



Department of Energy

Richland Operations Office
P.O. Box 550
Richland, Washington 99352

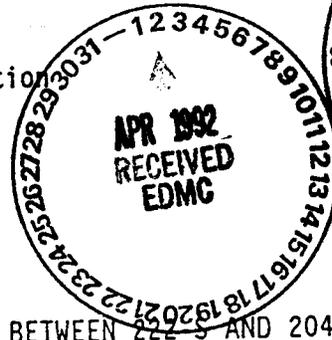
9104247

0019929

SEP 29 1991

91-EAB-239

Mr. Al Conklin, Head
Air Emissions & Defense Waste Section
Radiation Protection Division
Department of Health
Mail Stop LE-13
Olympia, Washington 98504-0095



Dear Mr. Conklin:

NOTIFICATION OF ROUTINE TRANSFERS BETWEEN 222-S AND 204-AR

This letter requests approval for the routine transfer of radioactive materials between the 222-S Laboratory in the 200 West Area and the 204-AR Waste Unloading Facility in the 200 East Area. This request is based on the enclosed analysis which demonstrates the emissions resulting from the transfer are below one percent of the Standard for radioactive emissions to air. Verbal approval has been requested from your office prior to each of the previous transfers. This request for approval would allow the transfers to occur without your verbal approval, provided all the conditions described in the enclosed analysis are met.

This notification is being made pursuant to the Radioactive Air Emissions Program, Washington Administrative Code 246-247. The analysis describes the limiting conditions on the radioactive content of the transfers, and provides a calculation of the annual dose received by the theoretical maximally exposed offsite individual, based on the methodology described in Appendix D of 40 Code of Federal Regulations 61. The offsite dose calculation packages from AIRDOS.PC and GENII are enclosed.

Both the 219-S Sample Gallery (in the 222-S Laboratory) and the 204-AR Waste Unloading Facility are equipped with High-Efficiency Particulate Air filtered exhaust systems, and transfers are controlled to minimize aerosolization and spills. The transfers increase (by a very small amount) the emissions from the 219-S Sample Gallery because the tanker is vented through the hood exhaust system in the sample gallery during waste loading. Emissions from the 204-AR Waste Unloading Facility will also occur. However, the emissions from these transfers are similar in nature to emissions from railcars, which are routinely offloaded in the 204-AR facility.

Transfers will occur approximately every six weeks, and contain less than 3300 gallons of waste. The transfers are made in tanker trucks approved by the U.S. Department of Transportation (DOT) for use in transporting low specific activity (LSA) materials. A waiver is being sought from the DOT to allow the transportation of radioactive materials that would exceed the LSA limits, and the enclosed analysis includes the bounds of the proposed waiver in determining the offsite dose.

9104247

Mr. Al Conklin

-2-

91-EAB-239

SEP 23 1991

Should you have any questions regarding the enclosed analysis, please contact Mr. S. D. Stites of my staff on (509) 376-8566.

Sincerely,



E. A. Bracken, Director
Environmental Restoration Division

ERD:SDS

Enclosure:
Transfers of Radioactive Materials

cc w/encl:
R. E. Lerch, WHC
R. W. Oldham, WHC

9112310792

TRANSFERS OF RADIOACTIVE MATERIALS FROM THE 222-S LABORATORY
TO THE 204-AR WASTE UNLOADING FACILITY

This analysis describes the limiting conditions of transfers of radioactive materials, that will take place on a routine basis, between the 222-S Laboratory in the 200 West Area and the 204-AR Waste Unloading Facility in the 200 East Area.

Transfers will occur approximately every six weeks and will contain approximately 3300 gallons of waste. Actual liquid volumes will be as high as 4000 gallons, after the addition of water used for pump priming and pipeline flushing. For calculation purposes, 3300 gallons is used, to maximize the radioactive concentration of the transfers. The transfers will be made in a MC-312 Tanker Truck, which is approved by the U.S. Department of Transportation (DOT) for transportation of low specific activity (LSA) material.

Three criteria must be met for a liquid waste to be considered LSA material:

1. The total concentration of radionuclides must be less than 0.001 mCi/g [49 CFR 173.425 (c)(1)(iii)].
2. The contribution of material with an A2 value less than 0.05 must be less than one percent [49 CFR 173.425 (c)(1)(iii)].
3. The radionuclide concentration cannot exceed ten percent of the LSA levels [49 CFR 173.425 (c)(2)(ii)].

The radionuclides of concern are Cesium-137, Strontium-89/90, Plutonium-239/240, and Americium-241. Based on values given in 49 Code of Federal Regulations (CFR) 173.403 to 173.435, the three criteria can be expressed as the following inequalities:

1. $[Cs] + [Sr] + [Pu] + [Am] < 0.001 \text{ mCi/g}$

2.
$$\frac{[Pu] + [Am]}{[Cs] + [Sr] + [Pu] + [Am]} < 0.01$$

3.
$$\frac{[Cs]}{0.03} + \frac{[Sr]}{0.0005} + \frac{[Pu]}{0.00001} + \frac{[Am]}{0.00001} < 1$$

Where:

[Cs] is the concentration of Cs-137 in mCi/g
[Sr] is the concentration of Sr-89/90 in mCi/g
[Pu] is the concentration of Pu-239/240 in mCi/g and
[Am] is the concentration of Am-241 in mCi/g.

9112310793

The waste transferred must meet the criteria of LSA materials. However, a waiver is being sought from DOT authorizing the use of MC-312 tanker trucks for waste that exceeds the second criteria for LSA materials. In no event, however, will the contribution of materials with an A2 value less than 0.05 exceed five percent of the radionuclide content. If the waiver is granted, the second equation can be expressed as:

$$\frac{[Pu] + [Am]}{[Cs] + [Sr] + [Pu] + [Am]} < 0.05$$

In order to determine the dose to the maximally exposed offsite individual as a result of these transfers (using the methodology described in 40 CFR 61 Appendix D), maximum concentration values (which can be converted to total content if the volume and density of the waste is known) are required. However, three inequalities with four variables cannot be solved directly, so simplification of the problem was required. Based on criteria one, the concentration of any of the four radionuclides of concern cannot exceed 0.001 mCi/g. Based on criteria three, the concentration of Cs-137 cannot exceed 0.03 mCi/g, the concentration of Sr-90 cannot exceed 0.0005 mCi/g, and the concentration of Pu-239/240 or Am-241 cannot exceed 0.00001 mCi/g. If all four radionuclides were present in these maximum concentrations, criteria two would not be violated. However, all four radionuclides cannot be present in these maximum concentrations simultaneously, as this would violate at least one criteria. Therefore, the assumption that each radionuclide is present in the maximum concentration provides a larger radiological content of the waste than would be allowed.

Each transfer contains approximately 3300 gallons of waste, and as many as nine transfers would be made in any twelve month period (approximately one transfer every six weeks). Based on this and the maximum concentration discussed above, the yearly inventory of transfers is:

112. Ci Cs-137
56.2 Ci Sr-90
1.12 Ci Pu-239/240
1.12 Ci Am-241.

To calculate the dose to the theoretical maximally exposed offsite individual by the methodology of 40 CFR 61 Appendix D, the yearly radioactive inventory is divided by 1000 (the waste is a liquid) and the quotient is used as input to an U.S. Environmental Protection Agency (EPA) approved dose code (in this case, AIRDOS.PC). By the very nature of the fact that this is a transfer, the source moves and is closest to the maximally exposed offsite individual at the 204-AR Waste Unloading Facility, approximately 16 km West of the individual. The resulting offsite dose to the theoretical maximally exposed offsite individual is 0.039 mrem/yr, well below one percent of the EPA emissions standard for radionuclides. Enclosed is the output from the AIRDOS.PC run which calculated this offsite dose.

This dose is an upper limit to the dose received as a result of transfers of LSA materials, or materials meeting DOT approved waivers to the LSA requirements. The dose is based on a transfer occurring every six weeks, with each transfer containing the maximum possible quantity of each radionuclide. Obviously, every transfer will not contain the maximum quantity of each radionuclide, and therefore the actual Appendix D dose will be less than 0.039 mrem/yr.

9112310791

CHECKLIST TO DOCUMENT HEDOP REVIEW AND APPROVAL

Document Reviewed (Complete reference) Appendix by Cathy Sowa in the
Department of Health Notification for the Routine Transfers Between
222-S and 204-AR (External Letter 9155393)

Yes No* N/A

[] [] Uses Hanford site data?

[] [] HEDOP-approved code(s) used? (use "NO" for non-approved codes,
and describe) *AIRDOS-PC used*

[] [] There are no model adjustments external to the computer
program? (for example, no adjustments for airborne release
durations longer than 8 hours, but less than 6 months)

[] [] Receptor locations selected according to HEDOP recommendations?

[] [] Are all applicable environmental pathways and code options
included and appropriate to the calculations?

[] Supporting notes, calculations, or other information is attached.
(Indicate number of pages and describe briefly. Be sure to sign and
date each added page.)

[] Approval granted on behalf of the Hanford Environmental Dose
Overview Panel?

Reviewer Name: Paul D. Rittmann, PhD CHP
(print or type)

Signature: Paul Rittmann Date: 8-2-91

*All "NO" responses must be explained and use of non-standard methods
justified.

9123101796

40 CFR Part 61
National Emission Standards
for Hazardous Air Pollutants

CLEAN AIR ACT COMPLIANCE REPORT
(Version 3.0 November 1989)

Facility: Transfers from 222-S to 204-AR

Address: P.O. Box 1970
Richland, WA. 99352

Annual Assessment for Year: 1991

Date Submitted: 6/12/91

Comments: Based on 9 transfers/year,
simplified maximum inventory

Prepared By:

Name: C. E. Sowa
Title: Engineer
Phone: (509) 376-2780

Prepared for:
U.S. Environmental Protection Agency
Office of Radiation Programs
Washington, D.C. 20460

9112310797

CLEAN AIR ACT COMPLIANCE REPORT

6/12/91 9:30 AM

Facility: Transfers from 222-S to 204-AR

Address: P.O. Box 1970

City: Richland

State: WA

Comments: Based on 9 transfers/year, simplified maximum inventory

Year: 1991

Dose Equivalent Rates to Nearby
Individuals (mrem/year)

Effective Dose Equivalent	0.0400
Highest Organ Dose is to ENDOSTEUM	0.3700

-----EMISSION INFORMATION-----

Radio-nuclide	Class	Amad	Stack #1 (Ci/y)
CS-137	D	1.0	1.1E-01
BA-137M	D	1.0	1.1E-01
SR-90	D	1.0	5.6E-02
Y-90	Y	1.0	5.6E-02
PU-239	Y	1.0	1.1E-03
AM-241	W	1.0	1.1E-03
BA-137M	D	1.0	0.0E-01
Stack Height (m)			10.00
Stack Diameter (m)			0.00

Entered (m): --A-- --B-- --C-- --D-- --E-- --F-- --G--
 0.00 0.00 0.00 0.00 0.00 0.00 0.00

-----SITE INFORMATION-----

Wind Data	JF20010.WND	Temperature (C)	12
Food Source	LOCAL	Rainfall (cm/y)	16
Distance to Individuals (m)	16000	Lid Height (m)	1000

*NOTE: The results of this computer model are dose estimates. They are only to be used for the purpose of determining compliance and reporting per 40 CFR 61.93 and 40 CFR 61.94.

9112310798

6/12/91 9:30 AM

ORGAN DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL

ORGAN	DOSE EQUIVALENT RATE TO THE ORGAN (mrem/y)
GONADS	2.0E-02
BREAST	1.6E-02
RED MARROW	6.1E-02
LUNGS	4.0E-02
THYROID	1.7E-02
ENDOSTEUM	3.7E-01
REMAINDER	2.8E-02
EFFECTIVE	4.0E-02

Transfers from 222-S to 204-AR

9112310799

6/12/91 9:30 AM

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY PATHWAY FOR ALL RADIONUCLIDES

	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
INGESTION	9.3E-03	7.9E-02
INHALATION	1.9E-02	2.8E-01
AIR IMMERSION	2.4E-10	3.4E-10
GROUND SURFACE	1.1E-02	1.1E-02
TOTAL:	4.0E-02	3.7E-01

91123101800

Transfers from 222-S to 204-AR

6/12/91 9:30 AM

DOSE TO THE MAXIMALLY EXPOSED INDIVIDUAL
BY RADIONUCLIDE FOR ALL PATHWAYS

RADIONUCLIDE	EFFECTIVE DOSE EQUIVALENT (mrem/y)	DOSE EQUIVALENT TO THE ORGAN WITH THE HIGHEST DOSE ENDOSTEUM (mrem/y)
CS-137	3.4E-03	2.2E-03
BA-137M	8.4E-13	8.4E-13
SR-90	4.7E-03	5.2E-02
Y-90	1.0E-05	5.9E-08
PU-239	8.0E-03	8.7E-02
AM-241	1.2E-02	2.1E-01
BA-137M	1.1E-02	1.1E-02
TOTAL :	4.0E-02	3.7E-01

Transfers from 222-S to 204-AR

91123101001

6/12/91 9:30 AM

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION
OF DISTANCE IN THE DIRECTIONS OF THE
MAXIMALLY EXPOSED INDIVIDUAL FOR
ALL RADIONUCLIDES AND ALL PATHWAYS

DIRECTION : EAST-SOUTHEAST

DISTANCE (meters)	EFFECTIVE DOSE EQUIVALENT (mrem/y)
16000	4.0E-02
80000	3.7E-03

Transfers from 222-S to 204-AR

91023101902

6/12/91 9:30 AM

EFFECTIVE DOSE EQUIVALENT AS A FUNCTION
OF ALL DISTANCES AND ALL DIRECTIONS FOR ALL
RADIONUCLIDES AND ALL PATHWAYS

DIRECTIONS:	N	NNE	NE	ENE	E	ESE	SE	SSE
DISTANCE (METERS):								
16000	1.4E-02	1.1E-02	1.5E-02	2.2E-02	3.9E-02	4.0E-02	3.1E-02	1.7E-02
80000	1.0E-03	8.6E-04	1.2E-03	2.0E-03	3.5E-03	3.7E-03	2.9E-03	1.4E-03
	S	SSW	SW	WSW	W	WNW	NW	NNW
DISTANCE (METERS):								
16000	1.5E-02	7.9E-03	6.5E-03	5.9E-03	9.8E-03	1.1E-02	1.2E-02	1.1E-02
80000	1.1E-03	6.2E-04	4.9E-04	4.2E-04	7.0E-04	7.3E-04	9.2E-04	8.5E-04

Transfers from 222-S to 204-AR

91123101803

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:38:33

Page A. 1

 This is a far-field (wide-scale release, multiple site) scenario.
 Release is chronic
 Individual dose

THE FOLLOWING TRANSPORT MODES ARE CONSIDERED
 Air

THE FOLLOWING EXPOSURE PATHS ARE CONSIDERED:
 Infinite plume, external
 Ground, external
 Inhalation uptake
 Drinking water ingestion
 Terrestrial foods ingestion
 Animal product ingestion
 Inadvertent soil ingestion

THE FOLLOWING TIMES ARE USED:
 Intake ends after (yr): 1.0
 Dose calculations ends after (yr): 70.0
 Release ends after (yr): 1.0

===== FILENAMES AND TITLES OF FILES/LIBRARIES USED =====

Input file name: \GENII\transfer.in	6-11-91
GENII Default Parameter Values (28-Mar-90 RAP)	3-28-90
Radionuclide Master Library (11/15/90 PDR)	11-15-90
Food Transfer Factor Library - (RAP 29-Aug-88) (UPDATED LEACHING FA	8-29-88
Bioaccumulation Factor Library - (30-Aug-88) RAP	8-30-88
External Dose Factors for GENII in person Sv/yr per Bq/n (8-May-90 R	5-08-90
Internal Dose Increments, Worst Case Solubilities, 12/3/90 PDR	12-03-90
200 AREA - 10 M - Pasquill A - F (1983 - 1987 Average)	

----- Release Terms -----

Release	Surface Buried		
Radio-	Air	Water	Source
nuclide	Ci/yr	Ci/yr	Ci/m3
SR90	5.6E-02	0.0E+00	0.0E+00
Y 90	5.6E-02	0.0E+00	0.0E+00
CS137	1.1E-01	0.0E+00	0.0E+00
PU239	1.1E-03	0.0E+00	0.0E+00
AM241	1.1E-03	0.0E+00	0.0E+00

===== AIR TRANSPORT =====

Joint frequency data input.
 1.6E+04 Maximum individual distance from release point (m)
 1.3E+01 Maximum individual sector index (Wind Toward E)
 1.0E+01 Effective stack height (m)

400116716

===== EXTERNAL EXPOSURE =====
 8.8E+03 Hours of exposure to plume
 4.4E+03 Hours of exposure to ground contamination

===== INHALATION =====
 8.8E+03 Hours of inhalation exposure per year
 Resuspension not considered

===== INGESTION POPULATION =====
 1 Atmospheric production definition: 1 - Use population-weighted chi/Q

===== DRINKING WATER SOURCE/IRRIGATION =====
 7.3E+02 Drinking water consumption rate (l/yr)
 0 Drinking water source: 1-ground, 2-surface, 3-system
 T Drinking water treatment: T/F
 1.0 Drinking water transit/holdup time (d)

===== TERRESTRIAL FOOD INGESTION =====

FOOD TYPE	GROW TIME d	--IRRIGATION-- S RATE * in/yr		TIME mo/yr	YIELD kg/m2	PROD- UCTION kg/yr	--CONSUMPTION-- HOLDUP d		RATE kg/yr
Leaf Veg	90.0	0	0.0	0.0	1.5		1.0	3.0E+01	
Oth. Veg	90.0	0	0.0	0.0	4.0		5.0	2.2E+02	
Fruit	90.0	0	0.0	0.0	2.0		5.0	3.3E+02	
Cereals	90.0	0	0.0	0.0	0.8		180.0	8.0E+01	

===== ANIMAL FOOD INGESTION =====

FOOD TYPE	---HUMAN---		TOTAL PROD- UCTION kg/yr	DRINK WATER CONTAM FRACT.	DIET FRAC- TION	GROW TIME d	---STORED FEED---		YIELD kg/m3	STOR- AGE d
	CONSUMPTION RATE kg/yr	HOLDUP d					-IRRIGATION-- S RATE * in/yr	TIME mo/yr		
Meat	8.0E+01	15.0		0.00	0.3	90.00	0	0.0	0.0	0.80 180.0
Poultry	1.8E+01	1.0		0.00	1.0	90.00	0	0.0	0.0	0.80 180.0
Cow Milk	2.7E+02	1.0		0.00	0.3	45.00	0	0.0	0.0	2.00 100.0
Eggs	3.0E+01	1.0		0.00	1.0	90.00	0	0.0	0.0	0.80 180.0
-----FRESH FORAGE-----										
Meat					0.75	45.0	0	0.0	0.0	2.00 100.0
Cow Milk					0.75	30.0	0	0.0	0.0	1.50 0.0

Input prepared by: _____ Date: _____
 Input checked by: _____ Date: _____

9112310105

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:38:51

Page B. 1

7.8E-08 Individual chi/Q

91123101606

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 1

Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 70.0
 Dose units: Rem

Organ	Committed Dose Equivalent	Weighting Factors	Weighted Dose Equivalent
Gonads	1.0E-05	2.5E-01	2.5E-06
Breast	2.2E-06	1.5E-01	3.3E-07
R Marrow	4.9E-05	1.2E-01	5.9E-06
Lung	5.4E-06	1.2E-01	6.5E-07
Thyroid	2.2E-06	3.0E-02	6.7E-08
Bone Sur	5.0E-04	3.0E-02	1.5E-05
Liver	7.6E-05	6.0E-02	4.5E-06
LL Int.	4.9E-06	6.0E-02	2.9E-07
UL Int.	3.4E-06	6.0E-02	2.0E-07
S Int.	2.8E-06	6.0E-02	1.7E-07
Stomach	2.7E-06	6.0E-02	1.6E-07
Internal Effective Dose Equivalent			3.0E-05
External Dose			6.0E-08
Annual Effective Dose Equivalent			3.0E-05

 Controlling Organ: Bone Sur
 Controlling Pathway: Inh
 Controlling Radionuclide: AM241

 Total Inhalation EDE: 2.5E-05
 Total Ingestion EDE: 5.1E-06

70810127116

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 2

Release period:

1.0

Uptake/exposure period:

1.0

Dose commitment period:

70.0

Dose units:

Rem

	Dose Commitment Year				
	1	2	3	...	
Internal Intake Year:					
3			0.0E+00	...	
2		0.0E+00	0.0E+00	...	Internal Effective Dose Equivalent
1	3.5E-06	+ 1.0E-06	+ 7.9E-07	+ ... = 3.0E-05	
					Cumulative Internal Dose
Internal Annual Dose	3.5E-06	+ 1.0E-06	+ 7.9E-07	+ ... = 3.0E-05	
	+	+	+	+	
External Annual Dose	6.0E-08	0.0E+00	0.0E+00	... 6.0E-08	
					Cumulative Dose
Annual Dose	3.5E-06	+ 1.0E-06	+ 7.9E-07	+ ... = 3.0E-05	
				3.5E-06	Maximum Annual Dose Occurred In Year 1

91123101800

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 4

Release period:
Uptake/exposure period:
Dose commitment period:
Dose units:

1.0
1.0
70.0
Rem

External Dose by Exposure Pathway

Pathway	
-----	-----
Plume	9.9E-10
Sur Soil	5.9E-08
-----	-----
Total	6.0E-08

91123111810

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 5

Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 70.0
 Dose units: Rem

Cumulative Internal Dose to Organs by Exposure Pathway

Pathway	Lung	Stomach S Int.	UL Int.	LL Int.	Bone Su R	Marro	Testes	
Inhale	3.0E-06	7.7E-08	8.4E-08	1.1E-07	1.5E-07	4.6E-04	3.7E-05	7.1E-06
Leaf Veg	1.5E-07	1.7E-07	1.9E-07	2.7E-07	4.8E-07	7.7E-06	1.6E-06	2.4E-07
Oth. Veg	2.1E-07	2.5E-07	2.8E-07	4.8E-07	9.7E-07	1.3E-05	3.4E-06	3.4E-07
Fruit	2.2E-07	2.6E-07	2.8E-07	5.0E-07	1.0E-06	1.4E-05	3.6E-06	3.5E-07
Cereals	7.9E-08	9.0E-08	9.6E-08	1.4E-07	2.5E-07	4.0E-06	8.1E-07	1.3E-07
Meat	1.1E-06	1.2E-06	1.2E-06	1.2E-06	1.3E-06	1.6E-06	1.3E-06	1.2E-06
Poultry	9.3E-09	1.0E-08	1.0E-08	1.0E-08	1.0E-08	1.0E-08	9.9E-09	1.0E-08
Cow Milk	5.4E-07	5.9E-07	5.9E-07	6.2E-07	7.0E-07	2.3E-06	1.3E-06	5.8E-07
Eggs	1.7E-09	1.9E-09	1.9E-09	2.2E-09	3.0E-09	2.0E-08	9.2E-09	1.9E-09
Soil Ing	2.8E-10	3.1E-10	3.4E-10	4.9E-10	8.6E-10	1.4E-08	2.8E-09	4.4E-10
Water	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	5.4E-06	2.7E-06	2.8E-06	3.4E-06	4.9E-06	5.0E-04	4.9E-05	1.0E-05

Pathway	Ovaries	Muscle	Thyroid	Liver
Inhale	7.0E-06	6.9E-08	6.9E-08	7.2E-05
Leaf Veg	2.3E-07	1.4E-07	1.4E-07	8.1E-07
Oth. Veg	3.2E-07	2.0E-07	2.0E-07	1.1E-06
Fruit	3.3E-07	2.0E-07	2.0E-07	1.1E-06
Cereals	1.2E-07	7.3E-08	7.3E-08	4.2E-07
Meat	1.1E-06	1.0E-06	1.0E-06	2.3E-09
Poultry	9.3E-09	8.6E-09	8.6E-09	2.0E-12
Cow Milk	5.4E-07	5.0E-07	5.0E-07	8.6E-11
Eggs	1.7E-09	1.6E-09	1.6E-09	1.6E-10
Soil Ing	4.2E-10	2.5E-10	2.5E-10	1.5E-09
Water	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total	9.7E-06	2.2E-06	2.2E-06	7.6E-05

9123008

GENII Dose Calculation Program
(Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 6

Release period: 1.0
Uptake/exposure period: 1.0
Dose commitment period: 70.0
Dose units: Rem

External Dose by Exposure Pathway

Pathway	
-----	-----
Plume	9.9E-10
Sur Soil	5.9E-08
-----	-----
Total	6.0E-08

9112310002

 GENII Dose Calculation Program
 (Version 1.485 3-Dec-90)

Case title:

Executed on: 06/11/91 at 11:41:14

Page C. 8

Release period: 1.0
 Uptake/exposure period: 1.0
 Dose commitment period: 70.0
 Dose units: Rem

Cumulative Internal Dose to Organs by Radionuclide

Radionuclide	Lung	Stomach	S Int.	UL Int.	LL Int.	Bone Su	R Marro	Testes
SR 90	1.5E-08	2.2E-08	3.3E-08	2.0E-07	8.7E-07	2.1E-05	9.2E-06	1.0E-08
Y 90	4.3E-08	4.5E-08	1.1E-07	5.4E-07	1.3E-06	8.7E-11	8.6E-11	2.9E-12
CS 137	2.4E-06	2.6E-06	2.6E-06	2.6E-06	2.6E-06	2.4E-06	2.4E-06	2.6E-06
AM 241	1.5E-06	7.9E-10	1.9E-09	1.0E-08	3.1E-08	2.4E-04	1.9E-05	3.7E-06
PU 239	1.4E-06	7.2E-10	1.7E-09	9.3E-09	2.9E-08	2.4E-04	1.9E-05	3.7E-06
Total	5.4E-06	2.7E-06	2.8E-06	3.4E-06	4.9E-06	5.0E-04	4.9E-05	1.0E-05

Radionuclide	Ovaries	Muscle	Thyroid	Liver
SR 90	1.0E-08	1.0E-08	1.0E-08	0.0E+00
Y 90	2.9E-12	2.8E-12	2.9E-12	8.6E-11
CS 137	2.4E-06	2.2E-06	2.2E-06	0.0E+00
AM 241	3.6E-06	9.2E-11	8.7E-11	3.8E-05
PU 239	3.6E-06	8.0E-11	8.0E-11	3.7E-05
Total	9.7E-06	2.2E-06	2.2E-06	7.6E-05

External Dose by Radionuclide

Radionuclide	
SR 90	5.7E-12
Y 90	3.1E-10
CS 137	5.9E-08
AM 241	4.7E-12
PU 239	4.6E-14
Total	6.0E-08

START

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CORRESPONDENCE DISTRIBUTION COVERSHEET

Author: E. A. Bracken, RL Addressee: Al Conklin, DOH Correspondence No.: Incoming: 9104247
Reference: 9155393

Subject: NOTIFICATION TO THE DEPARTMENT OF HEALTH OF ROUTINE TRANSFERS
BETWEEN 222-S AND 204-AR

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