

APPENDIX D

GUIDES FOR RELEASE OF RADIOACTIVITY FROM THE SAVANNAH RIVER PLANT

I. GUIDE FOR OFFSITE EXPOSURE (REVISED 1976)

This guide is the SRP administrative control for limiting offsite effects from releases of radioactivity. In this context, a guide states the value of the relevant parameter for which the probability of harmful consequences is acceptably low. Revisions are made to the guide when warranted by new information or experience.

This guide does not in any way modify the guides stated in ERDA Manual chapter 0524 or those recommended by the ICRP, NCRP, and FRC for control of population exposure. The numerical limit recommended by these standards-setting organizations of 170 mrem/yr for the average dose to the whole population remains as the basic radiation protection criterion for control of public exposure. The guide limits indicate the Savannah River Plant's objective to keep off-site exposures as far below this criterion as practicable.

A. Applicability

This guide applies to the release of radioactive materials in gaseous and liquid effluents from the Savannah River Plant.

B. Objective

The objective for prescribing the dose limits in this guide is to keep exposures to the public in the vicinity of the Savannah River Plant as low as practicable.

C. Limits

The annual exposure to an individual in the off-plant population caused specifically by release of radioactivity from the Savannah River Plant shall not exceed the following limits:

<u>Type of Exposure</u>	<u>Dose Limit, mrem/year</u>
Whole Body	10
Gonads	10
Bone Marrow	10
Gastrointestinal Tract	30
Bone	30
Thyroid	30
All other organs	30

D. Bases

The bases for this guide are operating experience, recommendations of the International Commission on Radiological Protection (ICRP), the National Council on Radiation Protection and Measurements (NCRP), the Federal Radiation Council (FRC), and the guidelines of the Energy Research and Development Administration (ERDA).

E. Risks

The guide limits are only 6% of the numerical guides recommended by the ICRP, NCRP, and FRC for population exposure. The guides were established by these authoritative organizations on the basis of conservative assumptions and were set substantially below levels where biological damage has been observed in humans. Thus the SRP guide limits represent no significant health risk to the population in the vicinity of the Savannah River Plant.

Another measure of the minimal risk represented by the guide limits can be obtained by comparing them with the exposure from natural radiation background. A person living at the boundary of the Savannah River Plant receives an annual exposure of 120 mrem from natural radiation sources. The whole body exposure limit of 10 mrem per year specified in this guide is approximately 8% of the natural radiation background dose. With the maximum annual exposure of an individual restricted to 10 mrem, the average exposure to the general population in the vicinity of the plant would be approximately 1% of natural radiation background. It is proper to compare the 10 mrem/yr limit, rather than 30 mrem/yr limit, because it applies to the organs of consequence of radiation-induced leukemia and genetic damage, the important effects when assessing the impact of low radiation exposure of a large population.

II. OPERATING GUIDES FOR RELEASE OF RADIOACTIVITY

These SRP operating guides state values for radioactivity releases that are achievable with good operating practice, and are based on the continuing objective of reducing radioactive effluents to the lowest practical levels. The guides are reviewed at least annually and increased or decreased as needed to reflect best current operating practice, experience, and production commitments.

A. Plant Release Guides for Radioactive Liquids, 1976

1. REACTOR AREAS

The quantity of each radionuclide entering plant streams or basins from all reactor areas shall not exceed the following guides.

<u>Radionuclides</u>	<u>Ci/yr</u>
^3H	50,000
^{32}P	0.14
^{35}S	2.5
^{51}Cr	0.88
$^{58,60}\text{Co}, ^{59}\text{Fe}$	0.08
^{65}Zn	0.04
^{89}Sr	0.34
^{90}Sr	0.15
^{91}Y	0.34
$^{95}\text{Zr}-^{95}\text{Nb}$	0.60
$^{103}\text{Ru}, ^{106}\text{Ru}-\text{Rh}$	0.10
$^{124}, ^{125}\text{Sb}$	0.10
^{131}I	0.34
^{134}Cs	0.30
^{137}Cs	0.60
$^{140}\text{Ba}-^{140}\text{La}$	0.04
$^{141}\text{Ce}, ^{144}\text{Ce}$	0.35
^{147}Pm	0.23
^{239}Np	0.03
All alpha emitters, total	0.03
All other beta or gamma emitters, total	0.03

2. SEPARATIONS AREAS

a) Seepage Basin

Radioactivity release to separations areas seepage basins shall not exceed the following guides.

<u>Radionuclide</u>	<u>Ci/yr</u>	
	<u>F Area</u>	<u>H Area</u>
³ H	a	a
⁵¹ Cr	b	10.0
⁵⁸ Co	b	1.0
⁶⁰ Co	b	1.0
⁶⁵ Zn	b	1.0
⁸⁹ Sr	0.2	0.5
⁹⁰ Sr	0.2	0.8
⁹⁵ Zr	5.0	1.5
⁹⁵ Nb	5.0	2.5
¹⁰³ Ru	2.0	2.5
¹⁰⁶ Ru	20.0	10.0
^{124, 125} Sb	b	0.2
¹³¹ I	1.0	0.8
¹³⁴ Cs	0.5	1.0
¹³⁷ Cs	5.0	10.0
¹⁴¹ Ce	0.1	0.5
¹⁴⁴ Ce	0.5	2.5
¹⁴⁷ Pm	1.0	1.5
All alpha emitters, total	1.0	0.8
All other beta or gamma emitters, total	0.5	0.4

a. 39,000 Ci for both areas.

b. Included in all other beta or gamma emitters guide.

b) *Plant Streams*

Radioactivity releases from the separations areas to plant streams shall not exceed the following guides (total for both areas).

<u>Radionuclide</u>	<u>Ci/yr</u>
³ H	200
^{89, 90} Sr	0.040
^{134, 137} Cs	0.075
All alpha emitters, total	0.2
All other beta or gamma emitters, total	0.01

3. RAW MATERIALS AREA

Liquid releases to streams or basins shall not exceed the following guide.

<u>Radionuclide</u>	<u>Ci/yr</u>
$^{235}, ^{238}\text{U}$	0.5

4. TECHNICAL AREA

a) Seepage Basins

Radioactive nuclide releases to seepage basins from 700-Area Savannah River Laboratory facilities shall not exceed the following guides.

<u>Radionuclide</u>	<u>Ci/yr</u>
^3H	25
$^{89}, ^{90}\text{Sr}$	0.003
$^{134}, ^{137}\text{Cs}$	0.005
$^{235}, ^{238}\text{U}$	0.005
All other alpha emitters, total	0.05
All other beta or gamma emitters, total	0.03

b) Streams

Liquid releases to streams from technical area facilities shall not exceed the following guides.

<u>Radionuclide</u>	<u>Ci/yr</u>
All alpha emitters, total	0.005
All beta or gamma emitters, total	0.010

c) CMX-TNX Seepage Basin

<u>Radionuclide</u>	<u>Ci/yr</u>
$^{235}, ^{238}\text{U}$	0.005
All other alpha emitters, total	0.001
All beta or gamma emitters, total	0.004

5. HEAVY WATER PRODUCTION AREA

Liquid releases from the 400-Area facilities to streams shall not exceed the following guides.

<u>Radionuclide</u>	<u>Ci/yr</u>
³ H	6,500
^{89,90} Sr	0.015
^{134,137} Cs	0.015
All alpha emitters, total	0.005
All other beta or gamma emitters, total	0.2

B. PLANT RELEASE GUIDES FOR ATMOSPHERIC RELEASES, 1976

1. REACTOR AREAS

Radioactivity released to the atmosphere from the reactor area facilities shall not exceed the following guides.

<u>Radionuclide</u>	<u>Ci/yr</u>
³ H	250,000
¹⁴ C	60
⁴¹ Ar	150,000
^{83,85m,87,88} Kr	10,000
¹³¹ I	0.015
^{133m,133,135} Xe	20,000
All other beta or gamma emitters, total	0.003
All alpha emitters, total	2x10 ⁻³

2. SEPARATIONS AREAS

Radioactivity released to the atmosphere from the separations area facilities shall not exceed the following guides.

<u>Radionuclides</u>	<u>Ci/yr</u>
³ H	200,000
¹⁴ C	50
⁸⁵ Kr	950,000
^{89,90} Sr	0.02
⁹⁵ Zr	0.1
⁹⁵ Nb	0.1
¹⁰³ Ru	0.25
¹⁰⁶ Ru	0.5
¹²⁹ I	0.25
¹³¹ I	1.5
^{131m,133} Xe	500
¹³⁴ Cs	0.001
¹³⁷ Cs	0.003
¹⁴¹ Ce	0.004
¹⁴⁴ Ce	0.04
^{235,238} U	0.01
^{238,239} Pu	0.02
All other alpha emitters, total	0.002
All other beta or gamma emitters, total	0.02

3. RAW MATERIALS AREA
Atmospheric releases:

	<u>Radionuclide</u>	<u>Ci/yr</u>
313-M	²³⁸ U	1x10 ⁻⁴
321-M	Total alpha	1x10 ⁻⁴
322-M	³ H	100
322-M	Total alpha	1x10 ⁻⁴

4. HEAVY WATER PRODUCTION AREA
Atmospheric releases:

	<u>Radionuclide</u>	<u>Ci/yr</u>
	³ H	9,000

5. TECHNICAL AREAS

a) Building 773-A Atmospheric Releases:

<u>Radionuclide</u>	<u>Ci/yr</u>
³ H	1,000
⁶⁰ Co	0.005
¹³¹ I	0.05
Other beta or gamma emitters, total	0.001
Alpha emitters, total	0.0002

b) CMX-TNX Atmospheric Releases:

<u>Radionuclide</u>	<u>Ci/yr</u>
³ H	50