1} \quad (A.18)$$

The volume, V , for Equation A.15 may be taken to be a series of canals, a pond, small bay, small lake, etc. However, the model loses credibility if V is very large since instantaneous mixing in V was assumed; therefore, Equation A.16 should be used for large V .

Once the mixing ratio, M_p , and the reconcentration factor, N_i , are determined, the water concentration, C_{iw} , of nuclide i is found as:

$$C_{iw} = 1119 Q_i N_i M_p / F_r \quad (A.19)$$

FIGURE A.1. Reconciliation in Reactor Effluent Due to Recycling Through a Cooling Pond

where:

1119 • a unit conversion factor from $(\text{Ci/hr})/(\text{ft}^3/\text{sec})$ to pCi/liter

Q_i • the release rate of radionuclide i , Ci/yr , and

F_r • the annual average river flow rate, ft^3/sec .

Dose factors for persons swimming in contaminated water are calculated using the water concentration of radionuclides and the assumption that the water is an infinite medium with respect to the range of the emitted radiations. The radiation dose rate to people boating on this water is assumed to be half that for swimmers.

A.2.2.2 Aquatic Foods

Concentrations of radionuclides in aquatic foods are directly related to the concentrations in the water. Equilibrium ratios between the two concentrations, called bioaccumulation factors in this report, are taken from References 8 and 9 and are listed in file BIOAC, presented in Appendix D. The concentration in aquatic foods, C_{ip} , is related to the water concentration as

$$C_{ip} = C_{iw} B_{ip} \quad (A.20)$$

where B_{ip} is the bioaccumulation factor for nuclide i and pathway p , dimensionless.

A.2.2.3 Drinking Water

The concentrations of radionuclides in drinking water are also related to concentrations in the river water. Water consumed by humans is subject to a wide variety of types of treatment processing prior to consumption. Radionuclides are removed with varying degrees of efficiency depending on the specific treatment used. Radionuclide removal efficiencies for water treatment plants assumed for use in the computer code PABLM are based on extensive experience with the alum-floc process used in the water treatment plants, Richland and Pasco, Washington. These two cities are on the Columbia River downstream of the Hanford Site. Water samples were collected before and after processing at these treatment plants for several years (1, 10). From these data, the fractions of contained radionuclides that pass through a water treatment plant were estimated. These fractions were presented in the data file BIOAC, in Appendix D. They are used as is B_{ip} .

A.2.2.4 Sediments

The calculation of sediment load, transport and concentrations of radionuclides associated with suspended and deposited materials is a complex problem. Some studies have shown that radionuclides in water adhere to particles in suspension⁽¹¹⁾, and that they deposit with the particles. Therefore, for the program PABLM, a simplified scheme for obtaining an order of magnitude estimate of the concentration of radionuclides in shoreline sediments is used^(2, 12). The model assumes a constant water concentration per year, as long as the release lasts, and a deposition rate dependent only on water concentration. This is described mathematically as:

$$\frac{dC_{is}}{dt} = KC_{iw} - C_{is}\lambda_i \quad (A.21)$$

where:

- C_{is} • the sediment surface concentration, pCi/m², and
- K • a rate constant, liter/m²-yr.

The buildup of an individual radionuclide is:

$$C_{is} = KC_{iw} \left(1 - e^{-\lambda_i t} \right) / \lambda_i \quad (A.22)$$

In the original evaluation of Equation A.22, λ_i was chosen to be the radiological decay constant, although the true value should include an unknown "environmental" removal constant. The value of K was derived from radionuclide concentrations measured in water and sediment samples collected over a period of years in the Columbia River between Richland, Washington and the river mouth and in Tillamook Bay, Oregon, 75 km (47 miles) south of the river mouth^(13, 14). The value used is 25300 l·m⁻²·yr⁻¹.^(a) Radioactive daughter products are allowed to build up in both the water and sediment. Once the release of radionuclides to the river ceases, removal from the sediments is assumed to be by radioactive decay only.

External radiation doses to people standing near the sediments are calculated based on an infinite flat plane source model. To correct for the actual geometry of a river bank or other beach, shore width factors^(2, 15) are used. Shore width factors, W , suggested for use with PABLM are given in Table A-3. These are multiplicative factors used to describe the effective surface contamination, C_{is} , as:

(a) A value for a constant K^1 , l·m⁻²·d⁻¹, was originally derived as $\sim 10^2$ for an equation of the form

$$C_{is} = KC_{iw} T_{Ri} \left(1 - e^{-\lambda_i t} \right)$$

where $T_{Ri} = \ln_2 / \lambda_i$, days.

Conversion of T_{Ri} days to $\ln_2 / \lambda_i$ in years⁻¹ leads to the value of 2.53×10^4 l·m⁻²·yr⁻¹ used for Equation A.22 in the PABLM code. Three "significant" digits are carried to ensure that the PABLM code yields answers comparable to those obtained with the older expression. The answer is, however, still an order of magnitude estimate of the sediment surface concentration.

$$C_{is} = S_i W \quad (A.23)$$

TABLE A-3. Shore Width Factors

<u>Exposure Situation</u>	<u>Shore Width Factor (W)</u>
Discharge canal bank	0.1
River shoreline	0.2
Lake shore	0.3
Nominal ocean site	0.5
Tidal basin	1.0

A.3 USAGE PARAMETERS

Usage refers to duration of human exposure to external sources of radiation and to intake rates of food and water. The usage depends on the specific exposure pathway and situation. The hypothetical "maximum-exposed individual" has usage rates higher than an average individual, to realistically maximize potential dose. For population dose calculations, the usages of the average adult are assumed for the entire exposed population. Usage values are input to the PABLM computer models.

A.4 DOSE COMMITMENT FACTORS

The form of the dose commitment factor used depends on the exposure pathway considered. For external exposure, the dose is accrued only during the year of exposure. However, for ingestion pathways, the radionuclides may accumulate in the body and one year of exposure may result in a dose received over a several-year period. Thus, there are different equations for the two types of exposure. For some radionuclides, there are also special models for some specific organs.

A.4.1. External Dose Commitment Factors

For calculating external dose factors from water immersion, the penetrating power of the radiation emitted determines whether it contributes to skin dose only, or to both skin and total-body dose. Beta and gamma radiation which can penetrate 7×10^{-3} cm of tissue is considered to contribute to skin dose; radiation which can penetrate 5 cm of tissue is considered to contribute to

total-body dose (and dose to internal organs). The dose factors for immersion are derived assuming that the contaminated water is an infinite medium compared with the range of the emitted radiations. Under this assumption, the energy emitted per gram of water equals the energy absorbed per gram of water. Corrections are applied for differences in energy absorption between tissue and water, physical geometry of the specific exposure situation, and the conversion from MeV per disintegration per gram to rem. The resulting dose factors, input to PABLM from the file GRDFLIB, are presented in Appendix E. The units are mrem/hr per pCi/liter.

Material deposited from the air or from irrigation water onto the ground represents a large, uniform thin sheet of contamination. The factors for converting surface contamination in pCi/m² to gamma dose at one meter above a uniformly contaminated plane are also presented in file GRDFLIB in Appendix E. The units are mrem/hr per pCi/m² of surface.

The total accumulated dose from external irradiation is thus calculated as

$$D_{pr} = \sum_{T=1}^{\text{no. of years}} \sum_{i=1}^{\text{no. of radionuclides}} C_{ip}(T) \cdot U_p \cdot F_{ipr} \quad (\text{A.24})$$

The dose factor F_{ipr} is independent of the year in which the dose is received. The organ, r , is either skin or total body. The doses to internal organs are set equal to the total-body dose.

A.4.2. Internal Dose Commitment Factors

Unlike the external dose factors, the factors for dose from internally deposited radionuclides are dependent on the length of time the nuclides have been in the body. Therefore the internal factors are calculated in PABLM from more basic nuclear and metabolic data.

The dose model used is derived from that originally given by the International Commission on Radiological Protection⁽⁶⁾ for body burden and maximum permissible concentration. For the PABLM computer program, effective decay energies for radionuclides are calculated using the ICRP model. This model is

based on the assumption that the entire quantity of a given radionuclide is located at the center of a spherical organ with an appropriate effective radius.⁽²⁾ Metabolic parameters for the standard man are used.⁽¹⁶⁾ The equation for committed radiation dose equivalent per picocurie per year ingested, F_{ipr} for organ r , for an arbitrary period following ingestion for a period T_i is:

$$F_{ipr} = 0.0187 \frac{f_{wir} \epsilon_{ir}}{m_r (\lambda_e)^2} \left[T_1 \lambda_e + e^{-\lambda_e T_2} - e^{-\lambda_e (T_2 - T_1)} \right] \quad (A.25)$$

where:

- $F_{ipr}(T_2)$ • the dose commitment for T_2 years following ingestion of of a radionuclide at the rate of one picocurie/yr over T_1 years, rem/pCi over T_2 Years. (Note this is independent of pathway p).
- 0.0187 • a unit conversion factor = $\left(1.602 \times 10^{-8} \frac{\text{g-rad}}{\text{MeV}} \right) \left(\frac{0.037 \text{ dis}}{\text{sec-pCi}} \right) \left(\frac{3.15 \times 10^7 \text{ sec}}{\text{yr}} \right)$,
- f_{wir} • the fraction of nuclide i ingested reaching the organ r ,
- ϵ_{ir} • the effective decay energy of radionuclide i in organ r , MeV per disintegration,
- m_r • the effective mass of organ r , grams. Organ masses used in PABLM are those taken from ICRP-23,⁽¹⁶⁾ listed in g, Table A-4,
- T_1 • the intake time, taken to be 1 year in PABLM
- T_2 • the time over which the dose is accumulated, years.
- λ_e • the effective removal half-time, related to the biological half-time, T_{Bi} , and the radiological half-time, T_{Ri} , as

TABLE A-4. Organs and Organ Masses Used in PABLM^(a)

| Organ | mass
(g) | Organ
Reference
No. |
|---|-------------|---------------------------|
| Total-body | 70,000 | 1 |
| Body water | 63,000 | 2 |
| Kidney | 310 | 3 |
| Liver | 1,800 | 4 |
| Spleen | 180 | 5 |
| Bone | 7,000 | 6 |
| Fat | 13,500 | 7 |
| Lung | 1,000 | 8 |
| Adrenals | 14 | 9 |
| Testes | 35 | 10 |
| Ovaries | 11 | 11 |
| Skin | 2,600 | 12 |
| Brain | 1,400 | 13 |
| Muscle | 28,000 | 14 |
| Prostate | 16 | 15 |
| Thyroid | 20 | 16 |
| Pancreas | 100 | 17 |
| Heart | 330 | 18 |
| GI-general ^(b) | 0 | 19 |
| GI-stomach ^(b) | 250 | 20 |
| GI-small intestine ^(b) | 400 | 21 |
| GI-large intestine ^(b) | 250 | 22 |
| GI-lower large intestine ^(b) | 135 | 23 |

(a) from Reference 16.

(b) masses for GI are contents of compartment

$$\lambda_e = \frac{0.693(T_{Ri} + T_{Bi})}{T_{Ri} T_{Bi}} \text{ years}^{-1}.$$

Therefore, using this formulation, the total accumulated dose over T_2 years to an organ of reference, r , from ingestion of food products contaminated with radionuclides is written as:

$$D_r = \sum_{T=1}^{T_2} \sum_{p=1}^{\text{No. of Food Pathways}} \sum_{i=1}^{\text{No. of Nuclides}} C_{ip}(T) U_p F_{ipr}(T_2-T) \quad (\text{A.26})$$

Notice that the concentration of radionuclide i in pathway p , $C_{ip}(T)$, is allowed to change with time. The (T_2-T) formulation implies that the dose period ends at year T_2 . In PABLM, T_2 is generally taken to be either 50 or 70 years.

The computer program PABLM accounts for special cases which deviate from Equation A.26. For the radionuclides ^3H and ^{14}C , the accumulated dose for the organs total-body and bone are calculated as above. Since these radionuclides distribute evenly in the rest of the body, the doses for all the other organs are set equal to that for total-body. For isotopes of sodium, all organs including bone are set equal to total-body. The GI tract model also differs from that of Equation A.26.

The four compartments of the GI tract, stomach, SI, ULI, and LLI, are modeled as a four-compartment system with a plug flow, and no long term storage or retention. The portions of the GI tract are assumed to be irradiated from radionuclides uniformly distributed in the material passing through each compartment; therefore, the dose in any one year is equal to the dose commitment for that year. The dose factor per picocurie per year ingested is calculated as

$$F_{ipr} = 2.56 \times 10^{-5} \frac{\tau_r f_{ir}^* \epsilon_{ir}}{m_r} e^{-\lambda_i \tau_r} \quad (\text{A.27})$$

where:

2.56×10^{-5} • a unit conversion factor, equal to

$$\left(1.602 \times 10^{-8} \frac{\text{g-rad}}{\text{MeV}}\right) \left(\frac{0.037 \text{ dis}}{\text{sec} \cdot \text{pCi}}\right) \left(\frac{86400 \text{ sec}}{\text{day}}\right) / 2$$

The factor of 1/2 accounts for the fact that the dose is calculated for the inner wall of the organs and not to the contents,

- τ_r • the travel time of the contents of the GI tract through compartment r , days,
- τ'_r • the travel time to the entrance of the compartment, days, and
- f_{ir}^* • the fraction of the total quantity of the ingested radionuclide i that remains at the entrance of the compartment, r .

Values of the travel times for the four compartments of the GI tract are given in Table A-5.

The total accumulated dose for the GI tract is:

$$D_r = \sum_{T=1}^{T_2} \sum_{p=1}^{\text{no. of pathways}} \sum_{i=1}^{\text{no. of nuclides}} C_{ip}(T) U_p F_{ipr} \quad (\text{A.28})$$

TABLE A-5. Travel Times for the GI Tract Model

| Organ | Travel Time
through
Organ, τ ,
(days) | Travel Time
to Organ, τ' ,
(days) |
|--------------------------|---|--|
| Stomach | 0.0417 ^(a) | 0.0 |
| GI-small intestine | 0.1667 | 0.0417 |
| GI-upper large intestine | 0.3333 | 0.2083 |
| GI-lower large intestine | 0.7500 | 0.5417 |

(a) Ingested material does not flow through the stomach. It remains in there for 1 hour after which time it is passed to the SI in a relatively short time.

GLOSSARY FOR APPENDIX A

B_{iv}	• concentration ratio for plant uptake, dimensionless
B_{ip}	• bioaccumulation factor for aquatic food products, dimensionless
$C_{ip}(T)$	• time-dependent concentration of nuclide i in pathway p , pCi/g, pCi/l, or pCi/m ³
C_{ia}	• concentration of nuclide i in animal products, pCi/kg or pCi/l
C_{iaw}	• concentration of nuclide i in animal drinking water, pCi/l
C_{id}	• concentration of nuclide i on terrestrial vegetation from direct deposition, pCi/kg,
C_{iF}	• concentration of nuclide i in feed or forage, pCi/kg
C_{ir}	• concentration of nuclide i in plants from root uptake, pCi/kg
C_{ip}	• concentration of nuclide i in aquatic foods, pCi/kg
C_{is}	• concentration of nuclide i in soil or sediment, pCi/kg or pCi/m ²
C_{iv}	• concentration of nuclide i in farm or garden crops, pCi/kg
C_{iw}	• concentration of nuclide i in water, pCi/kg
d_i	• deposition rate of nuclide i , pCi/m ² -yr
D_{ipr}	• the dose to organ r from nuclide i through exposure pathway p , rem
ϵ_{ir}	• effective decay energy of nuclide i in organ r , MeV
f_i^*	• fraction of nuclide i remaining at the entrance to GI organ r , dimensionless
f_{wir}	• fraction of nuclide i ingested reaching organ r , dimensionless
F	• flow rate, ft ³ /sec
$F_{ipr}(T)$	• dose commitment factor for organ r from nuclide i through pathway p , time-dependent, rem/pCi.

F_{ca}	• fraction of animal product which is carbon, dimensionless
F_{cF}	• fraction of feed or fodder which is carbon, dimensionless
F_{cv}	• fraction of vegetation which is carbon, dimensionless
F_{ha}	• fraction of animal product which is hydrogen, dimensionless
F_{hF}	• fraction of feed or fodder which is hydrogen, dimensionless
F_{hv}	• fraction of vegetation which is hydrogen, dimensionless
F_r	• river flow rate, ft^3/sec
g	• coolant water recycle fraction, dimensionless
I	• irrigation rate, ℓ/m^2 - month
K	• sedimentation rate constant, $\ell/\text{m}^2\text{-yr}$
L	• makeup coolant water flow rate, ft^3/sec
M_p	• mixing ratio for pathway p, dimensionless
m_r	• mass of organ r, g
n	• number of coolant recycles in a facility lifetime, dimensionless
N_i	• reconcentration ratio, dimensionless
P	• soil "surface density", kg/m^2
Q_{aw}	• animal water consumption rate, ℓ/d
Q_F	• animal feed or fodder consumption rate, kg/d
Q_i	• radionuclide i release rate, Ci/yr
r	• direct deposition foliar retention fraction, dimensionless
S_{ia}	• animal radionuclide transfer coefficient, ℓ/kg or d/kg
t_c	• coolant water cycle time, hr
t_h	• holdup time, d
T_A	• ambient water temperature, $^{\circ}\text{K}$
T_{Bi}	• biological half-life of nuclide i, yr

T_o	• effluent water outlet temperature, °K
T_p	• exposure point water temperature, °K
T_{Ri}	• radiological half-life of nuclide i, yr
T_v	• translocation coefficient from leaves to edible portion of plant, dimensionless
U_p	• Annual usage (exposure) parameter for pathway p, kg/yr, l/yr, or hr/yr
V	• volume of coolant pond, ft ³
V_{di}	• deposition velocity of nuclide i, m/sec
W	• shore width factor, dimensionless
Y_v	• plant yield, kg/m ²
λ_e	• effective biological removal constant, yr ⁻¹
λ_{Ei}	• effective environmental removal constant, yr ⁻¹
λ_i	• radiological decay constant for nuclide i, yr ⁻¹
λ_T	• cooling pond turnover rate, sec ⁻¹
τ'_r	• transit time to GI organ r, d
τ_r	• transit time through GI, organ r, d
$\bar{\chi}_i$	• annual average air concentration of nuclide i, sec/m ³

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APPENDIX B
COMPUTER CODE SUBROUTINE DESCRIPTIONS

APPENDIX B

COMPUTER CODE SUBROUTINE DESCRIPTIONS

The models described in Appendix A are incorporated into the computer code PABLM, which is programmed for the UNIVAC 1100/44 in ASCII FORTRAN. A short description of the functions of each subroutine in PABLM is given in this Appendix.

MAIN

MAIN is the main program and calls the other subroutines to perform the calculations requested by the user. The data library reading subroutines are called by the main program. All other input data is read by the main program. Input data that is required is explained in detail in Appendix F. The main program is designed for flexibility and ease of running related calculations. Many cases can be run using one input of control or inventory data. The main program controls the calling of the environmental concentration and dose calculating subroutines. The time loop on years for the accumulated dose commitment is contained in MAIN.

There are no common or equivalence statements. All input to subroutines is through the calling sequence.

RLIBIN

Subroutine RLIBIN reads the radiological decay data from the radionuclide master library, including half-life, decay chain position, and branching ratios. It also tests for consistency in the library decay chains.

FLIBIN

Subroutine FLIBIN reads the food transfer coefficient library.

OLIBS

Subroutine OLIBS reads biological data from the organ data library. It also checks for consistency with the master radionuclide library read by RLIBIN.

SLIBIN

Subroutine SLIBIN reads dose factors from the library for external exposure from radionuclides in the soil or in water. It also checks for consistency with the master radionuclide library read by RLIBIN.

BLIBIN

Subroutine BLIBIN reads bioaccumulation factors from the library for aquatic organisms in salt and fresh water. It also reads a factor for cleanup of drinking water by water treatment plants.

ZEROR

Subroutine ZEROR is used to set the values of real number arrays to real zero.

ZEROI

Subroutine ZEROI is used to set the values of integer arrays to integer zero.

IDNUC

Subroutine IDNUC checks the nuclides from the input source term against the radionuclide master library. If a nuclide is not found, the program aborts. The subroutine also initializes flags indicating which decay chains are active in the calculation.

OFPCHK

Subroutine OFPCHK counts the number of organs, terrestrial exposure pathways, and aquatic exposure pathways chosen for the calculation. If no organs or no exposure pathways are initialized, the program aborts.

SETDAT

Subroutine SETDAT selects required data from that read by the library reading subroutines and creates condensed data arrays for the calculations based on the decay chains for the radionuclides in the input inventory. This subroutine also adjusts units on the input data to make it compatible with the later calculations. If no data is available for a nuclide in any decay chain, a message is printed and the radionuclide is dropped, but the program is not aborted.

QAPAGE

Subroutine QAPAGE performs no calculations. It prints back the options chosen and parameters used in the calculation. It allows the user to check his input and verify the problem run.

DFCALC

Subroutine DFCALC uses the biological data from the organ data library to prepare the time-independent portion of the dose commitment factor for each radionuclide in each active decay chain. The dose factors are organ-specific. These are special cases for ^3H , ^{14}C , ^{13}N , ^{22}Na , and ^{24}Na . For these radionuclides, all organ dose factors are set equal to that for total body, except for those for bone for ^3H and ^{14}C . There is also a separate model for organs of the GI tract.

DOSE

In subroutine DOSE, all environmental concentrations of radionuclides are calculated from the initial input inventory. The initial inventory are specified for either an initial deposition on the soil in Ci/m^2 , as a chronic atmospheric release in Ci/yr , as a chronic liquid release in Ci/yr , as an acute atmospheric release in Ci , or as an acute liquid release in Ci . For a source such as a tank with a constant mass leak rate, the source term may be decayed with time. For atmospheric releases, air and soil concentrations are calculated. For liquid releases, a reconcentration factor may be calculated in one of three ways. Then water, shoreline sediment, and irrigated field soil concentrations

are calculated. From the water and soil concentrations, the concentrations of radionuclides in food products is determined. There are special specific activity models included for tritium and carbon-14.

SOIL

This subroutine is used to initialize the soil concentration for the terrestrial food pathways for the initial deposition mechanism. It is not used in scenarios involving chronic releases.

ACHAIN

Subroutine ACHAIN is called by DOSE to perform the radiological chain decay calculations on the source term and on nuclides built up in the environment. It solves both the integral and differential forms of the Bateman equations.

EXMO

Function EXMO for ACHAIN calculates the function $(1 - e^{-\lambda t})/\lambda$, used in the integral formulation of the Bateman equations.

ASUM

Function ASUM for ACHAIN sums terms in the coefficients of the Bateman equations.

SUMPRD

Function SUMPRD for ACHAIN sums the products of the coefficients and exponential terms of the Bateman equations.

DOSCI

Subroutine DOSCI calculates dose commitments from ingestion of contaminated farm crops and from exposure to contaminated soil, and calculates the accumulated dose. It also sets up arrays for the output routines.

DOSC2

Subroutine DOSC2 calculates dose commitments from ingestion of contaminated aquatic food products and exposure to contaminated shoreline and water, and calculates the accumulated dose. It also sets up arrays for the output routines.

DOSOUT

Subroutine DOSOUT controls the calling of the summary and complete accumulated dose output table.

SUMMARY

Subroutine SUMMARY prints three summary dose commitment tables from all exposure pathways combined.

OUT1

Subroutine OUT1 prints summary and complete output accumulated dose tables for all terrestrial exposure pathways.

OUT2

Subroutine OUT2 prints summary and complete output accumulated dose tables for all aquatic exposure pathways.

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APPENDIX C

PABLM CODE FLOW DIAGRAMS

1. Subroutine Hierarchy
2. Main Routine
3. Subroutine SETDAT
4. Subroutine DFCALC
5. Subroutine DOSE
6. Subroutine DOSC1
7. Subroutine DOSC2

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APPENDIX D
DATA LIBRARIES

APPENDIX D

DATA LIBRARIES

Five data libraries are used by PABLM:

1. RMDLIB--radionuclide decay data library, read as 10,
2. FTRANSLIB--food transfer coefficient library, read as 12,
3. ORGLIB--organ data library, read as 11,
4. GRDFLIB--external dose factor library, read as 16, and
5. BIOAC--aquatic bioaccumulation factor library, read as 14.

The data in the libraries is set up such that additional data on changes to existing data may be entered with little difficulty. Listings of the libraries are given in Appendix E.

RADIONUCLIDE MASTER DATA LIBRARY--RMDLIB

The RMDLIB contains all radiological decay data used by PABLM. The library is organized into two sections. The first section contains radionuclides which are not members of decay chains, and also radionuclides singled out from chains with the "+D" (plus daughters) designation. Radionuclides in the first section are arranged by increasing atomic number. The second section of the library contains radionuclides organized into decay chains ordered under the radionuclides highest in the chain. RMDLIB contains about 280 entries.

The data contained on each card of the RMDLIB library is as follows:

Column 1	Alphabetic element symbol
Column 2	Atomic weight, also metastable and/or "+D" designation
Column 3	Radiological half-life, days
Column 4	Relative position in decay chain
Column 5	Precursor in decay chain
Column 6	Branching ratio from primary precursor

Column 7 Alternate precursor in decay chain
 Column 8 Branching ratio from alternate precursor

The RMDLIB FORTRAN format is (A2, A6, E10.2, 2I2, F7.4, I2, F7.4).

FOOD TRANSFER COEFFICIENT LIBRARY--FTRANSLIB

The FTRANSLIB contains factors used in PABLM relating concentrations of elements in soil to concentrations in farm products produced on that soil, and relating concentrations in animal feed to concentrations in animal products. The library has entries for 63 elements arranged by increasing atomic number compatible with the order of RMDLIB. The data contained on each card in the FTRANSLIB is as follows:

Column 1 Alphabetic element symbol
 Column 2 Elemental deposition velocity, m/sec
 Column 3-8 Food transfer coefficients for plants,
 (pCi per gram plant (wet)/pCi per gram soil), milk
 (day/liter), eggs, beef, pork and poultry
 (day/kilogram).

The FTRANSLIB FORTRAN format is (A2, 7E9.2).

ORGAN DATA LIBRARY--ORGLIB

The ORGLIB contains data used in PABLM for dose calculations to specific organs from ingested radionuclides. Data is arranged in blocks by nuclide. The blocks are ordered to be compatible with the RMDLIB chain order. Data in each block is arranged by organ index. The organs for which data are potentially available are:

| Organ
Index | Organ
Name |
|----------------|---------------|
| 1 | Total body |
| 2 | Body water |
| 3 | Kidneys |
| 4 | Liver |
| 5 | Spleen |
| 6 | Bone |

| Organ
Index | Organ
Name |
|----------------|-----------------------|
| 7 | Fat |
| 8 | Lungs |
| 9 | Adrenals |
| 10 | Testes |
| 11 | Ovaries |
| 12 | Skin |
| 13 | Brain |
| 14 | Muscle |
| 15 | Prostate |
| 16 | Thyroid |
| 17 | Pancreas |
| 18 | Heart |
| 19 | GI |
| 20 | Stomach |
| 21 | Small intestine |
| 22 | Upper large intestine |
| 23 | Lower large intestine |

For most entries, only data for organs number 1, 3, 4, 6, 8, 20, 21, 22, and 23 are included. The data contained on each card in the ORGLIB library is as follows:

Column 1	Alphabetic element symbol
Column 2	Atomic weight, also metastable and/or "+D" designation
Column 3	Organ index (1-23)
Column 4	Biological half-life, days
Column 5	f_w --fraction of ingested nuclide reaching organ of interest
Column 6	f_2 --fraction from blood to organ of interest
(not used by PABLM)(only for inhalation doses)

Columns 7,8,9 Effective energy absorbed per disintegration in adult organs (MeV). Columns 8 and 9 are only used for Organ 8 (lungs).

The ORGLIB FORTRAN format is (A2, A6, I2, 6E8.2).

EXTERNAL RADIATION DOSE FACTOR LIBRARY--GRDFLIB

The external radiation dose factor file contains factors used in PABLM to calculate skin and total-body doses from exposure to radionuclides in the environment. There is a set for exposure from contaminated ground (which, when modified by a shore-width factor, is for exposure to river sediments), and a set for immersion in contaminated water used for swimming. There is also an unused set for air submersion doses. There are entries for 186 nuclides, arranged in the order of RMDLIB.

The data contained on each card in the GRDFLIB library is as follows:

Column 1	Alphabetic element symbol
Column 2	Atomic weight, also metastable and/or "+D"
Columns 3-4	Soil contamination external dose factors for skin and total body, mrem/hr per pCi/m ² ,
Columns 5-6	Swimming external dose factors for skin and total body, mrem/hr per pCi/l,
Columns 7-8	Air submersion dose factors for total body and skin, mrem/hr per pCi/m ³ .

The GRDFLIB FORTRAN format is (A2, A6, 6E9.2).

AQUATIC BIOACCUMULATION FACTOR LIBRARY--BIOACH

The bioaccumulation library contains the factors used by PABLM relating the concentration of nuclides in aquatic biota to the concentration of the nuclides in the water. These are separate factors for fresh and salt water. Also included is a factor for the cleanup of drinking water in water treatment plants. The library contains entries for 63 elements.

The library is organized as:

Column 1	Alphabetic element symbol
Columns 2-5	Bioaccumulation factors for fish, crustacea, molluscs
and algae for salt water (pCi/kg per pCi/l)
Columns 6-9	Bioaccumulation factors as above for fresh water
Column 10	Fractional amount of radionuclide that passes through a
water treatment facility.

The FORTRAN format is (A2, 9F9.1).

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APPENDIX E

LIBRARY AND CODE LISTINGS

1. RMDLIB
2. ORGLIB
3. FTRANSLIB
4. BIOAC
5. GRDFLIB
6. PABLM

1. Radionuclide Master Data Library (RMDLIB)

13	4.51E+3	1	0
9E10	3.40E+8	1	0
C14	2.021E+6	1	0
15	5.92E+3	1	0
F19	7.62E+2	1	0
422	7.50E+2	1	0
424	5.25E+1	1	0
P32	1.43E+1	1	0
P33	2.40E+1	1	0
A33	7.93E+4	1	0
A34	7.61E+2	1	0
C44	5.11E+7	1	0
3C45	5.59E+1	1	0
C451	2.77E+1	1	0
454	5.12E+2	1	0
455	1.07E+1	1	0
F535	7.95E+2	1	0
F537	2.46E+1	1	0
CJ57	2.71E+2	1	0
CJ59	7.08E+1	1	0
CJ60	1.72E+3	1	0
NI59	2.74E+7	1	0
NI55	4.51E+4	1	0
NI55	1.03E+1	1	0
CJ54	5.22E+1	1	0
Z455	2.40E+2	1	0
A576	1.10E+0	1	0
SE77	2.57E+7	1	0
3R52	1.47E+0	1	0
3R33+)	7.74E+2	1	0
3434	2.21E+2	1	0
4R30	5.77E+2	1	0
4R31	1.13E+4	1	0
7335	1.87E+1	1	0
9334+)	1.06E+2	1	0
9337+)	5.06E+1	1	0
9R30+)	1.04E+4	1	0
9R31+)	5.95E+1	1	0
9R32+)	1.13E+1	1	0
Y314+)	5.45E+2	1	0
Z335+)	5.59E+4	1	0
Z335+)	5.40E+1	1	0
Z337+)	7.04E+1	1	0
4J75	5.65E+4	1	0
4J77+)	2.75E+0	1	0
T3101	7.46E+3	1	0
4J105+)	5.04E+1	1	0
RJ105+)	1.45E+1	1	0
RJ106+)	5.65E+2	1	0
PJ107	2.57E+2	1	0
AG110+)	2.52E+2	1	0
A3111	7.45E+0	1	0
CJ113	4.97E+3	1	0
SV117	1.00E+1	1	0
SV119	2.50E+2	1	0
SV121	2.78E+2	1	0

1. Radionuclide Master Data Library (RMDLIB)

94123	1.22E+2	1	0	0
94125+0	7.64E+0	1	0	0
94126+0	3.65E+7	1	0	0
94127	5.02E+1	1	0	0
94125+0	1.01E+5	1	0	0
FE123+1	1.17E+2	1	0	0
FE127+0	1.09E+2	1	0	0
FE129+0	3.35E+1	1	0	0
FE131+0	1.25E+0	1	0	0
FE131+0	1.74E+2	1	0	0
FE132+0	5.25E+0	1	0	0
FE133+0	5.45E+2	1	0	0
I 130	5.15E+1	1	0	0
I 131+0	9.04E+0	1	0	0
I 133+0	2.75E+1	1	0	0
CS136	1.51E+1	1	0	0
CS137+0	1.10E+4	1	0	0
CS139+0	5.53E+5	1	0	0
BA140+0	1.24E+1	1	0	0
CE143+0	1.34E+0	1	0	0
CE144+0	2.44E+2	1	0	0
PA144+0	4.13E+1	1	0	0
PA142	2.21E+0	1	0	0
94153	1.95E+0	1	0	0
EJ152	2.97E+5	1	0	0
EJ153	1.94E+0	1	0	0
EJ154	5.14E+5	1	0	0
EJ155	1.91E+5	1	0	0
EJ156	1.52E+1	1	0	0
GC153	2.42E+2	1	0	0
TS150	7.23E+1	1	0	0
TS156+	4.69E+5	1	0	0
V 151	1.40E+2	1	0	0
V 155	7.51E+1	1	0	0
94210+0	5.14E+5	1	0	0
BI210+0	5.01E+0	1	0	0
94222+0	5.42E+0	1	0	0
94223+0	1.14E+1	1	0	0
94224+0	5.65E+0	1	0	0
94225+0	1.49E+1	1	0	0
94226+0	5.94E+5	1	0	0
94228+0	2.10E+5	1	0	0
AC227+0	7.95E+5	1	0	0
TA227+0	1.87E+1	1	0	0
TA229+0	5.79E+2	1	0	0
TA230+0	2.41E+7	1	0	0
TA232+0	5.13E+2	1	0	0
94231+0	1.19E+7	1	0	0
J 232+0	2.62E+4	1	0	0
J 233+0	5.72E+7	1	0	0
J 234	3.91E+7	1	0	0
J 235+0	2.59E+11	1	0	0
J 236	5.55E+7	1	0	0
J 238+0	1.45E+12	1	0	0
94237+0	7.42E+8	1	0	0
9J236	1.04E+5	1	0	0
9J237	4.56E+1	1	0	0

1. Radionuclide Master Data Library (RMDLIB)

[illegible]

1. Radionuclide Master Data Library (RMDLIB)

IN115	2.19E17	4	5	0.955	1	1.0
SN125	7.64E+0	1	0		0	
SB125	1.01E+3	2	1	1.0	0	
TE125+	5.90E+1	3	2	0.23	0	
SN126	5.63E+7	1	0		0	
SB126+	1.52E-2	2	1	1.0	0	
SN126	5.73E-1	3	2	0.14	0	
SN127	5.85E+1	1	0		0	
TE127+	1.09E+2	2	1	0.157	0	
TE127	5.00E-1	3	2	0.975	1	0.351
TE127+	5.55E+1	1	0		0	
TE129	5.53E-2	2	1	1.0	0	
I 129	5.73E+7	3	2	1.0	0	
TE131+	1.25E+0	1	0		0	
TE131	1.74E-2	2	1	0.222	0	
I 131	5.64E+0	3	2	1.0	1	0.774
XE131+	1.19E+1	4	5	0.0109	0	
TE132	5.25E+0	1	0		0	
I 132	7.59E-2	2	1	1.0	0	
TE134+	5.85E-2	1	0		0	
TE134	5.64E-3	2	1	0.15	0	
I 135	5.67E-1	3	2	1.0	1	0.37
XE135+	2.12E+0	4	5	0.027	0	
XE135	5.24E+0	5	4	1.0	3	0.971
TE134	2.90E-2	1	0		0	
I 134	5.55E-2	2	1	1.0	0	
CS134+	1.21E-1	1	0		0	
CS134	7.53E+2	2	1	1.0	0	
I 135	2.75E-1	1	0		0	
XE135+	1.03E-2	2	1	0.155	0	
XE135	5.74E-1	3	2	1.0	1	0.334
CS135	5.40E+4	4	5	1.0	0	
XE137	2.55E-3	1	0		0	
CS137	1.10E+4	2	1	1.0	0	
SA137+	1.77E-3	3	2	0.925	0	
XE139	7.44E-3	1	0		0	
CS134	2.67E-2	2	1	1.0	0	
XE139	4.99E-4	1	0		0	
CS137	5.58E-3	2	1	1.0	0	
SA139	5.72E-2	3	2	1.0	0	
XE140	1.45E-4	1	0		0	
CS140	7.64E+4	2	1	1.0	0	
SA140	1.24E+1	3	2	1.0	0	
LA140	1.68E+0	4	5	1.0	0	
SA141	1.27E-2	1	0		0	
LA141	1.64E-1	2	1	1.0	0	
GE141	5.23E+1	3	2	1.0	0	
SA142	7.43E-3	1	0		0	
LA142	5.44E-2	2	1	1.0	0	
GE143	1.54E+0	1	0		0	
PA143	1.55E+1	2	1	1.0	0	
CE144	2.84E+2	1	0		0	
PA144	1.20E-2	2	1	1.0	0	
VD144	5.77E17	3	2	1.0	0	
VD147	1.11E+1	1	0		0	
PA147	7.54E+2	2	1	1.0	0	
PA148+	4.13E+1	1	0		0	

1. Radionuclide Master Data Library (RMDLIB)

04149	5.37E+0	2	1	1.0	0
04151	1.15E+0	1	0		0
04151	5.29E+4	2	1	1.0	0
4157	2.95E-1	1	0		0
04157	1.43E+3	2	1	1.0	0
14230	2.81E+7	1	0		0
04225	5.84E+5	2	1	1.0	0
04222	5.42E+0	5	2	1.0	0
03210	8.12E+5	4	5	1.0	0
03210	5.61E+0	5	4	1.0	0
03210	1.34E+2	5	5	1.0	0
0232	2.02E+0	1	0		0
14232	2.16E+3	2	0		0
04224	2.11E+5	5	2	1.0	0
02228	2.55E-1	4	5	1.0	0
14229	5.92E+2	5	4	1.0	1 1.0
04229	5.66E+0	5	5	1.0	0
03212	4.43E-1	7	5	1.0	0
03212	2.20E+2	5	7	1.0	0
0235	2.59E+1	1	0		0
14231	1.06E+0	2	1	1.0	0
04231	1.17E+7	5	2	1.0	0
02227	7.95E+5	4	5	1.0	0
14227	1.47E+1	5	4	0.2352	0
04223	1.51E+2	6	4	0.0134	0
04223	1.14E+1	7	5	1.0	6 1.1
0237	5.75E+0	1	0		0
0237	7.82E+5	2	1	1.0	0
04233	2.77E+1	5	2	1.0	0
0233	5.74E+7	4	5	1.0	0
14229	2.09E+0	5	4	1.0	0
04225	1.04E+1	5	5	1.0	0
02225	1.00E+1	7	5	1.0	0
0238	1.55E+2	1	0	0.0	0
14230	2.41E+1	2	1	1.0	0
04234	4.13E-4	5	2	1.0	0
04230	2.81E+1	4	5	0.0018	0
04242	5.55E+0	1	0		0
04242	5.64E-1	2	1	1.0	0
04242	1.03E+2	5	2	0.427	0
02242	1.41E+5	4	2	0.175	0
02238	2.18E+0	5	0		0
02238	5.21E+4	5	5	1.0	5 1.0
04244	5.61E+5	1	0		0
02244	5.22E+0	2	0		0
0240	5.44E-1	5	2	0.222	0
02240	2.54E+6	4	5	1.0	1 1.0
04247	5.72E+0	1	0		0
04243	1.04E+4	2	0		0
02243	2.05E-1	5	1	1.0	0
04243	2.77E+0	4	5	1.0	2 0.0024
02239	2.35E+0	5	4	1.0	0
02239	8.91E+5	5	5	1.0	2 0.2275
04245	5.10E+5	1	0		0
02241	5.25E+5	2	1	1.0	0
04241	1.54E+5	5	2	1.0	0

2. Organ Data Library (ORGLIB)

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*** ORGAN DATA LIBRARY UPDATED BY SAN 8/10/79 ***
H 3 1 1.0+1 1.0 1.0 .0059
H 3 5 .0059
HE10 1 1.8+2 2.00+3 1.0 .209
HE10 3 1.2+2 6.00+3 0.08 .209
HE10 4 2.7+2 2.00+4 0.1 .209
HE10 5 0.5+2 6.40+4 0.32 1.043
HE10 9 .209
HE10 20 .209
HE10 21 .209
HE10 22 .209
HE10 23 .209
C 14 1 10. 1.0 1.0 .054
C 14 5 90. 0.025 0.025 .27
C 14 7 12. 0.5 0.5 .054
C 14 20 .054
C 14 21 .054
C 14 22 .054
C 14 23 .054
V 15 1 90. 1.0 1.0 1.143
F 15 1 2.0+2 1.0 1.0 0.95
F 15 5 1.45+3 0.53 0.53 1.252
F 15 9 .054
F 15 20 .054
F 15 21 .054
F 15 22 .054
F 15 23 .054
VA22 1 1.10+1 1.0 1.0 1.513
VA22 5 .054
VA22 20 1.513
VA22 21 1.513
VA22 22 1.513
VA22 23 1.513
VA24 1 1.10+1 1.0 1.0 2.725
VA24 5 1.5
VA24 20 1.5
VA24 21 2.7
VA24 22 1.0
VA24 23 1.0
P 32 1 257. .75 1.0 .525
P 32 4 18. .05 0.07 .525
P 32 6 1.15+3 .575 0.50 5.459
P 32 8 .525
P 32 13 257. .55+2 .007 .525
P 32 20 .525
P 32 21 .525
P 32 22 .525
P 32 23 .525
P 33 1 257. .75 1.0 .0455
P 33 4 18. .05 0.07 .0455
P 33 5 1.15+3 .58 0.20 .0455
P 33 9 .0455
P 33 13 257. .55+2 .007 .0455
P 33 20 .0455
P 33 21 .0455
P 33 22 .0455
P 33 23 .0455

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2. Organ Data Library (ORGLIB)

CA41	1	1.6444	.50	1.0	.0035
CA41	5	1.6444	.54	0.9	.0035
CA41	9				.0035
CA41	20				.0035
CA41	21				.0035
CA41	22				.0035
CA41	23				.0035
SC45	1	30.0	.10-3	1.0	1.353
SC45	5	75.0	.20-5	.02	.512
SC45	9	56.0	.15-4	.15	.553
SC45	9	43.0	.20-4	.20	1.131
SC45	9				.540
SC45	20				.540
SC45	21				1.5
SC45	22				.409
SC45	23				.409
CR51	1	515.	.005	1.0	.017
CR51	5	515.	.13-4	.27-2	.007
CR51	9	515.	.20-3	.04	.014
CR51	15	515.	.45-5	.90-3	.084-1
CR51	15	515.	0.45-5	.90-3	5.5-3
CR51	20				.014
CR51	21				.025
CR51	22				.0055
CR51	23				.0055
4V54	1	17.	.10	1.0	.512
4V54	4	25.	.02	.24	.227
4V54	9				.230
4V54	17	5.70	.005	.03	.130
4V54	20				.230
4V54	21				.510
4V54	22				.122
4V54	23				.122
4V55	1	17.	.10	1.0	1.810
4V55	4	25.	.02	.24	1.235
4V55	9				1.30
4V55	17	5.70	.005	.03	1.10
4V55	20				1.5
4V55	21				1.9
4V55	22				1.03
4V55	23				1.03
FE55	1	800.	.10	1.0	9.5-3
FE55	4	554.	.015	.15	9.5-3
FE55	5	400.	.002	.02	6.5-3
FE55	5	1600.	.010	.10	4.2-2
FE55	5	5200.	.002	.02	7.5-3
FE55	20				.0055
FE55	21				.0055
FE55	22				.0055
FE55	23				7.5-3
FE57	1	800.	.10	1.0	.835
FE57	4	554.	.015	.15	.437
FE57	5	500.	.002	.02	.540
FE57	5	1600.	.01	.10	.725
FE57	5	5200.	.002	.02	.420
FE57	20				.420
FE57	21				.410

2. Organ Data Library (ORGLIB)

FE57	22				.233
FE57	23				.234
CJ57	1	9.50	.300	1.0	.13
CJ57	4	9.50	.077	.04	.053
CJ57	5	9.50	.420-3	.14-2	.145
CJ57	9				.033
CJ57	17	9.30	.610-3	.032	.041
CJ57	20				.053
CJ57	21				.034
CJ57	22				.0435
CJ57	23				.0435-2
CJ58	1	9.50	.300	1.0	.523
CJ58	4	9.50	.077	.040	.272
CJ58	5	9.50	.420-3	.140-2	.270
CJ58	9				.270
CJ58	17	9.30	.500-3	.032	.171
CJ58	20				.270
CJ58	21				.510
CJ58	22				.151
CJ58	23				.151
CJ59	1	9.50	.500	1.0	1.575
CJ59	4	9.50	.077	.040	.745
CJ59	5	9.50	.420-3	.140-2	.551
CJ59	9				.720
CJ59	17	9.30	.500-3	.200-2	.440
CJ59	20				.720
CJ59	21				1.50
CJ59	22				.337
CJ59	23				.337
VI59	1	557.	.500	1.0	7.7-3
VI59	4	500.	.020	.070	7.7-3
VI59	5	500.	.150	.500	7.7-3
VI59	9				.770-2
VI59	20				.077-1
VI59	21				.077-1
VI59	22				.077-1
VI59	23				7.7-3
VI55	1	557.	.500	1.0	.021
VI55	4	500.	.020	.070	.021
VI55	5	500.	.150	.500	.105
VI55	9				.021
VI55	20				.021
VI55	21				.021
VI55	22				.021
VI55	23				.021
VI55	1	557.	.500	1.0	.740
VI55	4	500.	.020	.070	.752
VI55	5	500.	.150	.500	5.175
VI55	9				1.20
VI55	20				1.2
VI55	21				1.4
VI55	22				.635
VI55	23				.545
CJ54	1	40.	.250	1.0	.251
CJ54	3	15.	.010	.050	.155
CJ54	4	150.	.020	.040	.141
CJ54	5	2.	.020	.070	.170

2. Organ Data Library (ORGLIB)

C054	5				.170
CJ54	13	300.	.003	.010	.210
CJ54	19	80.	.003	.010	.170
CJ54	20				.17
CJ54	21				.23
CJ54	22				.155
CJ54	23				.155
ZV55	1	953.	.100	1.0	.341
ZV55	3	129.	.004	.04	.113
ZV55	4	41.	.035	.350	.153
ZV55	5	1300.	.013	.150	.143
ZV55	8				.150
ZV55	10	270.	.000-0	.000-5	.355
ZV55	11	107.	.000-1	.000-5	.355
ZV55	14	1960.	.030	.300	.320
ZV55	15	14.	.005	.060	.355
ZV55	17	25.	.005	.050	.094
ZV55	20				.13
ZV55	21				.32
ZV55	22				.154
ZV55	23				.044
A575	1	280.	.050	1.0	1.3
A575	3	550.	.500-5	.010	1.1
A575	4	550.	.000-5	.030	1.1
A575	8				1.10
A575	20				1.1
A575	21				1.3
A575	22				1.1
A575	23				1.1
SE77	1	11.	.3	1.	.042
SE77	3	11.	.04	.04	.042
SE77	4	24.	.05	.07	.042
SE77	5				.042
SE77	20				.042
SE77	21				.042
SE77	22				.042
SE77	23				.042
3232	1	4.0	1.0	1.0	1.715
3232	3				.850
3232	20		.5.0-2		.55
3232	21		.5.0-2		1.5
3232	22		.5.0-2		.552
3232	23		.5.0-2		.522
R335	1	45.	1.0	1.0	.705
R335	4	53.	.05	.05	.574
R335	5	45.	.004	.004	.553
R335	8				.550
R335	14	50.	.450	.450	.700
R335	17	50.	.013	.005	.850
R335	20				.55
R335	21				.70
R335	22				.555
R335	23				.555
3270.0	1	4000.	.5	1.0	1.137
3270.0	5	4000.	.0225	.500	5.541
3270.0	8				1.505
3270.0	20				.777

.042 .042

2. Organ Data Library (ORGLIB)

S270+)	21				.777		
S270+)	22				.777		
S270+)	23				.777		
S271+)	1	4000.	.300	1.0	1.441		
S271+)	5	4000.	.210	.700	5.47		
S271+)	9				1.15	1.4	1.7
S271+)	20				.54		
S271+)	21				.39		
S271+)	22				.777		
S271+)	23				.777		
S272+)	1	4000.	.300	1.0	2.501		
S272+)	5	4000.	.210	.700	5.502		
S272+)	9				1.75	1.7	1.9
S272+)	20				.45		
S272+)	21				.35		
S272+)	22				1.457		
S272+)	23				1.457		
Z273+)	1	450.	.100-3	1.0	.023		
Z273+)	5	400.	.200-5	.020	.020		
Z273+)	4	320.	.700-5	.070	.024		
Z273+)	5	300.	.500-5	.005	.023		
Z273+)	5100.	.550-4	.550	.110			
Z273+)	8			.019	.020	.024	
Z273+)	20			.019			
Z273+)	21			.019			
Z273+)	22			.019			
Z273+)	23			.019			
Z275+)	1	450.	.100-5	1.0	1.39		
Z275+)	5	300.	.200-5	.020	.510		
Z275+)	4	520.	.700-5	.070	.539		
Z275+)	5	300.	.500-5	.005	.450		
Z275+)	5100.	.550-4	.550	1.30			
Z275+)	8			.527	.47	.55	
Z275+)	20			.32			
Z275+)	21			.57			
Z275+)	22			.253			
Z275+)	23			.253			
Z277+)	1	450.	.100-5	1.0	2.11		
Z277+)	5	300.	.200-5	.020	1.435		
Z277+)	4	520.	.700-5	.070	1.594		
Z277+)	5	300.	.500-5	.005	1.50		
Z277+)	5100.	.550-4	.550	6.3			
Z277+)	8			1.55	1.5	1.5	
Z277+)	20			.34			
Z277+)	21			1.2			
Z277+)	22			1.205			
Z277+)	23			1.205			
Y273	1	5.	.3	1.	.044		
Y273	5	3.	.05	.18	.044		
Y273	445.	.05	.1	.043			
Y273	8			.044	.044	.048	
Y273	20			.044			
Y273	21			.044			
Y273	22			.044			
Y273	23			.777-2			
Y277+)	1	5.0	.300	1.0	.547		
Y277+)	5	3.0	.050	.050	.05		

2. Organ Data Library (ORGLIB)

4344+3	445.0	.033	.130	.478
4344+3	4			.478
4344+3	5			.478
4344+3	6			.478
4344+3	7			.478
4344+3	8			.478
4344+3	9			.478
4344+3	10			.478
4344+3	11			.478
4344+3	12			.478
4344+3	13			.478
4344+3	14			.478
4344+3	15			.478
4344+3	16			.478
4344+3	17			.478
4344+3	18			.478
4344+3	19			.478
4344+3	20			.478
4344+3	21			.478
4344+3	22			.478
4344+3	23			.478
4344+3	24			.478
4344+3	25			.478
4344+3	26			.478
4344+3	27			.478
4344+3	28			.478
4344+3	29			.478
4344+3	30			.478
4344+3	31			.478
4344+3	32			.478
4344+3	33			.478
4344+3	34			.478
4344+3	35			.478
4344+3	36			.478
4344+3	37			.478
4344+3	38			.478
4344+3	39			.478
4344+3	40			.478
4344+3	41			.478
4344+3	42			.478
4344+3	43			.478
4344+3	44			.478
4344+3	45			.478
4344+3	46			.478
4344+3	47			.478
4344+3	48			.478
4344+3	49			.478
4344+3	50			.478
4344+3	51			.478
4344+3	52			.478
4344+3	53			.478
4344+3	54			.478
4344+3	55			.478
4344+3	56			.478
4344+3	57			.478
4344+3	58			.478
4344+3	59			.478
4344+3	60			.478
4344+3	61			.478
4344+3	62			.478
4344+3	63			.478
4344+3	64			.478
4344+3	65			.478
4344+3	66			.478
4344+3	67			.478
4344+3	68			.478
4344+3	69			.478
4344+3	70			.478
4344+3	71			.478
4344+3	72			.478
4344+3	73			.478
4344+3	74			.478
4344+3	75			.478
4344+3	76			.478
4344+3	77			.478
4344+3	78			.478
4344+3	79			.478
4344+3	80			.478
4344+3	81			.478
4344+3	82			.478
4344+3	83			.478
4344+3	84			.478
4344+3	85			.478
4344+3	86			.478
4344+3	87			.478
4344+3	88			.478
4344+3	89			.478
4344+3	90			.478
4344+3	91			.478
4344+3	92			.478
4344+3	93			.478
4344+3	94			.478
4344+3	95			.478
4344+3	96			.478
4344+3	97			.478
4344+3	98			.478
4344+3	99			.478
4344+3	100			.478

2. Organ Data Library (ORGLIB)

A2111	4	15.0	.500-4	.050	.574		
A2111	5	50.0	.500-5	.050	1.54		
A2111	9				.330		
A2111	20				.35		
A2111	21				.40		
A2111	22				.57		
A2111	23				.570		
C2113+	1	200.	.0025	1.0	.200		
C2113+	5	500.	2.5	0.1	.200		
C2113+	4	200.	1.9	0.75	.200		
C2113+	9				.134	.134	
C2113+	20				.134		
C2113+	21				.154		
C2113+	22				.200		
C2113+	23				.200		
SV123	1	.35 +2	.05	1.0	.522		
SV123	4	.70 +2	.500-4	.01	.522		
SV123	5	.10 +5	.02	.5	2.511		
SV123	9				.522		
SV123	15	.35+2	.4-4	.15-2	.522		
SV123	15	.70+2	.3-5	.10-5	.522		
SV123	20				.522		
SV123	21				.522		
SV123	22				.522		
SV123	23				.522		
SV125+	1	35.0	.050	1.0	.946		
SV125+	4	70.0	.500-5	.010	.911		
SV125+	5	100.	.020	.500	4.442		
SV125+	9				.940	.94	1.0
SV125+	15	55.	.500-4	.150-2	.940		
SV125+	15	70.	.500-5	.100-5	.940		
SV125+	20				.942		
SV125+	21				.942		
SV125+	22				.942		
SV125+	23				.942		
SV126+	1	55.	.05	1.0	1.5		
SV126+	4	70.	.0005	.01	1.1		
SV126+	5	100.	.02	.5	4.0		
SV126+	9				1.1	1.1	1.5
SV126+	15	55.	.500-4	.150-2	.53		
SV126+	15	70.	.500-5	.100-5	.55		
SV126+	20				1.1		
SV126+	21				1.5		
SV126+	22				.2		
SV126+	23				.2		
SV124	1	58.0	.030	1.0	1.507		
SV124	4	58.0	.500-4	.002	.971		
SV124	5	100.0	.005	.100	2.555		
SV124	5	100.0	.000-5	.030	.970		
SV124	15	4.0	.000-5	.500-1	.544		
SV124	20				.92		
SV124	21				1.5		
SV124	22				.544		
SV124	23				.544		
SV125+	1	58.0	.05	1.0	.557		
SV125+	4	58.0	.500-4	.002	.221		
SV125+	5	100.	.005	.1	.525		

2. Organ Data Library (ORGLIB)

93125+0	8	100.	.0007	.03	.227	.23	.26
93125+0	16	50.	.0007	.0300-4	.137		
93125+0	20				.21		
93125+0	21				.44		
93125+0	22				.15		
93125+0	23				.157		
TE127+0	1	15.	.250	1.0	.237		
TE127+0	3	30.	.020	.070	.237		
TE127+0	4	30.	.010	.050	.237		
TE127+0	5	30.	.250-2	.010	.320		
TE127+0	5	30.	.023	.090	1.133		
TE127+0	8				.235	.32	.32
TE127+010	30.		.750-3	.003	.310		
TE127+015	9.		.250-3	.001	.223		
TE127+020					.333		
TE127+021					.549		
TE127+022					.237		
TE127+023					.237		
TE129+0	1	15.	.250	1.0	.555		
TE129+0	3	30.	.020	.070	.515		
TE129+0	4	30.	.010	.050	.523		
TE129+0	5	30.	.250-2	.010	.730		
TE129+0	5	30.	.023	.090	2.733		
TE129+0	8				.733	.84	.83
TE129+010	30.		.750-3	.003	.520		
TE129+015	9.		.250-3	.001	.523		
TE129+020					.10		
TE129+021					.11		
TE129+022					.510		
TE129+023					.510		
TE131+0	1	15.	.250	1.0	2.315		
TE131+0	3	30.	.020	.070	1.449		
TE131+0	4	30.	.010	.050	1.521		
TE131+0	5	30.	.250-2	.010	.800		
TE131+0	5	30.	.023	.090	5.753		
TE131+0	8				.753	.99	1.0
TE131+010	30.		.750-3	.003	1.317		
TE131+015	9.		.250-3	.001	1.317		
TE131+020					.73		
TE131+021					2.32		
TE131+022					1.131		
TE131+023					1.131		
TE131+0	1	15.	.25	1.0	1.333		
TE131+0	3	30.	.02	.07	1.000		
TE131+0	4	30.	.01	.05	1.001		
TE131+0	5	30.	.0025	.01	1.002		
TE131+0	5	30.	.023	.09	4.555		
TE131+0	8				1.13		
TE131+0	10	30.	.75-3	.003	1.01		
TE131+0	15	9.	.25-3	.001	1.010		
TE131+0	20				5.7	6.4	
TE131+0	21				5.7	6.4	
TE131+0	22				5.7	6.4	
TE131+0	23				5.7	6.4	
TE132+0	1	15.	.250	1.0	2.157		
TE132+0	3	30.	.020	.070	1.070		
TE132+0	4	30.	.010	.050	1.242		

2. Organ Data Library (ORGLIB)

TE152+0	5	50.	.230-2	.010	1.19)		
TE152+0	5	50.	.225	.000	3.524		
TE152+0	5				1.22	1.24	1.23
TE152+0	10	50.	.750-3	.003	.814		
TE152+0	15	9.	.230-3	.001	.814		
TE152+0	20				1.23		
TE152+0	21				2.17		
TE152+0	22				.901		
TE152+0	23				.901		
I 151+0	1	100.	1.0	1.0	.253		
I 151+0	3	7.	.040	.04	.277		
I 151+0	4	7.	.120	.12	.303		
I 151+0	5	7.	.005	.005	.027		
I 151+0	5	14.	.070	.07	1.102		
I 151+0	9				.305		
I 151+0	10	7.	.005	.005	.235		
I 151+0	15	100.	.300	.300	.255		
I 151+0	20		.50-2		.50		
I 151+0	21		.50-2		.44		
I 151+0	22		.50-2		.257		
I 151+0	23		.50-2		.257		
I 155+0	1	100.	1.0	1.0	1.453	1.1	1.1
I 155+0	3				.900		
I 155+0	15	100.	.150	.170	.503		
I 155+0	20		.50-2		.70		
I 155+0	21		.50-2		.12		
I 155+0	22		.50-2		.902		
I 155+0	23		.50-2		.502		
C9156	1	115.	1.0	1.0	1.227		
C9156	3	42.	.010	.010	.546		
C9156	4	40.	.070	.070	.742		
C9156	5	48.	.005	.005	.290		
C9156	5	140.	.040	.040	1.225		
C9156	8	140.	.005	.005	.350		
C9156	14	140.	.400	.400	.550		
C9156	20				.53		
C9156	21				.55		
C9156	22				.257		
C9156	23				.257		
C9157+0	1	115.	1.0	1.0	.524		
C9157+0	3	42.	.010	.010	.557		
C9157+0	4	40.	.070	.070	.707		
C9157+0	5	44.	.005	.005	.370		
C9157+0	5	140.	.040	.040	1.365		
C9157+0	8	140.	.005	.005	.710		
C9157+0	14	140.	.400	.400	.590		
C9157+0	20				.41		
C9157+0	21				.57		
C9157+0	22				.529		
C9157+0	23				.529		
BA140+0	1	45.0	.050	1.0	2.554		
BA140+0	3	5.50	.500-5	.100-4	1.577		
BA140+0	4	775.	.500-4	.500-3	1.544		
BA140+0	5	13.0	.250-5	.500-4	1.20		
BA140+0	5	65.0	.055	.700	5.152		
BA140+0	5				.751	1.4	1.4
BA140+0	14200.		.150-6	.003	2.50		

2. Organ Data Library (ORGLIB)

3A140+0 20			.34		
3A140+0 21			.40		
3A140+0 22			.354		
3A140+0 23			.354		
CE143+0 1 563.	.100=3	1.0	.733		
CE143+0 3 563.	.200=5	.020	.773		
CE143+0 4 293.	.250=4	.250	.813		
CE143+0 5 1500.	.300=4	.300	3.791		
CE143+0 9			.552	.72	.85
CE143+0 20			.313		
CE143+0 21			.733		
CE143+0 22			.454		
CE143+0 23			.454		
CE144+0 1 563.	.100=3	1.0	1.313		
CE144+0 3 563.	.200=5	.020	1.273		
CE144+0 4 293.	.250=4	.250	1.273		
CE144+0 5 1500.	.300=4	.300	5.443		
CE144+0 9			1.30	1.30	1.30
CE144+0 20			1.3		
CE144+0 21			1.3		
CE144+0 22			1.3		
CE144+0 23			1.272		
P4144+0 1 556.	.100=3	1.0	1.431		
P4144+0 3 556.	.200=5	.02	.627		
P4144+0 4 556.	.300=5	.05	.794		
P4144+0 5 1500.	.350=4	.35	2.057		
P4144+0 9			.794		
P4144+0 20			.794		
P4144+0 21			1.431		
P4144+0 22			.531		
P4144+0 23			.531		
P4149 1 556.	.100=3	1.0	.377		
P4149 3 556.	.200=5	.020	.374		
P4149 4 556.	.300=5	.060	.374		
P4149 5 1500.	.350=4	.350	1.353		
P4149 9			.440		
P4149 20			.44		
P4149 21			.54		
P4149 22			.373		
P4149 23			.373		
EJ152 1 555.	.100=3	1.0	.55		
EJ152 5 127.	.300=5	.030	.33		
EJ152 4 127.	.250=4	.250	.43		
EJ152 5 1500.	.350=4	.350	.43		
EJ152 9			.330		
EJ152 20			.71		
EJ152 21			.43		
EJ152 22			.20		
EJ152 23			.20		
EJ154 1 535.	.100=3	1.0	.755		
EJ154 5 127.	.300=5	.030	0.487		
EJ154 4 127.	.250=4	.250	.570		
EJ154 5 1500.	.350=4	.350	1.575		
EJ154 9			.570		
EJ154 20			.57		
EJ154 21			.755		
EJ154 22			.724		

2. Organ Data Library (ORGLIB)

EJ154	23				.423	
EJ155	1	535.	.100=3	1.0	.157	
EJ155	3	1480.	.300=5	.030	.093	
EJ155	4	127.	.250=4	.250	.093	
EJ155	5	1500.	.350=4	.360	.290	
EJ155	9				.093	
EJ155	20				.045	
EJ155	21				.15	
EJ155	22				.075	
EJ155	23				.075	
EJ156	1	535.	.100=3	1.0	1.09	
EJ156	3	1480.	.300=5	.03	.637	
EJ156	4	127.	.250=4	.25	.715	
EJ156	5	1500.	.350=4	.35	2.379	
EJ156	9				.715	
EJ156	20				.715	
EJ156	21				1.79	
EJ156	22				.531	
EJ156	23				.531	
GJ153	1	550.	.100=3	1.0	.170	
GJ153	4	460.	.120=4	.120	.099	
GJ153	5	1000.	.450=4	.450	.230	
GJ153	9				.099	
GJ153	20				.099	
GJ153	21				.17	
GJ153	22				.072	
GJ153	23				.072	
FJ150	1	570.	.100=3	1.0	.350	
FJ150	3	700.	.300=5	.030	.400	
FJ150	5	1000.	.350=4	.500	1.1	
FJ150	9				.491	
FJ150	20				.49	
FJ150	21				.95	
FJ150	22				.34	
FJ150	23				.34	
HJ1564	1	750.	1.0	.04	1.0	.910
HJ1564	3	400.	.20	.05	.02	.320
HJ1564	4	375.	.50	.05	.05	.370
HJ1564	5	1000.	.50	.05	.50	.400
HJ1564	9					.37
HJ1564	20					.37
HJ1564	21					.91
HJ1564	22					.20
HJ1564	23					.20
I151	1	1.0	.100	1.0	5.300=3	
I151	4	2.0	.005	.060	5.200=3	
I151	5	3.0	.007	.070	.015	
I151	9				5.200=3	
I151	20				5.200=3	
I151	21				5.300=3	
I151	22				5.200=3	
I151	23				5.300=3	
I155	1	1.0	.100	1.0	.135	
I155	4	2.0	.005	.060	.135	
I155	5	3.0	.007	.070	.542	
I155	9				.141	
I155	20				.14	

2. Organ Data Library (ORGLIB)

# 195	21				.19			
# 195	22				.135			
# 195	23				.135			
P3210+)	1 1450.	.090	1.0		5.20			
P3210+)	3 351.	.010	.140		10.0			
P3210+)	4 1750.	.0354	.080		10.			
P3210+)	5 3550.	.020	.280		20.			
P3210+)	5				.157	10.		43.
P3210+)	20				.027			
P3210+)	21				.045			
P3210+)	22				.050			
P3210+)	23				.050			
B1210+)	1 5.0	.010	1.0		10.			
B1210+)	3 6.0	.035	.500		10.			
B1210+)	4 15.0	.150+2	.150		13.			
B1210+)	5 10.0	.100+3	.010		17.			
B1210+)	6 13.3	.500+3	.030		20.			
B1210+)	5				.775	15.		45.
B1210+)	20				.40			
B1210+)	21				.40			
B1210+)	22				.40			
B1210+)	23				.40			
QA224+)	1 100.	.500	1.0		2.90 +2			
QA224+)	3 154. +2	.150	.300		2.90 +2			
QA224+)	5				.277+3	.28 +3		.29+3
QA224+)	20				4.2			
QA224+)	21				4.2			
QA224+)	22				4.2			
QA224+)	23				4.2			
QA225+)	1 100.	.50	1.0		2.90 +2			
QA225+)	3 10.	.5.1 +4	.902		2.50 +2			
QA225+)	4 10.	.12 +3	.040+2		2.50 +2			
QA225+)	6 164. +2	.15	.50		2.90 +2			
QA225+)	5				2.50 +2	2.50 +2		2.50+2
QA225+)	20				5.5			
QA225+)	21				5.5			
QA225+)	22				5.5			
QA225+)	23				5.5			
QA226+)	1 100.	.500	1.0		.110+3			
QA226+)	3 154. +2	.150	.100		.110+3			
QA226+)	5				.110+3			
QA226+)	20				5.70			
QA226+)	21				5.70			
QA226+)	22				5.70			
QA226+)	23				5.7			
QA228+)	1 100.	.500	1.0		2.3 +2			
QA228+)	3 164. +2	.050	.100		1.7 +2			
QA228+)	5				.715	.22 +2		.14+3
QA228+)	20				.55			
QA228+)	21				.55			
QA228+)	22				.55			
QA228+)	23				.55			
AC227+)	1 240. +2	.100+3	1.0		2.0 +2			
AC227+)	3 240. +2	.100+5	.010		5.2 +1			
AC227+)	4 240. +1	.500+1	.500		5.2 +1			
AC227+)	5 355. +2	.500+0	.500		1.0 +1			
AC227+)	5				.342	2.10+2		3.2 +2

2. Organ Data Library (ORGLIB)

AC227+J	20				.54J		
AC227+J	21				.54J		
AC227+J	22				.54J		
AC227+J	23				.54J		
T+227+J	1	570.	+2	.1J0-3	1.0	.2J0+3	
T+227+J	3	220.	+2	.5J0-5	.050	.51 +2	
T+227+J	4	570.	+2	.5J0-5	.050	.51 +2	
T+227+J	5	565.	+2	.7J0-4	.70J	.97J+3	
T+227+J	5					.927+2	.28 +3 .55+3
T+227+J	20					.54	
T+227+J	21					.54	
T+227+J	22					.53J	
T+227+J	23					.53	
T+224+J	1	570.	+2	.1J0-3	1.0	.23J+3	
T+224+J	3	220.	+2	.5J0-5	.050	.55 +2	
T+224+J	4	570.	+2	.5J0-5	.050	.55 +2	
T+224+J	5	565.	+2	.7J0-4	.70J	.97J+3	
T+224+J	5					.117+3	.31 +3 .33+3
T+224+J	20					.54	
T+224+J	21					.54	
T+224+J	22					.54	
T+224+J	23					.54	
T+230+J	1	570.	+2	.1J0-3	1.0	.23J+2	
T+230+J	3	220.	+2	.5J0-5	.050	.44J+2	
T+230+J	4	570.	+2	.5J0-5	.050	.48J+2	
T+230+J	5	565.	+2	.7J0-4	.70J	.242+3	
T+230+J	5					.48J+2	.280+2 .28+2
T+230+J	20					.47	
T+230+J	21					.47	
T+230+J	22					.47	
T+230+J	23					.47	
T+232+J	1	570.	+2	.1J0-3	1.0	.52 +2	
T+232+J	3	220.	+2	.5J0-5	.050	.41 +2	
T+232+J	4	570.	+2	.5J0-5	.050	.41 +2	
T+232+J	5	565.	+2	.7J0-4	.70J	.27J+3	
T+232+J	5					.41J+2	.410+2 .55+2
T+232+J	20					.40	
T+232+J	21					.41	
T+232+J	22					.40	
T+232+J	23					.40	
PA231+J	1	410.	+2	.1J0-3	1.0	1.4J +2	
PA231+J	3	510.	+2	.4J0-5	.040	.72.0	
PA231+J	4	540.	+2	.5J0-5	.050	.5.3 +1	
PA231+J	5	565.	+2	.45J-4	.45J	.7.5J +2	
PA231+J	5					.51J+2	.52 +2 .7J+2
PA231+J	2J					.5J	
PA231+J	21					.7J	
PA231+J	22					.55	
PA231+J	23					.55	
J 232+J	1	120.		.J1J	1.0	.2.8J +2	
J 232+J	3	15.0		.11J-2	.11J	1.1J +2	
J 232+J	5	500.		.11J-2	.11J	1.20J +3	
J 232+J	8					.552+2	.75.0+2 .12+3
J 232+J	20					.54	
J 232+J	21					.54	
J 232+J	22					.53	
J 232+J	23					.53	

2. Organ Data Library (ORGLIB)

J 233+)	1	100.	.010	1.0	50.			
J 233+)	3	15.	.110+2	.110	50.			
J 233+)	6	300.	.110+2	.110	2.50 +2			
J 233+)	8				.500+2			
J 233+)	20				.49			
J 233+)	21				.49			
J 233+)	22				.49			
J 233+)	23				.49			
J 234	1	100.	.010	1.0	49.			
J 234	3	15.	.110+2	.110	49.			
J 234	6	300.	.110+2	.110	2.40 +2			
J 234	8				.490+2			
J 234	20		1.000		.49			
J 234	21		1.000		.49			
J 234	22		1.000		.49			
J 234	23		1.000		.49			
J 235+)	1	100.	.010	1.0	45.			
J 235+)	3	15.	.110+2	.110	45.			
J 235+)	6	300.	.110+2	.110	2.30 +2			
J 235+)	8				.45 +2	.45 +2	.45 +2	
J 235+)	20		1.0		.55			
J 235+)	21		1.0		.77			
J 235+)	22		1.0		.51			
J 235+)	23		1.0		.51			
J 236	1	100.	.010	1.0	47.			
J 236	3	15.	.110+2	.110	47.7			
J 236	6	300.	.110+2	.110	2.30 +2			
J 236	8				47.			
J 236	20				.45			
J 236	21				.45			
J 236	22				.45			
J 236	23				.45			
J 238+)	1	100.	.01	1.0	43.0			
J 238+)	3	15.	1.1	.5 0.11	43.0			
J 238+)	6	300.	1.1	.5 0.11	220.7			
J 238+)	8				43.0			
J 238+)	20		1.0		0.43			
J 238+)	21		1.0		0.43			
J 238+)	22		1.0		0.43			
J 238+)	23		1.0		0.43			
VP237+)	1	540. +2	.100+5	1.0	47.			
VP237+)	3	540. +2	.500+5	.050	47.			
VP237+)	4	1.46+4	.300+5	.450	47.			
VP237+)	5	565. +2	.450+1	.450	2.50 +2			
VP237+)	8				.490+2	.490+2	.49+2	
VP237+)	20				.50			
VP237+)	21				.52			
VP237+)	22				.52			
VP237+)	23				.52			
PJ236	1	550. +2	.50 +4	1.0	51.			
PJ236	3	520. +2	.50 +5	.02	50.			
PJ236	4	140. +2	1.35+5	.45	50.			
PJ236	5	565. +2	1.35+5	.45	5.12 +2			
PJ236	8				.50	.50	.51	
PJ236	20	.5+4	1.0	.0	.51			
PJ236	21	.5+4	1.0	.0	.51			
PJ236	22	.5+4	1.0	.0	.51			

2. Organ Data Library (ORGLIB)

Z4574	15	10.	.005	.060	.450
Z4574	17	25.	.003	.030	.250
Z4574	20				.15
Z4574	21				.27
Z4574	22				.412
Z4574	23				.412
Z457	1	.953.	.100	1.0	.523
Z457	5	1.29.	.004	.040	.523
Z457	4	31.	.055	.550	.523
Z457	5	1300.	.015	.150	1.553
Z457	5				.570
Z457	19	270.	.005-4	.000-3	.570
Z457	11	107.	.000-2	.000-3	.570
Z457	12	1700.	.050	.500	.570
Z457	15	14.	.005	.050	.570
Z457	17	25.	.003	.030	.570
Z457	20				.523
Z457	21				.523
Z457	22				.523
Z457	23				.523
R337	1	45.	1.0	1.0	.070
R337	2	55.	.000	.050	.070
R337	5	45.	.000	.004	.070
R337	5				.070
R337	10	80.	.450	.450	.070
R337	17	60.	.003	.003	.070
R337	20				.070
R337	21				.070
R337	22				.070
R337	23				.070
S457	1	.150+5	.500	1.0	.553
S457	5	.180+5	.210	.700	2.75
S457	5				.553
S457	20	.5	1.0	0.0	.553
S457	21	.5	1.0	0.0	.553
S457	22	.5	1.0	0.0	.553
S457	23	.5	1.0	0.0	.553
S470	1	4000.	.5	1.0	1.137
S470	5	4000.	.0225	.500	3.650
S470	5				1.533
S470	20				.777
S470	21				.777
S470	22				.777
S470	23				.777
Y 70	1	.120+5	.100-3	1.0	.717
Y 70	5	.180+5	.750-4	.750	4.555
Y 70	5				.820
Y 70	20				.47
Y 70	21				.47
Y 70	22				.717
Y 70	23				.717
S471	1	.150+5	.500	1.0	1.554
S471	5	.180+5	.210	.700	5.47
S471	5				1.13
S471	20				.54
S471	21				.54
S471	22				.777

2. Organ Data Library (ORGLIB)

3221	23				0.777		
Y 21	1	.140+5	.100+5	1.0	.757		
Y 21	5	.180+5	.750+4	.750	5.525		
Y 21	5				.151	.42	.68
Y 21	20				.53		
Y 21	21				.53		
Y 21	22				.107		
Y 21	23				.107		
Y 21	1	.140+5	.100+5	1.0	.512		
Y 21	5	.180+5	.750+4	.750	6.049		
Y 21	5				.53		
Y 21	20				.53		
Y 21	21				.53		
Y 21	22				.51		
Y 21	23				.51		
3222	1	.180+5	.500	1.0	2.501		
3222	5	.180+5	.210	.700	4.502		
3222	5				1.75	1.9	1.9
3222	20				.43		
3222	21				.43		
3222	22				1.357		
3222	23				1.457		
Y 22	1	.140+5	.100+5	1.0	1.357		
Y 22	5	.140+5	.750+4	.750	7.257		
Y 22	5				1.50		
Y 22	20				1.5		
Y 22	21				1.5		
Y 22	22				1.475		
Y 22	23				1.475		
Y 23	1	.140+5	.100+5	1.0	1.534		
Y 23	5	.140+5	.750+4	.750	7.257		
Y 23	5				1.51	1.50	1.50
Y 23	20				1.5		
Y 23	21				1.7		
Y 23	22				1.502		
Y 23	23				1.502		
Z223	1	450.	.100+5	1.0	.023		
Z223	5	910.	.200+5	.020	.020		
Z223	4	320.	.700+5	.070	.024		
Z223	5	900.	.500+5	.005	.025		
Z223	5	1000.	.350+4	.350	.110		
Z223	5				.019	.020	.024
Z223	20				.019		
Z223	21				.019		
Z223	22				.019		
Z223	23				.019		
V3234	1	760.	.100+5	1.0	.033		
V3234	5	750.	.200+5	.020	.030		
V3234	4	345.	.700+5	.070	.030		
V3234	5	75.	.500+5	.005	.038		
V3234	5	1000.	.350+4	.350	.073		
V3234	5				.034		
V3234	20				.033		
V3234	21				.033		
V3234	22				.030		
V3234	23				.030		
Z225	1	450.	.100+5	1.0	1.09		

[illegible]

2. Organ Data Library (ORGLIB)

IV1154	15	8.40	.500-5	.400-5	.150		
IV1154	20				.20		
IV1154	21				.25		
IV1154	22				.15		
IV1154	23				.15		
IV115	1	48.0	.702	1.0	.170		
IV115	3	60.0	.400-4	.040	.170		
IV115	4	58.0	.250-5	.140	.170		
IV115	5	48.0	.400-4	.020	.170		
IV115	5	57.0	.540-5	.170	.250		
IV115	8				.170		
IV115	12	67.0	.550-5	.190	.170		
IV115	15	5.40	.500-6	.400-5	.170		
IV115	20				.17		
IV115	21				.17		
IV115	22				.17		
IV115	23				.17		
SV125	1	55.0	.350	1.0	.245		
SV125	4	70.0	.500-5	.010	.211		
SV125	5100.		.02	.500	.2452		
SV125	5				.250	.94	1.0
SV125	15	55.0	.400-4	.160-2	.240		
SV125	15	70.0	.500-5	.100-5	.240		
SV125	20				.242		
SV125	21				.242		
SV125	22				.242		
SV125	23				.242		
SV125	1	58.0	.35	1.0	.357		
SV125	4	55.0	.500-4	.002	.221		
SV125	5100.		.005	.1	.525		
SV125	5				.211	.23	.25
SV125	15	4.0	.400-6	.500-4	.137		
SV125	20				.21		
SV125	21				.34		
SV125	22				.15		
SV125	23				.15		
TE1254	1	15.0	.250	1.0	.114		
TE1254	3	50.0	.020	.070	.112		
TE1254	4	50.0	.010	.050	.113		
TE1254	5	50.0	.250-2	.010	.140		
TE1254	5	50.	.025	.040	.553		
TE1254	5				.140		
TE1254	10	50.	.750-5	.005	.110		
TE1254	15	9.	.250-5	.001	.112		
TE1254	20				.14		
TE1254	21				.15		
TE1254	22				.112		
TE1254	23				.112		
SV126	1	55.	.05	1.0	1.3		
SV126	4	70.	.0005	.0100	1.1		
SV126	5100.		.02	.5	4.		
SV126	5				1.1	1.1	1.1
SV126	15	55.	.500-4	.15-2	.54		
SV126	15	70.	5.0-5	.0001	.54		
SV126	20				1.1		
SV126	21				1.3		
SV126	22				0.2		

2. Organ Data Library (ORGLIB)

94126	25				0.2		
93126	1 34.	.05	1.0		1.4		
93126	4 34.	0.0 -5	.002		.95		
93126	5 100.	.005	0.1		5.3		
93126	5				.95	.05	.95
93126	15 4.0	9. -7	5.0 -5		.70		
93126	20				.95		
93126	21				1.4		
93126	22				.74		
93126	25				.73		
93127	1 34.	.05	1.0		.905		
93127	4 34.	0.0 -5	.002		.527		
93127	5 100.	.005	.1		2.225		
93127	5				.527		
93127	15 4.	9. -7	5.0 -5		.477		
93127	20				.527		
93127	21				1.4		
93127	22				.524		
93127	25				.524		
TE1274	1 15.0	.250	1.0		.257		
TE1274	5 50.0	.020	.070		.257		
TE1274	4 50.0	.010	.050		.257		
TE1274	5 50.0	.250-2	.010		.320		
TE1274	5 50.0	.025	.090		1.145		
TE1274	5				.255	.32	.32
TE1274	10 50.0	.750-5	.005		.310		
TE1274	15 9.	.250-5	.001		.225		
TE1274	20				.033		
TE1274	21				.049		
TE1274	22				.257		
TE1274	25				.257		
TE127	1 15.	.250	1.0		.255		
TE127	5 50.	.020	.070		.245		
TE127	4 50.	.010	.050		.255		
TE127	5 50.	.250-2	.010		.240		
TE127	5 50.	.025	.090		1.175		
TE127	5				.240		
TE127	10 50.	.750-5	.005		.240		
TE127	15 9.0	.250-5	.001		.235		
TE127	20				.24		
TE127	21				.24		
TE127	22				.24		
TE127	25				.235		
TE1274	1 15.	.250	1.0		.555		
TE1274	5 50.0	.020	.070		.515		
TE1274	4 50.	.010	.050		.525		
TE1274	5 50.	.250-2	.010		.730		
TE1274	5 50.	.025	.090		2.245		
TE1274	5				.735	.45	.45
TE1274	10 50.	.750-5	.005		.570		
TE1274	15 9.0	.250-5	.001		.505		
TE1274	20				.11		
TE1274	21				.11		
TE1274	22				.510		
TE1274	25				.511		
TE129	1 15.0	.250	1.0		.598		
TE129	5 50.	.020	.070		.552		

2. Organ Data Library (ORGLIB)

TE129	4	50.	.010	.050	.551		
TE129	5	50.	.250-2	.010	.550		
TE129	5	50.	.025	.090	2.555		
TE129	5				.730	.73	.73
TE129	10	50.	.750-4	.005	.500		
TE129	15	50.	.250-4	.001	.550		
TE129	20				.73		
TE129	21				.73		
TE129	22				.525		
TE129	23				.525		
I 129	1	100.	1.0	1.0	3.72 -2		
I 129	3	7.0	.040	.040	3.75 -2		
I 129	4	7.0	.120	.120	7.59 -2		
I 129	5	7.0	.005	.005	.077		
I 129	5	14.0	.070	.070	.315		
I 129	5				.092		
I 129	10	7.0	.005	.005	.055		
I 129	15	100.	.500	.500	5.52 -2		
I 129	20				.042		
I 129	21				.042		
I 129	22				.0574		
I 129	23				.0574		
TE131	1	15.	.250	1.0	1.50		
TE131	3	50.	.020	.070	.810		
TE131	4	50.	.010	.050	.370		
TE131	5	50.	.250-2	.010	.800		
TE131	5	50.	.025	.040	2.50		
TE131	5				.755	.09	1.0
TE131	10	50.	.750-3	.005	.50		
TE131	15	5.	.250-3	.001	.570		
TE131	20				.73		
TE131	21				1.2		
TE131	22				.55		
TE131	23				.55		
TE131	1	15.	.25	1.0	1.355		
TE131	3	50.	.02	.07	1.009		
TE131	4	50.	.01	.05	1.091		
TE131	5	50.	.025	.04	2.555		
TE131	5				1.13		
TE131	10	50.	.75-3	.005	1.01		
TE131	15	5.	.25-3	.001	1.010		
TE131	20				1.13		
TE131	21				1.35		
TE131	22				.805		
TE131	23				.805		
I 131	1	100.	1.0	1.0	.434		
I 131	3	7.	.04	.04	.277		
I 131	4	7.	.12	.12	.305		
I 131	5	7.	.005	.005	.027		
I 131	5	14.	.07	.07	1.102		
I 131	5				.500		
I 131	10	7.	.005	.005	.23		
I 131	15	100.	.500	.500	.235		
I 131	20		5.0-2		.50		
I 131	21		5.0-2		.44		
I 131	22		5.0-2		.257		
I 131	23		5.0-2		.257		

2. Organ Data Library (ORGLIB)

TE152	1	15.	.250	1.0	2.159		
TE152	5	30.	.020	.070	1.07		
TE152	4	30.	.010	.050	1.242		
TE152	5	30.	.250-2	.010	.950		
TE152	5	30.	.025	.090	3.544		
TE152	8				1.04	1.1	1.1
TE152	10	30.	.750-4	.005	.750		
TE152	15	9.0	.250-5	.001	.914		
TE152	20				.15		
TE152	21				.21		
TE152	22				.301		
TE152	23				.301		
I 152	1	100.	1.0	1.0	1.221		
I 152	5	7.0	.020	.040	.334		
I 152	4	7.0	.120	.120	1.107		
I 152	5	7.0	.005	.005	.950		
I 152	5	14.0	.070	.070	2.499		
I 152	5				1.00		
I 152	10	7.0	.005	.005	.540		
I 152	15	100.	.050	.040	.577		
I 152	20		5.0-2		1.0		
I 152	21		5.0-2		1.7		
I 152	22		5.0-2		.910		
I 152	23		5.0-2		.910		
I 153	1	100.	1.0	1.0	.430		
I 153	5				.555	.78	.90
I 153	15	100.	.225	.240	.498		
I 153	20		5.0-2		.59		
I 153	21		5.0-2		.94		
I 153	22		5.0-2		.534		
I 153	23		5.0-2		.534		
I 154	1	100.	1.0	1.0	2.55		
I 154	5				1.10		
I 154	15	100.	.040	.040	.923		
I 154	20		5.0-2		1.1		
I 154	21		5.0-2		1.5		
I 154	22		5.0-2		1.107		
I 154	23		5.0-2		1.107		
CS1544	1	115.	1.0	1.0	.140		
CS1544	5	32.	.010	.010	.032		
CS1544	4	90.	.070	.070	.122		
CS1544	5	98.	.005	.005	.130		
CS1544	5	140.	.040	.040	.417		
CS1544	14	140.	.400	.400	.927-1	.12	.50
CS1544	20				.092		
CS1544	21				.011		
CS1544	22				.0545		
CS1544	23				.0545		
CS154	1	115.0	1.0	1.0	1.152		
CS154	5	42.0	.010	.010	.449		
CS154	4	90.0	.070	.070	.505		
CS154	5	98.0	.005	.005	.450		
CS154	5	140.	.040	.040	1.247		
CS154	5	140.	.005	.005	.570		
CS154	14	140.	.400	.400	1.1		
CS154	20				.57		

2. Organ Data Library (ORGLIB)

CS134	21			1.1		
CS134	22			.403		
CS134	23			.405		
I 135	1 100.	1.0	1.0	1.233		
I 135	3			.99	1.1	1.1
I 135	15 100.	.150	.170	.523		
I 135	20	5.0E-2		.70		
I 135	21	5.0E-2		.12		
I 135	22	5.0E-2		.902		
I 135	23	5.0E-2		.902		
CS135	1 115.	1.0	1.0	5.54 -2		
CS135	3 42.	.010	.010	5.54 -2		
CS135	4 90.	.070	.070	5.54 -2		
CS135	5 98.	.005	.005	.055		
CS135	5 140.	.040	.040	.329		
CS135	5 140.	.003	.003	.055		
CS135	14 140.	.400	.400	.055		
CS135	20			.055		
CS135	21			.055		
CS135	22			.055		
CS135	23			.055		
CS137	1 115.	1.0	1.0	.574		
CS137	3 42.	.010	.010	.359		
CS137	4 90.	.070	.070	.400		
CS137	5 98.	.005	.005	.370		
CS137	5 140.	.040	.040	1.355		
CS137	5 140.	.003	.003	.410		
CS137	14 140.	.400	.400	.570		
CS137	20			.91		
CS137	21			.57		
CS137	22			.329		
CS137	23			.329		
CS138	1 115.	1.0	1.0	2.259		
CS138	3 42.	.01	.01	1.439		
CS138	4 90.	.07	.07	1.575		
CS138	5 98.	.005	.005	1.45		
CS138	5 140.	.04	.04	5.842		
CS138	5			1.5		
CS138	14 140.	.40	.40	2.29		
CS138	20			1.5		
CS138	21			2.29		
CS138	22			1.332		
CS138	23			1.332		
CS139	1 115.	1.	1.	2.711		
CS139	3 42.	.01	.01	2.557		
CS139	4 90.	.07	.07	2.584		
CS139	5 98.	.005	.005	2.55		
CS139	5 140.	.04	.04	12.5		
CS139	5			2.58		
CS139	14 140.	.4	.4	2.71		
CS139	20			2.55		
CS139	21			2.71		
CS139	22			2.555		
CS139	23			2.555		
BA140	1 65.0	.050	1.1	2.354		
BA140	3 4.50	.500-5	.100-5	1.379		
BA140	4 775.	.500-5	.500-5	1.543		

2. Organ Data Library (ORGLIB)

3A140	5	15.0	.250-5	.500-4	1.20
3A140	5	65.0	.045	.700	5.133
3A140	5				.751
3A140	142	100.	.150-3	.005	2.30
3A140	20				.30
3A140	21				.40
3A140	22				.354
3A140	23				.352
LA140	1	500.	.0001	1.0	1.347
LA140	4	400.	.150-4	.150	1.150
LA140	5	1000.	.400-4	.400	3.555
LA140	5				1.10
LA140	20				1.1
LA140	21				1.2
LA140	22				.703
LA140	23				.703
3A141	1	65.	.05	1.0	2.355
3A141	3	8.5	.500-5	.100-3	2.115
3A141	4	375.	.500-4	.500-3	2.147
3A141	5	15.	.250-5	.500-4	2.115
3A141	5	65.	.035	.7	10.04
3A141	5				2.147
3A141	142	100.	.130-3	.003	2.355
3A141	20				2.147
3A141	21				2.355
3A141	22				1.129
3A141	23				1.129
LA141	1	500.	.0001	1.0	.731
LA141	4	400.	.150-4	.15	.742
LA141	5	1000.	.400-4	.40	2.550
LA141	5				.742
LA141	20				.742
LA141	21				.731
LA141	22				.733
LA141	23				.733
CE141	1	565.	.100-3	1.000	.221
CE141	3	565.	.200-5	.020	.174
CE141	4	295.	.250-4	.250	.179
CE141	5	1500.	.500-4	.500	.229
CE141	5				.180
CE141	20				.13
CE141	21				.221
CE141	22				.171
CE141	23				.171
3A142	1	65.	.05	1.0	3.409
3A142	3	8.5	.500-5	.100-3	2.022
3A142	4	375.	.500-4	.500-3	2.257
3A142	5	15.	.250-5	.500-4	2.022
3A142	5	65.	.035	.7	7.755
3A142	5				2.257
3A142	14	2000.	.150-3	.005	3.409
3A142	20				2.257
3A142	21				3.409
3A142	22				1.555
3A142	23				1.555
LA142	1	500.	.0001	1.0	2.133
LA142	4	400.	.150-4	.15	1.53

1.4 1.4

2. Organ Data Library (ORGLIB)

LA142	5	1000.	.40=4	.40	4.713		
LA142	4				1.33		
LA142	20				1.33		
LA142	21				2.133		
LA142	22				1.133		
LA142	23				1.133		
CE143	1	364.	.100=3	1.0	.733		
CE143	3	364.	.200=3	.020	.773		
CE143	4	294.	.250=4	.250	.813		
CE143	5	1500.	.500=4	.500	5.721		
CE143	9				.562	.72	.85
CE143	20				.513		
CE143	21				.533		
CE143	22				.453		
CE143	23				.453		
PR143	1	75.0	.100=3	1.0	.324		
PR143	3	750.	.200=5	.020	.324		
PR143	4	375.	.200=4	.200	.324		
PR143	5	1500.	.400=4	.400	1.515		
PR143	9				.329		
PR143	20				.32		
PR143	21				.32		
PR143	22				.32		
PR143	23				.324		
CE144	1	563.	.100=3	1.0	1.313		
CE144	3	563.	.200=5	.020	1.273		
CE144	4	293.	.250=4	.250	1.273		
CE144	5	1500.	.500=4	.500	5.443		
CE144	9				1.30	1.30	1.50
CE144	20				1.3		
CE144	21				1.3		
CE144	22				1.3		
CE144	23				1.242		
PR144	1	75.	.10=3	1.	1.203		
PR144	3	750.	.20=3	.02	1.173		
PR144	4	375.	.20=4	.20	1.173		
PR144	5	1500.	.40=4	.40	5.344		
PR144	9				1.175		
PR144	20				1.175		
PR144	21				1.203		
PR144	22				1.171		
PR144	23				1.171		
VO144	1	556.	.100=3	1.0	20.0		
VO144	3	556.	.500=5	.050	20.0		
VO144	4	131.	.500=4	.500	20.0		
VO144	5	1500.	.550=4	.550	120.		
VO144	9				20.		
VO144	20				.17		
VO144	21				.17		
VO144	22				.17		
VO144	23				.17		
VO147	1	556.	.100=3	1.0	.551		
VO147	3	556.	.500=5	.050	.551		
VO147	4	131.	.500=4	.500	.551		
VO147	5	1500.	.550=4	.550	1.550		
VO147	9				.227	.227	.31
VO147	20				.22		

2. Organ Data Library (ORGLIB)

V0147	21				.57
V0147	22				.232
V0147	23				.232
V0147	1	556.	.100-3	1.0	5.330-2
V0147	3	556.	.200-5	.020	5.330-2
V0147	4	556.	.500-5	.060	5.330-2
V0147	5	556.	.550-4	.350	.343
V0147	5	556.			.059
V0147	20				5.330-2
V0147	21				5.330-2
V0147	22				5.330-2
V0147	23				5.330-2
V0147	1	656.	.100-3	1.0	1.041
V0147	3	656.	.200-5	.02	.529
V0147	4	656.	.500-5	.05	.734
V0147	5	656.	.550-4	.35	2.057
V0147	5	656.			.734
V0147	20				.734
V0147	21				1.041
V0147	22				.331
V0147	23				.331
V0147	1	656.	.100-3	1.0	1.055
V0147	3	656.	.200-5	.02	.337
V0147	4	656.	.500-5	.06	.337
V0147	5	656.	.550-4	.35	3.527
V0147	5	656.			.337
V0147	20				.337
V0147	21				1.055
V0147	22				.733
V0147	23				.733
V0147	1	656.	.100-3	1.0	.072
V0147	3	656.	.200-5	.02	.337
V0147	4	656.	.500-5	.06	.337
V0147	5	656.	.550-4	.35	1.534
V0147	5	656.			.573
V0147	20				.573
V0147	21				.373
V0147	22				.373
V0147	23				.345
V0147	1	556.	.100-3	1.0	.345
V0147	3	556.	.200-5	.020	.042
V0147	4	556.	.500-5	.050	.042
V0147	5	556.	.550-4	.350	.042
V0147	5	556.			.042
V0147	20				.042
V0147	21				.041
V0147	22				.041
V0147	23				.041
V0147	1	1.0	.100	1.0	.572
V0147	3	4.0	.005	.060	.043
V0147	5	9.0	.007	.070	1.553
V0147	5	9.0			.043
V0147	20				.043
V0147	21				.043
V0147	22				.043
V0147	23				.043
V0147	1	1.0			.043
V0147	3	4.0			.043
V0147	5	9.0			.043
V0147	5	9.0			.043
V0147	20				.043
V0147	21				.043
V0147	22				.043
V0147	23				.043
V0147	1	7.0	.500	1.0	.012
V0147	3				.012
V0147	5				.012
V0147	5				.012
V0147	20				.012
V0147	21				.012
V0147	22				.012
V0147	23				.012
V0147	1				.012

2. Organ Data Library (ORGLIB)

RE157	4	14.0	.005	.010	.012			
RE157	5	3.50	.005	.010	.052			
RE157	5				.012			
RE157	12	25.0	.130	.250	.012			
RE157	15	3.0	.350+2	.007	.012			
RE157	20				.012			
RE157	21				.012			
RE157	22				.012			
RE157	23				.012			
T4230	1	570. +2	.100+3	1.0	.450+2			
T4230	3	220. +2	.500+5	.050	.450+2			
T4230	4	570. +2	.500+5	.050	.450+2			
T4230	5	565. +2	.700+4	.700	.222+3			
T4230	5				.450+2	.480+2	.45+2	
T4230	20				.47			
T4230	21				.47			
T4230	22				.47			
T4230	23				.47			
RA226	1	14100.	.500	1.0	.110+3			
RA226	5	164. +2	.350	.100	.110+3			
RA226	5				.110+3			
RA226	20				3.70			
RA226	21				3.70			
RA226	22				3.70			
RA226	23				3.7			
P3210	1	11460.	.050	1.0	3.20			
P3210	5	551.	.010	.100	10.0			
P3210	4	1750.	.005+4	.050	10.			
P3210	5	5550.	.020	.250	27.			
P3210	5				.157	14.	43.	
P3210	20				.027			
P3210	21				.043			
P3210	22				.050			
P3210	23				.050			
31210	1	5.0	.010	1.0	10.0			
31210	3	5.0	.003	.500	17.			
31210	4	15.0	.150+2	.150	13.			
31210	5	10.0	.100+3	.010	17.			
31210	5	14.3	.500+3	.050	40.			
31210	5				.775	15.	43.	
31210	20				.40			
31210	21				.40			
31210	22				.40			
31210	23				.40			
PJ210	1	30.	.050	1.0	55.0			
PJ210	3	70.	.074	.070	55.0			
PJ210	4	41.	.010	.170	55.0			
PJ210	5	50.	.002	.141	55.0			
PJ210	5	24.	.005	.100	275.			
PJ210	4				55.0			
PJ210	20				.53			
PJ210	21				.53			
PJ210	22				.53			
PJ210	23				.53			
U 232	1	160.	.010	1.0	2.40 +0			
J 232	3	15.0	.110+2	.110	1.10 +2			
J 232	5	500.	.110+2	.110	1.20 +4			

2. Organ Data Library (ORGLIB)

J 232	9					.532+2	.760+2	.19+3
J 232	20					.54		
J 232	21					.54		
J 232	22					.54		
J 232	23					.54		
I 4232	1	570. +2	.100-3	1.0		.52 +2		
I 4232	3	220. +2	.500-5	.050		.51 +2		
I 4232	4	370. +2	.500-5	.050		.51 +2		
I 4232	5	565. +2	.700-4	.700		.270+3		
I 4232	9					.410+2	.65+2	
I 4232	20					.50		
I 4232	21					.51		
I 4232	22					.50		
I 4232	23					.50		
RA224	1	1000. +2	.500	1.0		2.5 +2		
RA224	3	160. +2	.050	.100		1.7 +2		
QA224	5					.715	.22 +2	.14+3
RA224	20					.55		
RA224	21					.53		
RA224	22					.53		
RA224	23					.53		
AC224	1	240. +2	.100-3	1.0		.230+3		
AC224	3	200. +2	.100-5	.010		.550+2		
AC224	4	240. +1	.500-4	.200		.560+2		
AC224	5	565. +2	.500-3	.500		.270+3		
AC224	9					.997	2.2 +1	1.0 +2
AC224	20					.72		
AC224	21					1.1		
AC224	22					.62		
AC224	23					.62		
I 4224	1	570. +2	.100-3	1.0		.230+3		
I 4224	3	220. +2	.500-5	.050		.55 +2		
I 4224	4	370. +2	.500-5	.050		.55 +2		
I 4224	5	565. +2	.700-4	.700		.270+3		
I 4224	9					.110+3	.51 +3	.33+3
I 4224	20					.44		
I 4224	21					.44		
I 4224	22					.44		
I 4224	23					.44		
RA220	1	1000. +2	.500	1.0		2.50 +2		
RA220	3	160. +2	.050	.100		2.50 +2	.24 +3	.24+3
RA220	5					.240+3		
RA220	20					.42		
RA220	21					.42		
RA220	22					.42		
RA220	23					.42		
PA212	1	240. +2	.100-3	1.0		.230+3		
PA212	3	200. +2	.100-5	.010		.550+2		
PA212	4	240. +1	.500-4	.200		.560+2		
PA212	5	565. +2	.500-3	.500		.270+3		
PA212	9					.997	2.2 +1	1.0 +2
PA212	20					.72		
PA212	21					1.1		
PA212	22					.62		
PA212	23					.62		
PA212	1	5.0	.010	1.0		.45.0	.55.0	
PA212	3	6.0	.015	.500		.42.0		

2. Organ Data Library (ORGLIB)

B1212	4	15.0	.150-2	.150	55.0			
B1212	5	10.0	.100-3	.010	52.0			
B1212	6	13.3	.500-5	.030		.011+3		
B1212	8				45.0			
B1212	20				1.3			
B1212	21				2.2			
B1212	22				1.7			
B1212	23				1.7			
J 235	1	100.	.010	1.0	45.			
J 235	3	15.	.110-2	.110	45.			
J 235	5	300.	.110-2	.110	2.50 +2			
J 235	8				.451+2	.46 +2	.45+2	
J 235	20		1.0		.55			
J 235	21		1.0		.77			
J 235	22		1.0		.51			
J 235	23		1.0		.51			
T4231	1	570. +2	.100-3	1.0	.130			
T4231	3	220. +2	.500-5	.050	.130			
T4231	4	570. +2	.500-5	.050	.150			
T4231	5	565. +2	.700-4	.700	.550			
T4231	8				.110	.110	.110	
T4231	20		1.0		.11			
T4231	21		1.0		.14			
T4231	22		1.0		.073			
T4231	23		1.0		.045			
PA231	1	410. +2	.100-3	1.0	1.40 +2			
PA231	3	510. +2	.400-5	.040	79.0			
PA231	4	540. +2	.500-5	.050	5.5 +1			
PA231	5	565. +2	.450-4	.450	7.50 +2			
PA231	8				.510+2	.52 +2	.70+2	
PA231	20				.60			
PA231	21				.70			
PA231	22				.55			
PA231	23				.55			
AC227	1	240. +2	.100-3	1.0	2.0 +2			
AC227	3	240. +2	.100-5	.010	5.2 +1			
AC227	4	240. +1	.500-4	.500	5.2 +1			
AC227	5	565. +2	.500-4	.500	1.0 +3			
AC227	8				4.40	2.10 +2	3.2 +2	
AC227	20				.540			
AC227	21				.540			
AC227	22				.540			
AC227	23				.540			
T4227	1	570. +2	.100-3	1.0	.200+3			
T4227	3	220. +2	.500-5	.050	.51 +2			
T4227	4	570. +2	.500-5	.050	.51 +2			
T4227	5	565. +2	.700-4	.700	.920+3			
T4227	8				.827+2	.23 +3	.45+3	
T4227	20				.54			
T4227	21				.54			
T4227	22				.54			
T4227	23				.54			
RA223	1	15100.	.500	1.0	2.75 +2			
RA223	3	10.	.500 -4	.002	2.75 +2			
RA223	4	10.	1.2 -4	.000 -4	2.75 +2			
RA223	5	164. +2	.150	.500	2.75 +2			
RA223	8				24.0 +1			

2. Organ Data Library (ORGLIB)

RA223	20				3.7			
RA223	21				3.9			
RA223	22				3.7			
RA223	23				3.7			
VP237	1	390. +2	.133+3	1.0	43.			
VP237	3	540. +2	.530+5	.130	49.			
VP237	4	145. +3	.450+5	.450	49.			
VP237	5	365. +2	.435+4	.450	2.50 +2			
VP237	8				.470+2	.490+2	.49+2	
VP237	20				.50			
VP237	21				.52			
VP237	22				.52			
VP237	23				.52			
PA233	1	410. +2	.133+3	1.0	.52			
PA233	3	510. +2	.400+5	.040	.13			
PA233	4	540. +2	.500+5	.050	.13			
PA233	5	565. +2	.435+4	.450	.11			
PA233	8				.13			
PA233	20				.13			
PA233	21				.32			
PA233	22				.13			
PA233	23				.13			
J 233	1	100. +2	.010	1.0	50.			
J 233	3	150. +2	.110+2	.110	50.			
J 233	5	300. +2	.110+2	.110	2.50 +2			
J 233	8				.500+2			
J 233	20				.47			
J 233	21				.47			
J 233	22				.47			
J 233	23				.47			
T4224	1	570. +2	.133+3	1.0	.330+3			
T4224	3	220. +2	.500+5	.050	.47 +2			
T4224	4	570. +2	.500+5	.050	.47 +2			
T4224	5	730. +2	.700+4	.700	.700+3			
T4224	8				.270+3	.270+3	.27+3	
T4224	20				.40			
T4224	21				.40			
T4224	22				.40			
T4224	23				.40			
RA225	1	100. +2	.50	1.0	2.50 +2			
RA225	3	10. +2	.50	.002	2.50 +2			
RA225	4	10. +2	.12 +3	.040+2	2.50 +2			
RA225	5	164. +2	.13	.50	2.50 +2			
RA225	8				2.50 +2	2.50 +2	2.50+2	
RA225	20				3.5			
RA225	21				3.5			
RA225	22				3.5			
RA225	23				3.5			
AC225	1	200. +2	.001+1	1.0	2.50 +2			
AC225	3	240. +2	1.0 +5	.01	2.50 +2			
AC225	4	240. +1	5.0 +5	.50	2.50 +2			
AC225	5	730. +2	3.0 +5	.50	1.50 +3			
AC225	8				2.70 +2	2.70 +2	2.70+2	
AC225	20				3.5			
AC225	21				3.5			
AC225	22				3.5			
AC225	23				3.5			

U 234	1	100.	00	1.00	25.00
J 234	3	15.	1.1	-3 0.11	25.00
J 234	5	300.	1.1	-3 0.11	25.00
J 234	5				25.00
J 234	20		1.0		0.45
J 234	21		1.0		0.45
J 234	22		1.0		0.45
J 234	23		1.0		0.45
J 234	1	370. +2	1.00 +5	1.00	0.91
J 234	3	370. +2	500 +5	0.50	0.90
J 234	4	370. +2	500 +5	0.50	0.90
J 234	5	365. +2	700 +5	0.700	0.45
J 234	5				0.90
J 234	20		1.0		0.90
J 234	21		1.0		0.90
J 234	22		1.0		0.90
J 234	23		1.0		0.90
J 234	1	200. +2	100 +3	1.00	51.
J 234	3	270. +2	500 +5	0.50	0.55
J 234	4	140. +2	450 +5	0.50	57.
J 234	5	365. +2	0.50 +5	0.450	5.02 +2
J 234	5				0.30
J 234	20				0.19
J 234	21				0.17
J 234	22				0.73
J 234	23				0.750
J 234	1	200. +2	100 +3	1.00	57.00
J 234	3	270. +2	500 +5	0.50	55.00
J 234	4	140. +2	450 +5	0.50	55.00
J 234	5	365. +2	0.50 +5	0.450	5.00 +2
J 234	5				0.20
J 234	20				0.22
J 234	21				0.20
J 234	22				0.20
J 234	23				0.20
J 234	1	200. +2	100 +3	1.00	30.00
J 234	3	240. +2	200 +5	0.20	73.00
J 234	4	150. +2	450 +5	0.50	75.00
J 234	5	345. +2	0.50 +5	0.450	3.00 +2
J 234	5				53.00
J 234	20				0.52
J 234	21				0.52
J 234	22				0.52
J 234	23				0.52
J 234	1	350. +2	500 +5	1.00	51.
J 234	3	320. +2	500 +6	0.20	51.
J 234	4	140. +2	1.55 +5	0.450	51.
J 234	5	365. +2	1.55 +5	0.450	2.50 +2
J 234	5				51.00
J 234	20		3.00	0.00	0.510
J 234	21		3.00	0.00	0.510
J 234	22		3.00	0.00	0.510
J 234	23		3.00	0.00	0.510
J 234	1	350. +2	500 +5	1.00	57.
J 234	3	320. +2	500 +6	0.20	57.
J 234	4	140. +2	1.55 +5	0.450	57.
J 234	5	365. +2	1.55 +5	0.450	2.50 +2

2. Organ Data Library (ORGLIB)

PJ238	5				57.0		
PJ238	20	.3=4	1.0	0.0	.55		
PJ238	21	.3=4	1.0	0.0	.55		
PJ238	22	.3=4	1.0	0.0	.57		
PJ238	23	.3=4	1.0	0.0	.57		
C4244	1	240. +2	.170=3	1.0	54.		
C4244	3	240. +2	.270=5	.020	54.		
C4244	4	150. +2	.450=4	.400	54.		
C4244	5	365. +2	.450=4	.450	2.70 +2		
C4244	5				50.0	50.	50.
C4244	10	1.0+3		0.5	-3 5.0	+1	
C4244	11	1.0+3		0.1	-3 5.0	+1	
C4244	20				.57		
C4244	21				.57		
C4244	22				.57		
C4244	23				.57		
PJ244	1	350. +2	.500=4	1.0	54.4		
PJ244	3	320. +2	.500=5	.020	54.4		
PJ244	4	14.6+3	1.45=5	.43	54.4		
PJ244	5	365. +2	1.45=5	.45	2.92 +2		
PJ244	5				54.4	54.4	54.4
PJ244	20				.75		
PJ244	21				.75		
PJ244	22				.75		
PJ244	23				.75		
PJ244	1	350. +2	.500=4	1.0	55.0		
PJ244	3	320. +2	.500=5	.020	55.0		
PJ244	4	14.6 +2	1.45=5	.450	55.0		
PJ244	5	365. +2	1.45=5	.450	2.70 +2		
PJ244	5				55.0		
PJ244	20	.3=4	1.0	.0	.53		
PJ244	21	.3=4	1.0	.0	.53		
PJ244	22	.3=4	1.0	.0	.53		
PJ244	23	.3=4	1.0	.0	.53		
C4247	1	240. +2	.170=3	1.0	55.		
C4247	3	240. +2	.270=5	.020	55.		
C4247	4	150. +2	.450=4	.450	55.		
C4247	5	365. +2	.450=4	.450	2.70 +2		
C4247	5				55.0	55.0	55.0
C4247	20				.71		
C4247	21				.71		
C4247	22				.71		
C4247	23				.71		
C4243	1	240. +2	.170=3	1.0	50.0		
C4243	3	240. +2	.270=5	.020	50.0		
C4243	4	150. +2	.450=4	.450	50.0		
C4243	5	365. +2	.450=4	.450	2.70 +2		
C4243	5				50.	50.	50.
C4243	20				.54		
C4243	21				.71		
C4243	22				.51		
C4243	23				.51		
PJ243	1	350. +2	.500=4	1.0	.57		
PJ243	3	320. +2	.500=5	.020	.57		
PJ243	4	1.5+4	1.45=5	.45	.25		
PJ243	5	365. +2	1.45=5	.45	.2.		
PJ243	5				.17		

2. Organ Data Library (ORGLIB)

PJ243	20				.13		
PJ243	21				.13		
PJ243	22				.13		
PJ243	23				.13		
A4243	1	200.	+2	.100-3	1.0	34.0	
A4243	3	270.	+2	.300-5	.030	34.0	
A4243	4	106.	+2	.450-4	.450	34.0	
A4243	5	345.	+2	.450-4	.450	2.70	+2
A4243	5					34.0	54.0 54.0
A4243	20					.54	
A4243	21					.55	
A4243	22					.55	
A4243	23					.55	
V4239	1	590.	+2	.100-3	1.0	.250	
V4239	3	540.	+2	.300-5	.030	.210	
V4239	4	1.45	+5	.450-5	.450	.250	
V4239	5	345.	+2	.450-4	.450	1.070	
V4239	5					.150	.15 .15
V4239	20					.15	
V4239	21					.22	
V4239	22					.22	
V4239	23					.22	
PJ239	1	530.	+2	.300-4	1.0	33.0	
PJ239	3	520.	+2	.300-5	.020	33.0	
PJ239	4	145.	+2	1.35-5	.450	33.0	
PJ239	5	365.	+2	1.35-5	.450	2.70	+2
PJ239	5					33.0	
PJ239	20	.3-4	1.0	0.0		.520	
PJ239	21	.3-4	1.0	0.0		.520	
PJ239	22	.3-4	1.0	0.0		.520	
PJ239	23	.3-4	1.0	0.0		.520	
C4245	1	240.	+2	.100-3	1.0	35.0	
C4245	3	200.	+2	.200-5	.020	35.0	
C4245	4	150.	+2	.450-4	.450	35.0	
C4245	5	365.	+2	.450-4	.450	2.60	+2
C4245	5					35.0	55.0 55.0
C4245	20					.57	
C4245	21					.51	
C4245	22					.55	
C4245	23					.55	
PJ241	1	550.	+2	.300-4	1.0	2.252	
PJ241	3	520.	+2	.300-5	.020	2.372	
PJ241	4	146.	+2	1.35-5	.450	.990	
PJ241	5	365.	+2	1.35-5	.450	14.	
PJ241	4					.133-1	.030 .15
PJ241	20	.3-4	1.0	0.0		.011	
PJ241	21	.3-4	1.0	0.0		.012	
PJ241	22	.3-4	1.0	0.0		.011	
PJ241	23	.3-4	1.0	0.0		.011	
A4241	1	200.	+2	.100-3	1.0	57.	
A4241	3	270.	+2	.300-5	.030	57.	
A4241	4	146.	+2	.450-4	.450	57.	
A4241	5	365.	+2	.450-4	.450	2.31	+2
A4241	5					57.0	
A4241	20			1.0		.55	
A4241	21			1.0		.52	
A4241	22			1.0		.54	
A4241	23			1.0		.53	

3. Food Transfer Coefficient (FTRANSLIB)

AC	1.0-03	2.5-03	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
TI	1.0-03	4.2-03	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
PA	1.0-03	2.5-03	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
J	1.0-03	2.5-03	3.2-01	5.0-01	5.0-03	5.0-01	1.2-03
VP	1.0-03	2.5-03	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
PJ	1.0-03	2.5-04	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
AW	1.0-03	2.5-04	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
CI	1.0-03	2.5-03	2.0-03	2.5-05	5.0-03	1.0-02	4.0-03
CF	1.0-03	2.5-03	2.0-03	7.5-07	5.0-03	1.0-02	4.0-03

4. Bioaccumulation (BIOAC)

ELMT	FISH	SALT WATER CRUS.	FRESH WATER FACTORS	ALGAE	FISH	FRESH WATER CRUS.	FRESH WATER FACTORS	ALGAE	FACTORS	W.W.
H	1.0	1.0	1.0	1.0	.9	.9	.9	.9	1.0	
BE	1000.0	1000.0	1000.0	1000.0	2.0	10.0	10.0	20.0	.2	
C	1.0	1.0	1.0	1.0	4500.0	9100.0	9100.0	4500.0	1.0	
V	.9	.9	.9	.9	.9	.9	.9	.9	1.0	
F	4.0	4.0	4.0	1.0	10.0	100.0	100.0	2.0	.8	
VA	1.0	1.0	1.0	1.0	100.0	200.0	200.0	500.0	.9	
P	10000.0	10000.0	10000.0	10000.0	10000.0	20000.0	20000.0	50000.0	.4	
AR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.9	
CA	10.0	10.0	10.0	1.0	40.0	530.0	330.0	130.0	.2	
SC	100.0	300.0	300.0	1000.0	2.0	1000.0	1000.0	1000.0	.3	
CR	100.0	1000.0	1000.0	1000.0	20.0	2000.0	2000.0	4000.0	.9	
MY	5000.0	10000.0	50000.0	10000.0	400.0	90000.0	90000.0	10000.0	.5	
FE	1000.0	4000.0	20000.0	6000.0	100.0	5200.0	3200.0	1000.0	.2	
CJ	100.0	10000.0	500.0	100.0	50.0	200.0	200.0	200.0	.2	
VI	500.0	100.0	100.0	100.0	100.0	100.0	100.0	50.0	.2	
CJ	1000.0	5000.0	5000.0	1000.0	30.0	400.0	400.0	2000.0	.6	
ZV	5000.0	5000.0	5000.0	1000.0	2000.0	10000.0	10000.0	20000.0	.4	
SE	10.0	10.0	10.0	100.0	170.0	170.0	170.0	1000.0	.3	
SR	3.0	10.0	10.0	100.0	420.0	530.0	330.0	50.0	.8	
KR	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.0	
RS	50.0	50.0	10.0	10.0	2000.0	1000.0	1000.0	1000.0	.9	
SR	1.0	1.0	1.0	20.0	30.0	100.0	100.0	500.0	.2	
Y	50.0	100.0	100.0	500.0	25.0	1000.0	1000.0	5000.0	.2	
ZR	50.0	100.0	100.0	1000.0	3.3	6.7	6.7	1000.0	.7	
VS	100.0	200.0	200.0	100.0	30000.0	100.0	100.0	500.0	.7	
YJ	10.0	100.0	100.0	100.0	10.0	10.0	10.0	1000.0	.9	
TC	10.0	100.0	100.0	1000.0	15.0	5.0	5.0	20.0	.7	
RJ	3.0	100.0	100.0	1000.0	10.0	300.0	300.0	2000.0	.5	
RY	10.0	100.0	100.0	100.0	10.0	300.0	300.0	200.0	.5	
PJ	10.0	100.0	100.0	100.0	10.0	300.0	300.0	200.0	.5	
AG	1000.0	5000.0	5000.0	1000.0	2.3	770.0	770.0	200.0	.7	
CO	100.0	5000.0	10000.0	10000.0	200.0	2000.0	2000.0	1000.0	.5	
SV	3.0	5.0	5.0	10.0	3000.0	1000.0	1000.0	100.0	.7	
SS	1000.0	1000.0	1000.0	10000.0	1.0	10.0	10.0	1500.0	.8	
TE	10.0	10.0	100.0	1000.0	400.0	75.0	75.0	100.0	.8	
I	20.0	100.0	100.0	10000.0	15.0	5.0	5.0	40.0	.5	
XE	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	.0	
CS	50.0	50.0	10.0	10.0	2000.0	100.0	100.0	500.0	.9	
SA	3.0	5.0	5.0	100.0	4.0	200.0	200.0	500.0	.4	
LA	50.0	100.0	100.0	500.0	25.0	1000.0	1000.0	5000.0	.2	
CE	50.0	100.0	100.0	500.0	1.0	1000.0	1000.0	4000.0	.2	
PR	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
VO	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
PM	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
SM	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
EU	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
TS	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
YJ	100.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	5000.0	.2	
A	10.0	10.0	10.0	100.0	1200.0	10.0	10.0	1200.0	.9	
PS	500.0	1000.0	1000.0	5000.0	100.0	100.0	100.0	2000.0	.9	
BI	15.0	1000.0	1000.0	10000.0	15.0	10.0	10.0	1500.0	.9	
PJ	500.0	5000.0	5000.0	2000.0	500.0	2000.0	2000.0	2000.0	.5	
RV	1.0	1.0	1.0	1.0	57.0	1.0	1.0	1.0	.0	
RA	50.0	100.0	100.0	100.0	50.0	250.0	250.0	2500.0	.7	
AC	25.0	1000.0	1000.0	5000.0	25.0	1000.0	1000.0	5000.0	.7	

4. Bioaccumulation (BIOAC)

14	10000.0	2000.0	2000.0	3000.0	30.0	500.0	500.0	500.0	1500.0	.7
PA	10.0	10.0	10.0	5.0	11.0	110.0	110.0	110.0	1100.0	.7
U	10.0	10.0	10.0	57.0	2.0	60.0	60.0	60.0	500.0	.7
VP	10.0	10.0	10.0	5.0	10.0	400.0	400.0	400.0	300.0	.7
PJ	3.0	200.0	200.0	1000.0	3.5	100.0	100.0	100.0	350.0	.7
AL	25.0	1000.0	1000.0	5000.0	25.0	1000.0	1000.0	1000.0	5000.0	.7
CM	25.0	1000.0	1000.0	5000.0	25.0	1000.0	1000.0	1000.0	5000.0	.7
CF	25.0	1000.0	1000.0	5000.0	25.0	1000.0	1000.0	1000.0	5000.0	.7

5. External Dose Factors (GRDFLIB)

1 3	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
3E10	.0E+00	.0E+00	2.7E-07	.0E+00	2.0E+00	3.0E+00
C 14	.0E+00	.0E+00	3.9E-07	.0E+00	1.4E+11	3.5E-07
4 13	9.4E-07	7.5E-07	2.6E-05	1.7E-05	9.5E-07	1.4E-06
F 14	9.0E-07	6.4E-07	2.3E-05	1.9E-05	9.2E-07	1.1E-06
Y422	1.4E-08	1.5E-08	4.4E-05	4.0E-05	1.9E-06	2.3E-06
Y424	2.9E-08	2.5E-08	9.3E-05	7.9E-05	3.5E-06	4.5E-06
P 32	.0E+00	.0E+00	6.4E-07	6.4E-07	3.0E-09	6.2E-07
P 33	.0E+00	.0E+00	2.2E-05	9.7E-11	4.3E-11	2.0E-09
A237	.0E+00	.0E+00	1.3E-07	5.2E-10	3.3E-10	1.2E-07
A241	.0E+00	.0E+00	3.2E-05	2.4E-05	1.1E-06	1.6E-06
A441	2.0E-07	3.4E-07	8.5E-07	7.3E-07	2.0E+00	3.0E+00
9C45	1.5E-05	1.3E-05	4.3E-05	3.7E-05	1.7E-06	2.0E-06
C451	2.4E-10	2.2E-10	6.4E-03	3.2E-03	2.4E-08	2.9E-03
Y454	6.4E-07	5.4E-07	1.4E-06	1.5E-05	7.0E-07	3.1E-07
Y455	1.3E-05	1.1E-05	4.6E-05	3.2E-05	1.5E-06	2.4E-06
F535	.0E+00	.0E+00	3.6E-10	3.7E-11	3.5E-11	1.6E-03
F537	9.4E-07	9.0E-07	2.6E-05	2.2E-05	1.0E-06	1.2E-05
CJ37	1.0E-07	9.1E-10	2.7E-07	2.2E-07	1.0E-07	1.2E-07
CJ55	9.2E-07	7.0E-07	2.3E-05	1.3E-05	9.2E-07	1.1E-06
CJ50	2.0E-08	1.7E-04	5.4E-05	4.5E-05	2.0E-06	2.5E-06
Y157	.0E+00	.0E+00	4.4E-07	2.3E-07	2.0E+00	3.0E+00
Y153	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00	.0E+00
Y155	4.3E-07	3.7E-07	1.9E-05	1.0E-05	4.4E-07	1.1E-06
CJ54	1.7E-07	1.5E-07	5.2E-07	3.7E-07	1.7E-07	2.4E-07
Z455	4.6E-07	4.0E-07	1.2E-05	1.1E-05	4.4E-07	5.6E-07
3E77	.0E+00	.0E+00	3.2E-07	3.4E-11	2.4E-06	3.3E-05
3382	2.2E-08	1.7E-06	6.3E-06	3.3E-05	2.4E-06	2.7E-05
3383+)	9.3E-11	9.4E-11	3.1E-07	1.7E-09	7.5E-09	2.7E-07
3444	1.7E-05	1.2E-04	5.3E-05	3.5E-05	1.6E-06	3.0E-06
3535	7.2E-10	6.3E-10	9.5E-07	1.7E-07	8.0E-08	6.4E-07
3536+)	1.4E-08	1.5E-04	3.4E-05	4.5E-05	2.1E-06	2.4E-06
3537+)	6.5E-13	5.5E-13	5.4E-17	4.5E-07	2.1E-09	4.4E-07
3770+)	.0E+00	.0E+00	1.5E-07	5.4E-10	2.4E-10	1.3E-07
3771+)	4.3E-07	7.1E-07	2.4E-05	1.7E-05	4.9E-07	1.5E-06
3772+)	1.0E-05	4.0E-07	3.1E-05	2.6E-05	1.1E-06	1.3E-05
Y 314+)	4.4E-07	3.4E-07	1.2E-05	1.0E-05	4.6E-07	3.6E-07
Z493+)	.0E+00	.0E+00	.0E+00	.0E+00	1.3E-06	1.6E-05
Z495+)	5.4E-07	5.0E-07	1.4E-05	1.5E-05	6.4E-07	3.4E-07
Z497+)	9.4E-07	3.5E-07	2.4E-05	1.5E-05	6.4E-07	1.4E-06
YJ33	9.3E-10	2.4E-11	2.9E-03	1.2E-07	2.0E+00	3.0E+00
YJ34+)	2.2E-07	1.7E-07	9.1E-07	4.7E-07	2.2E-07	3.4E-07
YJ101	3.0E-09	2.7E-09	1.2E-05	5.3E-07	3.4E-07	7.6E-07
RJ103+)	4.2E-09	3.5E-09	1.1E-05	9.7E-07	4.1E-07	4.7E-07
RJ105+)	5.1E-09	4.5E-09	1.4E-05	1.2E-05	5.4E-07	1.0E-06
RJ106+)	1.4E-07	1.5E-07	1.7E-05	3.9E-07	1.7E-07	1.5E-06
RJ107	.0E+00	.0E+00	.0E+00	.0E+00	5.9E-07	5.9E-06
A3110+)	2.1E-08	1.4E-05	5.3E-05	4.9E-05	2.2E-06	2.4E-06
A3111	2.1E-10	1.5E-10	3.4E-07	4.3E-04	2.2E-06	3.2E-07
CJ1134	2.6E-12	2.3E-12	1.4E-07	3.7E-10	1.2E-05	1.4E-04
34123	6.5E-05	.0E+00	5.0E-07	.0E+00	2.0E+00	3.0E+00
34125+)	5.6E-10	3.7E-10	1.1E-04	1.5E-07	7.3E-06	9.1E-07
34126+)	1.0E-04	9.0E-07	6.0E-04	1.3E-04	1.3E-05	9.6E-04
35124	1.5E-08	1.3E-04	4.5E-05	3.5E-05	1.6E-06	2.2E-06
35125+)	3.5E-07	3.1E-07	9.5E-07	7.5E-07	3.6E-07	4.5E-07
YJ127+)	1.3E-12	1.1E-12	1.8E-07	2.6E-10	1.2E-10	1.6E-07

5. External Dose Factors (GRDFLIB)

FE1214+)	9.0E-10	7.7E-10	7.4E-07	2.1E-07	9.4E-08	5.7E-07
FE1314+)	9.3E-09	5.4E-09	2.7E-09	2.2E-05	1.0E-06	1.3E-06
FE1315+)	2.6E-09	2.2E-09	1.6E-05	7.4E-07	3.4E-07	1.1E-06
FE132+)	2.0E-09	1.7E-09	4.8E-07	4.0E-07	1.4E-07	2.3E-07
FE1334+)	1.7E-09	1.5E-09	5.0E-05	3.9E-05	1.4E-06	2.4E-06
I 130	1.7E-09	1.3E-09	4.8E-05	3.9E-05	1.4E-06	2.3E-06
I 131+)	3.4E-09	2.4E-09	9.3E-07	7.9E-07	3.1E-07	4.9E-07
I 135+)	1.4E-09	1.2E-09	4.0E-05	3.3E-05	1.5E-06	2.0E-06
CS136	1.7E-08	1.3E-09	4.4E-05	4.1E-05	1.9E-06	2.2E-06
CS137+)	4.9E-09	4.2E-09	1.4E-05	1.7E-05	4.7E-07	7.0E-07
CS139+)	7.2E-09	6.3E-09	3.2E-05	1.7E-05	9.0E-07	2.1E-06
SA140+)	2.4E-09	2.1E-09	7.6E-07	4.9E-07	2.2E-07	4.4E-07
CE143+)	2.5E-09	2.2E-09	1.0E-05	3.7E-07	2.6E-07	5.3E-07
CE144+)	3.7E-10	3.2E-10	1.4E-05	5.5E-09	4.0E-08	1.2E-06
PA144+)	5.2E-09	1.3E-09	1.5E-05	3.7E-05	2.0E+00	3.0E+00
PA149	2.3E-11	2.3E-11	3.5E-07	1.3E-03	6.7E-09	3.1E-07
SA153	3.0E-10	2.7E-10	2.5E-07	5.5E-09	3.0E-08	2.0E-07
EJ152	5.5E-09	7.4E-09	2.1E-09	1.3E-05	1.3E-05	2.5E-04
EJ154	9.0E-09	7.3E-09	2.7E-09	2.1E-05	4.6E-05	5.4E-04
EJ155	4.3E-10	3.4E-10	1.1E-07	9.0E-03	5.0E-06	5.6E-05
EJ156	5.7E-09	7.6E-09	2.4E-05	2.1E-05	9.4E-07	1.5E-06
T3150	1.0E-08	8.5E-09	2.4E-05	2.4E-05	2.0E+00	3.0E+00
HA1564	1.0E-08	8.5E-09	2.4E-05	2.4E-05	2.0E+00	3.0E+00
A 151	2.4E-12	2.1E-12	6.8E-10	5.3E-10	2.5E-10	4.2E-10
A 155	.0E+00	.0E+00	7.9E-03	3.2E-10	1.4E-10	7.2E-09
PA210+)	1.7E-11	1.3E-11	3.6E-07	3.0E-09	2.7E-09	3.4E-07
BI210+)	.0E+00	.0E+00	3.5E-07	2.7E-09	1.3E-09	3.3E-07
QA222+)	1.5E-08	1.3E-09	5.0E-05	3.2E-05	1.5E-06	2.9E-06
QA223+)	1.4E-09	1.3E-09	1.3E-05	4.0E-07	2.0E+00	3.0E+00
QA224+)	1.0E-09	3.4E-09	5.5E-05	2.3E-05	2.0E+00	3.0E+00
QA225+)	1.2E-10	5.4E-11	6.3E-05	1.7E-09	2.0E+00	3.0E+00
QA226+)	1.3E-05	1.3E-09	5.0E-05	3.3E-05	1.5E-06	2.9E-06
QA229+)	1.4E-08	1.2E-03	4.8E-05	3.7E-05	2.0E+00	3.0E+00
AC227+)	2.4E-09	2.0E-09	6.3E-07	4.4E-07	2.0E+00	3.0E+00
T4227+)	6.3E-10	5.1E-10	1.5E-07	1.3E-07	2.0E+00	3.0E+00
T4229+)	1.0E-08	5.9E-09	5.5E-05	2.3E-05	2.0E+00	3.0E+00
T4230+)	1.0E-10	7.5E-12	4.4E-03	1.2E-09	3.5E-10	1.9E+09
T4232+)	4.0E-09	3.0E-09	4.4E-05	3.4E-05	2.0E+00	3.0E+00
PA231+)	2.7E-09	2.2E-09	7.0E-07	5.0E-07	2.0E+00	3.0E+00
J 232+)	2.7E-11	2.6E-12	1.1E-09	4.5E-10	2.0E-10	4.9E-10
J 233+)	7.5E-11	5.7E-12	2.4E-09	1.0E-09	4.7E-10	1.3E-09
J 234	5.1E-10	7.3E-12	1.2E-03	1.2E-09	5.2E-10	3.3E-09
J 235+)	2.1E-09	1.3E-09	3.9E-07	3.0E-07	1.4E-07	1.9E-07
J 236	1.3E-10	2.1E-13	3.1E-09	3.0E-12	1.2E-12	1.3E-09
J 239+)	5.3E-10	5.5E-10	9.3E-07	7.1E-05	3.4E-08	3.1E-07
NP237+)	1.5E-09	1.4E-09	4.3E-07	3.5E-07	1.4E-07	2.1E-07
QJ241+)	5.4E-12	4.6E-12	9.5E-11	5.1E-11	2.8E-11	3.2E-11
C4245	1.5E-11	1.0E-12	3.3E-09	1.1E-10	3.6E-05	4.0E-02
C4247+)	2.6E-09	2.2E-09	7.3E-07	4.7E-07	2.0E+00	3.0E+00
C4249	3.2E-09	5.4E-09	4.7E-07	3.1E-07	2.0E+00	3.0E+00
CF252	7.2E-05	5.6E-04	1.7E-05	1.4E-05	.0E+00	.0E+00
Z4544	3.4E-09	2.9E-09	1.2E-05	7.3E-07	3.4E-07	5.8E-07
Z457	.0E+00	.0E+00	2.4E-07	1.3E-09	7.1E-10	2.3E-07
KR554	4.2E-10	1.3E-11	9.4E-09	2.4E-11	.0E+00	7.6E-10
KR55	.0E+00	.0E+00	1.1E-05	1.4E-09	6.7E-09	4.7E-07
KR554	.0E+00	.0E+00	5.1E-07	2.3E-07	1.3E-07	5.2E-07
KR55	.0E+00	.0E+00	1.4E-07	4.7E-09	2.2E-09	1.6E-07

5. External Dose Factors (GRDFLIB)

K397	.0E+00	.0E+00	4.6E-05	2.7E-05	1.3E-06	2.7E-06
Q397	.0E+00	.0E+00	2.5E-05	1.2E-10	2.0E+00	3.0E+00
K399	.0E+00	.0E+00	7.7E-05	4.5E-05	2.1E-06	4.7E-06
Q399	4.0E-09	3.5E-09	3.6E-05	1.2E-05	5.6E-07	2.7E-05
K399	.0E+00	.0E+00	6.8E-05	4.9E-05	3.8E-06	2.2E-05
Q399	.0E+00	.0E+00	1.5E-07	5.2E-10	2.4E-10	1.5E-07
Y 70	2.5E-12	2.2E-12	9.6E-07	1.5E-09	6.1E-09	3.5E-07
Y 71	2.7E-11	2.4E-11	5.7E-07	5.7E-09	3.1E-09	3.2E-07
Y 72	1.9E-09	1.5E-09	2.0E-05	4.5E-07	2.1E-07	1.5E-05
Y 73	7.4E-10	5.7E-10	1.4E-05	1.7E-07	8.7E-08	1.2E-06
V3734	1.0E-10	3.2E-13	3.0E-09	2.2E-11	2.2E-12	1.2E-09
V375	5.0E-09	5.1E-09	1.8E-05	1.2E-05	5.4E-07	7.5E-07
V377	5.4E-09	4.5E-09	1.9E-05	1.2E-05	5.6E-07	1.1E-05
TC774	1.1E-09	9.5E-10	2.7E-07	2.4E-07	1.1E-07	1.3E-07
TC77	.0E+00	.0E+00	2.6E-10	1.3E-10	5.4E-11	2.4E-09
R4105	7.7E-10	6.5E-10	3.0E-07	1.7E-07	7.4E-08	1.5E-07
QJ106	1.9E-09	1.5E-09	1.9E-05	3.3E-07	1.7E-07	1.5E-05
QJ109	4.0E-11	3.5E-11	3.4E-07	2.3E-09	4.3E-09	3.0E-07
CJ113	.0E+00	.0E+00	.0E+00	.0E+00	2.0E+00	3.0E+00
TE125	4.4E-11	3.5E-11	1.5E-05	3.7E-09	1.7E-09	1.1E-09
S4126	1.0E-04	9.0E-09	6.0E-03	1.3E-03	1.3E-05	3.5E-04
S4126	1.0E-05	4.7E-09	3.5E-05	2.4E-05	3.0E-05	9.0E-05
S4127	5.6E-09	5.7E-09	1.8E-05	1.5E-05	6.7E-07	2.0E-07
TE127	1.1E-11	1.0E-11	1.7E-07	2.4E-09	1.2E-09	1.6E-07
TE129	9.4E-10	7.1E-10	7.0E-07	1.9E-07	9.7E-08	3.3E-07
I 129	7.5E-10	4.9E-10	3.5E-05	1.7E-05	1.8E-08	3.2E-08
XE131	.0E+00	.0E+00	5.6E-05	5.2E-09	2.4E-09	4.8E-09
I 132	2.0E-05	1.7E-05	5.5E-05	4.4E-05	2.0E-06	2.7E-05
I 133	4.5E-09	3.7E-09	1.5E-05	2.5E-07	4.4E-07	9.8E-07
XE133	.0E+00	.0E+00	1.0E-07	5.9E-09	2.7E-09	3.0E-08
XE133	.0E+00	.0E+00	1.1E-07	5.7E-09	2.5E-08	5.9E-09
TE134	1.2E-09	1.0E-09	3.5E-07	2.3E-07	1.2E-07	1.2E-07
I 134	1.9E-06	1.5E-05	5.5E-05	4.2E-05	2.0E-06	2.9E-06
C3134	7.3E-10	6.2E-10	1.9E-07	1.5E-07	7.3E-08	2.1E-09
C3134	1.4E-04	1.2E-05	3.5E-05	2.2E-05	1.3E-06	1.7E-05
XE135	.0E+00	.0E+00	1.0E-05	7.5E-07	3.5E-07	3.0E-07
XE135	.0E+00	.0E+00	7.9E-07	4.5E-07	2.1E-07	4.2E-07
C3135	.0E+00	.0E+00	1.1E-03	5.5E-11	2.4E-11	3.4E-09
XE137	.0E+00	.0E+00	2.1E-05	2.7E-07	1.2E-07	1.4E-05
C3137	4.9E-09	4.2E-09	1.4E-05	1.9E-05	4.7E-07	7.9E-07
XE134	.0E+00	.0E+00	3.4E-05	2.5E-05	3.0E-06	4.4E-06
C3138	2.4E-05	2.1E-04	5.7E-05	4.1E-05	1.8E-06	3.1E-05
S4139	2.7E-09	2.4E-09	1.0E-05	7.7E-05	3.7E-08	3.2E-07
LA140	1.7E-05	1.5E-05	5.3E-05	4.1E-05	1.9E-06	2.7E-05
S4141	4.7E-09	4.3E-09	2.4E-05	1.1E-05	5.2E-07	1.6E-05
LA141	2.4E-10	2.3E-10	1.0E-05	5.1E-05	2.3E-09	2.2E-07
CE141	5.2E-10	5.5E-10	2.4E-07	1.3E-07	5.9E-08	1.5E-07
SA142	9.0E-09	7.7E-09	3.0E-05	2.2E-05	1.0E-06	1.6E-05
LA142	1.4E-05	1.5E-05	5.7E-05	4.3E-05	2.0E-06	3.1E-05
R4143	.0E+00	.0E+00	2.8E-07	1.5E-09	7.4E-10	2.5E-07
CE144	5.7E-10	5.2E-10	1.4E-05	5.5E-05	4.0E-08	1.2E-05
P4144	2.3E-10	2.0E-10	1.3E-05	5.5E-05	2.6E-08	1.2E-05
YJ147	1.2E-09	1.0E-09	5.0E-07	2.9E-07	1.3E-07	3.1E-07
P4147	.0E+00	.0E+00	1.3E-03	7.3E-11	4.3E-11	1.2E-08
P4148	5.4E-09	4.5E-09	2.4E-05	1.1E-05	5.2E-07	1.2E-05
P4151	2.3E-09	2.2E-09	8.4E-07	5.0E-07	2.3E-07	5.0E-07
S4151	2.1E-10	4.9E-11	1.9E-09	2.5E-10	2.7E-06	5.3E-05

5. External Dose Factors (GRDFLIB)

4 137	3.6E-09	3.1E-09	1.2E-05	9.3E-07	3.8E-07	9.3E-07
T4230	1.0E-10	7.8E-12	4.4E-07	1.2E-09	5.5E-10	1.9E-09
Q4226	1.5E-08	1.3E-09	5.0E-05	3.3E-05	1.5E-06	2.9E-05
R4222	1.5E-08	1.3E-09	5.0E-05	3.2E-05	1.5E-06	2.9E-05
P4210	1.7E-11	1.3E-11	3.6E-07	3.0E-07	2.7E-09	3.4E-07
31210	.0E+00	.0E+00	3.5E-07	2.7E-07	1.3E-09	3.3E-07
PJ210	5.2E-14	3.4E-14	1.7E-11	1.5E-11	9.0E-12	7.5E-12
J 232	2.7E-11	2.5E-12	1.1E-07	4.5E-10	2.0E-10	4.8E-10
T4232	4.0E-09	3.0E-09	4.8E-05	3.4E-05	2.0E+00	3.0E+00
Q4224	1.4E-08	1.2E-08	4.8E-05	3.4E-05	2.0E+00	3.0E+00
T4228	1.0E-08	9.4E-09	3.5E-05	2.5E-05	2.0E+00	3.0E+00
J 235	2.1E-09	1.3E-09	3.8E-07	3.0E-07	1.4E-07	1.9E-07
Q4231	2.7E-09	2.2E-09	7.0E-07	5.1E-07	2.0E+00	3.0E+00
AC227	2.0E-09	2.0E-09	6.3E-07	4.2E-07	2.0E+00	3.0E+00
J 237	2.3E-09	1.3E-09	3.4E-07	2.5E-07	1.2E-07	1.5E-07
VP237	1.5E-09	1.4E-09	4.5E-07	3.5E-07	1.4E-07	2.1E-07
Q4233	1.5E-09	1.3E-09	4.0E-07	3.3E-07	9.5E-06	3.0E-05
J 233	7.5E-11	5.7E-12	2.9E-07	1.7E-07	4.7E-10	1.3E-09
T4227	2.7E-09	2.2E-09	1.3E-05	5.3E-07	2.0E+00	3.0E+00
AC225	1.8E-09	1.5E-09	1.1E-05	4.0E-07	2.0E+00	3.0E+00
J 238	6.3E-10	3.5E-10	9.4E-07	7.4E-09	3.4E-09	9.1E-07
T4234	1.3E-10	1.1E-10	8.7E-07	2.9E-08	3.8E-05	1.6E-04
Q4242	1.8E-10	2.5E-11	1.5E-07	5.1E-09	4.8E-05	1.8E-02
C4242	2.4E-11	5.5E-12	4.7E-09	3.4E-10	1.6E-10	2.1E-09
PJ242	1.5E-11	1.1E-12	3.6E-09	1.1E-10	3.1E-11	1.6E-09
VP238	3.2E-09	2.3E-09	1.1E-05	7.7E-07	3.5E-07	3.7E-07
PJ238	1.8E-11	1.3E-12	4.0E-09	1.3E-10	6.8E-11	1.7E-09
C4240	1.8E-11	2.9E-12	3.4E-07	2.5E-10	1.2E-10	1.7E-09
PJ240	9.6E-10	8.4E-10	1.5E-07	1.3E-07	2.0E+00	3.0E+00
PJ240	1.8E-11	1.3E-12	4.0E-09	1.4E-10	6.5E-11	1.7E-09
C4243	1.4E-09	1.2E-09	2.9E-07	2.5E-07	1.2E-07	1.3E-07
Q4243	1.5E-09	1.3E-09	4.6E-07	3.1E-07	1.4E-07	2.5E-07
VP239	1.1E-09	9.5E-10	3.7E-07	2.4E-07	1.1E-07	2.1E-07
PJ239	7.7E-12	7.4E-13	1.7E-09	1.2E-10	5.6E-11	7.6E-10
C4245	1.2E-09	2.5E-10	1.3E-07	7.5E-08	3.6E-05	4.3E-02
A4241	2.6E-10	1.8E-10	6.1E-08	3.9E-08	1.8E-08	2.7E-08

6. PABLM

@FIN,SO AA,MAIN

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MS NOW IS      C TRKS LIMIT 10000 MEM MAX IS      2000 WORDS LIMIT      95000
FIN 8R1 *10/05/79-10:00:00,1

10.  C
20.  C THIS CODE CALCULATES RADIATION DOSES FROM AIRBORNE RELEASES
30.  C AND LIQUID EFFLUENTS FOR
40.  C INGESTION OF CONTAMINATED FOODSTUFFS AND FOR EXPOSURE TO
50.  C CONTAMINATED GROUND
60.  C
70.  C
80.  C
90.  C DIMENSION TITLR(20),TITLF(60),TITLO(20),TITLS(20),TITLB(40)
100.  C REAL*4 LFCON(15,100)
110.  C DIMENSION AIRCON(15,100),PLTCON(15,100),WATCON(15,100)
120.  C DIMENSION KFDTP(15),XQ(15),GRWP(15),YELDI(15),RIRR(15)
130.  C DIMENSION CON(15),KORG(15)
140.  C DIMENSION TRAD(100),DPVL(100),FDT(15,100),TBID(100,5)
150.  C DIMENSION FW(100,5),EN(100,5)
160.  C DIMENSION EL(100),AW(300),TR(300),DVEL(70),FTRC(6,70),FELT(70)
170.  C DIMENSION IO(200),IBEG(300),IEND(300)
180.  C DIMENSION TP(2000),E(2000),FWL(2000),AWO(100),ELTO(100)
190.  C DIMENSION TITL(20),ELT(100),AW(100),Q(100)
200.  C DIMENSION IOFNUC(100),ALI(100),AM(100),WAT(100,9)
210.  C DIMENSION DKF(2,300),IHEM(300),DK(2,100),IFRM(2,100)
220.  C DIMENSION KPTHWY(8),USAGE(8),REL(100),RHZ(8)
230.  C DIMENSION SHORDF(300,2),SWIMDF(300,2),SLDFAC(100,2),SWDFAC(100,2)
240.  C DIMENSION BJCAC(9,100),BIOACF(5,100),FDCON(8,100),EXTCON(8,100)
250.  C DIMENSION HLDUP1(15),HLDUP2(8)
260.  C DIMENSION NCHN(300),NOFNUC(200),NCHST(200),IFR(2,300)
270.  C DIMENSION TOFO(15,5)
280.  C DIMENSION DCFAC(100,5),SLCON(10,100)
290.  C .EPBCON(15,100),DOS6PD(100,5),DCINT(15,100,5)
300.  C .TOTOC(100,5),TDDOSE(5),DOSCON(9,5)
310.  C DIMENSION TRNS(15),PECON(100),TOTOC(100,5),DCINT(8,100,5)
320.  C DIMENSION DCINTN(8,5),DEXTN(8,5),DOSCH(5)
330.  C .UPBODY(8),OPSKIN(8),ETDOOS(100,5),DEXT(8,100,5)
340.  C DIMENSION NFLAG(300),NFLAGC(200)
350.  C CHARACTER AM*6,AW*6,TT*8,DD*8
360.  C CHARACTER AVI*6
370.  C INTEGER T2,DKSORS
380.  C
390.  C NAMELIST INPUT LIST
400.  C
410.  C NAMELIST/INPUT/NEXT,KFDTP,XQ,GRWP,YELO,RIRR,CON,IDEF,CFLO,
420.  C .RM,FLO,VOL,TOR,CTIM,PLIFE,EXTIM,KORG,T2,IAC,IREC,POP,IPOP,
430.  C .IOUT,TRNS,HLDUP1,HLDUP2,IPCNT,SW,ISALT,KPTHWY,USAGE,RMZ,DKSORS
440.  C NMAX=100
450.  C POP=1.0
460.  C
470.  C READ DATA LIBRARY FOR MASTER NUCLEIDE INDEX AND RADIOLOGICAL HALF LIFE
480.  C
490.  C 3 CONTINUE
500.  C CALL RLIBIN(TITLR,ELT,AW,TR,NUC,NCH,NCHN,NOFNUC,NCHST,IFR,
510.  C .DKF,IHEM)
520.  C
530.  C READ FOOD TRANSFER COEFFICIENT DATA LIBRARY
540.  C
550.  C

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6. PABLM

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520.      CALL FLIB,NINFELT,FELT,OVEL,FTRC,TITLE1
525.      C
530.      C READ ORGAN DATA LIBRARY
535.      C
540.      CALL OLIBSINUC,ELT,AW,IO,TB,FVL,E,IBEG,IEND,TITLE1
545.      C
550.      C READ EXTERNAL DOSE FACTOR LIBRARY
555.      C
560.      CALL SLIBININUC,ELT,AW,SHORDF,SWIMDF,TITLE1
565.      C
570.      C READ BIOACCUMULATION FACTOR LIBRARY
575.      C
580.      CALL RLTBINIBELT,NBELT,BIOAC1,TITLE1
585.      C
590.      C START OF CALCULATION FOR NEXT CASE
595.      C
600.      C READ INPUT CARD DATA
605.      C
610.      1 READ15,100,END=991 TITLE1
615.      READ15,INPUT,ERR=971
620.      IF(NEXT.GE.4.) GO TO 95
625.      IF(NEXT.EQ.3) GO TO 2
630.      C
635.      C READ NEW RELEASE INVENTORY
640.      C
645.      CALL ZEROR1EO,01
650.      READ15,200,END=991 NIN,FINV
655.      C
660.      C IF NUMBER OF NUCLIDES IS OUT OF RANGE PRINT ERROR MESSAGE AND STOP
665.      C
670.      IF(NIN.GT.NMAX.OR.NIN.LT.1) GO TO 98
675.      READ15,300,END=991 (ELT111,AW111,Q111,I=1,NIN)
680.      C
685.      C IDENTIFY INPUT RADIONUCLIDES
690.      C
695.      CALL IDNUCINUC,ELT,AW,ELT1,AW1,NIN,NCHN,NFLAG,NFLAGC1
700.      C
705.      C COUNT ORGANS, FOOD TYPES AND PATHWAYS
710.      C
715.      2 CALL OFPCHKINORG,NORG,KFDTYP,KPTHWY,NFT,NPT1
720.      C
725.      C SET DATA ARRAYS FOR DOSE CALCULATION ACCORDING TO NUCLIDES, ORGANS
730.      C AND FOOD PATHS SPECIFIED ON INPUT.
735.      C
740.      CALL SETDATINUC,AW,ELT,TR,TB,C,FVL,Q,FINV,KORG,KFDTYP,
745.      .NORG,NFT,NFELT,FELT,OVEL,FTRC,OPVL,FOTC,NONUC,AWO,ELTO,TRAD,IBIO,
750.      .IO,EN,IBEG,IEND,FV,KPTHWY,NPT,RELT,NBELT,SHORDF,SWIMDF,SLOFAC,
755.      .SMUTAC,BIOAC1,BIOACF,IOFNUC,NOFNUC,NCHST,IFR,IFRH,NCHN,
760.      .DK,DKF,IMEM,AL,AM,NCH,NFLAG,NFLAGC,ICHN,ISALT1
765.      C
770.      C WRITE QUALITY ASSURANCE PAGE
775.      C
780.      C
785.      CALL QAPAGE111TLE1,TITL1,TITL2,TITL3,KFDTYP,XO,GRNP,
790.      .PIRR,CON,IDEF,IAC,PLIFE,EXTIM,KORG,T2,IREC,POP,TRNS,NFT,
795.      .YELD,NORG,NONUC,ELTO,AWO,FINV,PD,TPOP,TITL5,TITL6,
800.      .KPTHWY,USAGE,HLDUP1,HLDUP2,NPT,RM2,AM,DKSORS,CFLO1
805.      C

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6. PABLM

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1090. C CALCULATE DOSE FACTOR FOR CURRENT INVENTORY AND ORGANS.
1100. C
1110. CALL DFCALC (TRAD,TBIO,FW,EN,NUC,NORG,DCFAC,KORG,
1120. .ELTO)
1130. CALL ZEROR (7500,DCINT)
1131. CALL ZEROR (50,DOSEGRD)
1132. CALL ZEROR (50,TOTDC)
1133. CALL ZEROR (20,DOSCOM)
1134. CALL ZEROR (5,TDDOSE)
1135. CALL ZEROR (75,TDFD)
1136. CALL ZEROR (400,DCINTA)
1137. CALL ZEROR (50,ETDOS)
1138. CALL ZEROR (80,EXTCON)
1139. CALL ZEROR (50,TOTDCA)
1140. CALL ZEROR (4,DCINTN)
1141. CALL ZEROR (4,DEXTN)
1142. CALL ZEROR (5,DOSCM)
1143. CALL ZEROR (150,SLCON)
1144. CALL ZEROR (400,DEXT)
1150. C TIME LOOP FOR PABLM
1160. C
1170. DO 50 ITT=1,12
1180. C
1190. C
1200. C CALCULATE FOOD CONCENTRATION FACTORS
1210. C
1220. CALL DOSE (IDEP,NFT,NUC,IREF,CFLQ,FLO,VOL,TOR,CTIN,PLIFE,RM,
1230. .SLCON,EDBCON,KFDTYP,ELTO,XQ,TRAD,YELD,GPWP,DPVL,TRNS,
1240. .RTRP,FDTC,HLCPUP1,PLTCON,WATCON,AIRCON,LFCON,ITT,NPT,KPTHWY,
1250. .FYTCN,FDCON,RM2,AM,WAT,BIOACF,HLCPUP2,SW,
1260. .RECON,ICHN,IOfNUC,AL,DK,IFRM,DMSOPS,IAC)
1270. C
1280. C
1290. C CALCULATE DOSE FROM FOOD CONCENTRATION AND DOSE FACTORS
1300. C
1310. IF (NFT.GT.0)
1320. .CALL DOSC1 (NUC,NORG,KORG,NFT,CGN,POP,EXTIM,SLCON,EDBCON,
1330. .DOSEGRD,TOTDC,DCFAC,SLDFAC,KFDTYP,DOSCOM,TDDOSE,ELTO,
1340. .TRAD,TBIO,DCINT,ITT,PLIFE,TDFD,T2)
1350. IF (NPT.GT.0)
1360. .CALL DOSC2 (KPTHWY,FDCON,USAGE,POP,DCINTA,DCFAC,
1370. .DEXT,EXTCON,SLDFAC,SWDFAC,ETDOS,
1380. .NORG,NUC,TOTDCA,KORG,NPT,DCINTN,DEXTN,
1390. .DOSCM,DPSKIN,TTSKIN,DPBODY,TTBODY,T2,ITT,
1400. .TP10,TRAD,ELTO)
1410. C
1420. C WRITE OUTPUT REPORTS
1430. C
1440. LIFE=PLIFE
1450. IF (ITT.EQ.1) GO TO 55
1460. IF (ITT.EQ.LIFE) GO TO 55
1470. IF (ITT.EQ.T2) GO TO 55
1480. GO TO 50
1490. 55 CALL DOSOUT (TITLE1,DD,ELTO,AWO,NORG,KORG,TRAD,AM,IDEP,ITT,IPOP,
1500. .PLIFE,NUC,IOUT,IFCNT,NFT,CON,XQ,RTRR,HLCPUP1,TRNS,TOTDC,
1510. .DOSEGRD,WATCON,AIRCON,PLTCON,KFDTYP,LFCON,DOSCOM,TDDOSE,
1520. .TDFD,T2,DCINT,NPT,KPTHWY,DCINTA,DEXT,WAT,CFLQ,SW,DCINTN,

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6. PABLM

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1 1510.      .DEXTN,HLDP2,USAGE,RM2,FDCON,BIOACF,ETTDOS,EXTCON,DOSCH,
1 1520.      .DPSKIN,TTSKIN,RECON,ISALT,DPBODY,TTBODY,TOTDCA)
1 1530.      C
1 1540.      C
1 1550.      50 CONTINUE
1 1560.      C
1 1570.      IF INEXT.GE.2160 TO 1
1 1580.      C
1 1590.      C NORMAL EXIT 95
1 1600.      C
1 1610.      95 PRINT 400
1 1620.      STOP
1 1630.      C
1 1640.      C INVENTORY INPUT ERROR IN SPECIFICATION OF NUMBER OF NUCLIDES.
1 1650.      C
1 1660.      98 PRINT 500, MIN,NMAX
1 1670.      STOP
1 1680.      C
1 1690.      C END OF INPUT CARD FILE
1 1700.      C
1 1710.      99 PRINT 600
1 1720.      STOP
1 1730.      C
1 1740.      97 PRINT 1009
1 1750.      1009 FORMAT(' ERROR ON NAMELIST INPUT')
1 1760.      STOP
1 1770.      C
1 1780.      C FORMAT STATEMENTS
1 1790.      C
1 1800.      100 FORMAT(20A4)
1 1810.      200 FORMAT(1I3,E10.2)
1 1820.      300 FORMAT(42,A6,4X,E8.2)
1 1830.      400 FORMAT(1H1,'END OF INPUT FOR THIS RUN')
1 1840.      500 FORMAT(1H1,'ERROR IN NUMBER OF NUCLIDES INPUT, NONUC =',I5,' MAXI
1 1850.      .MUM ALLOWED IS',I4)
1 1860.      600 FORMAT(1H1,'END OF FILE ON INPUT, STOP')
1 1870.      700 FORMAT(1H1,'DEBUG SUBCHK
1 1880.      AT '
1 1890.      END

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END FTN 189 IRANK 1550 DBANK

6. PABLM

@FTN,50 AA,RLIBIN

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MS NOW IS      45 TRKS LIMIT  10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN 1R1  *10/05/79-10:CA(2,1)
      10.      SUBROUTINE RLIBIN(ITL,ELT,AM,TR,NUC,NCH,NCHN,NOFNUC,NCHST,
      20.      .IFR,DKF,IMEM)
      30.      C
      40.      C THIS SUBROUTINE READS A MASTER NUCLEIDE DATA LIBRARY WITH CHAIN
      50.      C DECAY DATA.
      60.      C
      70.      DIMENSION ELT(200),AM(300),TR(200),NCHN(300),NOFNUC(200)
      80.      .,NCHST(200),IFR(2,300),DKF(2,300),IMEM(300)
      90.      DIMENSION ITL(2),IT(2),FR(2)
     100.      C
     110.      CHARACTER AM*6,A*6
     120.      C
     130.      C INITIALIZE INDICES
     140.      C
     150.      IM=0
     160.      NCH=0
     170.      NUC=1
     180.      C
     190.      C READ TITLE CARD
     200.      C
     210.      READ(10,200,END=99) ITL
     220.      C
     230.      C READ AND COUNT NUCLEIDE ID AND DECAY DATA.
     240.      C
     250.      1 READ(10,100,END=99) E,A,T,IM,ITI1,FR11,IT12,FR12
     260.      C
     270.      C TEST FOR END OF LIBRARY
     280.      C
     290.      IF(TH.GT.0) GO TO 2
     300.      NUC=NUC+1
     310.      IF(NUC.GT.300) GO TO 98
     320.      IF(NUC.LT.1) GO TO 98
     330.      RETURN
     340.      C
     350.      C TEST FOR NEW CHAIN, IM = 1
     360.      C
     370.      2 IF(TH.GT.1) GO TO 3
     380.      C
     390.      C FIRST MEMBER, NEW CHAIN
     400.      C
     410.      NCH=NCH+1
     420.      NOFNUC(NCH)=1
     430.      IM=1
     440.      NCHST(NCH)=NUC
     450.      GO TO 4
     460.      C
     470.      C DAUGHTER NUCLEIDES
     480.      C TEST ORDER
     490.      C
     500.      3 IF(TH-IM-NE.1) GO TO 97
     510.      IM=IM
     520.      NOFNUC(NCH)=NOFNUC(NCH)+1
     530.      IFR11,NUC=ITI11

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6. PABLM

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540.      IFR(2,NUC)=IT(2)
550.      DKF(1,NUC)=FR(1)
560.      DKF(2,NUC)=FR(2)
570.      C
580.      C SET DATA FOR CURRENT NUCLIDE.
590.      C
600.      4 ELT(NUC)=E
610.      AM(NUC)=A
620.      TR(NUC)=T
630.      IMEM(NUC)=IM
640.      NCHN(NUC)=NCH
650.      NUC=NUC+1
660.      GO TO 1
670.      C
680.      C PRINT ERROR MESSAGES AND STOP
690.      C
700.      97 PRINT 500, NCH,IM
710.      500 FORMAT(1H1,' DIAGNOSTIC 1: DECAY CHAIN',I4,' HAS IMPROPER ORDER. C
720.      .URRENT MEMBER INDEX IS',I4)
730.      STOP
740.      98 PRINT 300, NUC
750.      300 FORMAT(1H1,' DIAGNOSTIC 2: IMPROPER NUMBER OF NUCLIDES IN MASTER L
760.      .IBRARY, NUC=',I4)
770.      STOP
780.      99 PRINT 400
790.      400 FORMAT(1H1,' DIAGNOSTIC 3: END OF FILE ON MASTER LIBRARY UNIT 10')
800.      STOP
810.      C
820.      C INPUT DATA FORMATS
830.      C
840.      100 FORMAT(A2,A6,E10.2,I2,2(I2,F7.4))
850.      200 FORMAT(20A4)
860.      DEBUG SUBCHK
870.      AT 1
880.      END

```

END FTH 34 IRANK 228 DRANK

6. PABLM

DEFIN,SO AA.FLIBIN

```

MS NOW IS      85 TRMS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FIN BR1 *10/05/79-10:00(2,1)
1.      SUBROUTINE FLIBIN(INFELT,FELT,DVEL,FTRC,TITLE)
2.      C
3.      C THIS MODULE READS A FOOD TRANSFER FACTOR LIBRARY
4.      C
5.      DIMENSION FELT(70),DVEL(70),FTRC(6,70),TITLE(60)
6.      C
7.      C SET ELEMENT COUNT INDEX NE
8.      C
9.      NE=1
10.     C
11.     C READ TITLE INFORMATION
12.     C
13.     READ(12,100,END=99) TITLE
14.     100 FORMAT(20A9)
15.     C
16.     C READ NEXT DATA CARD
17.     C
18.     1 READ(12,300,END=2) FELT(NE),DVEL(NE),FTRC(1,NE),I=1,61
19.     NE=NE+1
20.     GO TO 1
21.     C
22.     C ON END OF FILE ON DATA CARD READ, RETURN
23.     C
24.     2 NEFELT=NE-1
25.     RETURN
26.     C
27.     C ON END OF FILE ON TITLE CARD READ PRINT ERROR MESSAGE AND STOP
28.     C
29.     99 PRINT 400
30.     400 FORMAT(1H1,'END OF FILE AT TITLE CARD ON FOOD DATA LIBRARY')
31.     300 FORMAT(A2,7E9.2)
32.     STOP
33.     END

```

END FIN 65 IBANK 97 DRANK

6. PABLM

@FTN,SO AA,OLIBS

```

MS NOW TS      PC TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN OR1 *10/05/79-10:0912,1
10.      SUBROUTINE OLIBSINUC,ELT,AW,IO,TB,FWL,E,IBEG,IEND,TITLO
11.      C
12.      C THIS MODULE READS DATA FROM THE ORGAN DATA LIBRARY
13.      C
14.      DIMENSION ELT(1000),AW(300),FWL(2000),IBEG(300),IEND(300)
15.      DIMENSION TB(200),E(2000),IO(2000)
16.      DIMENSION TITLO(20),EI(3)
17.      CHARACTER AW*6,A*6
18.      AL2=ALOG(2.)
19.      C
20.      C SET DATA ARRAYS TO ZERO
21.      C
22.      CALL ZEROI(200,IO)
23.      CALL ZEROI(NUC,IEND)
24.      CALL ZEROI(NUC,IBEG)
25.      CALL ZEPOR(2000,FWL)
26.      CALL ZEPOR(200,TP)
27.      CALL ZEPOR(200,EI)
28.      C
29.      C INITIALIZE CONTROL INTEGERS
30.      C
31.      NC=1
32.      IP=0
33.      NO=0
34.      C
35.      C READ ORGAN LIBRARY TITLE CARD
36.      C
37.      READ(11,100,END=99) TITLO
38.      100 FORMAT(20A1)
39.      C
40.      C READ FIRST DATA CARD
41.      C
42.      READ(11,200,END=99) EL,A,IOR,TBI,FWI,F2PI,(EI(I),I=1,3)
43.      200 FORMAT(A2,A6,I2,6E8.2)
44.      1 IF(EL.NE.ELT(INC).OR.A.NE.AW(INC)) GO TO 6
45.      IF(IOR.EQ.1) GO TO 2
46.      IF(NUC.NE.NC) GO TO 7
47.      GO TO 3
48.      2 IF(NUC.GT.1) IEND(NUC)=IP
49.      NOLD=NC
50.      IREG(INC)=IP+1
51.      3 IP=IP+1
52.      C
53.      C SET DATA FOR CURRENT NUCLIDE AND ORGAN
54.      C
55.      FWL(IP)=FWI
56.      TB(IP)=TBI
57.      IO(IP)=IOR
58.      EI(IP)=EI(1)
59.      IF(EI(3).GT.0.) EI(IP)=EI(3)
60.      C
61.      C READ NEXT DATA CARD
62.      C

```

6. PABLM

```

540.      READ(11,200,END=99) EL,A,IOR,TBI,FBI,F2P1,(E1(I),I=1,3)
550.      GO TO 1
560.      C
570.      C INCREMENT NUCLIDE INDEX NC
580.      C
590.      6 NC=NC+1
600.      IF(NC.GT.NUC) GO TO 98
610.      GO TO 1
620.      C
630.      C ERROR IN ORGAN LIBRARY DATA ORDER
640.      C
650.      7 PRINT 300,NC,NOLD,EL,A,ELT(NOLD),AW(NOLD)
660.      300 FORMAT(1H1,'ERROR IN ORGAN DATA LIBRARY INPUT, NC, NOLD =',2I5/
670.      .,1 NUCLIDE INPUT IS ',A2,A6/' NUCLIDE NOLD IS ',A2,A6)
680.      STOP
690.      C
700.      C UNIDENTIFIED NUCLIDE OR OTHER PROBLEM
710.      C
720.      98 WRITE(6,401)EL,A,NC
730.      401 FORMAT(1H1,'UNABLE TO IDENTIFY NUCLIDE ',A2,A6,' NUCLIDES CHECKED
740.      1 =',15,' --STOP')
750.      STOP
760.      C
770.      C END OF FILE ON ORGAN DATA LIBRARY
780.      C
790.      99 IF(NOLD.GT.0) IEND(NOLD)=IP
800.      IF(NC.GT.1) RETURN
810.      PRINT 400,NUC,AC,NOLD,IP
820.      400 FORMAT(1H1,'END OF FILE ON ORGAN DATA LIBRARY'/
830.      .,1 NUCLIDES IN MASTER LIBRARY =',14/' CURRENT NUCLIDE INDEX =',14/
840.      .,1 PREVIOUS NUCLIDE INDEX =',14/' DATA ARRAY INDEX =',15)
850.      STOP
860.      END

```

END FIN 212 IRANK 268 DRANK

6. PABLM

BF 14,50 AA,ELIRIN

```

MS NOW IS      85 TRKS LIMIT 10000 MEM MAX IS      71000 WORDS LIMIT      95000
FTN API  +10/5,70-10:05(2,1)
1.      SUBROUTINE SLIBININUC,ELT,AW,SHORDF,SWIMDF,TITLS)
2.      C
3.      C THIS SUBROUTINE READS DATA FROM THE EXTERNAL DOSE FACTOR LIBRARY
4.      C
5.      C DIMENSION ELT(300),AW(300),SHORDF(300,2),SWIMDF(300,2),TITLS(20)
6.      C CHARACTER AW*6,M*6
7.      C
8.      C INITIALIZE ARRAYS AND CONTROL INTEGERS
9.      C
10.     NC=1
11.     IP=0
12.     DO 10 I=1,2
13.     DO 10 J=1,300
14.     SHORDF(I,J)=0.0
15.     SWIMDF(I,J)=0.0
16.     C
17.     C READ TITLE CARD
18.     C
19.     C READ(16,100,END=99) TITLS
20.     C
21.     C READ DATA FROM FILE
22.     C
23.     2 READ(16,200,END=98)EL,W,SHORS,SHORTB,SWMS,SWMTB
24.     1 IF(EL.NE.ELT(INC).OR.W.NE.AW(INC)) GO TO 6
25.     IP=IP+1
26.     IF(IP.GT.300) GO TO 97
27.     C
28.     C SET DATA FOR CURRENT NUCLIDE
29.     C
30.     SHORDF(INC,1)=SHORS
31.     SHORDF(INC,2)=SHORTB
32.     SWIMDF(INC,1)=SWMS
33.     SWIMDF(INC,2)=SWMTB
34.     C
35.     C READ NEXT DATA CARD
36.     C
37.     GO TO 2
38.     C
39.     C INCREMENT NUCLIDE INDEX
40.     C
41.     6 NC=NC+1
42.     IF(INC.GT.NUC)GO TO 97
43.     GO TO 1
44.     C
45.     C ERROR IN LIBRARY ORDER OR SIZE, PRINT MESSAGE AND STOP
46.     C
47.     97 PRINT 300,IP,NC
48.     STOP
49.     C
50.     C END-OF-FILE ON DATA READ
51.     C
52.     98 IF(IP.GT.1) RETURN
53.     C

```

6. PABLM

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56. C IF EMPTY,PRINT MESSAGE AND STOP
57. C
58. C PRINT 400
59. C STOP
60. C
61. C END-OF-FILE ON TITLE READ, STOP
62. C
63. C 99 PRINT 500
64. C STOP
65. C
66. C FORMAT STATEMENTS
67. C
68. C 100 FORMAT(20A9)
69. C 200 FORMAT(A2,A6,4E9.2)
70. C 300 FORMAT(1H1,' PROBLEM IN EXTERNAL OF LIB READ',/,
71. C ' NUCLEIDES FOUND =',I5,/, ' NUCLEIDES CHECKED FROM MASTER LIBRARY =',
72. C ' ,I5,' STOP')
73. C 400 FORMAT(1H1,' EXTERNAL DOSE FACTOR LIBRARY EMPTY, STOP')
74. C 500 FORMAT(1H1,' EXTERNAL DOSE FACTOR LIBRARY TITLE READ ERROR,STOP')
75. C END

```

END FTH 149 IPANK 154 DRANK

6. PABLM

AFIN,<0 AA,RLTRIN

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MS NOW IS      85 TRKS LIMIT  10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN 871  *10/05/79-10:09(2,1)
1.      SUBROUTINE BLIBIN(BELT,NBELT,BIOAC1,TITLE)
2.      C
3.      C   THIS SUBROUTINE READS THE BIOACCUMULATION DATA LIBRARY
4.      C
5.      C   DIMENSION BIOAC1(9,100),TITLE(40),BELT(100)
6.      C
7.      C   NP=1
8.      C
9.      C   READ TITLE INFORMATION
10.     C
11.     C   READ(14,100,END=99)TITLE
12.     C   100 FORMAT(20A1)
13.     C
14.     C   READ DATA RECORDS
15.     C
16.     C   1 READ(14,200,END=2)BELT(NB1),BIOAC1(1,NB1),I=1,9)
17.     C   NP=NP+1
18.     C   GO TO 1
19.     C
20.     C   ON END-OF-FILE, RETURN
21.     C
22.     C   2 NBELT=NP-1
23.     C   RETURN
24.     C
25.     C   IF END-OF-FILE ON TITLE CARD READ, PRINT ERROR MESSAGE AND STOP
26.     C
27.     C   99 PRINT 300
28.     C   300 FORMAT(1H1,' END-OF-FILE ON TITLE CARD READ, BIOACCUMULATION LIBRA
29.     C   *RY, STOP')
30.     C   200 FORMAT(A2,8F9.1,F6.1)
31.     C   STOP
32.     C   END

```

END FTN 58 TRANK 87 DPANK

6. PABLM

DEFIN,SO AA,ZEROR

MS NOW IS 85 TRKS LIMIT 10000 MEM MAX IS 21000 WORDS LIMIT 95000
 FTYN BRJ *10/05/77-10:0912,)

```

1.      SUBROUTINE ZEROR(IN,A)
2.      C THIS MODULE SETS N VALUES OF ARRAY A TO REAL ZERO.
3.      DIMENSION A(1)
4.      DO 1 J=1,N
5.      A(J)=0.
1      6.      1 CONTINUE
1      7.      RETURN
      8.      END
  
```

END FTYN 34 IBANK J' DRANK

6. PABLM

REFIN,50 AA,ZEROI

MS NOW IS 85 TRKS LIMIT 10000 MEM MAX IS 21000 WORDS LIMIT 95000
 FTA PRI *10/05/70-10:09(2,1)

```

1.      SUBROUTINE ZEROIIN,K1
2.      C    THIS MODULE SETS N VALUES OF ARRAY K TO INTEGER ZERO.
3.      DIMENSION K(1)
4.      DO 1 J=1,N
5.      K(J)=0
6.      1 CONTINUE
7.      RETURN
8.      END
  
```

END FTA 30 IBANK 10 DRANK

6. PABLM

AFIN,SO AA.TDNUC

MS NOW IS 85 TRWS LIMIT 10000 MEM MAX IS 21000 WORDS LIMIT 95000
FTN 6R1 *17/CS/79-10:0912,)

```

1.      SUBROUTINE TDNUC(NUC,ELT,AW,ELTI,AWI,NIN,NCHN,NFLAG,NFLAGC)
2.      C
3.      C THIS MODULE IDENTIFIES NUCLIDES IN INPUT INVENTORY
4.      C
5.      DIMENSION NFLAGC(200),NCHN(200)
6.      DIMENSION ELTI(300),AWI(300),ELTI(100),AWI(100),NFLAG(300)
7.      CHARACTER AW*6,AWI*6
8.      C
9.      C INITIALIZE COUNT INDEX ON UNIDENTIFIED NUCLIDES
10.     C
11.     4 CONTINUE
12.     ISTOP=C
13.     C
14.     C LOOP ON NUCLIDES INPUT. TEST AGAINST MASTER LIST.
15.     C
16.     CALL ZEROI(200,NFLAGC)
17.     CALL ZEROI(300,NFLAG)
18.     DO 3 IN=1,NIN
19.     DO 1 IL=1,NUC
20.     ILN=IL
21.     IF(ELT(IL).NE.ELTI(IN)) GO TO 1
22.     IF(AW(IL).EQ.AWI(IN)) GO TO 2
23.     1 CONTINUE
24.     C
25.     C NO MATCH IN LIBRARY FOR INPUT NUCLIDE. PRINT NAME OF UNKNOWN NUCLIDE
26.     C
27.     ISTOP=ISTOP+1
28.     PRINT 100, ELTI(IN),AWI(IN)
29.     GO TO 3
30.     2 NFLAG(ILN)=IN
31.     NFLAGC(NCHN(ILN))=1
32.     3 CONTINUE
33.     IF(ISTOP.LT.1) RETURN
34.     C
35.     C PRINT TOTAL NUMBER OF UNKNOWN NUCLIDES AND STOP.
36.     C
37.     PRINT 200, ISTOP
38.     100 FORMAT(1H0,'UNIDENTIFIED NUCLIDE ',A2,A6)
39.     200 FORMAT(1H0,'THERE WERE UNIDENTIFIED NUCLIDES, ISTOP =',I4)
40.     STOP
41.     DEBUC SUBCHK
42.     AT 4
43.     END

```

END FTN 205 IRANK 130 DRANK

6. PABLM

BTN,50 AA.OFCHK

MS NOW TS 85 TRKS LIMIT 10000 MEM MAX IS 1000 WORDS LIMIT 95000
FTN BR1 *10/CS/79-10:1012,1

```

10.      SUBROUTINE OFPCHK(KORG,NORG,KFOTYP,KPTHWY,NFT,NPT)
20.      C
30.      C THIS MODULE COUNTS ORGANS, FOOD TYPES AND PATHWAYS SPECIFIED
40.      C
50.      DIMENSION KORG(15),KFOTYP(15),KPTHWY(8)
60.      C
70.      C COUNT ORGANS INDICATED FOR DOSE CALCULATIONS
80.      C
90.      1 CONTINUE
100.     NORG=0
110.     DO 10 I=1,5
120.     IF(KORG(I).GT.C) NORG=NORG+1
130.     10 CONTINUE
140.      C COUNT FOOD TYPES REQUESTED FOR DOSE CALCULATION
150.      C
160.     NFT=0
170.     DO 11 I=1,15
180.     IF(KFOTYP(I).GT.C) NFT=NFT+1
190.     11 CONTINUE
200.      C COUNT ARRRG PATHWAYS
210.      C
220.     13 NPT=0
230.     DO 14 I=1,8
240.     IF(KPTHWY(I).GT.C) NPT=NPT+1
250.     14 CONTINUE
260.      C
270.      C PRINT ERROR MESSAGES IF NO ORGANS OR FOOD TYPES SPECIFIED
280.      C
290.     IF(NORG.GT.0) GO TO 12
300.     PRINT 100, NORG
310.     STOP
320.     12 CONTINUE
330.     IF(NPT.NE.0.OR.NFT.NE.0)RETURN
340.     PRINT 200,NFT,NPT
350.     STOP
360.      C
370.      C FORMAT STATEMENTS
380.      C
390.     100 FORMAT(1H1,' NO ORGANS SPECIFIED, NORG = ',I4)
400.     200 FORMAT(1H1,' NO FOOD TYPES OR PATHWAYS SPECIFIED, NFT,NPT='
410.     ,2I4)
420.     DEBUG SUBCHK
430.     AT 1
440.     END

```

END FTN 148 IRANK 81 DBANK

6. PABLM

QFTN,SO AA.SETDAT

```

MS NOW IS      85 IRKS LIMIT 10000 MEM MAX IS      71000 WORDS LIMIT  95000
FTN ORI *10/05/79-10:10(2,1)
10.  SUBROUTINE SETDAT(INUC,AW,ELT,TR,TB,E,FWL,Q,FINV,KORG,KFDTYP,
20.  .NORG,NFT,NFELT,FELT,DVEL,FTRC,DPVL,FDTC,NOFNUC,AWO,ELTO,TRAD,TBIO,
30.  .IC,EN,IBEG,IEND,FV,KPTHWY,NPT,BELT,NBELT,SHORDF,SWIMDF,SLODFAC,
40.  .SLODFAC,RIOAC1,RIOJCF,IOFNUC,NOFNUC,NCHST,IFR,IFRM,NCHN,DK,DKF,
50.  .IMEM,AL,AM,NCH,NFLAG,NFLAGC,ICHN,ISALT)
60.  C THIS MODULE PREPARES CONDENSED DATA ARRAYS FOR DOSE CALCULATIONS.
70.  C THE INVENTORY IS MODIFIED BY THE FACTOR FINV.
80.  C
90.  DIMENSION AW(100),ELT(100),TR(100),TB(100),E(100),FWL(100),
100.  DIMENSION AWO(100),ELTO(100),TRAD(100),TBIO(100,5),LFT(15)
110.  DIMENSION Q(100),NORG(5),KFDTYP(15),IO(1000)
120.  DIMENSION KPTHWY(8),BELT(100),SHORDF(100,2),SWIMDF(100,2),
130.  .SLODFAC(100,2),SLODFAC(100,2),RIOAC1(9,100),RIOACF(5,100)
140.  DIMENSION IOFNUC(100),NOFNUC(100),NCHST(100),IFR(2,100),
150.  .NCHN(100),DKF(2,100),IMEM(100),DK(2,100),IFRM(2,100),
160.  .AL(100),AM(100)
170.  DIMENSION FELT(70),DVEL(70),FTRC(16,70),DPVL(100),FDTC(15,100)
180.  DIMENSION EN(100,5),IBEG(100),IEND(100),DFGRD(100,5),
190.  .GPDF(100,2)
200.  DIMENSION FV(100,5)
210.  DIMENSION NFLAG(100),NFLAGC(100)
220.  CHARACTER AW*6
230.  CHARACTER AWO*6
240.  DATA LFT/1,1,1,1,1,1,1,1,1,2,3,4,5,6,0/
250.  C
260.  C INITIALIZE VALID NUCLIDE COUNT, INUC, AND OTHER DATA ARRAYS
270.  C
280.  1 CONTINUE
290.  INUC=0
300.  CALL ZEROR(100,TRAD)
310.  CALL ZEROR(100,TBIO)
320.  CALL ZEROR(100,FDTC)
330.  IF(FINV.LE.0.) FINV=1.0
340.  C
350.  ICHN=0
360.  CALL ZEROR(100,ELTO)
370.  CALL ZEROR(100,AWO)
380.  CALL ZEROR(100,IOFNUC)
390.  CALL ZEROR(100,AL)
400.  CALL ZEROR(100,AM)
410.  C
420.  C LOOP ON ALL CHAINS FROM MASTER LIBRARY
430.  C
440.  DO 20 IC=1,NCH
450.  C
460.  C IF THIS CHAIN IS NOT USED, THEN SKIP TO 20
470.  C
480.  IF(NFLAGC(IC).NE.1)GO TO 20
490.  C
500.  ICHN=ICHN+1
510.  NOF=NOFNUC(IC)
520.  N1=NCHST(IC)
530.  N2=N1+NOF-1

```

6. PABLM

```

1 520.      IONF=0
1 530.      I=0
1 540.      C
1 550.      C  LOOP ON ALL NUCLIDES IN ACTIVE CHAIN
1 560.      C
1 570.      DO 15 IL=N1,N2
1 580.      C
1 590.      C  CAPTURE ALL DAUGHTERS
1 600.      C
1 610.      IF (IONE.EQ.1) GO TO 10
1 620.      C
1 630.      C  IF THIS NUCLIDE AT THE FRONT OF THE CHAIN IS NOT SPECIFIED, SKIP.
1 640.      C
1 650.      IF (NFLAG(IL).EQ.0) GO TO 14
1 660.      IONF=1
1 670.      C
1 680.      C  SET ALL DATA FOR THIS NUCLIDE FROM INPUT AND EXTERNAL FILES
1 690.      C
1 700.      C  IGNORE NUCLIDE IL IF INVENTORY IS ZERO OR IF THERE IS NO ORGAN DATA
1 710.      C
1 720.      IF (IBEG(IL).LE.0) GO TO 19
1 730.      C
1 740.      C  INCLUDE NUCLIDE IL IN DATA ARRAY POSITION INUC
1 750.      C
1 760.      IO INUC=INUC+1
1 770.      C
1 780.      C  SET DATA THAT DEPENDS ONLY ON NUCLIDE
1 790.      C
1 800.      C
1 810.      C  RADIOLOGICAL DATA
1 820.      C
1 830.      IFRM(1,INUC)=MAX(0,IFR(1,IL)-1)
1 840.      IFRM(2,INUC)=MAX(0,IFR(2,IL)-1)
1 850.      DM(1,INUC)=DMF(1,IL)
1 860.      DM(2,INUC)=DMF(2,IL)
1 870.      AL(INUC)=0.693/TRI(IL)*365.25
1 880.      IF (NFLAG(IL).EQ.0) GO TO 16
1 890.      NFIL=NFLAG(IL)
1 900.      AM(INUC)=0.1NFIL*FINV
1 910.      16 CONTINUE
1 920.      ELTO(INUC)=ELT(IL)
1 930.      AMO(INUC)=AM(IL)
1 940.      TRAD(INUC)=TRI(IL)
1 950.      C
1 960.      C  MULTIPLY BY .001 TO CHANGE UNITS TO REM FROM MPREM
1 970.      C
1 980.      SLOFAC(INUC,1)=SHORDF(IL,1)*0.001
1 990.      SLOFAC(INUC,2)=SHORDF(IL,2)*0.001
1 1000.     SWDFAC(INUC,1)=SWIMDF(IL,1)*0.001
1 1010.     SWDFAC(INUC,2)=SWIMDF(IL,2)*0.001
1 1020.     C
1 1030.     IF (INPT.EQ.0) GO TO 30
1 1040.     C
1 1050.     C  SET BIOACCUMULATION FACTORS
1 1060.     C
1 1070.     DO 25 IK=1,NBELT
1 1080.     IF K=IF

```

6. PABLM

```

3 1090. IF(ELTO(INUC).EQ.RELT(IE)GO TO 26
7 1100. 25 CONTINUE
2 1110. PRINT 400,ELT(IL),AW(IL)
7 1120. INUC=INUC-1
2 1121. C DECREASE CHAIN SIZE INTEGER
2 1122. I=I+1
2 1130. GO TO 15
2 1140. 26 DO 27 IP=1,NPT
7 1150. JPT=KPTHMY(I)
7 1160. IF(JPT.GE.5160 TO 28
7 1170. KPT=JPT
3 1180. IF(I/SALT.EQ.(KPT-KPT+4
7 1190. BIOACF(IP,INUC)=BIOACF(KPT,IEK)
7 1200. GO TO 25
7 1210. 28 IF(JPT.LE.5160 TO 29
3 1220. BI ACF(IP,INUC)=BIOACF(9,IEK)
7 1230. 29 CONTINUE
7 1240. 27 CONTINUE
7 1250. 30 CONTINUE
2 1260. C
2 1270. C SET DATA FOR SELECTED ORGANS FOR CURRENT NUCLIDE
2 1280. C
2 1290. I1=IREG(11)
2 1300. I2=IEND(11)
2 1305. IF(I1.EQ.0.OR.I2.EQ.0)GO TO 40
7 1310. DO 5 I06=1,NORG
7 1320. DO 3 I1=11,12
4 1330. IK=I1
4 1340. IF(NORG(I06).EQ.10(11)) GO TO 4
4 1350. 3 CONTINUE
7 1360. GO TO 5
7 1370. 4 FWT(INUC,I06)=FMT(IK)
7 1380. EN(INUC,I06)=E(IK)
7 1390. TRC(INUC,I06)=TRC(IK)
7 1400. 5 CONTINUE
7 1410. 40 CONTINUE
2 1410. C
2 1420. C SET DATA FOR SELECTED FOOD TYPES FOR CURRENT NUCLIDE BY ELEMENT.
2 1430. C FIRST FIND ELEMENT.
7 1440. DO 7 IE=1,NFELT
7 1450. IFK=IE
3 1460. IF(ELT(IL).EQ.FELT(IE)) GO TO 8
7 1470. 7 CONTINUE
7 1480. PRINT 200,ELT(IL),AW(IL)
7 1490. I=I+1
2 1490. INUC=INUC-1
2 1490. GO TO 15
2 1500. 8 DPVL(INUC)=DVEL(IEK)
2 1510. C
2 1520. C SET FOOD TRANSFER COEFFICIENT
2 1530. C
2 1530. IF(NFT.EQ.0)GO TO 149
7 1540. DO 9 IFD=1,NFT
7 1550. IF(KFDTYP(IFD).EQ.15) GO TO 9
7 1560. KFD=LF1(KFDTYP(IFD))
3 1570. FDTC(IFD,INUC)=FTRC(KFD,IEK)
7 1580. 9 CONTINUE

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6. PABLM

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1545. 149 CONTINUE
1595. GO TO 15
1600. C
1610. C NO DATA IN ORGAN LIBRARY, ELIMINATE THIS NUCLIDE.
1620. C
1630. 19 PRINT 100, ELT(IIL),AW(IIL)
1633. C DECREASE CHAIN SIZE INTEGER
1634. I=I-1
1640. C
1650. GO TO 15
1660. C
1670. C INCREMENT INDEX TO SKIP UNUSED CHAIN MEMBERS
1680. C
1685. 14 I=I+EM(IIL)
1700. C
1710. 15 CONTINUE
1720. C
1730. C SET NUMBER OF NUCLIDES IN REDUCED CHAIN
1740. C
1750. 10FNUC(I:CHN)=NCN-I
1760. C
1770. 20 CONTINUE
1780. NONUC=INUC
1790. IF(NONUC.LE.0) GO TO 98
1800. RETURN
1810. C
1820. C FORMAT STATEMENTS
1830. C
1840. 100 FORMAT(1H0,'NO DATA IN ORGAN LIBRARY FOR NUCLIDE ',A2,A6,' THIS NU
1850. CLIDE DROPPED')
1860. 200 FORMAT(1H0,'NO DATA FOR ELEMENT IN FOOD DATA LIBRARY, ',
1870. A2,A6,' DROPPED')
1880. 300 FORMAT(1H0,'NONE OF INPUT NUCLIDES HAVE DATA IN LIBRARIES, NUC = '
1890. ',I3)
1900. 400 FOR AT(IH1),' NO DATA FOR ELEMENT ',A2,A6,'IN BIOACCUMULATION FACTO
1910. R LIBRARY, THIS NUCLIDE DROPPED.')
1920. C
1930. C NO DATA FOR ANY NUCLIDES IN INPUT INVENTORY.
1940. C
1950. 98 PRINT 300, NONUC
1960. 99 STOP
1961. DEBUG SUBCHK
1962. AT 1
1970. END

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END FIN 1266 IRANK 1573 DRANK

6. PABLM

#FTN,SO AA,QAPAGE

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MS NOW TS      R6 TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN RR1 *10/05/79-10:10:11,1
10.      SUBROUTINE QAPAGE(TITLE1,TITLR,TITLF,TITLO,KFDTYP,XQ,GRWP,
20.      CRIRP,CON,IDEF,IAC,PLIFE,EXTIM,KORG,T2,IREC,POP,TRNS,NFT,YELD
30.      E,NORG,NUC,ELIO,AWO,FINV,DD,IPOP,TITLS,TITLB,XPTHWY,USAGE,
40.      HLDUP1,HLDUP2,NPT,RM2,AM,DKSORS,CFLOI
50.      DIMENSION TITL E1(20),TITLR1(20),TITLF1(20),TITLO(20)
60.      DIMENSION KFDTYP(15),XQ(15),GRWP(15),RIRRI(15),CON(15)
70.      DIMENSION TITLS(20),TITLB(40),XPTHWY(8),RM2(8)
80.      DIMENSION HLDUP1(15),HLDUP2(8),UNITS(8)
90.      DIMENSION FNAME(8)
100.     DIMENSION KORG(5),TRNS(15),YELDI(5),ELTO(100),AWO(100),
110.     EAM(100),PNAME(15),ONAME(23)
120.     DIMENSION USAGE(8)
130.     C
140.     CHARACTER AWC*6,TT*8,DD*8,PNAME*10,ONAME*10,TYPE*7,PATH*5
150.     CHARACTER TPOP*10,UNITS*7,FNAME*10
160.     INTEGER T2,DKSORS
170.     C
180.     DATA (FNAME(I),I=1,8)/'FISH','CRUSTACEA','MOLLUSCS','PLANTS',
190.     'DRINK','H2O','SHORELINE','SWIMMING','BOATING'/
200.     C
210.     DATA (UNITS(I),I=1,8)/'KKG/YR','KKG/YR','KKG/YR','KKG/YR',
220.     'L/YR','HR/YR','HR/YR','HR/YR'/
230.     C
240.     DATA (PNAME(I),I=1,15)/'LEAFY VEG.','O.A.G.VEG.','POTATOES',
250.     'RT.VEG.','PERRIES','MELONS','ORCH.FRUIT','WHEAT',
260.     'OT.GRAIN','EGGS','MILK','BEEF','POPK','POULTRY','EXTERNAL'/
270.     C
280.     DATA (ONAME(I),I=1,23)/'TOTAL BODY','BODY WATER','KIDNEYS',
290.     'LIVER','SPLEEN','BONE','FAT','LUNGS','ADRENALS','TESTES',
300.     'OVARIES','SKIN','BRAIN','MUSCLE','PROSTATE','THYROID','PANCREAS',
310.     'HEART','GI','STOMACH','SMALL INT','UPPER LARG','LOWER LARG'/
320.     C
330.     CALL ADATE(DD,TT)
340.     C
350.     WRITE(6,1)DD,TITLE1
360.     1
370.     FORMAT(1H1,5X,' *** Q.A. PAGE ***',33X,'RUN ON ',A8,/,48X,
380.     ' PABLM, VERSION 2.0, APRIL 1979',/,18X,' CASE TITLE: ',20A4,/)
390.     C
400.     TPOP=' MAX. INC.'
410.     IF (IPOP.NE.0) TPOP='POPULATION'
420.     TYPE=' ACUTE'
430.     IF (IAC.EQ.0) TYPE='CHRONIC'
440.     PATH='WATER'
450.     IF (IDEP.EQ.0) PATH='INIT.'
460.     IF (IDEP.EQ.1) PATH=' AIR'
470.     IF (IDEP.GT.2) PATH=' BOTH'
480.     WRITE(6,2)TYPE,PATH,IPOP
490.     2
500.     FORMAT(33X,' TYPE OF DOSE CALCULATED: ',A7,' INGESTION AND EXTERNA
510.     L EXPOSURE',/,48X,' FOR :',A5,' PATHWAY, ',A10,/)
520.     C
530.     WRITE(6,3)TITLR,TITLF(I),I=1,20,TITLO,TITLS,TITLB(I),I=1,20)

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570. 3  FORMAT(5X,' *** DATA LIBRARIES USED:',/,8X,' RADIONUCLIDE LIBRARY:
580. 6  ',20A4,/,', FOOD TRANSFER FACTOR LIBRARY: ',20A4,/,10X,' ORGAN DAT
590. 8A LIBRARY: ',20A4,/,', EXTERNAL DOSE FACTOR LIBRARY: ',20A4,/,
600. 65X,' BIOACCUMULATION LIBRARY: ',20A4,/,)
610. C
620. IF INPT.EQ.0160 TO 12
630. WRITE(6,01)
640. 4  FORMAT(5X,' *** FOOD DATA USED:',/,8X,' FOOD TYPE',9X,'X/Q',6X,
650. 8  F'GROWING PERIOD YIELD IRR. RATE HOLDUP CON
660. 8  ASSUMPTION TRANSLOCATION',/,22X,' 1SEC/M**3) 10DAYS) 1
670. 8  KKG/M**3) (L/M**2/MONTH) (DAYS) (KG/YR)',/,)
680. DO 10 I=1,NF1
690. 10  WRITE(6,5)IPNAME(IKFDY(I),XQ(I),GRUP(I),YELD(I),RIRR(I),
700. 8  HLDUP(I),CON(I),TRNS(I))
710. 5  FORMAT(4X,A10,715X,1PE9.2E2,1X)
720. 12 CONTINUE
730. C
740. IF INPT.EQ.0160 TO 13
750. WRITE(6,20)
760. 20  FORMAT(5X,' *** PATHWAY DATA USED:',/,20X,' PATHWAY',T40,' MIXING RAT
770. 8  .10',16C,' HOLDUP (DAYS)',T65,' USAGE UNITS',/,)
780. DO 10 I=1,NPT
790. 10  JP=KPTHWY(I)
800. 100 WRITE(6,21)FNAME(JP),RM2(I),HLDUP2(I),USAGE(I),UNITS(JP)
810. 21  FORMAT(20X,A10,3110X,1PE10.21,2X,A7)
820. 13 CONTINUE
830. C
840. C
850. WRITE(6,6)IONAME(IKORG(I),I=1,NORG)
860. 6  FORMAT(1/5X,' *** ORGANS CONSIDERED:',/,10X,5110X,A10),/,)
870. C
880. IF INKSORS.NE.01WRITE(6,40)
890. 40  FORMAT(5X,' *** RELEASE TERM DECAYING FROM TIME ZERO ***')
900. WRITE(6,7)1ELT(01),A40(I),A1(I),I=1,NONUCI
910. 7  FORMAT(1/5X,' *** NUCLIDES CONSIDERED:',/,10X,3111X,' NUCLIDE RELE
920. 8  CASE ',/,10X,3110X,'ELT. WT. (CI/YR) ',/,/,110X,3110X,A2,1X,
930. 8  A6,2X,1PE8.2E2)))
940. C
950. WRITE(6,8)PLIFE,EXTIM,T2
960. 8  FORMAT(1/5X,' *** TIMES CONSIDERED (YEARS):',/,40X,' FACILITY LIFE
970. 8  =',1PE9.2E2,/,23X,' EXTERNAL EXPOSURE TIME (HOURS) =',1PE9.2E2,/,
980. 8  A34X,' DOSE COMMITMENT TIME =',15,/,)
990. C
1000. WRITE(6,9)POF,IREC,FINV,CFL0
1010. 9  FORMAT(1/5X,' ***',37X,' POPULATION:',1PE10.2E2,/,5X,' ***',20X,' RECON
1020. 8  CENTRATION MODEL USED:',13,/,5X,' ***',17X,' INVENTORY MODIFICATION
1030. 8  EFACOR:',1PE10.2E2,/,5X,' ***',20X,' COOLANT FLOW RATE:',1PE10.2E2)
1040. C
1050. WRITE(6,11)
1060. 11  FORMAT(1/15X,' INPUT PREPARED BY:',15X,' DATE:',/,34X,' *****
1070. 8  *****',5X,' *****',/,16X,' INPUT CHECKED BY:',15X,' DATE:',/,
1080. 8  A34X,' *****',5X,' *****')
1090. C
1100. RETURN
1110. END

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END FTY 245 IRANK 927 DRANK

6. PABLM

GETN,50 AA.DFCALC

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MS NOW IS      26 TRKS LIMIT  10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN SR1  *10/05/79-10:1012,1)
1.  C THIS SUBROUTINE CALCULATES DOSE FACTORS FOR INGESTION AND      . DFC00100
2.  C EXPOSURE TO CONTAMINATED GROUND.      . DFC00200
3.  SUBROUTINE DFCALC(TPAD,TBTO,FW,EN,NONUC,NORG,      . DFC00300
4.  DCFAC,KORG,ELTO1
5.  REAL*4 MASS(23)
6.  DIMENSION DCFAC(100,5),EN(100,5)
7.  DIMENSION TEFF(100,5),TRAD(100),TPI0(100,5),FW(100,5)      . DFC00500
8.  DIMENSION KORG(5),TRTM(4),TP(4),ELTO(100)
9.  C GI TRAVEL TIMES, FRACTIONAL DAYS
10. DATA (TRTM(I),I=1,4)/.0417,.1667,.3333,.7500/
11. C TRAVEL TIMES TO GI ORGANS, FRACTIONAL DAYS
12. DATA (TPI(I),I=1,4)/0.0,.0417,.2083,.5417/
13. C ICRP-23 ORGAN MASSES OR GI ORGAN CONTENTS MASS
14. DATA (MASS(I),I=1,23)/70000.,600.,310.,1800.,180.,7000.,13500.,
15. 6100.,14.,35.,11.,2600.,1900.,28000.,16.,20.,100.,330.,0.,250.,
16. 400.,250.,135./
17. DO 100 INUC=1,NONUC      . DFC01100
18. DO 100 IORG=1,NORG      . DFC01200
19. JORG=KORG(IORG)      . DFC01300
20. TEFF(INUC,IORG)=TRAD(INUC)*TBTO(INUC,IORG)/(TRAD(INUC)+      . DFC01400
21. 6*TBTO(INUC,IORG))
22. IF (KORG(IORG).GE. 20)GO TO 200
23. DCFAC(INUC,IORG)=2.92E-4*FW(INUC,IORG)*FN(INUC,IORG)*
24. 6*TEFF(INUC,IORG)**2/(MASS(JORG)*.001)
25. GO TO 50      . DFC03300
26. 200 IOR=JORG-19
27. DCFAC(INUC,IORG)=0.0256*TRTM(IOR)*EN(INUC,IORG)*FW(INUC,IORG)*
28. 6*EXP(-0.693/TRAD(INUC)*TP(IOR)/MASS(JORG)*0.001)
29. 99 CONTINUE
30. H='H'
31. C='C'
32. N='N'
33. NA='NA'
34. IF (ELTO(INUC).EQ.H.OR.ELTO(INUC).EQ.C)GO TO 400
35. IF (ELTO(INUC).EQ.N.OR.ELTO(INUC).EQ.NA)GO TO 500
36. GO TO 100
37. C
38. C SPECIAL CASE FOR H-3,C-14
39. C
40. 400 IF (JORG.EQ.6)GO TO 100
41. DCFAC(INUC,IORG)=DCFAC(INUC,1)
42. GO TO 100
43. C
44. C SPECIAL CASE FOR N-13,NA-22,NA-24
45. C
46. 500 CONTINUE
47. DCFAC(INUC,IORG)=DCFAC(INUC,1)
48. 100 CONTINUE      . DFC03800
49. RETURN
50. END      . DFC03900

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END FTN 264 IBANK 192 DRANK

6. PABLM

&FEN,SO AA,DOSE

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MS NOW IS      P6 TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FT  (R)  *10/05/79-10:1100,1)

10.  C ROUTINE FOR AIR AND WATER CONCENTRATION
11.  SUBROUTINE DOSE (IDEP,NFT,NUC,TFEC,CFLD,FLO,VOL,TOR,CTIM,
12.  GPLIFE,RM,SLCON,EDCON,KFDTYP,ELTO,XO,TRAD,YELD,GRWP,OPVL,
13.  ATPN,P1PR,FDTG,HLDUP1,PLTCON,WATCON,AIRCON,LFCON,ITT,
14.  FNP1,KPTHWY,EXTCON,FCON,RM2,AM,WAT,PIOACF,HLDUP2,SW,
15.  ERECON,ICHN,ICFNUC,AL,DK,IFRM,DKSORS,IAC)
16.  C
17.  INTEGER DKSORS
18.  REAL*4 LFCON(15,100),MUD(100)
19.  DIMENSION AL(100),DK(2,100),IFRM(2,100)
20.  DIMENSION AIFCON(15,100),RECON(100),WATCON(100)
21.  DIMENSION SLCON(15,100),EDCON(15,100),PLTCON(15,100)
22.  DIMENSION ELTO(100),KFDTYP(15),API(100),XO(15),TRAD(100),
23.  OPVL(100),TRANS(15),P1PR(15),FDTG(15,100),HLDUP1(15),HLDUP2(8)
24.  DIMENSION YELD(15),GRWP(15)
25.  DIMENSION KPTHWY(8),RM2(8),EXTCON(8,100)
26.  E,FCON(8,100),LPI(100,8),BIOACF(15,100),
27.  EIOFNUC(100),SLC(100)
28.  C
29.  DATA TENV,DEPR,SLDN/14.,.25,224./,CHKNGC,CHKNWC/.12,.3/
30.  DATA CONGC,COWWC/55.,60./,BFFC,BFWC/68.,50./,PI66C,PI6WC/4.2,10./
31.  C
32.  C DECAY RELEASE TERM (AM) IF SOURCE IS DECAYING
33.  C IAC FROM A CONSTANT MASS LEAK FROM A TANK OF DECAYING MATERIAL
34.  C DON'T DO IT AFTER RELEASE ENDS, OR 1ST YEAR
35.  C
36.  LIFE=PLIFE
37.  IF(ITT.FO.1)GO TO 1
38.  IF(DKSORS.EQ.0)GO TO 1
39.  IF(ITT.GT.LIFE)GO TO 1
40.  C
41.  INUC=0
42.  DO 2000 IC=1,ICHN
43.  J=IOFNUC(IC)
44.  IST=INUC+1
45.  K=IST+J-1
46.  DO 2001 I=IST,K
47.  2001 AM(I)=AM(I)/AL(I)
48.  C
49.  CALL ACHAIN(J,I,C,DK(I,IST),IFRM(1,IST),AL(IST),
50.  .AM(IST),AM(IST),C)
51.  C
52.  DO 2002 I=IST,K
53.  2002 AM(I)=AM(I)*AL(I)
54.  C
55.  2000 INUC=INUC+J
56.  C
57.  1 CONTINUE
58.  AITT=ITT
59.  DO 101 I=1,NUC
60.  WATCON(I)=0.C
61.  DO 101 J=1,NFT
62.  AIRCON(I,J)=0.C

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540.      IF INPT.EQ.01 GO TO 60
550.      IF (IDEP.EQ.01 GO TO 1601
560.      IF (IDEP.EQ. 1) GO TO 50
570.      IF (IDEP.EQ.2) GO TO 60
580.      C CALCULATE ATR CONCENTRATION PCI/M**2
590.      DO 100 IFD=1,NFT
1 600.      IF (KFDTP1(IFD).EQ. 0) GO TO 100
1 610.      DO 110 INUC=1,NONUC
1 620.      IF (ITT.LE.LIFE) GO TO 105
1 630.      AIRCON(IFD,INUC)=0.0
1 640.      GO TO 110
1 650.      105 ATRCON(IFD,INUC)=AM(INUC)*X01(IFD)*1.E12*3.169E-8
1 660.      110 CONTINUE
1 670.      100 CONTINUE
1 680.      IF (IDEP.EQ. 1) GO TO 150
690.      C CALCULATE WATER CONCENTRATION PCI/LITER
700.      DO 200 INUC=1,NONUC
1 710.      IF (IREC.EQ. 2) GO TO 61
1 720.      IF (IREC.EQ. 3) GO TO 62
1 730.      RECON(INUC)=1./(1.-(CFLO-FL0)/(CFLO+VOL*TOR))
1 740.      E*EXP(-0.693/TRAD(INUC)*CTIM*0.04171)
1 750.      GO TO 199
1 760.      61 RECON(INUC)=(1.-(VOL*EXP(-0.693/TPAD(INUC)*CTIM*0.04171)
1 770.      E**ITT)*8766./CTIM*1.1)/(1.-VOL*EXP(-0.693/TRAD(INUC)*
1 780.      ECTIM*0.04171)
1 790.      GO TO 199
1 800.      62 RECON(INUC)=1.
1 810.      199 WATCON(INUC)=1119.11*RECON(INUC)*AM(INUC)*RM/CFLO
1 820.      200 IF (ITT.GT.LIFE) WATCON(INUC)=0.0
1 830.      150 CONTINUE
840.      C
850.      1600 CONTINUE
860.      C
870.      IF INPT.EQ.01 GO TO 1601
880.      C CALCULATE WATER CONCENTRATION PCI/L
890.      DO 210 IFD=1,NPT
1 900.      IF (KPTHWY(IFD).EQ. 0.) GO TO 210
1 910.      DO 250 INUC=1,NONUC
2 920.      IF (KPTHWY(IFD).EQ.6) GO TO 260
2 930.      IF (ITT.LE.LIFE) GO TO 201
2 940.      EXTCON(IFD,INUC)=0.0
2 950.      WAT(INUC,IFD)=0.0
2 960.      FDCON(IFD,INUC)=0.0
2 970.      GO TO 250
2 980.      201 CONTINUE
2 990.      WAT(INUC,IFD)=AM(INUC)*RECON(INUC)*RM21(IFD)*1119.11/CFLO
2 1000.      IF (KPTHWY(IFD).EQ. 7) GO TO 270
2 1010.      IF (KPTHWY(IFD).EQ. 8) GO TO 280
2 1020.      C CALCULATE FOOD CONCENTRATION PCI/KG
2 1030.      FDCON(IFD,INUC)=BIOACF(IFD,INUC)*WAT(INUC,IFD)*EXP(-0.693/
2 1040.      TPAD(INUC)*HLDUP2(IFD))
2 1050.      GO TO 250
2 1060.      C CALCULATE EXTERNAL CONCENTRATION FOR SWIMMING OR BOATING
2 1070.      270 EXTCON(IFD,INUC)=WAT(INUC,IFD)*EXP(-0.693/TRAD(INUC)*HLDUP2(IFD))
2 1080.      GO TO 250
2 1090.      280 EXTCON(IFD,INUC)=WAT(INUC,IFD)*EXP(-0.693/TRAD(INUC)*HLDUP2(IFD)
2 1100.      .11/2.

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6. PABLM

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1 1110. 250 CONTINUE
1 1120. GO TO 210
1 1130. 260 CONTINUE
1 1140. INUC=0
1 1150. C
1 1160. C SHORFLINE SEDIMENTS REQUIRE A SPECIAL BUILDUP AND DECAY MODEL
1 1170. C
1 1180. DO 1250 KC=1,ICNN
2 1190. KJ=10FNUC(KC)
1 1200. IST=INUC+1
1 1210. K=IST+KJ-1
1 1220. IF(ITT.GT.LIFE)GO TO 1262
1 1230. DO 1260 I=IST,K
1 1240. WAT(I,IFD)=AM(I)+RECON(I)*RM2(IFD)+1119.11/CFLO
1 1250. MUD(I)=WAT(I,IFD)/AL(I)
1 1260. CALL ACHAIN(KJ,AITT,DK(I,IST),IFRM(I,IST),AL(IST),MUD(IST),
1 1270. &MUD(IST),I)
1 1280. DO 1261 I=IST,K
1 1290. 1261 EXTCON(IFD,I)=MUD(I)*AL(I)*SW*25312.
1 1300. GO TO 1249
1 1310. C
1 1320. C SIMPLE CHAIN DECAY IN SEDIMENTS AFTER SOURCE TERM GONE
1 1330. C
1 1340. 1262 DO 1263 I=IST,K
1 1350. 1263 MUD(I)=EXTCON(IFD,I)/AL(I)
1 1360. CALL ACHAIN(KJ,1-C,DK(I,IST),IFRM(I,IST),AL(IST),MUD(IST),
1 1370. &MUD(IST),I)
1 1380. DO 1264 I=IST,K
1 1390. 1264 EXTCON(IFD,I)=MUD(I)*AL(I)
1 1400. C
1 1410. 1249 INUC=INUC+KJ
1 1420. 1250 CONTINUE
1 1430. 210 CONTINUE
1 1440. 1601 CONTINUE
1 1450. IF(NFT.EQ.0)GO TO 1602
1 1460. IF(IDEP.NE.0)GO TO 1603
1 1470. IF(ITT.EQ.1)CALL SOILIAM,SLCON,NFT,NONUC)
1 1480. 1603 CONTINUE
1 1490. C
1 1500. C FIND AN INDEX TO GIVE CORRECT PLTCON'S FOR NON-PLANT
1 1510. C PATHWAYS: IPL
1 1520. C
1 1530. DO 10 I=1,NFT
1 1540. IF (KFDYPI(I).GT.9)GO TO 10
1 1550. IPL=I
1 1560. GO TO 11
1 1570. 10 CONTINUE
1 1580. C
1 1590. C IF THERE ARE NO PLANT PATHWAYS, PRINT MESSAGE AND STOP
1 1600. C
1 1610. PRINT 12
1 1620. 12 FORMAT(1H1,' THIS CODE WILL NOT RUN WITHOUT AT LEAST',
1 1630. ' ONE PLANT PATHWAY--STOP')
1 1640. 11 CONTINUE
1 1650. DO 160 IFD=1,NFT
1 1660. DO 160 INUC=1,NONUC
1 1670. PLTCON(IFD,INUC)=C.0

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6. PABLM

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2 1640. LFCN(I,F,D,INUC)=0.0
2 1641. 301 EDCN(I,F,D,INUC)=0.0
1 1700. IF(IIT.GT.1)GO TO 302
1 1710. IF(IIDF.EQ.0)GO TO 302
1 1720. DO 303 INUC=1,NONUC
1 1730. 3-3 SLCON(I,F,D,INUC)=0.0
1 1740. 302 CONTINUE
1 1750. ENVDC=C.0
1 1760. YAIR=0.0
1 1770. CAIR=0.0
1 1780. GCON=C.0
1 1790. INUC=0
1 1800. DO 399 ICH=1,ICHN
2 1810. J=10FNUC(ICH)
2 1820. C
2 1830. C DECAY ONE MEMBER CHAINS
2 1840. C
2 1850. IF(IJ.GT.1)GO TO 1110
2 1860. SLCON(I,F,D,INUC+1)=SLCON(I,F,D,INUC+1)*EXP(-AL(INUC+1))
2 1870. GO TO 1111
2 1880. C
2 1890. C CALL CHAIN DECAY ROUTINE
2 1900. C
2 1910. 1110 IST=INUC+1
2 1920. K=IST+J-1
2 1930. DO 1112 I=IST,K
3 1940. 1112 SLC(I)=SLCON(I,F,D,1)/AL(I)
2 1950. CALL ACHAIN(I,J,1.0,DK(I),IST),IFRM(I,IST),AL(IST),SLC(IST),
2 1960. .SLC(IST),0)
2 1970. DO 1113 I=IST,K
3 1980. 1113 SLCON(I,F,D,1)=SLC(I)+AL(I)
2 1990. 1111 CONTINUE
2 2000. C
2 2010. C THERE ARE SPECIAL CASES FOR H-3 AND C-14
2 2020. C
2 2030. DO 399 JJ=1,J
2 2040. INUC=INUC+1
2 2050. H='H'
2 2060. C='C'
2 2070. IF(FLT(I,INUC).EQ.W)GO TO 1000
2 2080. IF(FLT(I,INUC).EQ.C)GO TO 1500
3 2090. C
2 2100. ENVDC=C.693/ITNV+C.693/TRAD(INUC)
2 2110. IF(IIDF.EQ.2)GO TO 300
2 2120. C
2 2130. C AIR DEPOSITION MECHANISM
2 2140. C
2 2150. IF(IAC.EQ.1)GO TO 3000
2 2160. LFCN(I,F,D,INUC)=DEPR*TRNS(I,F,D)*AIRCON(I,F,D,INUC)*
2 2170. .DPVL(INUC)*(1.-EXP(-ENVDC*GFW(I,F,D)))/(YEL(I,F,D))+ENVDC*.86400.
2 2180. GO TO 3001
2 2190. 3000 LFCN(I,F,D,INUC)=DEPR*TRNS(I,F,D)*AIRCON(I,F,D,INUC)*
2 2200. .DPVL(INUC)*3.1567/YEL(I,F,D)
2 2210. 3001 CONTINUE
3 2220. C
2 2230. C
2 2240. SLCON(I,F,D,INUC)=SLCON(I,F,D,INUC)+AIRCON(I,F,D,INUC)*
2 2250. .DPVL(INUC)*3.1567/SLON*(1.-EXP(-AL(INUC)))/AL(INUC)
2 2260.

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6. PABLM

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2207. IF (IDEP.EQ.1) GO TO 320
2217. C
2227. C IRRIGATION MECHANISM
2237. C
2247. 340 IF (IAC.EQ.1) GO TO 3002
2257. LFCO11IFD,INUC1=LFCO11IFD,INUC1+DEPFR*TRNS1IFD1*WATCON1INUC1
2267. .+RIPRIIFD1/2.635E6*(1.-EXP1-ENVDC*GPWP1IFD1)/YELDIIFD1*
2277. .ENVDC1+R6400.
2287. C
2297. GO TO 3003
2307. 3002 LFCO11IFD,INUC1=LFCO11IFD,INUC1+DEPFR*TRNS1IFD1*
2317. .WATCON1INUC1+RIRRIIFD1*3.156E7/2.635E6/YELDIIFD1
2327. 3003 CONTINUE
2337. SLCO11IFD,INUC1=SLCO11IFD,INUC1+WATCON1INUC1+RIRRIIFD1/
2347. .2.635E6*3.16E7/SLDN*11.-EXP1-AL1INUC1)/AL1INUC1
2357. 320 CONTINUE
2367. IF (KFDTYP1IFD1).EQ.151 GO TO 400
2377. PLTCON1IFD,INUC1=PLTCON1IFD,INUC1+SLCON1IFD,INUC1*FDT1C1PL,INUC1
2387. IF (KFDTYP1IFD1).GT.91 GO TO 350
2397. EDBCON1IFD,INUC1=PLTCON1IFD,INUC1+EXP1-C.693/TRAD1INUC1*HLDUP1
2407. 1IFD1)
2417. GO TO 400
2427. 350 IF (KFDTYP1IFD1).EQ.111 GO TO 370
2437. IF (KFDTYP1IFD1).EQ.121 GO TO 375
2447. IF (KFDTYP1IFD1).EQ.131 GO TO 380
2457. IF (KFDTYP1IFD1).EQ.141 GO TO 385
2467. EDBCON1IFD,INUC1=ICHKNGC*PLTCON1IFD,INUC1+CHKHWC*WATCON1INUC1
2477. +FDT1C1IFD,INUC1*EXP1-C.693/TRAD1INUC1*HLDUP11IFD1)
2487. GO TO 400
2497. 370 EDBCON1IFD,INUC1=ICOWGC*PLTCON1IFD,INUC1+CONWC*WATCON1INUC1+
2507. FDT1C1IFD,INUC1*EXP1-C.693/TRAD1INUC1*HLDUP11IFD1)
2517. GO TO 400
2527. 375 EDBCON1IFD,INUC1=IRFFC*PLTCON1IFD,INUC1+BFWC*WATCON1INUC1+
2537. FDT1C1IFD,INUC1*EXP1-C.693/TRAD1INUC1*HLDUP11IFD1)
2547. GO TO 400
2557. 380 EDBCON1IFD,INUC1=IP1GGC*PLTCON1IFD,INUC1+PIGWC*WATCON1INUC1+
2567. FDT1C1IFD,INUC1*EXP1-C.693/TRAD1INUC1*HLDUP11IFD1)
2577. GO TO 400
2587. 385 EDBCON1IFD,INUC1=ICHKNGC*PLTCON1IFD,INUC1+CHKHWC*WATCON1INUC1
2597. +FDT1C1IFD,INUC1*EXP1-C.693/TRAD1INUC1*HLDUP11IFD1)
2607. GO TO 400
2617. C
2627. C TRITIUM PLANT CONCENTRATION
2637. C
2647. 1000 CONTINUE
2657. DATA H1,H2,H3,H4,H5,H6,H7,H8/9.,.008,.0625,.083,.094,
2667. .106,.087,.0927,H1,H2,H3,H4,H5,H6,H7,H8/.80,.12,.80,.88,.67,
2677. .65C,.70,.75/
2687. IF (IDEP.EQ.2) GO TO 450
2697. C CALCULATE TRITIUM AIR CONCENTRATION PCI/KG OF H
2707. C
2717. C ACUTE RELEASE AIR CONC. CORRECTION FACTOR
2727. C
2737. HCMULT=1.0
2747. IF (IAC.EQ.1) HCMULT=P766.
2757. TAI2=AI1PCON1IFD,INUC1*H1/H2*HCMULT
2767. C CALCULATE PLANT CONCENTRATION - LEAF ROUTE PCI/KG

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6. PABLM

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2670.      LFCN(IID,INUC)=TAIR*(W1/H1*(1.-W1)*H3)
2680.  C CALCULATE SOIL CONCENTRATION PCI/KG
2690.      SLCON(IID,INUC)=ATRCN(IID,INUC)*71/H2
2700.      IF (KFDTYP(IID).EQ. 15) GO TO 400
2710.      PLTCN(IID,INUC)=LFCN(IID,INUC)+SLCON(IID,INUC)*FDTCT(IPL,INUC)
2720.      IF (IDEP.EQ. 1) GO TO 500
2730.  C CALCULATE TRITIUM WATER CONCENTRATION PCI/KG OF H
2740.  450  TWAT=WATCON(INUC)*H
2750.      LFCN(IID,INUC)=TWAT*(W1/H1*(1.-W1)*H3)+LFCN(IID,INUC)
2760.      SLCON(IID,INUC)=SLCON(IID,INUC)+WATCON(INUC)*21
2770.      PLTCN(IID,INUC)=LFCN(IID,INUC)+
2780.      (SLCON(IID,INUC)*FDTCT(IPL,INUC)
2790.      IF (KFDTYP(IID).EQ. 15) GO TO 400
2800.  500  IF (KFDTYP(IID).LT. 8) GO TO 550
2810.      IF (KFDTYP(IID).GT. 9) GO TO 600
2820.      PLTCN(IID,INUC)=PLTCN(IID,INUC)+W2/H1*(1.-W2)*H3/
2830.      (W1/H1*(1.-W1)*H3)
2840.  550  FDBCON(IID,INUC)=PLTCN(IID,INUC)*EXP(-0.693/TRAD(INUC)*
2850.      SHLDD(IID))
2860.      GO TO 400
2870.  C CALCULATE ANIMAL PRODUCTS CONCENTRATION
2880.  C CALCULATE TRITIUM GRAIN CONCENTRATION PCI/KG
2890.  600  GRCON=W2/H1*(1.-W2)*H3/(W1/H1*(1.-W1)*H3)
2900.      IF (KFDTYP(IID).EQ. 11) GO TO 610
2910.      IF (KFDTYP(IID).EQ. 12) GO TO 620
2920.      IF (KFDTYP(IID).EQ. 13) GO TO 630
2930.      IF (KFDTYP(IID).EQ. 14) GO TO 640
2940.      PLTCN(IID,INUC)=PLTCN(IID,INUC)+GRCON
2950.      FDBCON(IID,INUC)=(CHKNGC*PLTCN(IID,INUC)+CHKNWC+WATCON(INUC))/
2960.      (CHKNGC+W2/H1*(1.-W2)*H3)+CHKNWC/H1*(W8/H1*(1.-W8)*H8)
2970.      GO TO 400
2980.  610  PLTCN(IID,INUC)=PLTCN(IID,INUC)*(W3/H1*(1.-W3)*
2990.      SH1)/(W1/H1*(1.-W1)*H3)
3000.      FDBCON(IID,INUC)=(COMGC*PLTCN(IID,INUC)+COMWC+WATCON(INUC))/
3010.      (COMGC+W3/H1*(1.-W3)*H3)+COMWC/H1*(W4/H1*(1.-W4)*H4)
3020.      GO TO 400
3030.  620  PLTCN(IID,INUC)=PLTCN(IID,INUC)+GRCON
3040.      FDBCON(IID,INUC)=(BFFC*PLTCN(IID,INUC)+BFWC+WATCON(INUC))/
3050.      (BFFC+W2/H1*(1.-W2)*H3)+BFWC/H1*(W5/H1*(1.-W5)*H5)
3060.      GO TO 400
3070.  630  PLTCN(IID,INUC)=PLTCN(IID,INUC)+GRCON
3080.      FDBCON(IID,INUC)=(PIGGC*PLTCN(IID,INUC)+PIGWC+WATCON(INUC))/
3090.      (PIGGC+W2/H1*(1.-W2)*H3)+PIGWC/H1*(W6/H1*(1.-W6)*H6)
3100.      GO TO 400
3110.  640  PLTCN(IID,INUC)=PLTCN(IID,INUC)+GRCON
3120.      FDBCON(IID,INUC)=(CHKNGC*PLTCN(IID,INUC)+CHKNWC+WATCON(INUC))/
3130.      (CHKNGC+W2/H1*(1.-W2)*H3)+CHKNWC/H1*(W7/H1*(1.-W7)*H7)
3140.      GO TO 400
3150.  C
3160.  C CARBON-14 PLANT CONCENTRATION
3170.  C
3180.  1500  CONTINUE
3190.      DATA CC,C1,C2,C3,C4,C5,C6,C7,C8,C9/7.1E-5,1.6E-4,.11,
3200.      (.40,.11,.069,.24,.33,.20,.15/.71,72/.10,.03/
3210.      IF (IDEP.EQ. 2) GO TO 700
3220.  C CALCULATE C-14 AIP CONCENTRATION - PCI/KG OF C
3230.  C

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6. PABLM

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3 3222. C ACUTE RELEASE AIR CONC. CORRECTION FACTOR
3 3223. C
3 3224. HCMULT=1.0
3 3225. IF I1AC.EQ.11 HCMULT=.766.
3 3230. CA19=AIRCON(I1FD,INUC)/C1*HCMULT
3 3240. C CALCULATE C-14 PLANT CONCENTRATION - LEAF ROUTE
3 3250. LFCON(I1FD,INUC)=CA19*C2
3 3260. SLCON(I1FD,INUC)=CA19*Z2
3 3270. IF (KFDTYP(I1FD)) .EQ. 15) GO TO 400
3 3280. PLTCN(I1FD,INUC)=LFCN(I1FD,INUC)*SLCON(I1FD,INUC)*FDTCT(IPL,INUC)
3 3290. IF (IDEP .EQ. 1) GO TO 750
3 3300. C CALCULATE C-14 WATER CONCENTRATION - PCI/KG OF C
3 3310. 700 CWAT=WATCON(INUC)/C
3 3320. LFCN(I1FD,INUC)=CWAT*C2*LFCN(I1FD,INUC)
3 3330. SLCON(I1FD,INUC)=SLCON(I1FD,INUC)*CWAT*Z2
3 3340. PLTCN(I1FD,INUC)=LFCN(I1FD,INUC)*SLCON(I1FD,INUC)*FDTCT(IPL,INUC)
3 3350. IF (KFDTYP(I1FD)) .EQ. 15) GO TO 400
3 3360. 750 IF (KFDTYP(I1FD)) .LT. 81 GO TO 760
3 3370. IF (KFDTYP(I1FD)) .GT. 91 GO TO 800
3 3380. PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C3/C2
3 3390. 760 EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)
3 3400. GO TO 400
3 3410. 800 IF (KFDTYP(I1FD)) .EQ. 11) GO TO 810
3 3420. IF (KFDTYP(I1FD)) .EQ. 12) GO TO 820
3 3430. IF (KFDTYP(I1FD)) .EQ. 13) GO TO 830
3 3440. IF (KFDTYP(I1FD)) .EQ. 14) GO TO 840
3 3450. PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C3/C2
3 3460. EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)/C3*C9
3 3470. GO TO 400
3 3480. 810 PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C4/C2
3 3490. EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)/C4*C5
3 3500. GO TO 400
3 3510. 820 PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C7/C2
3 3520. EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)/C3*C6
3 3530. GO TO 400
3 3540. 830 PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C3/C2
3 3550. EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)*C3*C7
3 3560. GO TO 400
3 3570. 840 PLTCN(I1FD,INUC)=PLTCN(I1FD,INUC)*C3/C2
3 3580. EDBCON(I1FD,INUC)=PLTCN(I1FD,INUC)/C3*C8
3 3590. 400 CONTINUE
3 3600. 399 CONTINUE
1 3610. 300 CONTINUE
3 3620. 1602 CONTINUE
3 3630. 900 RETURN
3 3640. DEBUG SUBCHK
3 3650. AT 1
3 3660. END

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END FTY 4954 IPANK 571 DBANK

6. PABLM

GF,N,SO AA.ACHAIN

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MS NOW IS      93 TRKS LIMIT 10000 MEM MAX IS      71000 WORDS LIMIT      95000
FTN GR1 *10/05/70-10:1412,1
10.      SUBROUTINE ACHAIN(NUC,T,DK,IFRM,AL,AM,AO,INTGRL)
20.      DIMENSION DK(2,9),IFRM(2,9),AL(9),AM(9),AO(9),A(45),EXP0(9)
30.      C INITIALIZE COEFFICIENT ARRAY TO ZERO
40.      N2N=NUC*INUC-11/2*NUC
50.      10 CONTINUE
60.      CALL ZEROR(N2N,A)
70.      C DO LOOP ON CHAIN MEMBERS, MAX = NUC
80.      DO 5 J=1,NUC
90.      C CALCULATE EXPONENTIAL FOR CURRENT NUCLIDE
100.      ARG=-AL(J)*T
110.      C FORM IS EXP(ARG) FOR INTGRL = 0
120.      IF (INTGRL.GT.0) GO TO 20
130.      EXP0(J)=EXP(ARG)
140.      GO TO 21
145.      C FORM IS (1-EXP(ARG))/AL FOR INTGRL > 0
150.      20 EXP0(J)=EXM0(ARG,AL(J))
160.      21 CONTINUE
170.      JJ=J+J-11/2
180.      J1=J-1
190.      IF (J1.LE.0) GO TO 4
200.      IMAX=MNCIJ1,2)
210.      DO 2 M=1,J1
220.      DO 2 L=M,J1
230.      DO 1 I=1,IMAX
240.      IF (IFRM(I,J).EQ.0) A(M+JJ)=A(M+JJ)+DK(I,J)*AL(I1)*A(M+L*(L-11/2)
250.      1 CONTINUE
260.      2 CONTINUE
270.      A(M+JJ)=A(M+JJ)/(AL(J1)-AL(M))
280.      3 CONTINUE
290.      4 A(J+JJ)=A(M+JJ)-ASUM(J1,A(JJ+1))
300.      AO(J)=SUMPRD(J,EXP0,A(JJ+1))
310.      5 CONTINUE
320.      RETURN
330.      DEBUG SUBCHK
340.      AT 10
350.      END

```

END FTN 410 IPANK 135 DPANK

6. PABLM

GETN,SO AA,EXMO

MS NOW IS 97 TRKS LIMIT 17000 MEM MAX IS 21000 WORDS LIMIT 95000
 FIN,RI *12/15/79-10:1412,1

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10.      FUNCTION EXMO(ARG,AL)
20.      C THIS FUNCTION CALCULATES  $11 - \exp(\text{ARG})/AL$  FOR NEGATIVE ARG
30.      IF ARG.GT.0.C160 TO 59
40.      IF ARG.GT.0.CC1160 TO 3
50.      I=-FIX(ALOG 10(-ARG))
60.      IEF=1
70.      IF I.LT.211=2
80.      TERM=-ARG
90.      EXMO=-ARG/AL
100.     DO 1 I=2,1
110.     TERM=(TERM*ARG)/FLOAT(I)
120.     EXMO=EXMO+TERM/AL
130.     1 CONTINUE
140.     GO TO 4
150.     3 EXMO=11.0-EXP(ARG)/AL
160.     4 RETURN
170.     99 PRINT 100,ARG
180.     100 FORMAT(' ERROR IN FUNCTION EXMO, POSITIVE ARG=',1PE10.3)
190.     STOP
200.     END
  
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END FTN 100 TRANK 49 DBANK

6. PABLM

3FTN,SO AA,ASUM

MS NOW TS 93 TRKS LIMIT 10000 MEM MAX IS 21000 WORDS LIMIT 95000
FTN BR1 *10/05/70-10:14(2,)

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1. FUNCTION ASUM(IJ,AI
2. DIMENSION A(II)
3. ASUM=0.
4. IF(IJ.LE.0) GO TO 2
5. DO 1 I=1,J
6. ASUM=ASUM+A(II)
7. 1 CONTINUE
8. 2 RETURN
9. END
10.
11.

```

END FTN 42 TRANK 14 DPANK

6. PABLM

@FIN,SO 4A-SUMPRD

MS NOW TS 93 TRKS LIMIT 10000 MEM MAX IS 21000 WORDS LIMIT 95000
FTN 491 *10/05/79-10:1912,1

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1. FUNCTION SUMPRD(J,A,B)
2. DIMENSION A(11),B(11)
3. SUMPRD=0
4. DO 1 I=1,J
5. SUMPRD=SUMPRD+A(11)*B(I)
6. 1 CONTINUE
7. RETURN
8. END

```

END FTN 49 18ANK 18 OPANK

6. PABLM

DEFIN,SO AA,SOIL

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MS NOW IS      93 TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN BR1 *17/05/79-10:14(1,1)
100.      SUBROUTINE SCILIAM,SLCON,NFT,NONUCI
110.      C
120.      DIMENSION AM(100),SLCON(15,100)
130.      C
140.      C FOR INITIAL NUCLIDE DEPOSITION MODE (IDEP=0), SET INITIAL
150.      C DEPOSITION IN CI/M2 FOR YEAR 1. DECAY OCCURS IN OTHER ROUTINES.
160.      C
170.      C
180.      SLON=224.
190.      DO 10 I=1,NFT
200.      DO 20 J=1,NONUC
210.      20 SLCON(I,J)=AM(I)*1.0E12/SLON
220.      10 CONTINUE
230.      RETURN
240.      END
END FTN 67 IRANK 27 DRANK

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6. PABLM

AFIN,SO AA,DOSCI

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MS NOW IS      93 TRKS LIMIT 10000 MEM MAX IS      71000 WORDS LIMIT      95000
FIN #R1 *10/05/79-10:14:00,1
10. C THIS SUBROUTINE CALCULATES THE RADIATION DOSE FROM
20. C FROM INGESTION OF CONTAMINATED FARM PRODUCTS AND
30. C EXPOSURE TO CONTAMINATED GROUND
40. SUBROUTINE DOSCI INONUC,NORG,KORG,NFT,CON,POP,EXTIM,SLCON,EDBCON
50. &,DOSGRD,TOTDC,DCFAC,SLDFAC,KFDTYP,DOSCOM,TDDOSE,ELTO,
60. ITRAD,TBIO,DCINT,ITT,PLIFE,TDFD,T2
70. DIMENSION DOSGRD(100,5),SLDFAC(100,5)
80. DIMENSION SLCON(15,100),EDBCON(15,100),KFDTYP(15),CON(15)
90. DIMENSION KORG(5),DOSCOM(4,5),TDDOSE(5)
100. DIMENSION DCINT(15,100,5),DCFAC(100,5),TOTDC(100,5)
110. DIMENSION ITRAD(100),TBIO(100,5)
120. DIMENSION TDFD(15,5),ELTO(100)
130. INTEGER T2
140. C DOSE FROM EXPOSURE TO CONTAMINATED GROUND
150. DATA SLON/224./
160. CALL ZEPORISEO,TOTDCI
170. DO 60 I=1,NFT
180. IF (KFDTYP(I)).NE.15 GO TO 60
190. DO 100 INUC=1,NONUC
200. DOSGRD(INUC,1)=SLDFAC(INUC,1)*SLCON(I,INUC)*SLON*EXTIM*POP*
210. .DOSGRD(INUC,1)
220. DOSGRD(INUC,2)=SLDFAC(INUC,2)*SLCON(I,INUC)*SLON*EXTIM*POP*
230. .DOSGRD(INUC,2)
240. 100 CONTINUE
250. 60 CONTINUE
260. C INTERNAL DOSE DUE TO INGESTION OF CONTAMINATED FARM PRODUCTS
270. DO 200 IFD=1,NFT
280. IF (KFDTYP(IFD)).EQ. 0.1 GO TO 200
290. IF (KFDTYP(IFD)).EQ. 15.1 GO TO 200
300. DO 300 INUC=1,NONUC
310. DO 300 IORG=1,NORG
320. T1=1.0
330. TEFF=ITRAD(INUC)*TBIO(INUC,IORG)/ITRAD(INUC)
340. IF (KORG(IORG)).GE.20160 TO 76
350. DCINT(IFD,INUC,IORG)=DCFAC(INUC,IORG)*EDBCON(IFD,INUC)*CON(IFD
360. *POP*10.693/TEFF*T1*365.25*(EXP(-C.693/
370. TEFF*(T2-ITT+1)*365.25)-EXP(-0.693/TEFF
380. *(T2-ITT)*365.25))*DCINT(IFD,INUC,IORG)
390. GO TO 75
400. 76 DCINT(IFD,INUC,IORG)=DCFAC(INUC,IORG)*EDBCON(IFD,INUC)*
410. .CON(IFD)*POP*DCINT(IFD,INUC,IORG)
420. 75 CONTINUE
430. C
440. C SPECIAL CASES SET EQUAL TO TOTAL-BODY
450. C
460. H=H*
470. C=C*
480. N=N*
490. NA=NA*
500. IF (ELTO(INUC).EQ.H.OR.ELTO(INUC).EQ.C) GO TO 400
510. IF (ELTO(INUC).EQ.N.OR.ELTO(INUC).EQ.NA) GO TO 410
520. GO TO 301

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6. PABLM

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3 400. C
4 401. C SPECIAL CASE FOR H-3, C-14
5 500. C
6 501. 400 IF (KORG(IORG).EQ.6160 TO 299
7 502. DO 401 I=1,NORG
8 503. IF (KORG(I).NE.1160 TO 401
9 504. DCINT(IFD,INUC,IORG)=DCINT(IFD,INUC,I)
10 505. GO TO 301
11 506. 401 CONTINUE
12 507. C
13 508. C SPECIAL CASE FOR N-13, NA-22, NA-24
14 509. C
15 600. 410 DO 411 I=1,NORG
16 601. IF (KORG(I).NE.1160 TO 411
17 602. DCINT(IFD,INUC,IORG)=DCINT(IFD,INUC,I)
18 603. GO TO 301
19 604. 411 CONTINUE
20 605. 301 CONTINUE
21 606. 299 TOTDC(INUC,IORG)=TOTDC(INUC,IORG)+DCINT(IFD,INUC,IORG)
22 607. 300 CONTINUE
23 608. 200 CONTINUE
24 609. C
25 700. C GENERATE OUTPUT ARRAYS
26 701. C
27 720. IF (ITT.EQ.1160 TO 450
28 721. LIFE=PLIFE
29 722. IF (ITT.EQ.LIFE160 TO 450
30 723. IF (ITT.EQ.T2160 TO 450
31 724. GO TO 900
32 725. 450 CONTINUE
33 726. CALL ZEPORIZE,DOSCOM1
34 727. DO 600 IFD=1,NFY
35 728. IF (KEDTYP(IFD).EQ.0160 TO 600
36 729. IF (KEDTYP(IFD).LT.10160 TO 610
37 730. IF (KEDTYP(IFD).EQ.10160 TO 620
38 731. IF (KEDTYP(IFD).EQ.11160 TO 630
39 732. IF (KEDTYP(IFD).LT.15160 TO 640
40 733. GO TO 600
41 734. C
42 735. C TOTALS FOR PRODUCE
43 736. C
44 737. 610 DO 601 IORG=1,NORG
45 738. DO 601 INUC=1,NONUC
46 739. DOSCOM1,IORG)=DOSCOM1,IORG)+DCINT(IFD,INUC,IORG)
47 740. 601 CONTINUE
48 741. GO TO 600
49 742. C
50 743. C TOTALS FOR EGGS
51 744. C
52 745. 620 DO 602 IORG=1,NORG
53 746. DO 602 INUC=1,NONUC
54 747. DOSCOM12,IORG)=DOSCOM12,IORG)+DCINT(IFD,INUC,IORG)
55 748. 602 CONTINUE
56 749. GO TO 600
57 750. C
58 751. C TOTALS FOR MILK
59 752. C
60 753. C

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6. PABLM

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1 1040. 630 DO 603 IORG=1,NORG
2 1050. DO 603 INUC=1,NONUC
3 1060. DOSCOM(3,IOrg)=DOSCOM(3,IOrg)+DCINT(IID,INUC,IOrg)
4 1070. 603 CONTINUE
5 1080. GO TO 600
6 1090. C
7 1100. C TOTALS FOR MEAT
8 1110. C
9 1120. 640 DO 604 IORG=1,NORG
10 1130. DO 604 INUC=1,NONUC
11 1140. DOSCOM(4,IOrg)=DOSCOM(4,IOrg)+DCINT(IID,INUC,IOrg)
12 1150. 604 CONTINUE
13 1160. 600 CONTINUE
14 1170. DO 700 I=1,NORG
15 1180. IDDOSE(I)=0.0
16 1190. 700 CONTINUE
17 1200. DO 750 ID=1,4
18 1210. DO 750 IORG=1,NORG
19 1220. IDDOSE(IORG)=IDDOSE(IORG)+DOSCOM(ID,IOrg)
20 1230. 750 CONTINUE
21 1240. DO 801 IID=1,NFI
22 1250. IF (KFDTYP(IID).EQ.0) GO TO 801
23 1260. IF (KFDTYP(IID).EQ.15) GO TO 801
24 1270. DO 800 IORG=1,NORG
25 1280. IIDF(IID,IOrg)=0.0
26 1290. DO 800 INUC=1,NONUC
27 1300. IIDF(IID,IOrg)=IIDF(IID,IOrg)+DCINT(IID,INUC,IOrg)
28 1310. 800 CONTINUE
29 1320. 801 CONTINUE
30 1330. 900 RETURN
31 1340. END

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END FYN 839 IPANK 121 DPANK

6. PABLM

AFIN,SO AA,POSC2

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MS NOW TS      93 YRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN PRI *10/05/79-10:19(2,1)
10.  SUBROUTINE DOSC2(KPTHWY,FDCON,USAGE,POP,DCINTA,DCFAC,
20.  EXFT,EXTCON,SLOFAC,SWDFAC,ETDOS,NORG,NONUC,
30.  TOTDCA,KORG,NPT,DCINTN,DEXTN,DOSCM,DPSKIN,
40.  ETYSKIN,OPBODY,TTBCDY,T2,ITT,TBTO,TRAD,ELTO)
50.  C DOSE CALCULATIONS
60.  DIMENSION KPTHWY(18),FDCON(8,100)
70.  DIMENSION USAGE(8),DCINTA(8,100,5),DCFAC(100,5)
80.  DIMENSION TRAD(100),TBTO(100,5),ELTO(100)
90.  DIMENSION DEXT(8,100,5),EXTCON(8,100),
100.  SLOFAC(100,2),KORG(5)
110.  DIMENSION SWDFAC(100,2),ETDOS(100,5),TOTDCA(100,5)
120.  DIMENSION DCINTN(8,5),DEXTN(8,5)
130.  DIMENSION DOSCM(5),DPSKIN(8),OPBODY(8)
140.  INTEGER T2
150.  C
160.  C INTERNAL DOSE
170.  C
180.  1 CONTINUE
190.  CALL ZEROR(50,TOTDCA)
200.  CALL ZEROR(40,DCINTN)
210.  CALL ZEROR(5,DOSCM)
220.  CALL ZEROR(50,ETDOS)
230.  CALL ZEROR(40,DEXTN)
240.  CALL ZEROR(8,DPSKIN)
250.  CALL ZEROR(8,OPBODY)
260.  TTBCDY=0.0
270.  ETYSKIN=0.0
280.  DO 100 IFD=1,NPT
290.  IF (KPTHWY(IFD)).EQ.0 .OR. KPTHWY(IFD).GE.61.60 TO 100
300.  DO 110 INUC=1,NONUC
310.  DO 120 IORG=1,NORG
320.  IF(DCFAC(INUC,IORG).LE.0.0160 TO 120
330.  IF(KORG(IORG).EQ.12160 TO 120
340.  IF(KORG(IORG).GE.20160 TO 210
350.  C
360.  C GENERAL CASE: MOST ORGANS
370.  C
380.  TT=1.0
390.  TEFF=TRAD(INUC)*TBTO(INUC,IORG)/(TRAD(INUC)+TBTO(INUC,IORG))
400.  C
410.  DCINTA(IFD,INUC,IORG)=DCINTA(IFD,INUC,IORG)*DCFAC(INUC,IORG)*
420.  .FDCN(IFD,INUC)*USAGE(IFD)*POP*(0.693/TEFF*TT+365.25*
430.  .EXP(-0.693/TEFF*(T2-ITT+1)*365.25)-EXP(-0.693/TEFF*
440.  .(T2-ITT)*365.25))
450.  GO TO 220
460.  210 DCINTA(IFD,INUC,IORG)=DCINTA(IFD,INUC,IORG)*DCFAC(INUC,IORG)*
470.  .FDCN(IFD,INUC)*USAGE(IFD)*POP
480.  220 CONTINUE
490.  C
500.  C SPECIAL CASES SET EQUAL TO TOTAL BODY
510.  C
520.  H='H '
530.  C='C '

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6. PABLM

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3 470.      N=NA
4 480.      N=NA
5 490.      IF(ELT(INUC).EQ.H.OR.ELT(INUC).EQ.C)GO TO 230
6 500.      IF(ELT(INUC).EQ.N.OR.ELT(INUC).EQ.NA)GO TO 240
7 510.      GO TO 250
8 520.      C
9 530.      C SPECIAL CASE FOR H-3,C-14
10 540.      C
11 550.      230 IF(KOPG(IORG).EQ.6)GO TO 250
12 560.      DO 231 I=1,NORG
13 570.      IF(KOPG(I).NE.1)GO TO 231
14 580.      DCINTA(IFD,INUC,IORG)=DCINTA(IFD,INUC,I)
15 590.      GO TO 250
16 600.      231 CONTINUE
17 610.      C
18 620.      C SPECIAL CASE FOR N-13,NA-22,NA-24
19 630.      C
20 640.      240 DO 241 I=1,NCRE
21 650.      IF(KOPG(I).NE.1)GO TO 241
22 660.      DCINTA(IFD,INUC,IORG)=DCINTA(IFD,INUC,I)
23 670.      GO TO 250
24 680.      241 CONTINUE
25 690.      C
26 700.      C TOTAL DOSE, INTERNAL ONLY
27 710.      C
28 720.      250 TOTDCA(INUC,IORG)=TOTDCA(INUC,IORG)+DCINTA(IFD,INUC,IORG)
29 730.      120 CONTINUE
30 740.      110 CONTINUE
31 750.      100 CONTINUE
32 760.      C EXTERNAL DOSE--TOTAL BODY AND SKIN
33 770.      DO 260 IFD=1,NPT
34 780.      IF (KPTHWY(IFD).EQ. 0 .OR. KPTHWY(IFD).LT. 6) GO TO 200
35 790.      DO 510 IORG=1,2
36 800.      DO 510 INUC=1,NONUC
37 810.      IF (KPTHWY(IFD).GT. 6) GO TO 550
38 820.      DEXT(IFD,INUC,IORG)=EXTCON(IFD,INUC)*USAGE(IFD)*SLDFAC(INUC,IORG)
39 830.      C*POP*DEXT(IFD,INUC,IORG)
40 840.      GO TO 260
41 850.      550 DEXT(IFD,INUC,IORG)=EXTCON(IFD,INUC)*USAGE(IFD)*SWDFAC(INUC,IORG)
42 860.      C*POP*DEXT(IFD,INUC,IORG)
43 870.      260 ETIDOS(INUC,IORG)=ETIDOS(INUC,IORG) + DEXT(IFD,INUC,IORG)
44 880.      510 CONTINUE
45 890.      200 CONTINUE
46 900.      C DOSE TO ORGAN BY PATHWAY
47 910.      C DOSE COMMITMENT TO ORGAN BY PATHWAY
48 920.      DO 400 IORG=1,NORG
49 930.      IF (IORG(IORG).EQ.12) GO TO 400
50 940.      DO 410 IFD=1,NPT
51 950.      IF(KPTHWY(IFD).EQ. 0) GO TO 410
52 960.      DO 420 INUC=1,NONUC
53 970.      IF (KPTHWY(IFD).GE. 6) GO TO 430
54 980.      DCINTN(IFD,IORG)=DCINTN(IFD,IORG) + DCINTA(IFD,INUC,IORG)
55 990.      GO TO 420
56 1000.      430 CONTINUE
57 1010.      DEXTN(IFD,IORG)=DEXTN(IFD,IORG)+ DEXT(IFD,INUC,2)
58 1020.      420 CONTINUE
59 1030.      IF (KPTHWY(IFD).GE. 6) GO TO 440

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6. PABLM

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2      1090.      DOSCH(IORG)=DOSCH(IORG) + DCINTN(IFD,IORG)
2      1100.      GO TO 410
2      1110.      440 CONTINUE
2      1120.      DOSCH(IORG)=DOSCH(IORG) + DEXTN(IFD,IORG)
2      1130.      410 CONTINUE
1      1150.      400 CONTINUE
1      1160.      C DOSE TO SKIN BY PATHWAY
1      1170.      DO 450 IFD=1,NPT
1      1180.      IF (KPTHWY(IFD) .LT. 6) GO TO 450
1      1190.      DO 460 INUC=1,NONUC
2      1200.      460 DPSKIN(IFD)=EPSKIN(IFD) + DEXT(IFD,INUC,1)
2      1210.      TTSKIN=TTSKIN + DPSKIN(IFD)
1      1220.      450 CONTINUE
1      1230.      C EXTERNAL DOSE TO TOTAL BODY BY PATHWAY
1      1240.      C
1      1250.      DO 551 IFD=1,NPT
1      1260.      IF (KPTHWY(IFD) .LT. 6) GO TO 551
1      1270.      DO 560 INUC=1,NONUC
2      1280.      560 DPBODY(IFD)=EPBODY(IFD)+DEXT(IFD,INUC,2)
1      1290.      TTBODY=TTBODY+EPBODY(IFD)
1      1300.      551 CONTINUE
1      1310.      RETURN
1      1320.      DEBUG SUBCHK
1      1330.      AT 1
1      1340.      END

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END FTN 1495 IRANK 176 DBANK

6. PABLM

RTN,SO AA.DOSOUT

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MS NOW IS      97 TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN .R1 *10/05/79-10:1412,1
100.      SUBROUTINE DOSOUT(TITLE1,DD,ELTO,AWO,NORG,KORG,TRAD,AM,IDEP,ITT,
110.      .IPOP,PLIFE,NONUC,IOUT,IPCNT,NFT,CON,XQ,RIRR,HLOUP1,TRANS,TOTOC,
120.      .DOSGRD,WATCON,AIRCON,PLTCON,KFDTYP,LFCON,DOSCON,TDDOSE,
130.      .TDFD,T2,DCINT,NPT,KPTHWY,DCINTA,DEXT,WAT,CFLO,SW,DCINTN,DEXTN,
140.      .HLOUP2,USAGE,RM2,FOCON,B1OACF,ETDOS,EXTCON,DOSCH,DPSKIN,
150.      .TTSKIN,RECON,ISALT,DPRODY,TBODY,TOTDCA)
160.      C
170.      C THIS SUBROUTINE COORDINATES THE PRINTING OF OUTPUT FROM AIR,
180.      C LIQUID, OR AIR AND LIQUID RELEASES.
190.      C
200.      C      DIMENSION TITLE1(20),ELTO(100),AWO(100),KORG(5),TRAD(100),AM(100),
210.      .CON(15),XQ(15),HLOUP1(15),TRANS(15),TOTOC(100,5),DOSGRD(100,5),
220.      .WATCON(15,10),AIRCON(15,100),PLTCON(15,100),KFDTYP(15),
230.      .RIRR(15),DOSCON(4,5),TDDOSE(15),TDFD(15,5),DCINT(15,100,5),
240.      .KPTHWY(8),DCINTA(8,100,5),DEXT(8,100,5),WAT(100,8),
250.      .DCINTN(8,5),DEXTN(8,5),HLOUP2(8),USAGE(8),RM2(8),FOCON(8,100),
260.      .B1OACF(15,100),ETDOS(100,5),DOSCH(5),DPSKIN(8),RECON(100),
270.      .DPRODY(8),TOTDCA(100,5),EXTCON(8,100)
280.      C
290.      C      INTEGER I2
300.      C      REAL*4 LFCON(15,100)
310.      C      CHARACTER DD*8,AVC*6
320.      C
330.      C      1 CONTINUE
340.      C
350.      C      GENERATE COMBINED SUMMARY OUTPUT FOR ALL PATHWAYS
360.      C
370.      C      CALL SUMHRY(TITLE1,DD,ITT,PLIFE,ELTO,AWO,NORG,KORG,NONUC,
380.      .NFT,KFDTYP,TDFD,DOSGRD,TOTOC,
390.      .NPT,KPTHWY,DCINTN,DEXTN,TOTDCA,DOSCH,ETDOS,
400.      .IPOP,IDEP)
410.      C
420.      C      IF(NFT.GT.0) GO TO 1C
430.      C      GO TO 2C
440.      C      1C CALL OUT1(NFT,NORG,NONUC,ELTO,TRAD,AM,IOUT,CON,XQ,RIRR,HLOUP1,
450.      .TRANS,PLIFE,TITLE1,TOTOC,DOSGRD,KORG,DD,AWO,WATCON,AIRCON,PLTCON,
460.      .KFDTYP,LFCON,IPOP,DOSCON,TDDOSE,ITT,TDFD,T2,DCINT,IPCNT)
470.      C      2C CONTINUE
480.      C      IF(NPT.GT.0) GO TO 3C
490.      C      GO TO 99
500.      C      3C CALL OUT2(TITLE1,DD,ELTO,AWO,NORG,KORG,NPT,NONUC,KPTHWY,DCINTA,
510.      .DEXT,TRAD,AM,WAT,CFLO,SW,DCINTN,DEXTN,HLOUP2,USAGE,RM2,FOCON,
520.      .B1OACF,TOTDCA,ETDOS,EXTCON,DOSCH,DPSKIN,TTSKIN,RECON,ISALT,IPOP,
530.      .DPRODY,TBODY,I2,IPCNT,ITT,PLIFE,IOUT)
540.      C      IF(NFT.GT.0.AND.NPT.GT.0) GO TO 4C
550.      C      GO TO 99
560.      C      4C CONTINUE
570.      C      99 CONTINUE
580.      C      RETURN
590.      C      DEBUG SUBCHK
600.      C      AT 1
610.      C      END

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END FTN 423 FRANK 210 FRANK

6. PABLM

AFIN,SO AA.SUMMRY

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MS NOW IS      93 TRKS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FIN 8P1  *17/05/79-10:1411,1)
100.      SUBROUTINE SUMMRY(TITLE1,DD,ITT,PLIFE,ELTO,AWO,NORG,KORG,
110.      ENONUC,NFT,KFDTYP,TDFD,DOSGRD,TOTDC,
120.      ENPT,KPTHWY,DCINTN,DEXTN,TOTDCA,DOSCH,ETDOOS,
130.      RIPOP,IDEF)
140.      C
150.      DIMENSION TITLE1(20),ELTO(100),AWO(100),KORG(5),KFDTYP(15),
160.      ETDFD(15,5),DOSGRD(100,5),TOTDC(100,5),KPTHWY(8),
170.      DCINTN(8,5),DEXTN(8,5),TOTDCA(100,5),
180.      EDOSCH(5),ETDOOS(100,5),ONAME(21),PNAME1(15),PNAME2(8),
190.      ETXTY(5),TOTAL(5),LINES(5),1PER(5),TTNUC(5),GRD(2,100)
200.      Z,TNUC(100,5),PUNCH(5,100)
210.      C
220.      CHARACTER ALO*6,AWO*7,ONAME*10,PNAME1*10,PNAME2*10,DD*10
230.      CHARACTER LINES*10
240.      C
250.      DATA (ONAME(I),I=1,21)/'TOTAL BODY','BODY WATER',' KIDNEYS ',
260.      ' LIVER ', ' SPLEEN ', ' PANF ', ' FAT ', ' LUNGS ',
270.      ' ADRENALS ', ' TESTES ', ' OVARIES ', ' SKIN ', ' BRAIN ',
280.      ' MUSCLE ', ' PROSTATE ', ' THYROID ', ' PANCREAS ', ' HEART ',
290.      ' GI ', ' STOMACH ', ' SMALL INT ', ' GI-ULT ', ' GI-ILL '
300.      C
310.      DATA (PNAME1(I),I=1,15)/'LEAFY VEG.','O.A.G. VEG',' POTATOES ',
320.      ' RT.VEG.',' BERRIES ', ' MELONS ', ' ORCH.FRUIT ', ' WHEAT ',
330.      ' OT. GRIN ', ' EGGS ', ' MILK ', ' BEEF ', ' PORK ',
340.      ' POULTRY ', ' UNUSED '
350.      C
360.      DATA (PNAME2(I),I=1,8)/' FISH ', ' CRUSTACEA ', ' MOLLUSCS ',
370.      ' H2O PLANTS ', ' DRINK.H2O ', ' SHORELINE ', ' SWIMMING ', ' BOATING '
380.      C
390.      DATA (LINES(I),I=1,5)/5*'/-----/'
400.      C
410.      C PREPARE CONTROL VARIABLES
420.      C
430.      I CONTINUE
440.      AMQ='REM '
450.      IF(ITT.EQ.1)AMQ='MAN-REM'
460.      AMP='FFF'
470.      IF(IDEF.EQ.1.AND.NFT.GT.DIAMR=' ON'
480.      AMQ='OFF'
490.      IF(IDEF.EQ.2.AND.NFT.GT.DIAMQ='ON'
500.      AMP='OFF'
510.      IF(INPT.GT.DIAMR=' ON'
520.      CALL ZEPOR(5,TEXT)
530.      CALL ZEPOR(5,TOTAL)
540.      CALL ZEROR(5,TTNUC)
550.      C
560.      C SUMMARY TABLE BY PATHWAY
570.      C 1. PREPARE TOTAL VARIABLES
580.      C
590.      DO 10 I=1,NONUC
600.      DO 10 J=1,NORG
610.      TEXT(I)=TEXT(I)+DOSGRD(I,2)
620.      DO 11 I=1,NORG

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6. PABLM

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1 640. DO 12 J=1,NPT
2 641. 12 TOTAL(I)=TOTAL(I)+TDFD(J,I)
3 642. 11 TOTAL(I)=TOTAL(I)+TEXT(I)+DOSCM(I)
4 643. C
5 644. C
6 645. C 2. PRINT TITLES AND TABLES FOR INFORMATION BY EXPOSURE PATHWAY
7 646. C
8 647. C
9 648. C
10 649. C
11 650. C
12 651. C
13 652. C
14 653. C
15 654. C
16 655. C
17 656. C
18 657. C
19 658. C
20 659. C
21 660. C
22 661. C
23 662. C
24 663. C
25 664. C
26 665. C
27 666. C
28 667. C
29 668. C
30 669. C
31 670. C
32 671. C
33 672. C
34 673. C
35 674. C
36 675. C
37 676. C
38 677. C
39 678. C
40 679. C
41 680. C
42 681. C
43 682. C
44 683. C
45 684. C
46 685. C
47 686. C
48 687. C
49 688. C
50 689. C
51 690. C
52 691. C
53 692. C
54 693. C
55 694. C
56 695. C
57 696. C
58 697. C
59 698. C
60 699. C
61 700. C
62 701. C
63 702. C
64 703. C
65 704. C
66 705. C
67 706. C
68 707. C
69 708. C
70 709. C
71 710. C
72 711. C
73 712. C
74 713. C
75 714. C
76 715. C
77 716. C
78 717. C
79 718. C
80 719. C
81 720. C
82 721. C
83 722. C
84 723. C
85 724. C
86 725. C
87 726. C
88 727. C
89 728. C
90 729. C
91 730. C
92 731. C
93 732. C
94 733. C
95 734. C
96 735. C
97 736. C
98 737. C
99 738. C
100 739. C
101 740. C
102 741. C
103 742. C
104 743. C
105 744. C
106 745. C
107 746. C
108 747. C
109 748. C
110 749. C
111 750. C
112 751. C
113 752. C
114 753. C
115 754. C
116 755. C
117 756. C
118 757. C
119 758. C
120 759. C
121 760. C
122 761. C
123 762. C
124 763. C
125 764. C
126 765. C
127 766. C
128 767. C
129 768. C
130 769. C
131 770. C
132 771. C
133 772. C
134 773. C
135 774. C
136 775. C
137 776. C
138 777. C
139 778. C
140 779. C
141 780. C
142 781. C
143 782. C
144 783. C
145 784. C
146 785. C
147 786. C
148 787. C
149 788. C
150 789. C
151 790. C
152 791. C
153 792. C
154 793. C
155 794. C
156 795. C
157 796. C
158 797. C
159 798. C
160 799. C
161 800. C
162 801. C
163 802. C
164 803. C
165 804. C
166 805. C
167 806. C
168 807. C
169 808. C
170 809. C
171 810. C
172 811. C
173 812. C
174 813. C
175 814. C
176 815. C
177 816. C
178 817. C
179 818. C
180 819. C
181 820. C
182 821. C
183 822. C
184 823. C
185 824. C
186 825. C
187 826. C
188 827. C
189 828. C
190 829. C
191 830. C
192 831. C
193 832. C
194 833. C
195 834. C
196 835. C
197 836. C
198 837. C
199 838. C
200 839. C
201 840. C
202 841. C
203 842. C
204 843. C
205 844. C
206 845. C
207 846. C
208 847. C
209 848. C
210 849. C
211 850. C
212 851. C
213 852. C
214 853. C
215 854. C
216 855. C
217 856. C
218 857. C
219 858. C
220 859. C
221 860. C
222 861. C
223 862. C
224 863. C
225 864. C
226 865. C
227 866. C
228 867. C
229 868. C
230 869. C
231 870. C
232 871. C
233 872. C
234 873. C
235 874. C
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238 877. C
239 878. C
240 879. C
241 880. C
242 881. C
243 882. C
244 883. C
245 884. C
246 885. C
247 886. C
248 887. C
249 888. C
250 889. C
251 890. C
252 891. C
253 892. C
254 893. C
255 894. C
256 895. C
257 896. C
258 897. C
259 898. C
260 899. C
261 900. C
262 901. C
263 902. C
264 903. C
265 904. C
266 905. C
267 906. C
268 907. C
269 908. C
270 909. C
271 910. C
272 911. C
273 912. C
274 913. C
275 914. C
276 915. C
277 916. C
278 917. C
279 918. C
280 919. C
281 920. C
282 921. C
283 922. C
284 923. C
285 924. C
286 925. C
287 926. C
288 927. C
289 928. C
290 929. C
291 930. C
292 931. C
293 932. C
294 933. C
295 934. C
296 935. C
297 936. C
298 937. C
299 938. C
300 939. C
301 940. C
302 941. C
303 942. C
304 943. C
305 944. C
306 945. C
307 946. C
308 947. C
309 948. C
310 949. C
311 950. C
312 951. C
313 952. C
314 953. C
315 954. C
316 955. C
317 956. C
318 957. C
319 958. C
320 959. C
321 960. C
322 961. C
323 962. C
324 963. C
325 964. C
326 965. C
327 966. C
328 967. C
329 968. C
330 969. C
331 970. C
332 971. C
333 972. C
334 973. C
335 974. C
336 975. C
337 976. C
338 977. C
339 978. C
340 979. C
341 980. C
342 981. C
343 982. C
344 983. C
345 984. C
346 985. C
347 986. C
348 987. C
349 988. C
350 989. C
351 990. C
352 991. C
353 992. C
354 993. C
355 994. C
356 995. C
357 996. C
358 997. C
359 998. C
360 999. C
361 1000. C

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6. PABLM

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1102.      BODYT=C.0
1170.      DO 40 IOR=1,2
1180.      DO 40 IN=1,NONUC
1190.      GRD(I,IOR,INI)=C05GRD(I,IN,IOR)*EITDOS(I,IN,IOR)
1200.      SKINT=SKINT+GRD(1,INI)/2.0
1210.      40 BODYT=BODYT+GRD(2,INI)
1220.      C
1230.      PRINT 100,DO
1240.      PRINT 310,TITLE1
1250.      PRINT 320,ITT,FLIFE,AMO,AMP,AMR
1255.      IF(IODEP.EQ.0)PRINT 121
1260.      PRINT 125,AMC
1270.      PRINT 330
1280.      PRINT 331
1290.      DO 41 INUC=1,NONUC
1300.      IPER1=GRD(1,INUC)/SKINT*100.
1310.      IPER2=GRD(2,INUC)/BODYT*100.
1320.      41 PRINT 340,EL TO (INUC),AMO (INUC),GRD(1,INUC),IPER1,GRD(2,INUC),
1330.      IPER2
1340.
1350.      PRINT 331
1360.      PRINT 360,SKINT,BODYT
1370.      C
1380.      C TEMPORARY IDAHO FALLS DOSE FACTOR FILE CREATION INSERT
1390.      C 1. ADD TOTAL BODY EXTERNAL TO TOTAL BODY INTERNAL
1400.      C
1410.      DO 1000 J=1,NONUC
1420.      DO 999 J=1,NCRG
1430.      PUNCH(J,I)=TNUC(I,J)*GRD(2,I)
1440.      999 CONTINUE
1450.      1000 CONTINUE
1460.      C
1470.      C
1480.      C
1490.      WRITE(9,1002)ITT,AMO,AMP,(KORG(I),I=1,NORG)
1500.      1002 FORMAT(1X,DOSE TIME= ',IS,',WATR= ',A4,',AIR= ',A4,/,SIS)
1510.      DO 1003 J=1,NONUC
1520.      1003 WRITE(9,1004)EL TO(J),AMO(J),(PUNCH(I,J),I=1,NORG)
1530.      1004 FORMAT(A2,A6,5(1PF10.2E2))
1540.      C
1550.      C END INSERT
1560.      C
1570.      C
1580.      C HERE IS WHERE ALL THE DAMN FORMATS GO
1590.      C
1600.      100 FORMAT(1H1,T30,'COMBINED PATHWAY SUMMARY TOTALS PABLM VERSION2',
1610.      2X,A10)
1620.      110 FORMAT(135,'TOTALS BY PATHWAY FOR SPECIFIED ORGANS (INTERNAL',
1630.      2X,DOSES ONLY)',/,T25,'CASE TITLE: ',20A4)
1640.      120 FORMAT(130,'*** DOSE COMMITTEE SUMMARY FOR DOSE-YEAR',I4,' OF A',
1650.      2F4.0,' YEAR PLANT LIFE ***',/,T50,'IRRIGATION CROP PATHWAY: ',
1660.      2A4,/,T40,'AIR DEPOSITION CROP PATH: ',A4,/,T52,'AQUATIC FOODS'
1670.      2X,' PATHWAY:',A4,/)
1675.      121 FORMAT(142,'INITIAL NUCLIDE DEPOSITION MODE: DN',I
1680.      125 FORMAT(140,'DOSES AND TOTALS REPORTED IN ',A7)
1690.      130 FORMAT(115,'EXPOSURE',/,T15,'PATHWAY',5X,5(10X,A10))
1700.      131 FORMAT(115,'-----',2X,5(1X,A10),/)
1710.      140 FORMAT(115,A10,5(10X,1PF10.1E2))

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6. PABLM

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1720. 150 FORMAT(115,'FIELD DEP.',5(10X,1PE10.1E2))
1730. 160 FORMAT(115,' TOTALS ',5(10X,1PE10.1E2))
1740. C
1750. 210 FORMAT(135,'TOTALS BY NUCLIDE FOR SPECIFIED ORGANS (INTERNAL',
1760. 1700. 220 'E' DOSE ONLY)',/,125,'CASE TITLE: ',20A4)
1770. 230 FORMAT(8X,'RADIO NUCLIDE',5(5X,A10,' '))
1780. 231 FORMAT(8X,'-----',5(5X,A10,' ----'))
1790. 240 FORMAT(10X,A4,A6,5(7X,1PE8.1E2,2X,13))
1800. 260 FORMAT(10X,'TOTALS ',5(7X,1PE8.1E2,' 100'))
1810. C
1820. 310 FORMAT(150,'EXTERNAL DOSE TOTALS BY NUCLIDE',/,125,'CASE TITLE: ',
1830. 1800. 320 'E',20A4)
1840. 320 FORMAT(130,'*** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR',I4,' OF A',
1850. 1800. 320 'E',A4,C,' YEAR PLANT LIFE ***',/,150,'IRRIGATED FIELD PATHWAY: ',A4,
1860. 1800. 320 'E',/,145,'AIR DEPOSITION FIELD PATHWAY: ',A4,/,145,
1870. 1800. 320 'E',A4,' BODY EXPOSURE PATHWAYS: ',A4,/)
1880. 330 FORMAT(135,'RADIO NUCLIDE',5X,'SKIN DOSE ',5X,
1890. 1800. 330 'E',TOTAL BODY DOSE ',5X)
1900. 331 FORMAT(135,'-----',5X,'-----',5X,
1910. 1800. 331 'E',-----',5X)
1920. 340 FORMAT(137,A4,A6,5X,1PE8.1E2,16,7X,1PE8.1E2,5X,15)
1930. 360 FORMAT(137,'TOTALS',9X,1PE8.1E2,' 100',7X,1PE8.1E2,5X,' 100')
1940. C
1950. RETURN
1960. DFBUG SUBCHK
1970. AT I
1980. END

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END FIN 877 IRANK 2760 DBANK

6. PABLM

AFIN,SO AA.OUT1

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MS NOV 15      93 TRMS LIMIT 10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN 481  *10/-5/79-10:15:12,1
10.      SUBROUTINE OUT1NFT,NORG,NONUC,ELTO,TRAD,AM,IOUT,
20.      ECON,XQ,PIRR,HLDLP,TRNS,PLIFE,TITLE1,
30.      ETOTDC,DOSGRD,KORG,DO,AWO,WATCON,AIRCON,PLTCON,KFDTYP,LFCON,
40.      IPOP,DOSCOM,TDDOSE,ITT,TDFD,T2,DCINT,IPCNT)
50.      REAL*4 LFCON(15,100)
60.
70.      C
80.      C THIS SUBROUTINE GENERATES OUTPUT FROM NORMAL FOOD
90.      C PATHWAYS, FROM AIR OR IRRIGATION DEPOSITION
100.     C
110.     DIMENSION KORG(5),WATCON(100),AIRCON(15,100),PLTCON(15,100)
120.     DIMENSION KFDTYP(15),TDDOSE(5)
130.     DIMENSION DOSCOM(4,5),TDFD(15,5),
140.     ETDOSE(5),ONAME(5),FNAME(4),ELTO(100),TRAD(100),AMI(100),CON(15),
150.     ETOTDC(100,5),DOSGRD(100,5),PNAME(15),XQ(15),
160.     CRIRR(15),HLDLP(15),TRNS(15),ONAME(23),TITLE(12),AWO(100)
170.     DIMENSION AMO(2),ICPER(5)
180.     DIMENSION DCINT(15,100,5)
190.     INTEGER T2
200.     CHARACTER AMO*7
210.     CHARACTER DD*8
220.     CHARACTER AWO*6
230.     CHARACTER ONAME*10
240.     CHARACTER FNAME*7
250.     CHARACTER PNAME*10
260.     CHARACTER ONA*10
270.     DATA (FNAME(I),I=1,4)/'PRODUCE','EGGS ','MILK ','MEAT '/
280.     DATA (PNAME(I),I=1,15)/'LEAFY VEG.','O.A.G. VES','POTATOES ','
290.     ETOT.RT.VEG.','BERRIES ','MELONS ','ORCH.FRUIT','WHEAT ','
300.     ETOT.GRAIN','EGGS','MILK','BEEF','POPK','POULTRY','EXTERNAL'/
310.     DATA (ONAME(I),I=1,23)/'TOTAL BODY','BODY WATER','KIDNEYS',
320.     EL'LIVER','SPLEEN','BONE','FAT','LUNGS','ADRENALS','TESTES',
330.     EOVARIES','SKIN','BRAIN','MUSCLE','PROSTATE','THYROID','PANCREAS'
340.     E,'HEART','GI','STOMACH','SMALL INT','UPPER LARG','LOWER LARG'/
350.     DATA AMO(I),AMO(2)/' REM ','MAN-REM'/
360.     "E1
370.     IF (IPOP.NE.0)IME=2
380.     C SHORT SUMMARY
390.     PRINT 649
400.     649 FORMAT(1H1)
410.     PRINT 13, TITLE1,DD
420.     13 FORMAT(4X,20A4,1CX,A8)
430.     PRINT 14
440.     14 FORMAT (/,1X,'PABLM',10X,'VERSION 2.0', 1CX,'APRIL 1979')
450.     C
460.     C PRINT TITLES
470.     C
480.     TT=ITT
490.     IF (ITT.EQ.1)PRINT 650,AMO(1)
500.     IF (ITT.EQ.2)PRINT 651,AMO(1),PLIFE
510.     IF (ITT.EQ.3)PRINT 652,AMO(1),T2
520.     PRINT 653
530.     653 FORMAT(/,30X,'DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY')
540.     650 FORMAT(/, ' **DOSE COMMITMENT SUMMARY, ',A7,' FOR THE FIRST YE

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400.      .AD***I
400.      451  FORM,11/, '      ***DOSE COMMITMENT SUMMARY, ',A7,' FOR A PLANTLIFE
410.      .OF',F5.2,' YEARS***I
410.      452  FORM,11/, '      ***DOSE COMMITMENT SUMMARY, ',A7,' FOR A DOSE COMMI
420.      .TMENT PERIOD nF',15,' YEARS***I
430.      DO 160 IORG=1,NORG
440.      ONA,IORG)=ONAME(IORG,IORG)
450.      160  CONTINUE
460.      PRINT 10,(ONAME(IORG),IORG=1,NORG)
470.      10  FORMAT(1H0,5X,'FOOD PATHWAY',4X,5(A10,5X))
480.      IFLAG=0
490.      C
500.      C PRINT INDIVIDUAL PRODUCE VALUES
510.      C
520.      DO 180 J=1,NFT
530.      IF(KFDTYPIJ).EQ.C160 TO 180
540.      IF(KFDTYPIJ).GT.9) GO TO 180
550.      PRINT 11,PNAME(KFDTYPIJ),17DPTJ,IORG,IORG=1,NORG)
560.      IFLAG=1
570.      11  FORMAT(1/,7X,A10,6X,5(1PE9.2E2,5X))
580.      180  CONTINUE
590.      C
600.      C PRINT PRODUCE TOTAL
610.      C
620.      IF(IFLAG.EQ.C160 TO 170
630.      PRINT 20
640.      20  FORM,11/,1X,'**PRODUCE TOTAL**')
650.      PRINT 12,(DOSCOM1,IORG),IORG=1,NORG)
660.      12  FORMAT(1H0,22X,5(1PE9.2E2,5X))
670.      170  CONTINUE
680.      IFLAG=0
690.      C
700.      C PRINT EGG TOTAL
710.      C
720.      DO 180 J=1,NFT
730.      IF(KFDTYPIJ).NE.10) GO TO 22
740.      PRINT 51
750.      51  FORMAT(1/,1X,'**EGG TOTAL**')
760.      PRINT 12,(DOSCOM2,IORG),IORG=1,NORG)
770.      22  CONTINUE
780.      C
790.      C PRINT MILK TOTAL
800.      C
810.      IF(KFDTYPIJ).NE.11) GO TO 23
820.      PRINT 52
830.      52  FORMAT(1/,1X,'**MILK TOTAL**')
840.      PRINT 12,(DOSCOM3,IORG),IORG=1,NORG)
850.      55  FORMAT(1/)
860.      23  CONTINUE
870.      189  CONTINUE
880.      C
890.      C PRINT INDIVIDUAL MEAT VALUES
900.      C
910.      DO 190 I=1,NFT
920.      IF(KFDTYPII).LT.12.OR.KFDTYPII).EQ.15)GO TO 190
930.      PRINT 11,PNAME(KFDTYPII),17DPTI,IORG,IORG=1,NORG)
940.      IFLAG=1

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1 1050. 190 CONTINUE
1 1060. C
1 1070. C PRINT HEAT TOTAL
1 1080. C
1 1090. IF (FLAG.EQ.C) GO TO 195
1 1100. PRINT 15
1 1110. 15 FORM T17,1X,'**HEAT TOTAL**')
1 1120. PRINT 12,(DOSCOMIN,IORG),IORG=1,NORG
1 1130. PRINT 55
1 1140. C
1 1150. C PRINT OVERALL TOTAL
1 1160. C
1 1170. 195 CONTINUE
1 1180. PRINT 17
1 1190. 17 FORMAT(1H,1X,'***TOTAL FOR ALL FOOD PRODUCTS***')
1 1200. PRINT 55
1 1210. PRINT 12,(TDDOSE(IORG),IORG=1,NORG)
1 1220. DO 19 I=1,NFI
1 1230. IF (KFTYP(I).NE.15) GO TO 19
1 1240. C
1 1250. C PRINT EXTERNAL TOTALS
1 1260. C
1 1270. T0GRD1=C.C
1 1280. T0GRD2=C.C
1 1290. DO 225 INUC=1,NONUC
1 1300. T0GRD1=T0GRD1+COSGRD(INUC,1)
1 1310. T0GRD2=T0GRD2+COSGRD(INUC,2)
1 1320. 225 CONTINUE
1 1330. PRINT 18
1 1340. 18 FORMAT(17,1X,'**EXTERNAL TOTAL**',8X,'SKIN',6X,'TOTAL BODY')
1 1350. PRINT 55
1 1360. PRINT 12,T0GRD1,T0GRD2
1 1370. 19 CONTINUE
1 1380. C
1 1390. C SUMMARY BY NUCLIDE
1 1400. C
1 1410. IF (TOUT.EQ.0) GO TO 399
1 1420. PRINT 649
1 1430. IF (ITT.EQ.1) PRINT 650,AMO(IM)
1 1440. IF (TI.EQ.PLIFE) PRINT 651,AMO(IM),PLIFE
1 1450. IF (ITT.EQ.T2) PRINT 652,AMO(IM),T2
1 1460. PRINT 21
1 1470. 21 FORMAT(17,' ***RADIONUCLIDE PERCENT CONTRIBUTION***',/,
1 1475. ,T31,'DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY',/)
1 1480. PRINT 24,(ION,IORG),IORG=1,NORG
1 1490. 24 FORMAT(1H,3X,'RADIONUCLIDE',3X,5(A10,3X,'%',2X))
1 1500. PRINT 55
1 1510. DO 200 INUC=1,NONUC
1 1520. DO 210 IORG=1,NORG
1 1530. ICPER(IORG)=T0TDC(INUC,IORG)/TDDOSE(IORG)*100
1 1540. 210 CONTINUE
1 1550. PRINT 25,(ELTC(INUC),AMO(INUC),(T0TDC(INUC,IORG),ICPER(IORG)
1 1560. ,IORG=1,NORG)
1 1570. 25 FORMAT(4X,A4,A6,5X,5(1PE9.2E2,2X,13,2X))
1 1580. 200 CONTINUE
1 1590. PRINT 26,(TDDOSE(IORG),IORG=1,NORG)
1 1600. 26 FORMAT(17,2X,'**TOTAL**',8X,5(1PE9.2E2,7X))

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6. PABLM

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1617.      DO 66 I=1,NFI
1627.      IF(IKFDTYP(I)).NE.15)GO TO 66
1630.      C
1647.      C CHART FOR EXTERNAL DOSE
1650.      C
1660.      PRINT 649
1677.      PRINT 13,TITLE1,DD
1680.      PRINT 14
1690.      IF(IIT.EQ.1)PRINT 650,AMOIM1
1700.      IF(I1.EQ.PLIFE)PRINT 651,AMOIM1,PLIFE
1710.      IF(IIT.EQ.T2)PRINT 652,AMOIM1,T2
1720.      PRINT 60
1730.      60 FORMAT (15X,'EXTERNAL DOSE FROM GROUND CONTAMINATION',/)
1740.      PRINT 70
1750.      70 FORMAT(/,1X,'RADIONUCLIDE',3X,'RELEASE',6X,
1760.      C'DOSE-SKIN',3X,'2',6X,'DOSE-TOT BODY',3X,'2')
1770.      PRINT 69
1780.      69 FORMAT(1X,65(' '))
1790.      DD 230 INUC=1,NUC
1800.      IDPER1=DOSGRD(INUC,1)/TDGRD1*100.
1810.      IDPER2=DOSGRD(INUC,2)/TDGRD2*100.
1820.      IF(IDPER1.GE.1PCNT) GO TO 235
1830.      IF(IDPER2.LT.1PCNT) GO TO 230
1840.      235 PRINT 65,ELT(INUC),AMO(INUC),AM(INUC),
1850.      C'DOSGRD(INUC,1),IDPER1,DOSGRD(INUC,2),IDPER2
1860.      65 FORMAT(/,1X,A4,A6,2(15X,1PE8.2E2),3X,13,7X,1PE8.2E2,5X,13)
1870.      230 CONTINUE
1880.      PRINT 30,TDGRD1,TDGRD2
1890.      30 FORMAT(1HD,'TOTAL',23X,1PE8.2E2,13X,1PE8.2E2)
1900.      66 CONTINUE
1910.      C
1920.      C COMPLETE INFORMATION LISTING -- OPTIONAL
1930.      C
1947.      IF(IOUT.LT.2) GO TO 399
1950.      PRINT 649
1967.      PRINT 13,TITLE1
1970.      PRINT 14
1980.      DD 300 IFD=1,NFI
1990.      IF(IIFD.GT.1)PRINT 649
2000.      IF(IIT.EQ.1)PRINT 650,AMOIM1
2010.      IF(I1.EQ.PLIFE)PRINT 651,AMOIM1,PLIFE
2020.      IF(IIT.EQ.T2)PRINT 652,AMOIM1,T2
2025.      PRINT 653
2030.      IF(IKFDTYP(IFD).EQ.0.OR.KFDTYP(IFD).EQ.15) GO TO 300
2040.      PRINT 36,PNAME(IKFDTYP(IFD)),CON(IFD),XO(IFD),RIRR(IFD),
2050.      C'HLDP(IIFD),TRANS(IFD),PLIFE
2060.      36 FORMAT(1X,A15,' CONSUMPTION = ',F10.4,T37,' X/O = ',1PE10.3E2,
2070.      C'.T55,' IRRIGATION RATE = ',DPF10.4,/,', HOLDUP = ',F10.4,T30,
2080.      C', TRANSLOCATION = ',1PE10.2E2,T60,' PLANT LIFE (YRS) = ',DPF10.4)
2090.      DD 325 IORG=1,AORG
2100.      TDCNUC=0.0
2110.      DD 360 INUC=1,NUC
2120.      TDCNUC=TDCNUC+DCINT(IFD,INUC,IORG)
2130.      360 CONTINUE
2140.      ONA(IORG)=ONAME(ORG(IORG))
2150.      IFLAG=C
2160.      IF(TDCNUC.LE.0)GO TO 325

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6. PABLM

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2 2170. PRINT 37,ONA(IORG)
2 2180. PRINT 31
2 2190. PRINT 32, AMCINI
2 2200. IFLAG = 1
2 2210. 500 CONTINUE
2 2220. 37 FORMAT(1/,1X,A1C1
2 2230. 31 FORMAT(1H,'NUCLIDE',6X,'HALF-LIFE',4X,'RELEASE',8X,
2 2240. 6'CONCENTRATION',6X,' FRACTION ',6X,'PLANT',4X,
2 2250. 6'DOSE COMM',6X,'X')
2 2260. 32 FORMAT(1H,'15X,'DAYS',8X,'CI/Y?',8X,'WATER',6X,'AIR',6X,
2 2270. 6'LLAF',3X,'RCOT',5X,'CONC',6X,'?')
2 2280. PRINT 39
2 2290. 39 FORMAT(1X,1031'+')
2 2300. DO 350 INUC=1,NONUC
2 2310. FL=LFCON(IFD,I AUCI)/PLTCON(IFD,INUC)
2 2320. FR=(1.-FL)
2 2330. KDCPER=DCINT(IFD,INUC,IORG)/TDCNUC*100
2 2340. IF(KDCPER .LT. 1PCNT) GO TO 350
2 2350. 370 CONTINUE
2 2360. PRINT 34,FLTCI(INUC),AMOI(INUC),TRADI(INUC),AM(INUC),WATCON
2 2370. 6(INUC),AIRCON(IFD,INUC),FL,FR,PLTCON(IFD,INUC),DCINT(IFD
2 2380. 6,INUC,IORG),KDCPER
2 2390. 34 FORMAT(1X,A4,A6,4X,2(1PE8.2E2,3X),3X,1PE7.1E2,3X,1PE7.1E2,1X,
2 2400. 6(1PE8.1E2,1X),2(1PE7.1E2,4X),1X,I3)
2 2410. 350 CONTINUE
2 2420. IF(IFLAG.EQ.1)PRINT 35,TDCNUC
2 2430. 35 FORMAT(87X,7(1'-'),1X,'TOTAL',81X,1PE7.1E2)
2 2440. 325 CONTINUE
2 2450. 300 CONTINUE
2 2460. 399 RETURN
2 2470. END

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END FTN 767 IRANK 1503 DBANK

6. PABLM

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620.      PRINT 30, AMC(M),ITT
630.      30  FORMAT (1HD, 'DOSE COMMITMENT TO ORGAN BY PATHWAY, I', A7, 'I',
640.      . ' FOR A COMMITMENT TIME OF ', I6, ' YEARS')
650.      PRINT 70, PLIFE, WATIT
660.      70  FORMAT (10X, 'FOR A PLANT LIFE OF ', IPE8.1E2, ' YEARS',
670.      . ' FOR ', A5, ' WATER')
680.      PRINT 31
690.      PRINT 27, IONAME(KORG(IORG)), IORG=1, NORG)
700.      DO 310 IFO=1, NPT
710.      IF (KPTHWY(IFD) .GE. 6) GO TO 320
720.      PRINT 29, PNAME(KPTHWY(IFD)), INCINTN(IFD, IORG), IORG=1, NORG)
730.      GO TO 310
740.      320  PRINT 26, PNAME(KPTHWY(IFD)), OPSKIN(IFD), OPBODY(IFD),
750.      . (DEXTN(IFD, IORG), IORG=1, NORG)
760.      310  CONTINUE
770.      PRINT 25, TTSKIN, TTBODY, IDOSCH(IORG), IORG=1, NORG)
780.      IF (IOUT.LT.1) GO TO 560
790.      C
800.      C SUMMARY TABLE-- DOSE COMMITMENT TO ORGAN BY NUCLIDE
810.      C
820.      PRINT 20, TITLE1, DO
830.      PRINT 21
840.      PRINT 40
850.      40  FORMAT (1HD, ' DOSE COMMITMENT TO ORGAN BY NUCLIDE,
860.      . EXTERNAL DOSES REPORTED SEPARATELY')
870.      DO 400 IORG=1, NORG
880.      PRINT 41, IONAME(KORG(IORG)), CFLC
890.      41  FORMAT (1//, 1X, A10, 10X, 'COOLANT FLOW=', IPE8.1E2, ' CUBIC FEET/SEC')
900.      PRINT 48
910.      48  FORMAT (1X, '=====')
920.      PRINT 42
930.      42  FORMAT (1//, ' NUCLIDE', 8X, 'HALF-LIFE', 3X, 'RELEASE', 20X,
940.      . 'DOSE COMM', 4X, 'X')
950.      PRINT 43, AMC(M)
960.      43  FORMAT (17X, 'DAYS', 6X, ' CI/YR', 23X, A7, /, 1X, 70I'+')
970.      DO 410 INUC=1, NONUC
980.      IDOCPER=TOTDC(INUC, IORG)/DOSCH(IORG)*100.
990.      PRINT 44, ELTC(INUC), AMO(INUC), TRAD(INUC), AM(INUC),
1000.      . ETOTDC(INUC, IORG), IDOCPER
1010.      44  FORMAT (11X, A4, A6, 5X, IPE8.1E2, 3X, IPE8.1E2, 19X,
1020.      . IPE8.1E2,
1030.      . 4X, 13I)
1040.      410  CONTINUE
1050.      PRINT 45, DOSCH(IORG)
1060.      45  FORMAT (156, 7(' -'), /, 2X, 'TOTAL', 47X, IPE8.1E2)
1070.      400  CONTINUE
1080.      PRINT 46, CFLC
1090.      46  FORMAT (1//, 1X, 'EXTERNAL DOSE', 16X, 'COOLANT FLOW = ', IPE8.1E2, ' CUB
1100.      . IC FEET/SEC.')
1110.      PRINT 47
1120.      47  FORMAT (1//, ' NUCLIDE', 8X, 'HALF-LIFE', 3X, 'RELEASE', 4X,
1130.      . 'SKIN DOSE', 3X, 'X', 4X, 'T.B. DOSE', 4X, 'X')
1140.      PRINT 43, AMC(M)
1150.      DO 420 INUC=1, NONUC
1160.      ISDPER=ETTDOS(INUC, 1)/TTSKIN*100.
1170.      ITDPER=ETTDOS(INUC, 2)/TTBODY*100
1180.      PRINT 75, ELTC(INUC), AMO(INUC), TRAD(INUC), AM(INUC), ETTDOS(INUC, 1)

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6. PABLM

afTN,SO AA.OUT2

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P5 NOW IS          93 TRKS LIMIT  10000 MEM MAX IS      21000 WORDS LIMIT      95000
FTN HR1  *IC/05/79-10:17(2,1)
100.      SUBROUTINE OUT2(TITLE1,DD,ELTO,AWO,NORG,KORG,NPT,NONUC,KPTHWY,
110.      DCINTA,DEXT,TRAD,AM,WAT,CFLQ,EW,DCINTN,DEXTN,HLDUP2,
120.      USAGE,RM2,FDCON,BTOACF,TOTDC,ETTDOS,EXTCON,DOSCH,
130.      ZDPSKIN,TTSKIN,RECON,ISALT,IPOP,DPRODY,TBODY,T2,IPCNT,
140.      TITI,PLIFE,IOUT1
150.      DIMENSION ELTO(100),AWO(100),ONAME(23),PNAME(8),KORG(5)
160.      DIMENSION KPTHWY(8),DCINTA(8,100,5),DEXT(8,100,5)
170.      DIMENSION DCINTN(8,5),DEXTN(8,5),DOSCH(5)
180.      DIMENSION TRAD(100),AM(100),WAT(100,8),DPSKIN(8)
190.      DIMENSION TOTDC(100,5),ETTDOS(100,5),EXTCON(8,100)
200.      DIMENSION HLDUP2(8),USAGE(8),FDCON(8,100),RM2(8)
210.      DIMENSION BTOACF(5,100),DPBODY(8),TITI(20),RECON(100)
220.      DIMENSION AMGI(2)
230.      C
240.      CHARACTER AMC*7
250.      CHARACTER DD*8
260.      CHARACTER AWO*6
270.      CHARACTER ONAME*10
280.      CHARACTER PNAME*10
290.      CHARACTER WATIT*5
300.      C
310.      INTEGER T2
320.      C
330.      DATA AMO(1),AMC(2),/ ' REM ', 'MAN-REM'/
340.      DATA IPNAME(1),I=1,8,/' FISH', 'CRUSTACEA', 'MOLLUSCS', 'PLANTS',
350.      'DRINK', 'H2O', 'SH,RELIN', 'SWIMMING', 'ROATING'/
360.      DATA IONAME(1),I=1,23,/' TOTAL BODY', 'BODY WATER', 'KIDNEYS',
370.      'LIVER', 'SPLEEN', 'BONE', 'FAT', 'LUNGS', 'ADRENALS', 'TESTES',
380.      'OVARIES', 'SKIN', 'BRAIN', 'MUSCLE', 'PROSTATE', 'THYROID', 'PANCREAS',
390.      'HEART', 'GI', 'STOMACH', 'SMALL INT', 'UPPER LARG', 'LOWER LARG'/
400.      C
410.      C SOME FORMATS FOR SUMMARY TABLES
420.      C
430.      C
440.      WATIT='FRESH'
450.      IF (ISALT.EQ.1) WATIT='SALT'
460.      M=1
470.      IF (IPOP.NE.0) M=2
480.      I CONTINUE
490.      20 FORMAT(1H1,4X,20A4,1CX,A8)
500.      21 FORMAT(1H0, ' PABLM+VERSION2. APRIL 1979 BA NAPIER',
510.      .15X, '*** AQUATIC EXPOSURE PATHWAYS ONLY ***')
520.      3) FORMAT(22X, 'EXTERNAL', 40X, 'INTERNAL', /,
530.      . 401'--'), 5X, 701'--')
540.      23 FORMAT(1H0, 'PATHWAY', 9X, 'SKIN', 8X, 'TOTAL BODY', 8X, 5(10, 5X), /)
550.      24 FORMAT (1X, A10, 3(X, 5(1PE8, 1E2, 7X)))
560.      25 FORMAT (1X, A10, 4X, 1PE8, 1E2, 8X, 1PE8, 1E2, 8X, 5(1PE8, 1E2, 7X))
570.      C
580.      C SUMMARY TABLE--DCSE COMMITMENT TO ORGIN BY PATHWAY
590.      C
600.      PRINT 20, TITLE1, DD
610.      PRINT 21

```

6. PABLM

```

1 1100.      T,ISDPER,ETDGS,INUC,21,ISDPER
1 1200.      75 FORMAT(1X,A4,A6,5X,1PE8.1E2,3X,1PE8.1E2,4X,1PE8.1E2,
1 1210.      .15,4X,1PE8.1E2,15)
1 1220. 420  CONTINUE
1 1230.      PRINT 49,TTSKIN,TTBODY
1 1240.      49 FORMAT(140,7(' '),157,7(' '),,2X,'TOTAL',22X,2(1X,1PE8.1E2))
1 1250.      IF(IOUT.LT.2)GO TO 560
1 1260.      C
1 1270.      C COMPLETE TABLE--DOSE COMMITMENT TO ORGAN
1 1280.      C
1 1290.      C BY PATHWAY AND NUCLIDE
1 1300.      C
1 1310.      C INTERNAL PATHWAY
1 1320.      C
1 1330.      PRINT 20,TITLE1,DD
1 1340.      PRINT 21
1 1350.      PRINT 50
1 1360. 50  FORMAT(1H0,' DOSE COMMITMENT')
1 1370.      DO 500 IFD=1,NPI
1 1380.      IF (KPTHWY(IFD) .EQ. 0 .OR. KPTHWY(IFD) .GE. 6) GO TO 500
1 1390.      IF(IFD.NE.1)PRINT 2
1 1400.      2  FORMAT(1H1)
1 1410.      PRINT 51, PNAME(KPTHWY(IFD))
1 1420.      51  FORMAT(1,5X,A10,1,5X,10(' '))
1 1430.      PRINT 52,HOLDUP2(IFD),USAGE(IFD),RM2(IFD)
1 1440.      52  FORMAT(1,,' HOLDUP = ',1PE8.1E2,1CX,'CONSUMPTION = ',1PE8.1E2,
1 1450.      1CX,'MIXING RATIO = ',1PE8.1E2)
1 1460.      DO 510 IORG=1,NORG
1 1470.      IF (KORG(IORG) .EQ. 12) GO TO 510
1 1480.      PRINT 51,ONAME(KORG(IORG))
1 1490.      IF (KPTHWY(IFD) .EQ. 5) GO TO 520
1 1500.      PRINT 53
1 1510.      53  FORMAT(1,,' NUCLIDE',7X,'HALF-LIFE',3X,'RELEASE',4X,'WATER',
1 1520.      1X,'CONC',3X,'RECON',3X,'R1OACF',5X,'CONC',22X,
1 1530.      1X,'DOSE COMM',3X,'1')
1 1540.      PRINT 54, AMC(M)
1 1550.      54  FORMAT(16X,'DAYS',7X,' CI/YR',6X,'PCI/L ',7X,'FAC',14X,
1 1560.      1X,'PCI/KG',21X,A7,1,1X,11(' '))
1 1570.      GO TO 530
1 1580.      520  PRINT 55
1 1590.      55  FORMAT(1,,' NUCLIDE',7X,'HALF-LIFE',3X,'RELEASE',4X,'WATER ',
1 1600.      1X,'CONC',2X,'RECON',3X,'H2O CH',5X,'CONC',21X,
1 1610.      1X,'DOSE COMM',4X,'1')
1 1620.      PRINT 56, AMC(M)
1 1630.      56  FORMAT(16X,'DAYS',7X,' CI/YR',6X,'PCI/L ',4X,'FAC',
1 1640.      14X,'FACTOR',4X,'PCI/KG',21X,A7,1,1X,11(' '))
1 1650.      570  DO 540 INUC=1,NONUC
1 1660.      IDCPER=DCINTA(IFD,INUC,IORG)/DCINTN(IFD,IORG)*100.
1 1670.      IF(IDCPER.LT.1)PCNT)GO TO 540
1 1680.      59  PRINT 57,ELTO(INUC),AMOI(INUC),TRAD(INUC),AM(INUC),WAT(INUC,IFD),
1 1690.      1X,'RECON',R1OACF(IFD,INUC),FDCGHI(IFD,INUC),
1 1700.      1X,'DCINTA(IFD,INUC,IORG),IDCPER
1 1710.      57  FORMAT(1X,A4,A6,3(4X,1PE8.1E2),3(1X,1PE8.1E2),
1 1720.      1X,1PE8.1E2,2X,13,4X)
1 1730.      540  CONTINUE
1 1740.      PRINT 58,DCINTN(IFD,IORG)
1 1750.      58  FORMAT(197,'-----',,,' TOTAL',197,1PE8.1E2)

```

6. PABLM

```

1767. 510 CONTINUE
1 1777. 500 CONTINUE
1 1787. C
1 1797. C EXTERNAL PATHWAYS
1 1807. C
1817. DO 550 IFD=1,NFI
1827. IF (KPTHWY(IFD)) .EQ. 0 .OR. KPTHWY(IFD) .LT. 61 GO TO 550
1837. PRINT 2
1847. PRINT 51,PNAME(KPTHWY(IFD))
1857. PRINT 60,HLDLP2(IFD),USAGE(IFD),RM2(IFD),SW
1867. 60 FORMAT(//,' HLDLP = ',F5.1,10X,'USAGE(HR/YR) = ',1PE8.1,10X,
1877. 'MIXING RATIO = ',DPE6.3,10X,'SHORE WIDTH FACT. = ',F5.3)
1887. PRINT 61, AMCI(I)
1897. 61 FORMAT(//,' NUCLIDE',7X,'HALF-LIFE',8X,'RELEASE',7X,'WATER '
1907. 'CONC',7X,'RECON',7X,'SHORFLI'E CONC',7X,' DOSE ',
1917. 'COMMITMENT',7X,' ' ' ')
1927. PRINT 62
1937. 62 FORMAT(16X,'DAYS',12X,' CI/YR',10X,'PCI/L ',10X,'FAC',
1947. 'EX',10X,'PCI/****',2X,'SKIN',7X,'2',4X,'T BODY',6X,'1',7X,123(' '))
1957. DO 670 INUC=1,NONUC
1967. ISPER=DEXT(IFD,INUC,11/DPSKIN(IFD))*100.
1977. IRPER=DEXT(IFD,INUC,21/DEXT(INUC,11)*100.
1987. IF (ISPER.GE.1PCNT)GO TO 65
1997. IF (IRPER.LT.1PCNT)GO TO 570
2007. 65 PRINT 63,ELT(INUC),AM0(INUC),TRAD(INUC),AM1(INUC),WAT(INUC,IFD),
2017. (RECON(INUC),EXTCON(IFD,INUC),DEXT(IFD,INUC,11,ISPER,DEXT(IFD,
2027. INUC,21,IRPER
2037. 63 FORMAT(1X,A2,A6,6I6X,1PE8.1E2,1X),15,1PE11.1E2,2X,15)
2047. 57 CONTINUE
2057. PRINT 64,DPSKIN(IFD),DEXT(INUC,21
2067. 64 FORMAT(192,7(' '),10X,7(' '),7,2X,'TOTAL',75X,2I8X,1PE8.1E2)
2077. 550 CONTINUE
2087. 560 CONTINUE
2097. RETURN
2107. DEBUG SUBCHK
2117. AT 1
2127. END

```

END FTH 718 IPANK 2045 DBANK

BACK AA.

MS NOW IS 93 TRKS LIMIT 10000 MEM MAX IS 10000 WORDS LIMIT 95000
 PURPUR 27R2 SL73R1 10/05/79 10:17:50
 END PACK. TEXT=51,IOC=1,SYM=25,REL=25,APS=1

BACK AA.
 END PREP.

8SYM PRINT',PRPP

8PIN

100

1. *Staphylococcus aureus*

1

APPENDIX F
INPUT PREPARATION AND DIAGNOSTICS

APPENDIX F

INPUT PREPARATION AND DIAGNOSTICS

The input data required for the calculations falls into four categories: general parameters, terrestrial parameters, aquatic parameters, and radionuclide release information. The preponderance of the data required by the code is contained in five data libraries that are accessed by the code (see Appendix E), thus eliminating much effort in preparing the input.

The general parameters include program control parameters, case-specific control parameters such as population and plant life, and reconcentration parameters. The terrestrial parameters characterize the type of farming done near the area of interest, and the aquatic parameters characterize the exposure pathways from liquid releases.

This appendix describes in detail the input variables, their use and the manner in which they are input to the program. The code has some self-generated diagnostics if an error is made on input. These are discussed after the input parameters.

DATA CARD DESCRIPTIONS

CARD 1--TITLE CARD

An entire card in Format 20A4. Words entered here are reprinted as a title on the output pages. Each following case requires either a title or a blank card.

CARDS 2 TO N--NAMELIST DATA CARDS (ONE OR MORE NAMELIST CARDS)

The minimum data for each case consists of one title card (Card 1), and one or more cards using the Namelist format (Cards 2 to N). The first Namelist card (Card 2) must be blank in Column 1, \$INPUT in columns 2-7, followed by at least one blank, followed by data items. The data items are separated by a comma, and the last data item must be followed by a \$END. The data items must have one of the three following forms:

1. Variable name = constant, where the variable name may be either subscripted or not.
2. Array name = set of constants (separated by commas). The number of constants must not exceed the number of elements in the array and they must be in the same order as the array is in storage, i.e., the first subscript changes most rapidly.
3. Subscripted variable = set of constants (separated by commas). This form results in the set of constants being placed in consecutive array elements, starting with the element designated by the subscripted variable. Again, the number of elements in the array between the given element in the array and the last element in the array.

The namelist variables retain their values throughout the execution of the program and need not be respecified unless a change is wished. The namelist input variables are shown in the following list:

TABLE OF NAMELIST VARIABLES

GENERAL PARAMETERS

A. Program control parameters

1. NEXT: This variable is used to string together several calculations. It controls the reading of radionuclide release inventories. There are four options corresponding to NEXT = 1,2,3,4.

NEXT = 1. For doing one case. Read release data, do computations, and end.

NEXT = 2. Read release data, do computations, and prepare to read another case.

NEXT = 3. Use previously input release data, do computation, and prepare to do another case.

NEXT = 4. Stop.

2. IDEP: Key for the type of radionuclide deposition mechanism on terrestrial plants.

IDEP = 0. Initial deposition mechanism. Input is in pCi/m^2 on the soil at time zero.

IDEP = 1. Atmospheric deposition mechanism. If IDEP = 1, any aquatic pathways will have zero results.

IDEP = 2. Water deposition (irrigation) mechanism. This also enables the aquatic exposure pathways. With this option, the IREC option (described below) and its supporting variables must be initialized.

3. IOUT: Key for completeness of output.

IOUT = 0. (default) Summary by exposure pathway only for input organs.

IOUT = 1. Summaries by pathway and by nuclide for input organs.

IOUT = 2. Complete output by pathway and nuclide for input organs. This option generates much paper.

4. IPCNT: The percent cut-off for reporting doses by nuclide for IOUT option 2. Default is zero.

5. IAC: Key for type of radionuclide release, either continuous chronic or accidental acute. Default is zero, chronic. If IAC = 1 for acute is used, PLIFE should be set equal to one.
6. DKSORS: Key for automatic decay of source term. Note that this is an integer value. Default is zero, no decay. This variable is useful to simulate a source such as a tank with a constant mass leak rate and decaying contents.

B. Case-specific general parameters

7. PLIFE: The time in years that the release of radionuclides continues, starting at the time the calculation begins. Zero for initial deposition mode, zero or one for acute releases.
8. T2: The time in years for which the accumulated dose is to be calculated. Note that this is an integer value.
9. IPOP: Key for population considered.
 IPOP = 0. (default) Maximum individual (POP = 1).
 IPOP = 1. Population. This requires that POP be specified.
10. POP: The population size for calculations other than maximum individual.
11. KOR(5): Choice of organs by number:

Number	Organ
1	Total body
2	Body water
3	Kidneys
4	Liver
5	Spleen
6	Bone
7	Fat
8	Lungs
9	Adrenals
10	Testes
11	Ovaries
12	Skin
13	Brain
14	Muscle
15	Prostate
16	Thyroid
17	Pancreas
18	Heart
19	GI
20	Stomach
21	Small intestine
22	Upper large intestine
23	Lower large intestine

C. Reconcentration parameters

12. IREC: Reconcentration model used.

IREC = 1. Cooling water is drawn from a cooling pond, small lake or reservoir which is connected to a larger body of water or is fed by a stream. Requires that namelist variables CFLO, FLO, CTIM, VOL, and TOR be included (described below).

IREC = 2. The cooling water inlet is downriver from the outfall or on a lake or ocean site arranged such that recirculation occurs. Requires namelist variables CTIM and VOL be included.

IREC = 3. No reconcentration, RECON = 1.

13. CFLO: Coolant flow in ft^3/sec . This is the water by which the radio-nuclide release is diluted.

14. FLO: Makeup flow, ft^3/sec (water drawn into the intake to replace losses).

15. CTIM: Cycle time in hours.

16. TOR: Pond turnover rate in inverse seconds.

17. VOL: For IREC = 1, VOL is the pond volume in ft^3
For IREC = 2, VOL is the recycle fraction, (the [unitless] mixing ratio at the point of intake).

18. RM: The mixing ratio, used in calculating the water concentration of released nuclides.

D. Terrestrial exposure pathway parameters

19. KFDTYP(15): Numeric definition of the food types for which ingestion doses will be calculated.

<u>Number</u>	<u>Food Type</u>
1	Leafy vegetables
2	Other above-ground vegetables
3	Potatoes
4	Other root vegetables
5	Berries
6	Melons
7	Orchard fruit
8	Wheat
9	Other grain
10	Eggs
11	Milk
12	Beef
13	Pork
14	Poultry
15	Field deposition, external exposure

20. XQ(15): The air concentration per unit release ($\bar{x}/Q'$ in sec/m^3) of radionuclides at the growing site of the corresponding food type.
21. GRWP(15): The growing period in days of the corresponding food type.
22. YELD(15): The yield in kg/m^2 of the corresponding food type.
23. RIRR(15): The irrigation rate in l/m^2 month of the corresponding food type.
24. HLDUP1(15): The holdup period in days of the corresponding food type.
25. CON(15): The consumption rate in kg/yr of the corresponding food type.
26. TRNS(15): The translocation factor of the corresponding food type.
27. EXTIM: The time an individual spends being exposed to nuclides on contaminated farm ground, hours/year.

E. Aquatic exposure pathway parameters

28. KPTHWY(8): Key for definition of exposure pathways for which to do computation:

<u>Number</u>	<u>Pathway</u>
1	Fish
2	Crustacea
3	Molluscs
4	Water plants
5	Drinking water
6	Shoreline external exposure
7	Swimming external exposure
8	Boating external exposure

29. RM2(8): Mixing ratio at each of the corresponding dose pathways (dimensionless).
30. HLDUP2(8): Holdup time (days) for each of the corresponding pathways.
31. USAGE(8): Usage for each of the corresponding pathways; kg/yr for edible foods, l/yr for drinking water, and hr/yr for external exposure.
32. ISALT: Key for bioaccumulation factors.

ISALT = 0. (default) Fresh water factors.

ISALT = 1. Salt water factors. Note that if ISALT = 1, the drinking water pathway should logically not be used.

33. SW: Shore width factor for use with shoreline exposure pathway.

CARD N + 1--INVENTORY HEADER CARD

This card supplies NIN and FINV. NIN is the number of cards in the radionuclide source term. FINV is a multiplicative inventory modification factor which, if left blank, defaults to 1.0. The format is (I3, E10.2).

CARDS N + 2 TO M--RADIONUCLIDE SOURCE CARDS

One card per input radionuclide is required. The cards hold the atomic symbol and atomic weight with metastable and/or "+D" designation, and the source amount. The alphanumeric representation of the released nuclide must exactly match that in the radionuclide master data library; otherwise a match cannot be made. The source is in Ci/m^2 for IDEP = 0, Ci/yr for chronic releases for IDEP = 1 or 2, and Ci for acute releases for IDEP = 1 or 2. The format is (A2, A6, 4X, E8.2).

SELF-GENERATED DIAGNOSTICS

If an error or anomaly is detected, the program will write an informative message. These come from several places in the code. These are listed below with some hints as to what might be wrong. The list is ordered by originating routine.

MAIN

1. END OF INPUT FOR THIS RUN. Normal termination.
2. END OF FILE ON INPUT, STOP. The code was expecting another case, but ran out of data cards.
3. ERROR IN NUMBER OF NUCLIDES INPUT, NONUC = XXX, MAXIMUM ALLOWED IS XXX. There were either zero or too many inventory cards.
4. ERROR ON NAMELIST INPUT: Something is misspelled.

RLIBIN

5. DECAY CHAIN XXX HAS IMPROPER ORDER. CURRENT MEMBER INDEX IS XXX.
6. IMPROPER NUMBER OF NUCLIDES IN MASTER LIBRARY, NUC = XXXX.
7. END OF FILE ON MASTER LIBRARY UNIT 10.

These three all indicate a problem with the radionuclide master data library.

FLIBIN

8. END OF FILE AT TITLE CARD ON FOOD DATA LIBRARY. There is no data in the Food Transfer Coefficient File.

OLIBS

9. ERROR IN ORGAN DATA LIBRARY INPUT, NC, NOLD = XXX, NUCLIDE INPUT IS XXXXX, NUCLIDE NOLD IS XXX. There is an error in the order of the organ data library compared with the radionuclide master data library.
10. UNABLE TO IDENTIFY NUCLIDE XXXXX, NUCLIDES CHECKED = XXX -- STOP. There is a nuclide in the organ library that is not in the master library.

11. END OF FILE ON ORGAN DATA LIBRARY.
NUCLIDES IN MASTER LIBRARY = XXX.
CURRENT NUCLIDE INDEX = XXX.
PREVIOUS NUCLIDE INDEX = XXX.
DATA ARRAY INDEX = XXX.

The organ data file ended before any data could be obtained.

SLIBIN

12. EXTERNAL DOSE FACTOR LIBRARY TITLE READ ERROR, STOP.
13. EXTERNAL DOSE FACTOR LIBRARY EMPTY, STOP.
14. PROBLEM IN EXTERNAL DF LIBRARY READ
NUCLIDES FOUND = XXX.
NUCLIDES CHECKED FROM MASTER LIBRARY = XXX, STOP.

These three messages indicate a problem with the external dose factor file.

BLIBIN

15. END OF FILE ON TITLE CARD READ,
BIOACCUMULATION LIBRARY, STOP.

IDNUC

16. UNIDENTIFIED NUCLIDE XXXXX.
17. THERE WERE UNIDENTIFIED NUCLIDES,
ISTOP = XXX. There is an error in the input source term.

OFFCHK

18. NO ORGANS SPECIFIED, NORG = XXX.
KORG was probably omitted from NAMELIST.
19. NO FOOD TYPES OR PATHWAYS SPECIFIED, NFT, NPT = XXX, XXX.
The input data was lacking either KFD TYP, KPTHWY, or both.

SETDAT

20. NO DATA IN ORGAN LIBRARY FOR NUCLIDE XXXX. THIS NUCLIDE DROPPED.
21. NO DATA FOR ELEMENT XX IN FOOD DATA LIBRARY, THIS NUCLIDE DROPPED.
22. NO DATA FOR ELEMENT XXXXX IN BIOACCUMULATION FACTOR LIBRARY, THIS
NUCLIDE DROPPED.
23. NONE OF THE INPUT NUCLIDES HAVE DATA IN LIBRARIES, NUC = XXX. Program
terminated.

APPENDIX G
SAMPLE PROBLEMS

APPENDIX G

SAMPLE PROBLEMS

To illustrate the use of the PABLM computer code, two example problems are presented here. The problems illustrate chronic releases of radionuclides to the atmosphere and to a river.

The first sample problem includes doses to the population surrounding a nuclear facility. The facility is assumed to operate for 30 years before being shut down. The accumulated dose is calculated for the 30 yr plant life plus another 40 years, for a total of 70 years.

The second sample illustrates the doses to a maximally-exposed individual living downstream from a waste tank leaking into a river. The source term is taken to be the same as that for the first example to illustrate the NEXT=3 option. The radioactive material in the tank is assumed to decay with time and to leak at a constant mass rate. The individual is assumed to irrigate from, fish in, and get drinking water from the river over a 70 year period.

Input for the first problem is:

| <u>Namelist
Parameter</u>	<u>Value</u>	<u>Remarks</u>
NEXT	2	Program control variable
IDEP	1	Atmospheric release
IOUT	0	Summary output only
IAC	0	Chronic release
PLIFE	30.	Thirty year release period
T2	70	Seventy year uptake time
IPOP	1	Population case
POP	2.5×10^5	Regional population
KORG		Organs of interest:
	1	Total body
	6	Bone
	8	Lungs

	16	Thyroid
	23	GI-LLI
KFDTYP		Terrestrial exposure pathways:
	1	Leafy vegetables
	2	Other above-ground vegetables
	4	Root vegetables
	7	Orchard fruit
	9	Grain
	10	Eggs
	11	Milk
	12	Beef
	15	External exposure
XQ	$9 \times 2.1 \times 10^{-8}$	Same air concentration per unit release at each food site, sec/m ³
GRWP	90.	Growing period at each food site, days
	60.	
	4*90.	
	30.	
	90.	
YELD	1.5	Yield of each food, kg/m ²
	0.7	
	4.0	
	2.0	
	1.0	
	0.84	
	1.3	
	0.84	
HLDUP1	5*14.	Holdup period for each food type, days
	18.	
	4.	
	34.	
TRNS	1.0	Translocation factors
	6*0.1	
	1.0	
	0.1	

CON	15.	Consumption rates of average individual in population.
	15.	
	117.	
	64.	
	80.	
	20.	
	230.	
	40.	
EXTIM	2920	External exposure time of average individual, hr/yr.

<u>Inventory Data</u>	<u>Value</u>	<u>Remarks</u>
NIN	5	Input nuclides
ELTI, AWI, Q	H 3	50.0 Release, Ci/yr
	C 14	5.0
	SR 90	0.5
	CS 137	1.0
	PU 239	0.1

For the second sample problem, it is assumed that the maximally-exposed individual is subjected to many of the same conditions as is the population in Example One. Thus, if the two problems are run concurrently, much of the data need not be re-entered. In addition to irrigated crops, the individual obtains food from the river.

<u>Namelist Parameter</u>	<u>Value</u>	<u>Remarks</u>
NEXT	3	Use previously input release
IDEP	2	Liquid release
DKSORS	1	Source now decaying annually
PLIFE	70.	70 year release
IPOP	0	Maximum individual
POP	1	
IREC	3	For a leaking tank, no reconcentration.
RM	1.0	Complete mixing in river

CFL0	1.0x10 ⁴	River flow rate, cfs
CON	30.	The maximum individual eats more than the
	182.	regular population
	335.	
	88.	
	30.	
	274.	
	30.	
XQ	9*0.0	No air source
RIRR	9*150.	Irrigation rate, ℓ/m^2 -/mo
EXTIM	4383	
KPTHWY		Aquatic exposure pathways:
	1	Fish
	5	Drinking water
	6	Shoreline
	7	Swimming
	8	Boating
RM2	5*1.0	Uniform mixing
HLDUP2	2*1.00	Holdup times, days
	3*0.33	
USAGE	40.	Usages in kg/yr, ℓ /yr, or hr/yr.
	730.	
	500.	
	2*100.	
ISALT	0	Fresh water
SW	0.2	River shore width factor

The input data card stream prepared from the preceding information is shown in Table G-1. Output reports generated by PABLM using the above information for the two sample problems are shown following the input listing.

Three sets of output tables are generated by PABLM for sample problem one. The first set represents the 70-year dose commitment from ingestion of farm products during the first year of the release from the nuclear facility. The second set contains the 70 year dose commitment from the accumulation of

radionuclides during the 30 year life of the facility. The final set includes the total accumulated dose for the 30 year plant life and 40 years worth of continuing environmental contact. It can be seen that for radionuclides with a short biological half-life and little environmental accumulation the total dose is received during the release from the facility. However, nuclides which remain in the environment following the end of the release still contribute to dose during the rest of the dose period.

The second sample generates only two sets of tables, because the release is assumed to continue throughout the dose period. The first set again represents the 70-year dose commitment from the first year of ingestion. The second set is the 70-year accumulated dose from the 70-year release.

Sample Problems

*** 3.A. PAGE ***

RUN ON 100979

PAFLM, VERSION 2.0, APRIL 1979

CASE TITLE: PAFLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME

TYPE OF DOSE CALCULATED: CHRONIC INGESTION AND EXTERNAL EXPOSURE
FOR: AIR PATHWAY, POPULATION

*** DATA LIBRARIES USED:
RADIONUCLIDE LIBRARY: RADIONUCLIDE MASTER DATA LIBRARY, 15 MARCH 79, SA NAPIER
FOOD TRANSFER FACTOR LIBRARY: *** FOOD TRANSFER COEFFICIENT LIBRARY 2/27/78 SA NAPIER ***
ORGAN DATA LIBRARY: *** ORGAN DATA LIBRARY UPDATED BY SAN 3/17/79 ***
EXTERNAL DOSE FACTOR LIBRARY: *** PROFILE FOR FOOD, 15 MARCH 1978, SA NAPIER ***
SEDIMENT ACCUMULATION LIBRARY: ELMT SALT WATER FACTORS FRESH WATER FACTORS D.

| FOOD DATA USED:
FOOD TYPE | K/D
(G/G/HR) | GROWING PERIOD
(DAYS) | YIELD
(KG/HR) | IRR. RATE
(L/HR/2/MONTH) | HOLDUP
(DAYS) | CONSUMPTION
(KG/YR) | TRANSLOCATION |
|------------------------------|-----------------|--------------------------|------------------|-----------------------------|------------------|------------------------|---------------|
| LEAFY VEG. | 2.10E-05 | 9.00E+01 | 1.50E+00 | .00 | 1.40E+01 | 1.50E+01 | 1.00E+00 |
| 3.A.3. VEG. | 2.10E-05 | 9.00E+01 | 7.00E+01 | .00 | 1.40E+01 | 1.50E+01 | 1.00E+01 |
| 3.1.21. VEG. | 2.10E-05 | 9.00E+01 | 4.00E+00 | .00 | 1.40E+01 | 1.17E+02 | 1.00E+01 |
| 3.1.21. FRUIT | 2.10E-05 | 9.00E+01 | 2.00E+00 | .00 | 1.40E+01 | 5.40E+01 | 1.00E+01 |
| 3.1.21.21 | 2.10E-05 | 9.00E+01 | 1.00E+00 | .00 | 1.40E+01 | 8.00E+01 | 1.00E+01 |
| EGGS | 2.10E-05 | 9.00E+01 | 4.40E+01 | .00 | 1.30E+01 | 2.00E+01 | 1.00E+01 |
| MILK | 2.10E-05 | 9.00E+01 | 1.50E+00 | .00 | 4.00E+00 | 2.30E+02 | 1.00E+01 |
| SEED | 2.10E-05 | 9.00E+01 | 8.40E+01 | .00 | 3.40E+01 | 4.00E+01 | 1.00E+00 |
| EXTERNAL | 2.10E-05 | .00 | .00 | .00 | .00 | .00 | 1.00E+01 |

*** ORGANS CONSIDERED:
TOTAL BODY BONE LUNGS THYROID LOWER LARG

NUCLIDES CONSIDERED:		NUCLIDE RELEASE		NUCLIDE RELEASE		
NUCLIDE	RELEASE
ELT. MT. (G/YR)	ELT. MT. (G/YR)	NUCLIDE	RELEASE
ELT. MT. (G/YR)	NUCLIDE	RELEASE
ELT. MT. (G/YR)
H 3	5.00E+01	C 14	5.00E+00	BR 90	5.00E+01	
Y 90	.00	CS 137	1.00E+00	BA 137M	.00	
PU 239	1.00E+01					

*** TIMES CONSIDERED (YEARS):
FACILITY LIFE = 3.00E+01
EXTERNAL EXPOSURE TIME (HOURS) = 2.92E+03
DOSE COMMITMENT TIME = 70

*** POPULATION: 2.50E+05
*** RECONCENTRATION MODEL USED: 0
*** INVENTORY MODIFICATION FACTOR: 1.00E+00
*** COOLANT FLOW RATE: .00

INPUT PREPARED BY:

DATE:

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION 2 100979
 TOTALS BY PATHWAY FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 1 OF A 30, YEAR PLANT LIFE ***

IRRIGATION CROP PATHWAY: OFF
 AIR DEPOSITION CROP PATH: ON
 AQUATIC FOODS PATHWAY: OFF

| EXPOSURE
PATHWAY	DOSES AND TOTALS REPORTED IN MAN-REM				
	TOTAL BODY	BONE	LUNGS	THYROID	GITLLI
LEAFY VEG.	4.7E+01	1.5E+00	1.5E+02	5.8E+03	1.1E+02
U.A.S. VEG.	1.3E+01	4.6E+01	7.6E+03	5.8E+03	6.0E+03
UT. LI. VEG.	4.3E+01	1.7E+00	4.9E+02	4.5E+02	4.8E+02
ORCH. FRUIT	3.1E+01	1.2E+00	2.7E+02	2.5E+02	2.4E+02
UT. GRAIN	6.3E+01	2.4E+00	1.1E+01	9.8E+02	1.0E+01
EGGS	1.7E+02	7.0E+02	2.3E+03	9.1E+03	9.1E+03
MILK	1.5E+01	5.9E+01	5.7E+02	5.3E+02	5.3E+02
BEEF	5.7E+01	9.0E+01	1.2E+01	3.0E+02	3.8E+02
FIELD DEP.	5.4E+02	6.4E+02	5.4E+02	6.4E+02	5.0E+02
TOTALS	2.9E+03	4.2E+00	4.5E+01	3.3E+01	3.4E+01

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION 2 100979
 TOTALS BY NUCLIDE FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 1 OF A 30, YEAR PLANT LIFE ***

IRRIGATION CROP PATHWAY: OFF
 AIR DEPOSITION CROP PATH: ON
 AQUATIC FOODS PATHWAY: OFF

RADIO NUCLIDE	DOSES AND TOTALS REPORTED IN MAN-REM									
	TOTAL BODY	X	BONE	X	LUNGS	X	THYROID	X	GITLLI	X
4 3	2.3E+02	3	.0	3	2.3E+02	3	2.3E+02	3	2.3E+02	7
5 14	2.5E+01	7	1.2E+00	13	2.5E+01	64	2.5E+01	61	2.5E+01	94
54 90	1.5E+00	55	5.7E+00	75	.0	0	.0	0	.0	0
7 90	.0	3	.0	3	.0	0	.0	0	.0	0
58 137	5.5E+01	23	7.3E+01	3	1.1E+01	22	.0	0	.0	0
54 137	.0	0	.0	3	.0	0	.0	0	.0	0
90 239	7.4E+03	3	1.0E+01	1	.0	3	.0	0	2.2E+02	7
TOTALS	2.7E+03	100	4.9E+00	100	3.9E+01	100	2.7E+01	100	2.9E+01	100

COMBINED PATHWAY SUMMARY TOTALS PAHLM VERSION2 100979
 EXTERNAL DOSE TOTALS BY NUCLIDE
 CASE TITLE: PAHLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 1 OF A 30. YEAR PLANTLIFE ***
 IRRIGATED FIELD PATHWAYS: OFF
 AIR DEPOSITION FIELD PATHWAYS: ON
 WATER BODY EXPOSURE PATHWAYS: OFF

DOSES AND TOTALS REPORTED IN MAN-REM					
RADIONUCLIDE	SKIN DOSE	%	TOTAL BODY DOSE	%	
-----	-----	---	-----	---	
H 3	.0	0	.0	0	
C 14	.0	0	.0	0	
SM 90	.0	0	.0	0	
T 99	.0	0	.0	0	
CS 137	7.4E-02	99	6.4E-02	99	
SA 137M	.0	0	.0	0	
PO 239	1.2E-05	0	1.2E-05	0	
-----	-----	---	-----	---	
TOTALS	7.4E-02	100	6.4E-02	100	

P43.4 SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 P43.4 VERSION 2.0 APRIL 1979 100979
 PROPOSE COMMITMENT SUMMARY, MANURE FOR THE FIRST YEAR**

DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY

FOOD PATHWAY	TOTAL BODY	BONE	LUNGS	THYROID	LOWER LARG
LEAFY VEG.	4.55E-01	1.54E+00	1.49E-02	5.70E-03	1.11E-02
O.A.S. VEG	1.29E-01	4.54E-01	7.52E-03	5.70E-03	5.95E-03
DIRTY VEG.	4.51E-01	1.57E+00	4.75E-02	4.49E-02	4.65E-02
DITCH FRUIT	5.15E-01	1.15E+00	2.75E-02	2.40E-02	2.63E-02
DITCHAIN	5.37E-01	2.39E+00	1.05E-01	9.80E-02	1.02E-01
ANNUOUS TOTAL**	1.99E+00	7.30E+00	2.09E-01	1.79E-01	1.93E-01
MEAT TOTAL**	1.55E-02	5.99E-02	4.29E-03	4.13E-03	9.13E-03
MILK TOTAL**	1.51E-01	5.95E-01	2.70E-02	5.35E-02	5.35E-02
BEEF	5.67E-01	9.00E-01	1.17E-01	2.95E-02	3.81E-02
MEAT TOTAL**	5.67E-01	9.00E-01	1.17E-01	2.95E-02	3.81E-02
ANNUAL TOTAL FOR ALL FOOD PATHWAYS**					
	2.74E+00	8.35E+00	3.85E-01	2.71E-01	2.94E-01
EXTERNAL TOTAL**	SKIN	TOTAL BODY			
	7.44E-02	5.37E-02			

COMBINED PATHWAY SUMMARY TOTALS PARLW VERSION2 100979
 TOTALS BY PATHWAY FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLW SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 30 OF A 30, YEAR PLANT LIFE ***

IRRIGATION CRDP PATHWAY: OFF
 AIR DEPOSITION CRDP PATHW: ON
 AQUATIC FOODS PATHWAY: OFF

DOSES AND TOTALS REPORTED IN MAN-REM

| EXPOSURE
PATHWAY	TOTAL DOSE	BONE	LUNGS	THYROID	GILLI
LEAFY VEG.	2.5E+01	4.4E+01	4.5E+01	1.7E+01	3.3E+01
GRAIN VEG	1.5E+01	5.2E+01	2.3E+01	1.7E+01	2.1E+01
DIET VEG.	1.1E+02	4.1E+02	1.5E+00	1.3E+00	1.4E+00
ORCH, FRUIT	5.2E+01	2.3E+02	4.4E+01	7.4E+01	7.9E+01
DIET GRAIN	4.2E+01	3.1E+02	3.2E+00	2.9E+00	3.1E+00
EGGS	1.3E+00	5.0E+00	2.4E+01	2.7E+01	2.7E+01
MILK	2.0E+01	7.5E+01	1.7E+00	1.6E+00	1.4E+00
DEER	1.4E+01	2.9E+01	3.5E+00	4.9E+01	1.1E+00
FIELD DEP.	2.4E+01	2.4E+01	2.4E+01	2.4E+01	2.4E+01
TOTALS	3.5E+02	1.2E+03	4.5E+01	3.2E+01	3.3E+01

COMBINED PATHWAY SUMMARY TOTALS PARLW VERSION2 100979
 TOTALS BY NUCLIDE FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLW SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 30 OF A 30, YEAR PLANT LIFE ***

IRRIGATION CRDP PATHWAY: OFF
 AIR DEPOSITION CRDP PATHW: ON
 AQUATIC FOODS PATHWAY: OFF

DOSES AND TOTALS REPORTED IN MAN-REM

RADIOISOTOPE	TOTAL DOSE	BONE	LUNGS	THYROID	GILLI
4 3	5.7E+01	0	6.9E+01	5.9E+01	6.9E+01
14	7.4E+00	3.7E+01	7.4E+00	7.4E+00	7.4E+00
35 30	3.1E+02	1.1E+03	0	0	0
90	2.0E+05	7.4E+07	0	0	0
137	2.0E+01	2.2E+01	3.5E+00	0	0
137M	0	0	0	0	0
230	1.7E+01	4.1E+00	0	0	5.8E+01
TOTALS	3.4E+02	1.2E+03	1.2E+01	4.1E+00	4.1E+00

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION2 100979
 EXTERNAL DOSE TOTALS BY NUCLIDE
 CASE TITLE: PABLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 30 OF A 30, YEAR PLANTLIFE ***

IRRIGATED FIELD PATHWAY: OFF
 AIR DEPOSITION FIELD PATHWAY: ON
 WATER BODY EXPOSURE PATHWAYS: OFF

DOSES AND TOTALS REPORTED IN MAN-REM				
NUCLIDE	SAIN DOSE	%	TOTAL BODY DOSE	%
-----	-----	---	-----	---
H 3	.0	0	.0	0
C 14	.0	0	.0	0
SR 90	.0	0	.0	0
Y 90	0.8E+03	0	5.7E+03	0
CS 137	2.4E+01	99	2.4E+01	99
SA 137M	.0	0	.0	0
RU 239	0.5E+03	0	5.5E+04	0
-----	-----	---	-----	---
TOTALS	2.4E+01	100	2.4E+01	100

PASAM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME 100979

PASAM VERSION 2.0 APRIL 1979

DOSE COMMITMENT SUMMARY, MAX-DOSE FOR A PLANTLIFE OF 30.00 YEARS

DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY

FOOD PATHWAY	TOTAL BODY	BONE	LUNGS	THYROID	LO-ER LRG
LEAFY VEG.	2.01E+01	9.42E+01	4.45E-01	1.73E-01	3.32E+01
C.A.S. VEG.	1.51E+01	5.93E+01	2.32E-01	1.73E-01	2.06E+01
DT. 41. VEG.	1.59E+02	4.05E+02	1.45E+00	1.35E+00	1.40E+00
ORCH. FRUIT	5.13E+01	2.29E+02	5.33E-01	7.37E-01	7.99E+01
DT. 41. VEG.	1.41E+01	5.14E+02	3.17E+00	2.94E+00	3.07E+00
***DOSE TOTAL**	2.97E+02	1.10E+03	5.14E+00	5.37E+00	5.79E+00
***EG TOTAL**	1.29E+00	5.01E+00	2.79E-01	2.74E-01	2.74E+01
***ILK TOTAL**	2.04E+01	7.52E+01	1.72E+00	1.60E+00	1.60E+00
SEEP	1.77E+01	2.92E+01	3.52E+00	6.80E-01	1.14E+00
***GAT TOTAL**	1.77E+01	2.92E+01	3.52E+00	6.80E-01	1.14E+00
TOTAL FOR ALL FOOD PATHWAYS	3.33E+02	1.21E+03	1.17E+01	5.13E+00	5.82E+00
***EXTERNAL TOTAL**	3414	TOTAL BODY			
	2.91E+01	2.40E+01			

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION2 100979
 TOTALS BY PATHWAY FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITTEE SUMMARY FOR DOSE-YEAR 70 OF A 30. YEAR PLANT LIFE ***

IRRIGATION CROP PATHWAY: JFF
 AIR DEPOSITION CROP PATH: JN
 AQUATIC FOODS PATHWAY: JFF

DOSES AND TOTALS REPORTED IN MAN-REM					
EXPOSURE
PATHWAY	TOTAL BODY	BONE	LUNGS	THYROID	GI=LLI
LEAFY VEG.	4.2E+01	1.5E+02	4.5E+01	1.7E+01	3.3E+01
U.A.S. VEG.	3.2E+01	1.2E+02	2.4E+01	1.7E+01	2.1E+01
BT, HT, VEG.	2.3E+02	8.5E+02	1.5E+00	1.3E+00	1.4E+00
JRCM, FRUIT	1.3E+02	4.7E+02	4.5E+01	7.4E+01	7.9E+01
BT, GRAIN	1.7E+02	6.2E+02	3.2E+00	2.9E+00	3.1E+00
EGGS	2.3E+00	8.7E+00	2.8E+01	2.7E+01	2.7E+01
MILK	4.0E+01	1.5E+02	1.7E+00	1.5E+00	1.6E+00
SEEF	1.9E+01	3.3E+01	3.6E+00	4.9E+01	1.1E+00
FIELD DEP.	6.0E+01	6.0E+01	6.0E+01	6.0E+01	6.0E+01
TOTALS	7.2E+02	2.5E+03	7.2E+01	6.8E+01	6.9E+01

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION2 100979
 TOTALS BY NUCLIDE FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITTEE SUMMARY FOR DOSE-YEAR 70 OF A 30. YEAR PLANT LIFE ***

IRRIGATION CROP PATHWAY: JFF
 AIR DEPOSITION CROP PATH: JN
 AQUATIC FOODS PATHWAY: JFF

DOSES AND TOTALS REPORTED IN MAN-REM									
RADIO NUCLIDE	TOTAL BODY		BONE		LUNGS		THYROID		GI=LLI
Y 3	5.4E+01	0	0	0	6.9E+01	5	6.9E+01	4	6.9E+01
C 14	7.4E+02	1	3.7E+01	1	7.4E+02	53	7.4E+02	91	7.4E+02
SR 90	5.3E+02	75	2.3E+03	77	0	0	0	0	0
Y 90	5.1E+00	0	1.9E+06	0	0	0	0	0	0
CS 137	2.1E+01	3	2.3E+01	0	3.7E+00	31	0	0	0
SA 137M	0	0	0	0	0	0	0	0	0
PU 239	1.7E+01	0	4.1E+00	0	0	0	0	0	7.0E+01
TOTALS	6.8E+02	100	2.4E+03	100	1.2E+01	100	8.1E+00	100	4.8E+00

COMBINED PATHWAY SUMMARY TOTALS PAHLM VERSION2 100979
 EXTERNAL DOSE TOTALS BY NUCLIDE
 CASE TITLE: PABLM SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 70 OF A 30. YEAR PLANTLIFE ***

IRRIGATED FIELD PATHWAY: JFF
 AIR DEPOSITION FIELD PATHWAY: JN
 WATER BODY EXPOSURE PATHWAYS: JFF

DOSES AND TOTALS REPORTED IN MANUREM					
RADIONUCLIDE		SKIN DOSE	%	TOTAL BODY DOSE	%
-----		-----	---	-----	---
1	3	.0	0	.0	0
2	14	.0	0	.0	0
SR	30	.0	0	.0	0
Y	30	1.7E+02	0	1.3E+02	0
CS	137	7.0E+01	99	6.0E+01	71
SA	137M	.0	0	.0	0
DU	239	2.0E+02	0	2.0E+03	0
-----		-----	---	-----	---
TOTALS		7.0E+01	100	8.4E+01	100

PAS-1 SAMPLE PROBLEM ONE-30 YEAR AIR RELEASE TO POPULATION, 70 YEAR DOSE TIME 100979

PAS-1 VERSION 2.0 APRIL 1979

DOSE COMMITMENT SUMMARY, MAXIMUM FOR A DOSE COMMITMENT PERIOD OF 70 YEARS

DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY

FOOD PATHWAY	TOTAL DOSE	BONE	LUNGS	THYROID	LOWER LARGE
LEAFY VEG.	4.10E+01	1.52E+02	4.51E+01	1.73E+01	3.33E+01
GRAIN VEG	5.15E+01	1.17E+02	2.37E+01	1.73E+01	2.07E+01
FRUIT VEG.	2.35E+02	3.55E+02	1.49E+00	1.35E+00	1.40E+00
DAIRY PRODUCT	1.23E+02	4.74E+02	0.53E+01	7.37E+01	7.93E+01
OTHER GRAIN	1.57E+02	5.21E+02	3.20E+00	2.94E+00	3.07E+00
***DOSE TOTAL**	5.97E+02	2.22E+03	0.24E+00	5.37E+00	5.91E+00
***DOSE TOTAL**	2.27E+00	9.59E+00	2.79E+01	2.74E+01	2.74E+01
***MILK TOTAL**	4.00E+01	1.43E+02	1.74E+00	1.60E+00	1.60E+00
BEEF	1.97E+01	3.25E+01	3.55E+00	8.80E+01	1.15E+00
***CAT TOTAL**	1.97E+01	3.25E+01	3.55E+00	4.40E+01	1.15E+00
TOTAL FOR ALL FOOD PRODUCTS	5.59E+02	2.41E+03	1.14E+01	9.13E+00	5.93E+00
***EXTERNAL TOTAL**	3414	TOTAL DOSE			
	7.02E+01	5.02E+01			

*** 0.4. PAGE ***

RUN ON 100979

PAHLM, VERSION 2.0, APRIL 1979

CASE TITLE: PAHLM SAMPLE PROBLEM INDO WATER RELEASE TO MAX.IND. 70 YEAR CHRONIC DECAYING
TYPE OF CASE CALCULATED: CHRONIC INGESTION AND EXTERNAL EXPOSURE
FOR WATER PATHWAY, MAX. IND.

*** DATA LIBRARIES USED:
RADIONUCLIDE LIBRARY: RADIONUCLIDE MASTER DATA LIBRARY, 15 MARCH 75, SA VAPIER
FOOD TRANSFER FACTOR LIBRARY: *** FOOD TRANSFER COEFFICIENT LIBRARY 2/27/78 SA VAPIER ***
ORGAN DATA LIBRARY: *** ORGAN DATA LIBRARY UPDATED BY SAN 9/10/79 ***
EXTERNAL DOSE FACTOR LIBRARY: *** GDOF, IS FOR FOOD, 15 MARCH 1978, SA VAPIER ***
SILACUMULATION LIBRARY: ELMT SALT WATER FACTORS FRESH WATER FACTORS

0.

| FOOD TYPE | X/D
(SEC/MIN) | GROWING PERIOD
(DAYS) | YIELD
(KG/M ² /YR) | IRR. RATE
(L/M ² /24HRS) | HOLDUP
(DAYS) | CONSUMPTION
(KG/YR) | TRANSLOCATION |
|--------------|------------------|--------------------------|----------------------------------|--|------------------|------------------------|---------------|
| LEAFY VEG. | .00 | 7.00E+01 | 1.50E+00 | 1.50E+02 | 1.40E+01 | 3.00E+01 | 1.00E+00 |
| J.A.S. VEG. | .00 | 5.00E+01 | 7.00E+01 | 1.50E+02 | 1.40E+01 | 3.00E+01 | 1.00E+01 |
| ST. RI. VEG. | .00 | 7.00E+01 | 4.00E+00 | 1.50E+02 | 1.40E+01 | 1.02E+02 | 1.00E+01 |
| JHCH. FRUIT | .00 | 7.00E+01 | 2.00E+00 | 1.50E+02 | 1.40E+01 | 3.35E+02 | 1.00E+01 |
| ST. GRAIN | .00 | 7.00E+01 | 1.00E+00 | 1.50E+02 | 1.40E+01 | 4.00E+01 | 1.00E+01 |
| EGGS | .00 | 7.00E+01 | 5.00E+01 | 1.50E+02 | 1.50E+01 | 2.74E+02 | 1.00E+01 |
| MILK | .00 | 7.00E+01 | 1.50E+00 | 1.50E+02 | 4.00E+00 | 3.00E+01 | 1.00E+01 |
| EGGS | .00 | 7.00E+01 | 5.00E+01 | 1.50E+02 | 3.40E+01 | 4.00E+01 | 1.00E+00 |
| EXTERNAL | .00 | .00 | .00 | 1.50E+02 | .00 | .00 | 1.00E+01 |

PATHWAY	MIXING RATIO	HOLDUP (DAYS)	USAGE	UNITS
FISH	1.00+000	1.00+000	4.00+001	(KG/YR)
CHICKEN	1.00+000	1.00+000	7.50+002	(L/YR)
SWIMMING	1.00+000	3.33+001	5.00+002	(MH/YR)
SWIMMING	1.00+000	3.33+001	1.00+002	(MH/YR)
BOATING	1.00+000	3.33+001	1.00+002	(MH/YR)

ORGANS CONSIDERED	DOSE	LUNGS	THYROID	LOWER LARGE
TOTAL DOSE				

*** RELEASE TERM DECAYING FROM TIME ZERO ***

| NUCLIDE | RELEASE
ELT. WT. (CI/YR) | NUCLIDE
ELT. WT. (CI/YR) | NUCLIDE
RELEASE
ELT. WT. (CI/YR) | NUCLIDE
RELEASE
ELT. WT. (CI/YR) |
|---------|-----------------------------|-----------------------------|--|--|
| SR 90 | 5.00E+01 | C 14 | 5.00E+00 | SR 90 |
| SR 90 | .00 | CS 137 | 1.00E+00 | SR 90 |
| PU 239 | 1.00E+01 | | | BA 137M |

*** TIMES CONSIDERED (YEARS):

FACILITY LIFE = 7.00E+01
EXTERNAL EXPOSURE TIME (HOURS) = 4.35E+03
DOSE COMMITMENT TIME = 70

[illegible][illegible]

PAGE 4 SAMPLE PROBLEM 1-3- WATER RELEASE TO MAX. 1ND. 70 YEAR CHRONIC DECAYING 100979

PAGE 4 VERSION 2.0 APRIL 1979

HOUSE COMMITMENT SUMMARY, REM FOR THE FIRST YEAR**

DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY

FOOD PATHWAY	TOTAL DOSE	KIDNEY	LUNGS	THYROID	LOWER LARG
LEAFY VEG.	5.54E-05	3.74E-04	5.03E-05	5.01E-05	5.06E-05
J.A.G. VEG	5.95E-05	2.34E-04	5.03E-05	5.01E-05	5.02E-05
DT.91.VEG.	5.23E-04	1.51E-03	3.04E-04	3.04E-04	3.04E-04
JRCM.FRUIT	5.13E-04	3.31E-03	5.61E-04	5.60E-04	5.60E-04
DT.5MAIN	5.57E-04	2.75E-03	5.35E-04	5.35E-04	5.35E-04
***DOSE TOTAL**	1.55E-03	5.03E-03	1.50E-03	1.50E-03	1.50E-03
***EG TOTAL**	5.31E-04	3.14E-03	5.23E-04	5.24E-04	5.24E-04
***ILK TOTAL**	3.28E-05	1.50E-04	3.13E-05	3.15E-05	3.15E-05
BEEP	1.57E-04	7.59E-04	1.49E-04	1.40E-04	1.46E-04
***AT TOTAL**	1.57E-04	7.59E-04	1.49E-04	1.40E-04	1.46E-04
***TOTAL FOR ALL FOOD PRODUCTIONS**	2.45E-03	1.21E-02	2.51E-03	2.30E-03	2.30E-03
***EXTERNAL TOTAL**	3414	TOTAL DOSE			
	4.27E-06	3.55E-06			

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION2 100979
 TOTALS BY NUCLIDE FOR SPECIFIED ORGANS (INTERNAL DOSES ONLY)
 CASE TITLE: PARLM SAMPLE PROBLEM TAG= WATER RELEASE TO MAX,IND. 70 YEAR CHRONIC DECAYING
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 70 OF A 70. YEAR PLANT LIFE ***

IRRIGATION CROP PATHWAY: ON
 AIR DEPOSITION CROP PATHW: OFF
 AQUATIC FOODS PATHWAY: ON

RADIO NUCLIDE	DOSES AND TOTALS REPORTED IN REM						THYROID	GILLI
	TOTAL BODY	%	ADVE	%	LUNGS	%		
H 3	1.0E+05	0	.0	0	1.0E+05	0	1.0E+05	0
C 14	1.0E+01	55	2.2E+01	77	1.0E+01	97	1.0E+01	99
SR 90	5.1E+02	21	1.4E+01	18	.0	0	.0	0
Y 90	4.3E+10	0	1.0E+03	0	.0	0	.0	0
CS 137	2.4E+02	7	2.7E+02	2	4.2E+03	2	.0	0
SA 137M	.0	0	.0	0	.0	0	.0	0
PU 239	2.0E+05	0	5.5E+04	0	.0	0	1.4E+04	0
TOTALS	2.4E+01	100	1.0E+00	100	1.7E+01	100	1.0E+01	100

COMBINED PATHWAY SUMMARY TOTALS PARLM VERSION2 100979
 EXTERNAL DOSE TOTALS BY NUCLIDE
 CASE TITLE: PARLM SAMPLE PROBLEM TAG= WATER RELEASE TO MAX,IND. 70 YEAR CHRONIC DECAYING
 *** DOSE COMMITMENT SUMMARY FOR DOSE-YEAR 70 OF A 70. YEAR PLANTLIFE ***

IRRIGATED FIELD PATHWAY: ON
 AIR DEPOSITION FIELD PATHWAY: OFF
 WATER BODY EXPOSURE PATHWAYS: ON

RADIO NUCLIDE	DOSES AND TOTALS REPORTED IN REM			
	SKIN DOSE	%	TOTAL BODY DOSE	%
H 3	.0	0	.0	0
C 14	2.2E+05	0	.0	0
SR 90	4.3E+08	0	1.9E+10	0
Y 90	1.4E+05	0	1.0E+05	0
CS 137	4.3E+03	99	4.2E+03	99
SA 137M	.0	0	.0	0
PU 239	2.2E+06	0	2.1E+07	0
TOTALS	4.9E+03	100	4.2E+03	100

RADON SAMPLE PROBLEM INDOOR WATER RELEASE TO MAX. IND. 70 YEAR CHRONIC DECAYING 100979
 RADON VERSION 2.0 APRIL 1979
 DOSE COMMITMENT SUMMARY, REM FOR A PLANTLIFE OF 70.00 YEARS
 DOSE COMMITMENT SUMMARY, REM FOR A DOSE COMMITMENT PERIOD OF 70 YEARS
 DOSES FOR TERRESTRIAL FOOD PATHWAYS ONLY

FOOD PATHWAY	TOTAL DOSE	DOSE	UNITS	THYROID	LOWER LARG
LEAFY VEG.	5.54E-03	2.35E-02	3.52E-03	3.44E-03	3.52E-03
GRAIN VEG.	5.72E-03	2.57E-02	3.50E-03	3.44E-03	3.50E-03
DT. RI. VEG.	3.35E-02	1.52E-01	2.12E-02	2.12E-02	2.12E-02
DRUM. FRUIT	5.23E-02	2.31E-01	3.90E-02	3.90E-02	3.90E-02
DT. GRAIN	4.35E-02	2.10E-01	3.73E-02	3.73E-02	3.73E-02
***FOODS TOTAL**	1.52E-01	6.97E-01	1.05E-01	1.04E-01	1.05E-01
***EG TOTAL**	4.45E-02	2.21E-01	4.35E-02	4.35E-02	4.35E-02
***MILK TOTAL**	2.35E-03	1.15E-02	2.12E-03	2.14E-03	2.12E-03
BEER	1.10E-02	5.20E-02	1.03E-02	1.02E-02	1.02E-02
***BEER TOTAL**	1.10E-02	5.20E-02	1.03E-02	1.02E-02	1.02E-02
TOTAL FOR ALL FOOD PATHWAYS	2.10E-01	9.31E-01	1.61E-01	1.60E-01	1.60E-01
***EXTR. TOTAL**	3.47E-03	3.41E-03			

PAS, M SAMPLE PROJECTIONS FOR WATER RELEASE TO MAX. IND. 70 YEAR CHRONIC DECAYING 100079

PAS, M REVISION 2, APRIL 1979 SA NAPIEM *** AQUATIC EXPOSURE PATHWAYS ONLY ***

DOSE COMMITMENT TO MAN BY PATHWAY (REM) FOR A COMMITMENT TIME OF 70 YEARS
FOR A PLANT LIFE OF 7.0E+01 YEARS FOR FRESH WATER

PATHWAY	EXTERNAL		INTERNAL				
	SKIN	TOTAL BODY	TOTAL BODY	BONE	LUNGS	THYROID	LIVER LARG
FISH			2.9E+02	5.4E+02	5.0E+03	4.1E+03	4.1E+03
CRIN. 42J			4.7E+04	1.4E+03	5.3E+05	2.1E+05	5.0E+05
SHORELINE	8.0E+04	7.4E+04	7.4E+04	7.4E+04	7.4E+04	7.4E+04	7.4E+04
SWIMMING	7.0E+07	4.0E+07	4.0E+07	4.0E+07	4.0E+07	4.0E+07	4.0E+07
BOATING	3.0E+07	2.0E+07	2.0E+07	2.0E+07	2.0E+07	2.0E+07	2.0E+07
TOTAL	8.7E+04	7.4E+04	3.0E+02	5.6E+02	5.3E+03	4.9E+03	4.9E+03

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