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Monitoring Data for Intake of Radionuclides

— Acute Intake by Inhalation —

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FOREWORD

Research in the Division of Radiotoxicology and Protection is done on dosimetry and the health effects resulting from intakes of radionuclides. The author of this report, Dr. N. Ishigure, is a section head of this division who has been engaged in research on dosimetry of internally deposited radionuclides, including development of dosimetric models and application of the models to individual monitoring for internal exposure.

The author has made a careful study of the most recent ICRP dosimetric system and has calculated the values for radioactivity in a whole body and in specific organs, and has calculated daily urinary and faecal excretion rates for radionuclides which were selected according to their importance in occupational exposure.

This report compiles the results of the calculations, which provide numerical information needed for the design of individual monitoring program and on the interpretation of the monitored data. It is hoped that this report can help dosimetrists involved in radiation protection to assess intakes of radionuclides in work places where individual monitoring is introduced as a component of the radiation protection program.

January, 1999

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Monitoring Data for Intake of Radionuclides
— Acute Intake by Inhalation —

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1. INTRODUCTION

Intake of radionuclides can occur as a result of various jobs associated with the different stages of the nuclear fuel cycle and through uses of radioactive sources in medicine, scientific research and industry, where individual monitoring is sometimes an essential component of radiation protection programs.

Individual monitoring for internal exposure is based on the determination of radioactivity in a whole body or in specific organs by direct measurement, or in excreta such as urine or faeces by indirect measurement. The measurement results are interpreted in terms of intake of radionuclides so as to demonstrate that good working conditions are maintained, or if unusual conditions are recognized, the interpretation is used to determine courses of action, which range from simply recording the information, through investigation into causes and consequences, up to intervention measures.

In 1988 the International Commission on Radiological Protection (ICRP) issued Publication 54[(1)] to present the information needed to relate measurement results with the intake of radionuclides. The models and parameters used in this document were taken from ICRP Publication 30[(2)-(5)] and Publication 48[(6)]. Publication 54 has filled the role of guidance on the design of monitoring programs and on the interpretation of the measurement results.

Recently the human respiratory tract model was revised by the ICRP[(7)]. There has also been a revision of the biokinetic models for some radionuclides[(8)-(11)]. Furthermore dose conversion coefficients for intakes of radionuclides based on these new models were computed by the ICRP and presented in Publication 68[(12)]. It has hence become necessary to obtain new information instead of that in Publication 54 to relate the measured data with the intake of radionuclides that is consistent with the new ICRP models and recommendations.

The author has computed the values for radioactivity in a whole body and in specific organs and has computed the daily urinary and faecal excretion rates of some selected radionuclides as a function of days following acute intake by inhalation, in which the most recent ICRP models have been used.

This report presents the results of calculations for the radionuclides described in Publication 54[(1)] and, in addition, other important radionuclides in the nuclear industry, research and medicine: ^{3}H, ^{32}P, ^{51}Cr, ^{54}Mn, ^{59}Fe, ^{57}Co, ^{58}Co, ^{60}Co, ^{65}Zn, ^{86}Rb, ^{85}Sr, ^{89}Sr, ^{90}Sr, ^{95}Zr, ^{106}Ru, ^{110m}Ag, ^{124}Sb, ^{125}Sb, ^{125}I, ^{129}I, ^{131}I, ^{134}Cs, ^{137}Cs, ^{140}Ba, ^{141}Ce, ^{144}Ce, ^{203}Hg, ^{226}Ra, ^{228}Ra, ^{228}Th, ^{232}Th, ^{234}U, ^{235}U, ^{238}U, ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Am, ^{242}Cm, ^{244}Cm and ^{252}Cf.

2. MODELS AND PARAMETERS

2.1. Respiratory tract model

The human respiratory tract model described in Publication 66[7] was used for the calculation of particle deposition and respiratory tract clearance of the deposited particles. The compartment model for respiratory tract clearance is shown in **Fig. 2-1**. In the figure s_p is a dissolution rate of inhaled material from its "initial" state to the blood, s_{pt} is a transformation rate of the material from its "initial" state to a "transformed" state, s_t is a dissolution rate from the "transformed" state to the blood, f_b is a fraction of the dissolved material becoming the "bound" state and s_b is an uptake rate from the "bound" state to the blood. Since the default value proposed for f_b is zero[7], the compartments in the "bound" state were all neglected and therefore the total number of the clearance compartments treated in this report was 27.

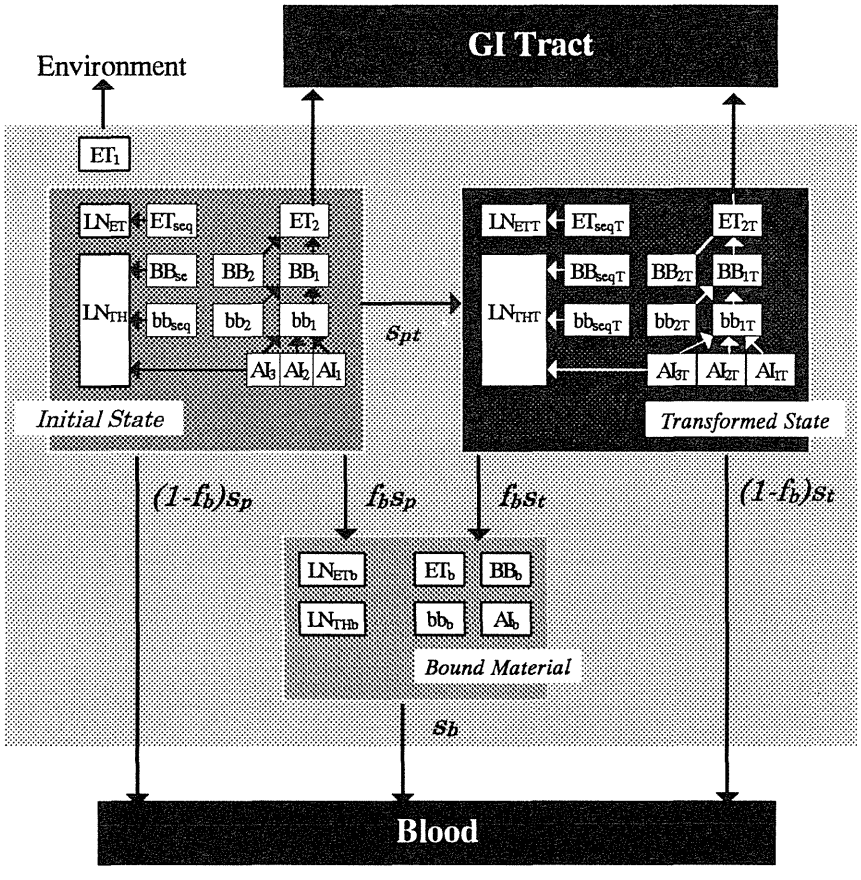

Fig. 2-1 Compartment model for respiratory tract clearance in ICRP Publication 66[7]

The following ICRP default values[7] for the physical characteristics of the radioactive aerosols were used.

- Activity Median Aerodynamic Diameter (AMAD) = 5 μm
- geometric standard deviation of particle size = 2.5
- particle density = 3 g cm^{-3}
- particle shape factor = 1.5

The subject exposed to the aerosols was the ICRP reference worker[7] doing light work: light exercise with the ventilation rate of 1.5 m^3 h^{-1} for 5.5 h + sitting with the rate of 0.54 m^3 h^{-1} for 2.5 h.

2.2. Gastrointestinal (GI) tract model

A certain fraction of the materials deposited in the respiratory tract are cleared to the GI tract via the pharynx. This report used the compartment model of the GI tract described in Publication 30[2] (**Fig. 2-2**). The document[2] should be referred to for the figure notation.

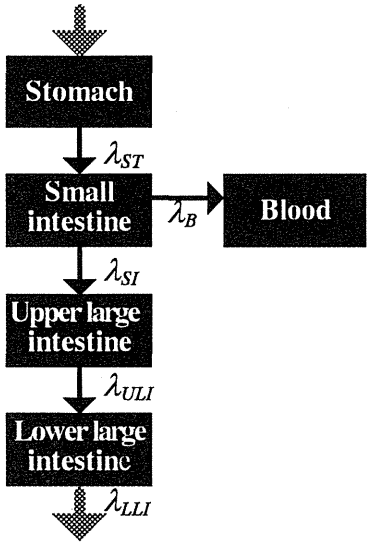

Fig. 2-2 Gastrointestinal model in ICRP Publication 30[2]

The rate constant, λ_B, for the absorption of the materials from the small intestine to the blood was obtained from the value of f_1, the fraction of materials absorbed into blood from the small intestine, using the equation:

$$\lambda_B = f_1 \lambda_{SI} / (1 - f_1)$$

When a value f_1=1 was given, it was assumed that λ_B was 100 and λ_{SI} was 0.

2.3. Biokinetic models

The ICRP publications describing the biokinetic models which were adopted in this report are summarised in **Table 2-1** together with the absorption types and the values of f_1.

Table 2-1 The ICRP publications describing the biokinetic models adopted in this report

Element	f_1 (Types)	ICRP Publications
Hydrogen	Not applicable	Publication 56[8]
Phosphorus	0.8 (F, M)	Publication 54[1]
Chromium	0.1 (F, M, S)	Publication 54[1]
Manganese	0.1 (F, M)	Publication 54[1]
Iron	0.1 (F, M)	Publication 69[10]
Cobalt	0.1 (M), 0.05 (S)	Publication 30[2], 67[9]
Zinc	0.5 (S)	Publication 67[9]
Rubidium	1.0 (F)	Publication 30
Strontium	0.3 (F), 0.01 (S)	Publication 67
Zirconium	0.002 (F, M, S)	Publication 67
Ruthenium	0.05 (F, M, S)	Publication 30, 67
Silver	0.05 (F, M, S)	Publication 67
Antimony	0.1 (F), 0.01 (M)	Publication 69
Iodine	1.0 (SR-1, F)	Publication 67
Cesium	1.0 (F)	Publication 30, 67
Barium	0.1 (F)	Publication 67
Cerium	0.0005 (M, S)	Publication 67
Mercury	1.0 (Organic), 0.02 (Inorganic)	Publication 30
Radium	0.2 (M)	Publication 67
Thorium	0.0005 (M), 0.0002 (S)	Publication 69
Uranium	0.02 (F, M), 0.002 (S)	Publication 69
Neptunium	0.0005 (M)	Publication 67
Plutonium	0.0005 (M), 0.00001 (S)	Publication 67
Americium	0.0005 (M)	Publication 67
Curium	0.0005 (M)	Publication 71[11]
Californium	0.0005 (M)	Publication 30

The model for each element used in this report is briefly described below.

(1) Model for hydrogen, phosphorus, chromium, manganese, cobalt, zinc, rubidium, zirconium, ruthenium, silver, antimony, cesium, cerium, mercury and californium

Biokinetic models for systemic activity of these elements are simple linear chains of compartments similar to the models in ICRP Publication 30[2]. A generalised model for these elements is illustrated in **Fig. 2-3**.

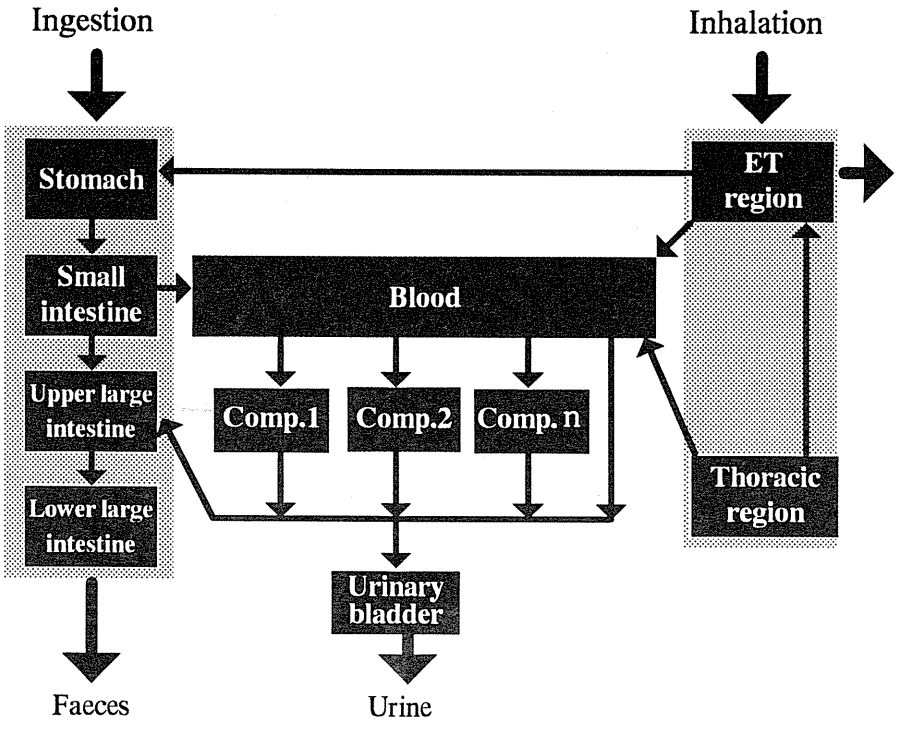

Fig. 2-3 Model for simple linear chains of compartments

The number of compartments for each element, the distribution of the element among the compartments and the half-time of the element in each compartment are given in the ICRP publications shown in **Table 2-1**; details are available in the respective publications.

A half-time of 0.25 days was assumed for the translocation of an element from the transfer compartment, if no specific value for the element has been given.

(2) Model for iron

The ICRP has made a special model for iron[10]. It is illustrated in **Fig. 2-4.**

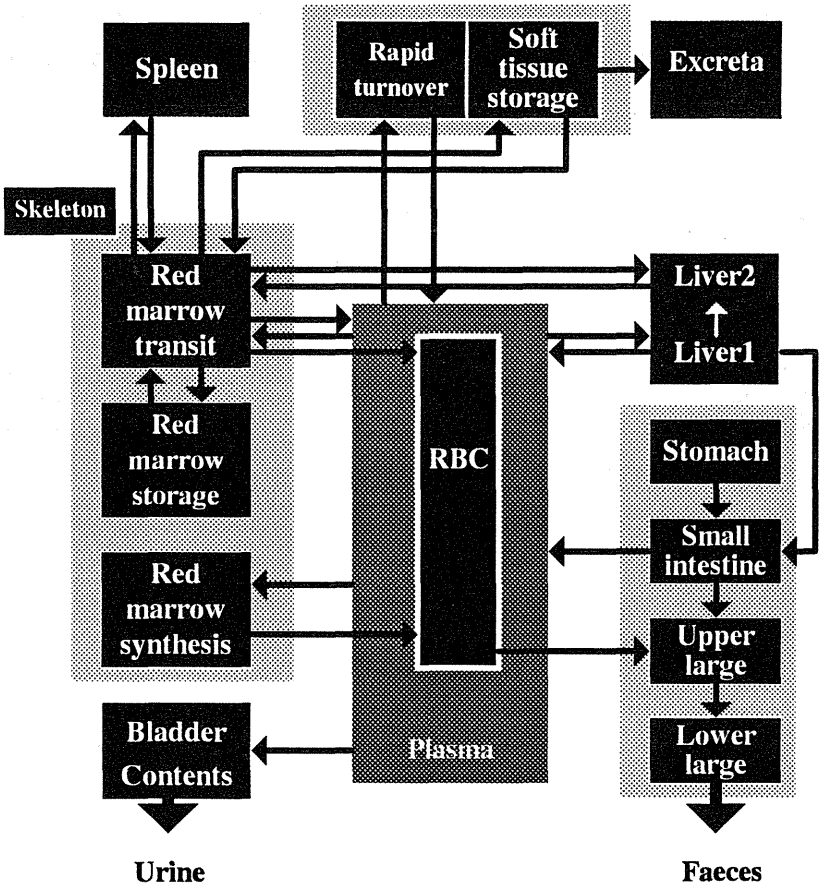

Fig.2-4 Biokinetic model for iron[10]

Most iron entering the body circulatory system transported to the red marrow and incorporated into haemoglobin in the compartment labelled "Red marrow synthesis", from which it is then re-released to circulate in the red blood cells. The red blood cells are destroyed with a half-time of 120 days; this occurs in the compartment labelled "Red marrow transit". Smaller amounts of iron are stored in the liver, spleen, red marrow pool labelled "Red marrow storage" and soft tissue pool labelled "Soft tissue storage". The liver is considered to be two compartments; "Liver 1" consists of parenchymal tissues that exchange iron with plasma, while "Liver 2" is associated with the reticuloendothelial system. The values for the transfer rate between the compartments are given in Publication 69[10].

(3) Model for iodine

A special model which allows for recycling of iodine has been made by the ICRP[9]. It is illustrated in **Fig. 2-5**.

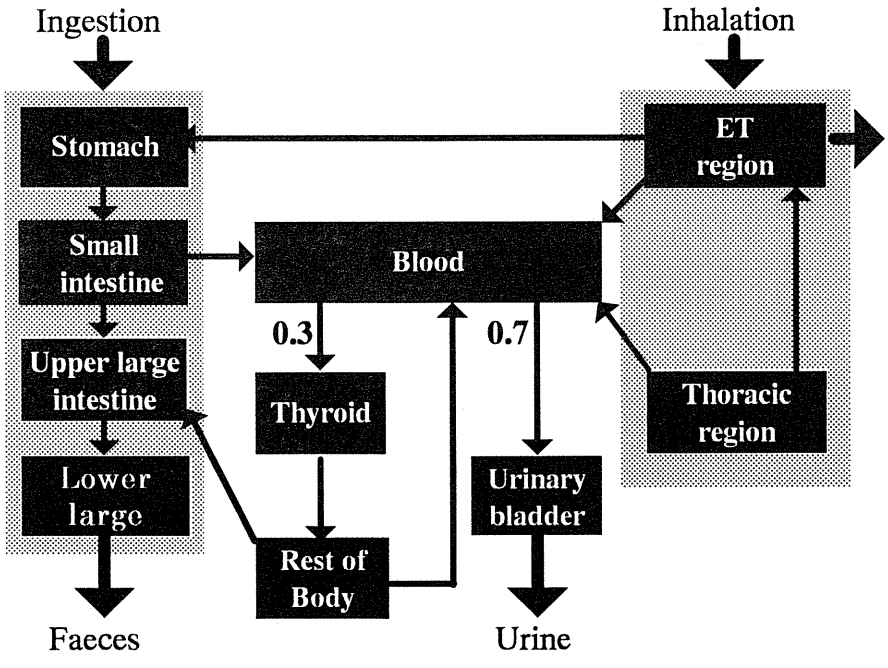

Fig. 2-5 Biokinetic model for iodine[9]

The model has three compartments. A fraction of 0.3 of the iodine absorbed into the blood is taken up by the thyroid. The remainder is directly excreted in urine. The biological half-time in the blood is 0.25 days. The iodine in the thyroid leaves this gland with a half-time of 80 days and is transferred to other tissues. The iodine is retained in the tissues with a half-time of 12 days. A fraction of 0.8 of the iodine in the tissues is released to the circulate system and available for uptake by the thyroid again and urinary excretion. The remainder is directly excreted in faeces in organic forms.

(4) Model for strontium, barium, radium and uranium

The ICRP has developed a physiologically-based generic model for strontium, barium, radium and uranium[9,10]. It is illustrated in **Fig. 2-6.**

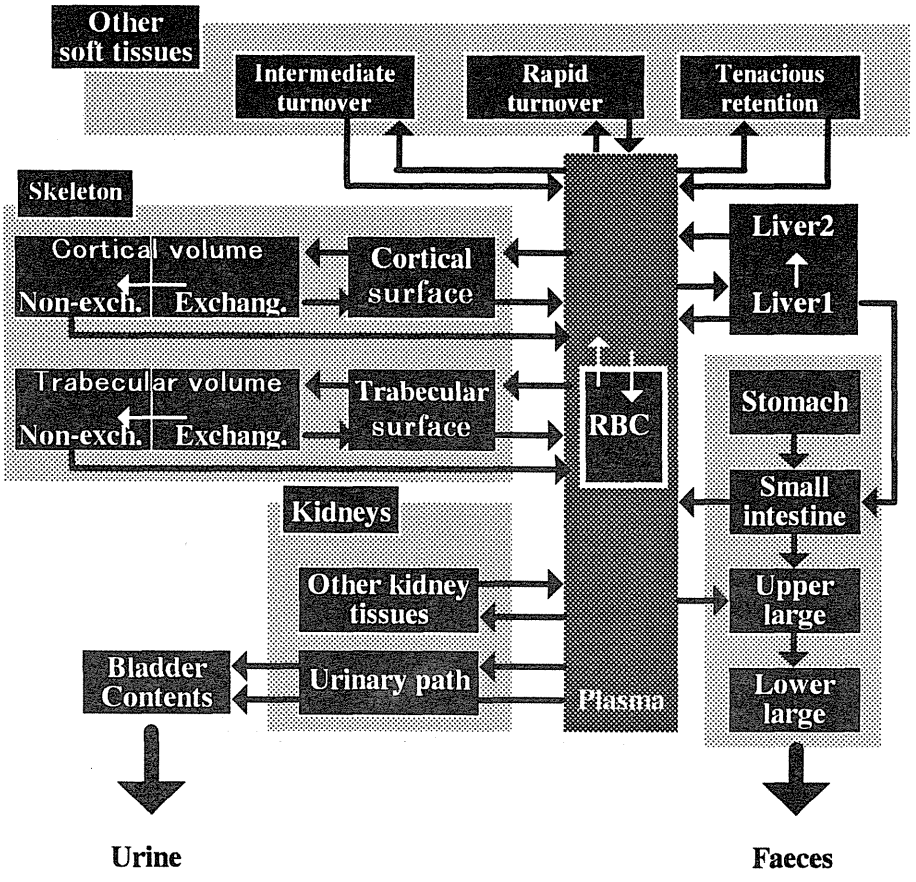

Fig. 2-6 Biokinetic model for strontium, barium, radium and uranium[9,10]

Material absorbed into the blood (plasma) is retained by the skeleton and soft tissues or excreted in urine or faeces. For radium and uranium the liver is distinct from the other soft tissues. In the case of uranium, exchange of material between plasma and kidney tissues is considered.

Material leaving every soft tissue compartment returns to the plasma and is redistributed among tissues at the same rate constant as for its initial absorption into the plasma. Material transferred to the skeleton deposits initially on bone surfaces and returns to the plasma or migrates to exchangeable bone volume within a few days. A portion of the material leaving the exchangeable bone volume returns to bone surfaces, while the remainder is assigned to a non-exchangeable bone volume from which it is gradually removed to the plasma by bone resorption.

The parameter values for strontium, barium and radium are given in Publication 67[9] and for uranium in Publication 69[10].

(5) Model for thorium, neptunium, plutonium, americium and curium

The ICRP has developed a physiologically-based generic model for thorium, neptunium, plutonium, americium and curium[9-11]. It is illustrated in **Fig. 2-7.**

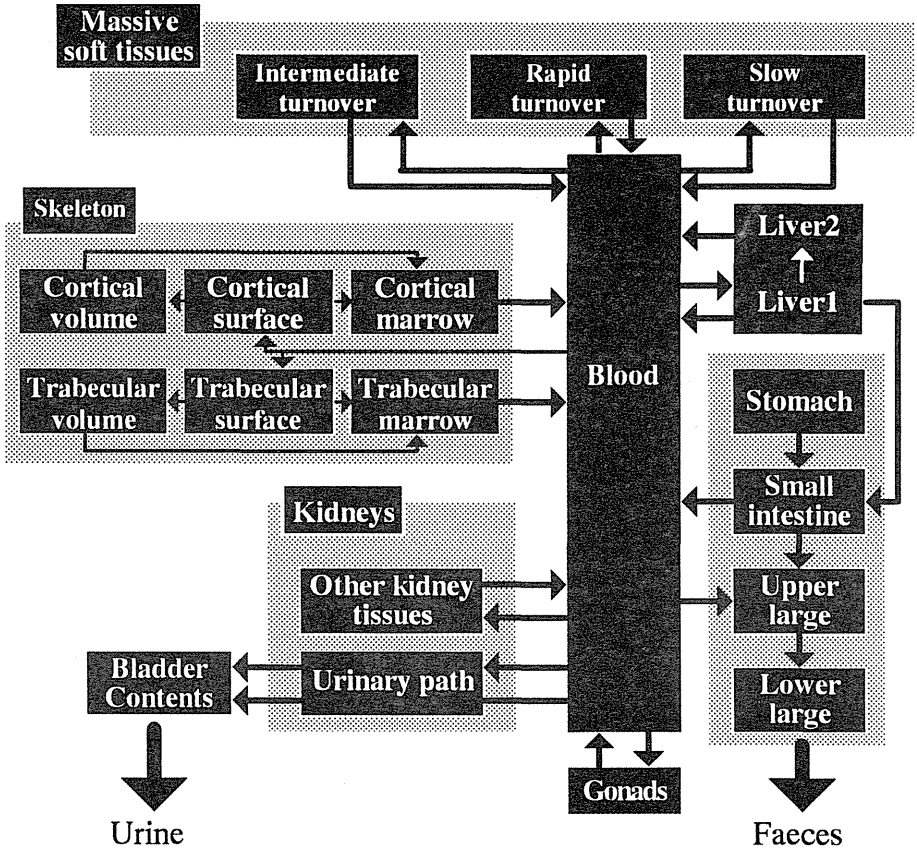

Fig. 2-7 Biokinetic model for thorium, neptunium, plutonium americium, and curium[9-11]

Material transferred to the skeleton deposits initially on bone surfaces and is subsequently transferred to the bone marrow by bone resorption or to the bone volume by bone formation. Material in the bone volume leaves for the bone marrow by bone resorption. Material in the bone marrow returns to the blood over a period of months and is redistributed among tissues at the same rate constant as for the initial absorption into the blood.

The compartment labelled "Rapid turnover" in massive soft tissues is a soft tissue pool that exchanges material with the blood over a period of hours or days. "Intermediate turnover" represents soft tissues with an intermediate retention up to 2 years and "Tenacious turnover" represents soft tissues with tenacious retention.

For americium and curium, the liver is considered as a single compartment. For thorium, plutonium and neptunium, the liver is divided into two compartments with the second compartment

labelled "Liver 2". "Liver 2" represents relatively tenacious retention which is defined on a kinetic, rather than a biological, basis. A portion of the material entering Liver 1 is removed to the small intestine via biliary secretion and the rest is removed either to the blood (americium, curium) or Liver 2 (thorium, plutonium, neptunium).

The parameter values for neptunium, plutonium and americium are given in Publication 67[9] and for thorium in Publication 69[10]. The parameter values for curium are taken to be the same as for americium[11].

2.4. Method of calculation

The retention of inhaled material in each compartment of the respiratory tracts, GI tracts, body tissues and excreta was expressed in the form of systems of simultaneous first order differential equations. These differential equations were numerically solved by the Runge-Kutta method. The calculation program was made on a commercially available software for the general purpose equation solver "EQUATRAN-G" (Omega Simulation Co., Ltd., Tokyo, Japan).

3. CALCULATED MONITORING DATA

For single acute intake of unit activity by inhalation, content of radioactivity in a whole body and in specific organs, and daily urinary and faecal excretion rates were calculated. Whole body content means the sum of systemic activities (including that in the urinary bladder) and activity retained within the respiratory and GI tracts. Daily urinary and faecal excretion rates at day t represent the excreted activity during one day just before the day t, which is in accordance with the representation of daily urinary excretion rate in Publication 54[1], except for the case of concentration of ^{3}H in urine, where instantaneous value at the day t was calculated.

The results are shown in the following tables and figures; numerical data at days 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 30, 60, 90, 180 and 365 are tabulated, and the data up to 1000 days are graphically presented. For whole body and organ contents, the numerical data at days 0.1, 0.2 and 0.5 are also presented in the tables.

Table 3-1(a) Daily urinary excretion of ^{3}H

Days after intake	Daily urinary excretion*
	Water
1	3.0E-02
2	3.1E-02
3	2.9E-02
4	2.7E-02
5	2.5E-02
6	2.4E-02
7	2.2E-02
8	2.1E-02
9	1.9E-02
10	1.8E-02
14	1.4E-02
30	4.7E-03
60	7.3E-04
90	1.8E-04
180	2.3E-05
365	8.9E-07

* Bq/d per Bq intake

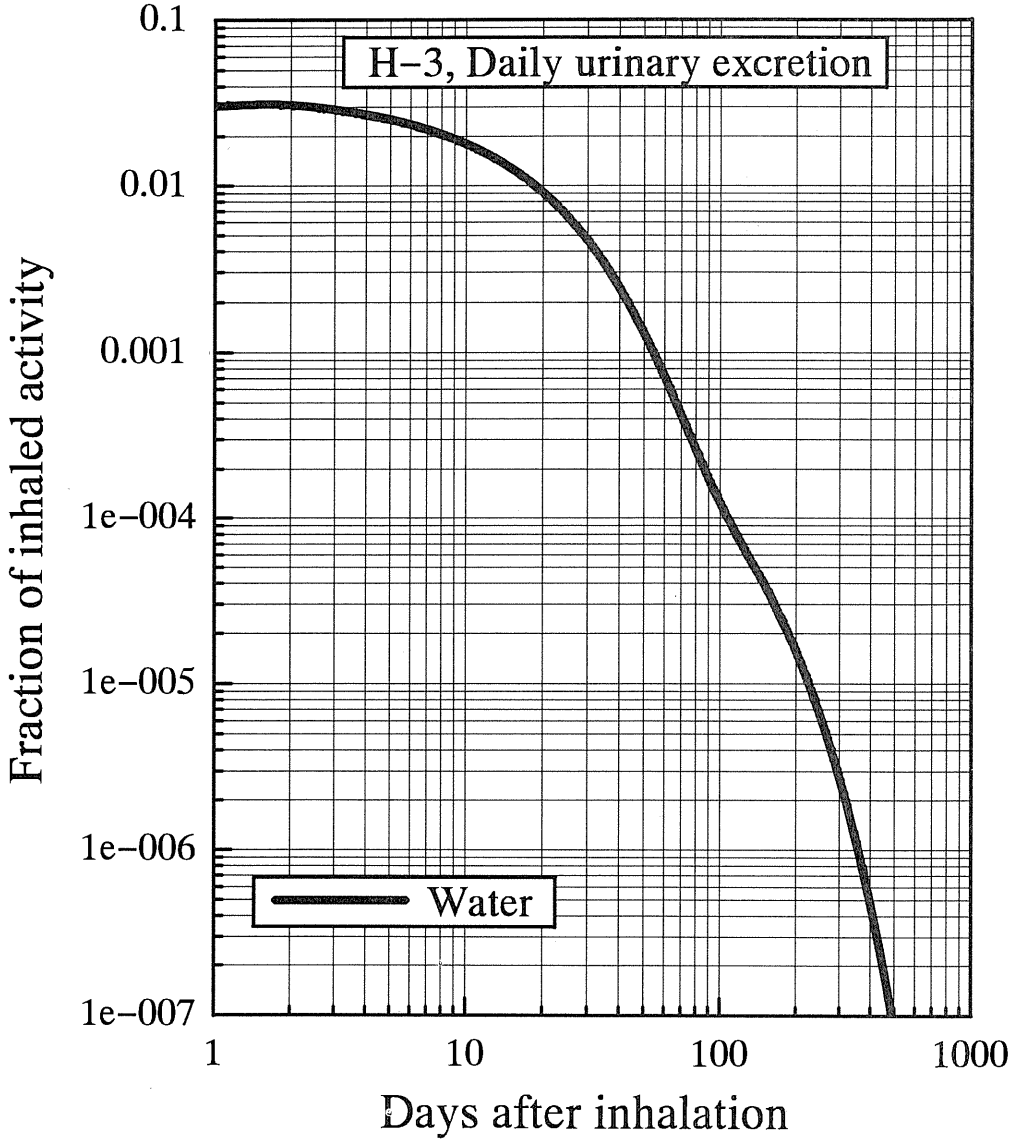

Fig.3-1(a) Daily urinary excretion of ^{3}H following acute intake by inhalation

Table 3-1(b) Concentration of ^{3}H in urine

Days after intake	Concentration*
	Water
1	2.3E-02
2	2.1E-02
3	2.0E-02
4	1.9E-02
5	1.7E-02
6	1.6E-02
7	1.5E-02
8	1.4E-02
9	1.3E-02
10	1.2E-02
14	9.4E-03
30	3.2E-03
60	5.0E-04
90	1.2E-04
180	1.6E-05
365	6.4E-07

* Instantaneous value for concentration of ^{3}H (Bq/d/l)

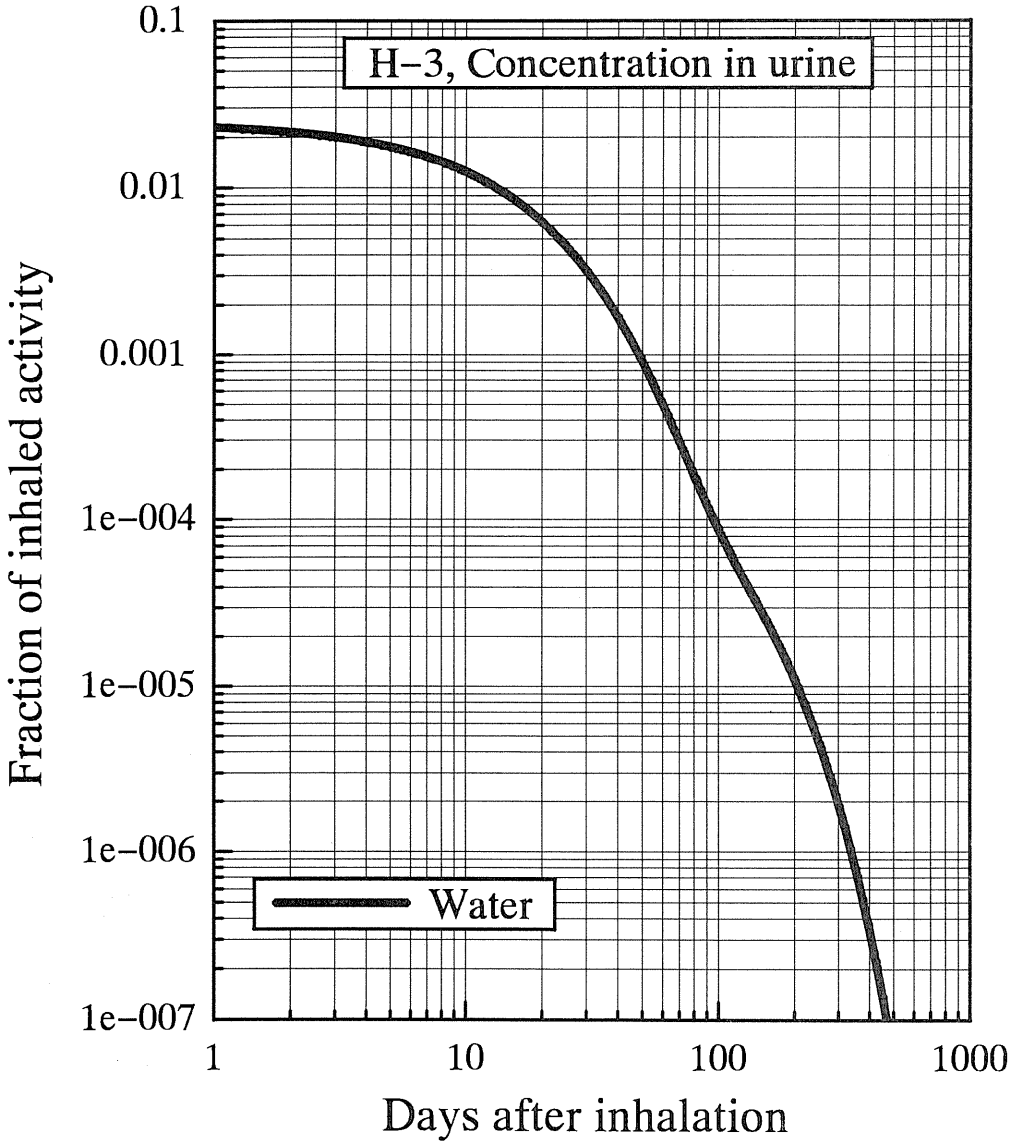

Fig.3-1(b) Concentration of ^{3}H in urine following acute intake by inhalation

Table 3-2(a) Daily urinary excretion of ^{32}P

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	4.9E-02	3.6E-02	-------
2	2.8E-02	2.2E-02	-------
3	1.7E-02	1.4E-02	-------
4	1.2E-02	9.5E-03	-------
5	8.8E-03	7.1E-03	-------
6	6.9E-03	5.6E-03	-------
7	5.5E-03	4.5E-03	-------
8	4.5E-03	3.7E-03	-------
9	3.8E-03	3.1E-03	-------
10	3.3E-03	2.7E-03	-------
14	2.0E-03	1.7E-03	-------
30	4.8E-04	4.3E-04	-------
60	3.7E-05	3.9E-05	-------
90	2.9E-06	3.9E-06	-------
180	1.4E-09	9.6E-09	-------
365	2.1E-16	3.3E-13	-------

* Bq/d per Bq intake

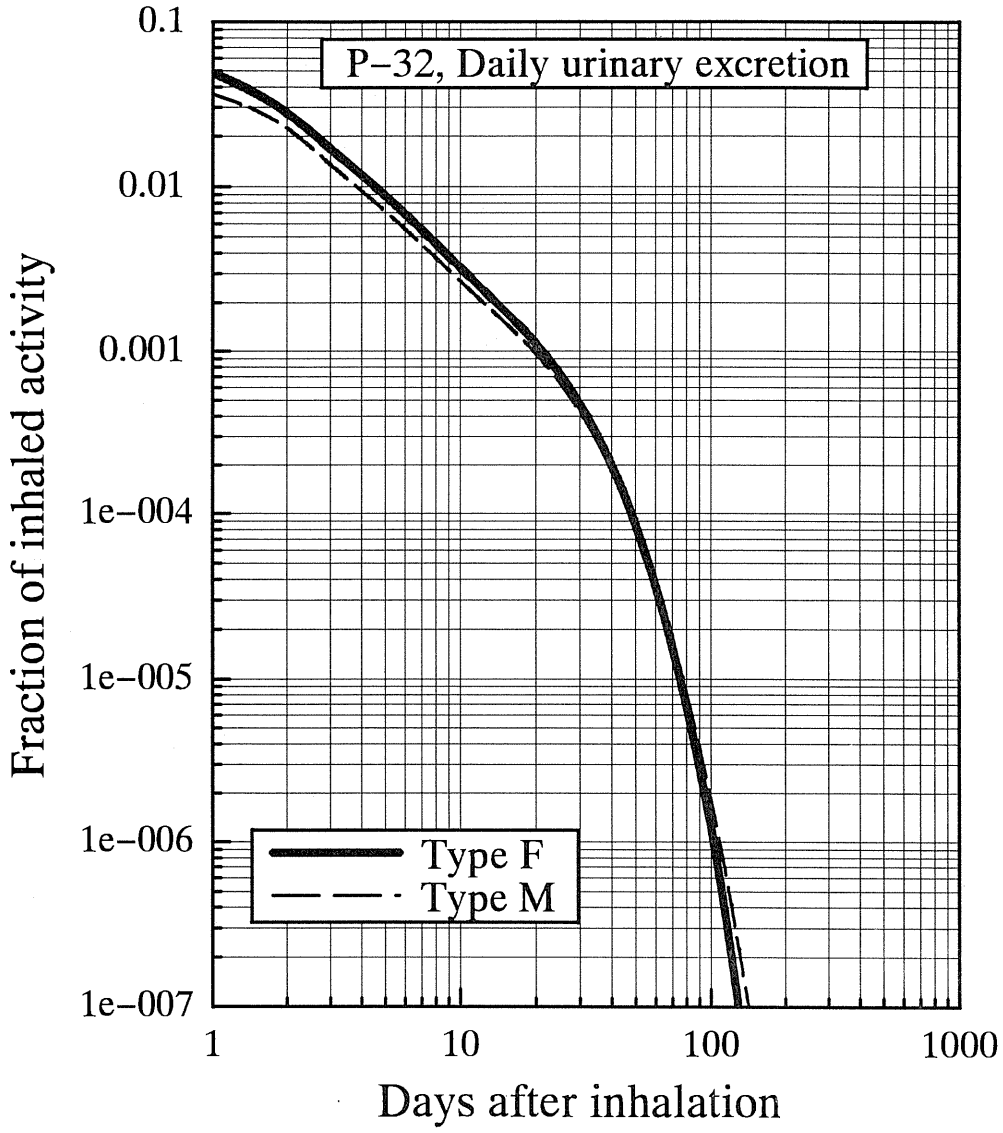

Fig.3-2(a) Daily urinary excretion of ^{32}P following acute intake by inhalation

Table 3-3(a) Whole body content of ^{51}Cr

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	7.9E-01	7.9E-01
0.2	7.5E-01	7.5E-01	7.5E-01
0.5	6.4E-01	6.5E-01	6.5E-01
1	5.0E-01	4.8E-01	4.8E-01
2	3.1E-01	2.6E-01	2.5E-01
3	2.2E-01	1.5E-01	1.5E-01
4	1.8E-01	1.1E-01	1.0E-01
5	1.6E-01	9.1E-02	8.4E-02
6	1.4E-01	8.2E-02	7.6E-02
7	1.3E-01	7.6E-02	7.0E-02
8	1.2E-01	7.1E-02	6.6E-02
9	1.1E-01	6.7E-02	6.3E-02
10	1.0E-01	6.4E-02	6.1E-02
14	7.9E-02	5.3E-02	5.1E-02
30	3.7E-02	2.8E-02	2.9E-02
60	1.3E-02	1.0E-02	1.1E-02
90	5.2E-03	3.9E-03	4.8E-03
180	3.3E-04	2.5E-04	4.1E-04
365	1.6E-06	1.1E-06	3.2E-06

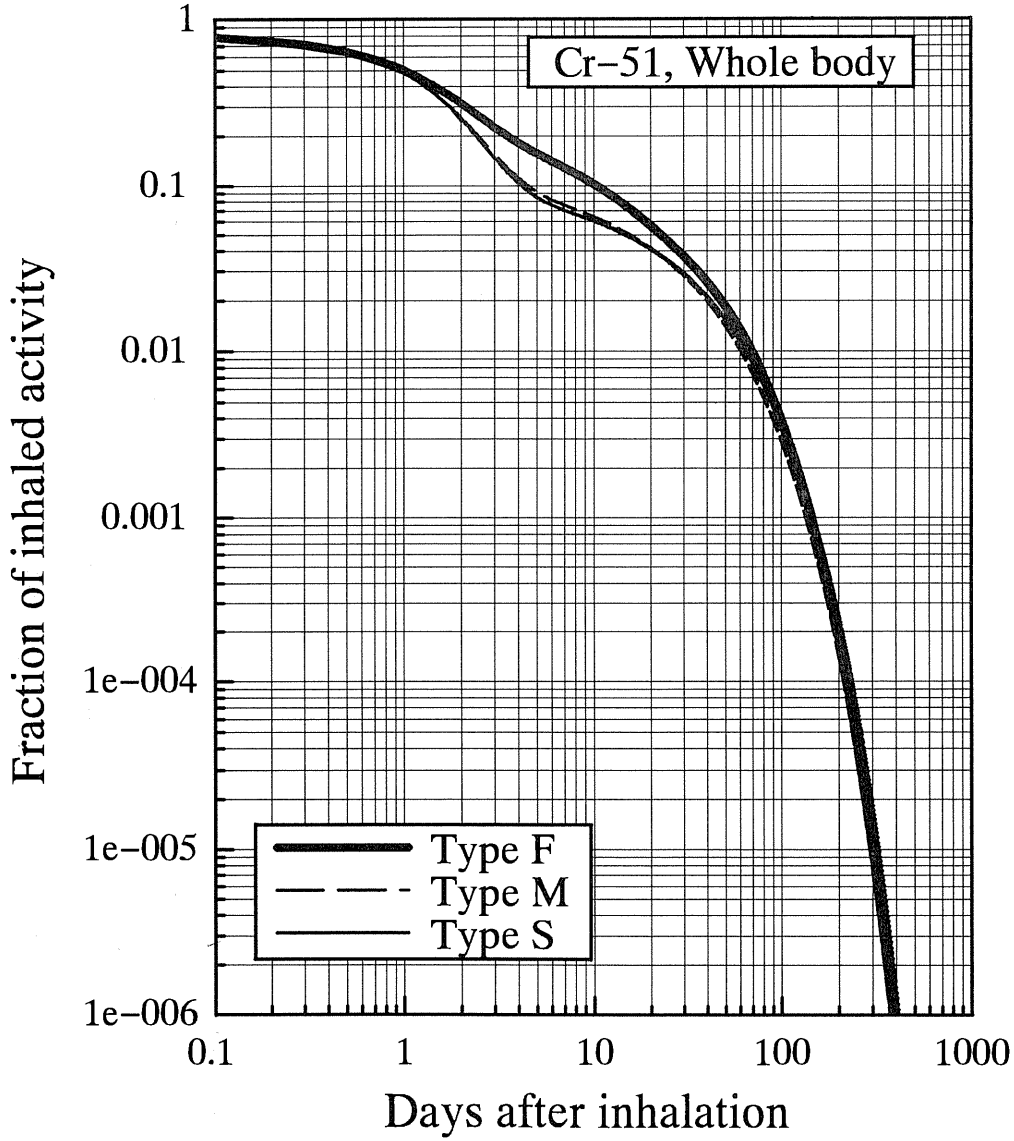

Fig.3-3(a) Whole body content of ^{51}Cr following acute intake by inhalation

Table 3-3(b) Daily urinary excretion of ^{51}Cr

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	3.4E-02	7.0E-03	4.0E-03
2	1.5E-02	3.7E-03	2.4E-03
3	7.6E-03	1.9E-03	1.2E-03
4	5.4E-03	1.3E-03	8.1E-04
5	4.4E-03	1.1E-03	6.5E-04
6	3.8E-03	9.3E-04	5.6E-04
7	3.3E-03	8.2E-04	4.9E-04
8	2.9E-03	7.3E-04	4.3E-04
9	2.5E-03	6.5E-04	3.8E-04
10	2.2E-03	5.8E-04	3.3E-04
14	1.3E-03	3.7E-04	2.0E-04
30	2.4E-04	9.7E-05	4.2E-05
60	4.6E-05	2.6E-05	8.9E-06
90	1.6E-05	9.5E-06	3.1E-06
180	8.2E-07	5.6E-07	1.6E-07
365	1.9E-09	1.9E-09	5.6E-10

* Bq/d per Bq intake

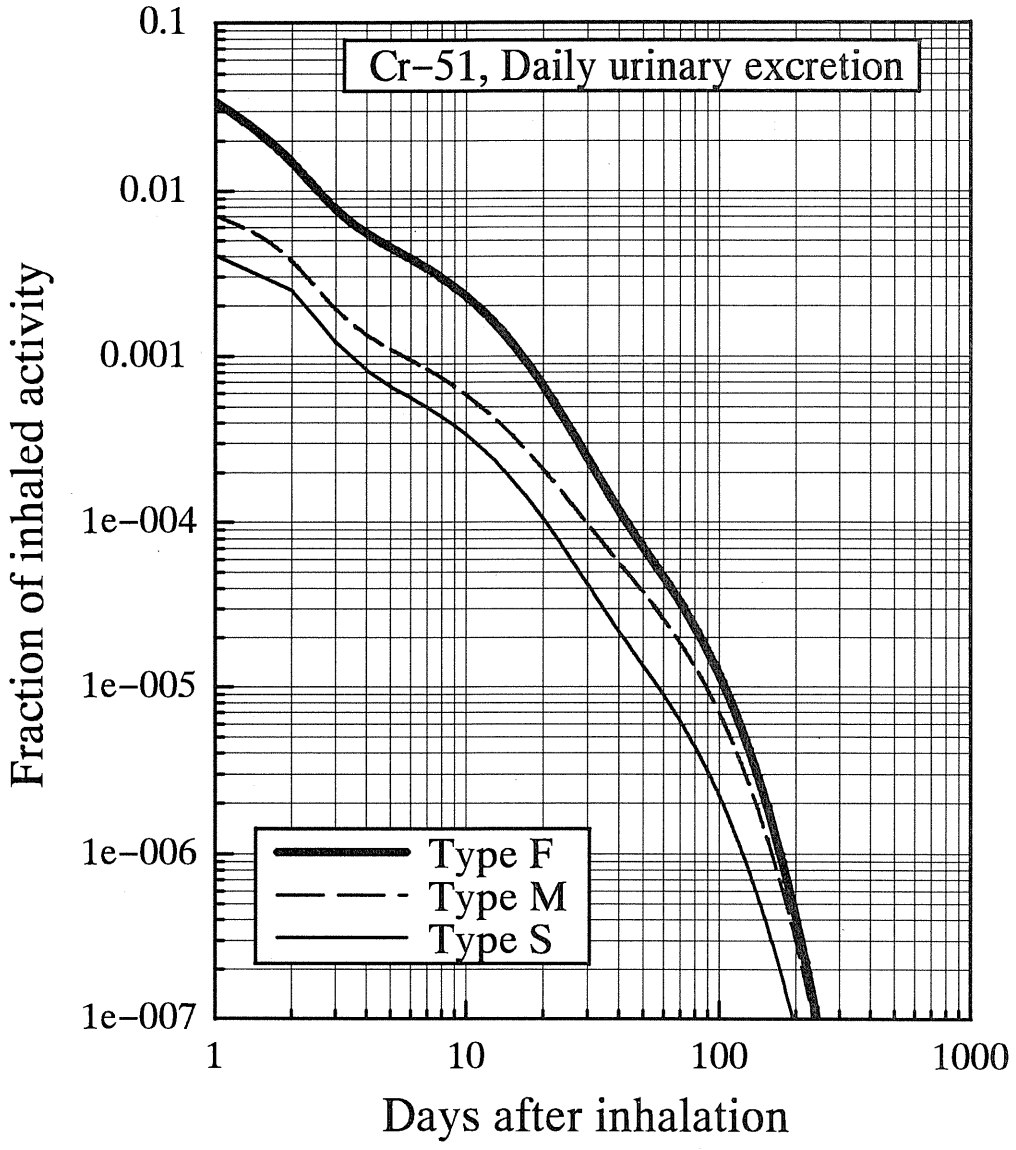

Fig.3-3(b) Daily urinary excretion of ^{51}Cr following acute intake by inhalation

Table 3-4(a) Whole body content of ^{54}Mn

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	7.9E-01	-------
0.2	7.6E-01	7.6E-01	-------
0.5	6.7E-01	6.6E-01	-------
1	5.5E-01	5.0E-01	-------
2	3.9E-01	2.8E-01	-------
3	3.1E-01	1.8E-01	-------
4	2.7E-01	1.4E-01	-------
5	2.5E-01	1.2E-01	-------
6	2.3E-01	1.1E-01	-------
7	2.2E-01	1.1E-01	-------
8	2.1E-01	1.0E-01	-------
9	2.0E-01	9.9E-02	-------
10	2.0E-01	9.6E-02	-------
14	1.7E-01	8.9E-02	-------
30	1.2E-01	6.8E-02	-------
60	6.7E-02	4.5E-02	-------
90	3.7E-02	3.1E-02	-------
180	6.4E-03	1.2E-02	-------
365	1.7E-04	2.4E-03	-------

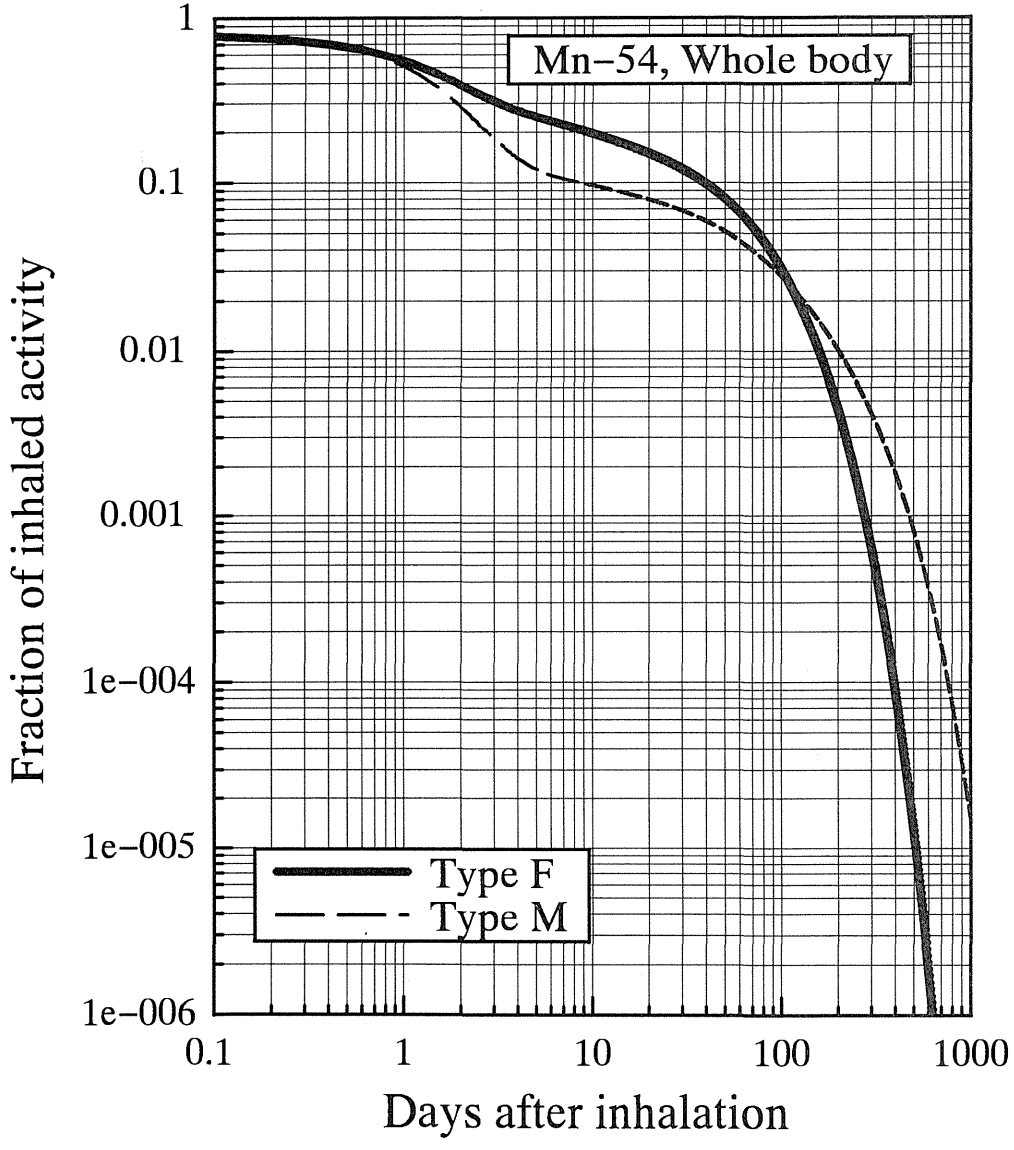

Fig.3-4(a) Whole body content of ^{54}Mn following acute intake by inhalation

Table 3-4(b) Daily urinary excretion of ^{54}Mn

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	5.2E-03	9.9E-04	-------
2	8.0E-03	1.8E-03	-------
3	7.2E-03	1.7E-03	-------
4	6.3E-03	1.5E-03	-------
5	5.5E-03	1.3E-03	-------
6	4.9E-03	1.2E-03	-------
7	4.3E-03	1.0E-03	-------
8	3.9E-03	9.3E-04	-------
9	3.5E-03	8.4E-04	-------
10	3.1E-03	7.6E-04	-------
14	2.2E-03	5.6E-04	-------
30	1.1E-03	3.1E-04	-------
60	5.7E-04	1.9E-04	-------
90	3.2E-04	1.3E-04	-------
180	5.5E-05	4.0E-05	-------
365	1.5E-06	6.6E-06	-------

* Bq/d per Bq intake

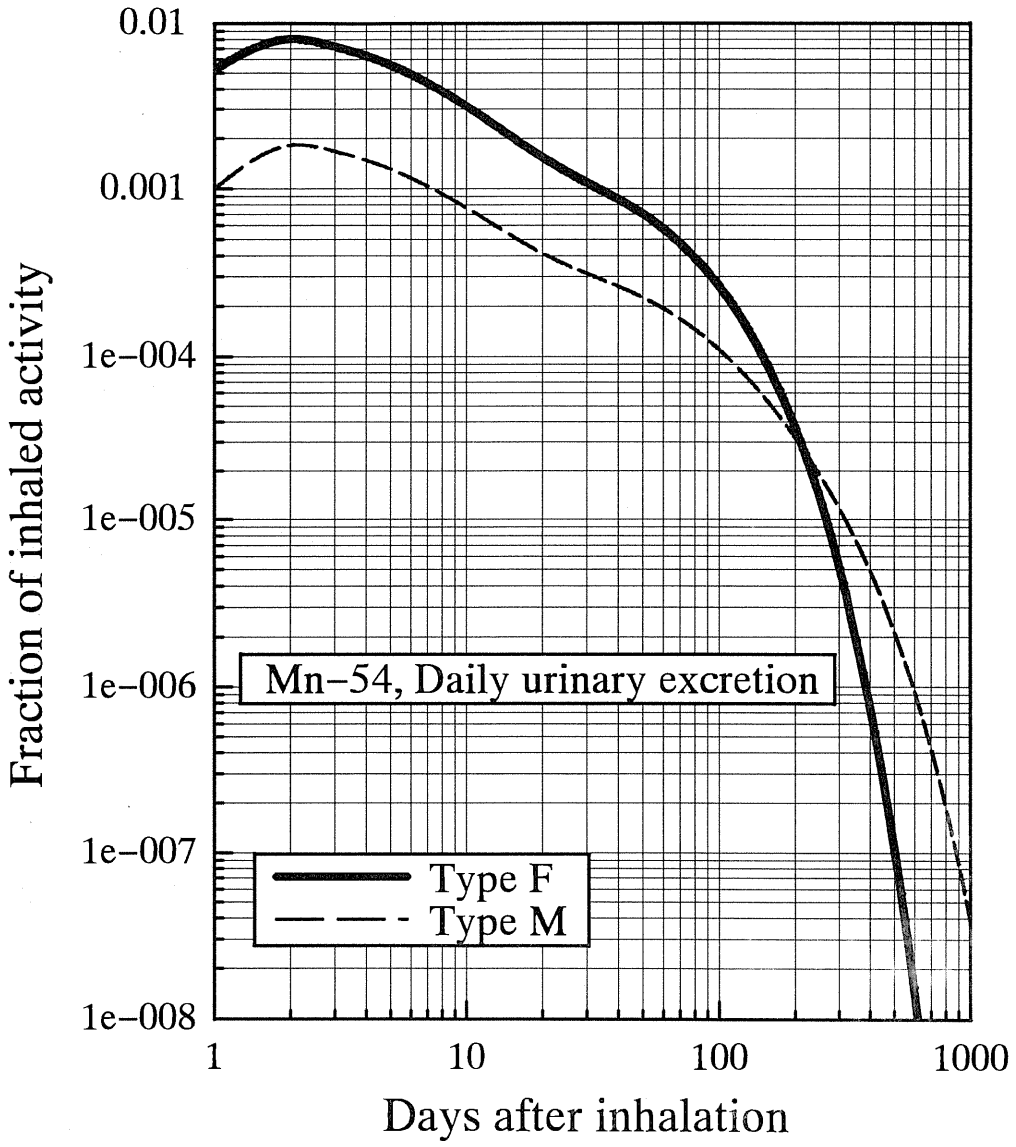

Fig.3-4(b) Daily urinary excretion of ^{54}Mn following acute intake by inhalation

Table 3-5(a) Whole body content of ^{59}Fe

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	7.9E-01	-------
0.2	7.5E-01	7.5E-01	-------
0.5	6.7E-01	6.6E-01	-------
1	5.4E-01	5.0E-01	-------
2	3.9E-01	2.8E-01	-------
3	3.3E-01	1.8E-01	-------
4	3.0E-01	1.4E-01	-------
5	2.8E-01	1.2E-01	-------
6	2.8E-01	1.2E-01	-------
7	2.7E-01	1.1E-01	-------
8	2.7E-01	1.1E-01	-------
9	2.6E-01	1.1E-01	-------
10	2.6E-01	1.0E-01	-------
14	2.4E-01	9.6E-02	-------
30	1.9E-01	7.2E-02	-------
60	1.2E-01	4.3E-02	-------
90	7.3E-02	2.6E-02	-------
180	1.8E-02	6.2E-03	-------
365	9.5E-04	3.3E-04	-------

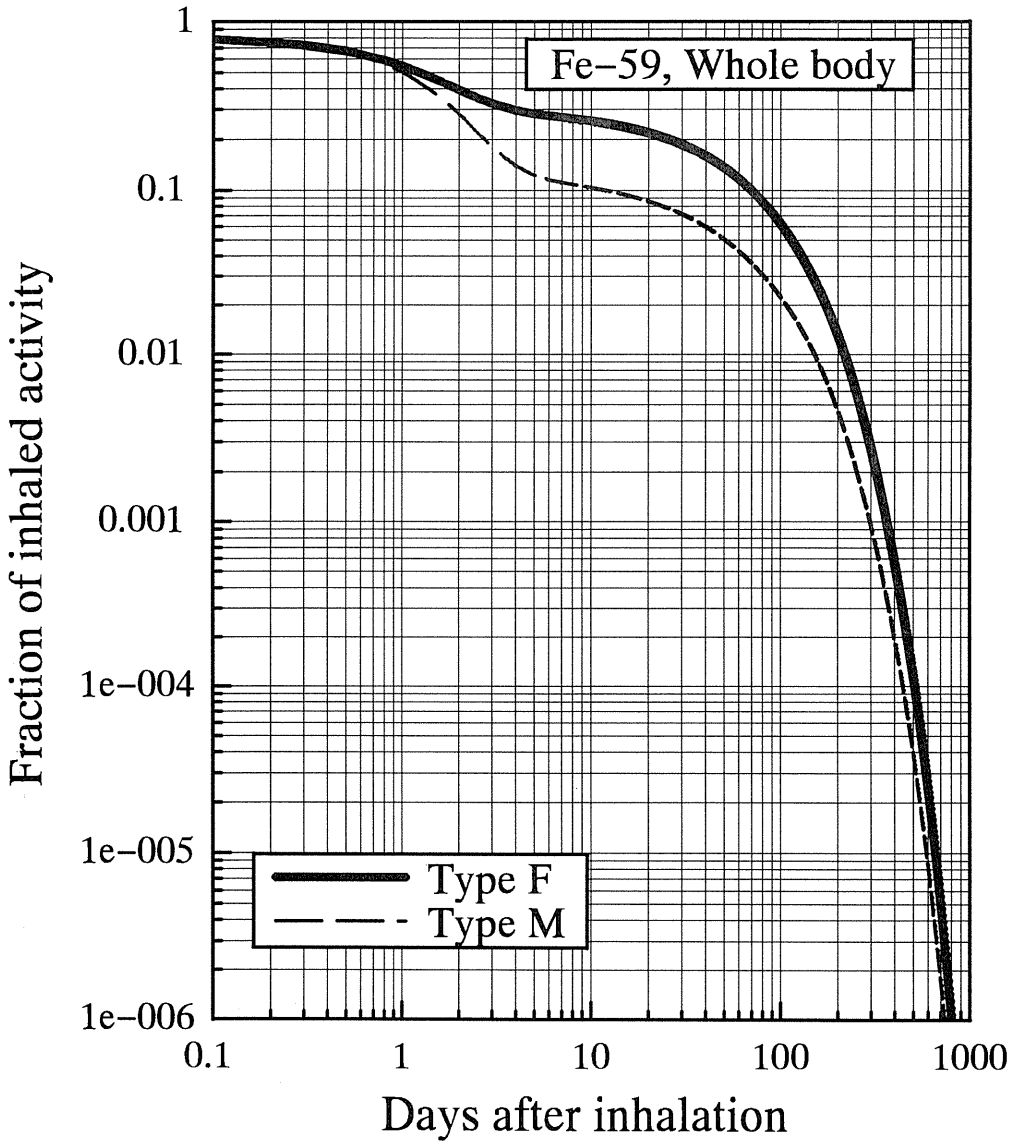

Fig.3-5(a) Whole body content of ^{59}Fe following acute intake by inhalation

Table 3-5(b) Daily urinary excretion of ^{59}Fe

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	6.0E-04	1.3E-04	-------
2	5.2E-05	1.4E-05	-------
3	3.3E-05	8.6E-06	-------
4	2.3E-05	6.1E-06	-------
5	1.7E-05	4.6E-06	-------
6	1.3E-05	3.6E-06	-------
7	1.0E-05	3.0E-06	-------
8	8.3E-06	2.6E-06	-------
9	7.2E-06	2.3E-06	-------
10	6.3E-06	2.1E-06	-------
14	4.7E-06	1.7E-06	-------
30	3.2E-06	1.2E-06	-------
60	2.0E-06	6.8E-07	-------
90	1.1E-06	4.1E-07	-------
180	2.6E-07	9.2E-08	-------
365	1.3E-08	4.5E-09	-------

* Bq/d per Bq intake

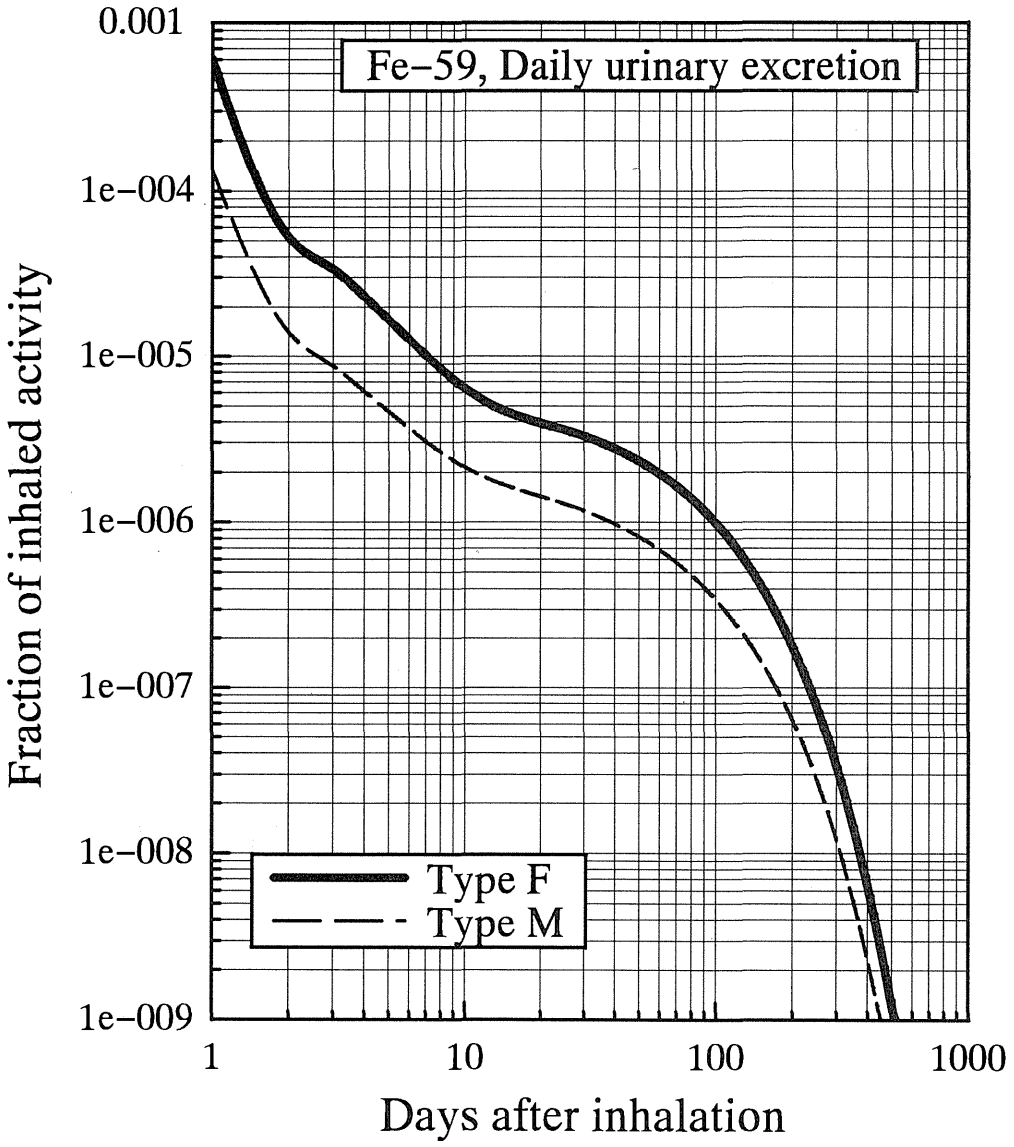

Fig.3-5(b) Daily urinary excretion of ^{59}Fe following acute intake by inhalation

Table 3-6(a) Whole body content of ^{57}Co

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.5E-01	7.6E-01
0.5	-------	6.5E-01	6.6E-01
1	-------	4.8E-01	4.9E-01
2	-------	2.6E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.1E-01	9.7E-02
5	-------	9.0E-02	7.9E-02
6	-------	8.2E-02	7.2E-02
7	-------	7.7E-02	6.8E-02
8	-------	7.4E-02	6.6E-02
9	-------	7.2E-02	6.5E-02
10	-------	7.0E-02	6.4E-02
14	-------	6.6E-02	6.0E-02
30	-------	5.0E-02	5.0E-02
60	-------	3.5E-02	3.9E-02
90	-------	2.7E-02	3.3E-02
180	-------	1.4E-02	2.2E-02
365	-------	4.8E-03	1.1E-02

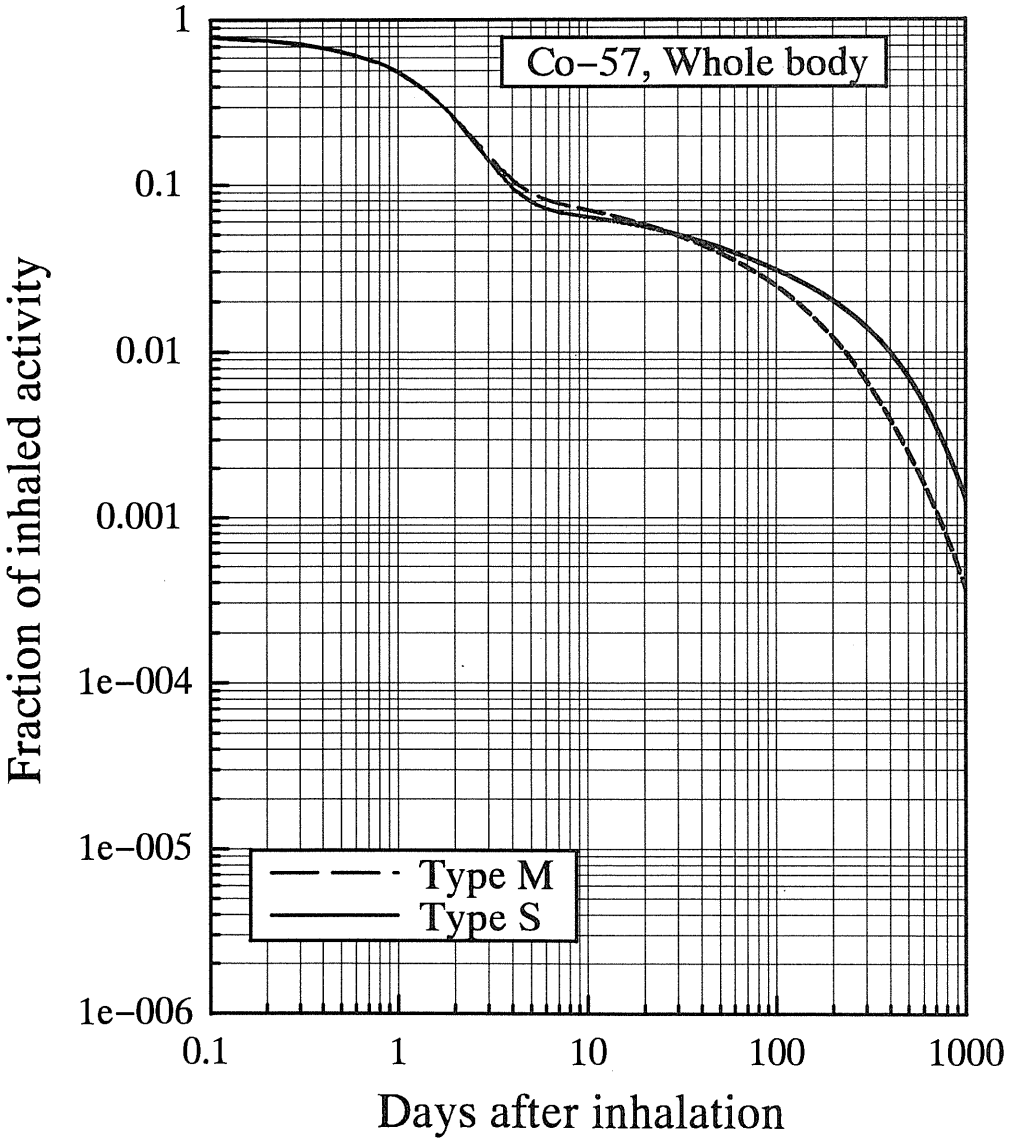

Fig.3-6(a) Whole body content of ^{57}Co following acute intake by inhalation

Table 3-6(b) Daily urinary excretion of ^{57}Co

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	2.0E-02	5.7E-03
2	-------	9.1E-03	3.1E-03
3	-------	3.7E-03	1.2E-03
4	-------	2.2E-03	6.7E-04
5	-------	1.7E-03	5.0E-04
6	-------	1.4E-03	4.2E-04
7	-------	1.3E-03	3.7E-04
8	-------	1.2E-03	3.3E-04
9	-------	1.1E-03	3.0E-04
10	-------	9.7E-04	2.7E-04
14	-------	7.0E-04	1.8E-04
30	-------	2.7E-04	5.3E-05
60	-------	1.4E-04	2.0E-05
90	-------	9.8E-05	1.3E-05
180	-------	4.2E-05	5.3E-06
365	-------	9.6E-06	1.8E-06

* Bq/d per Bq intake

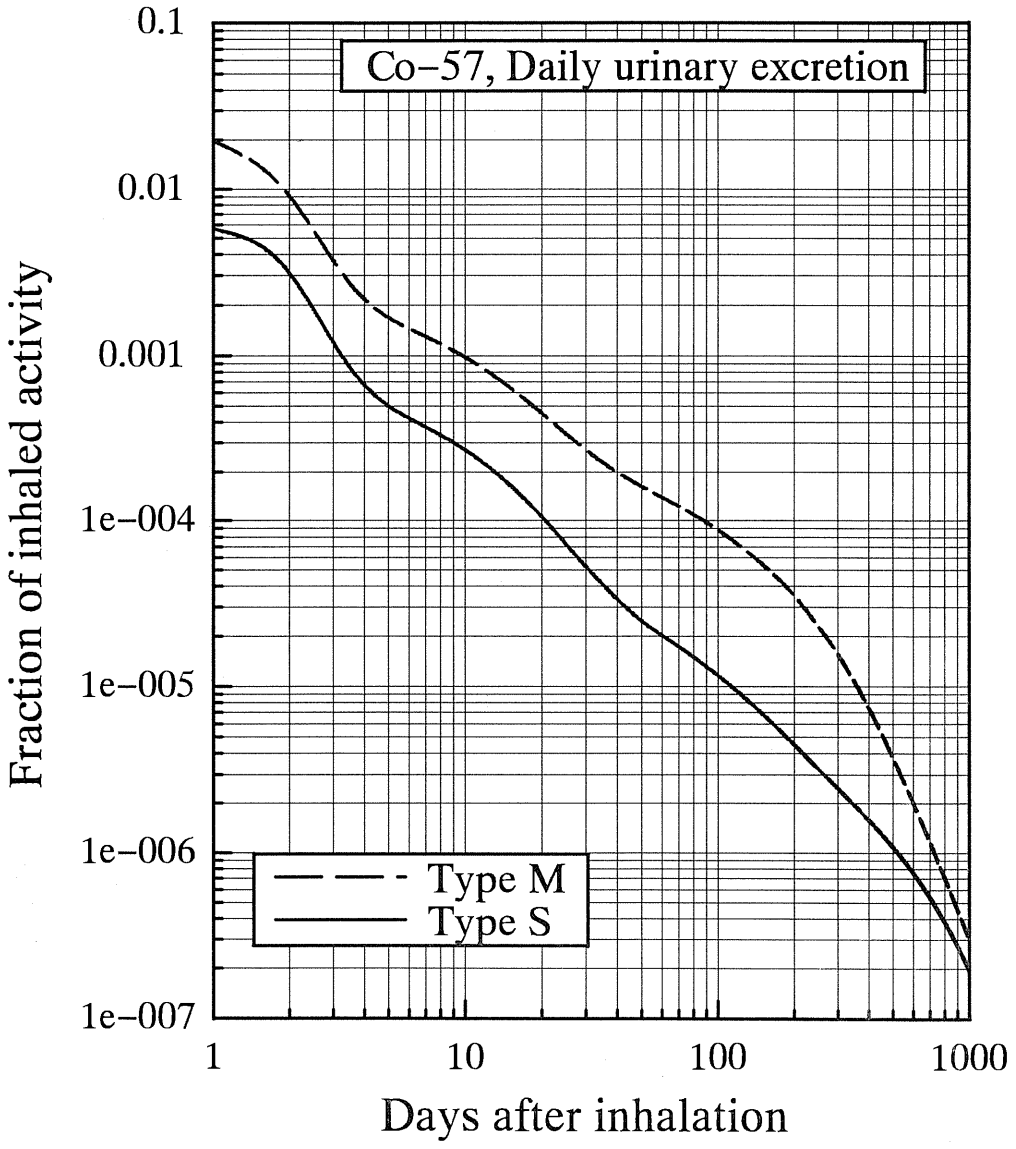

Fig.3-6(b) Daily urinary excretion of ^{57}Co following acute intake by inhalation

Table 3-7(a) Whole body content of ^{58}Co

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.5E-01	7.5E-01
0.5	-------	6.5E-01	6.5E-01
1	-------	4.8E-01	4.9E-01
2	-------	2.5E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.0E-01	9.4E-02
5	-------	8.7E-02	7.6E-02
6	-------	7.8E-02	6.9E-02
7	-------	7.3E-02	6.5E-02
8	-------	7.0E-02	6.3E-02
9	-------	6.8E-02	6.1E-02
10	-------	6.5E-02	5.9E-02
14	-------	5.8E-02	5.6E-02
30	-------	4.0E-02	4.0E-02
60	-------	2.3E-02	2.5E-02
90	-------	1.4E-02	1.7E-02
180	-------	3.8E-03	5.9E-03
365	-------	3.4E-04	8.0E-04

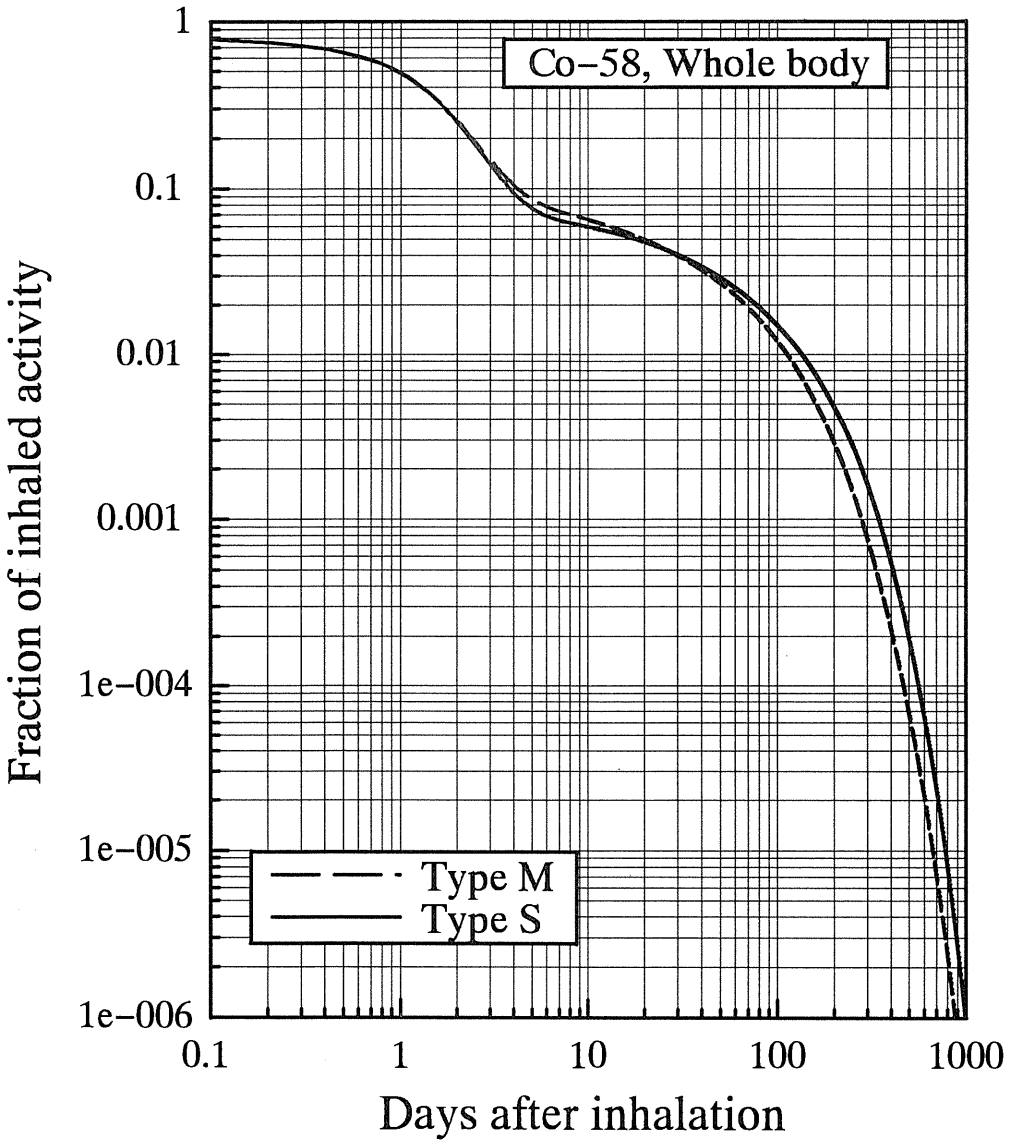

Fig.3-7(a) Whole body content of ^{58}Co following acute intake by inhalation

Table 3-7(b) Daily urinary excretion of ^{58}Co

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	2.0E-02	5.6E-03
2	-------	9.0E-03	3.1E-03
3	-------	3.6E-03	1.2E-03
4	-------	2.1E-03	6.5E-04
5	-------	1.6E-03	4.8E-04
6	-------	1.4E-03	4.0E-04
7	-------	1.2E-03	3.5E-04
8	-------	1.1E-03	3.1E-04
9	-------	1.0E-03	2.8E-04
10	-------	9.1E-04	2.5E-04
14	-------	6.3E-04	1.6E-04
30	-------	2.2E-04	4.2E-05
60	-------	9.0E-05	1.3E-05
90	-------	5.1E-05	6.9E-06
180	-------	1.1E-05	1.4E-06
365	-------	6.8E-07	1.3E-07

* Bq/d per Bq intake

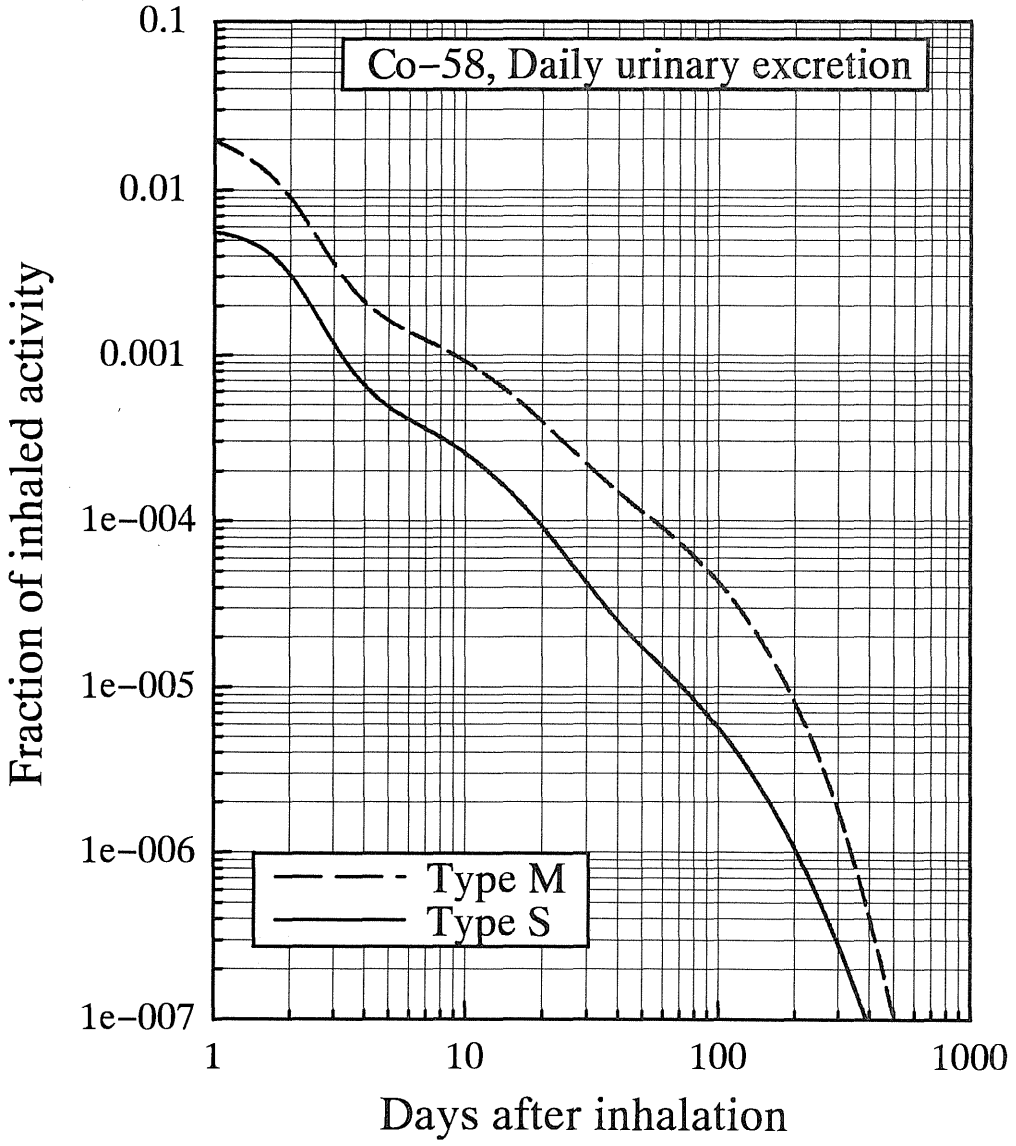

Fig.3-7(b) Daily urinary excretion of ^{58}Co following acute intake by inhalation

Table 3-8(a) Whole body content of ^{60}Co

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.5E-01	7.6E-01
0.5	-------	6.5E-01	6.6E-01
1	-------	4.9E-01	4.9E-01
2	-------	2.6E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.1E-01	9.8E-02
5	-------	9.1E-02	8.0E-02
6	-------	8.3E-02	7.3E-02
7	-------	7.8E-02	6.9E-02
8	-------	7.6E-02	6.8E-02
9	-------	7.4E-02	6.6E-02
10	-------	7.2E-02	6.5E-02
14	-------	6.6E-02	6.2E-02
30	-------	5.3E-02	5.4E-02
60	-------	4.0E-02	4.5E-02
90	-------	3.3E-02	4.0E-02
180	-------	2.1E-02	3.2E-02
365	-------	1.1E-02	2.5E-02

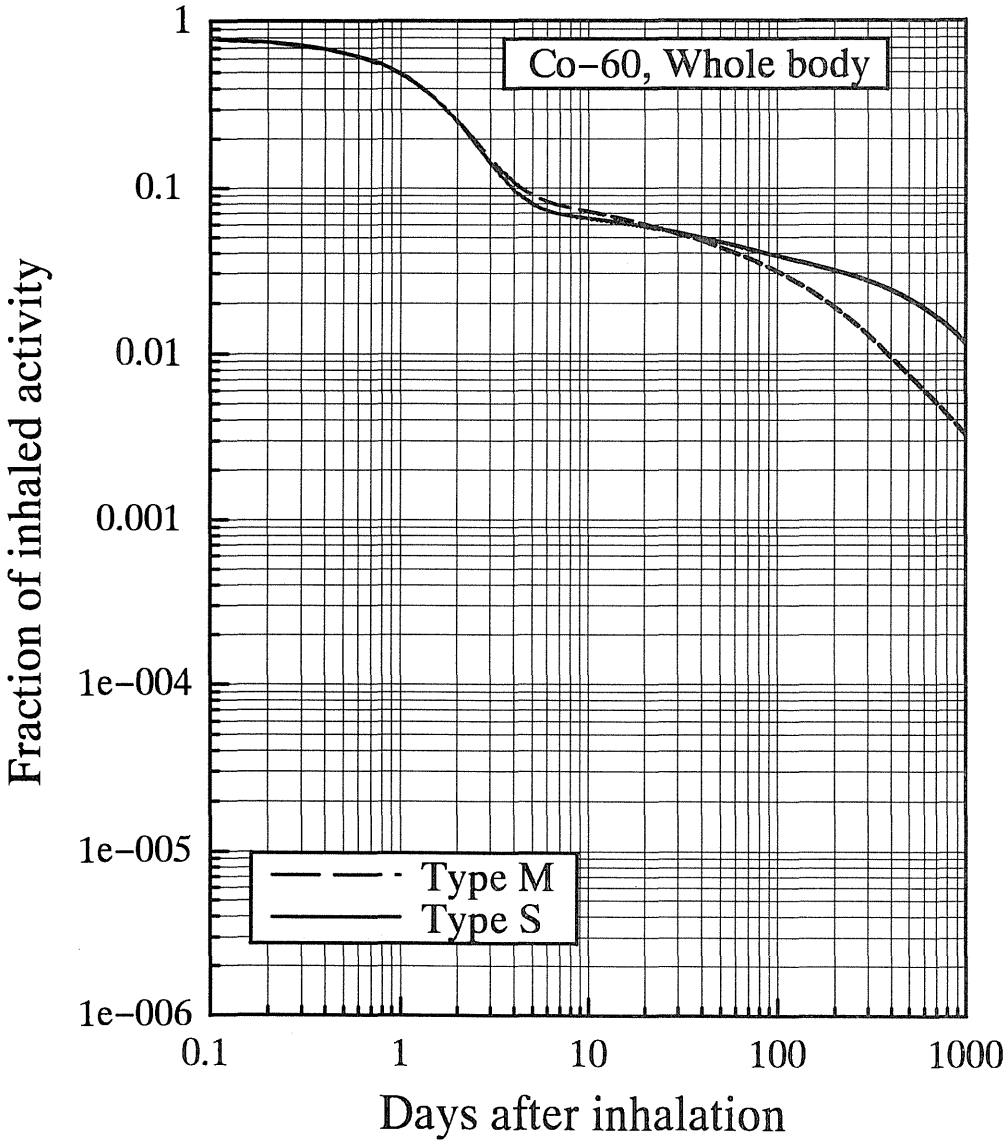

Fig.3-8(a) Whole body content of ^{60}Co following acute intake by inhalation

Table 3-8(b) Daily urinary excretion of ^{60}Co

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	2.0E-02	5.7E-03
2	-------	9.2E-03	3.1E-03
3	-------	3.7E-03	1.2E-03
4	-------	2.2E-03	6.7E-04
5	-------	1.7E-03	5.0E-04
6	-------	1.5E-03	4.3E-04
7	-------	1.3E-03	3.8E-04
8	-------	1.2E-03	3.4E-04
9	-------	1.1E-03	3.1E-04
10	-------	1.0E-03	2.8E-04
14	-------	7.2E-04	1.9E-04
30	-------	2.9E-04	5.6E-05
60	-------	1.6E-04	2.3E-05
90	-------	1.2E-04	1.6E-05
180	-------	6.2E-05	7.8E-06
365	-------	2.1E-05	4.1E-06

* Bq/d per Bq intake

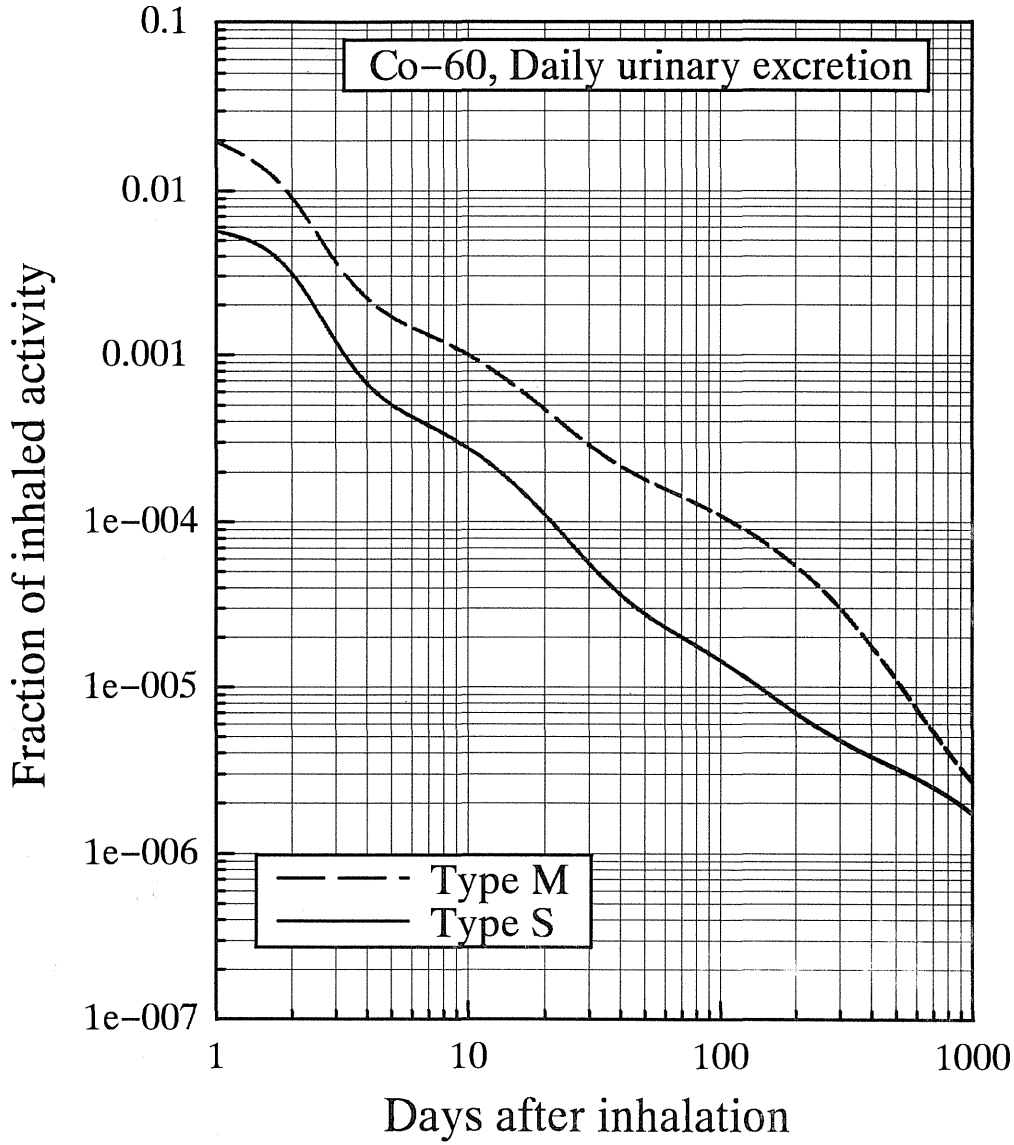

Fig.3-8(b) Daily urinary excretion of ^{60}Co following acute intake by inhalation

Table 3-9(a) Whole body content of ^{65}Zn

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	-------	7.9E-01
0.2	-------	-------	7.6E-01
0.5	-------	-------	6.7E-01
1	-------	-------	5.4E-01
2	-------	-------	3.8E-01
3	-------	-------	3.1E-01
4	-------	-------	2.8E-01
5	-------	-------	2.7E-01
6	-------	-------	2.6E-01
7	-------	-------	2.6E-01
8	-------	-------	2.5E-01
9	-------	-------	2.5E-01
10	-------	-------	2.5E-01
14	-------	-------	2.4E-01
30	-------	-------	2.1E-01
60	-------	-------	1.7E-01
90	-------	-------	1.4E-01
180	-------	-------	9.5E-02
365	-------	-------	4.3E-02

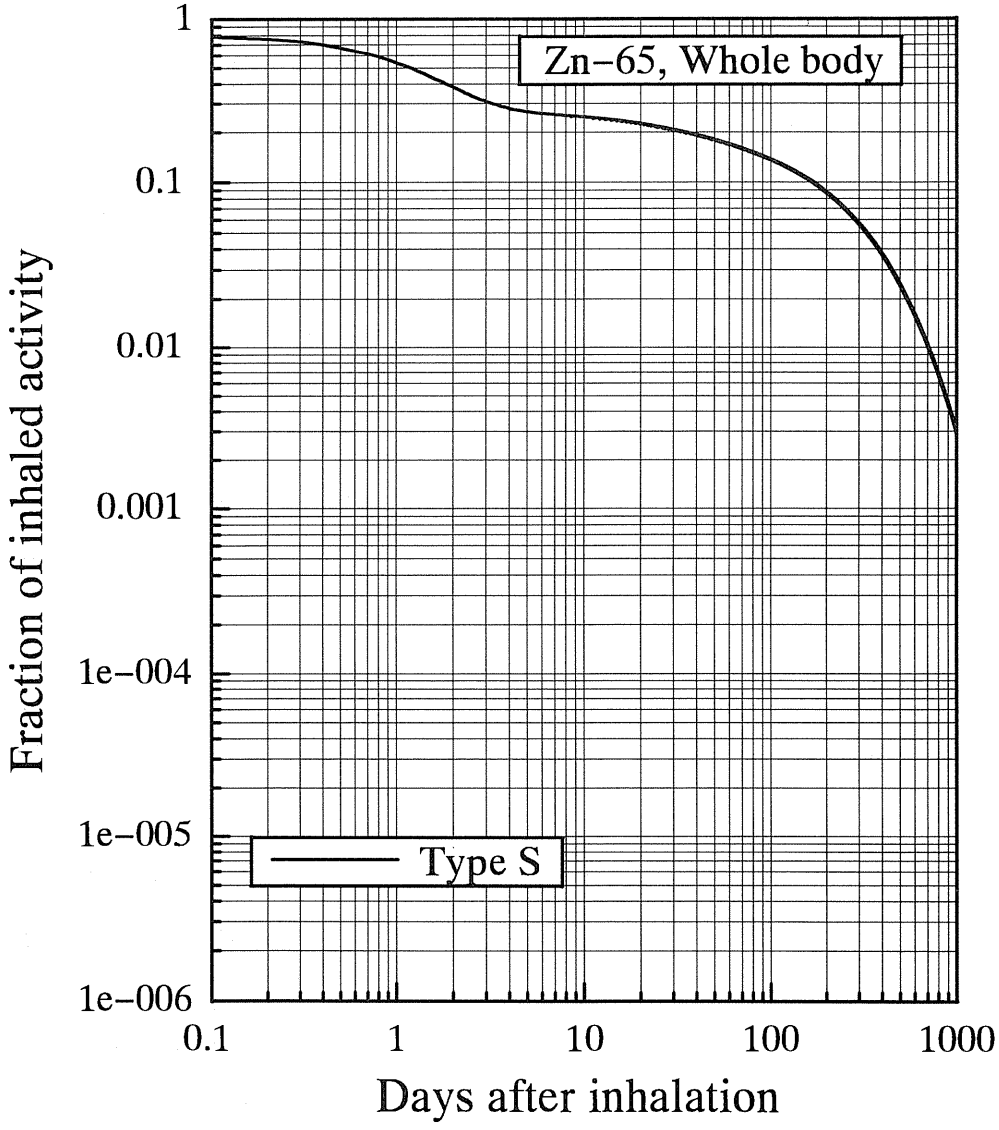

Fig.3-9(a) Whole body content of ^{65}Zn following acute intake by inhalation

Table 3-9(b) Daily urinary excretion of ^{65}Zn

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	-------	1.8E-04
2	-------	-------	3.7E-04
3	-------	-------	3.8E-04
4	-------	-------	3.7E-04
5	-------	-------	3.5E-04
6	-------	-------	3.4E-04
7	-------	-------	3.3E-04
8	-------	-------	3.2E-04
9	-------	-------	3.1E-04
10	-------	-------	3.0E-04
14	-------	-------	2.7E-04
30	-------	-------	1.7E-04
60	-------	-------	8.7E-05
90	-------	-------	5.4E-05
180	-------	-------	2.7E-05
365	-------	-------	1.2E-05

* Bq/d per Bq intake

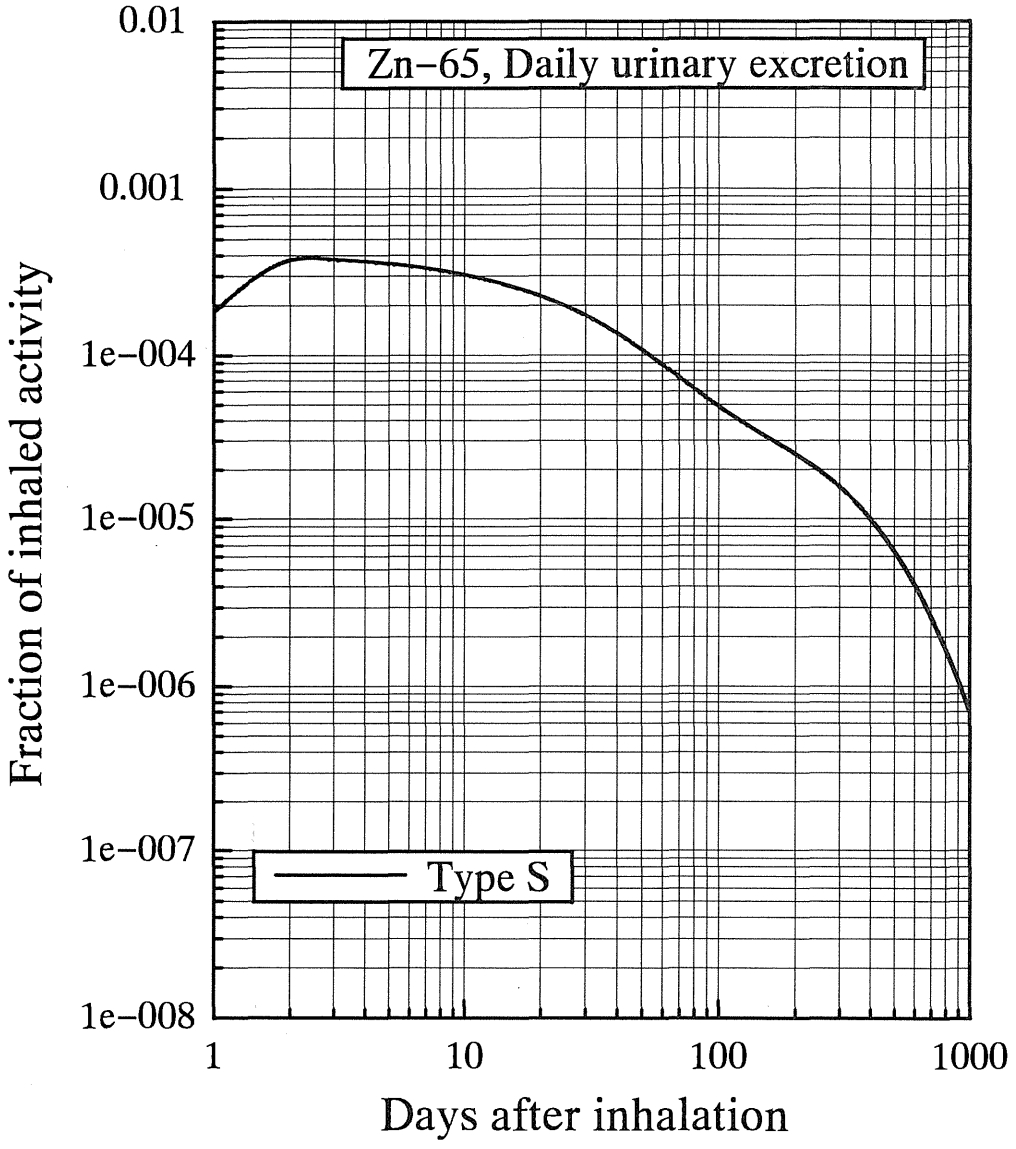

Fig.3-9(b) Daily urinary excretion of ^{65}Zn following acute intake by inhalation

Table 3-10(a) Whole body content of ^{86}Rb

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	-------	-------
0.2	7.5E-01	-------	-------
0.5	6.7E-01	-------	-------
1	5.8E-01	-------	-------
2	4.8E-01	-------	-------
3	4.3E-01	-------	-------
4	4.0E-01	-------	-------
5	3.8E-01	-------	-------
6	3.6E-01	-------	-------
7	3.4E-01	-------	-------
8	3.2E-01	-------	-------
9	3.0E-01	-------	-------
10	2.9E-01	-------	-------
14	2.3E-01	-------	-------
30	1.0E-01	-------	-------
60	2.0E-02	-------	-------
90	4.2E-03	-------	-------
180	3.6E-05	-------	-------
365	2.0E-09	-------	-------

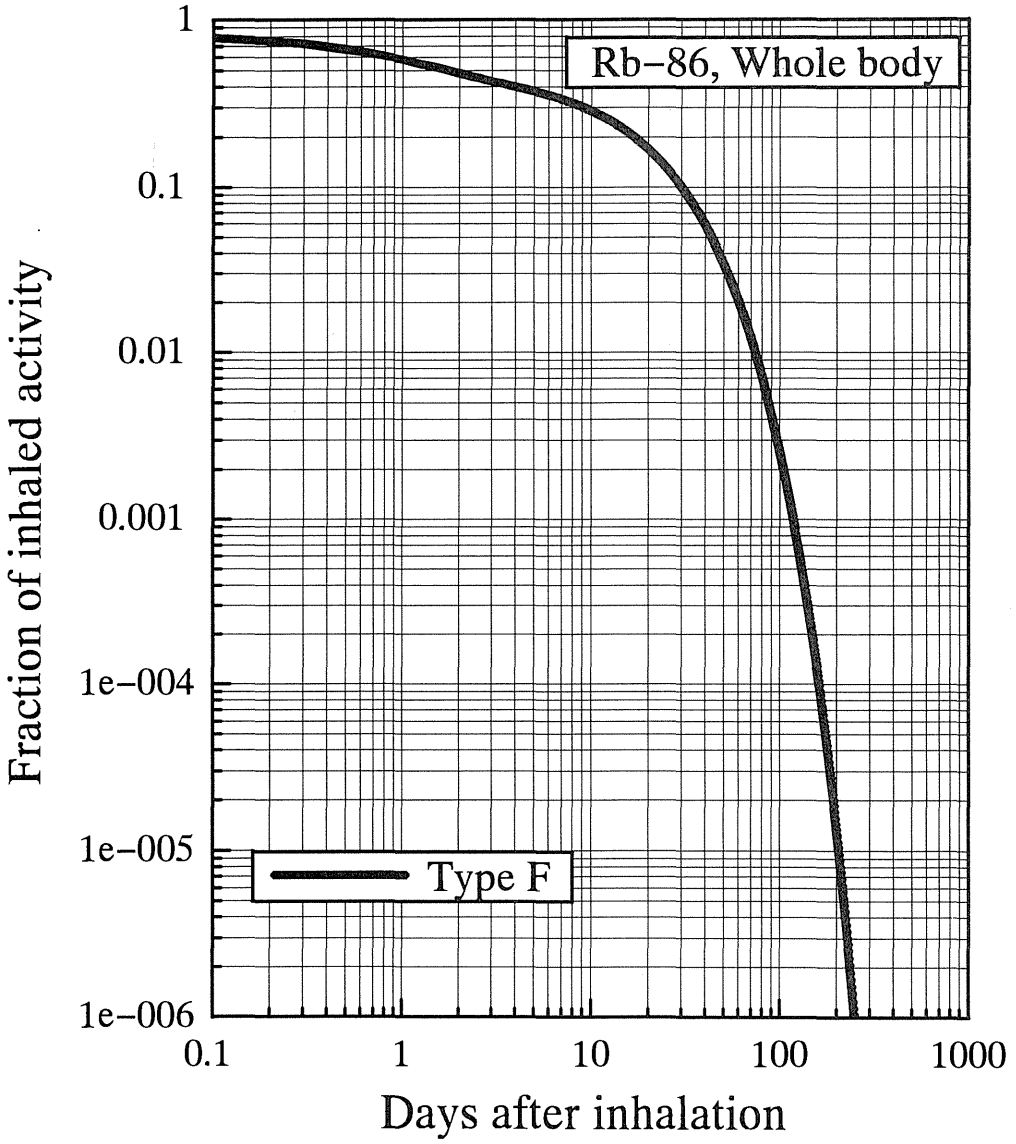

Fig.3-10(a) Whole body content of ^{86}Rb following acute intake by inhalation

Table 3-10(b) Daily urinary excretion of ^{86}Rb

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	3.0E-03	-------	-------
2	5.0E-03	-------	-------
3	4.9E-03	-------	-------
4	4.7E-03	-------	-------
5	4.4E-03	-------	-------
6	4.2E-03	-------	-------
7	4.0E-03	-------	-------
8	3.8E-03	-------	-------
9	3.6E-03	-------	-------
10	3.4E-03	-------	-------
14	2.7E-03	-------	-------
30	1.2E-03	-------	-------
60	2.4E-04	-------	-------
90	4.9E-05	-------	-------
180	4.2E-07	-------	-------
365	2.4E-11	-------	-------

* Bq/d per Bq intake

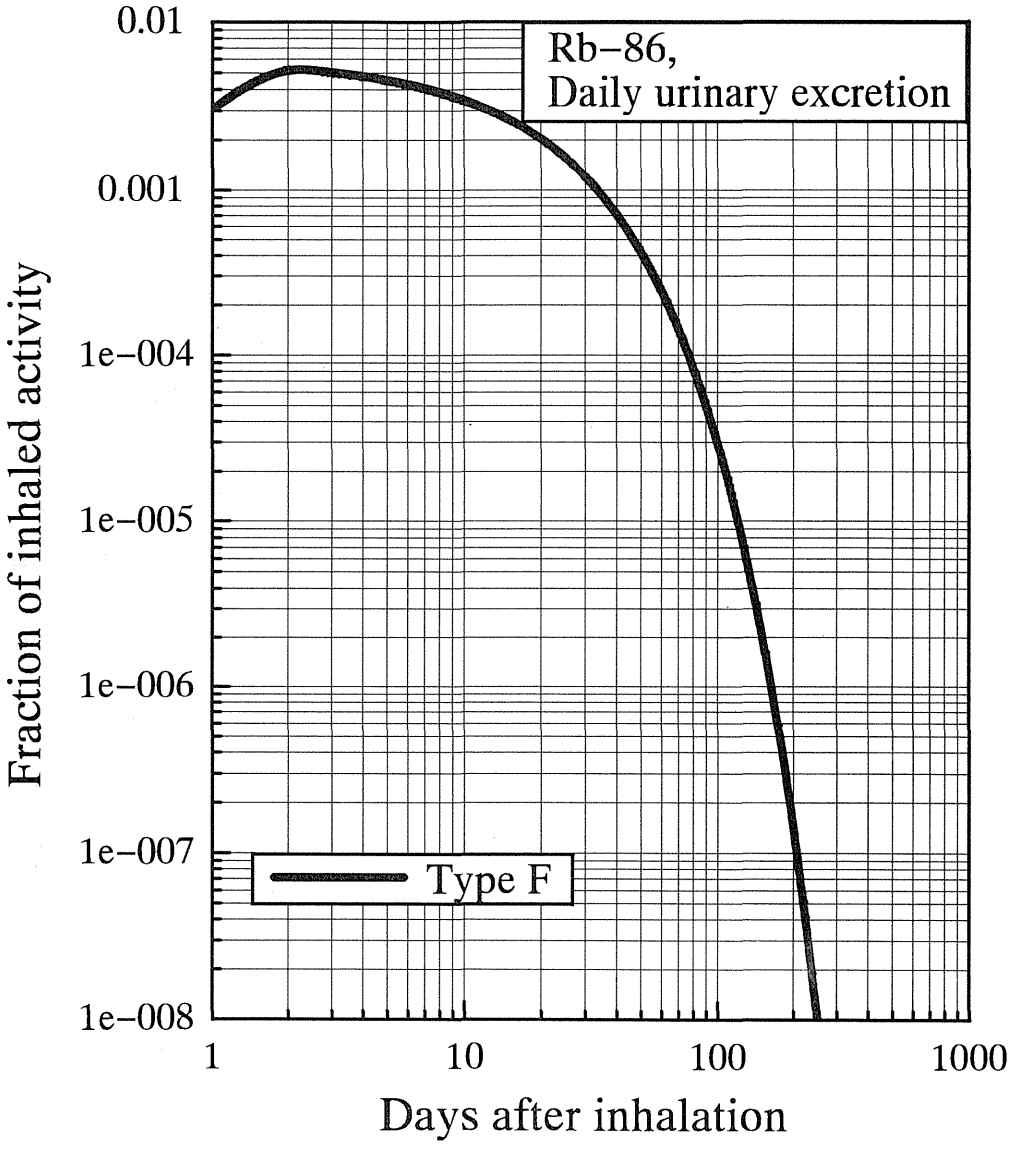

Fig.3-10(b) Daily urinary excretion of ^{86}Rb following acute intake by inhalation

Table 3-11(a) Whole body content of ^{85}Sr

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.7E-01	-------	7.9E-01
0.2	7.3E-01	-------	7.5E-01
0.5	6.2E-01	-------	6.6E-01
1	4.8E-01	-------	4.9E-01
2	3.2E-01	-------	2.5E-01
3	2.4E-01	-------	1.3E-01
4	2.0E-01	-------	8.9E-02
5	1.7E-01	-------	7.1E-02
6	1.6E-01	-------	6.3E-02
7	1.5E-01	-------	6.0E-02
8	1.4E-01	-------	5.8E-02
9	1.3E-01	-------	5.6E-02
10	1.3E-01	-------	5.5E-02
14	1.1E-01	-------	5.0E-02
30	6.3E-02	-------	3.7E-02
60	3.6E-02	-------	2.3E-02
90	2.4E-02	-------	1.5E-02
180	7.9E-03	-------	4.8E-03
365	9.2E-04	-------	5.6E-04

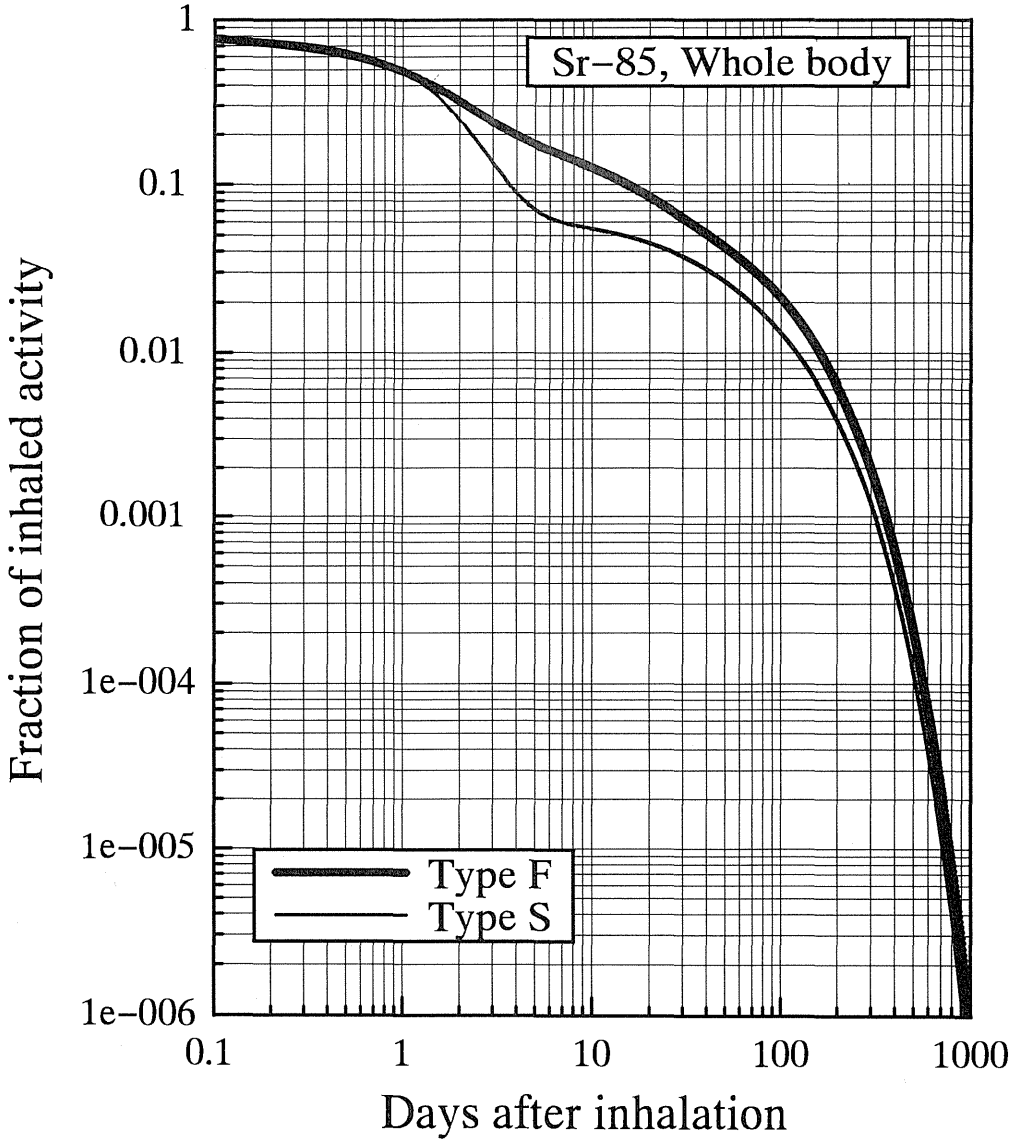

Fig.3-11(a) Whole body content of ^{85}Sr following acute intake by inhalation

Table 3-11(b) Daily urinary excretion of ^{85}Sr

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	6.8E-02	-------	8.0E-04
2	2.3E-02	-------	3.4E-04
3	1.5E-02	-------	2.1E-04
4	1.1E-02	-------	1.6E-04
5	8.7E-03	-------	1.2E-04
6	7.1E-03	-------	1.0E-04
7	5.9E-03	-------	8.3E-05
8	5.0E-03	-------	7.1E-05
9	4.3E-03	-------	6.2E-05
10	3.7E-03	-------	5.4E-05
14	2.4E-03	-------	3.7E-05
30	6.9E-04	-------	1.3E-05
60	1.2E-04	-------	3.6E-06
90	4.3E-05	-------	1.8E-06
180	8.3E-06	-------	4.7E-07
365	4.3E-07	-------	4.6E-08

* Bq/d per Bq intake

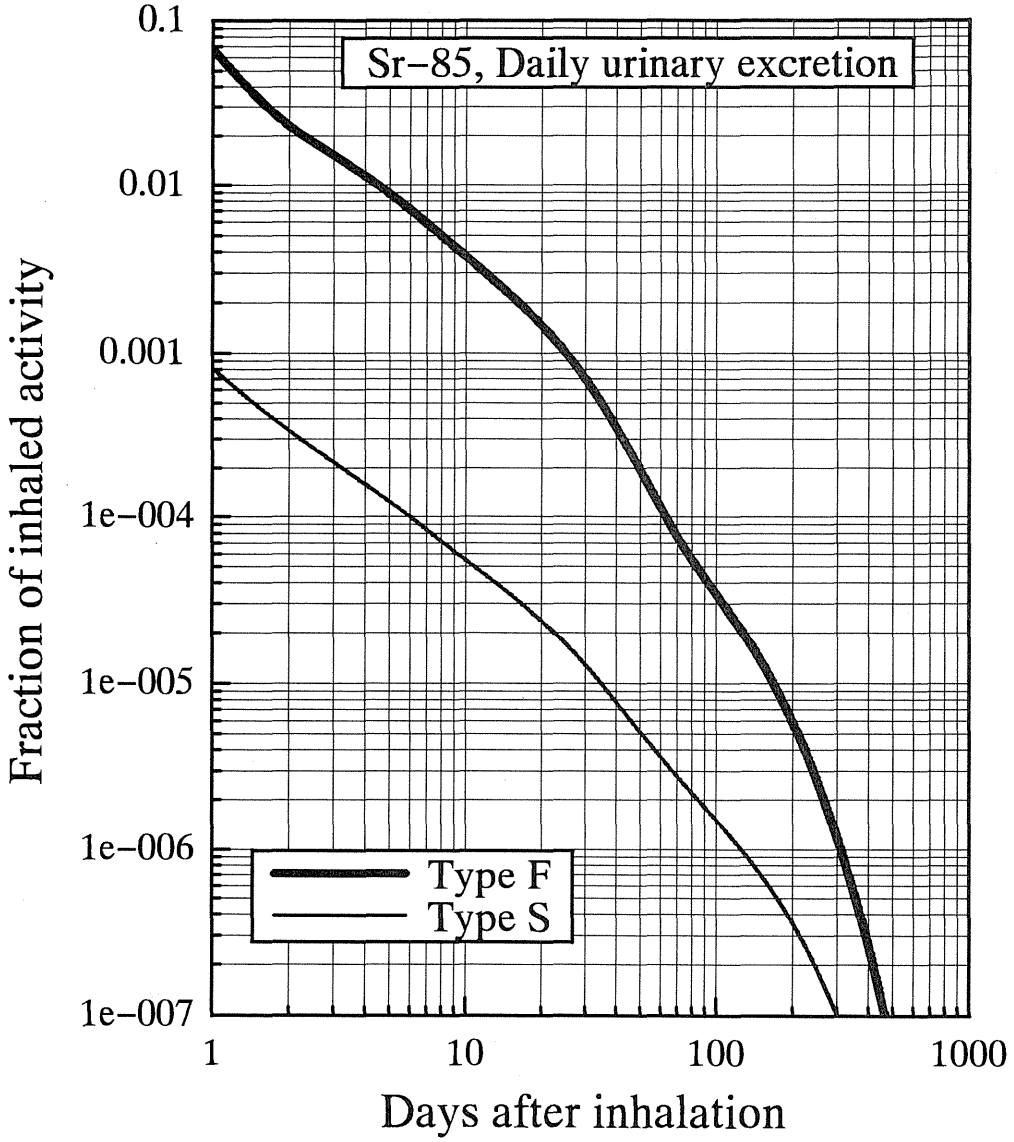

Fig.3-11(b) Daily urinary excretion of ^{85}Sr following acute intake by inhalation

Table 3-12(a) Daily urinary excretion of ^{89}Sr

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	6.7E-02	-------	8.0E-04
2	2.3E-02	-------	3.3E-04
3	1.5E-02	-------	2.1E-04
4	1.1E-02	-------	1.6E-04
5	8.6E-03	-------	1.2E-04
6	6.9E-03	-------	9.8E-05
7	5.7E-03	-------	8.2E-05
8	4.8E-03	-------	6.9E-05
9	4.2E-03	-------	6.0E-05
10	3.6E-03	-------	5.3E-05
14	2.3E-03	-------	3.5E-05
30	6.3E-04	-------	1.2E-05
60	9.6E-05	-------	3.0E-06
90	3.2E-05	-------	1.4E-06
180	4.8E-06	-------	2.7E-07
365	1.4E-07	-------	1.5E-08

* Bq/d per Bq intake

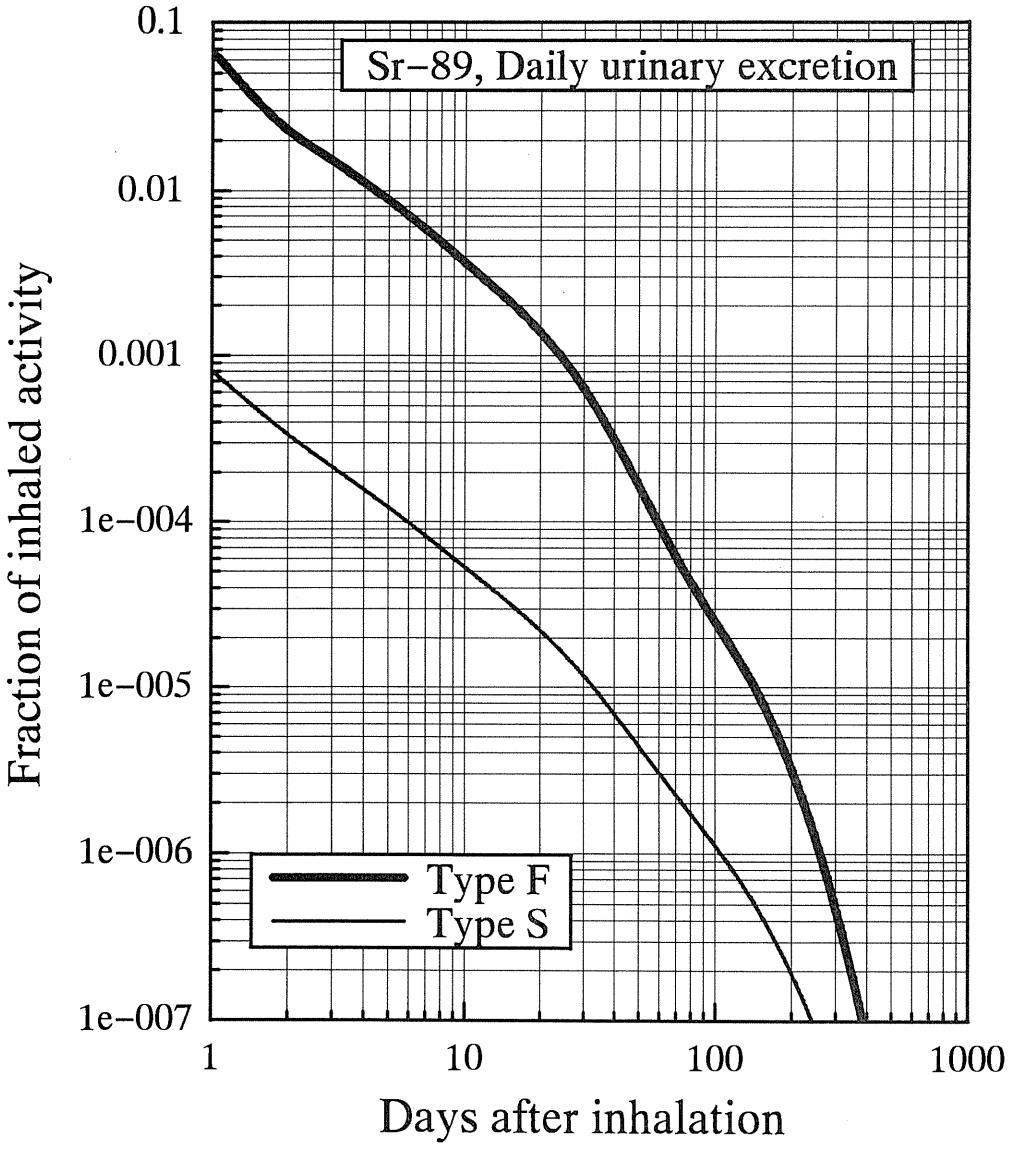

Fig.3-12(a) Daily urinary excretion of ^{89}Sr following acute intake by inhalation

Table 3-13(a) Daily urinary excretion of ^{90}Sr

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	6.8E-02	-------	8.1E-04
2	2.3E-02	-------	3.4E-04
3	1.6E-02	-------	2.2E-04
4	1.2E-02	-------	1.6E-04
5	9.2E-03	-------	1.3E-04
6	7.5E-03	-------	1.1E-04
7	6.3E-03	-------	9.0E-05
8	5.4E-03	-------	7.7E-05
9	4.7E-03	-------	6.8E-05
10	4.1E-03	-------	6.1E-05
14	2.8E-03	-------	4.3E-05
30	9.6E-04	-------	1.8E-05
60	2.2E-04	-------	6.9E-06
90	1.1E-04	-------	4.7E-06
180	5.6E-05	-------	3.1E-06
365	2.1E-05	-------	2.2E-06

* Bq/d per Bq intake

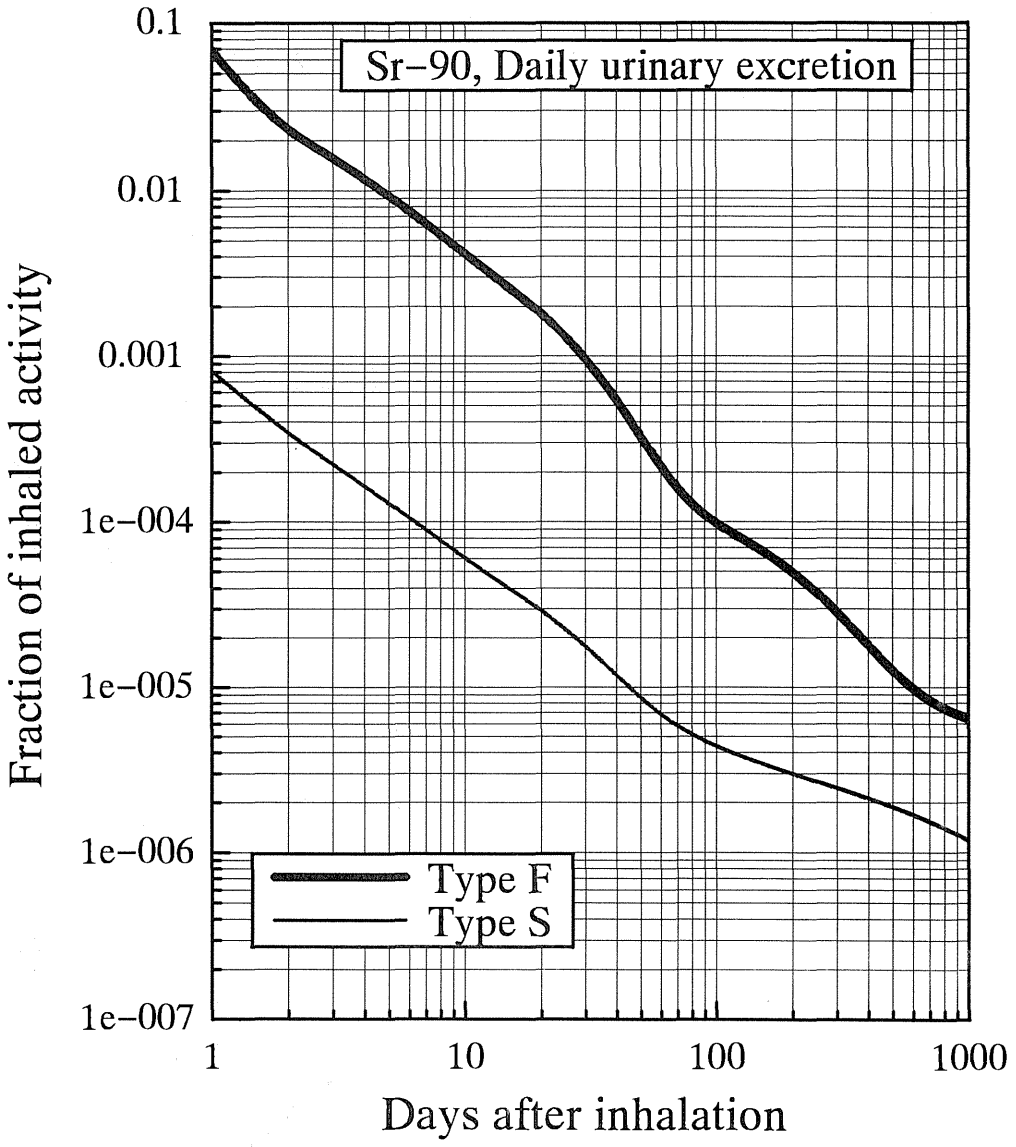

Fig.3-13(a) Daily urinary excretion of ^{90}Sr following acute intake by inhalation

Table 3-14(a) Whole body content of ^{95}Zr

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	7.9E-01	7.9E-01
0.2	7.6E-01	7.5E-01	7.5E-01
0.5	6.7E-01	6.6E-01	6.6E-01
1	5.4E-01	4.9E-01	4.9E-01
2	3.7E-01	2.6E-01	2.4E-01
3	2.9E-01	1.5E-01	1.3E-01
4	2.5E-01	1.0E-01	8.7E-02
5	2.3E-01	8.5E-02	6.9E-02
6	2.1E-01	7.7E-02	6.2E-02
7	2.0E-01	7.2E-02	5.8E-02
8	1.9E-01	7.0E-02	5.6E-02
9	1.8E-01	6.8E-02	5.5E-02
10	1.8E-01	6.6E-02	5.4E-02
14	1.5E-01	5.9E-02	5.0E-02
30	1.1E-01	4.3E-02	3.7E-02
60	7.3E-02	2.6E-02	2.3E-02
90	5.3E-02	1.7E-02	1.5E-02
180	2.0E-02	5.4E-03	4.7E-03
365	2.6E-03	6.3E-04	5.4E-04

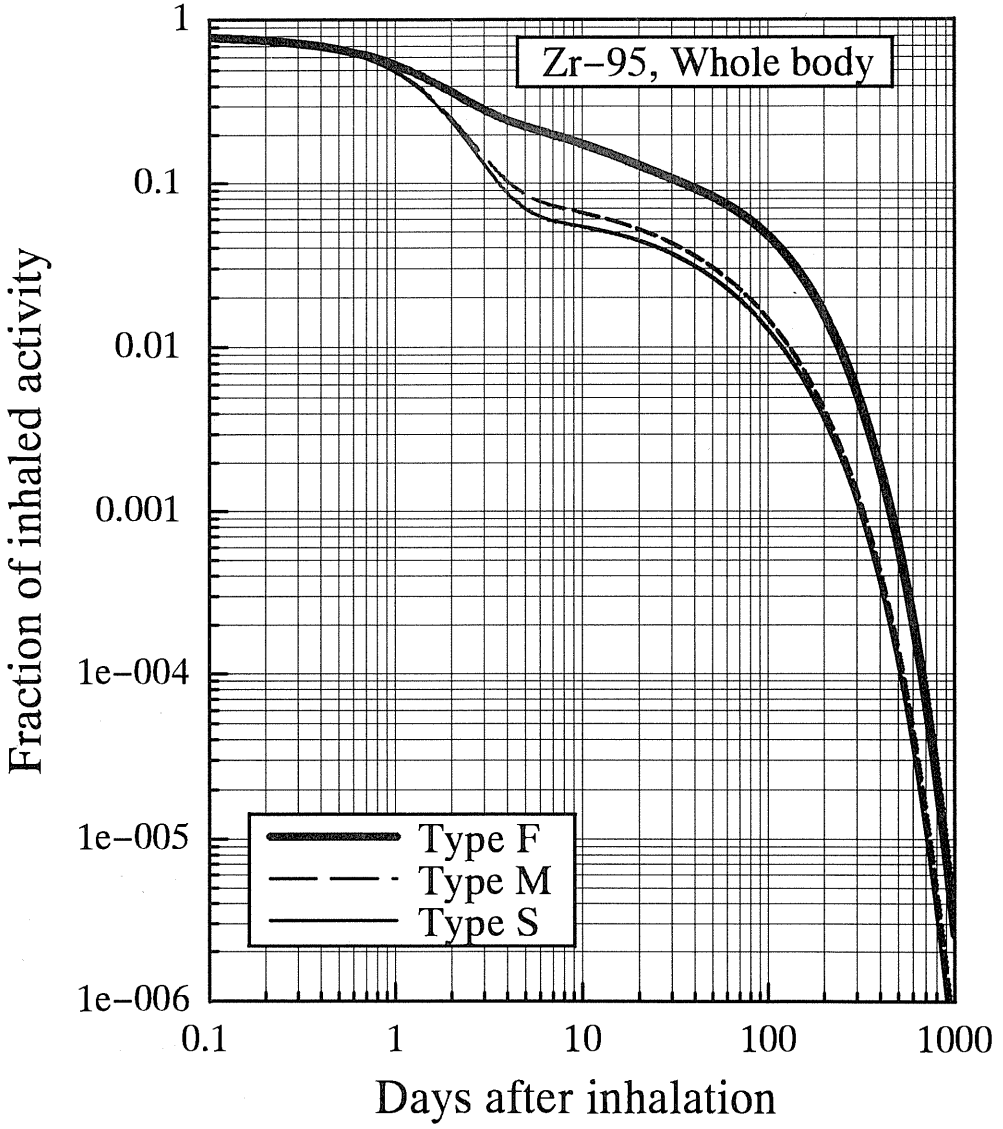

Fig.3-14(a) Whole body content of ^{95}Zr following acute intake by inhalation

Table 3-14(b) Daily urinary excretion of ^{95}Zr

ays after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	6.4E-03	6.6E-04	1.9E-05
2	9.9E-03	1.0E-03	3.9E-05
3	9.2E-03	9.6E-04	3.7E-05
4	8.2E-03	8.8E-04	3.4E-05
5	7.4E-03	7.9E-04	3.1E-05
6	6.6E-03	7.2E-04	2.8E-05
7	5.9E-03	6.6E-04	2.5E-05
8	5.3E-03	6.0E-04	2.3E-05
9	4.8E-03	5.5E-04	2.1E-05
10	4.3E-03	5.0E-04	1.9E-05
14	2.7E-03	3.5E-04	1.3E-05
30	4.8E-04	1.1E-04	3.7E-06
60	2.2E-05	3.7E-05	1.2E-06
90	3.7E-06	2.0E-05	6.8E-07
180	1.1E-06	4.0E-06	2.1E-07
365	1.5E-07	2.0E-07	2.3E-08

* Bq/d per Bq intake

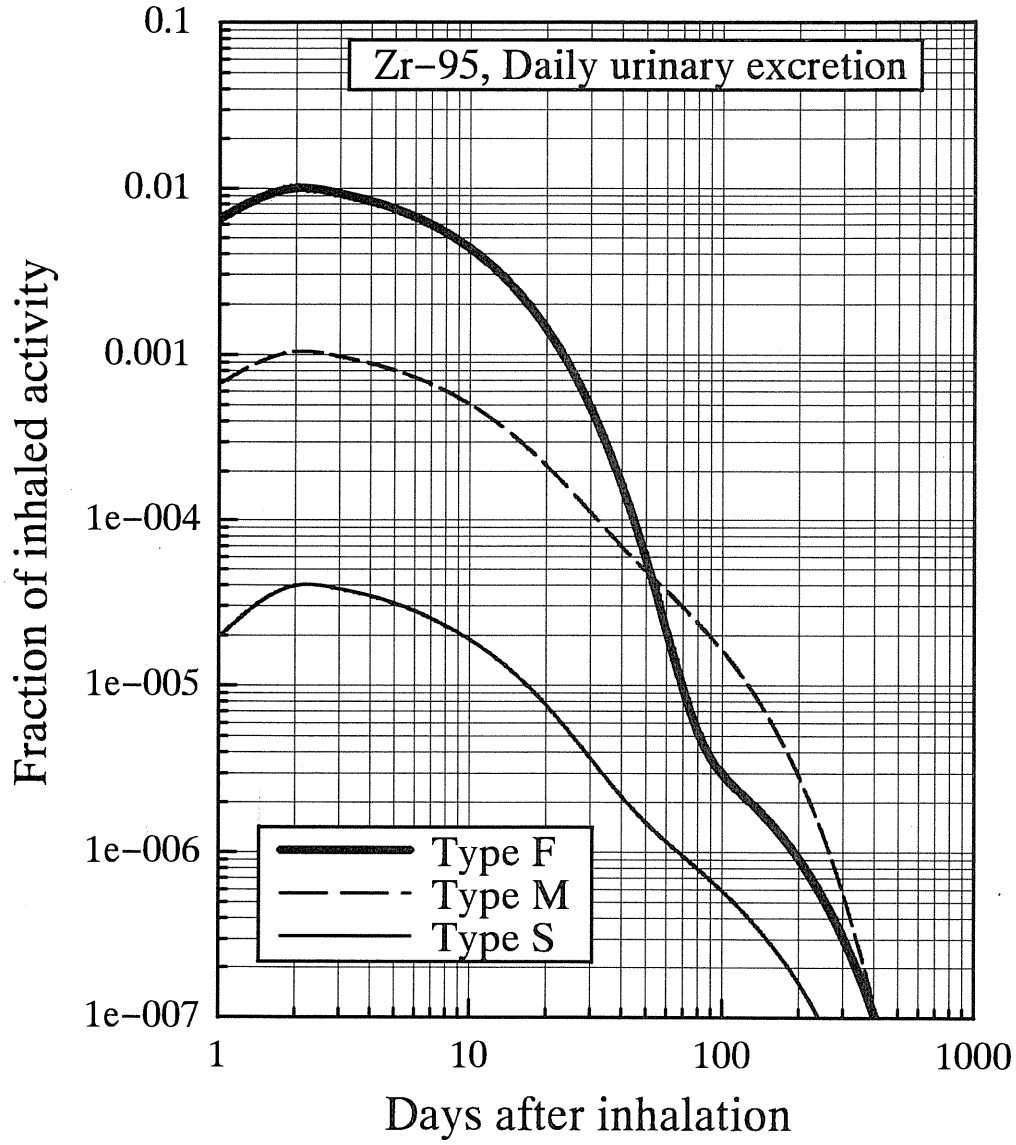

Fig.3-14(b) Daily urinary excretion of ^{95}Zr following acute intake by inhalation

Table 3-15(a) Whole body content of ^{106}Ru

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	7.9E-01	7.9E-01
0.2	7.5E-01	7.6E-01	7.6E-01
0.5	6.5E-01	6.6E-01	6.6E-01
1	5.1E-01	4.9E-01	4.9E-01
2	3.5E-01	2.7E-01	2.6E-01
3	2.7E-01	1.6E-01	1.5E-01
4	2.3E-01	1.2E-01	1.0E-01
5	2.1E-01	9.9E-02	8.6E-02
6	2.0E-01	9.1E-02	7.9E-02
7	1.9E-01	8.7E-02	7.6E-02
8	1.9E-01	8.4E-02	7.4E-02
9	1.8E-01	8.2E-02	7.2E-02
10	1.7E-01	8.0E-02	7.1E-02
14	1.5E-01	7.5E-02	6.7E-02
30	1.1E-01	5.9E-02	5.6E-02
60	7.5E-02	4.2E-02	4.4E-02
90	5.9E-02	3.3E-02	3.7E-02
180	3.8E-02	1.9E-02	2.6E-02
365	2.3E-02	8.7E-03	1.6E-02

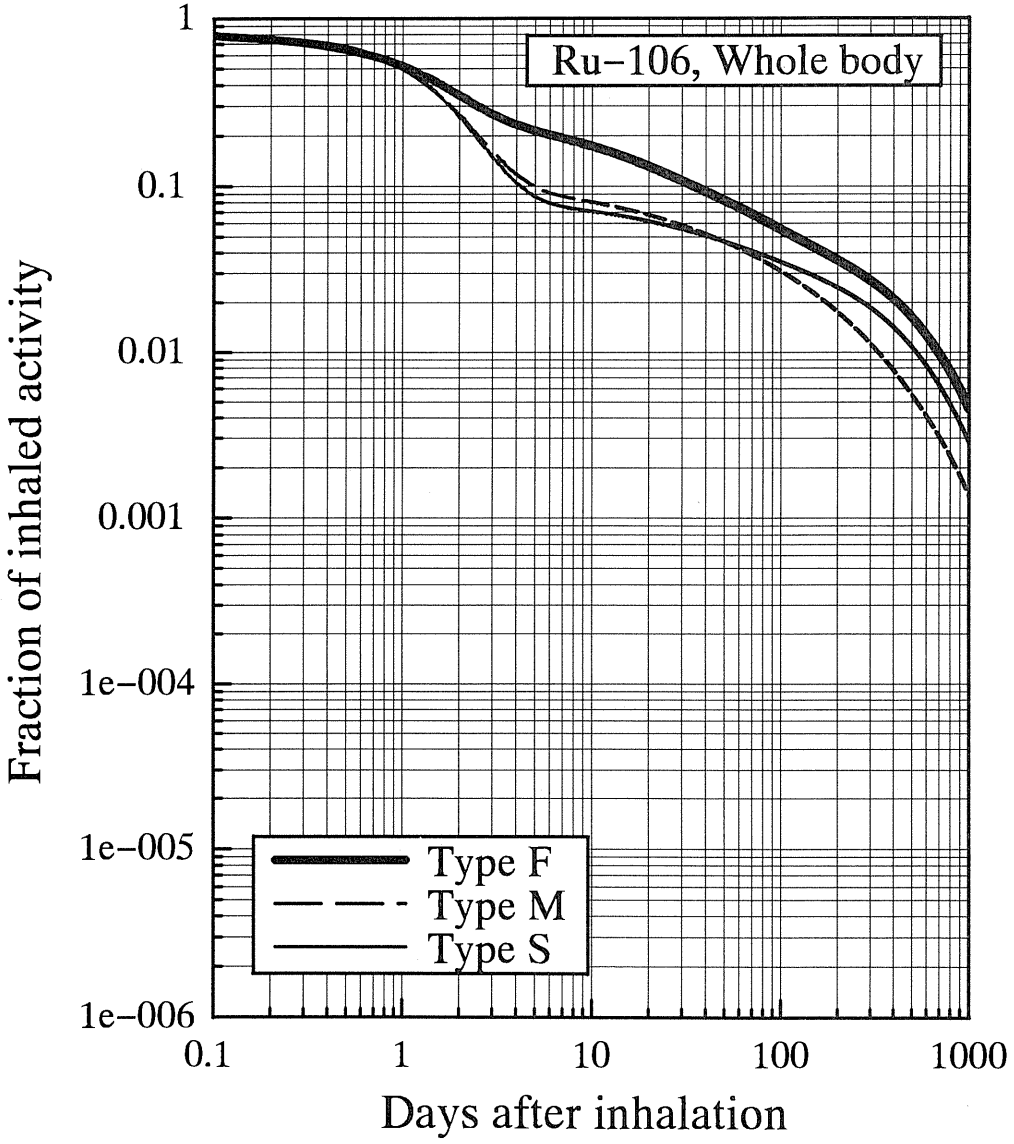

Fig.3-15(a) Whole body content of ^{106}Ru following acute intake by inhalation

Table 3-15(b) Daily urinary excretion of ^{106}Ru

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	3.5E-02	5.4E-03	2.2E-03
2	1.1E-02	2.1E-03	1.0E-03
3	7.6E-03	1.3E-03	5.9E-04
4	6.8E-03	1.2E-03	5.1E-04
5	6.3E-03	1.1E-03	4.7E-04
6	5.8E-03	1.0E-03	4.4E-04
7	5.4E-03	9.7E-04	4.1E-04
8	5.0E-03	9.1E-04	3.8E-04
9	4.7E-03	8.6E-04	3.5E-04
10	4.4E-03	8.1E-04	3.3E-04
14	3.3E-03	6.5E-04	2.6E-04
30	1.3E-03	3.2E-04	1.1E-04
60	4.5E-04	1.6E-04	4.2E-05
90	2.3E-04	1.1E-04	2.3E-05
180	4.9E-05	4.3E-05	6.4E-06
365	1.3E-05	1.1E-05	2.4E-06

* Bq/d per Bq intake

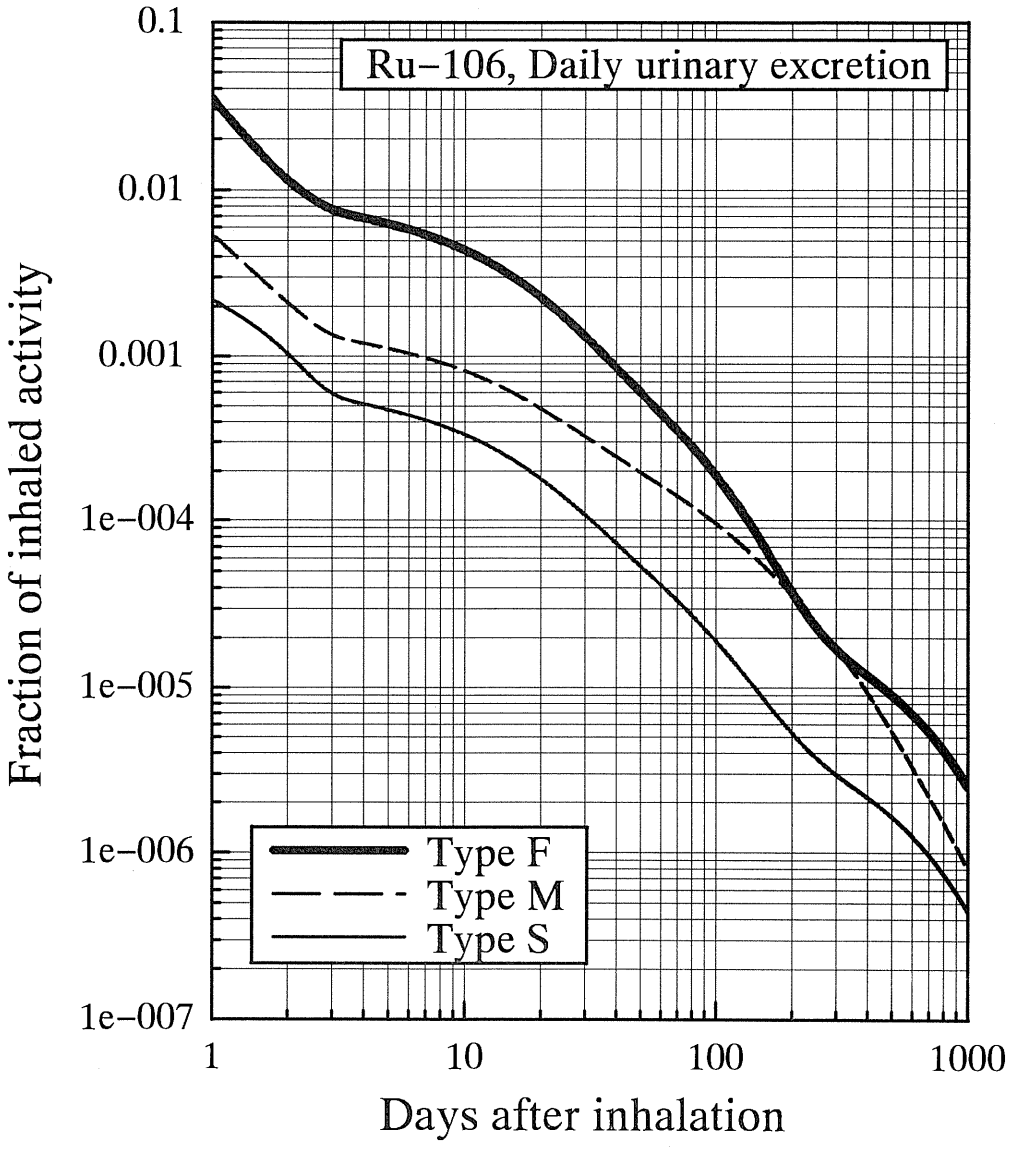

Fig.3-15(b) Daily urinary excretion of ^{106}Ru following acute intake by inhalation

Table 3-16(a) Whole body content of ^{110m}Ag

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	7.9E-01	7.9E-01
0.2	7.6E-01	7.6E-01	7.6E-01
0.5	6.7E-01	6.6E-01	6.6E-01
1	5.5E-01	5.0E-01	4.9E-01
2	3.9E-01	2.7E-01	2.6E-01
3	3.2E-01	1.7E-01	1.5E-01
4	2.9E-01	1.3E-01	1.1E-01
5	2.7E-01	1.1E-01	9.0E-02
6	2.6E-01	1.0E-01	8.3E-02
7	2.5E-01	9.7E-02	7.9E-02
8	2.5E-01	9.4E-02	7.7E-02
9	2.4E-01	9.2E-02	7.6E-02
10	2.4E-01	9.1E-02	7.5E-02
14	2.2E-01	8.6E-02	7.1E-02
30	1.7E-01	7.0E-02	5.9E-02
60	1.1E-01	4.9E-02	4.5E-02
90	7.4E-02	3.6E-02	3.6E-02
180	2.6E-02	1.6E-02	2.2E-02
365	6.9E-03	4.1E-03	1.0E-02

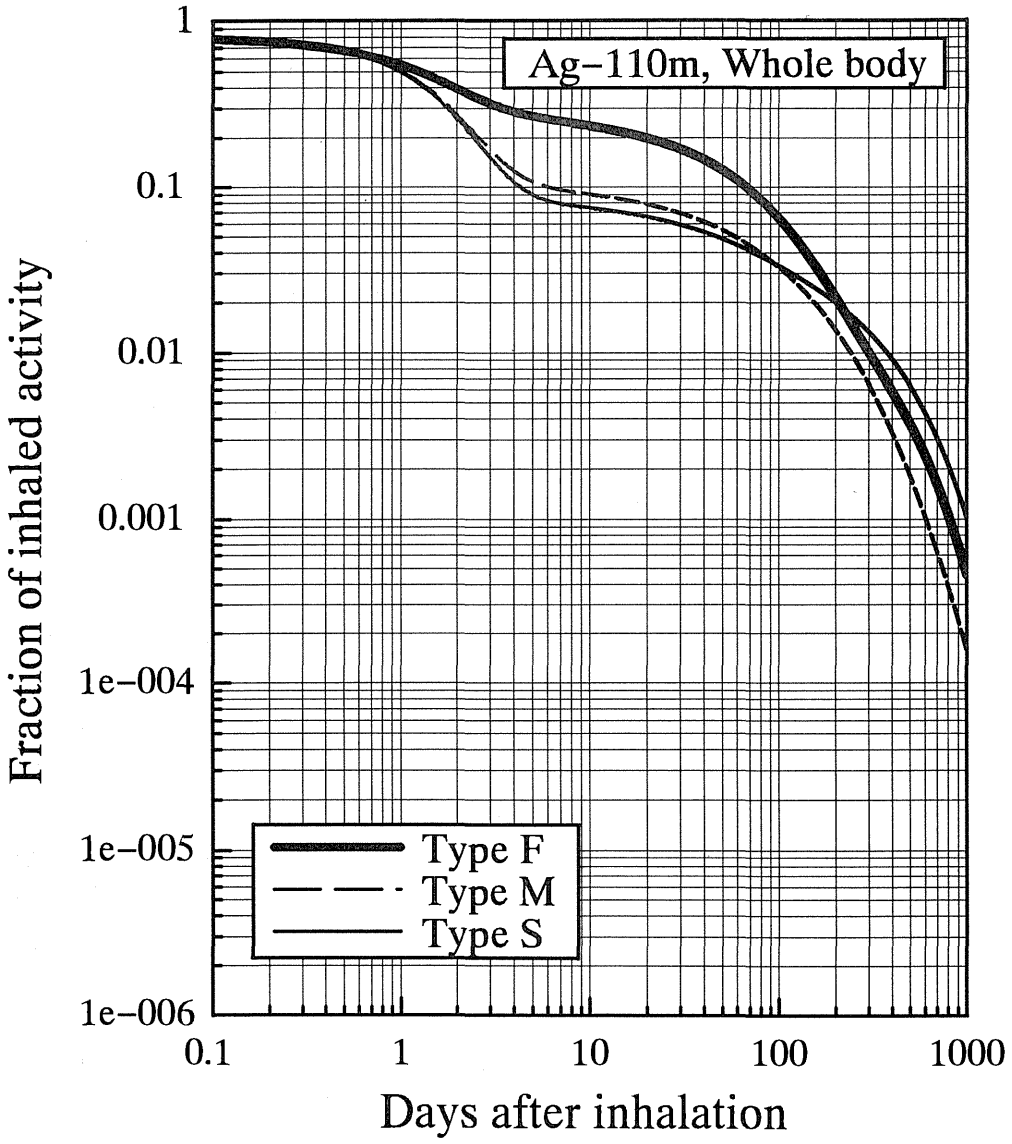

Fig.3-16(a) Whole body content of ^{110m}Ag following acute intake by inhalation

Table 3-16(b) Daily urinary excretion of ^{110m}Ag

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	2.3E-04	3.4E-05	1.2E-05
2	3.6E-04	6.0E-05	2.6E-05
3	3.3E-04	5.6E-05	2.5E-05
4	3.0E-04	5.0E-05	2.2E-05
5	2.7E-04	4.6E-05	2.0E-05
6	2.4E-04	4.2E-05	1.8E-05
7	2.2E-04	3.9E-05	1.7E-05
8	2.0E-04	3.6E-05	1.5E-05
9	1.9E-04	3.4E-05	1.4E-05
10	1.8E-04	3.2E-05	1.3E-05
14	1.5E-04	2.7E-05	1.1E-05
30	9.7E-05	2.0E-05	7.5E-06
60	5.9E-05	1.4E-05	4.7E-06
90	3.6E-05	1.0E-05	3.0E-06
180	8.7E-06	3.8E-06	8.3E-07
365	7.8E-07	6.9E-07	1.3E-07

* Bq/d per Bq intake

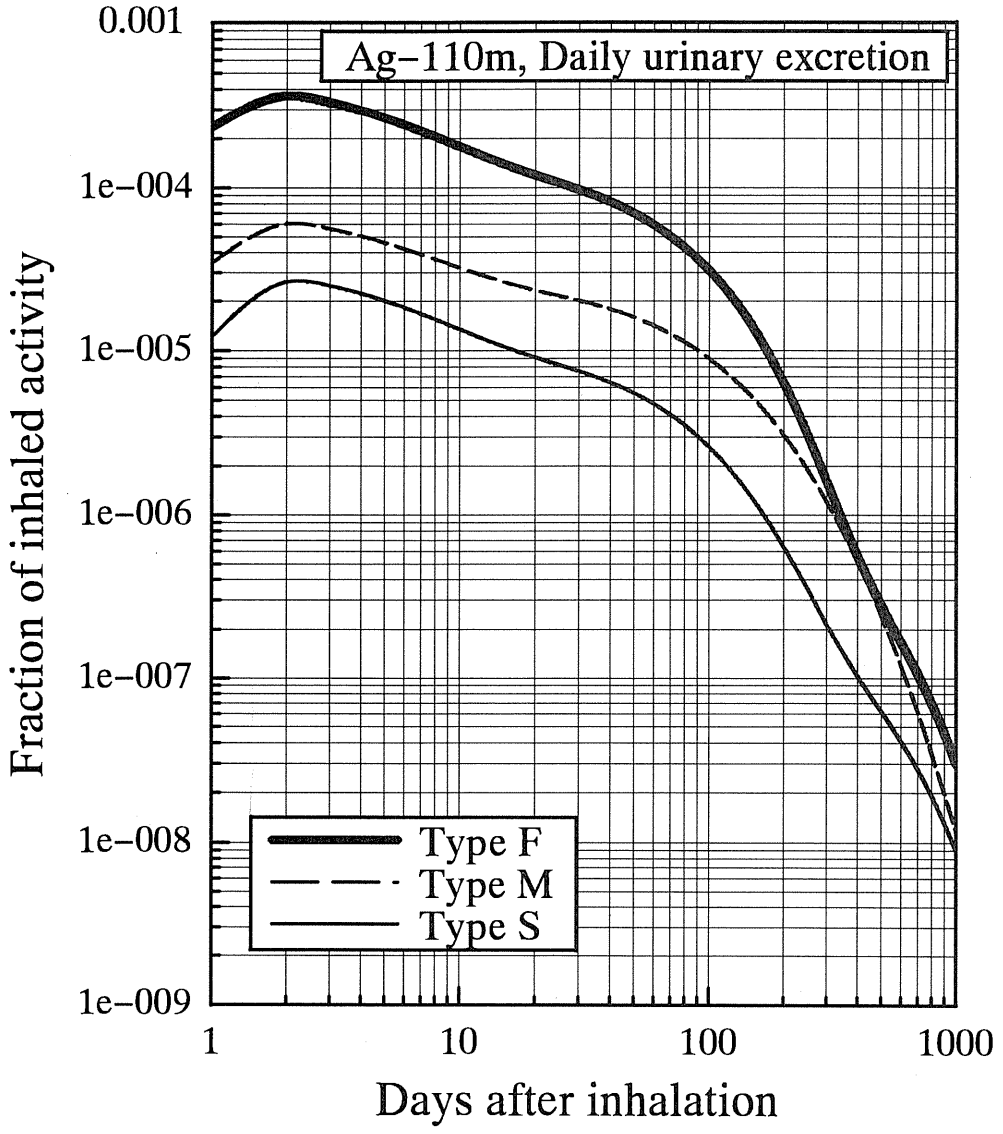

Fig.3-16(b) Daily urinary excretion of ^{110m}Ag following acute intake by inhalation

Table 3-17(a) Whole body content of ^{124}Sb

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	7.9E-01	-------
0.2	7.4E-01	7.5E-01	-------
0.5	6.3E-01	6.5E-01	-------
1	4.9E-01	4.9E-01	-------
2	3.1E-01	2.5E-01	-------
3	2.2E-01	1.4E-01	-------
4	1.7E-01	9.6E-02	-------
5	1.5E-01	7.7E-02	-------
6	1.3E-01	6.8E-02	-------
7	1.1E-01	6.3E-02	-------
8	1.0E-01	6.0E-02	-------
9	9.1E-02	5.7E-02	-------
10	8.2E-02	5.5E-02	-------
14	5.7E-02	4.8E-02	-------
30	2.5E-02	3.2E-02	-------
60	1.4E-02	1.7E-02	-------
90	8.8E-03	9.5E-03	-------
180	2.4E-03	2.0E-03	-------
365	2.0E-04	1.1E-04	-------

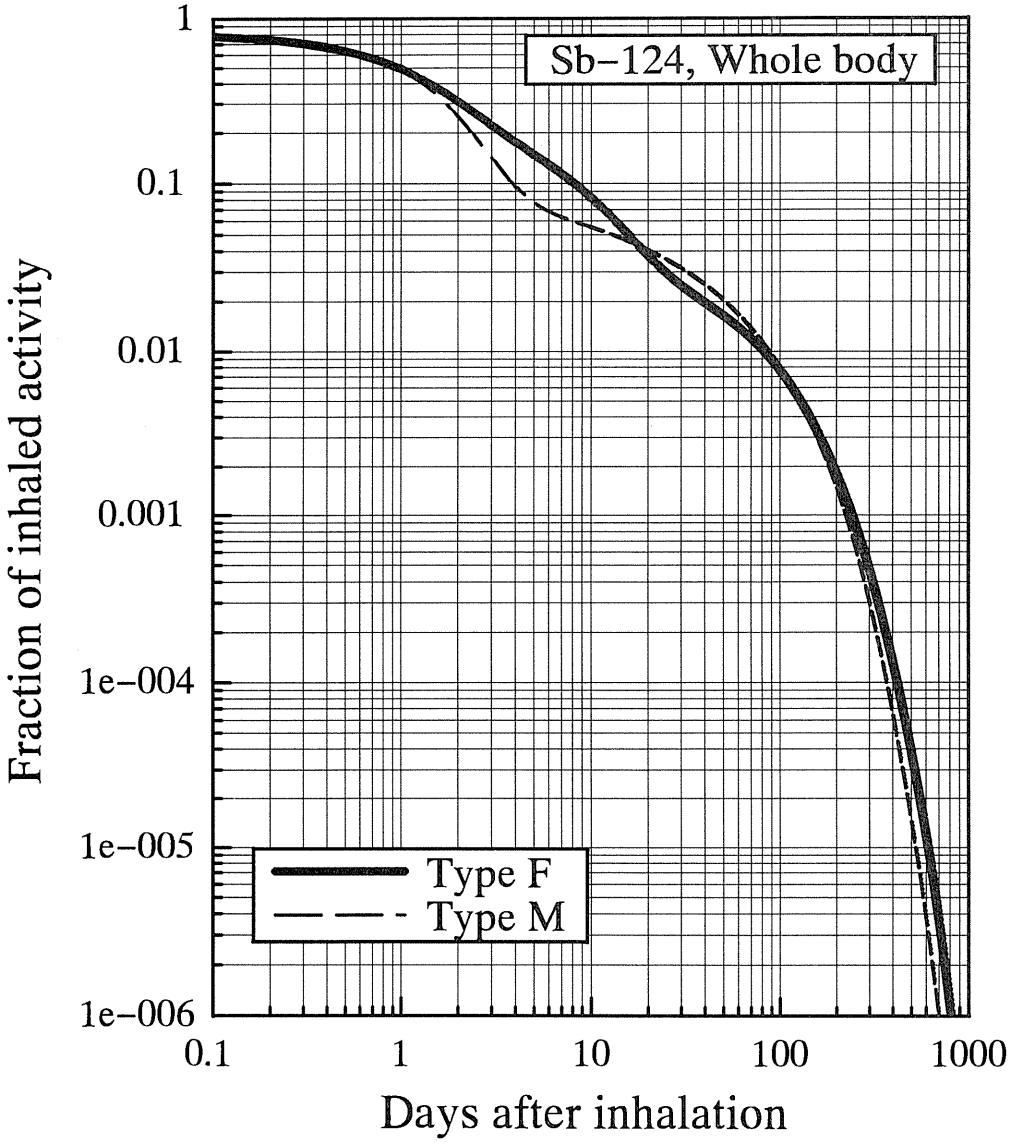

Fig.3-17(a) Whole body content of ^{124}Sb following acute intake by inhalation

Table 3-17(b) Daily urinary excretion of ^{124}Sb

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	5.6E-02	5.9E-03	-------
2	2.3E-02	2.5E-03	-------
3	1.7E-02	1.9E-03	-------
4	1.4E-02	1.6E-03	-------
5	1.2E-02	1.4E-03	-------
6	1.1E-02	1.3E-03	-------
7	9.2E-03	1.1E-03	-------
8	8.0E-03	9.8E-04	-------
9	6.9E-03	8.6E-04	-------
10	5.9E-03	7.6E-04	-------
14	3.3E-03	4.9E-04	-------
30	3.7E-04	1.5E-04	-------
60	4.8E-05	6.1E-05	-------
90	2.6E-05	3.4E-05	-------
180	5.0E-06	6.7E-06	-------
365	1.8E-07	2.9E-07	-------

* Bq/d per Bq intake

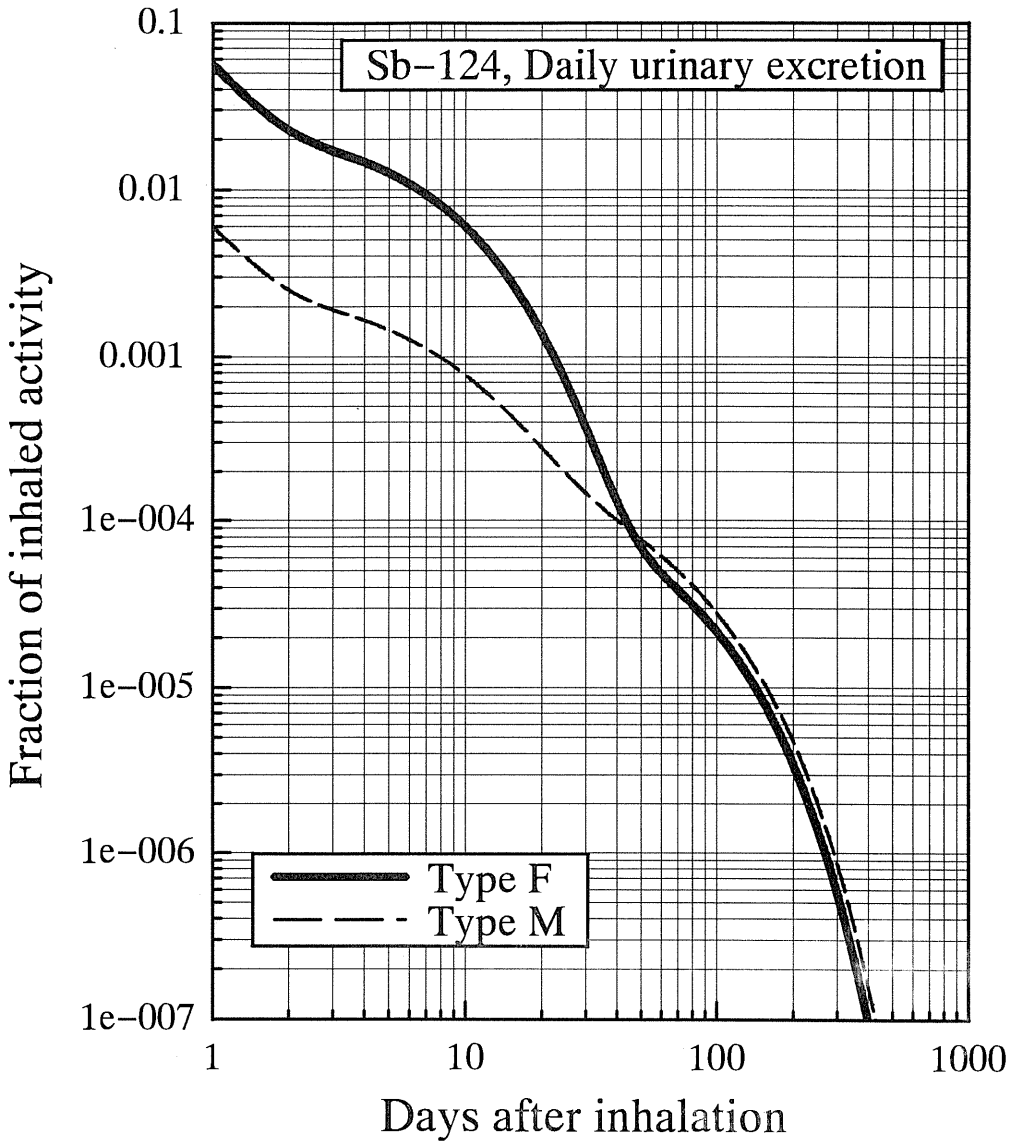

Fig.3-17(b) Daily urinary excretion of ^{124}Sb following acute intake by inhalation

Table 3-18(a) Whole body content of ^{125}Sb

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	7.9E-01	-------
0.2	7.4E-01	7.5E-01	-------
0.5	6.4E-01	6.6E-01	-------
1	4.9E-01	4.9E-01	-------
2	3.2E-01	2.6E-01	-------
3	2.3E-01	1.5E-01	-------
4	1.8E-01	1.0E-01	-------
5	1.6E-01	8.1E-02	-------
6	1.4E-01	7.3E-02	-------
7	1.2E-01	6.8E-02	-------
8	1.1E-01	6.5E-02	-------
9	1.0E-01	6.3E-02	-------
10	9.2E-02	6.2E-02	-------
14	6.6E-02	5.6E-02	-------
30	3.5E-02	4.4E-02	-------
60	2.7E-02	3.2E-02	-------
90	2.3E-02	2.5E-02	-------
180	1.7E-02	1.4E-02	-------
365	1.0E-02	5.6E-03	-------

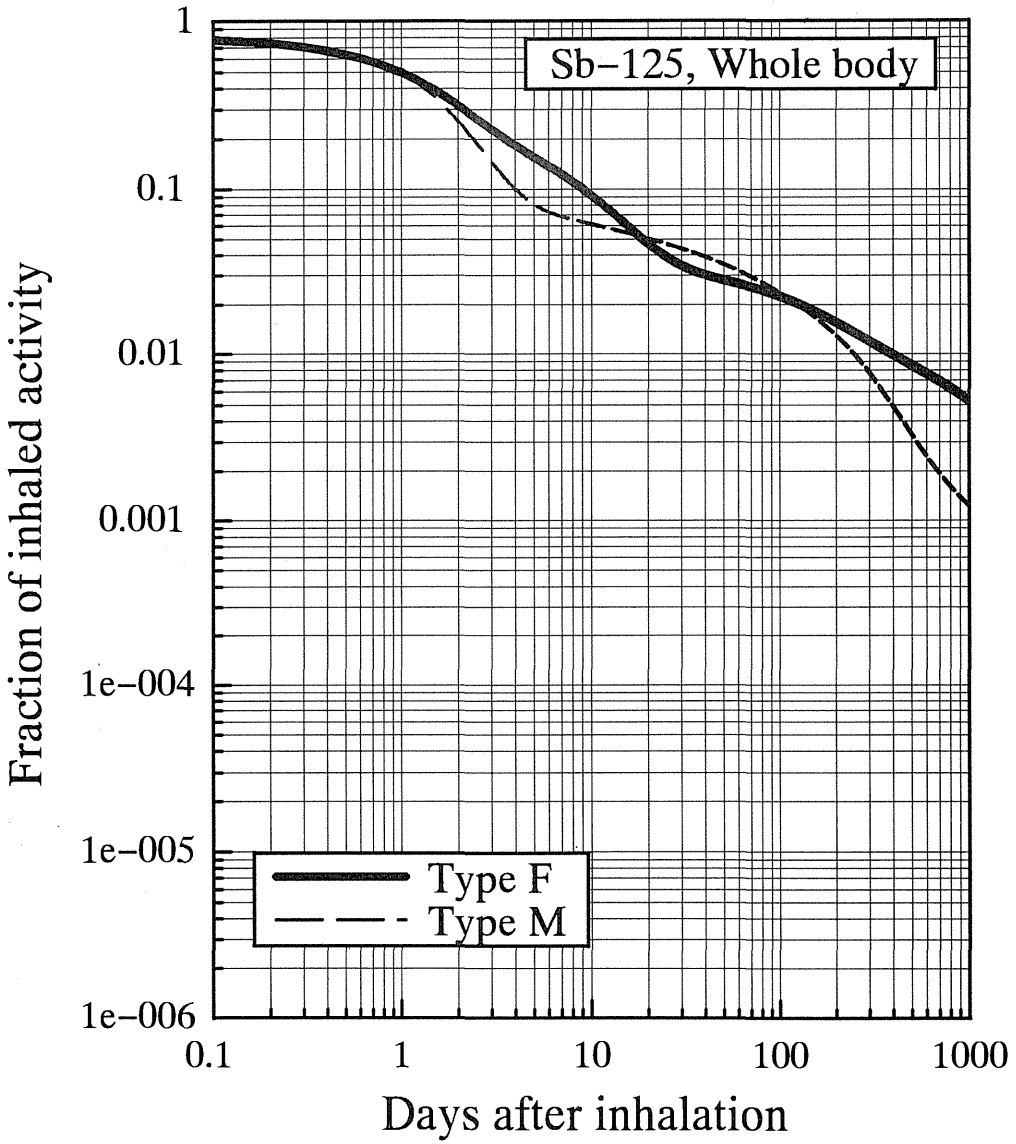

Fig.3-18(a) Whole body content of ^{125}Sb following acute intake by inhalation

Table 3-18(b) Daily urinary excretion of ^{125}Sb

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	5.6E-02	6.0E-03	-------
2	2.3E-02	2.6E-03	-------
3	1.7E-02	2.0E-03	-------
4	1.5E-02	1.7E-03	-------
5	1.3E-02	1.5E-03	-------
6	1.1E-02	1.3E-03	-------
7	1.0E-02	1.2E-03	-------
8	8.7E-03	1.1E-03	-------
9	7.6E-03	9.5E-04	-------
10	6.6E-03	8.5E-04	-------
14	3.8E-03	5.7E-04	-------
30	5.1E-04	2.0E-04	-------
60	9.3E-05	1.2E-04	-------
90	6.9E-05	8.9E-05	-------
180	3.5E-05	4.7E-05	-------
365	9.3E-06	1.5E-05	-------

* Bq/d per Bq intake

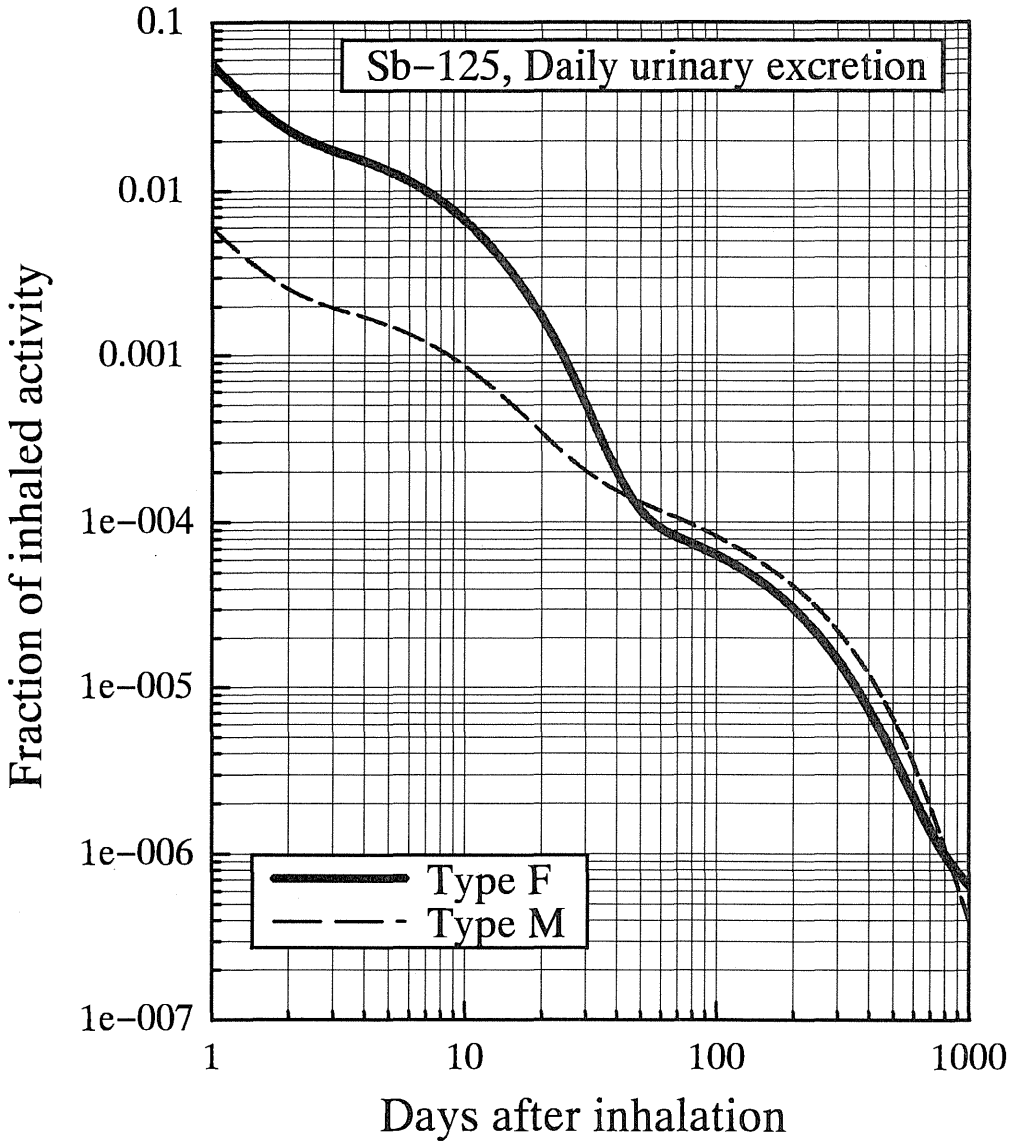

Fig.3-18(b) Daily urinary excretion of ^{125}Sb following acute intake by inhalation

Table 3-19(a) Thyroid content of ^{125}I

Days after intake	Thyroid		
	Type F	CH_3I	Elemental
0.1	2.7E-02	5.1E-02	5.4E-02
0.2	5.4E-02	8.9E-02	1.1E-01
0.5	1.0E-01	1.6E-01	2.0E-01
1	1.3E-01	1.9E-01	2.5E-01
2	1.4E-01	2.0E-01	2.6E-01
3	1.4E-01	2.0E-01	2.5E-01
4	1.3E-01	1.9E-01	2.5E-01
5	1.3E-01	1.9E-01	2.4E-01
6	1.3E-01	1.9E-01	2.4E-01
7	1.3E-01	1.8E-01	2.4E-01
8	1.2E-01	1.8E-01	2.3E-01
9	1.2E-01	1.8E-01	2.3E-01
10	1.2E-01	1.7E-01	2.2E-01
14	1.1E-01	1.6E-01	2.1E-01
30	8.1E-02	1.2E-01	1.5E-01
60	4.7E-02	6.9E-02	8.9E-02
90	2.8E-02	4.0E-02	5.2E-02
180	5.6E-03	8.1E-03	1.0E-02
365	2.0E-04	3.0E-04	3.8E-04

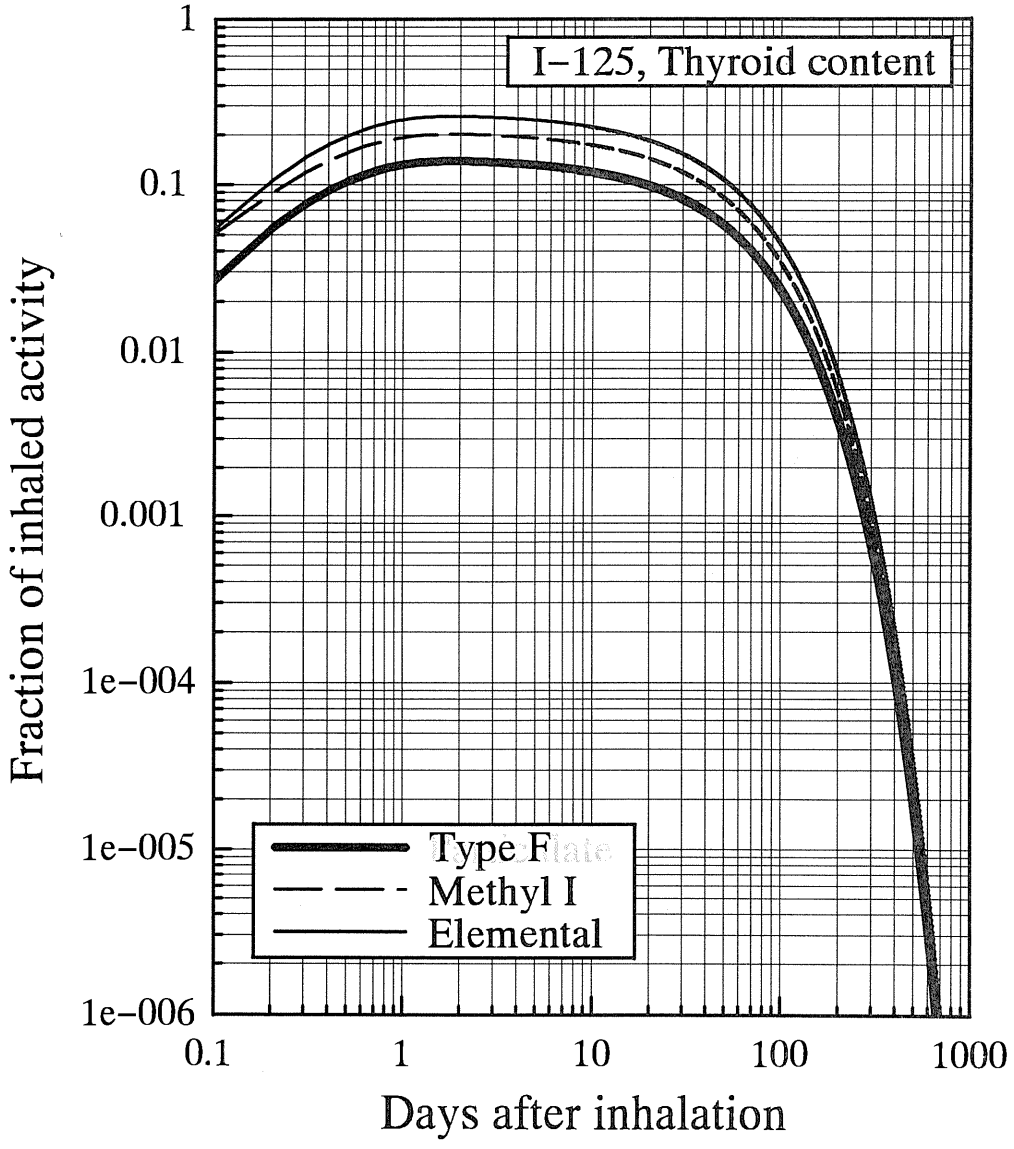

Fig.3-19(a) Thyroid content of ^{125}I following acute intake by inhalation

Table 3-19(b) Daily urinary excretion of ^{125}I

Days after intake	Daily urinary excretion*		
	Type F	CH_3I	Elemental
1	3.0E-01	4.5E-01	5.7E-01
2	2.7E-02	3.7E-02	4.9E-02
3	1.7E-03	2.4E-03	3.2E-03
4	2.0E-04	2.8E-04	3.6E-04
5	1.3E-04	1.9E-04	2.4E-04
6	1.5E-04	2.2E-04	2.8E-04
7	1.7E-04	2.6E-04	3.3E-04
8	2.0E-04	2.9E-04	3.7E-04
9	2.2E-04	3.2E-04	4.1E-04
10	2.4E-04	3.4E-04	4.4E-04
14	2.9E-04	4.2E-04	5.5E-04
30	3.5E-04	5.0E-04	6.5E-04
60	2.5E-04	3.6E-04	4.6E-04
90	1.5E-04	2.2E-04	2.8E-04
180	3.0E-05	4.4E-05	5.7E-05
365	1.1E-06	1.6E-06	2.1E-06

* Bq/d per Bq intake

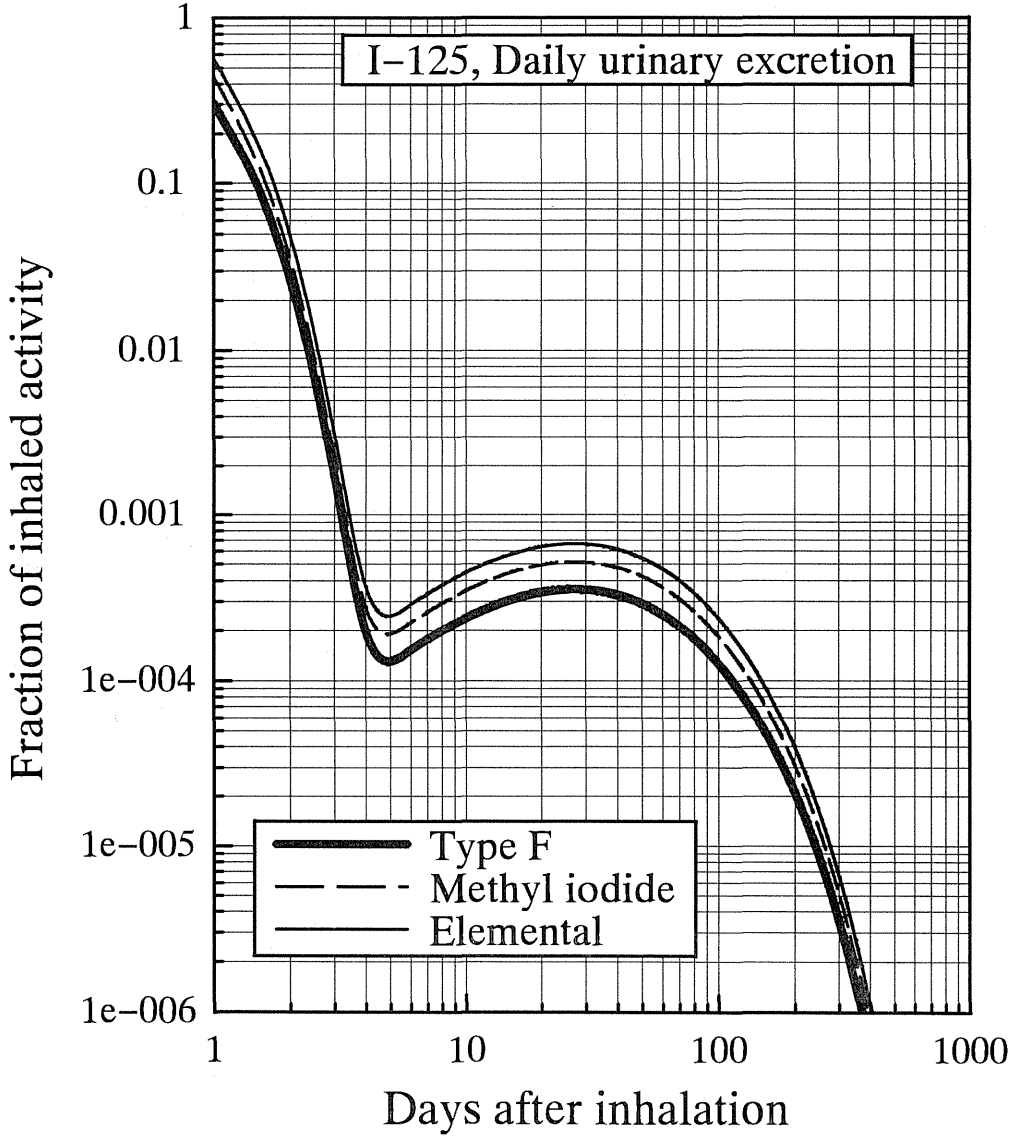

Fig.3-19(b) Daily urinary excretion of ^{125}I following acute intake by inhalation

Table 3-20(a) Thyroid content of ^{129}I

Days after intake	Thyroid		
	Type F	CH_3I	Elemental
0.1	2.7E-02	5.1E-02	5.4E-02
0.2	5.4E-02	8.9E-02	1.1E-01
0.5	1.0E-01	1.6E-01	2.0E-01
1	1.3E-01	2.0E-01	2.5E-01
2	1.4E-01	2.1E-01	2.6E-01
3	1.4E-01	2.1E-01	2.6E-01
4	1.4E-01	2.0E-01	2.6E-01
5	1.4E-01	2.0E-01	2.6E-01
6	1.4E-01	2.0E-01	2.6E-01
7	1.4E-01	2.0E-01	2.5E-01
8	1.3E-01	2.0E-01	2.5E-01
9	1.3E-01	2.0E-01	2.5E-01
10	1.3E-01	1.9E-01	2.5E-01
14	1.3E-01	1.9E-01	2.4E-01
30	1.1E-01	1.7E-01	2.2E-01
60	9.4E-02	1.4E-01	1.8E-01
90	7.8E-02	1.1E-01	1.5E-01
180	4.4E-02	6.4E-02	8.3E-02
365	1.4E-02	2.0E-02	2.6E-02

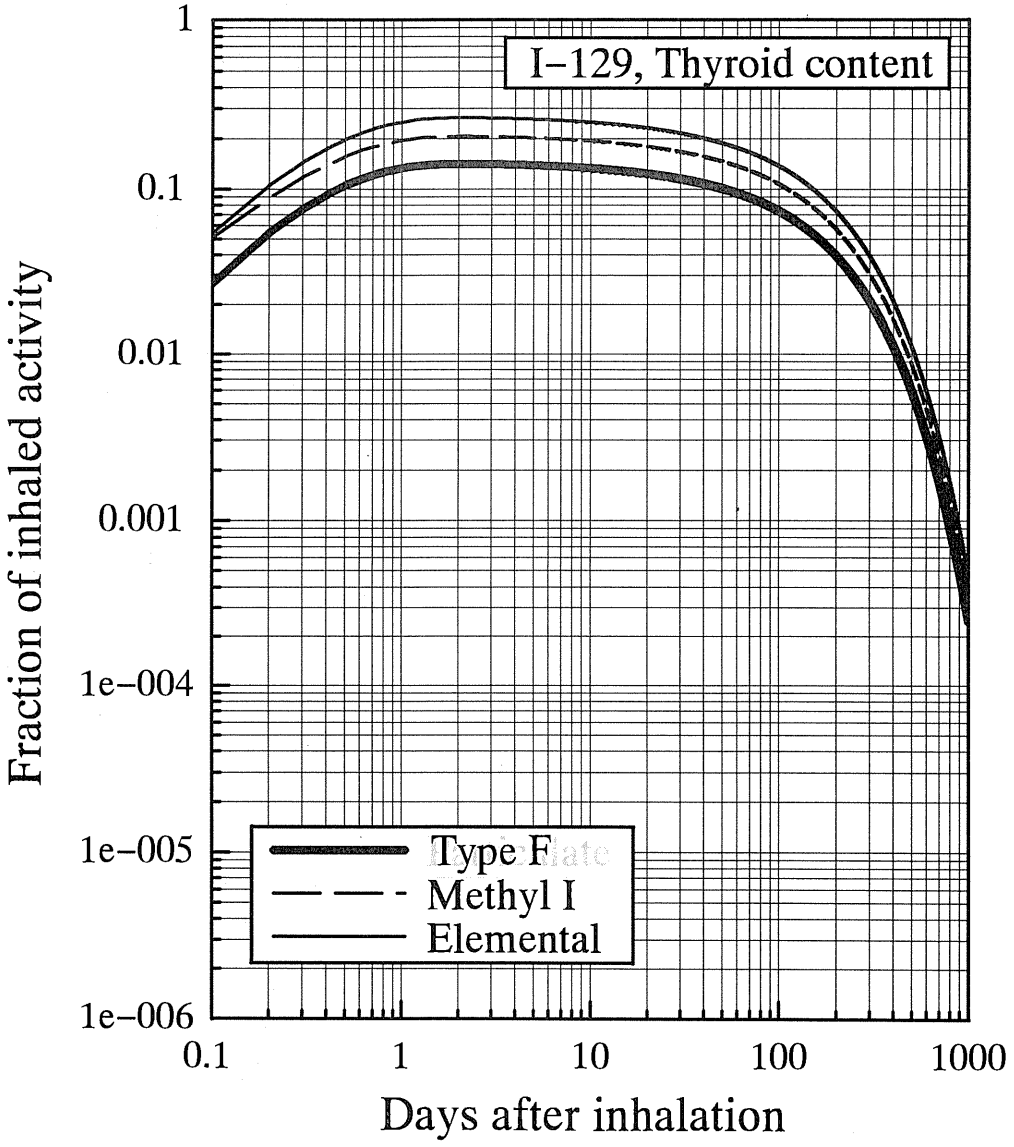

Fig.3-20(a) Thyroid content of ^{129}I following acute intake by inhalation

Table 3-20(b) Daily urinary excretion of ^{129}I

Days after intake	Daily urinary excretion*		
	Type F	CH_3I	Elemental
1	3.1E-01	4.5E-01	5.8E-01
2	2.8E-02	3.7E-02	5.1E-02
3	1.8E-03	2.4E-03	3.3E-03
4	2.1E-04	2.9E-04	3.8E-04
5	1.4E-04	2.0E-04	2.6E-04
6	1.6E-04	2.4E-04	3.0E-04
7	1.9E-04	2.8E-04	3.6E-04
8	2.2E-04	3.2E-04	4.1E-04
9	2.4E-04	3.5E-04	4.5E-04
10	2.6E-04	3.9E-04	5.0E-04
14	3.4E-04	5.0E-04	6.4E-04
30	4.9E-04	7.2E-04	9.2E-04
60	5.0E-04	7.2E-04	9.3E-04
90	4.2E-04	6.2E-04	7.9E-04
180	2.4E-04	3.5E-04	4.5E-04
365	7.5E-05	1.1E-04	1.4E-04

* Bq/d per Bq intake

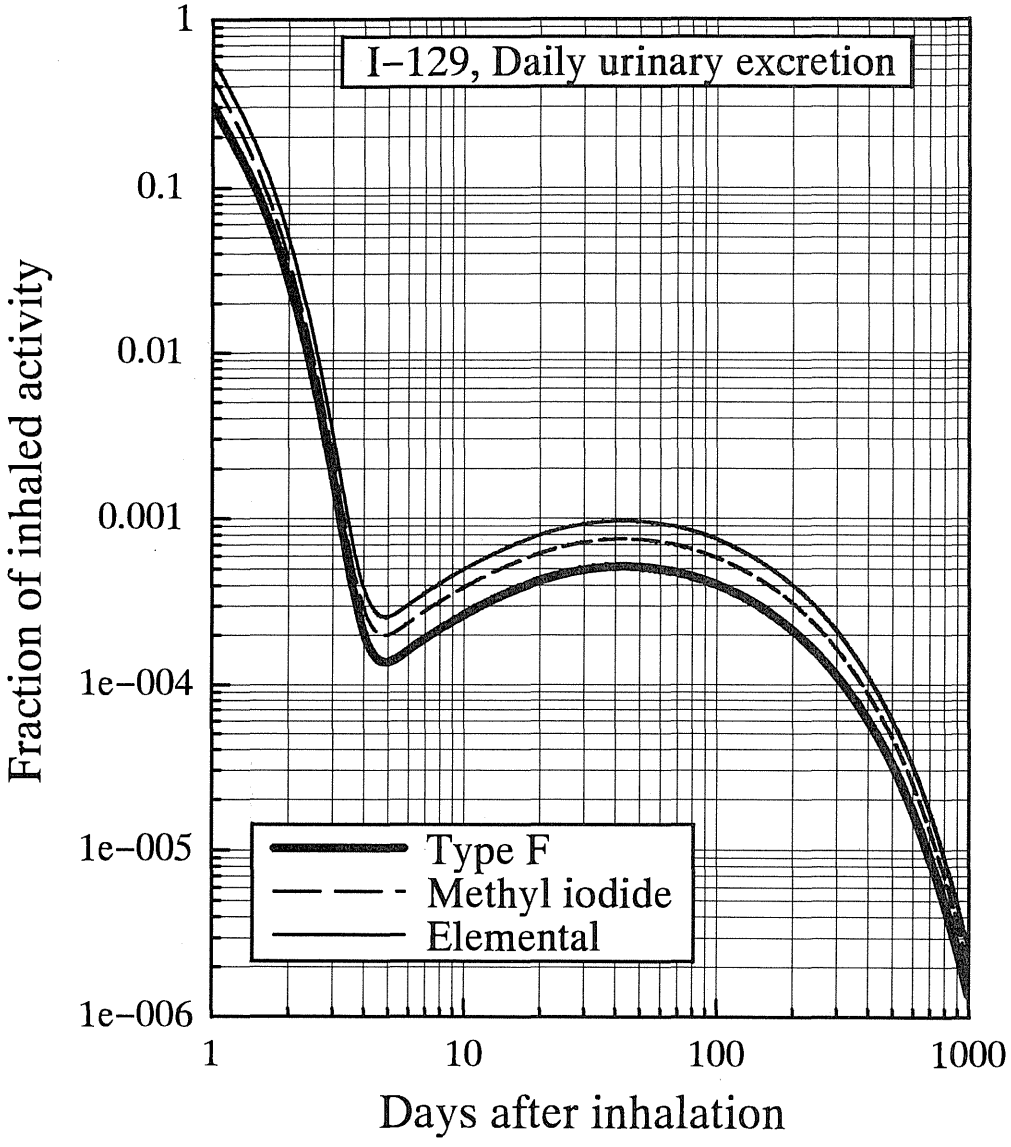

Fig.3-20(b) Daily urinary excretion of ^{129}I following acute intake by inhalation

Table 3-21(a) Thyroid content of ^{131}I

Days after intake	Thyroid		
	Type F	CH_3I	Elemental
0.1	2.6E-02	5.0E-02	5.4E-02
0.2	5.3E-02	8.8E-02	1.0E-01
0.5	1.0E-01	1.5E-01	1.9E-01
1	1.2E-01	1.8E-01	2.3E-01
2	1.2E-01	1.7E-01	2.2E-01
3	1.1E-01	1.6E-01	2.0E-01
4	9.9E-02	1.4E-01	1.9E-01
5	9.0E-02	1.3E-01	1.7E-01
6	8.2E-02	1.2E-01	1.5E-01
7	7.5E-02	1.1E-01	1.4E-01
8	6.8E-02	9.9E-02	1.3E-01
9	6.2E-02	9.0E-02	1.2E-01
10	5.6E-02	8.2E-02	1.1E-01
14	3.9E-02	5.6E-02	7.2E-02
30	8.7E-03	1.3E-02	1.6E-02
60	5.4E-04	7.9E-04	1.0E-03
90	3.4E-05	4.9E-05	6.3E-05
180	8.2E-09	1.2E-08	1.5E-08
365	3.1E-16	4.4E-16	5.7E-16

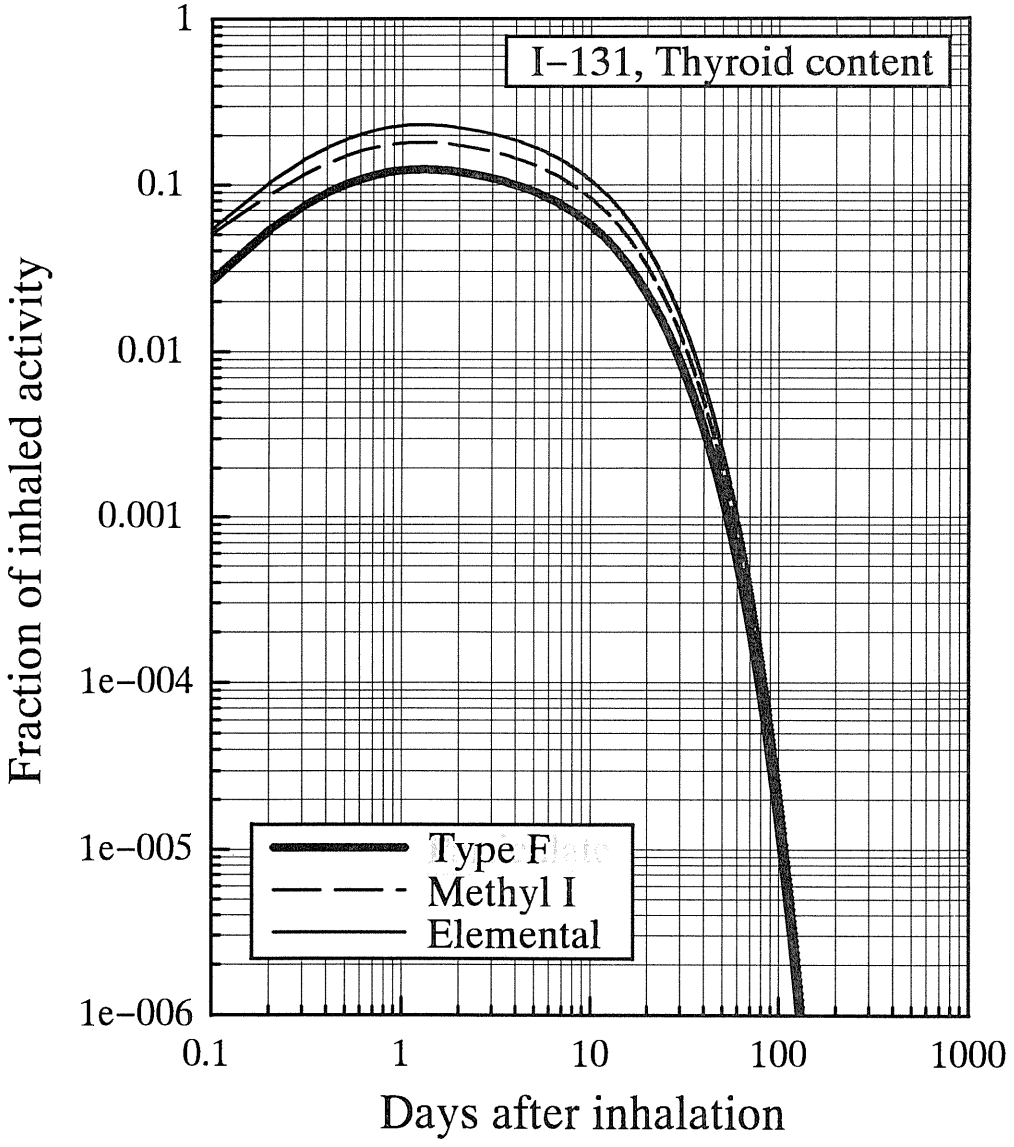

Fig.3-21(a) Thyroid content of ^{131}I following acute intake by inhalation

Table 3-21(b) Daily urinary excretion of ^{131}I

Days after intake	Daily urinary excretion*		
	Type F	CH_3I	Elemental
1	2.8E-01	4.1E-01	5.3E-01
2	2.3E-02	3.1E-02	4.3E-02
3	1.4E-03	1.9E-03	2.5E-03
4	1.5E-04	2.1E-04	2.7E-04
5	9.0E-05	1.3E-04	1.7E-04
6	9.7E-05	1.4E-04	1.8E-04
7	1.0E-04	1.5E-04	1.9E-04
8	1.1E-04	1.6E-04	2.0E-04
9	1.1E-04	1.6E-04	2.1E-04
10	1.1E-04	1.6E-04	2.1E-04
14	1.0E-04	1.5E-04	1.9E-04
30	3.7E-05	5.4E-05	6.9E-05
60	2.8E-06	4.1E-06	5.3E-06
90	1.8E-07	2.7E-07	3.4E-07
180	4.5E-11	6.5E-11	8.4E-11
365	1.7E-18	2.4E-18	3.1E-18

* Bq/d per Bq intake

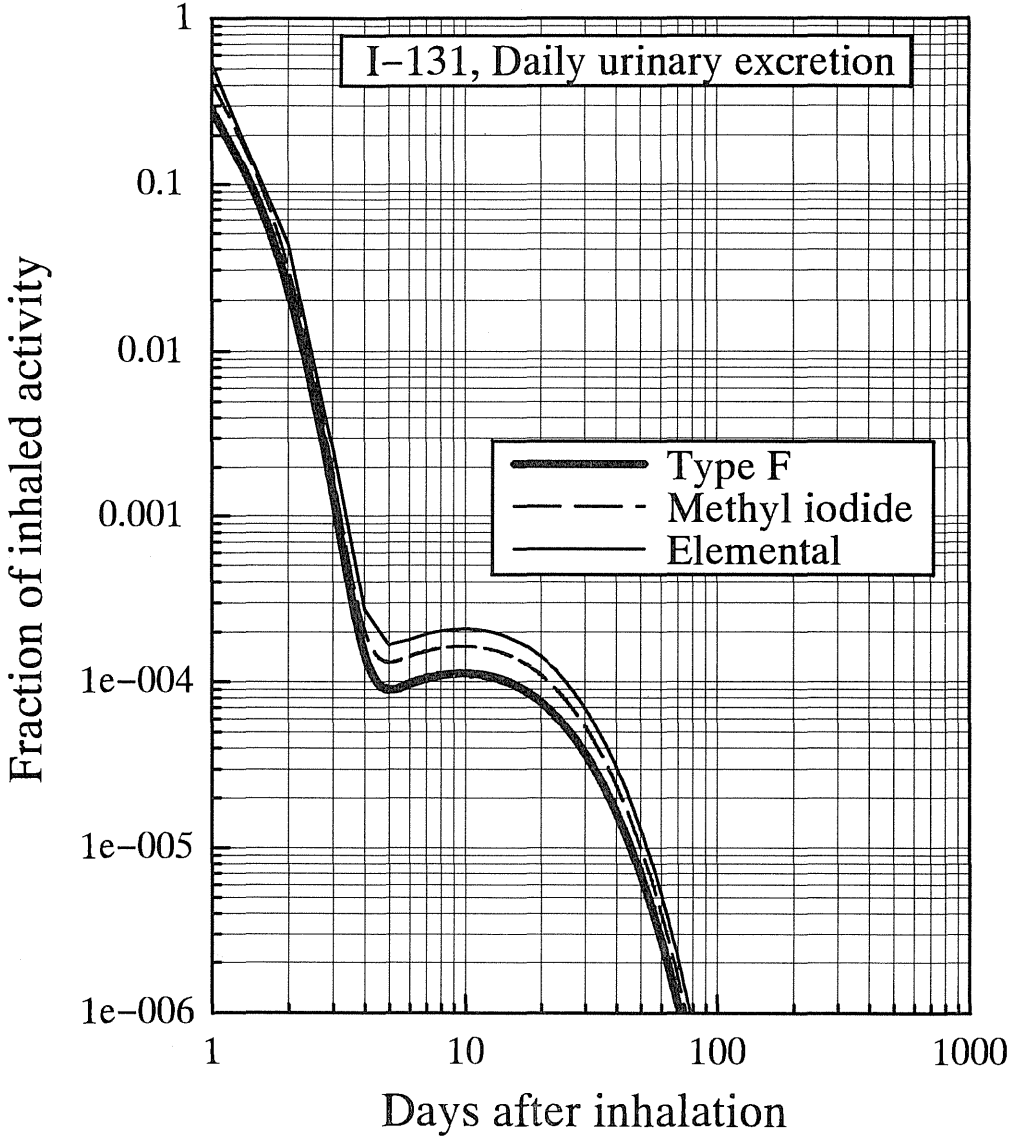

Fig.3-21(b) Daily urinary excretion of ^{131}I following acute intake by inhalation

Table 3-22(a) Whole body content of ^{134}Cs

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	-------	-------
0.2	7.6E-01	-------	-------
0.5	6.8E-01	-------	-------
1	6.0E-01	-------	-------
2	5.0E-01	-------	-------
3	4.6E-01	-------	-------
4	4.4E-01	-------	-------
5	4.3E-01	-------	-------
6	4.3E-01	-------	-------
7	4.2E-01	-------	-------
8	4.1E-01	-------	-------
9	4.1E-01	-------	-------
10	4.1E-01	-------	-------
14	4.0E-01	-------	-------
30	3.5E-01	-------	-------
60	2.8E-01	-------	-------
90	2.3E-01	-------	-------
180	1.2E-01	-------	-------
365	3.1E-02	-------	-------

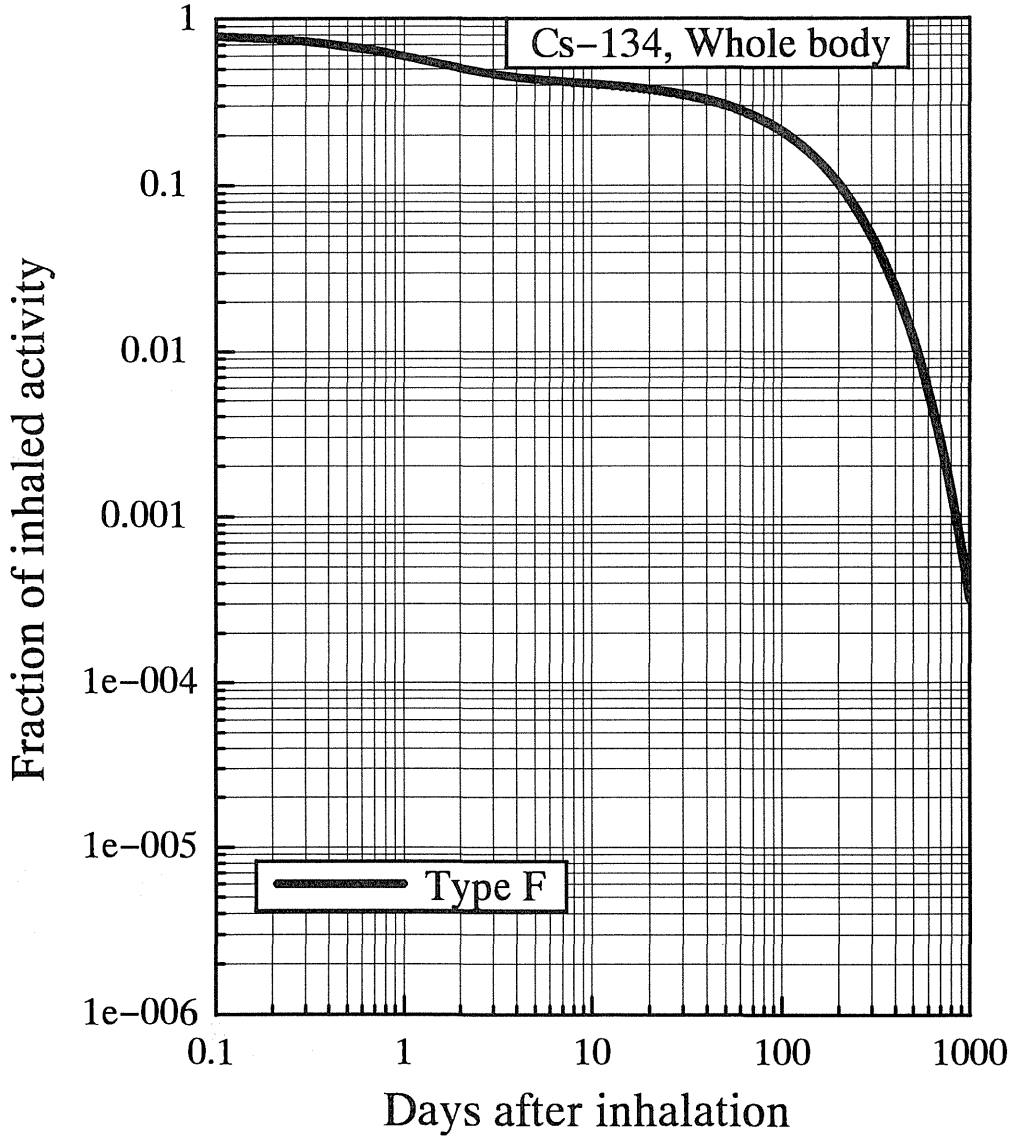

Fig.3-22(a) Whole body content of ^{134}Cs following acute intake by inhalation

Table 3-22(b) Daily urinary excretion of ^{134}Cs

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	7.9E-03	-------	-------
2	1.1E-02	-------	-------
3	8.8E-03	-------	-------
4	6.8E-03	-------	-------
5	5.4E-03	-------	-------
6	4.4E-03	-------	-------
7	3.7E-03	-------	-------
8	3.2E-03	-------	-------
9	2.9E-03	-------	-------
10	2.6E-03	-------	-------
14	2.1E-03	-------	-------
30	1.8E-03	-------	-------
60	1.4E-03	-------	-------
90	1.1E-03	-------	-------
180	6.0E-04	-------	-------
365	1.6E-04	-------	-------

* Bq/d per Bq intake

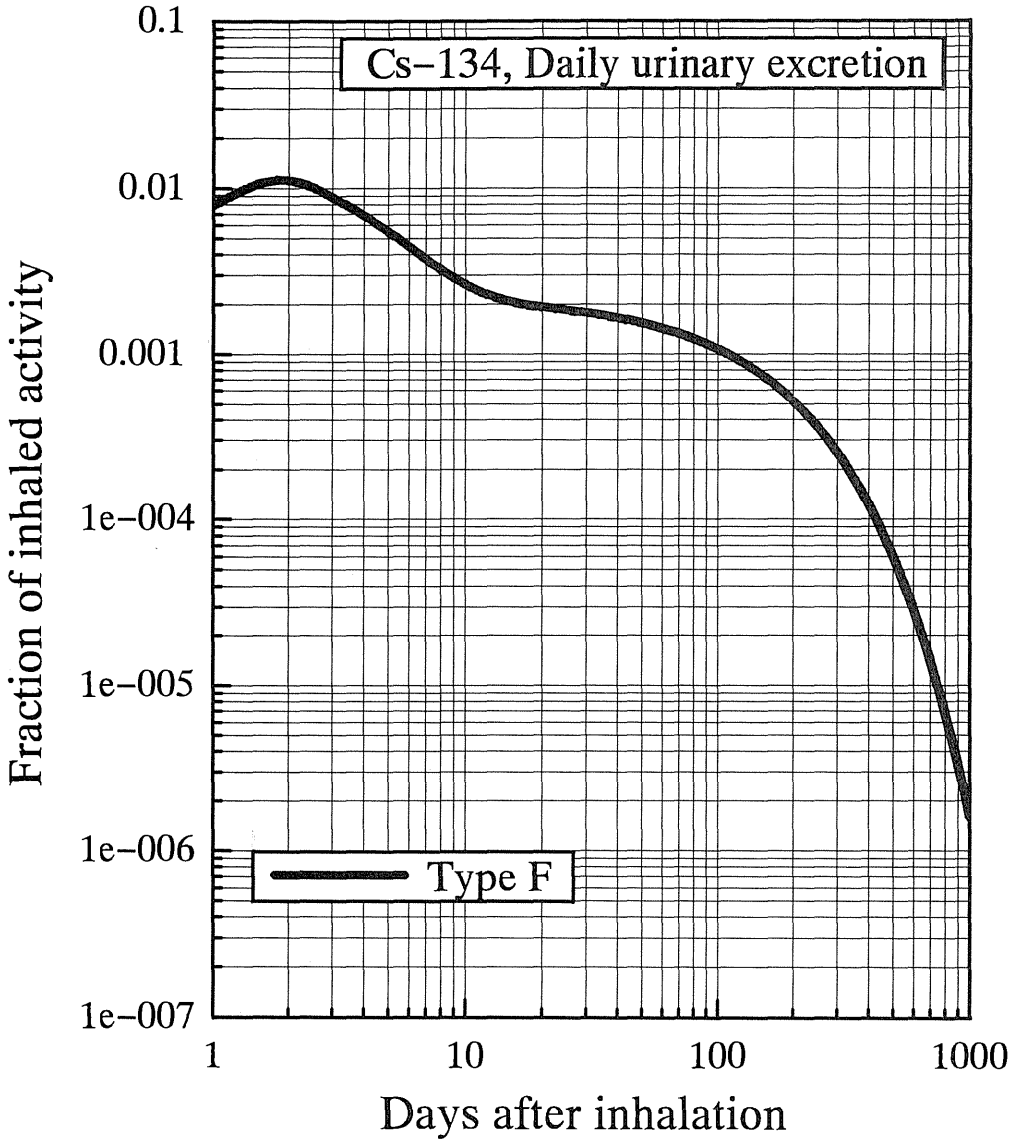

Fig.3-22(b) Daily urinary excretion of ^{134}Cs following acute intake by inhalation

Table 3-23(a) Whole body content of ^{137}Cs

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.9E-01	-------	-------
0.2	7.6E-01	-------	-------
0.5	6.8E-01	-------	-------
1	6.0E-01	-------	-------
2	5.0E-01	-------	-------
3	4.6E-01	-------	-------
4	4.4E-01	-------	-------
5	4.3E-01	-------	-------
6	4.3E-01	-------	-------
7	4.2E-01	-------	-------
8	4.2E-01	-------	-------
9	4.1E-01	-------	-------
10	4.1E-01	-------	-------
14	4.0E-01	-------	-------
30	3.6E-01	-------	-------
60	3.0E-01	-------	-------
90	2.4E-01	-------	-------
180	1.4E-01	-------	-------
365	4.3E-02	-------	-------

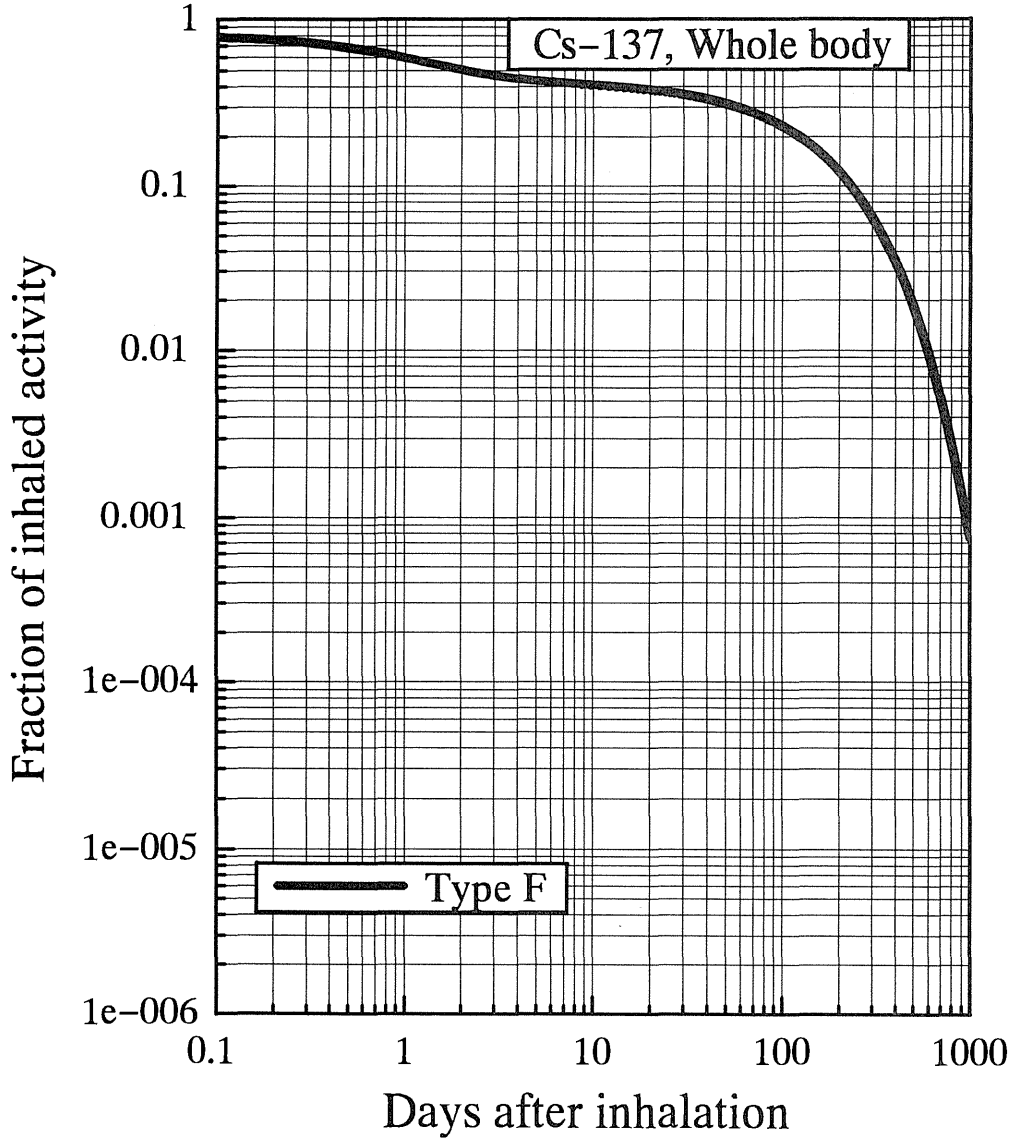

Fig.3-23(a) Whole body content of ^{137}Cs following acute intake by inhalation

Table 3-23(b) Daily urinary excretion of ^{137}Cs

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	7.9E-03	-------	-------
2	1.1E-02	-------	-------
3	8.8E-03	-------	-------
4	6.9E-03	-------	-------
5	5.4E-03	-------	-------
6	4.5E-03	-------	-------
7	3.8E-03	-------	-------
8	3.3E-03	-------	-------
9	2.9E-03	-------	-------
10	2.6E-03	-------	-------
14	2.2E-03	-------	-------
30	1.8E-03	-------	-------
60	1.5E-03	-------	-------
90	1.2E-03	-------	-------
180	7.0E-04	-------	-------
365	2.2E-04	-------	-------

* Bq/d per Bq intake

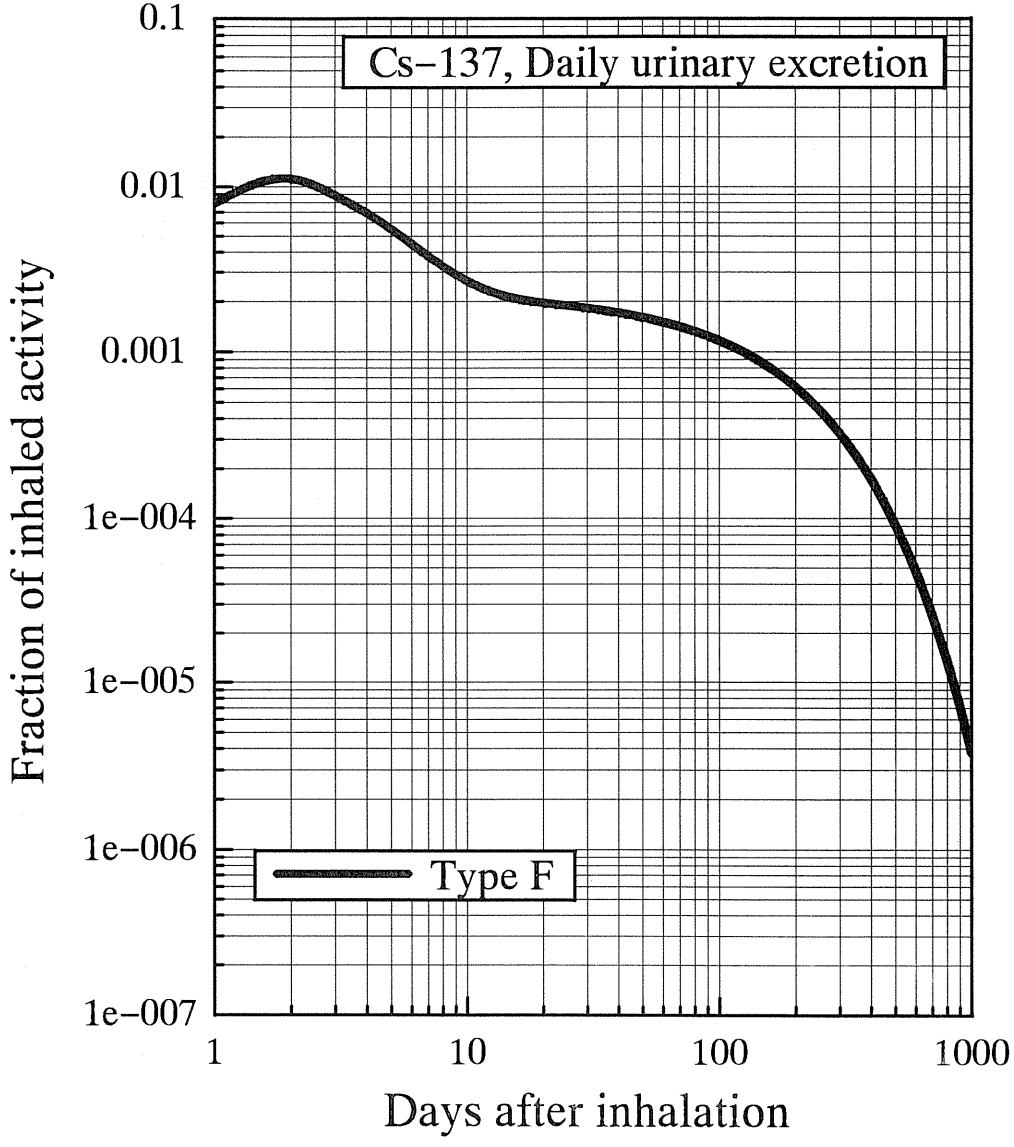

Fig.3-23(b) Daily urinary excretion of ^{137}Cs following acute intake by inhalation

Table 3-24(a) Whole body content of ^{140}Ba

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	7.8E-01	-------	-------
0.2	7.4E-01	-------	-------
0.5	6.3E-01	-------	-------
1	4.6E-01	-------	-------
2	2.5E-01	-------	-------
3	1.4E-01	-------	-------
4	8.9E-02	-------	-------
5	6.3E-02	-------	-------
6	4.8E-02	-------	-------
7	3.8E-02	-------	-------
8	3.2E-02	-------	-------
9	2.8E-02	-------	-------
10	2.4E-02	-------	-------
14	1.7E-02	-------	-------
30	6.1E-03	-------	-------
60	1.0E-03	-------	-------
90	1.7E-04	-------	-------
180	9.7E-07	-------	-------
365	3.3E-11	-------	-------

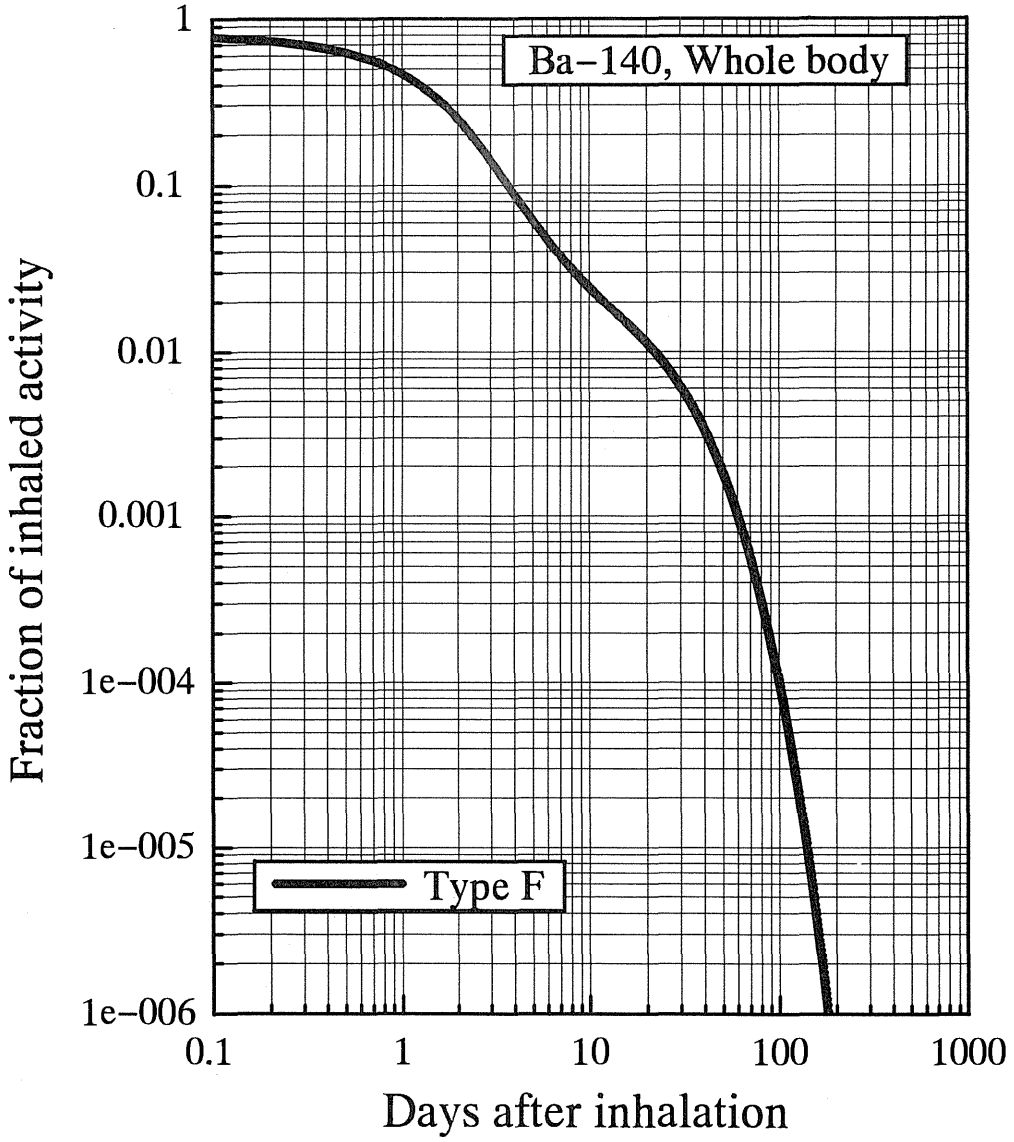

Fig.3-24(a) Whole body content of ^{140}Ba following acute intake by inhalation

Table 3-24(b) Daily urinary excretion of ^{140}Ba

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	1.6E-02	-------	-------
2	2.6E-02	-------	-------
3	1.7E-03	-------	-------
4	1.1E-03	-------	-------
5	7.4E-04	-------	-------
6	4.9E-04	-------	-------
7	3.2E-04	-------	-------
8	2.2E-04	-------	-------
9	1.5E-04	-------	-------
10	1.0E-04	-------	-------
14	2.7E-05	-------	-------
30	3.7E-06	-------	-------
60	5.2E-07	-------	-------
90	7.3E-08	-------	-------
180	2.1E-10	-------	-------
365	2.0E-15	-------	-------

* Bq/d per Bq intake

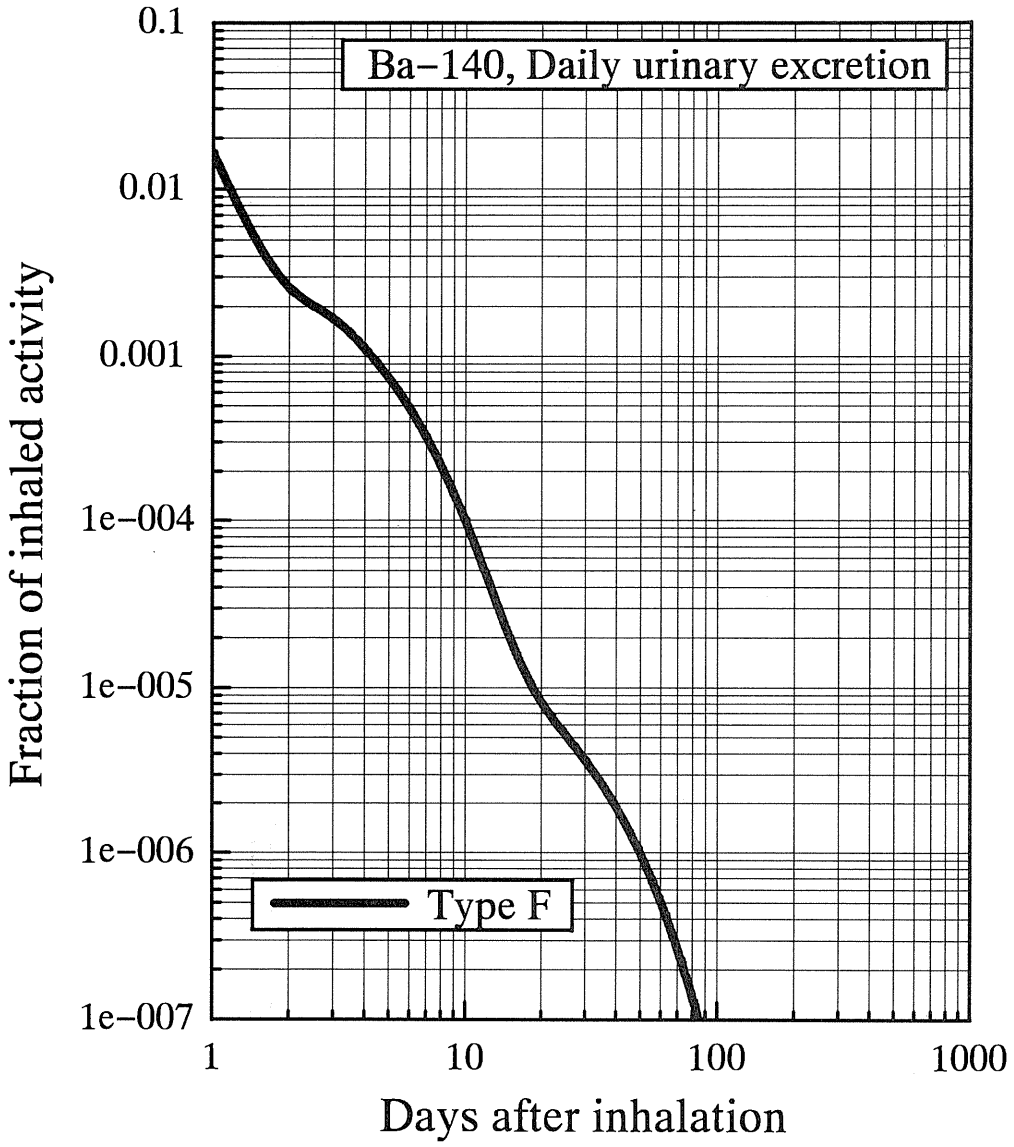

Fig.3-24(b) Daily urinary excretion of ^{140}Ba following acute intake by inhalation

Table 3-25(a) Whole body content of ^{141}Ce

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.5E-01	7.5E-01
0.5	-------	6.5E-01	6.5E-01
1	-------	4.9E-01	4.8E-01
2	-------	2.5E-01	2.4E-01
3	-------	1.5E-01	1.3E-01
4	-------	1.0E-01	8.3E-02
5	-------	8.5E-02	6.5E-02
6	-------	7.7E-02	5.8E-02
7	-------	7.3E-02	5.4E-02
8	-------	7.0E-02	5.2E-02
9	-------	6.8E-02	5.0E-02
10	-------	6.6E-02	4.8E-02
14	-------	5.9E-02	4.3E-02
30	-------	3.9E-02	2.7E-02
60	-------	1.9E-02	1.2E-02
90	-------	9.6E-03	5.7E-03
180	-------	1.3E-03	7.2E-04
365	-------	2.4E-05	1.2E-05

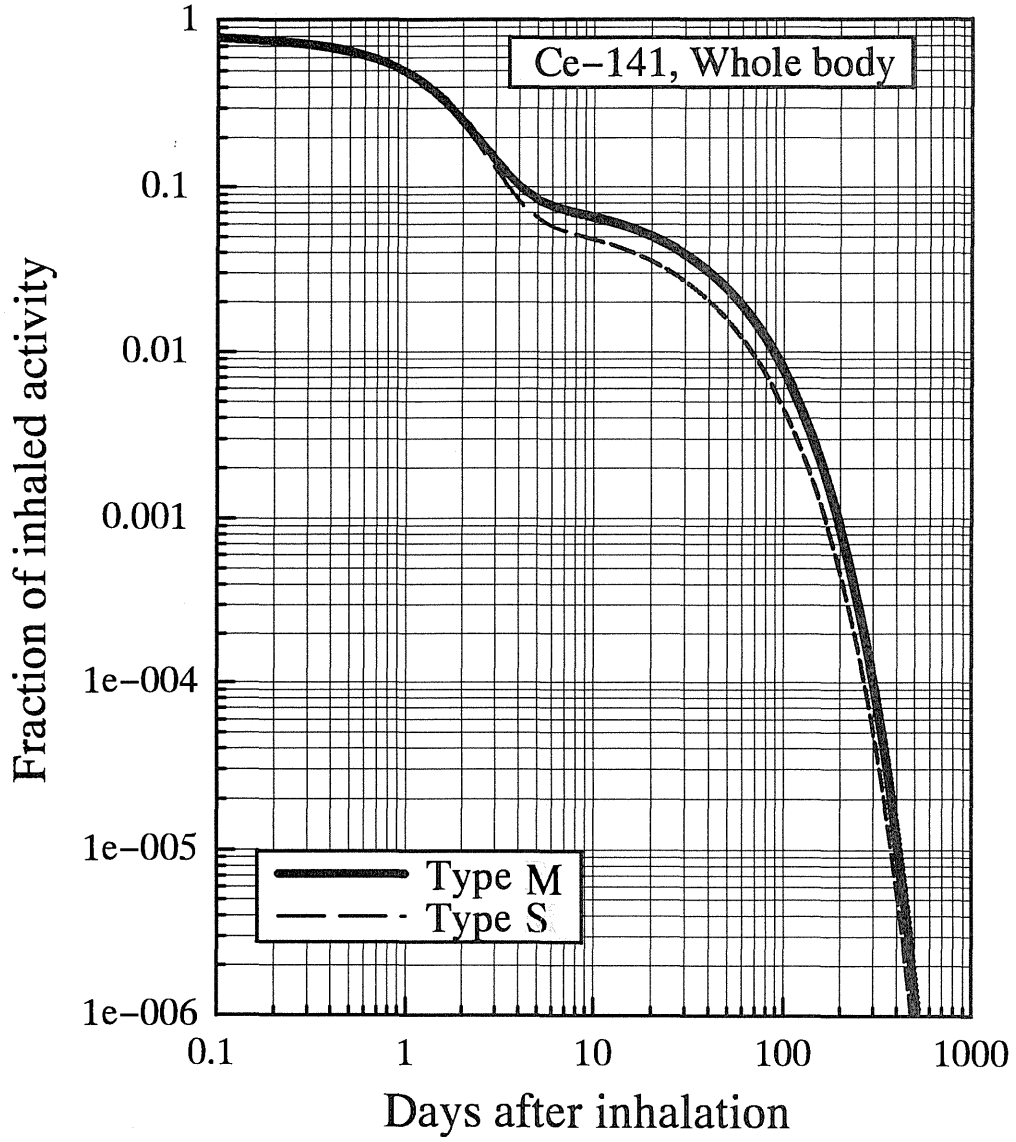

Fig.3-25(a) Whole body content of ^{141}Ce following acute intake by inhalation

Table 3-25(b) Daily urinary excretion of ^{141}Ce

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	3.2E-07	4.8E-09
2	-------	5.3E-07	9.0E-09
3	-------	5.4E-07	9.3E-09
4	-------	5.3E-07	9.3E-09
5	-------	5.2E-07	9.2E-09
6	-------	5.2E-07	9.1E-09
7	-------	5.1E-07	9.0E-09
8	-------	5.0E-07	8.9E-09
9	-------	5.0E-07	8.8E-09
10	-------	4.9E-07	8.7E-09
14	-------	4.6E-07	8.4E-09
30	-------	3.7E-07	6.8E-09
60	-------	2.2E-07	4.4E-09
90	-------	1.3E-07	2.6E-09
180	-------	2.1E-08	5.1E-10
365	-------	4.5E-10	1.4E-11

* Bq/d per Bq intake

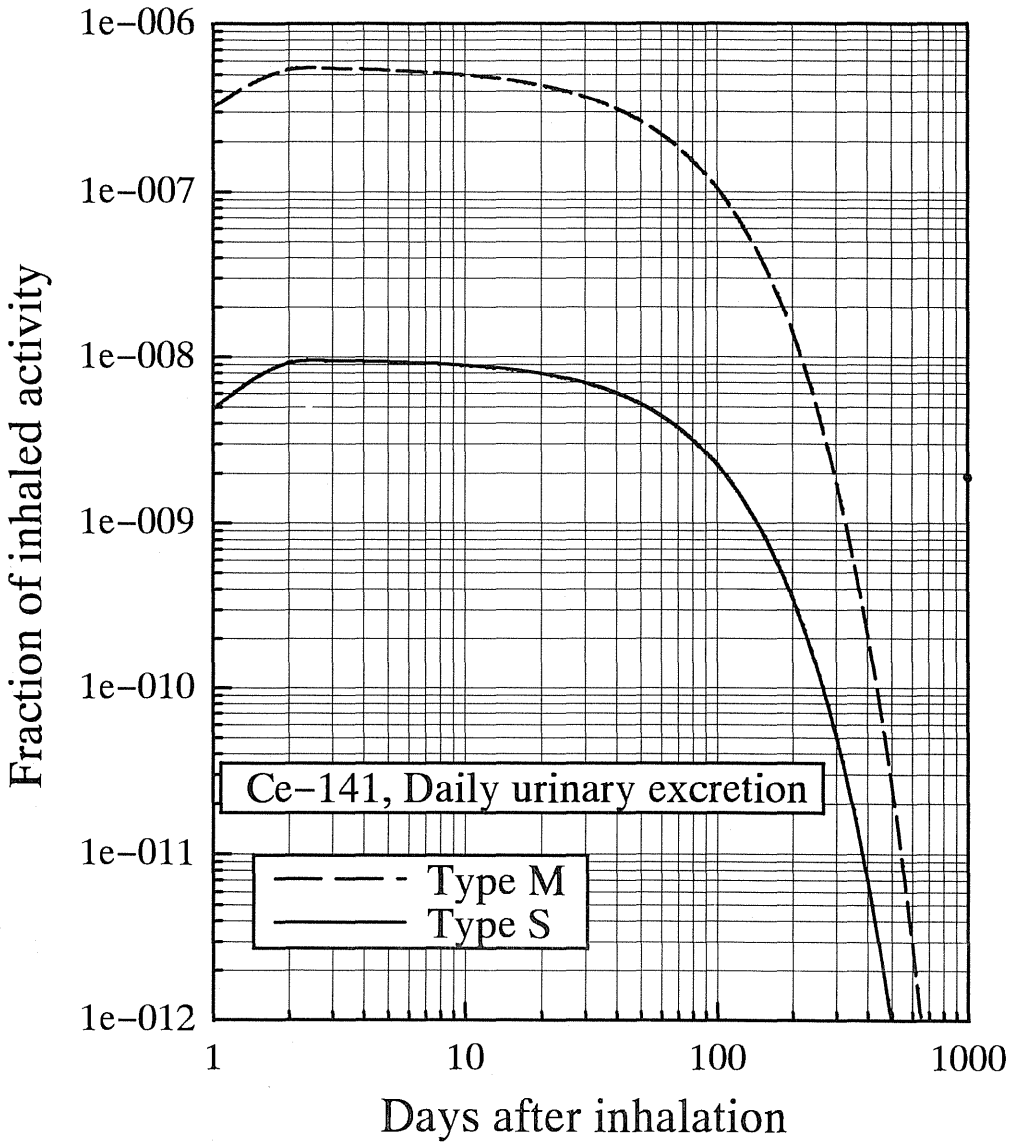

Fig.3-25(b) Daily urinary excretion of ^{141}Ce following acute intake by inhalation

Table 3-26(a) Whole body content of ^{144}Ce

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.6E-01	7.6E-01
0.5	-------	6.6E-01	6.6E-01
1	-------	5.0E-01	4.9E-01
2	-------	2.6E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.1E-01	9.0E-02
5	-------	9.3E-02	7.2E-02
6	-------	8.6E-02	6.5E-02
7	-------	8.3E-02	6.2E-02
8	-------	8.2E-02	6.0E-02
9	-------	8.1E-02	5.9E-02
10	-------	8.0E-02	5.8E-02
14	-------	7.7E-02	5.6E-02
30	-------	6.9E-02	4.7E-02
60	-------	5.9E-02	3.7E-02
90	-------	5.3E-02	3.1E-02
180	-------	4.0E-02	2.2E-02
365	-------	2.4E-02	1.2E-02

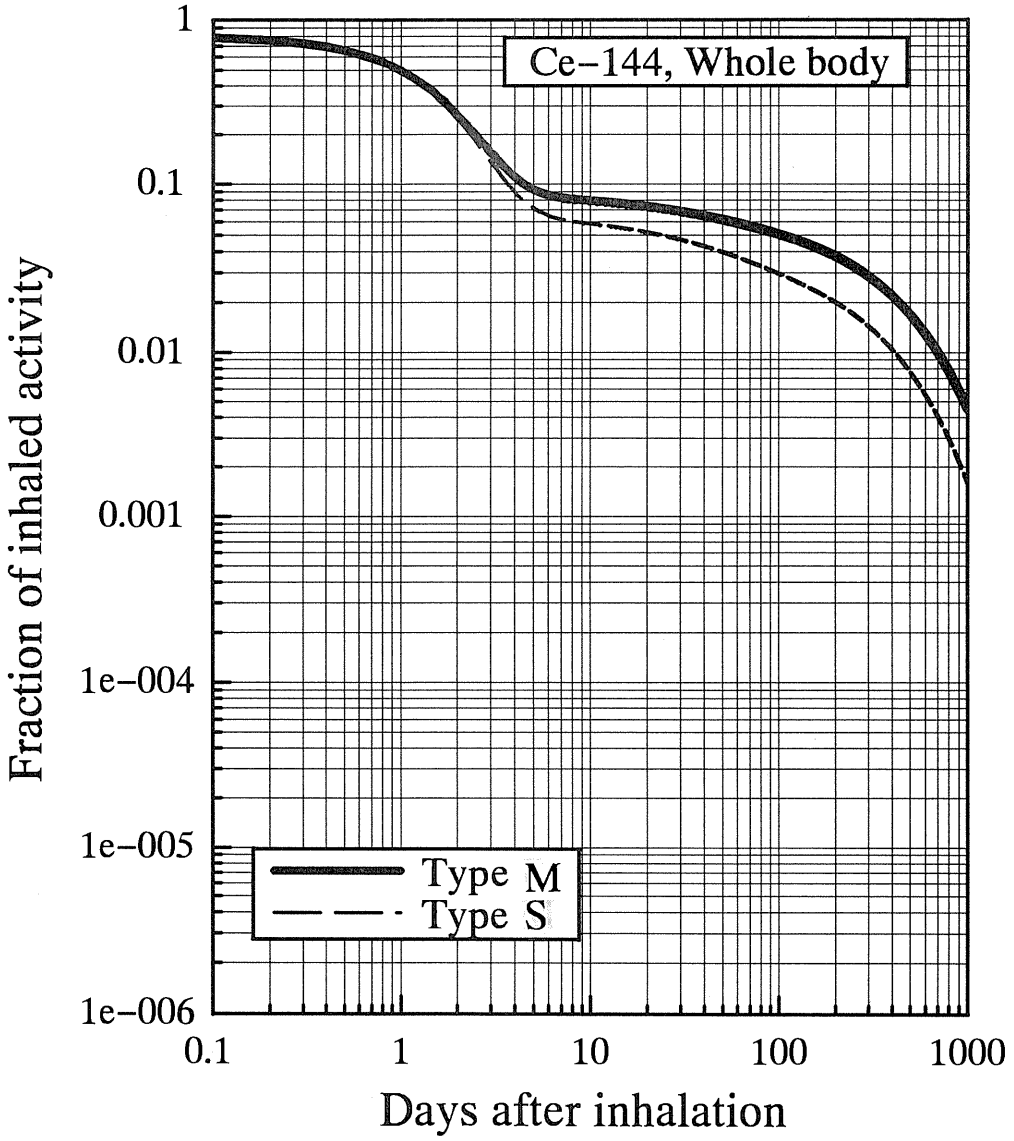

Fig.3-26(a) Whole body content of ^{144}Ce following acute intake by inhalation

Table 3-26(b) Daily urinary excretion of ^{144}Ce

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	3.2E-07	4.9E-09
2	-------	5.5E-07	9.4E-09
3	-------	5.7E-07	9.9E-09
4	-------	5.7E-07	1.0E-08
5	-------	5.8E-07	1.0E-08
6	-------	5.8E-07	1.0E-08
7	-------	5.8E-07	1.0E-08
8	-------	5.9E-07	1.0E-08
9	-------	5.9E-07	1.0E-08
10	-------	5.9E-07	1.1E-08
14	-------	6.1E-07	1.1E-08
30	-------	6.4E-07	1.2E-08
60	-------	6.8E-07	1.4E-08
90	-------	6.9E-07	1.4E-08
180	-------	6.4E-07	1.5E-08
365	-------	4.4E-07	1.4E-08

* Bq/d per Bq intake

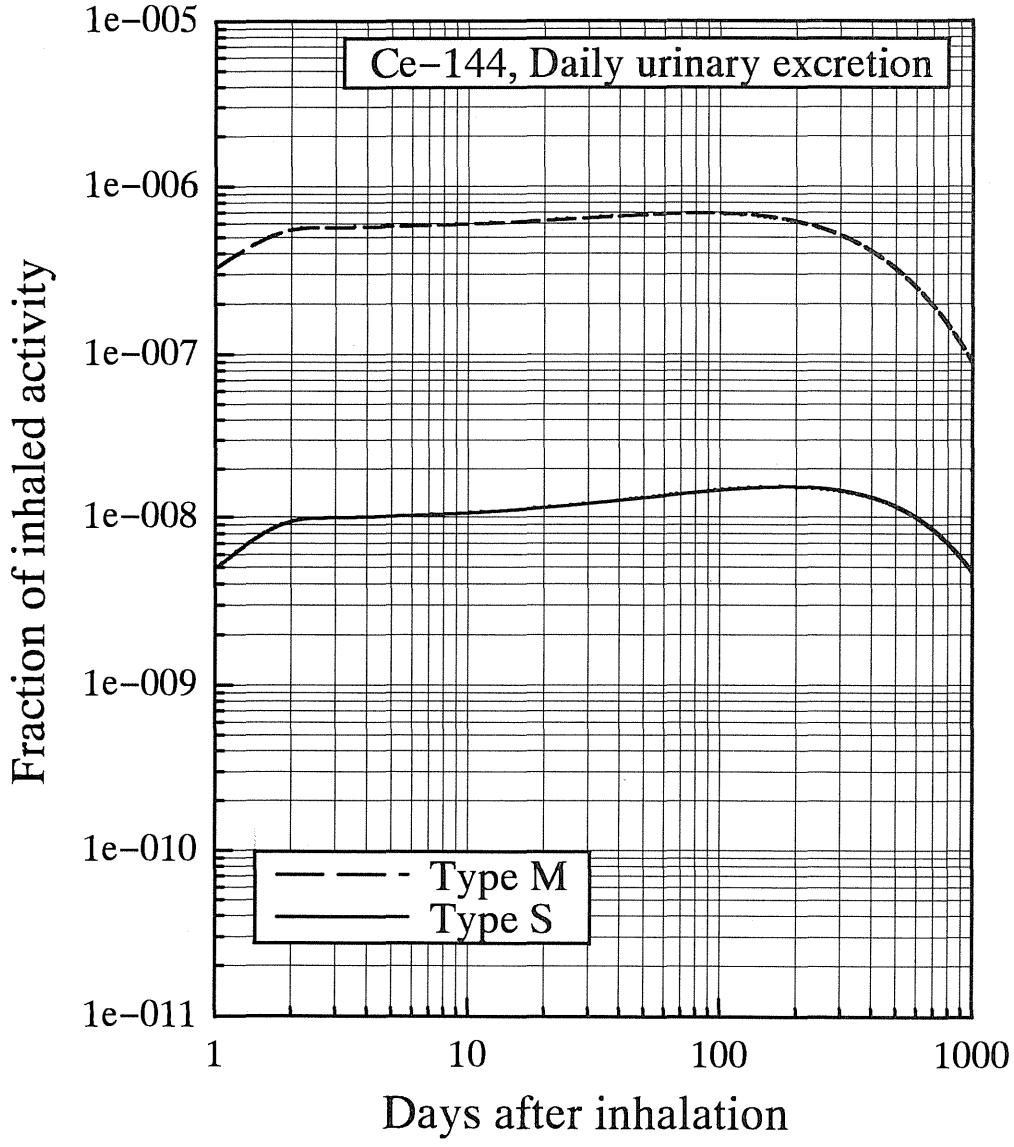

Fig.3-26(b) Daily urinary excretion of ^{144}Ce following acute intake by inhalation

Table 3-27(a) Whole body content of ^{203}Hg

Days after intake	Whole body		
	Inorg(F)*	Inorg(M)**	Organic
0.1	7.9E-01	7.9E-01	7.9E-01
0.2	7.5E-01	7.5E-01	7.6E-01
0.5	6.7E-01	6.6E-01	6.8E-01
1	5.4E-01	4.9E-01	6.0E-01
2	3.8E-01	2.6E-01	5.1E-01
3	3.1E-01	1.5E-01	4.7E-01
4	2.7E-01	1.1E-01	4.5E-01
5	2.5E-01	9.2E-02	4.3E-01
6	2.4E-01	8.4E-02	4.2E-01
7	2.3E-01	8.0E-02	4.1E-01
8	2.3E-01	7.7E-02	4.0E-01
9	2.2E-01	7.5E-02	3.9E-01
10	2.1E-01	7.3E-02	3.9E-01
14	1.9E-01	6.5E-02	3.5E-01
30	1.1E-01	4.3E-02	2.4E-01
60	4.6E-02	2.1E-02	1.2E-01
90	1.9E-02	1.0E-02	6.2E-02
180	1.8E-03	1.5E-03	8.3E-03
365	6.3E-05	4.0E-05	1.9E-04

* Inorganic compound, Type F

** Inorganic compounds, Type M

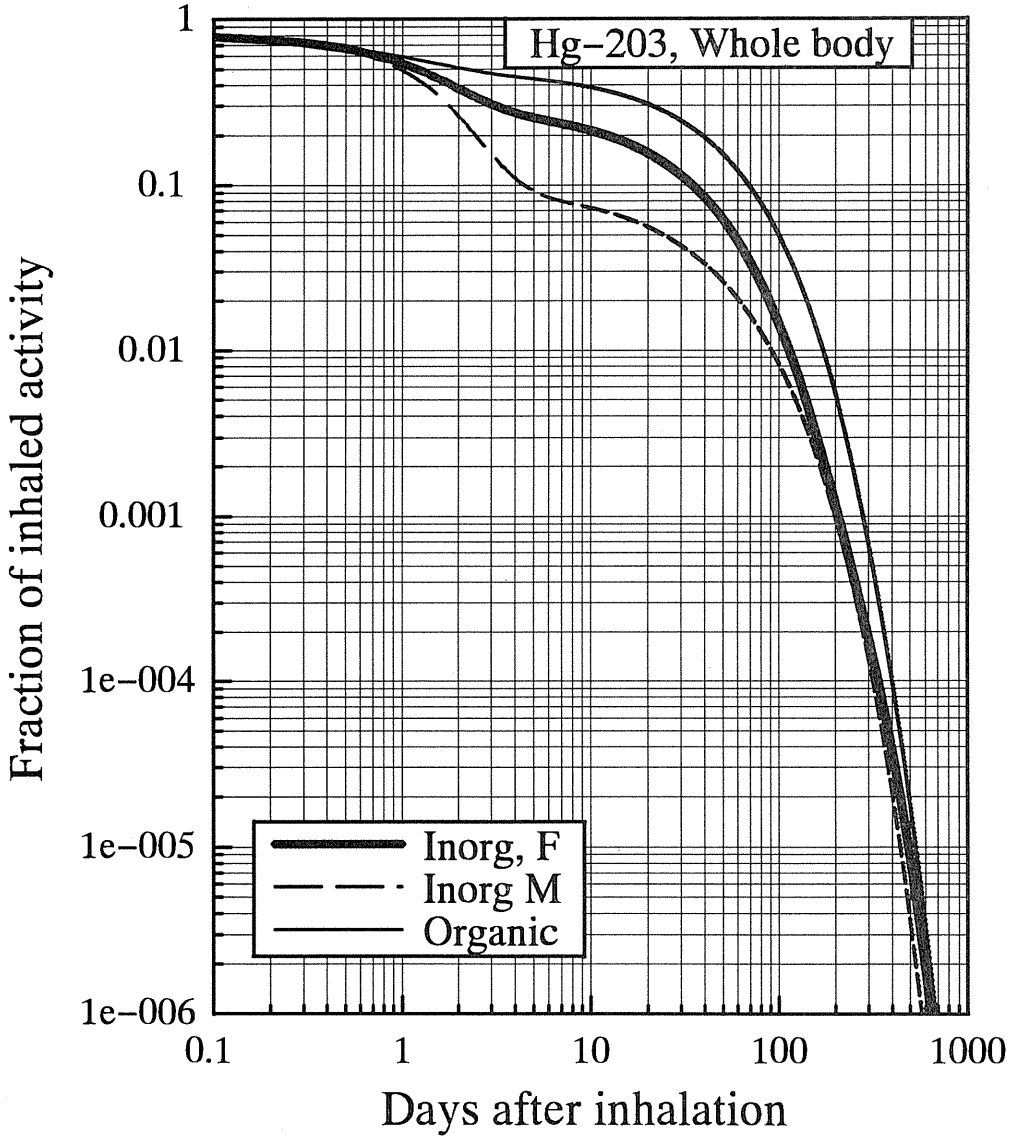

Fig.3-27(a) Whole body content of ^{203}Hg following acute intake by inhalation

Table 3-27(b) Daily urinary excretion of ^{203}Hg

Days after intake	Daily urinary excretion*		
	Inorg(F)**	Inorg(M)***	Organic
1	1.3E-03	1.6E-04	1.1E-03
2	2.2E-03	2.7E-04	1.8E-03
3	2.2E-03	2.8E-04	1.9E-03
4	2.1E-03	2.7E-04	1.8E-03
5	2.0E-03	2.7E-04	1.8E-03
6	2.0E-03	2.6E-04	1.7E-03
7	1.9E-03	2.5E-04	1.7E-03
8	1.8E-03	2.5E-04	1.7E-03
9	1.8E-03	2.4E-04	1.6E-03
10	1.7E-03	2.4E-04	1.6E-03
14	1.5E-03	2.1E-04	1.4E-03
30	9.1E-04	1.4E-04	9.8E-04
60	3.5E-04	6.8E-05	4.9E-04
90	1.3E-04	3.2E-05	2.4E-04
180	7.3E-06	3.8E-06	2.9E-05
365	2.1E-08	6.6E-08	3.7E-07

* Bq/d per Bq intake
** Inorganic compounds, Type F
*** Inorganic compounds, Type M

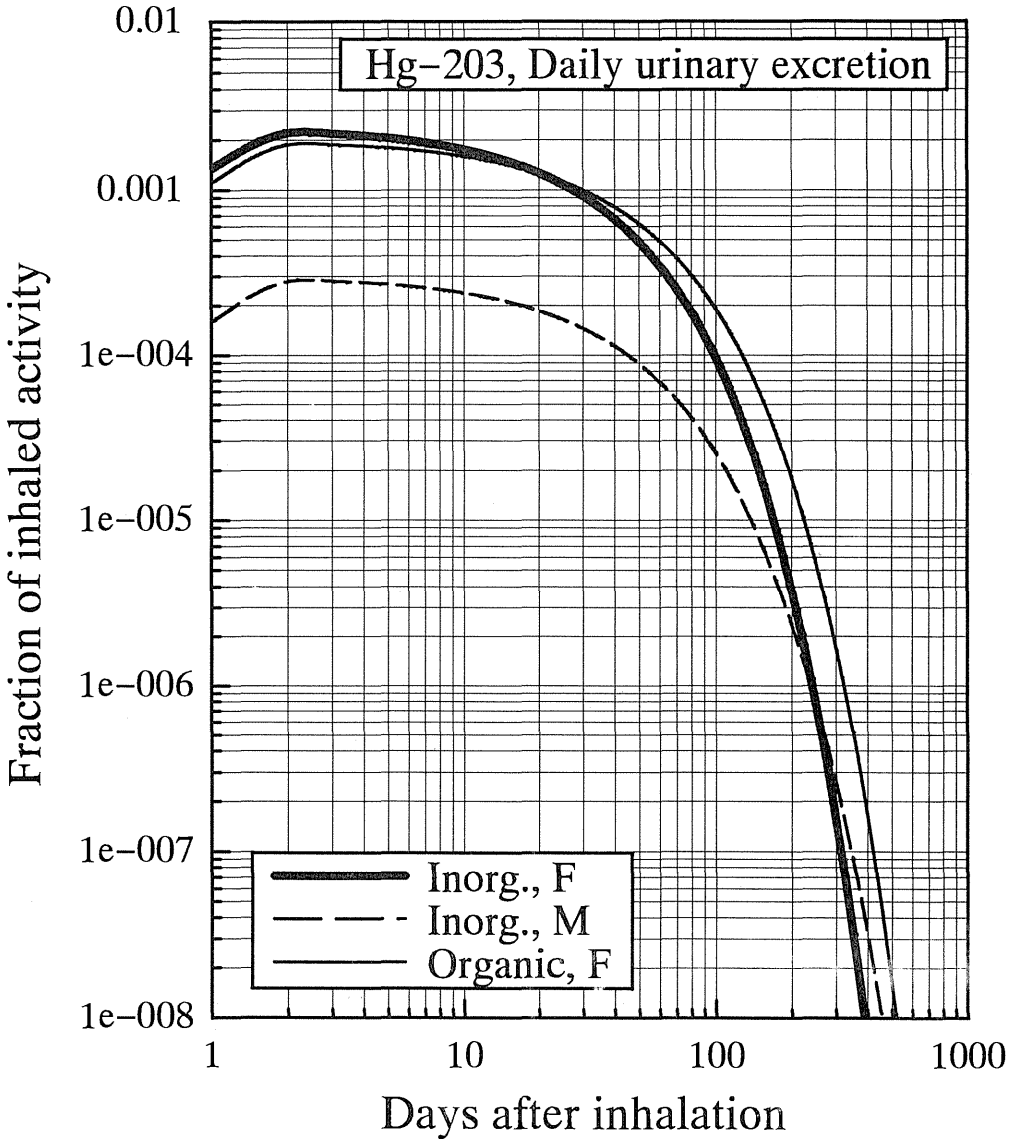

Fig.3-27(b) Daily urinary excretion of ^{203}Hg following acute intake by inhalation

Table 3-28(a) Whole body content of ^{226}Ra

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	-------
0.2	-------	7.6E-01	-------
0.5	-------	6.6E-01	-------
1	-------	5.0E-01	-------
2	-------	2.7E-01	-------
3	-------	1.6E-01	-------
4	-------	1.1E-01	-------
5	-------	9.3E-02	-------
6	-------	8.2E-02	-------
7	-------	7.6E-02	-------
8	-------	7.2E-02	-------
9	-------	7.0E-02	-------
10	-------	6.8E-02	-------
14	-------	6.2E-02	-------
30	-------	5.1E-02	-------
60	-------	3.8E-02	-------
90	-------	3.0E-02	-------
180	-------	1.8E-02	-------
365	-------	8.5E-03	-------

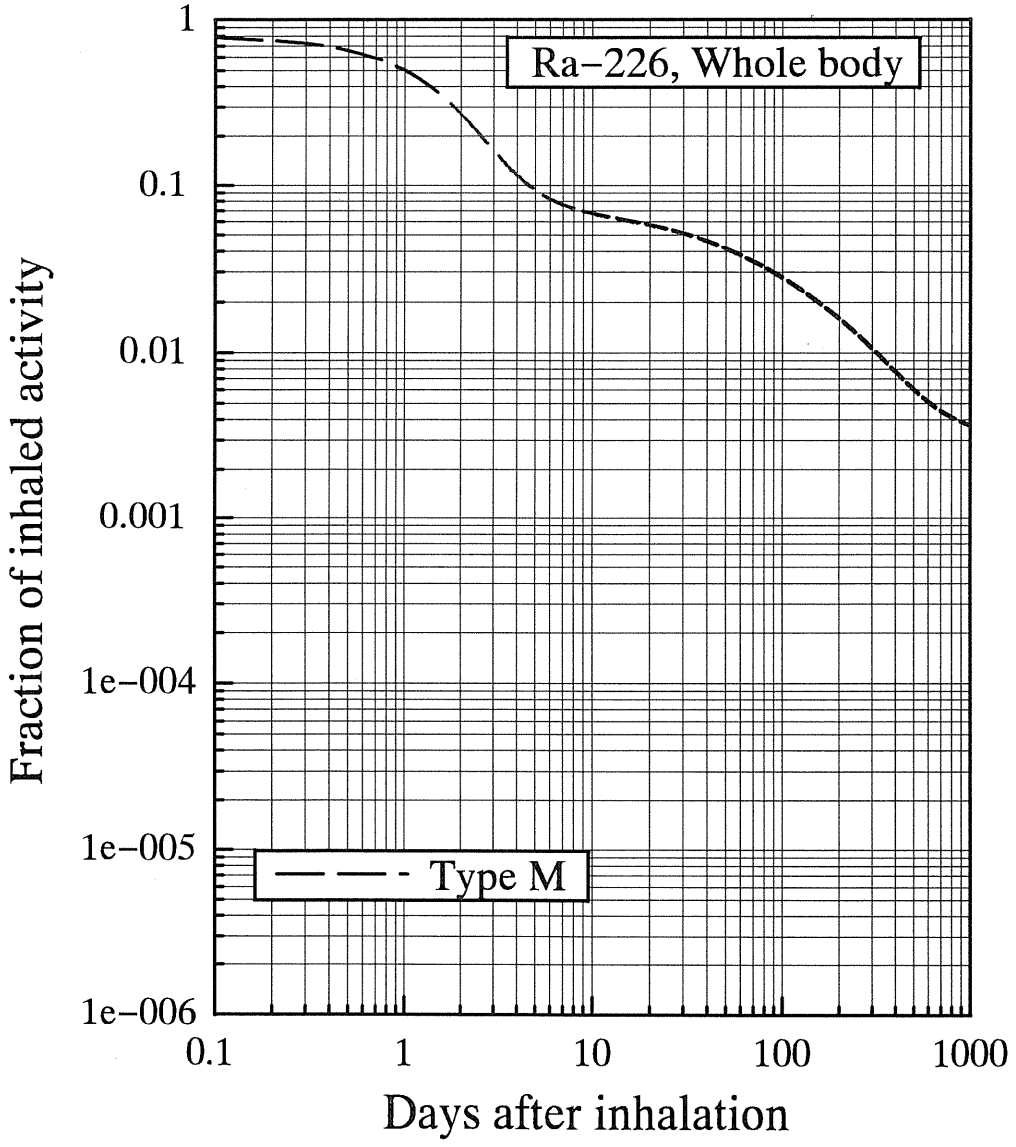

Fig.3-28(a) Whole body content of ^{226}Ra following acute intake by inhalation

Table 3-28(b) Daily urinary excretion of ^{226}Ra

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.6E-03	-------
2	-------	3.1E-04	-------
3	-------	2.1E-04	-------
4	-------	1.5E-04	-------
5	-------	1.1E-04	-------
6	-------	7.7E-05	-------
7	-------	5.7E-05	-------
8	-------	4.3E-05	-------
9	-------	3.4E-05	-------
10	-------	2.7E-05	-------
14	-------	1.5E-05	-------
30	-------	9.5E-06	-------
60	-------	6.3E-06	-------
90	-------	4.5E-06	-------
180	-------	2.0E-06	-------
365	-------	6.3E-07	-------

* Bq/d per Bq intake

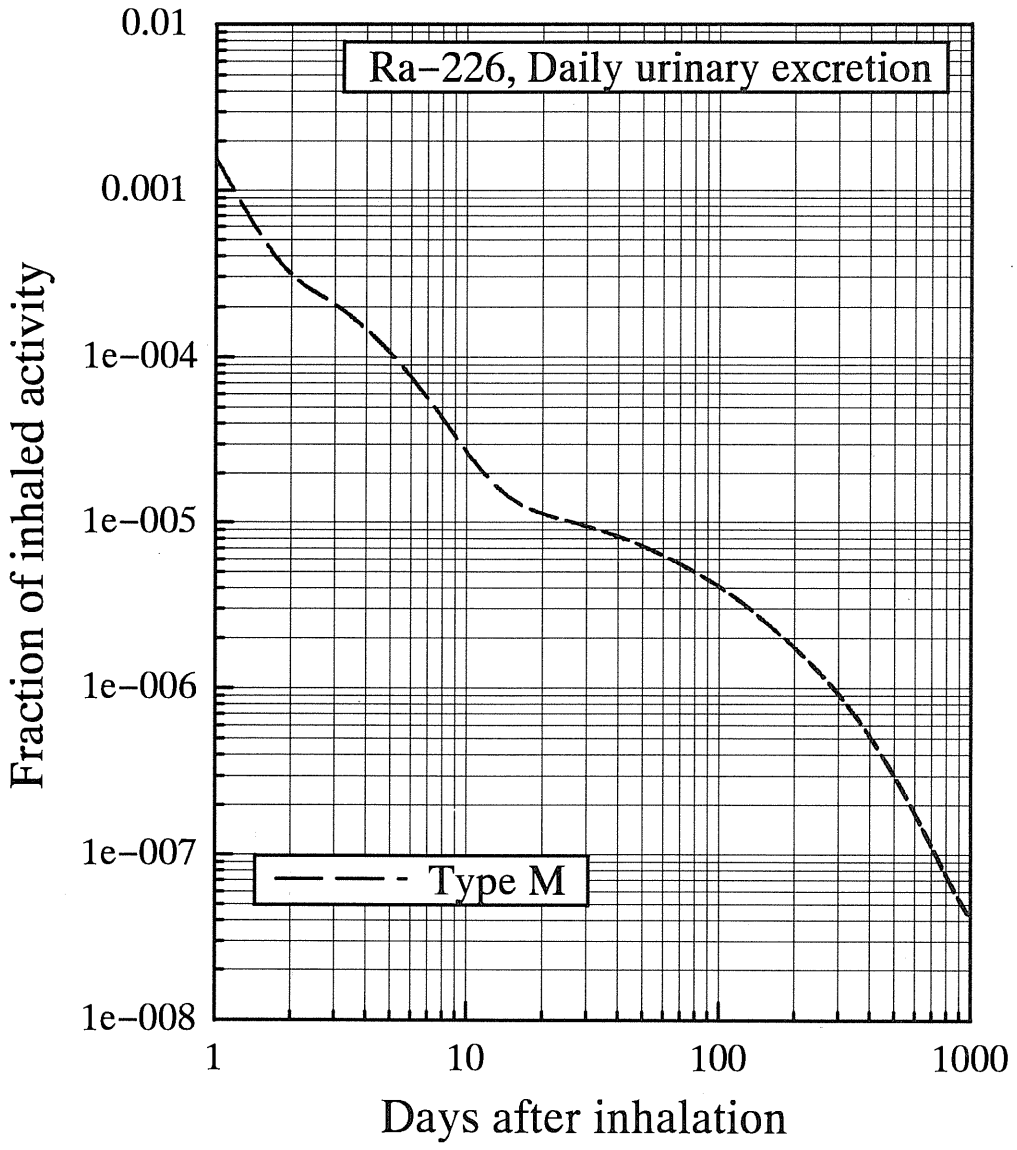

Fig.3-28(b) Daily urinary excretion of ^{226}Ra following acute intake by inhalation

Table 3-29(a) Whole body content of ^{228}Ra

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	-------
0.2	-------	7.6E-01	-------
0.5	-------	6.6E-01	-------
1	-------	5.0E-01	-------
2	-------	2.7E-01	-------
3	-------	1.6E-01	-------
4	-------	1.1E-01	-------
5	-------	9.3E-02	-------
6	-------	8.2E-02	-------
7	-------	7.6E-02	-------
8	-------	7.2E-02	-------
9	-------	6.9E-02	-------
10	-------	6.7E-02	-------
14	-------	6.2E-02	-------
30	-------	5.1E-02	-------
60	-------	3.7E-02	-------
90	-------	2.9E-02	-------
180	-------	1.7E-02	-------
365	-------	7.5E-03	-------

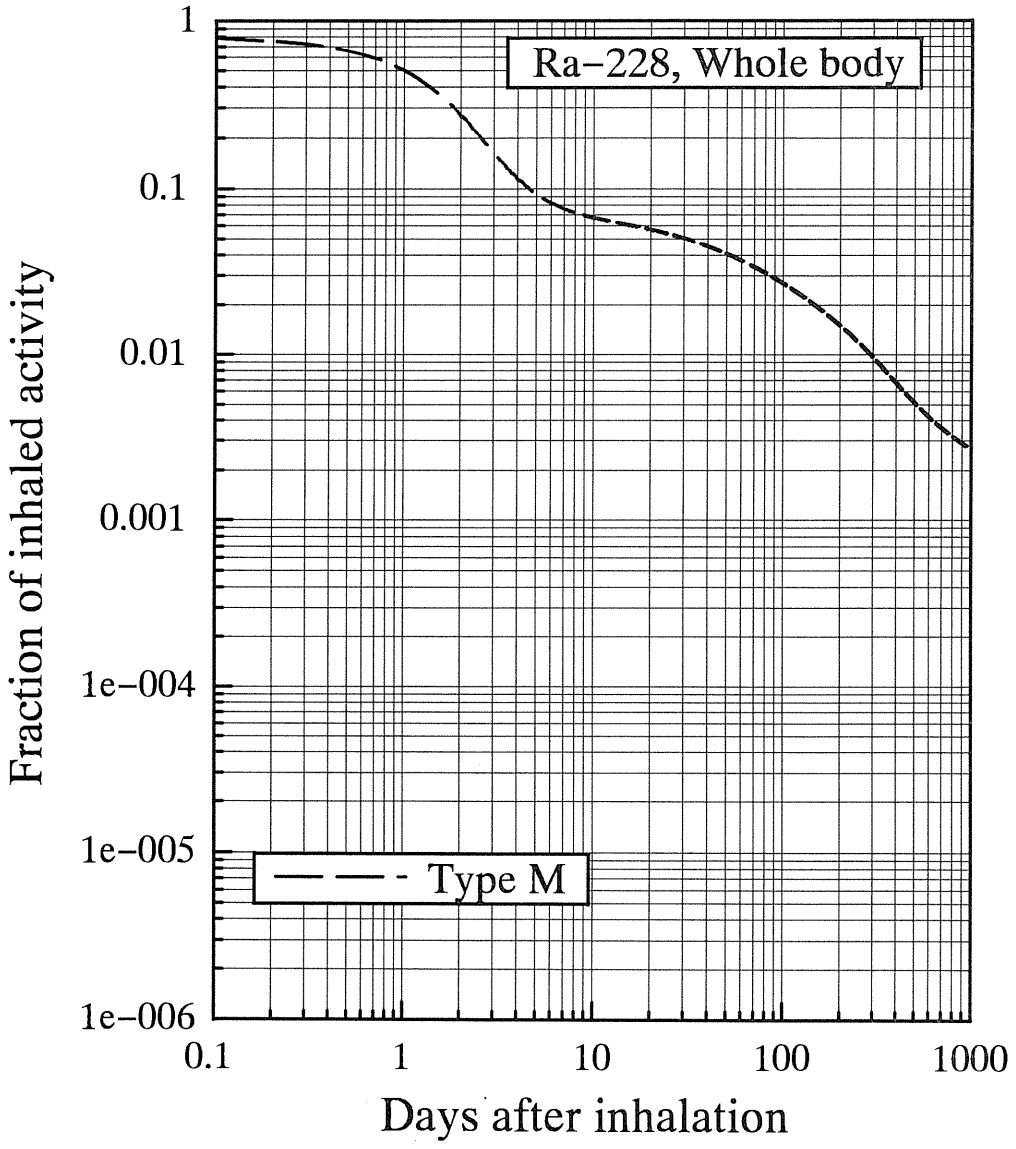

Fig.3-29(a) Whole body content of ^{228}Ra following acute intake by inhalation

Table 3-29(b) Daily urinary excretion of ^{228}Ra

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.6E-03	-------
2	-------	3.1E-04	-------
3	-------	2.1E-04	-------
4	-------	1.5E-04	-------
5	-------	1.0E-04	-------
6	-------	7.6E-05	-------
7	-------	5.7E-05	-------
8	-------	4.3E-05	-------
9	-------	3.4E-05	-------
10	-------	2.7E-05	-------
14	-------	1.5E-05	-------
30	-------	9.4E-06	-------
60	-------	6.2E-06	-------
90	-------	4.4E-06	-------
180	-------	1.9E-06	-------
365	-------	5.6E-07	-------

* Bq/d per Bq intake

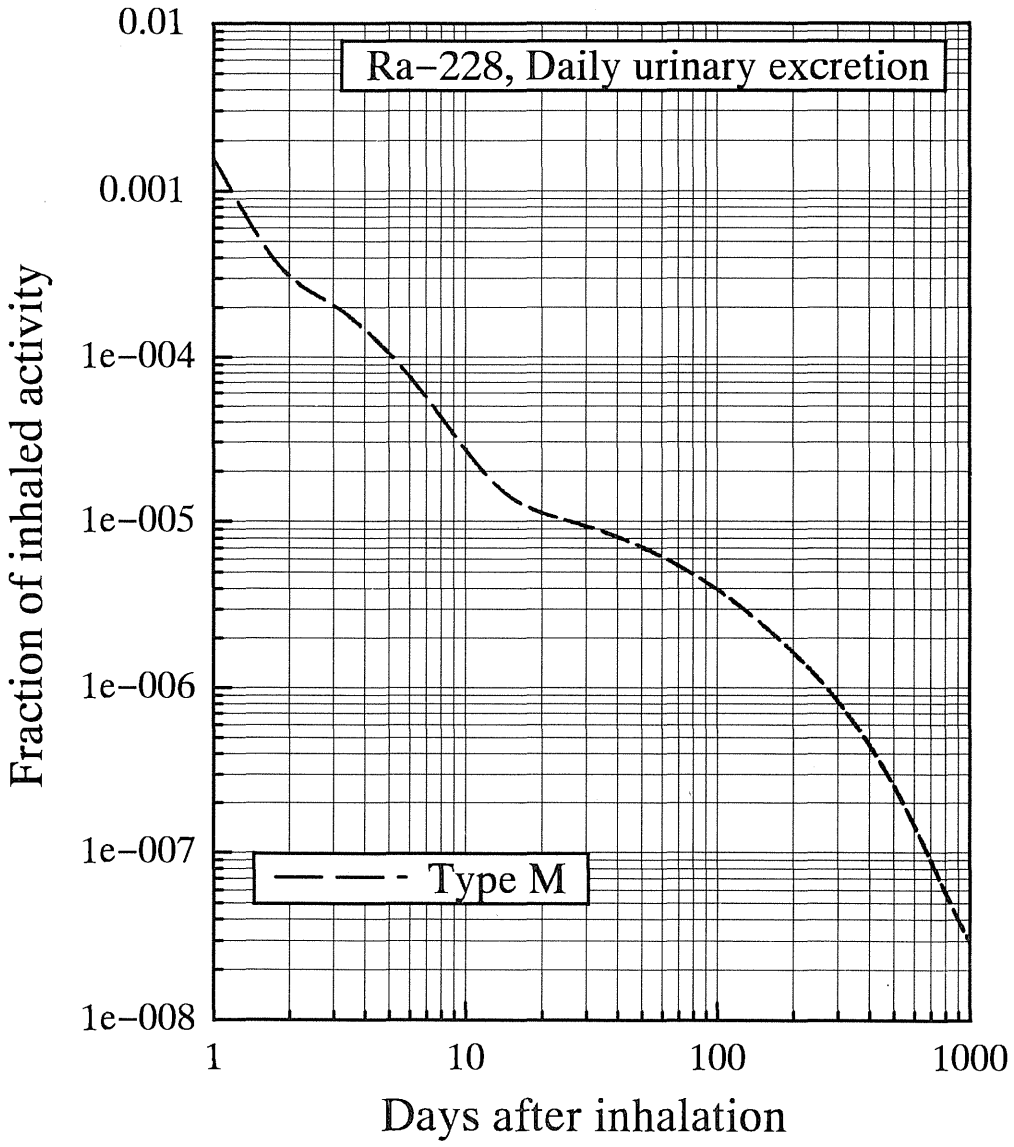

Fig.3-29(b) Daily urinary excretion of ^{228}Ra following acute intake by inhalation

Table 3-30(a) Whole body content of ^{228}Th

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.6E-01	7.6E-01
0.5	-------	6.6E-01	6.6E-01
1	-------	5.0E-01	4.9E-01
2	-------	2.6E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.1E-01	9.0E-02
5	-------	9.2E-02	7.2E-02
6	-------	8.5E-02	6.5E-02
7	-------	8.2E-02	6.2E-02
8	-------	8.0E-02	6.1E-02
9	-------	8.0E-02	6.0E-02
10	-------	7.9E-02	5.9E-02
14	-------	7.6E-02	5.7E-02
30	-------	6.9E-02	4.9E-02
60	-------	6.1E-02	4.0E-02
90	-------	5.7E-02	3.5E-02
180	-------	4.9E-02	2.8E-02
365	-------	3.9E-02	2.0E-02

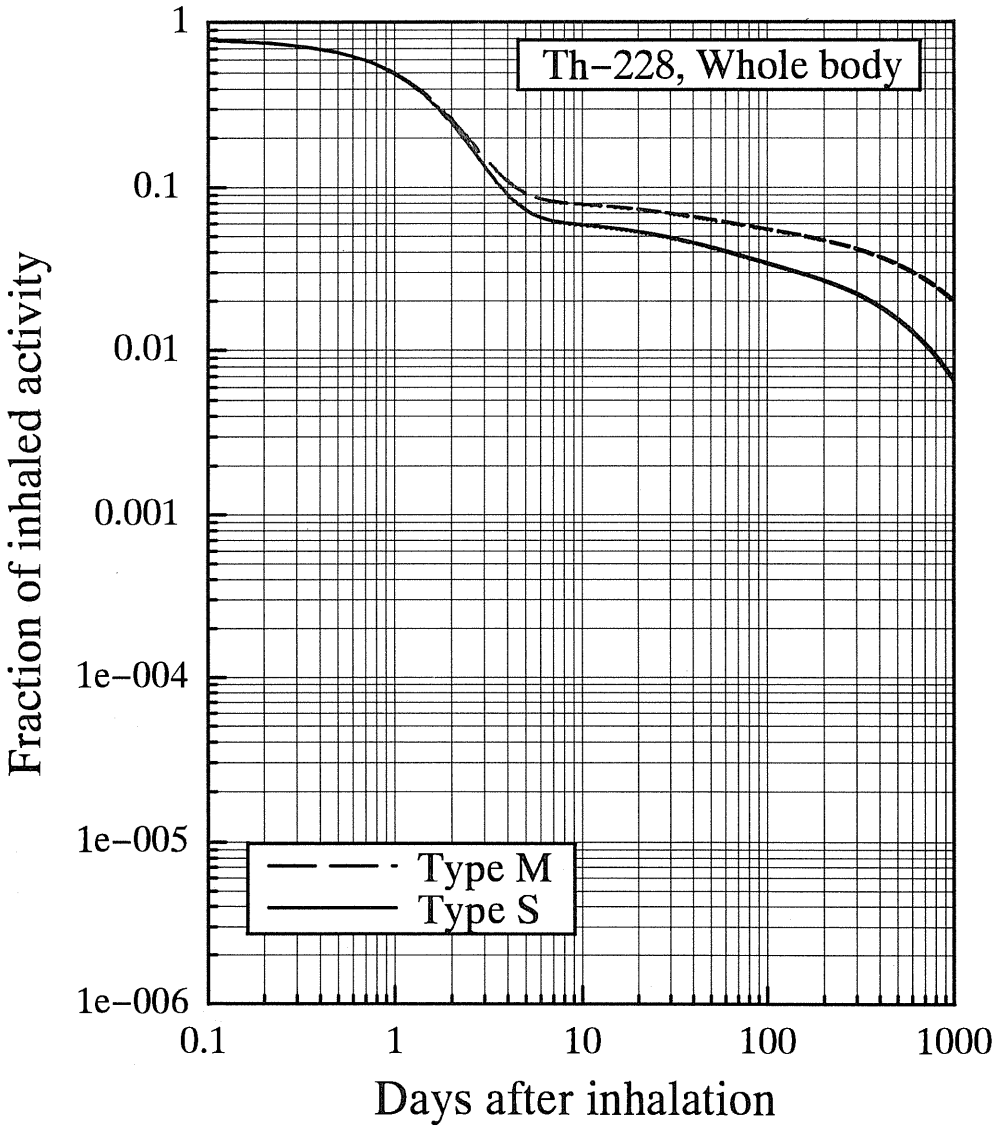

Fig.3-30(a) Whole body content of ^{228}Th following acute intake by inhalation

Table 3-30(b) Lung content of ^{228}Th

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	7.4E-02
0.2	-------	6.3E-02	7.0E-02
0.5	-------	6.0E-02	6.7E-02
1	-------	5.8E-02	6.4E-02
2	-------	5.6E-02	6.3E-02
3	-------	5.5E-02	6.2E-02
4	-------	5.4E-02	6.1E-02
5	-------	5.3E-02	6.0E-02
6	-------	5.2E-02	6.0E-02
7	-------	5.1E-02	5.9E-02
8	-------	5.1E-02	5.9E-02
9	-------	5.0E-02	5.8E-02
10	-------	4.9E-02	5.7E-02
14	-------	4.6E-02	5.5E-02
30	-------	3.7E-02	4.8E-02
60	-------	2.6E-02	3.9E-02
90	-------	2.0E-02	3.4E-02
180	-------	1.0E-02	2.7E-02
365	-------	2.8E-03	1.8E-02

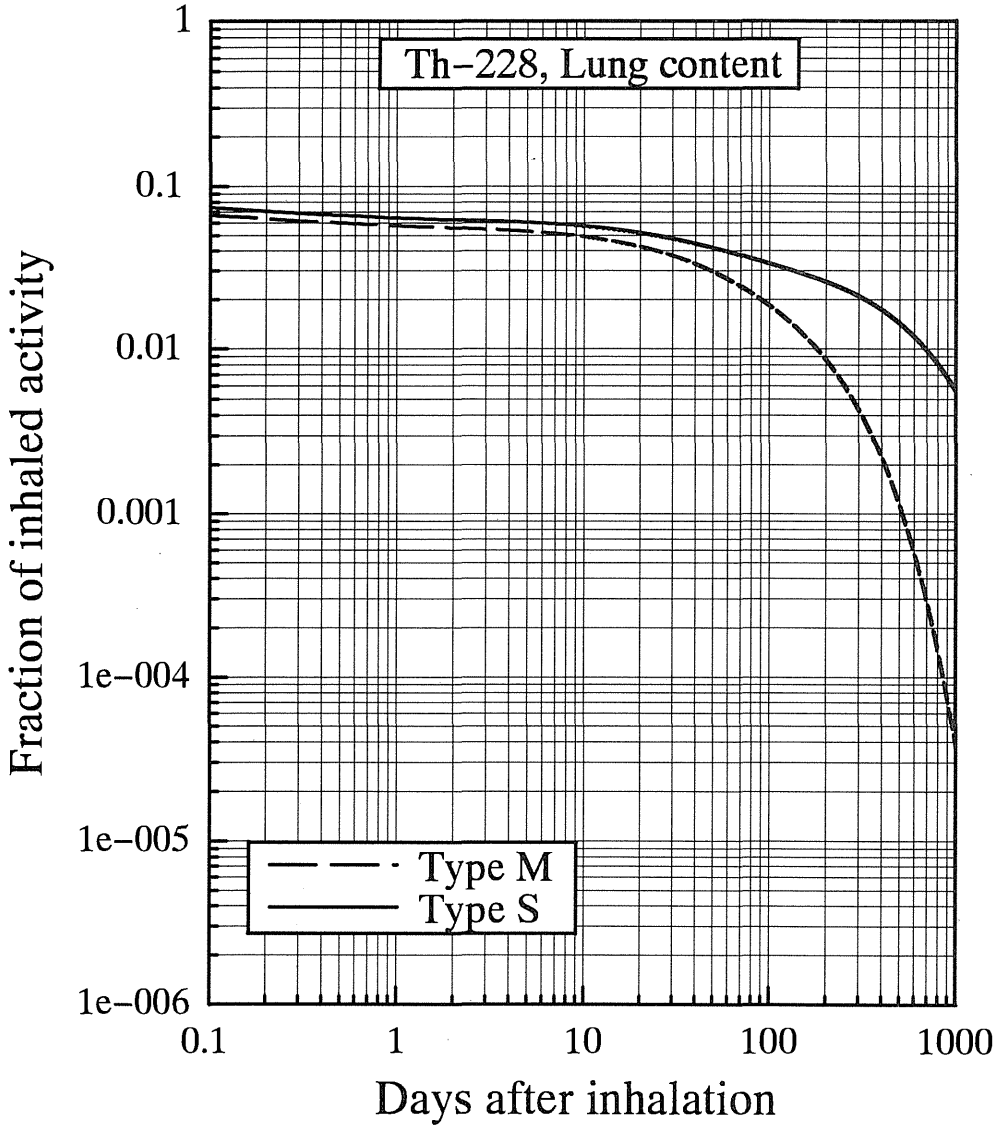

Fig.3-30(b) Lung content of ^{228}Th following acute intake by inhalation

Table 3-30(c) Daily urinary excretion of ^{228}Th

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.1E-03	1.3E-05
2	-------	2.3E-04	3.3E-06
3	-------	1.4E-04	1.9E-06
4	-------	1.1E-04	1.6E-06
5	-------	9.6E-05	1.4E-06
6	-------	8.4E-05	1.2E-06
7	-------	7.5E-05	1.1E-06
8	-------	6.7E-05	1.0E-06
9	-------	6.2E-05	9.7E-07
10	-------	5.7E-05	9.1E-07
14	-------	4.6E-05	7.8E-07
30	-------	2.9E-05	5.7E-07
60	-------	1.6E-05	4.2E-07
90	-------	1.1E-05	3.5E-07
180	-------	5.8E-06	2.7E-07
365	-------	2.3E-06	2.0E-07

* Bq/d per Bq intake

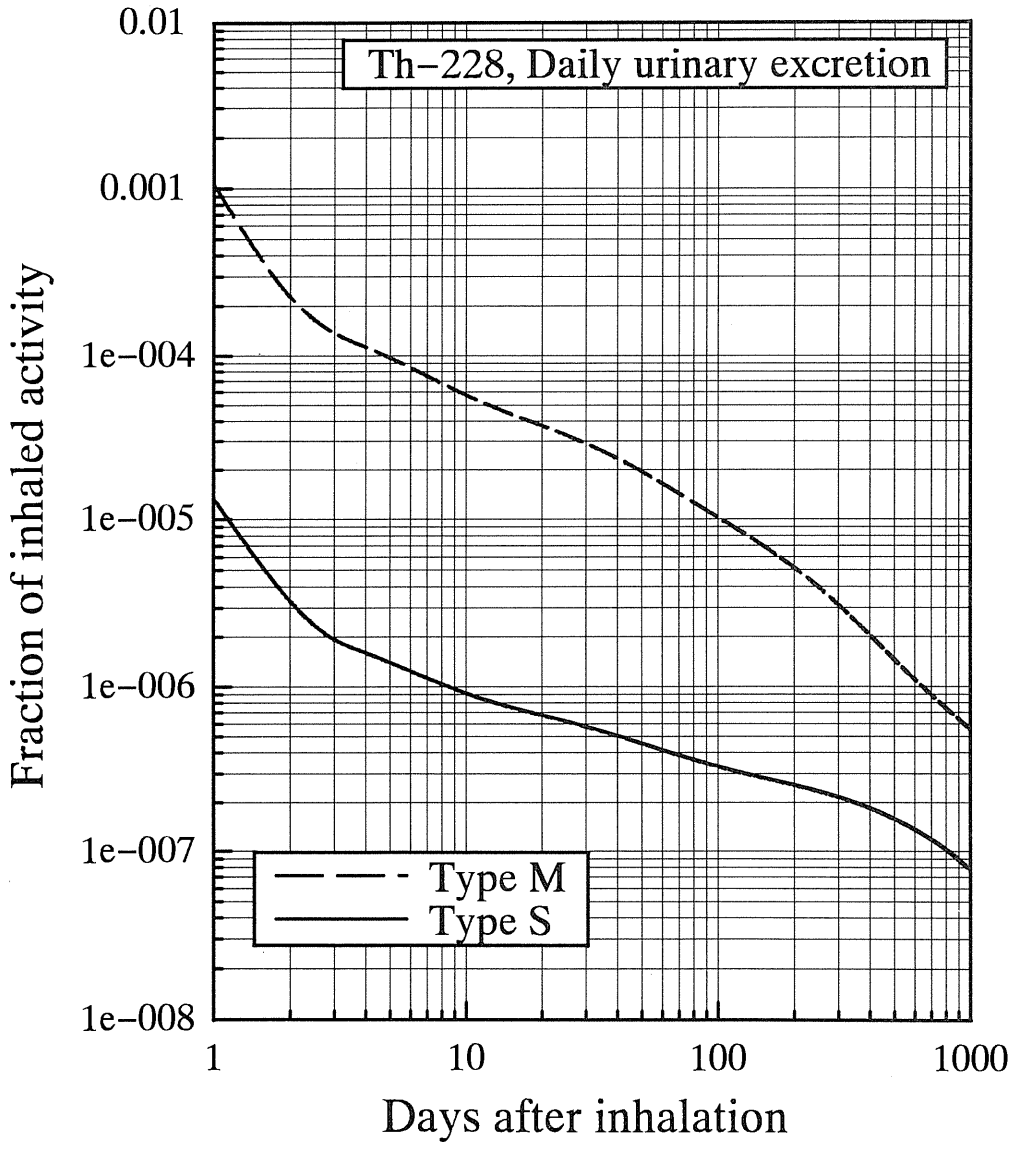

Fig.3-30(c) Daily urinary excretion of ^{228}Th following acute intake by inhalation

Table 3-30(d) Daily faecal excretion of ^{228}Th

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	1.1E-01
2	-------	1.5E-01	1.6E-01
3	-------	7.9E-02	8.4E-02
4	-------	3.3E-02	3.5E-02
5	-------	1.3E-02	1.4E-02
6	-------	5.3E-03	5.6E-03
7	-------	2.3E-03	2.5E-03
8	-------	1.2E-03	1.3E-03
9	-------	7.3E-04	8.2E-04
10	-------	5.7E-04	6.4E-04
14	-------	4.3E-04	5.0E-04
30	-------	2.7E-04	3.4E-04
60	-------	1.2E-04	1.8E-04
90	-------	5.9E-05	9.8E-05
180	-------	1.3E-05	3.1E-05
365	-------	3.1E-06	1.5E-05

* Bq/d per Bq intake

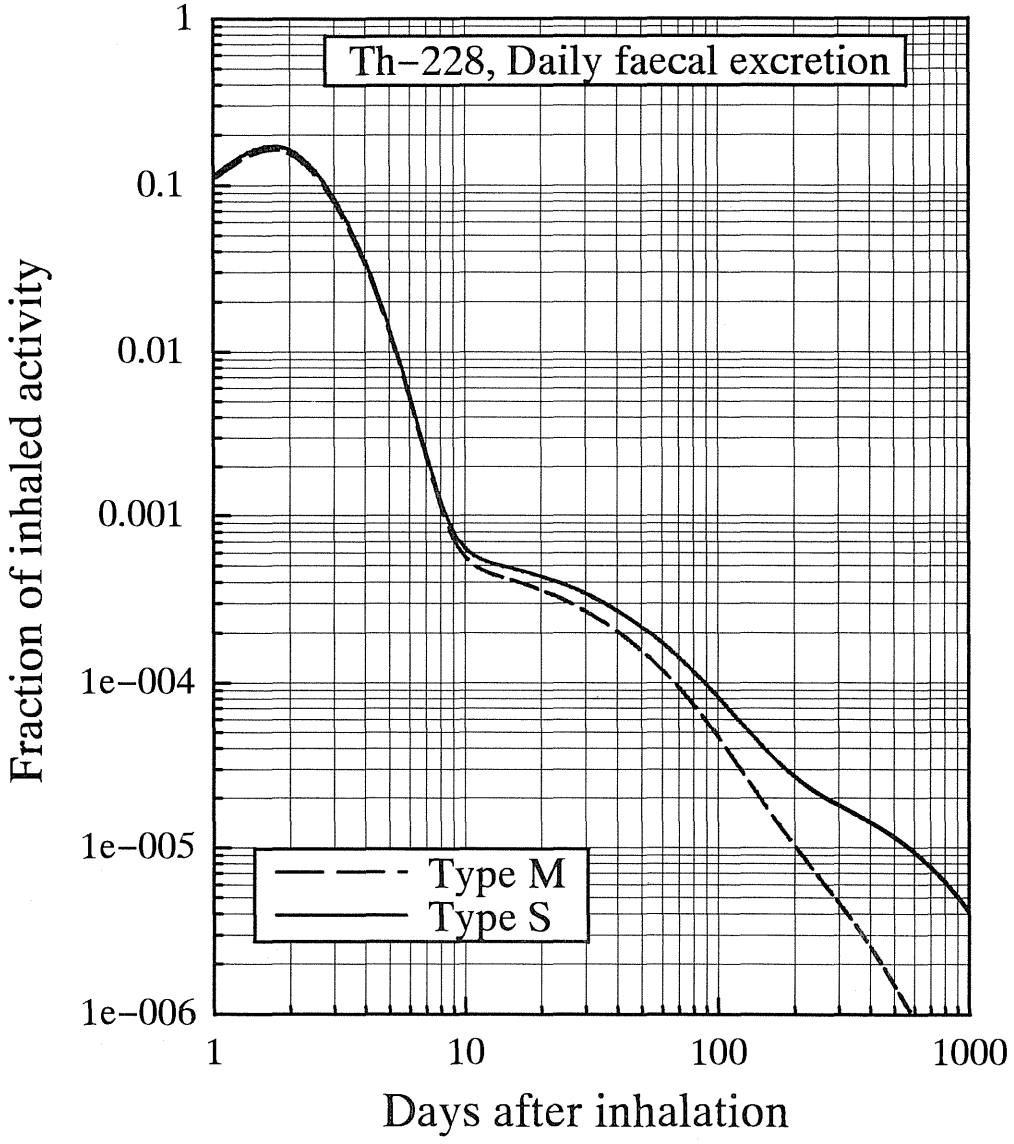

Fig.3-30(d) Daily faecal excretion of ^{228}Th following acute intake by inhalation

Table 3-31(a) Whole body content of ^{232}Th

Days after intake	Whole body		
	Type F	Type M	Type S
0.1	-------	7.9E-01	7.9E-01
0.2	-------	7.6E-01	7.6E-01
0.5	-------	6.6E-01	6.6E-01
1	-------	5.0E-01	4.9E-01
2	-------	2.6E-01	2.5E-01
3	-------	1.5E-01	1.4E-01
4	-------	1.1E-01	9.1E-02
5	-------	9.2E-02	7.3E-02
6	-------	8.5E-02	6.6E-02
7	-------	8.3E-02	6.3E-02
8	-------	8.1E-02	6.1E-02
9	-------	8.0E-02	6.0E-02
10	-------	8.0E-02	6.0E-02
14	-------	7.8E-02	5.7E-02
30	-------	7.1E-02	5.1E-02
60	-------	6.5E-02	4.3E-02
90	-------	6.2E-02	3.9E-02
180	-------	5.8E-02	3.3E-02
365	-------	5.6E-02	2.8E-02

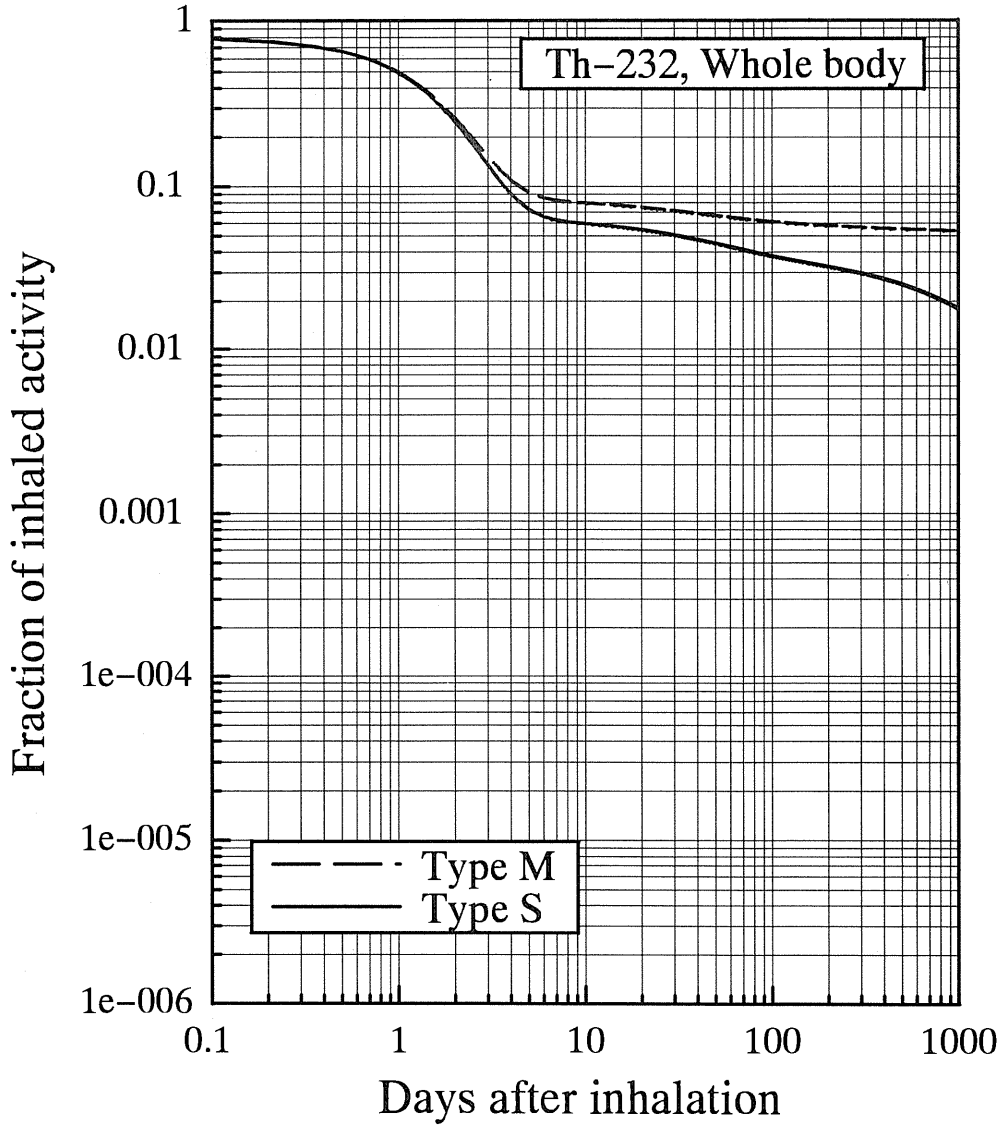

Fig.3-31(a) Whole body content of ^{232}Th following acute intake by inhalation

Table 3-31(b) Lung content of ^{232}Th

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	7.4E-02
0.2	-------	6.3E-02	7.0E-02
0.5	-------	6.0E-02	6.7E-02
1	-------	5.8E-02	6.4E-02
2	-------	5.6E-02	6.3E-02
3	-------	5.5E-02	6.2E-02
4	-------	5.4E-02	6.1E-02
5	-------	5.3E-02	6.1E-02
6	-------	5.3E-02	6.0E-02
7	-------	5.2E-02	6.0E-02
8	-------	5.1E-02	5.9E-02
9	-------	5.0E-02	5.8E-02
10	-------	5.0E-02	5.8E-02
14	-------	4.7E-02	5.6E-02
30	-------	3.8E-02	4.9E-02
60	-------	2.8E-02	4.2E-02
90	-------	2.2E-02	3.8E-02
180	-------	1.2E-02	3.2E-02
365	-------	4.0E-03	2.7E-02

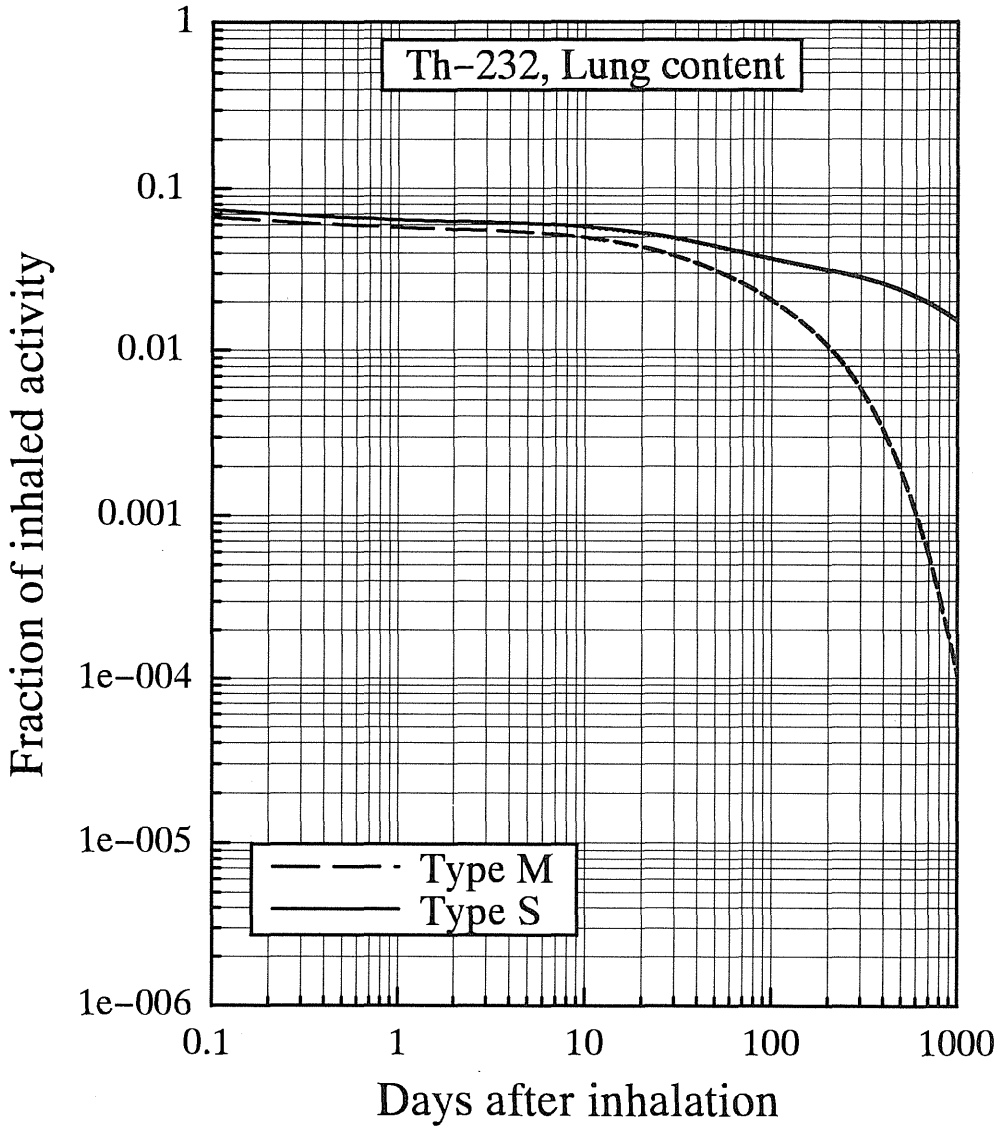

Fig.3-31(b) Lung content of ^{232}Th following acute intake by inhalation

Table 3-31(c) Daily urinary excretion of ^{232}Th

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.1E-03	1.3E-05
2	-------	2.3E-04	3.3E-06
3	-------	1.4E-04	1.9E-06
4	-------	1.1E-04	1.6E-06
5	-------	9.7E-05	1.4E-06
6	-------	8.5E-05	1.3E-06
7	-------	7.5E-05	1.1E-06
8	-------	6.8E-05	1.0E-06
9	-------	6.2E-05	9.8E-07
10	-------	5.8E-05	9.2E-07
14	-------	4.7E-05	7.9E-07
30	-------	3.0E-05	5.9E-07
60	-------	1.7E-05	4.4E-07
90	-------	1.2E-05	3.8E-07
180	-------	7.0E-06	3.2E-07
365	-------	3.4E-06	2.8E-07

* Bq/d per Bq intake

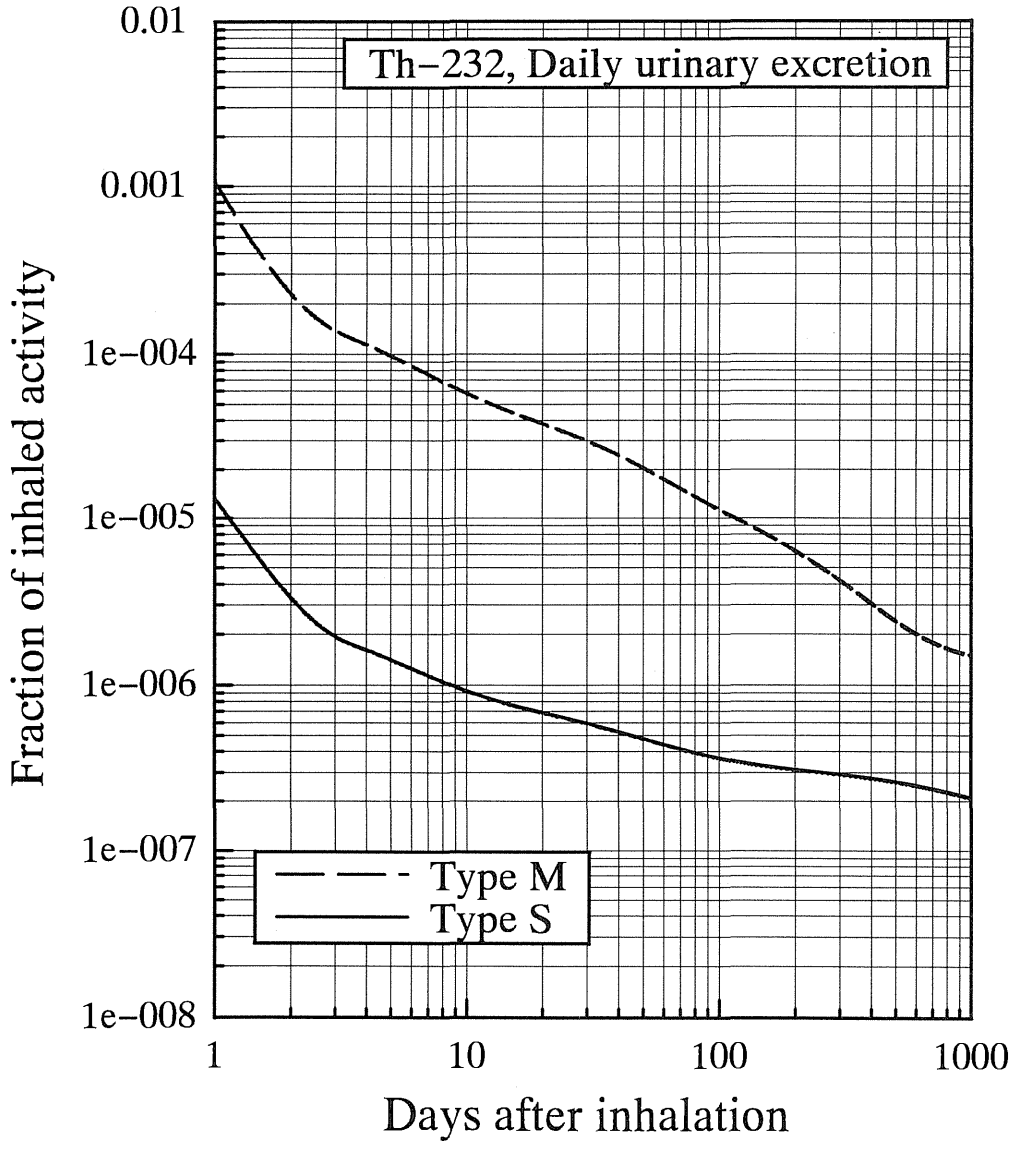

Fig.3-31(c) Daily urinary excretion of ^{232}Th following acute intake by inhalation

Table 3-31(d) Daily faecal excretion of ^{232}Th

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	1.1E-01
2	-------	1.5E-01	1.6E-01
3	-------	8.0E-02	8.4E-02
4	-------	3.3E-02	3.5E-02
5	-------	1.3E-02	1.4E-02
6	-------	5.3E-03	5.7E-03
7	-------	2.3E-03	2.5E-03
8	-------	1.2E-03	1.3E-03
9	-------	7.4E-04	8.2E-04
10	-------	5.7E-04	6.5E-04
14	-------	4.3E-04	5.1E-04
30	-------	2.8E-04	3.5E-04
60	-------	1.3E-04	1.9E-04
90	-------	6.4E-05	1.1E-04
180	-------	1.5E-05	3.7E-05
365	-------	4.5E-06	2.2E-05

* Bq/d per Bq intake

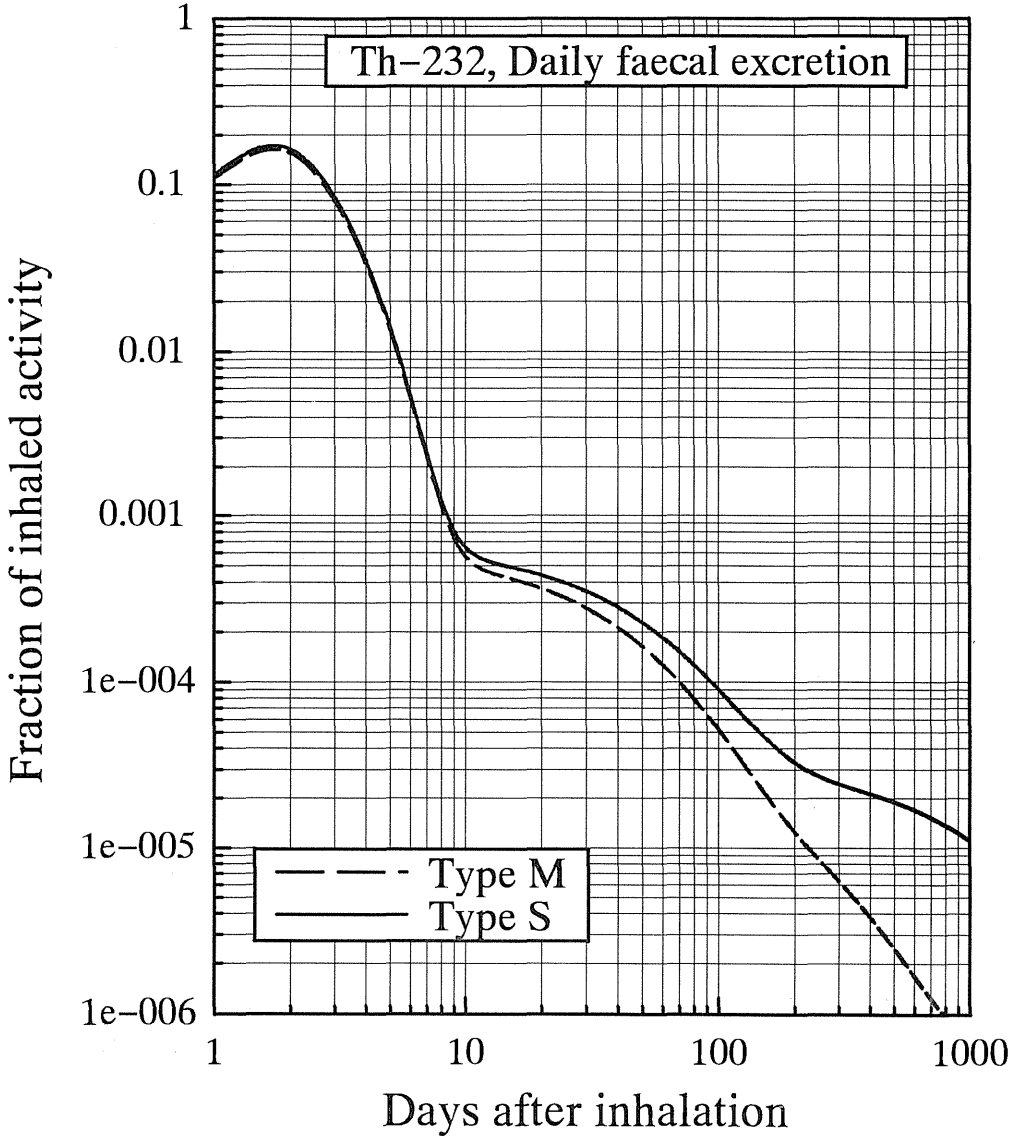

Fig.3-31(d) Daily faecal excretion of ^{232}Th following acute intake by inhalation

Table 3-32(a) Lung content of $^{234/235/238}U$

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	7.4E-02
0.2	-------	6.3E-02	7.0E-02
0.5	-------	6.0E-02	6.7E-02
1	-------	5.8E-02	6.4E-02
2	-------	5.6E-02	6.3E-02
3	-------	5.5E-02	6.2E-02
4	-------	5.4E-02	6.1E-02
5	-------	5.3E-02	6.1E-02
6	-------	5.3E-02	6.0E-02
7	-------	5.2E-02	6.0E-02
8	-------	5.1E-02	5.9E-02
9	-------	5.0E-02	5.8E-02
10	-------	5.0E-02	5.8E-02
14	-------	4.7E-02	5.6E-02
30	-------	3.8E-02	4.9E-02
60	-------	2.8E-02	4.2E-02
90	-------	2.2E-02	3.8E-02
180	-------	1.2E-02	3.2E-02
365	-------	4.0E-03	2.7E-02

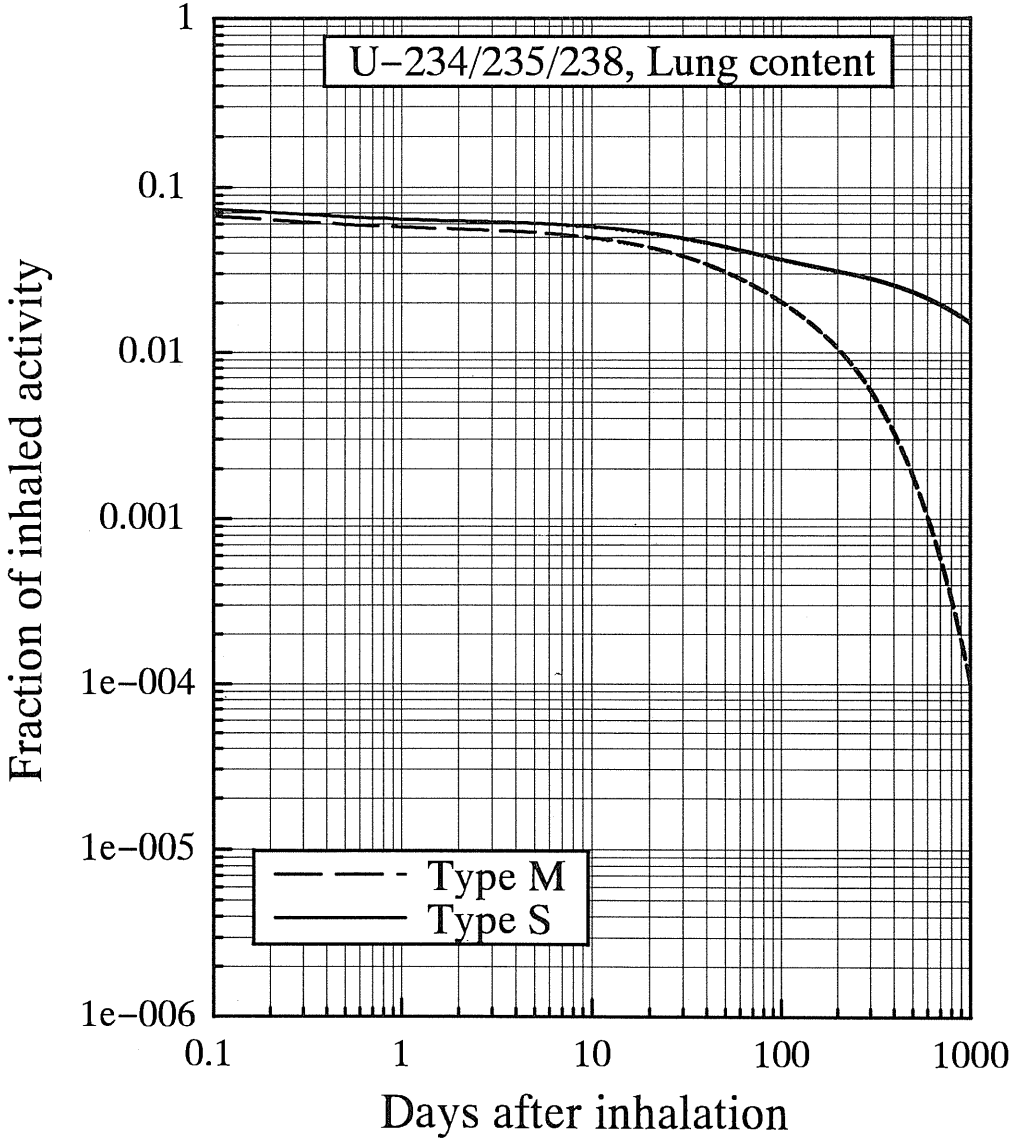

Fig.3-32(a) Lung content of $^{234/235/238}U$ following acute intake by inhalation

Table 3-32(b) Daily urinary excretion of $^{234/235/238}U$

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	1.8E-01	2.3E-02	7.0E-04
2	6.4E-03	1.1E-03	4.4E-05
3	5.1E-03	8.5E-04	2.6E-05
4	4.6E-03	7.9E-04	2.4E-05
5	4.2E-03	7.3E-04	2.2E-05
6	3.8E-03	6.9E-04	2.0E-05
7	3.5E-03	6.5E-04	1.9E-05
8	3.2E-03	6.1E-04	1.8E-05
9	2.9E-03	5.7E-04	1.7E-05
10	2.7E-03	5.4E-04	1.6E-05
14	1.9E-03	4.5E-04	1.3E-05
30	6.8E-04	2.7E-04	7.7E-06
60	2.3E-04	1.7E-04	5.2E-06
90	1.2E-04	1.2E-04	4.3E-06
180	3.1E-05	6.5E-05	3.3E-06
365	5.5E-06	2.2E-05	2.6E-06

* Bq/d per Bq intake

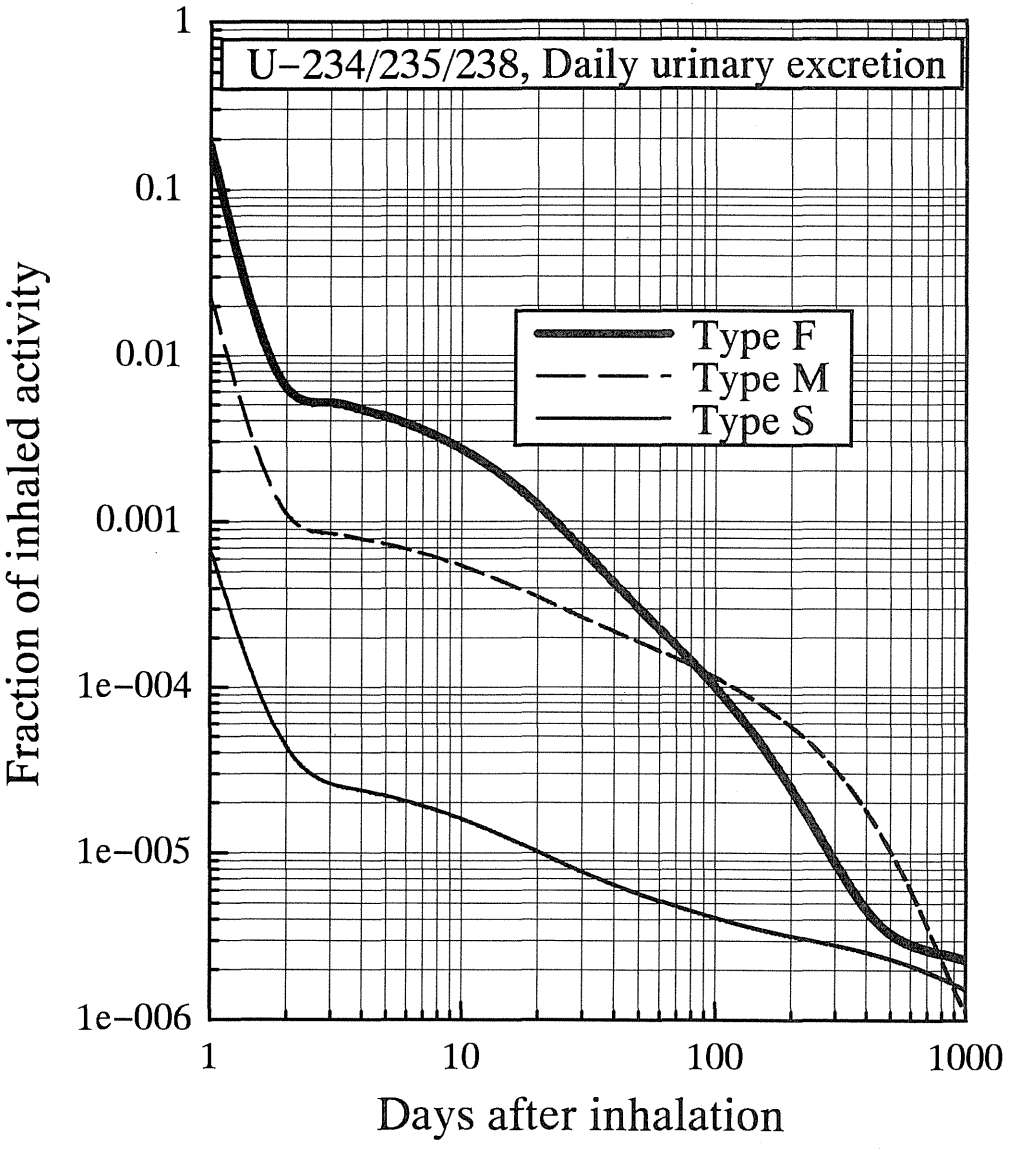

Fig.3-32(b) Daily urinary excretion of $^{234/235/238}U$ following acute intake by inhalation

Table 3-32(c) Daily faecal excretion of $^{234/235/238}U$

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	5.6E-02	1.1E-01	1.1E-01
2	7.7E-02	1.5E-01	1.6E-01
3	3.9E-02	7.8E-02	8.4E-02
4	1.6E-02	3.3E-02	3.5E-02
5	6.2E-03	1.3E-02	1.4E-02
6	2.3E-03	5.2E-03	5.7E-03
7	8.8E-04	2.3E-03	2.5E-03
8	3.3E-04	1.1E-03	1.3E-03
9	1.3E-04	7.2E-04	8.2E-04
10	5.4E-05	5.6E-04	6.5E-04
14	8.2E-06	4.2E-04	5.1E-04
30	3.2E-06	2.7E-04	3.5E-04
60	1.4E-06	1.2E-04	1.9E-04
90	7.8E-07	6.2E-05	1.1E-04
180	2.1E-07	1.4E-05	3.7E-05
365	3.7E-08	3.4E-06	2.2E-05

* Bq/d per Bq intake

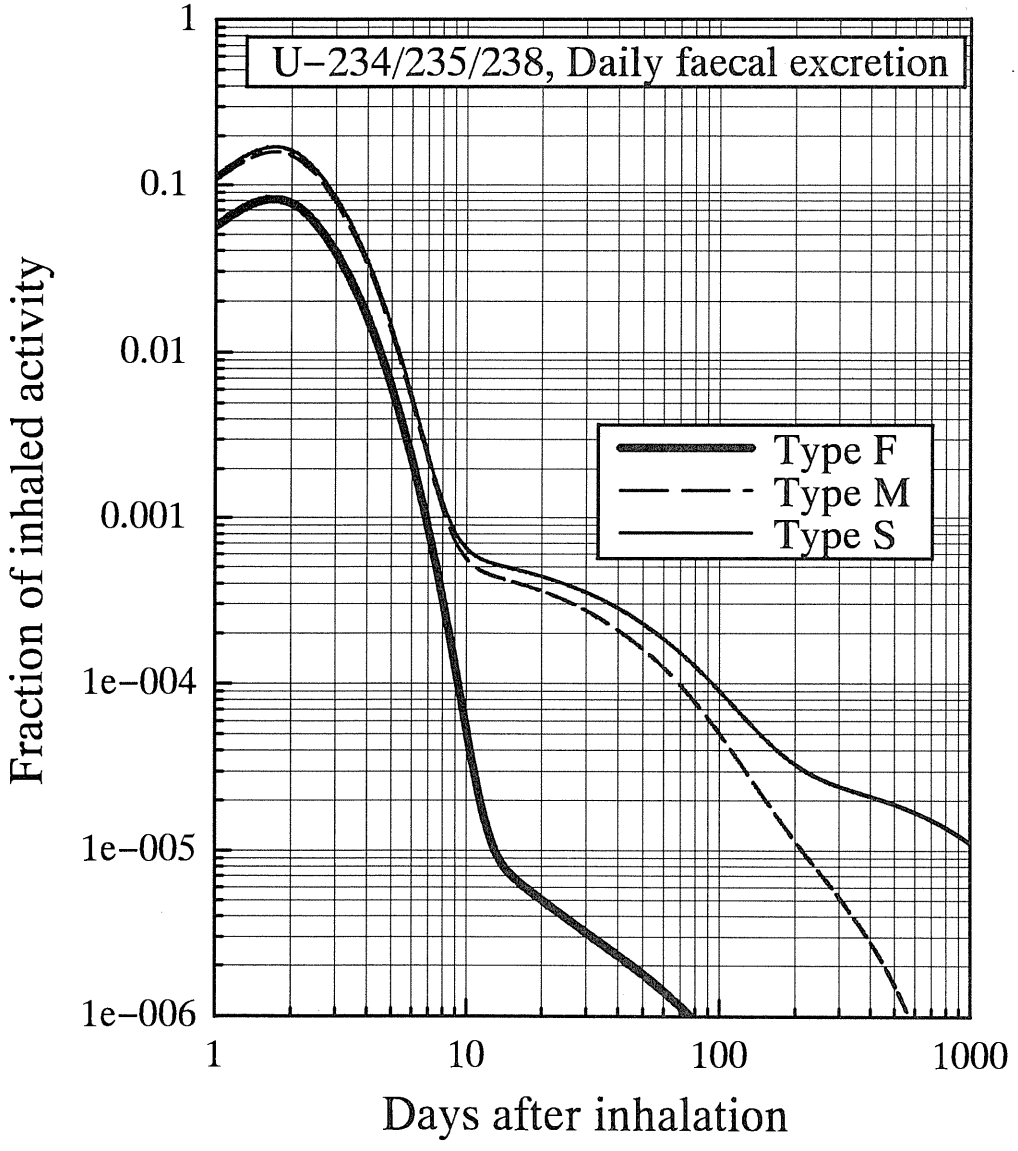

Fig.3-32(c) Daily faecal excretion of $^{234/235/238}U$ following acute intake by inhalation

Table 3-33(a) Lung content of ^{237}Np

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	-------
0.2	-------	6.3E-02	-------
0.5	-------	6.0E-02	-------
1	-------	5.8E-02	-------
2	-------	5.6E-02	-------
3	-------	5.5E-02	-------
4	-------	5.4E-02	-------
5	-------	5.3E-02	-------
6	-------	5.3E-02	-------
7	-------	5.2E-02	-------
8	-------	5.1E-02	-------
9	-------	5.0E-02	-------
10	-------	5.0E-02	-------
14	-------	4.7E-02	-------
30	-------	3.8E-02	-------
60	-------	2.8E-02	-------
90	-------	2.2E-02	-------
180	-------	1.2E-02	-------
365	-------	4.0E-03	-------

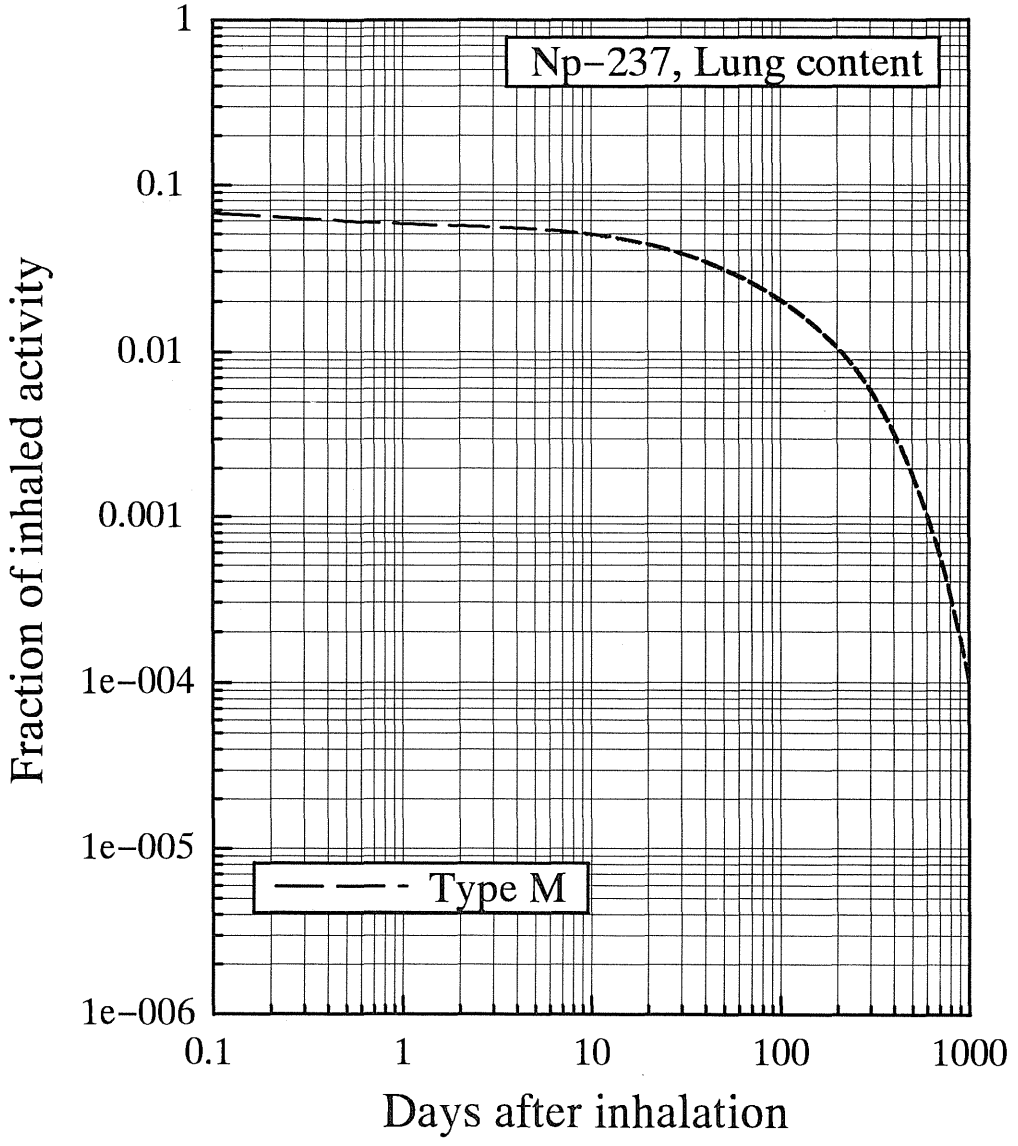

Fig.3-33(a) Lung content of ^{237}Np following acute intake by inhalation

Table 3-33(b) Daily urinary excretion of ^{237}Np

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	6.2E-03	-------
2	-------	1.3E-03	-------
3	-------	7.0E-04	-------
4	-------	4.8E-04	-------
5	-------	3.4E-04	-------
6	-------	2.6E-04	-------
7	-------	2.0E-04	-------
8	-------	1.7E-04	-------
9	-------	1.4E-04	-------
10	-------	1.3E-04	-------
14	-------	1.0E-04	-------
30	-------	7.7E-05	-------
60	-------	5.6E-05	-------
90	-------	4.4E-05	-------
180	-------	2.7E-05	-------
365	-------	1.3E-05	-------

* Bq/d per Bq intake

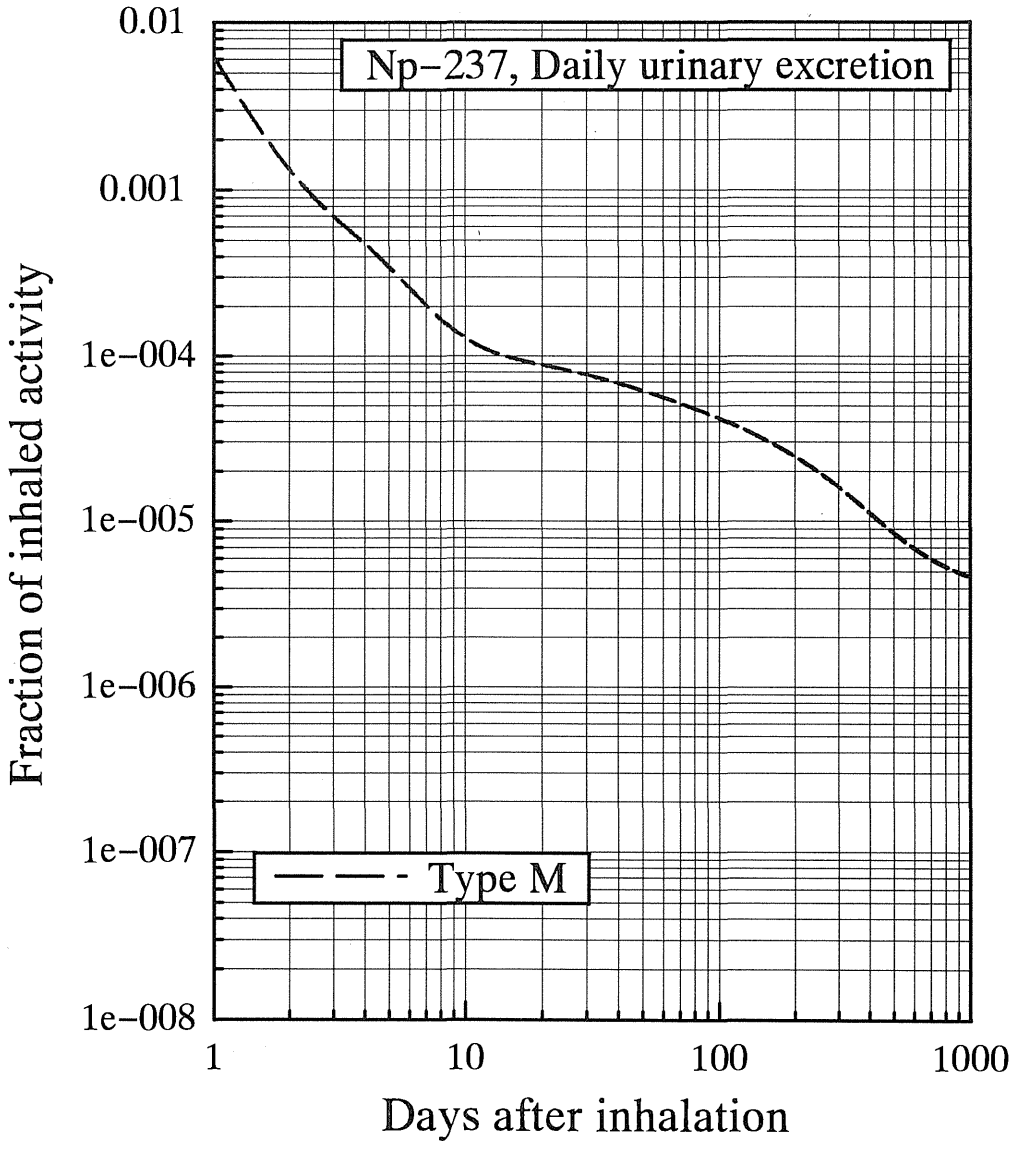

Fig.3-33(b) Daily urinary excretion of ^{237}Np following acute intake by inhalation

Table 3-33(c) Daily faecal excretion of ^{237}Np

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	-------
2	-------	1.5E-01	-------
3	-------	8.0E-02	-------
4	-------	3.3E-02	-------
5	-------	1.3E-02	-------
6	-------	5.3E-03	-------
7	-------	2.3E-03	-------
8	-------	1.2E-03	-------
9	-------	7.4E-04	-------
10	-------	5.7E-04	-------
14	-------	4.3E-04	-------
30	-------	2.8E-04	-------
60	-------	1.3E-04	-------
90	-------	6.4E-05	-------
180	-------	1.5E-05	-------
365	-------	4.1E-06	-------

* Bq/d per Bq intake

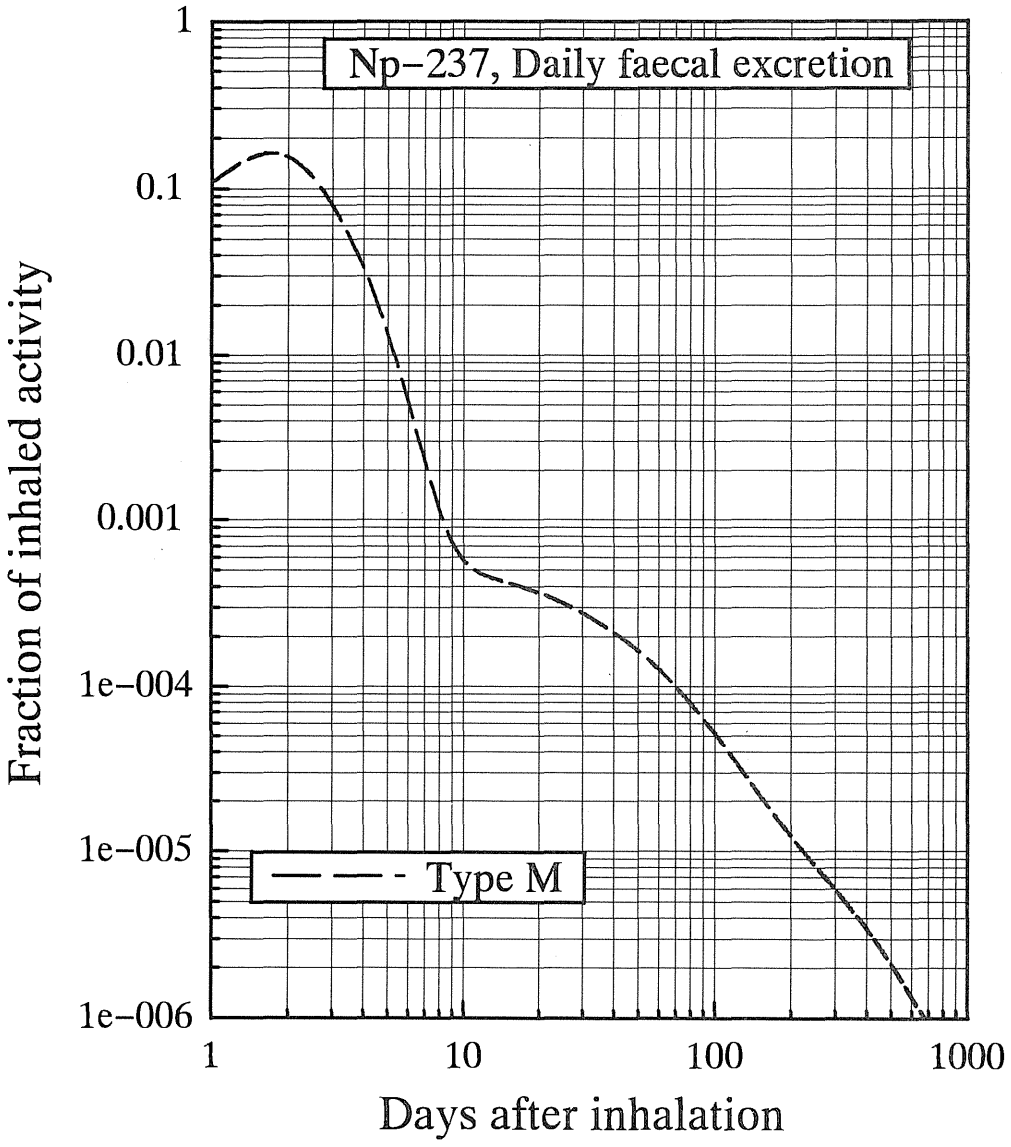

Fig.3-33(c) Daily faecal excretion of ^{237}Np following acute intake by inhalation

Table 3-34(a) Lung content of ^{238}Pu

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	7.4E-02
0.2	-------	6.3E-02	7.0E-02
0.5	-------	6.0E-02	6.7E-02
1	-------	5.8E-02	6.4E-02
2	-------	5.6E-02	6.3E-02
3	-------	5.5E-02	6.2E-02
4	-------	5.4E-02	6.1E-02
5	-------	5.3E-02	6.1E-02
6	-------	5.3E-02	6.0E-02
7	-------	5.2E-02	6.0E-02
8	-------	5.1E-02	5.9E-02
9	-------	5.0E-02	5.8E-02
10	-------	5.0E-02	5.8E-02
14	-------	4.7E-02	5.6E-02
30	-------	3.8E-02	4.9E-02
60	-------	2.8E-02	4.2E-02
90	-------	2.2E-02	3.8E-02
180	-------	1.2E-02	3.2E-02
365	-------	4.0E-03	2.6E-02

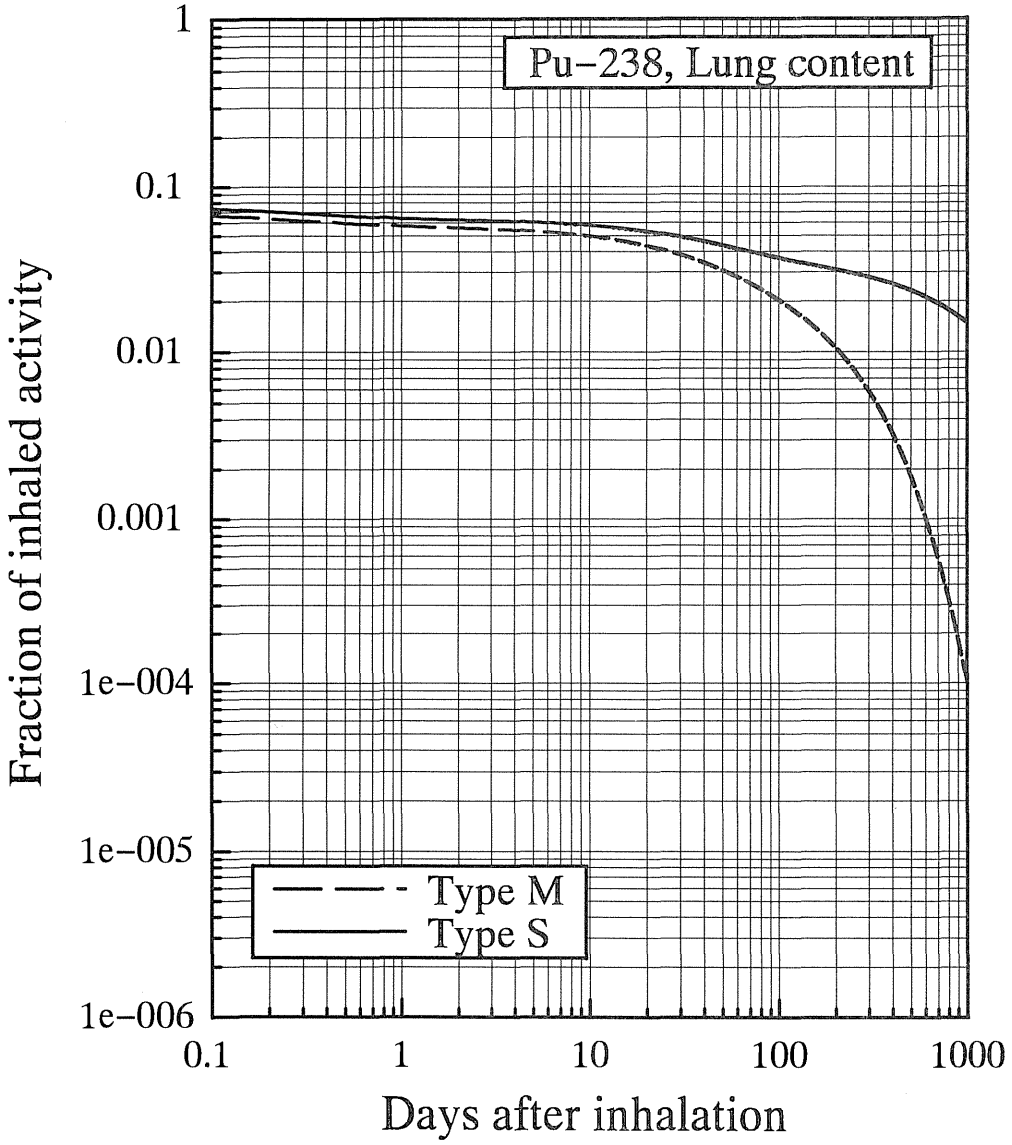

Fig.3-34(a) Lung content of ^{238}Pu following acute intake by inhalation

Table 3-34(b) Daily urinary excretion of ^{238}Pu

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	2.3E-04	2.3E-06
2	-------	1.3E-04	1.4E-06
3	-------	7.8E-05	8.3E-07
4	-------	5.3E-05	5.9E-07
5	-------	3.9E-05	4.5E-07
6	-------	3.0E-05	3.7E-07
7	-------	2.4E-05	3.1E-07
8	-------	2.0E-05	2.7E-07
9	-------	1.7E-05	2.4E-07
10	-------	1.5E-05	2.2E-07
14	-------	1.2E-05	1.9E-07
30	-------	9.5E-06	1.7E-07
60	-------	8.1E-06	1.6E-07
90	-------	7.1E-06	1.6E-07
180	-------	5.4E-06	1.6E-07
365	-------	3.8E-06	1.7E-07

* Bq/d per Bq intake

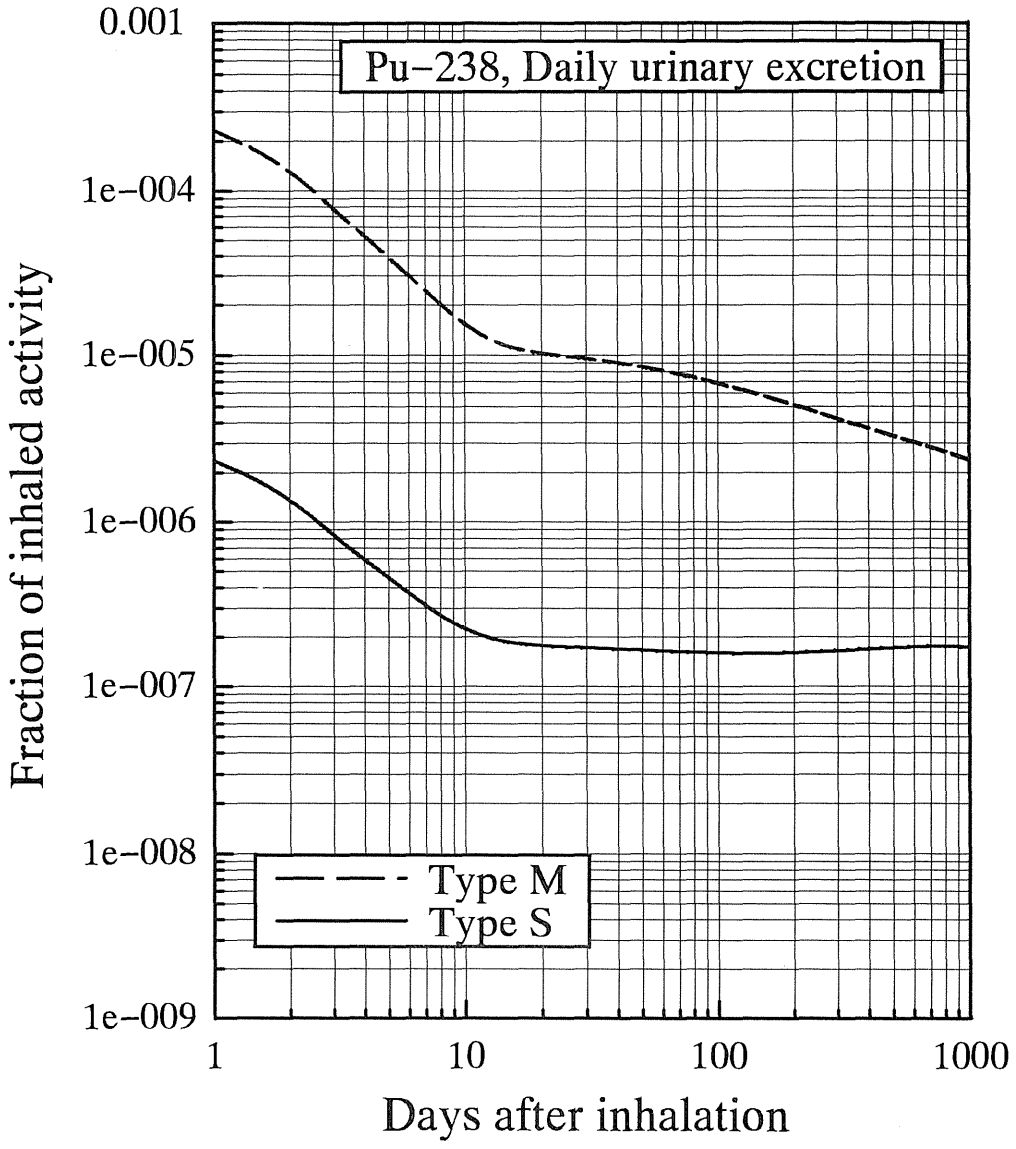

Fig.3-34(b) Daily urinary excretion of ^{238}Pu following acute intake by inhalation

Table 3-34(c) Daily faecal excretion of ^{238}Pu

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	1.1E-01
2	-------	1.5E-01	1.6E-01
3	-------	8.0E-02	8.4E-02
4	-------	3.4E-02	3.5E-02
5	-------	1.3E-02	1.4E-02
6	-------	5.4E-03	5.7E-03
7	-------	2.3E-03	2.5E-03
8	-------	1.2E-03	1.3E-03
9	-------	7.6E-04	8.2E-04
10	-------	5.8E-04	6.5E-04
14	-------	4.4E-04	5.1E-04
30	-------	2.8E-04	3.5E-04
60	-------	1.3E-04	1.9E-04
90	-------	6.6E-05	1.1E-04
180	-------	1.7E-05	3.7E-05
365	-------	5.4E-06	2.2E-05

* Bq/d per Bq intake

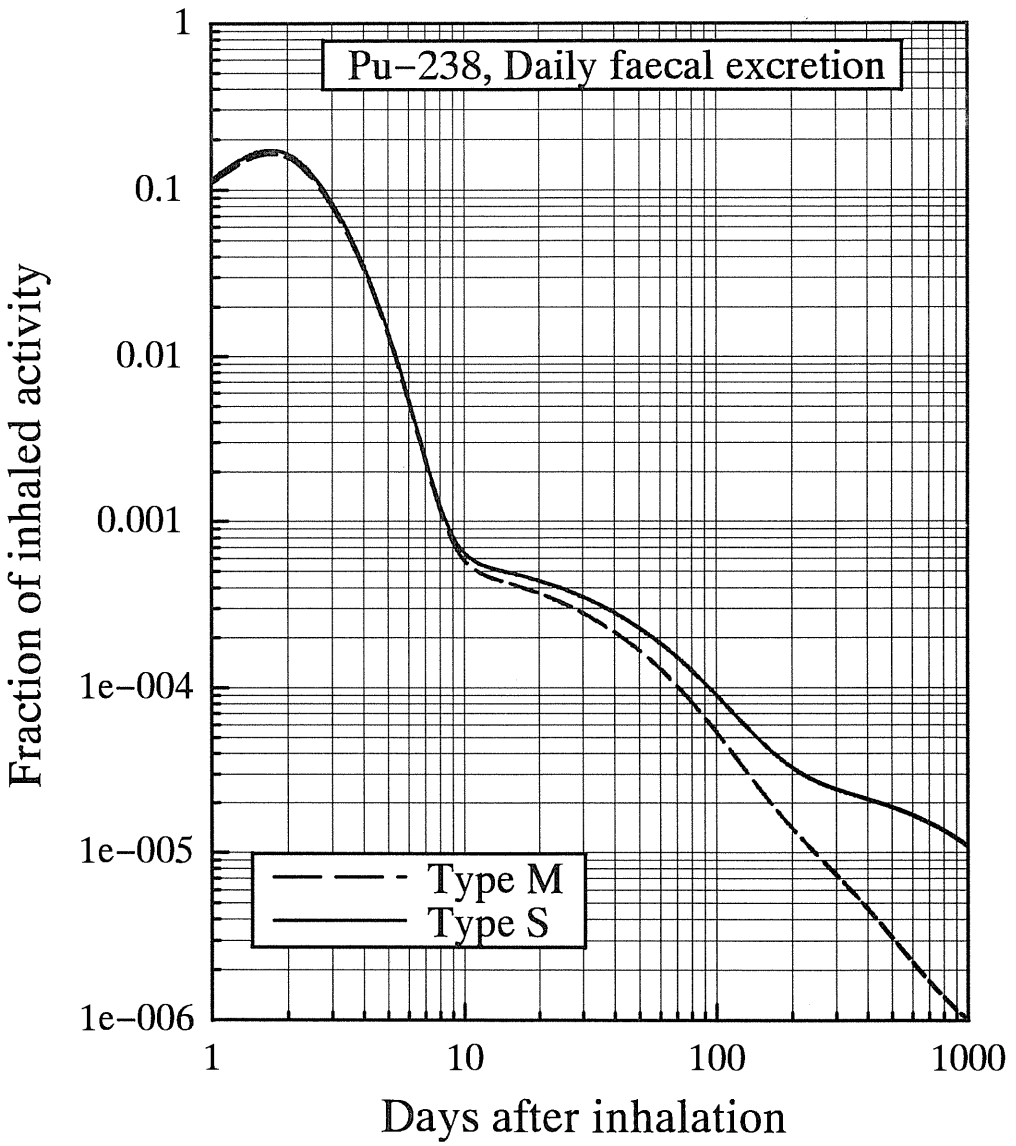

Fig.3-34(c) Daily faecal excretion of ^{238}Pu following acute intake by inhalation

Table 3-35(a) Lung content of $^{239/240}$Pu

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	7.4E-02
0.2	-------	6.3E-02	7.0E-02
0.5	-------	6.0E-02	6.7E-02
1	-------	5.8E-02	6.4E-02
2	-------	5.6E-02	6.3E-02
3	-------	5.5E-02	6.2E-02
4	-------	5.4E-02	6.1E-02
5	-------	5.3E-02	6.1E-02
6	-------	5.3E-02	6.0E-02
7	-------	5.2E-02	6.0E-02
8	-------	5.1E-02	5.9E-02
9	-------	5.0E-02	5.8E-02
10	-------	5.0E-02	5.8E-02
14	-------	4.7E-02	5.6E-02
30	-------	3.8E-02	4.9E-02
60	-------	2.8E-02	4.2E-02
90	-------	2.2E-02	3.8E-02
180	-------	1.2E-02	3.2E-02
365	-------	4.0E-03	2.7E-02

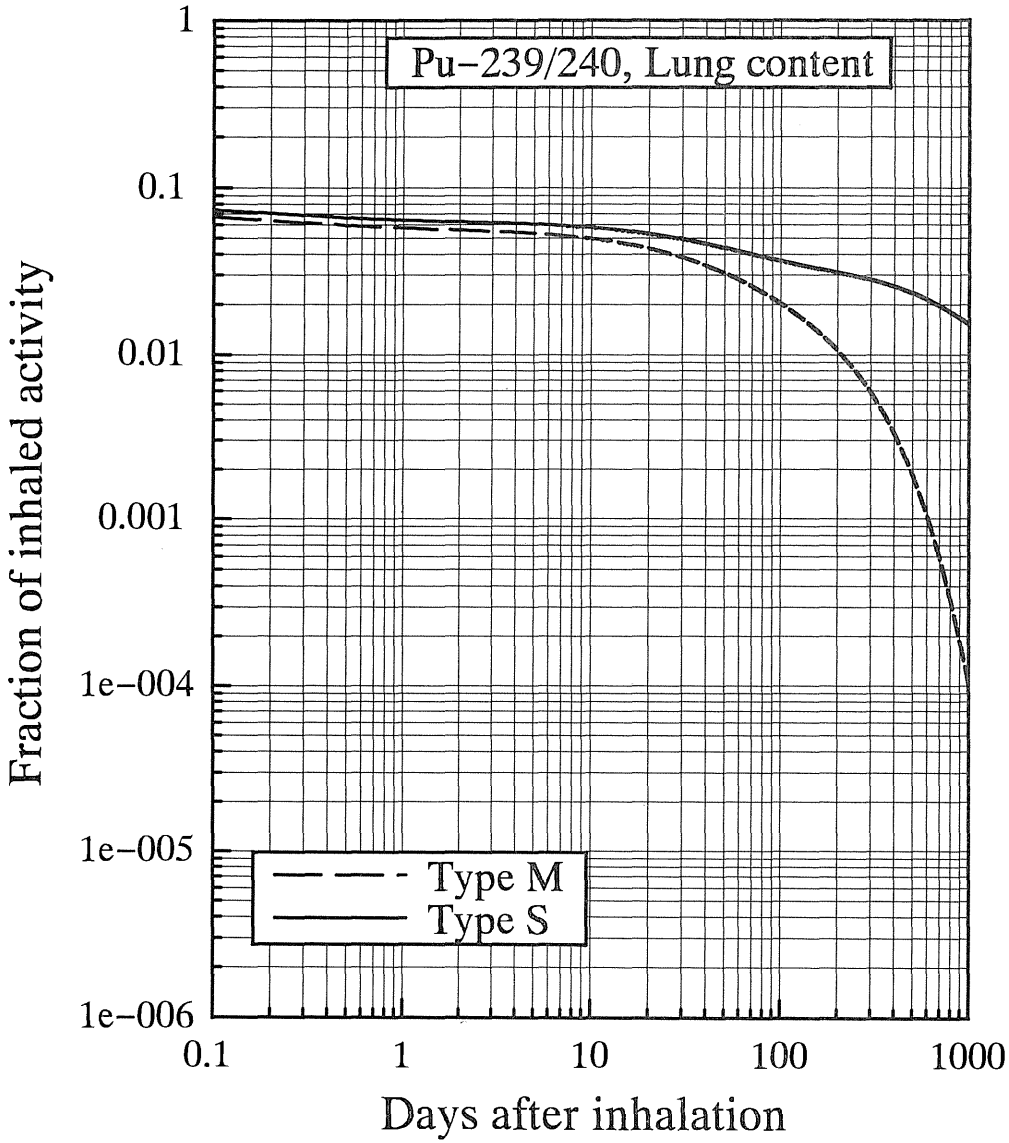

Fig.3-35(a) Lung content of $^{239/240}$Pu following acute intake by inhalation

Table 3-35(b) Daily urinary excretion of $^{239/240}$Pu

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	2.3E-04	2.3E-06
2	-------	1.3E-04	1.4E-06
3	-------	7.8E-05	8.3E-07
4	-------	5.3E-05	5.9E-07
5	-------	3.9E-05	4.5E-07
6	-------	3.0E-05	3.7E-07
7	-------	2.4E-05	3.1E-07
8	-------	2.0E-05	2.7E-07
9	-------	1.7E-05	2.4E-07
10	-------	1.5E-05	2.3E-07
14	-------	1.2E-05	1.9E-07
30	-------	9.5E-06	1.7E-07
60	-------	8.1E-06	1.6E-07
90	-------	7.1E-06	1.6E-07
180	-------	5.4E-06	1.6E-07
365	-------	3.9E-06	1.7E-07

* Bq/d per Bq intake

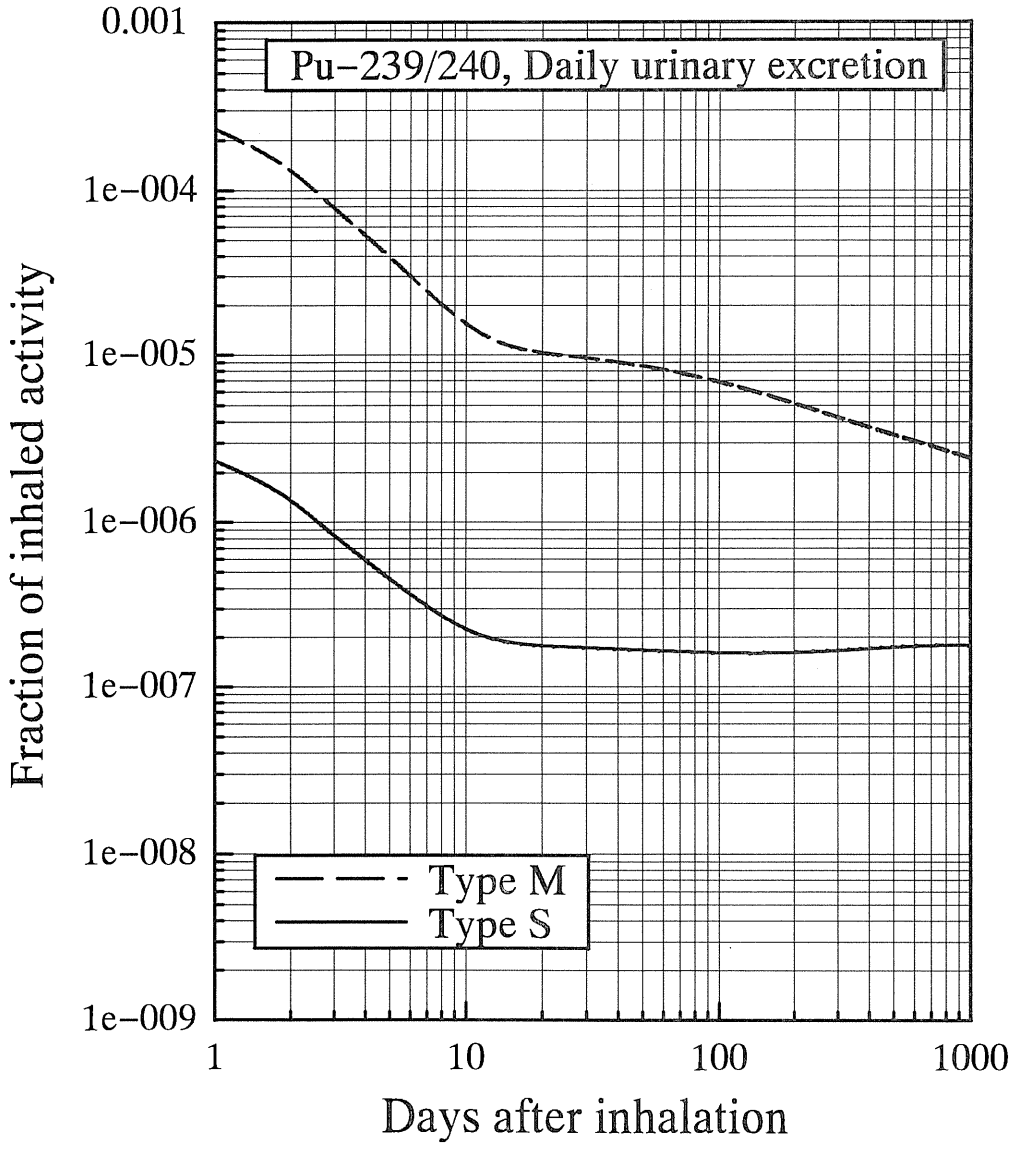

Fig.3-35(b) Daily urinary excretion of $^{239/240}$Pu following acute intake by inhalation

Table 3-35(c) Daily faecal excretion of $^{239/240}$Pu

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	1.1E-01
2	-------	1.5E-01	1.6E-01
3	-------	8.0E-02	8.4E-02
4	-------	3.4E-02	3.5E-02
5	-------	1.3E-02	1.4E-02
6	-------	5.4E-03	5.7E-03
7	-------	2.3E-03	2.5E-03
8	-------	1.2E-03	1.3E-03
9	-------	7.6E-04	8.2E-04
10	-------	5.8E-04	6.5E-04
14	-------	4.4E-04	5.1E-04
30	-------	2.8E-04	3.5E-04
60	-------	1.3E-04	1.9E-04
90	-------	6.7E-05	1.1E-04
180	-------	1.7E-05	3.7E-05
365	-------	5.4E-06	2.2E-05

* Bq/d per Bq intake

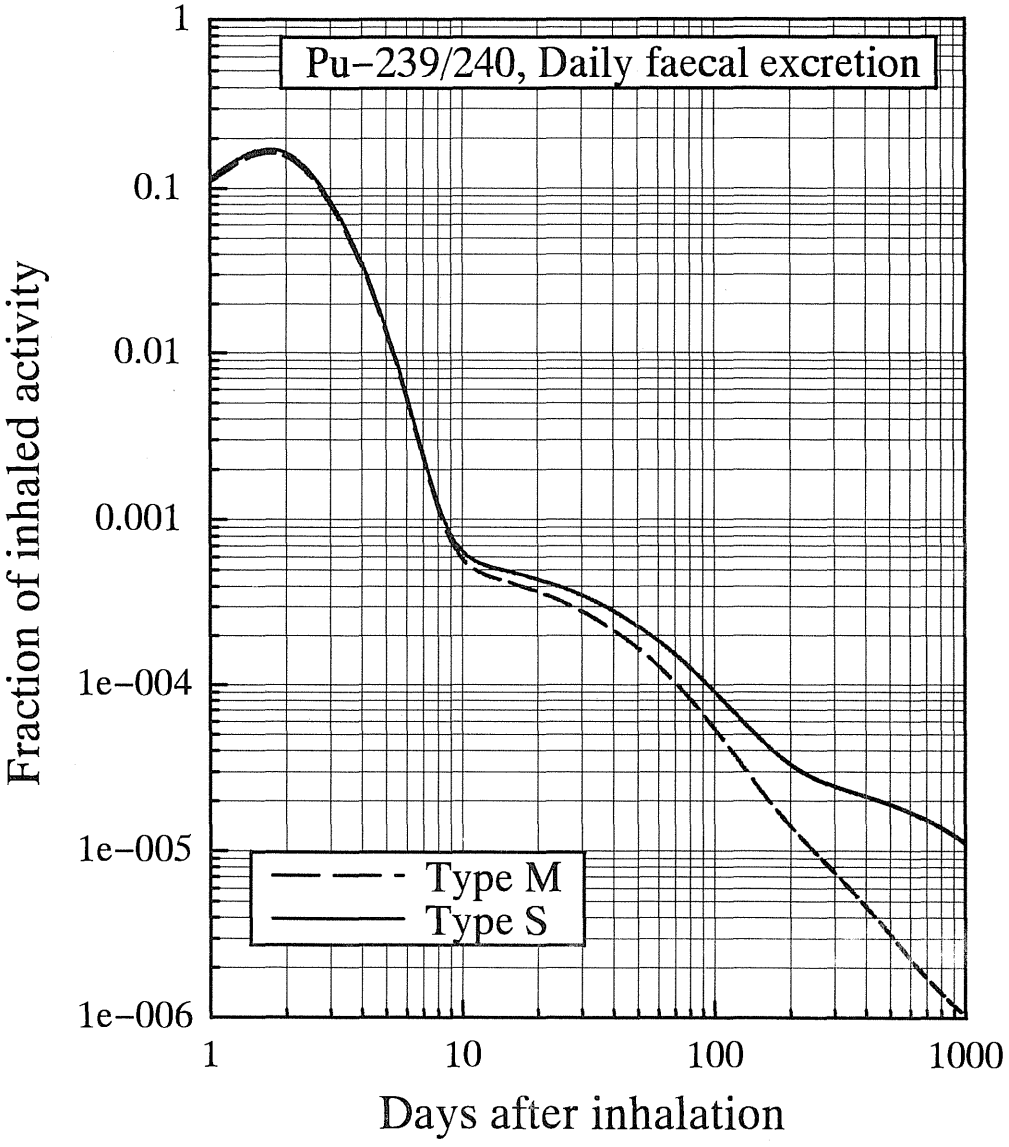

Fig.3-35(c) Daily faecal excretion of $^{239/240}$Pu following acute intake by inhalation

Table 3-36(a) Lung content of ^{241}Am

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	-------
0.2	-------	6.3E-02	-------
0.5	-------	6.0E-02	-------
1	-------	5.8E-02	-------
2	-------	5.6E-02	-------
3	-------	5.5E-02	-------
4	-------	5.4E-02	-------
5	-------	5.3E-02	-------
6	-------	5.3E-02	-------
7	-------	5.2E-02	-------
8	-------	5.1E-02	-------
9	-------	5.0E-02	-------
10	-------	5.0E-02	-------
14	-------	4.7E-02	-------
30	-------	3.8E-02	-------
60	-------	2.8E-02	-------
90	-------	2.2E-02	-------
180	-------	1.2E-02	-------
365	-------	4.0E-03	-------

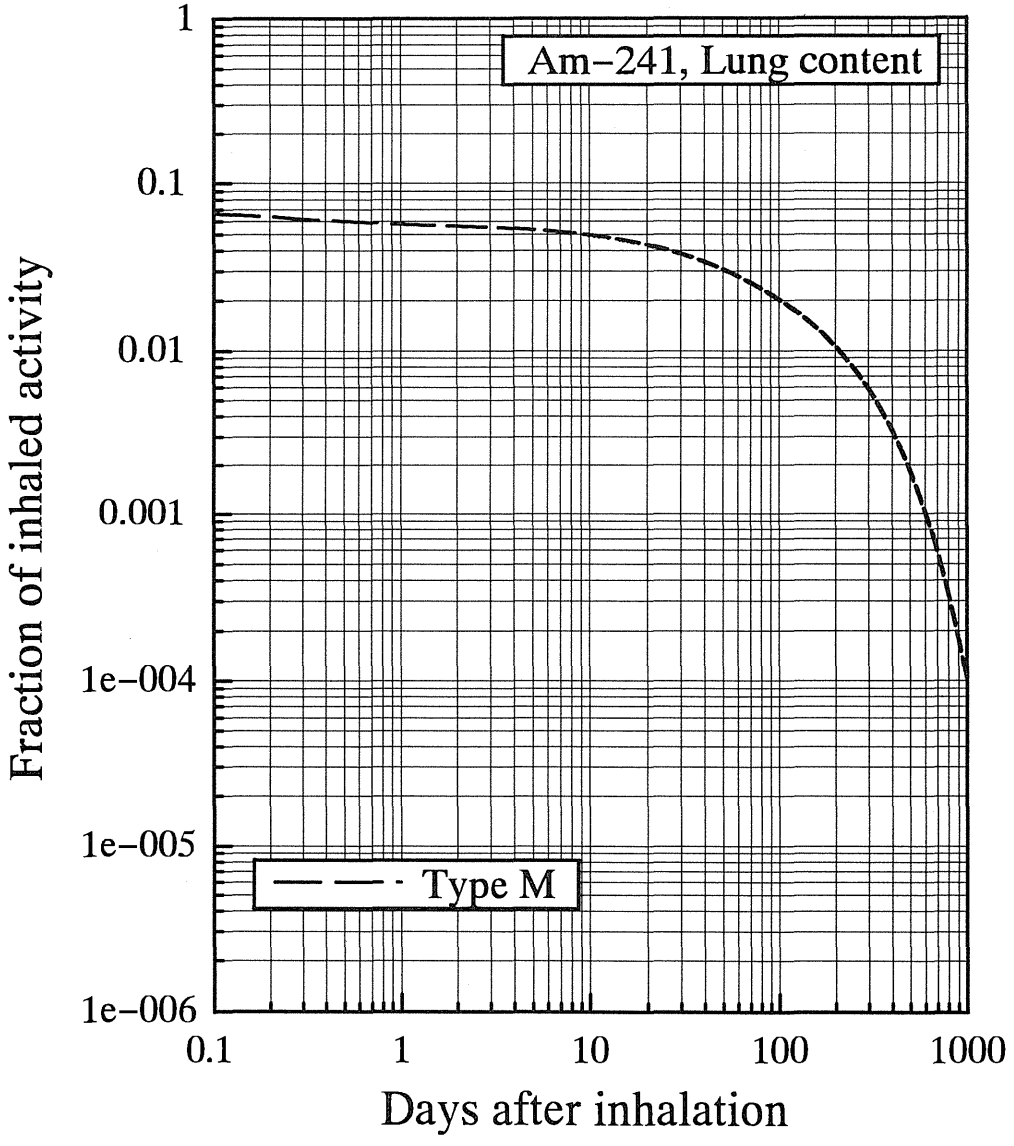

Fig.3-36(a) Lung content of ^{241}Am following acute intake by inhalation

Table 3-36(b) Daily urinary excretion of ^{241}Am

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.8E-03	-------
2	-------	2.3E-04	-------
3	-------	1.3E-04	-------
4	-------	9.0E-05	-------
5	-------	7.2E-05	-------
6	-------	6.3E-05	-------
7	-------	5.8E-05	-------
8	-------	5.4E-05	-------
9	-------	5.1E-05	-------
10	-------	4.9E-05	-------
14	-------	4.1E-05	-------
30	-------	2.6E-05	-------
60	-------	1.9E-05	-------
90	-------	1.6E-05	-------
180	-------	1.1E-05	-------
365	-------	7.0E-06	-------

* Bq/d per Bq intake

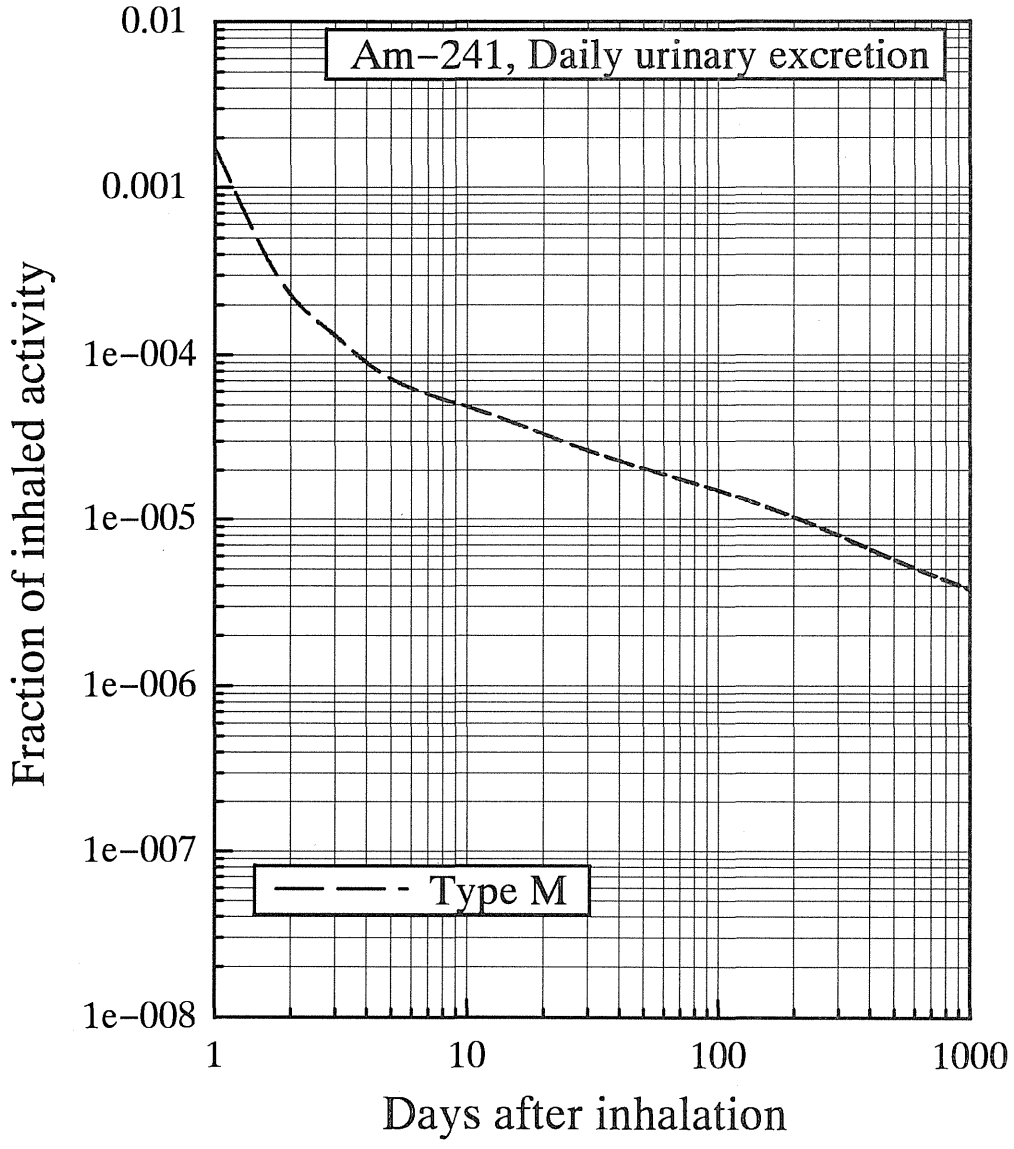

Fig.3-36(b) Daily urinary excretion of ^{241}Am following acute intake by inhalation

Table 3-36(c) Daily faecal excretion of ^{241}Am

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	-------
2	-------	1.5E-01	-------
3	-------	8.0E-02	-------
4	-------	3.3E-02	-------
5	-------	1.3E-02	-------
6	-------	5.3E-03	-------
7	-------	2.3E-03	-------
8	-------	1.2E-03	-------
9	-------	7.4E-04	-------
10	-------	5.7E-04	-------
14	-------	4.4E-04	-------
30	-------	2.8E-04	-------
60	-------	1.3E-04	-------
90	-------	6.6E-05	-------
180	-------	1.7E-05	-------
365	-------	5.6E-06	-------

* Bq/d per Bq intake

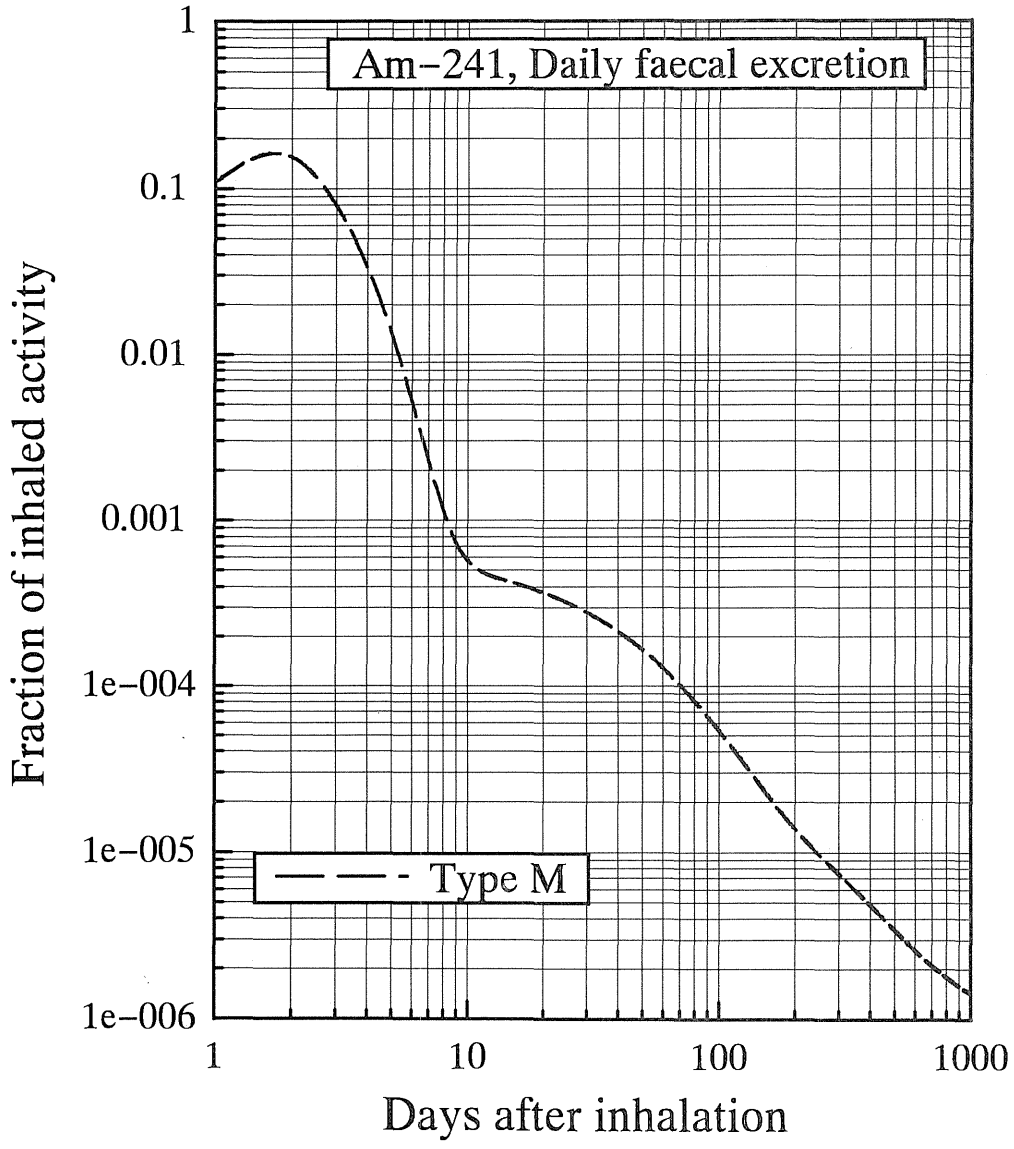

Fig.3-36(c) Daily faecal excretion of ^{241}Am following acute intake by inhalation

Table 3-37(a) Lung content of ^{242}Cm

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	-------
0.2	-------	6.3E-02	-------
0.5	-------	6.0E-02	-------
1	-------	5.7E-02	-------
2	-------	5.5E-02	-------
3	-------	5.4E-02	-------
4	-------	5.3E-02	-------
5	-------	5.2E-02	-------
6	-------	5.1E-02	-------
7	-------	5.0E-02	-------
8	-------	4.9E-02	-------
9	-------	4.8E-02	-------
10	-------	4.8E-02	-------
14	-------	4.4E-02	-------
30	-------	3.4E-02	-------
60	-------	2.2E-02	-------
90	-------	1.5E-02	-------
180	-------	5.5E-03	-------
365	-------	8.5E-04	-------

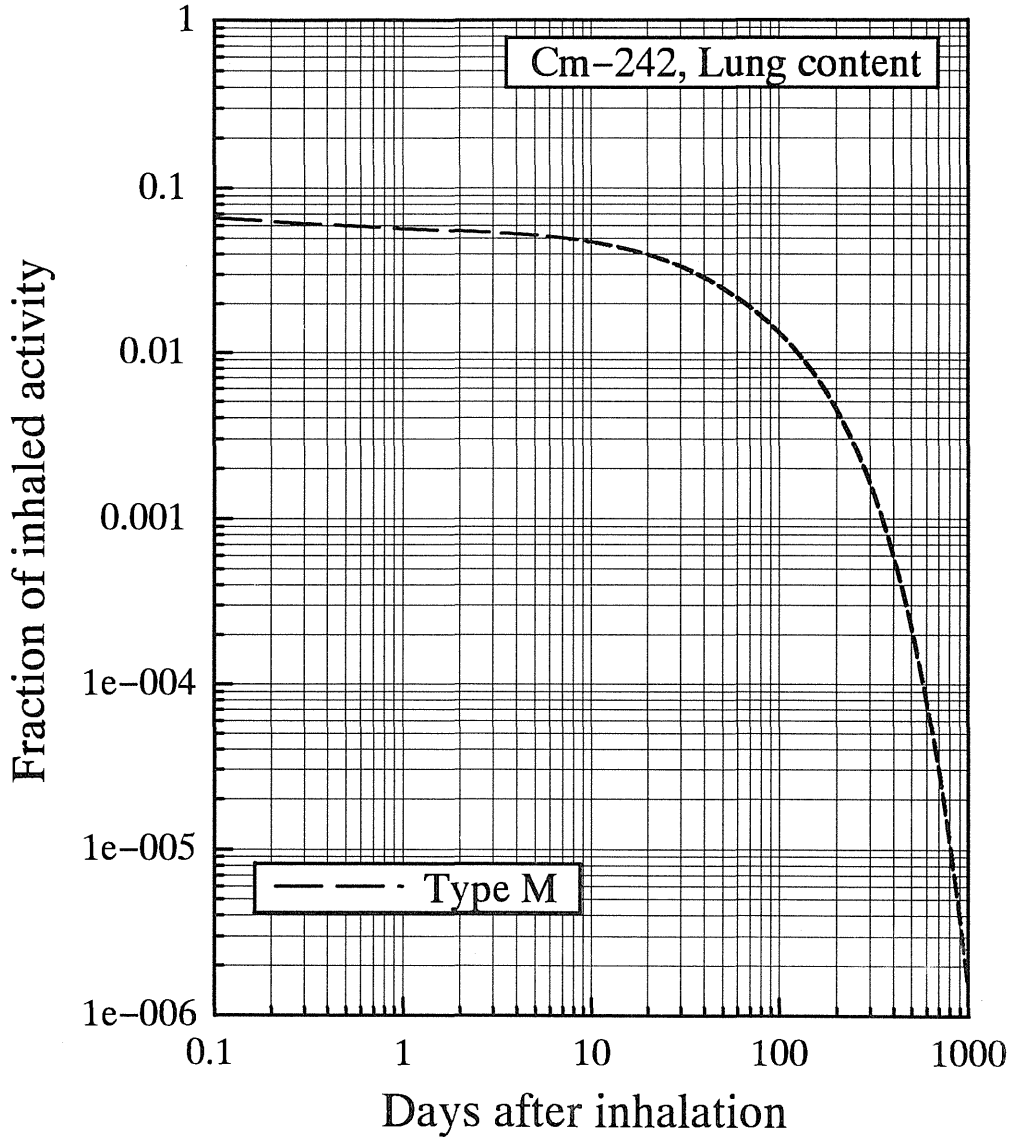

Fig.3-37(a) Lung content of ^{242}Cm following acute intake by inhalation

Table 3-37(b) Daily urinary excretion of ^{242}Cm

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.8E-03	-------
2	-------	2.3E-04	-------
3	-------	1.3E-04	-------
4	-------	8.8E-05	-------
5	-------	7.0E-05	-------
6	-------	6.1E-05	-------
7	-------	5.6E-05	-------
8	-------	5.2E-05	-------
9	-------	4.9E-05	-------
10	-------	4.7E-05	-------
14	-------	3.9E-05	-------
30	-------	2.3E-05	-------
60	-------	1.5E-05	-------
90	-------	1.1E-05	-------
180	-------	5.1E-06	-------
365	-------	1.5E-06	-------

* Bq/d per Bq intake

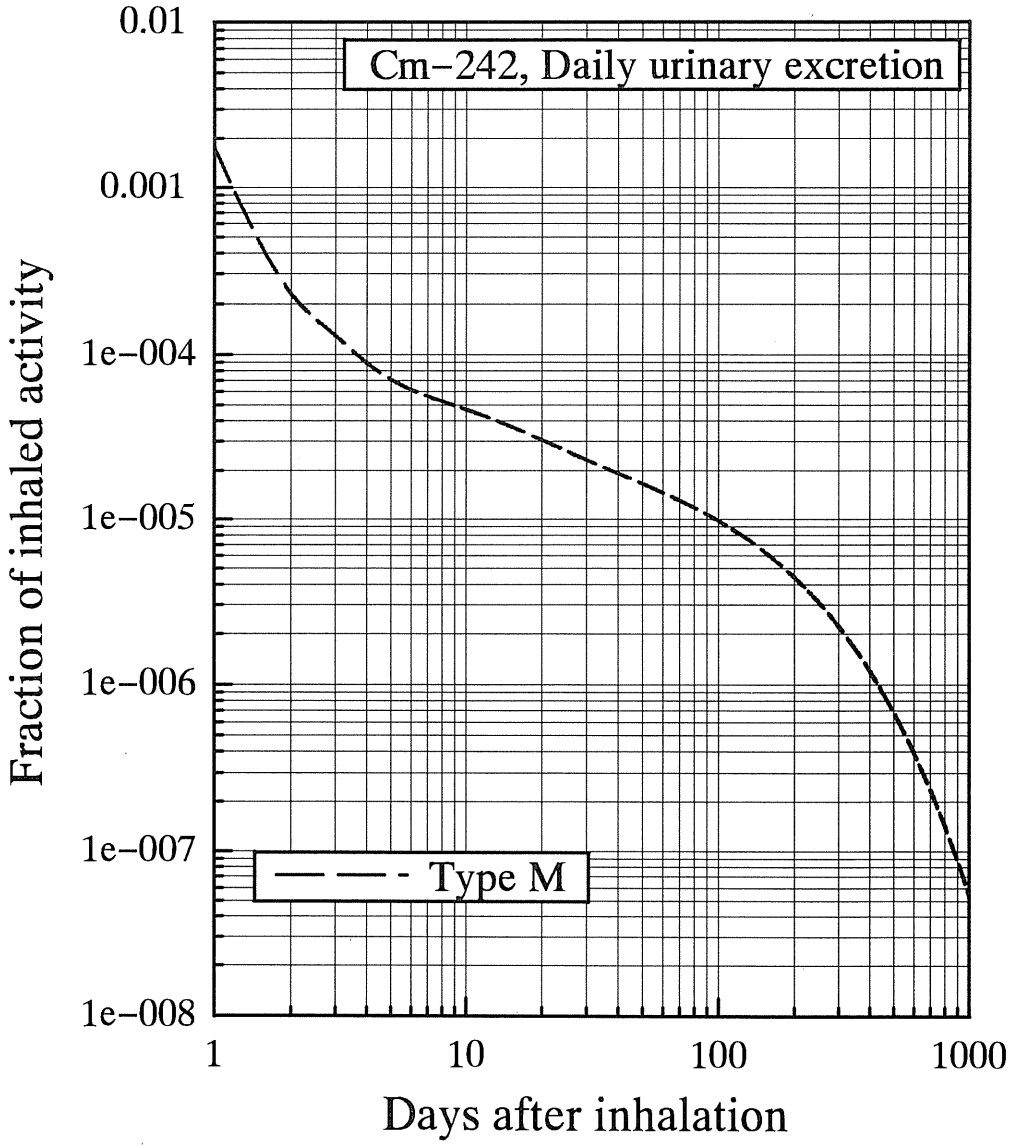

Fig.3-37(b) Daily urinary excretion of ^{242}Cm following acute intake by inhalation

Table 3-37(c) Daily faecal excretion of ^{242}Cm

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	-------
2	-------	1.5E-01	-------
3	-------	7.9E-02	-------
4	-------	3.3E-02	-------
5	-------	1.3E-02	-------
6	-------	5.2E-03	-------
7	-------	2.2E-03	-------
8	-------	1.1E-03	-------
9	-------	7.2E-04	-------
10	-------	5.5E-04	-------
14	-------	4.1E-04	-------
30	-------	2.5E-04	-------
60	-------	1.0E-04	-------
90	-------	4.5E-05	-------
180	-------	7.8E-06	-------
365	-------	1.2E-06	-------

* Bq/d per Bq intake

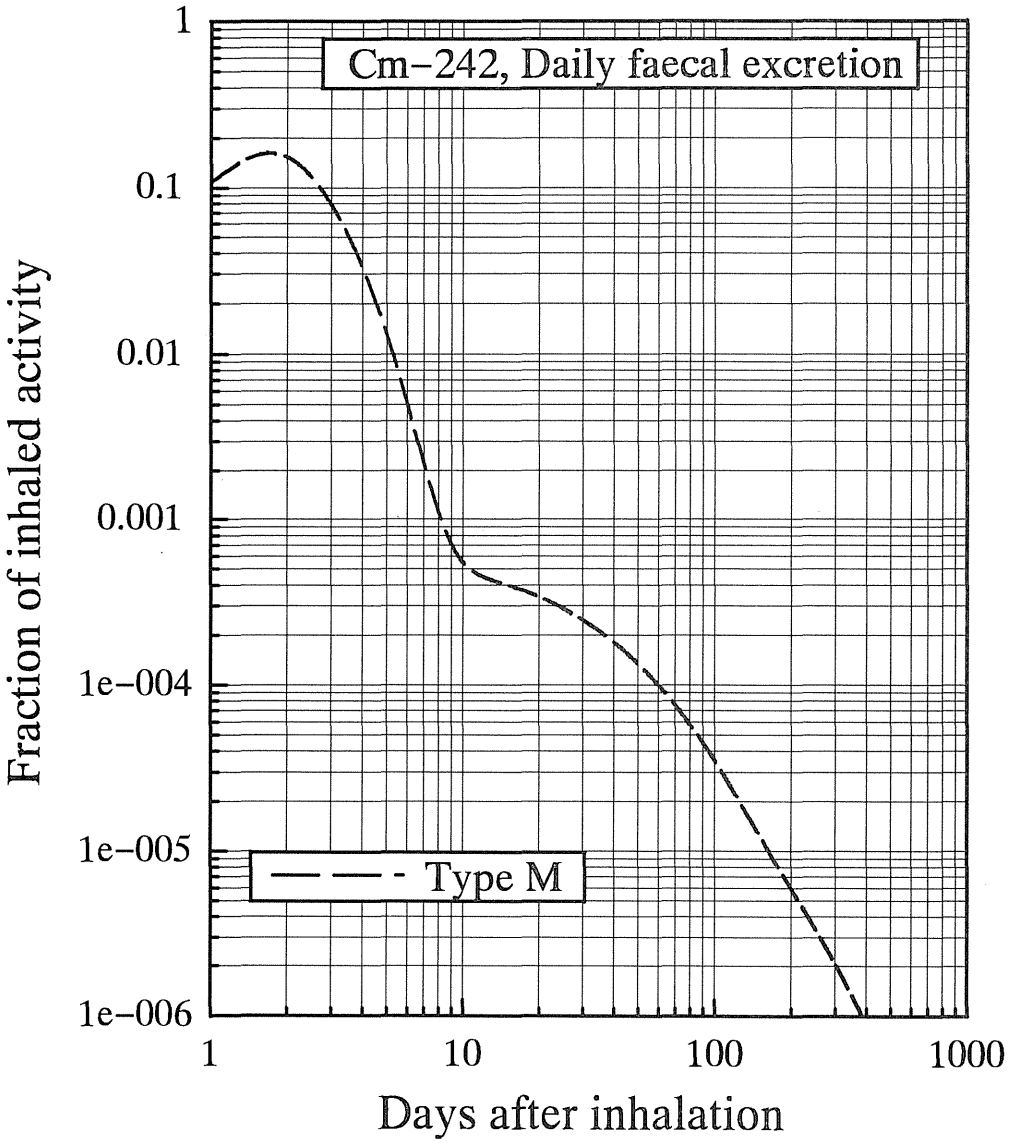

Fig.3-37(c) Daily faecal excretion of ^{242}Cm following acute intake by inhalation

Table 3-38(a) Lung content of ^{244}Cm

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	-------
0.2	-------	6.3E-02	-------
0.5	-------	6.0E-02	-------
1	-------	5.8E-02	-------
2	-------	5.6E-02	-------
3	-------	5.5E-02	-------
4	-------	5.4E-02	-------
5	-------	5.3E-02	-------
6	-------	5.3E-02	-------
7	-------	5.2E-02	-------
8	-------	5.1E-02	-------
9	-------	5.0E-02	-------
10	-------	5.0E-02	-------
14	-------	4.7E-02	-------
30	-------	3.8E-02	-------
60	-------	2.8E-02	-------
90	-------	2.2E-02	-------
180	-------	1.2E-02	-------
365	-------	3.8E-03	-------

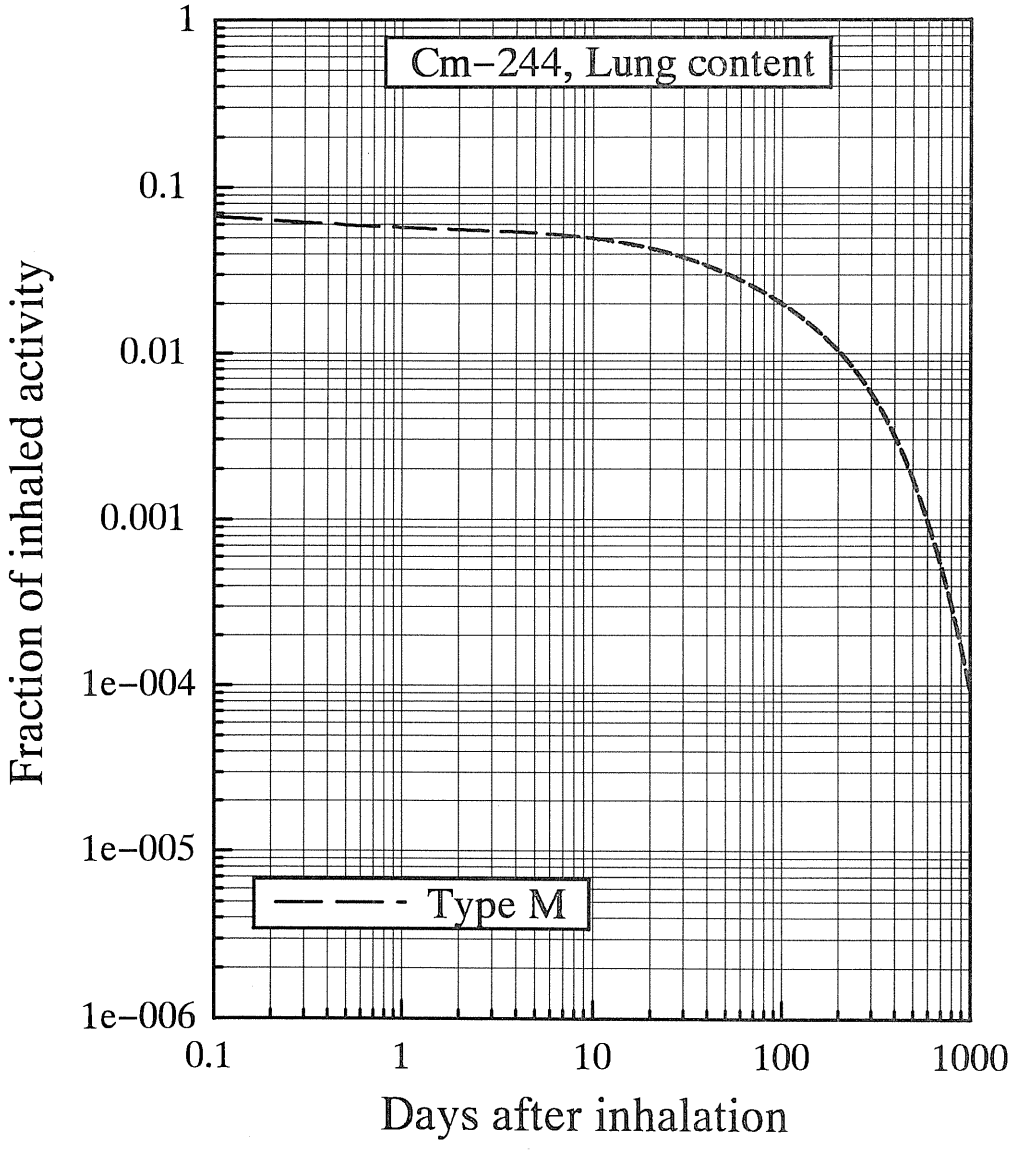

Fig.3-38(a) Lung content of ^{244}Cm following acute intake by inhalation

Table 3-38(b) Daily urinary excretion of ^{244}Cm

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	--------	1.8E-03	-------
2	-------	2.3E-04	-------
3	-------	1.3E-04	-------
4	-------	9.0E-05	-------
5	-------	7.2E-05	-------
6	-------	6.3E-05	-------
7	-------	5.8E-05	-------
8	-------	5.4E-05	-------
9	-------	5.1E-05	-------
10	-------	4.8E-05	-------
14	-------	4.1E-05	-------
30	-------	2.6E-05	-------
60	-------	1.9E-05	-------
90	-------	1.6E-05	-------
180	-------	1.1E-05	-------
365	-------	6.7E-06	-------

* Bq/d per Bq intake

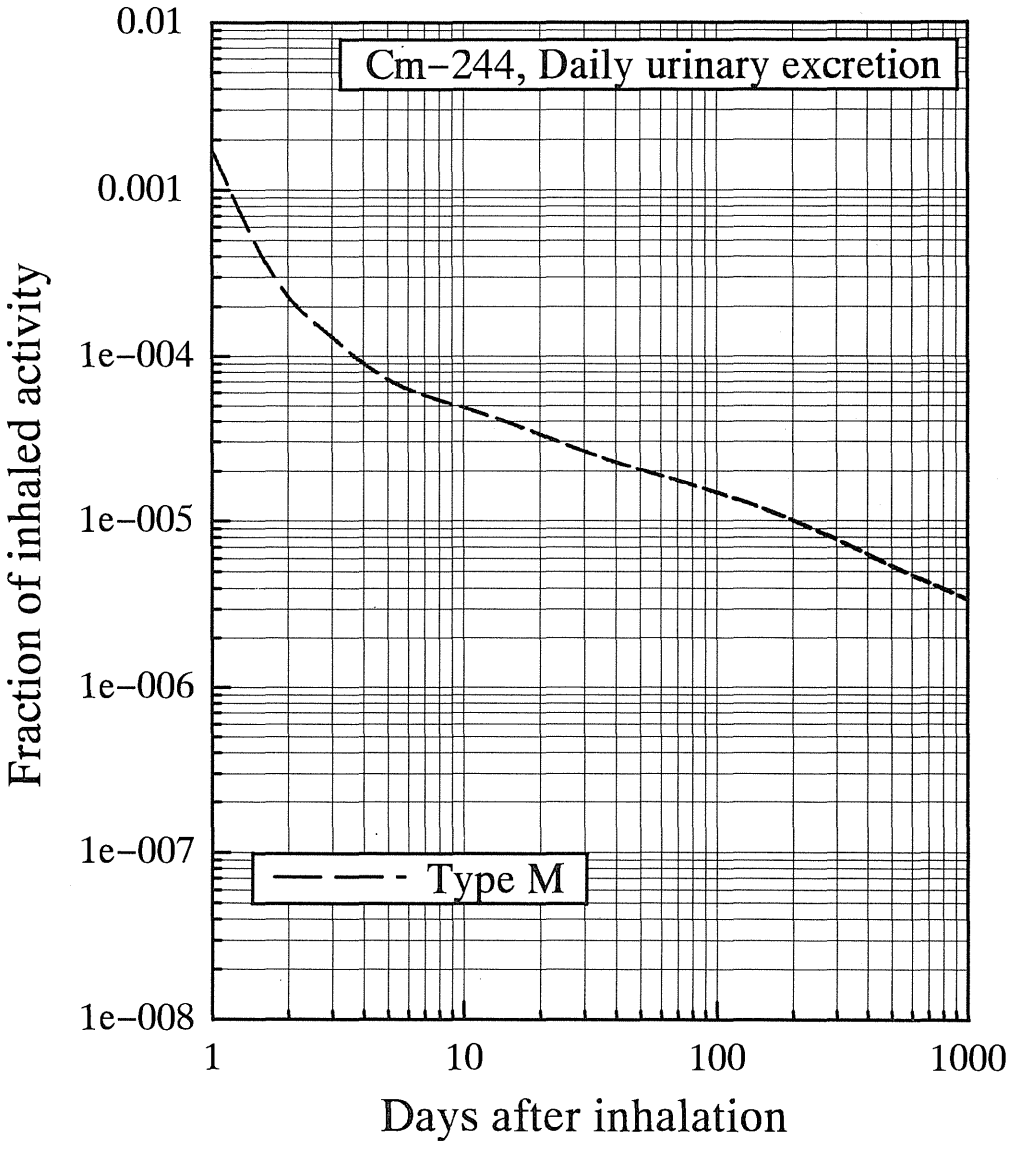

Fig.3-38(b) Daily urinary excretion of ^{244}Cm following acute intake by inhalation

Table 3-38(c) Daily faecal excretion of ^{244}Cm

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	-------
2	-------	1.5E-01	-------
3	-------	8.0E-02	-------
4	-------	3.3E-02	-------
5	-------	1.3E-02	-------
6	-------	5.3E-03	-------
7	-------	2.3E-03	-------
8	-------	1.2E-03	-------
9	-------	7.4E-04	-------
10	-------	5.7E-04	-------
14	-------	4.3E-04	-------
30	-------	2.8E-04	-------
60	-------	1.3E-04	-------
90	-------	6.5E-05	-------
180	-------	1.6E-05	-------
365	-------	5.3E-06	-------

* Bq/d per Bq intake

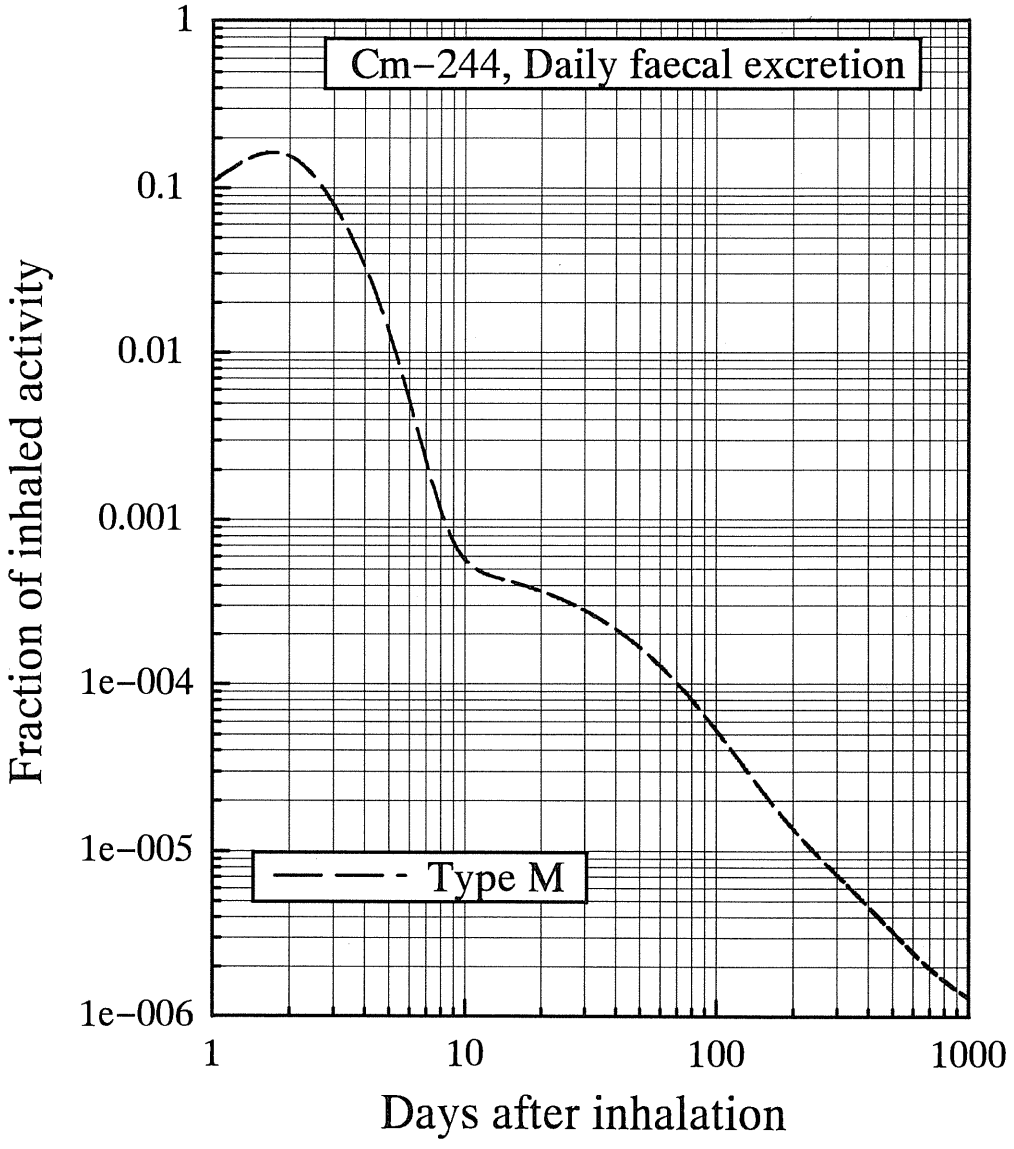

Fig.3-38(c) Daily faecal excretion of ^{244}Cm following acute intake by inhalation

Table 3-39(a) Lung content of ^{252}Cf

Days after intake	Lung		
	Type F	Type M	Type S
0.1	-------	6.7E-02	-------
0.2	-------	6.3E-02	-------
0.5	-------	6.0E-02	-------
1	-------	5.8E-02	-------
2	-------	5.6E-02	-------
3	-------	5.5E-02	-------
4	-------	5.4E-02	-------
5	-------	5.3E-02	-------
6	-------	5.2E-02	-------
7	-------	5.2E-02	-------
8	-------	5.1E-02	-------
9	-------	5.0E-02	-------
10	-------	4.9E-02	-------
14	-------	4.7E-02	-------
30	-------	3.8E-02	-------
60	-------	2.7E-02	-------
90	-------	2.0E-02	-------
180	-------	1.0E-02	-------
365	-------	3.1E-03	-------

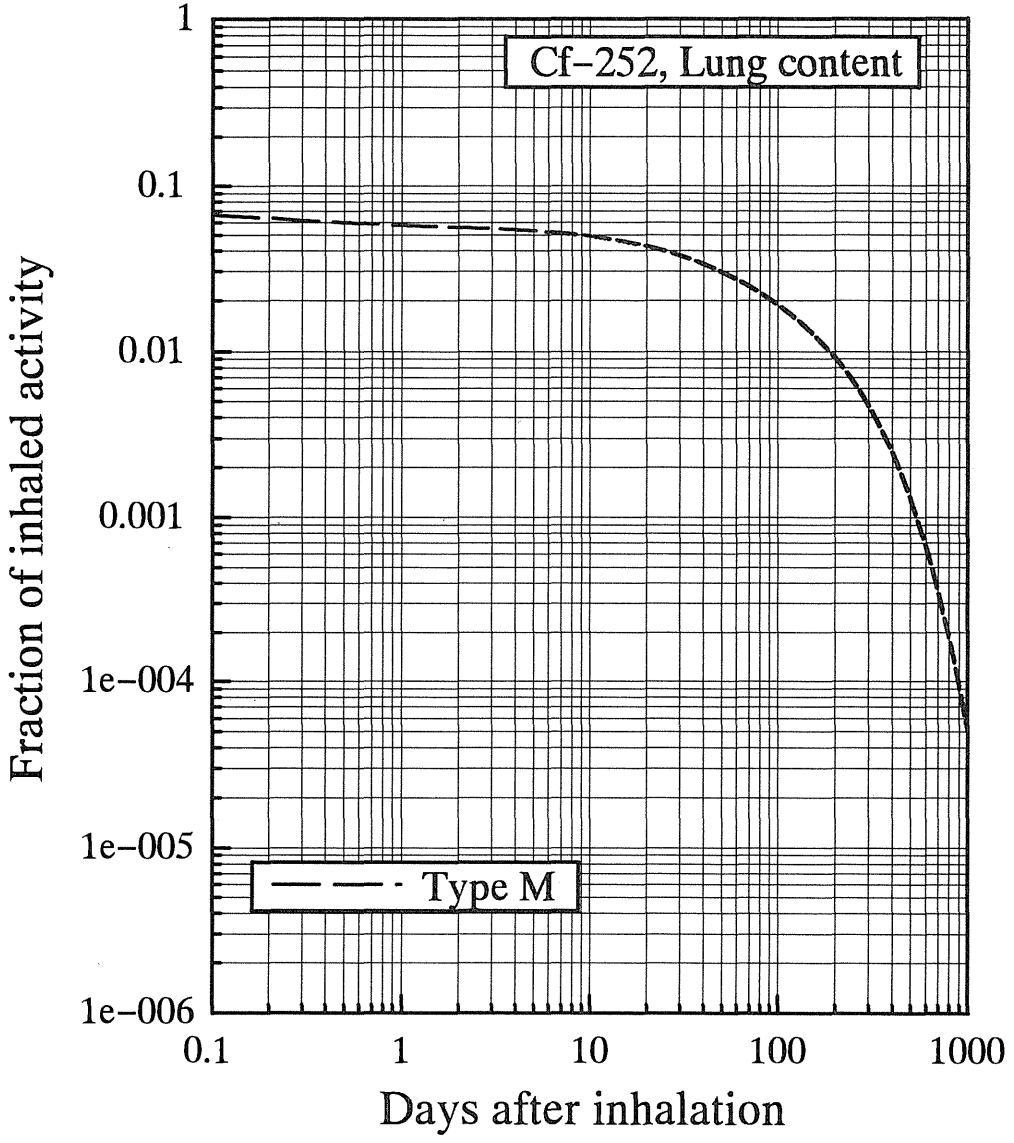

Fig.3-39(a) Lung content of ^{252}Cf following acute intake by inhalation

Table 3-39(b) Daily urinary excretion of ^{252}Cf

Days after intake	Daily urinary excretion*		
	Type F	Type M	Type S
1	-------	1.3E-03	-------
2	-------	1.2E-04	-------
3	-------	2.2E-05	-------
4	-------	1.5E-05	-------
5	-------	1.4E-05	-------
6	-------	1.4E-05	-------
7	-------	1.4E-05	-------
8	-------	1.4E-05	-------
9	-------	1.3E-05	-------
10	-------	1.3E-05	-------
14	-------	1.3E-05	-------
30	-------	1.0E-05	-------
60	-------	7.7E-06	-------
90	-------	6.1E-06	-------
180	-------	3.7E-06	-------
365	-------	1.8E-06	-------

* Bq/d per Bq intake

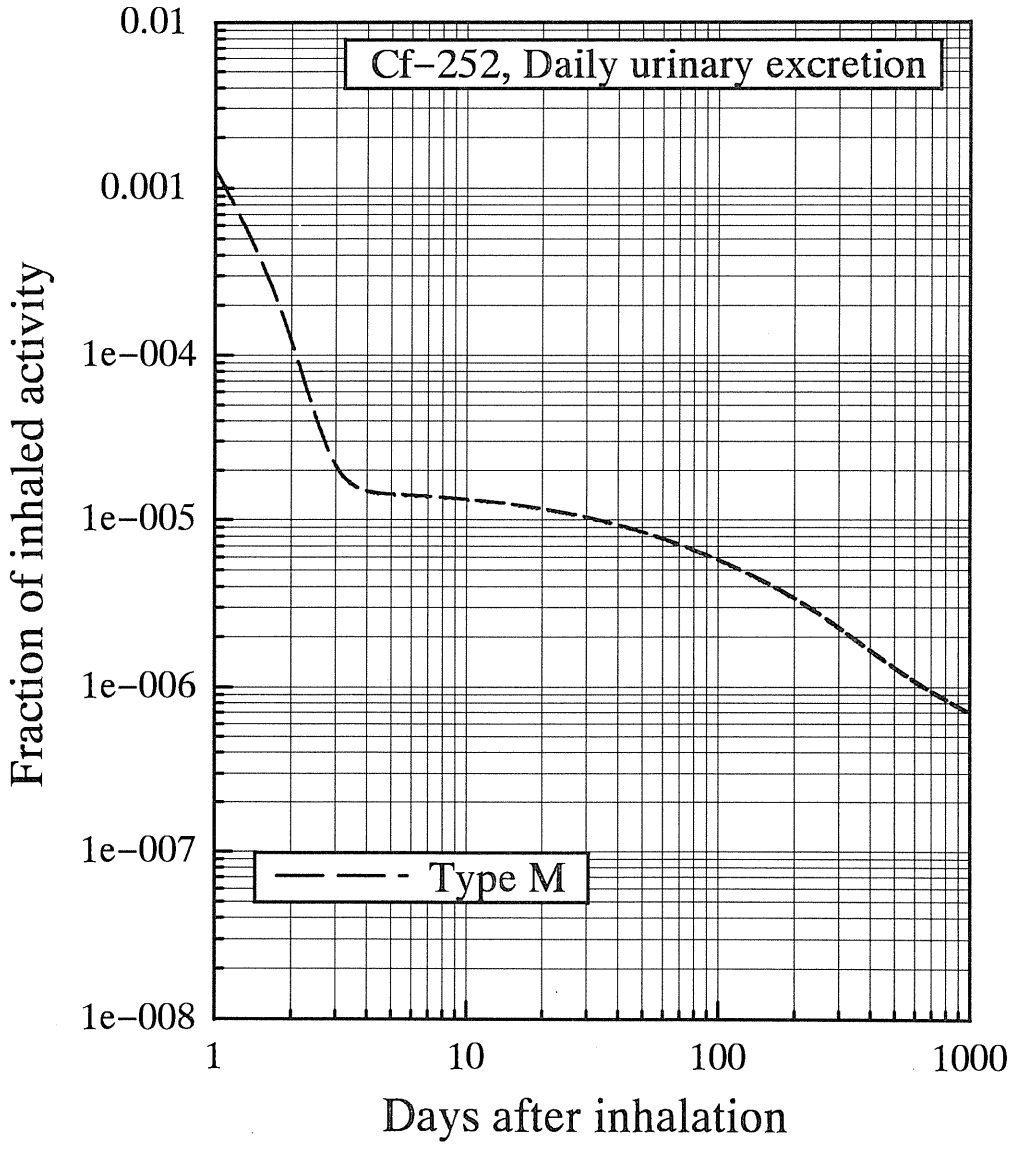

Fig.3-39(b) Daily urinary excretion of ^{252}Cf following acute intake by inhalation

Table 3-39(c) Daily faecal excretion of ^{252}Cf

Days after intake	Daily faecal excretion*		
	Type F	Type M	Type S
1	-------	1.1E-01	-------
2	-------	1.5E-01	-------
3	-------	8.0E-02	-------
4	-------	3.3E-02	-------
5	-------	1.3E-02	-------
6	-------	5.3E-03	-------
7	-------	2.3E-03	-------
8	-------	1.2E-03	-------
9	-------	7.5E-04	-------
10	-------	5.8E-04	-------
14	-------	4.4E-04	-------
30	-------	2.8E-04	-------
60	-------	1.3E-04	-------
90	-------	6.5E-05	-------
180	-------	1.6E-05	-------
365	-------	4.4E-06	-------

* Bq/d per Bq intake

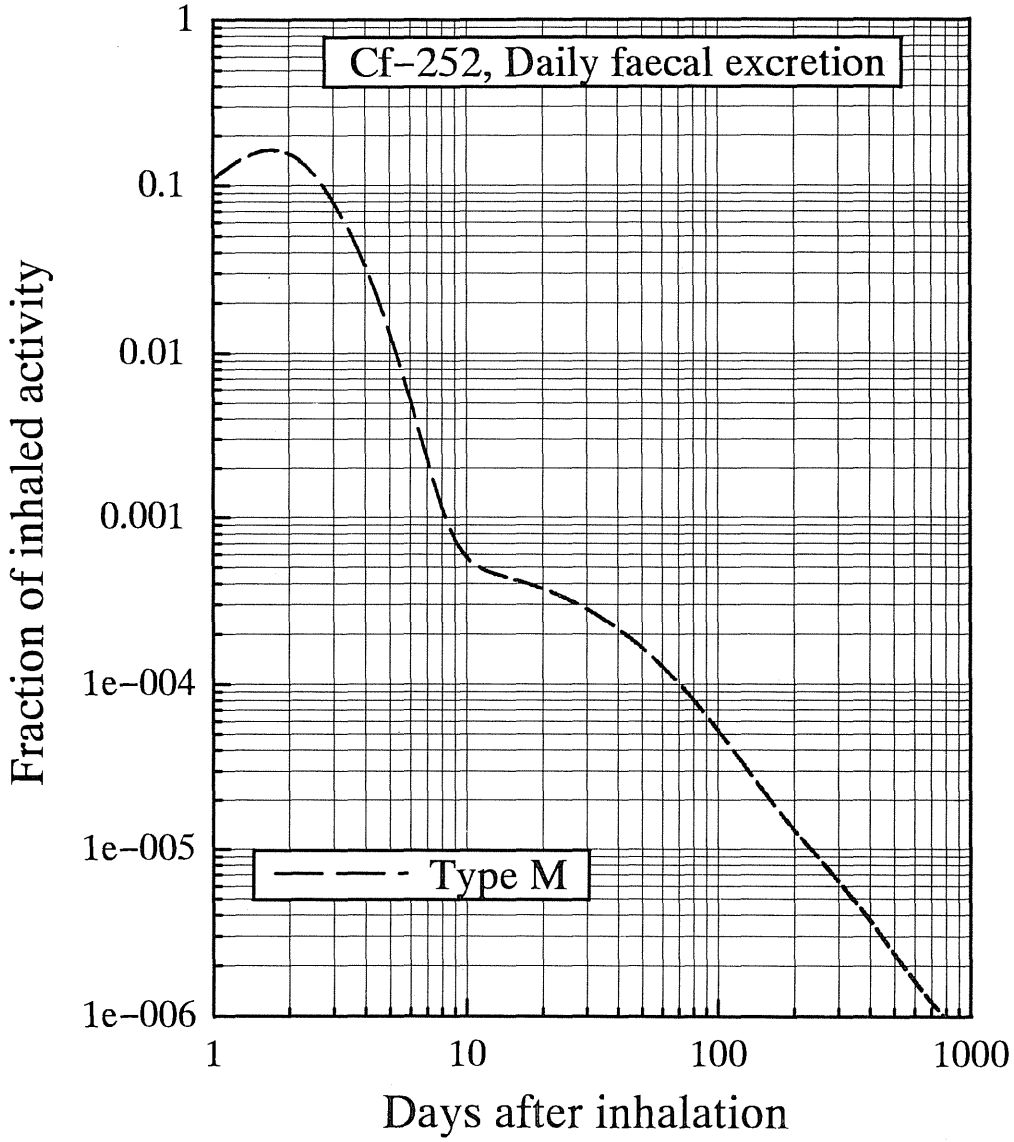

Fig.3-39(c) Daily faecal excretion of ^{252}Cf following acute intake by inhalation

ACKNOWLEDGEMENT

I would like to thank Dr. Jiro Inaba, Deputy Director-General, National Institute of Radiological Sciences (NIRS) for his helpful scientific discussion on the recent ICRP dosimetric system on internal exposure and for his kind encouragement for the publication of this report.

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Monitoring Data for Intake of Radionuclides: Acute Intake by Inhalation

National Institute of Radiological Sciences, Chiba, JAPAN

Radionuclide: Sr-90 Half life = 29.1 y

Dose coefficient (Sv/Bq) *Type F:* 3.0E-08 *Type S:* 7.7E-08

Days	Whole body content (Bq)			Daily urinary excretion(Bq/d)			Daily faecal excretion(Bq/d)		
	Type F	*Type M*	*Type S*	*Type F*	*Type M*	*Type S*	*Type F*	*Type M*	*Type S*
0	8.2E-01		8.2E-01	0.0E+00		0.0E+00	0.0E+00		0.0E+00
1	4.9E-01		4.9E-01	6.8E-02		8.1E-04	4.8E-02		1.1E-01
2	3.2E-01		2.5E-01	2.3E-02		3.4E-04	6.3E-02		1.6E-01
3	2.5E-01		1.4E-01	1.6E-02		2.2E-04	3.5E-02		8.3E-02
4	2.1E-01		9.3E-02	1.2E-02		1.6E-04	1.7E-02		3.5E-02
5	1.8E-01		7.5E-02	9.2E-03		1.3E-04	8.6E-03		1.4E-02
6	1.7E-01		6.7E-02	7.5E-03		1.1E-04	5.0E-03		5.6E-03
7	1.6E-01		6.4E-02	6.3E-03		9.0E-05	3.3E-03		2.5E-03
8	1.5E-01		6.3E-02	5.4E-03		7.7E-05	2.4E-03		1.3E-03
9	1.5E-01		6.2E-02	4.7E-03		6.8E-05	1.9E-03		8.4E-04
10	1.4E-01		6.1E-02	4.1E-03		6.0E-05	1.6E-03		6.6E-04
11	1.3E-01		6.0E-02	3.7E-03		5.5E-05	1.4E-03		5.9E-04
12	1.3E-01		6.0E-02	3.4E-03		5.0E-05	1.2E-03		5.5E-04
13	1.3E-01		5.9E-02	3.1E-03		4.6E-05	1.1E-03		5.3E-04
14	1.2E-01		5.9E-02	2.8E-03		4.3E-05	9.8E-04		5.1E-04
15	1.2E-01		5.8E-02	2.6E-03		4.0E-05	9.0E-04		5.0E-04
16	1.2E-01		5.7E-02	2.4E-03		3.7E-05	8.2E-04		4.9E-04
17	1.1E-01		5.7E-02	2.2E-03		3.5E-05	7.6E-04		4.8E-04
18	1.1E-01		5.6E-02	2.1E-03		3.3E-05	7.0E-04		4.7E-04
19	1.1E-01		5.6E-02	1.9E-03		3.1E-05	6.5E-04		4.5E-04
20	1.0E-01		5.5E-02	1.8E-03		2.9E-05	6.1E-04		4.4E-04
21	1.0E-01		5.5E-02	1.7E-03		2.8E-05	5.7E-04		4.3E-04
22	1.0E-01		5.5E-02	1.6E-03		2.6E-05	5.3E-04		4.2E-04
23	9.8E-02		5.4E-02	1.5E-03		2.5E-05	5.0E-04		4.1E-04
24	9.6E-02		5.4E-02	1.4E-03		2.4E-05	4.6E-04		4.0E-04
25	9.4E-02		5.3E-02	1.3E-03		2.2E-05	4.4E-04		3.9E-04
26	9.3E-02		5.3E-02	1.2E-03		2.1E-05	4.1E-04		3.9E-04
27	9.1E-02		5.2E-02	1.1E-03		2.0E-05	3.8E-04		3.8E-04
28	9.0E-02		5.2E-02	1.1E-03		1.9E-05	3.6E-04		3.7E-04
29	8.8E-02		5.2E-02	1.0E-03		1.9E-05	3.4E-04		3.6E-04

Sr-90 Page 1

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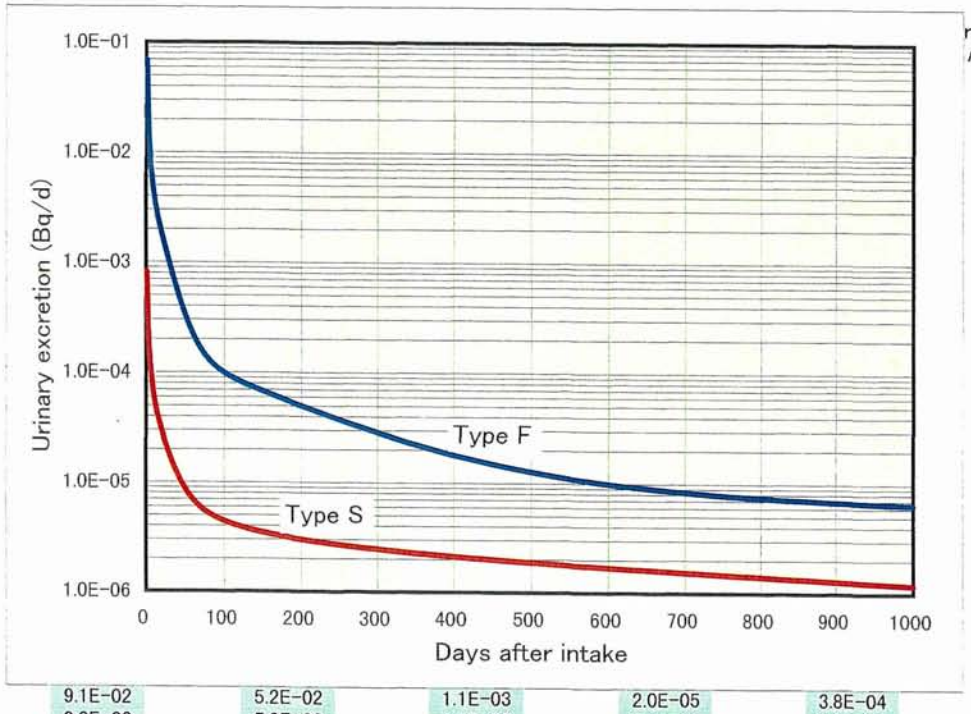
National Institute of Radiological Sciences, Chiba, JAPAN

Radionuclide: Sr-90 Half life = 29.1 y

Dose coefficient (Sv/Bq) *Type F:* 3.0E-08 *Type S:* 7.7E-08



Days	Whole body content (Bq)			Daily urinary excretion(Bq/d)			Daily faecal excretion(Bq/d)		
	Type F	*Type M*	*Type S*	*Type F*	*Type M*	*Type S*	*Type F*	*Type M*	*Type S*
0	8.2E-01		8.2E-01	0.0E+00		0.0E+00	0.0E+00		0.0E+00
1	4.9E-01		4.9E-01	6.8E-02		8.1E-04	4.8E-02		1.1E-01
2	3.2E-01		2.5E-01	2.3E-02		3.4E-04	6.3E-02		1.6E-01
3	2.5E-01		1.4E-01	1.6E-02		2.2E-04	3.5E-02		8.3E-02
4	2.1E-01		9.3E-02	1.2E-02		1.6E-04	1.7E-02		3.5E-02
5	1.8E-01		7.5E-02	9.2E-03		1.3E-04	8.6E-03		1.4E-02
6	1.7E-01		6.7E-02	7.5E-03		1.1E-04	5.0E-03		5.6E-03
7	1.6E-01		6.4E-02	6.3E-03		9.0E-05	3.3E-03		2.5E-03
8	1.5E-01		6.3E-02	5.4E-03		7.7E-05	2.4E-03		1.3E-03
9	1.5E-01		6.2E-02	4.7E-03		6.8E-05	1.9E-03		8.4E-04
10	1.4E-01		6.1E-02	4.1E-03		6.0E-05	1.6E-03		6.6E-04
11	1.3E-01		6.0E-02	3.7E-03		5.5E-05	1.4E-03		5.9E-04
12	1.3E-01		6.0E-02	3.4E-03		5.0E-05	1.2E-03		5.5E-04
13	1.3E-01		5.9E-02	3.1E-03		4.6E-05	1.1E-03		5.3E-04
14	1.2E-01		5.9E-02	2.8E-03		4.3E-05	9.8E-04		5.1E-04
15	1.2E-01		5.8E-02	2.6E-03		4.0E-05	9.0E-04		5.0E-04
16	1.2E-01		5.7E-02	2.4E-03		3.7E-05	8.2E-04		4.9E-04
17	1.1E-01		5.7E-02	2.2E-03		3.5E-05	7.6E-04		4.8E-04
18	1.1E-01		5.6E-02	2.1E-03		3.3E-05	7.0E-04		4.7E-04
19	1.1E-01		5.6E-02	1.9E-03		3.1E-05	6.5E-04		4.5E-04
20	1.0E-01		5.5E-02	1.8E-03		2.9E-05	6.1E-04		4.4E-04
21	1.0E-01		5.5E-02	1.7E-03		2.8E-05	5.7E-04		4.3E-04
22	1.0E-01		5.5E-02	1.6E-03		2.6E-05	5.3E-04		4.2E-04
23	9.8E-02		5.4E-02	1.5E-03		2.5E-05	5.0E-04		4.1E-04
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