

RG 374
 Reports by the Commander JTF 3 on Completion
 of Opn G.H.
 March 1948 - Nov 1953. APPENDIX "B"
 PROGRAM 2.0 - BIOEDICAL

Interservice Agency
 AFSWP Test Div Opns

1. GENERAL

The fundamental objective of this program was to obtain information which can be used in planning effective medical care for the victims of atomic warfare, and for the victims of industrial accidents in nuclear energy plants. 403059

2. FACILITIES

The physical facilities of the biomedical program on PARRY ISLAND, ENIWETOK ATOLL, consisted of personnel and administrative buildings, animal quarters and clinical laboratories, a total of 51 buildings.

3. ANIMALS

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Careful care and attention was given to the breeding of swine, dogs and mice in the tropical climate to insure the development of pure strains suitable for test purposes. At test time, animals to be exposed were healthy and remarkably consistent in their response to injury. The extent of participation of the animals in the four tests is shown in the following table:

Shot	Projects	Number of Mice*	Dogs*	Swine	Stations**
DOG	4	1,170	0	0	16
EASY	16	11,390	164	178	173
GEORGE	8	1,230	0	22	60
ITEM	1	0	16	0	8
TOTALS		13,790	180	200	257

* Includes necessary control animals.

** Actual number of structures in which material was placed on the shot islands.

4. EXPOSURE EQUIPMENT

Five types of exposure equipment were designed and procured for the experimentation; cylinders, hemispheres, thermal shelters, high dose stand types and foxholes. All of the units were satisfactory except for one foxhole (400 yards from ITEM ground zero) which partially caved in. There was no general failure of any equipment, although some of the closest phantoms were damaged by flying debris and some of the electrical circuits failed because of excessive humidity on GEORGE shot. The cylinder and hemisphere units were very satisfactory and provided a unique basic design for exposure equipment to be used in tests of this sort.

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5. MEDIAN LETHAL DOSAGE OF NUCLEAR RADIATION

a. The median lethal dosage (MLD) of nuclear radiation was obtained successfully for mice, dogs and swine. The MLD is defined as that dosage at which 50% mortality is to be expected. On EASY shot, 4,720 mice were exposed in 29 cylinder stations at distances ranging from 1,000 to 1,750 yards and all were recovered alive on E day, 6 hours after the detonation. The mortality rate over a period of 28 days was determined and a smooth curve relating dosage to mortality was obtained. The MLD occurred at the station which was 1,416 yards from ground zero.

b. On EASY shot, 19 swine were placed in each of nine stations at distances ranging from 1,300 to 1,750 yards. The mortality rate over a period of 30 days was determined. On the 30th day after the shot there were two swine living from the station at 1,650 yards and eight living from the station at 1,750 yards. The MLD, therefore, occurred at some distance between 1,650 yards and 1,750 yards from ground zero.

c. On EASY shot, 10 dogs were placed in each of nine stations at the same distance as the swine. The mortality rate was determined over a 30 day period. On E plus 30 days there were 2 dogs living from the station at 1,620 yards, 5 living from the station at 1,650 yards and 9 living from the station at 1,750 yards from ground zero. The MLD, therefore, occurred at about 1,650 yards.

d. The best data were those for mice, from which a smooth dosage mortality curve can be drawn. The observed MLD based on the theoretical gamma radiation yield for the EASY weapon was lower by a factor of approximately 0.7 than the MLD of mice of the same strain exposed to supervoltage X-ray. The MLD for dogs based on the theoretical gamma radiation was approximately the same as that obtained with supervoltage X-ray. When the MLD was based on measurement of film packs placed within the containers in which the dogs were exposed, a somewhat lower value was obtained. The MLD for swine, based on the theoretical gamma radiation, was conspicuously lower than the value obtained with supervoltage X-ray. Tentatively, this discrepancy is attributed to the hot, humid environment, which was tolerated poorly by the swine. It appears that for future field tests, dogs are more satisfactory than swine for the determination of MLD and for the study of therapy on the MLD. Results obtained from the radiation depth dosage (discussed later) offered some explanation for the discrepancies noted in determining the median lethal dosages of the animals.

6. THERMAL RADIATION INJURY

a. On EASY shot, 46 swine and 16 dogs were anesthetized and placed in six

stations ranging from 1,325 to 5,600 yards from ground zero. Of these, 4 died as a result of the anesthesia. Satisfactory burns were obtained for study and biopsy on the animals placed in the five nearest stations.

b. On GEORGE shot, 22 swine were anesthetized and placed in two stations at 3,460 and 4,780 yards from ground zero. Of these, 10 died as a result of anesthesia and inclement weather. The circuits operating the mechanism for the study of time dependency failed because of moisture. The burns that were obtained were satisfactory for gross and microscopic study and for the demonstration of spectral dependency.

c. The equipment used in the burn study functioned satisfactorily; it was shown that the atomic bomb flash burn is caused principally by visible light, less so by infrared, and least of all by ultraviolet. The effort to estimate the time dependency of the burning was less successful. It seems quite certain that no burning occurs during the first maximum of the thermal emission. With the data obtained, it appears that all the burn is inflicted during the first portion of the second maximum and that burning ceases at about 0.3 to 0.5 seconds after the blast. Since this time interval coincides with the peak of the second maximum and since decrease in illumination does not occur until somewhat later, there is uncertainty regarding the significance of the cutoff. Considerable analysis of other phenomena that occur simultaneously is required before the time data can be accepted. Good kodachrome photographs of the burns and excellent biopsy material were obtained, which should aid in the precise clinical definition of this type of flash burn.

7. BIOLOGICAL DOSIMETRY

a. The principal system of biological dosimetry depends upon the measurement of the percent change in the weight of the thymus and spleen of mice on the 5th day after irradiation. Comparison is made with special controls subjected to identical treatment except for the radiation. The effect of total nuclear radiation was studied in hemisphere stations with aluminum domes; the effect of total neutron radiation in hemisphere stations with lead domes; and the effect of fast neutrons, in hemisphere stations with lead cadmium domes. For DOG shot, 480 mice were exposed; for EASY shot, 720; and for GEORGE shot, 360. All mice were recovered alive. A comparable number of special control mice were placed in the hemispheres as a part of the dry run for each shot. The mouse thymus-spleen system worked very well with the expected yield. A consistent difference was observed between the film pack dose estimate and the mouse dose estimate, with the estimate from the mouse system always

lower.

b. Flowering Tradescantia plants were exposed to DOG, EASY and GEORGE shots at distances where the predicted radiation intensity was sufficiently low to produce chromosomal aberrations which could be analyzed. Tradescantia were also placed in drone aircraft for each of the three shots to measure the integrated dose of radiation during the cloud pass. The estimates of dose based on the study of chromosomes agreed well with the preliminary reports of the calibrated film.

c. The Tradescantia system was successful and the results obtained were consistent and agreed well with the measurements made by the mouse thymus-spleen system. The closest agreement between the dose estimates based on Tradescantia and those based on calibrated film was obtained in the drone aircraft experiments where the dose rate was lowest.

8. NUCLEAR RADIATION DEPTH DOSAGE STUDIES

a. Depth dose estimations were made to investigate the quality of the nuclear radiation. The specification of the quality of a beam of ionizing radiation of whatever source is a major problem in clinical radiology. The conventional unit is the half value layer (HVL), and in the case of X-ray therapy the conventional technique involves the use of phantoms constructed from material of unit density. The ability to specify the quality of the radiation from a nuclear weapon is intimately related to the problem of the experimental production of radiation injury, since it is possible that energy dependency and dose distribution may be important limiting factors in determining the type of injury that results.

b. Spherical lucite phantoms were displayed on EASY and GEORGE shots. In each case the nearest group of phantoms was lost due to flying debris. The ionization chambers and film packs were recovered from all the others and were in good condition for study.

c. Swine phantoms which resembled the shape and bulk of the torso of the swine, or a man, were exposed on EASY and GEORGE shots. All were recovered and the film packs contained in them are being processed.

d. The data have not been analyzed from the phantoms that contained calibrated film. In those that contained ionization chambers, it was found that the HVL using lucite (density slightly greater than unity) exceeded 20 centimeters. This finding indicates a very energetic composite radiation, the mean effective energy of which was well in excess of 1.0 Mev. It was mentioned above that the biological estimates of dose at a given distance were consistently lower than that given by

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calibrated film, or theory, by a factor of 0.7. That is to say, the relative biological efficiency of nuclear radiation was greater than unity when compared to supervoltage X-ray. These considerations indicate the need for further study of the energy dependence of biological effects caused by ionizing radiations with energies greater than 1.0 Mev.

9. BLAST INJURY

On "ITEM" shot, sixteen dogs were placed in 8 foxholes, 6 X 3 X 4 feet deep at distances ranging from 400 to 1,500 yards from ground zero. Radiation dosimeters and pressure gauges were also installed. The hole at 400 yards collapsed, burying the occupants. Live animals were recovered from all others. Severe radiation injury was sustained by all animals except those at 1,250 and 1,500 yards. Blast injury to the lungs and brain which might have been fatal ultimately was observed in animals placed at 600 and 800 yards.

10. CLINICAL STUDIES

a. Clinical studies of the characteristics and the time trend of radiation injury were performed. In the case of swine, such studies consisted of serially killing all of the group exposed to the same supralethal dose of gamma radiation. These animals were killed at intervals of hours and days during the first two weeks after the blast to determine the sequence and the extent of the pathological changes that occurred. In the case of the mice, 2,400 survivors of the dosage mortality study were returned to the Oak Ridge National Laboratory for life time study to observe the effects of nuclear radiation on longevity, the incidence of cancer and the occurrence of cataracts.

b. The clinical studies were successful and excellent Kodachrome photographs were obtained of every stage and type of radiation injury. The most significant findings (on the basis of gross examination alone since the histological specimens are still being studied) was the early evidence of injury to the intestinal mucous membrane. This early lesion disappeared after a few hours, but within several days another more severe involvement occurred. The gross appearance of these lesions suggested a vascular injury rather than damage to the epithelium alone. This observation is quite valuable and should become the basis for extensive experimental work in the future. Taken as a whole, the gross pathological findings indicated the essential similarity of radiation injury in man and large animals regardless of whether the source is a nuclear explosion or exposure of the whole body to supervoltage X-ray. Bacteriological studies failed to disclose bacteremia except as a terminal finding in dogs and swine. In spite of this finding, it appeared that

septicemia was the cause of death in many animals. The hematological studies displayed the typical time trend of the leukopenia and the lymphopenia and further demonstrated the fundamental similarity of radiation injury due to exposure of the whole body to nuclear radiation, or to supervoltage X-ray.

APPENDIX A
TABLE 10 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MUSCLE
OF MISCELLANEOUS FISH TAKEN FROM THE COLUMBIA RIVER - 1963

Units of pc/g

<u>Date</u>	<u>Species</u>	<u>Total Beta</u>	<u>p³²</u>	<u>Co⁶⁰</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Co⁵⁸</u>	<u>Cs¹³⁷</u>
Reporting Limits			2	0.7	1	5	0.7	0.7
<u>McNary (continued)</u>								
11-19	Squawfish	33	20	-	3	20	-	-
11-19	Squawfish	30	25	-	5	10	-	-
11-19	Squawfish	41	27	-	6	20	-	-
11-19	Squawfish	39	32	-	4	10	-	-
11-29	Sturgeon	72	61	-	3	10	-	-
11-29	Sturgeon	41	32	-	3	10	-	-
11-29	Sturgeon	120	110	-	-	20	-	-
12-27	Sucker	80	93	-	3	20	-	-
12-27	Sucker	71	73	-	3	20	-	-
12-27	Sucker	110	130	-	3	20	-	-
12-27	Sucker	290	300	-	3	30	-	-
12-27	Sucker	92	93	-	4	30	-	-
12-27	Sucker	71	69	-	3	30	-	-
12-27	Sturgeon	11	8	-	4	6	-	-
12-27	Sturgeon	20	7	-	-	10	-	-

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX A
TABLE 11

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p32</u>
<u>Reporting</u>	<u>Limits</u>	<u>50</u>	<u>50</u>
<u>Benton City</u>			
10-13	Mallard	-	-
10-13	Teal	-	-
10-13	Shoveler	-	-
10-13	Widgeon	-	-
<u>Chandler</u>			
11-17	Mallard	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	-	-
11-17	Teal	-	-
11-17	Teal	-	< 53
11-17	Widgeon	-	< 55
<u>Columbia River</u>			
11-17	Mallard	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	-	-
11-17	"	160	140
11-17	"	-	-
11-17	"	-	-
11-17	"	300	260
11-17	"	59	-
11-17	Golden Eye	530	550
11-17	Mallard	51	-
<u>Connell</u>			
12-29	Canada Goose	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p³²</u>
<u>Gibbon</u>	<u>Reporting Limits</u>	<u>50</u>	<u>50</u>
10-13	Teal	-	-
10-13	"	-	-
10-13	"	-	-
10-13	Widgeon	-	-
10-13	"	-	-
10-13	Mallard	-	-
10-13	"	-	-
<u>Mesa</u>			
10-13	Mallard	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	260	250
10-13	"	-	-
10-13	"	61	-
10-13	"	84	74
10-13	"	-	-
10-13	"	-	-
10-13	"	180	180
10-13	"	57	-
<u>North of Ringold</u>			
11-28	Mallard	-	-
11-28	"	-	-
11-28	"	-	-
11-28	"	-	-
11-28	"	-	-
11-28	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p32</u>
<u>Reporting Limits</u>		<u>50</u>	<u>50</u>
<u>North of Ringold (continued)</u>			
11-28	Mallard	-	-
11-28	"	61	-
11-28	"	-	-
11-28	"	-	-
11-28	"	55	-
11-28	"	57	-
11-28	"	-	-
11-28	"	-	-
11-28	"	-	-
<u>Othello</u>			
11-9	Pintail	-	-
11-9	"	-	-
11-9	Widgeon	-	-
11-9	"	-	-
11-9	Mallard	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-9	"	-	-
11-16	Mallard	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p32</u>
<u>Reporting Limits</u>		<u>50</u>	<u>50</u>
<u>Othello (continued)</u>			
11-16	Mallard	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-16	"	-	-
11-26	Widgeon	62	-
11-24	Mallard	52	-
11-24	"	-	-
11-24	"	80	87
11-24	"	-	-
11-24	"	120	80
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	90	92
11-24	"	-	-
11-24	"	-	-
11-24	"	140	170
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
11-24	"	-	-
12-1	Mallard	-	-
12-1	"	-	-
12-1	"	-	-
12-1	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Reporting Limits</u>	<u>Specie</u>	<u>Beta</u> 50	<u>p32</u> 50
<u>Othello (continued)</u>				
12-1		Mallard	-	-
12-1		"	-	-
12-1		"	-	-
12-1		"	-	-
12-1		"	-	-
12-1		"	-	-
12-8		Mallard	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-8		"	-	-
12-15		Mallard	-	-
12-15		"	140	110
12-15		"	-	-
12-15		"	-	-
12-15		"	-	-
12-15		"	230	250
12-15		"	59	-
12-15		"	-	-
12-15		"	-	-
12-15		"	69	56
12-15		"	-	-
12-15		"	-	-
12-15		"	-	-
12-15		"	-	-
12-15		"	60	-
12-15		"	-	-
12-15		"	-	-
12-15		"	95	77
12-15		"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p32</u>
<u>Reporting Limits</u>		<u>50</u>	<u>50</u>
<u>Othello (continued)</u>			
12-15	Mallard	-	-
12-15	"	-	-
12-15	"	-	-
12-15	"	-	-
12-15	"	-	-
12-15	"	-	-
12-22	Mallard	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	160	150
12-22	"	310	290
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	50	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	84	65
12-22	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Reporting Limits</u>	<u>Beta</u> <u>50</u>	<u>p32</u> <u>50</u>
<u>Othello (continued)</u>			
12-22	Mallard	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
12-22	"	-	-
<u>Prosser</u>			
11-30	Mallard	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	"	-	-
11-30	Widgeon	-	-
12-12	Mallard	-	-
12-12	"	-	-
12-12	"	-	-
12-12	"	-	-
12-12	"	-	-
12-12	"	-	-
<u>Richland</u>			
12-17	Mallard	-	-
12-17	"	-	-
12-17	"	-	-
12-17	"	-	-
12-17	"	-	-

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p32</u>
<u>Reporting Limits</u>		<u>50</u>	<u>50</u>
<u>Richland (continued)</u>			
12-17	Mallard	54	-
12-17	"	-	-
12-17	"	-	-
12-17	"	-	-
12-20	Mallard	170	150
<u>Scootney Reservoir</u>			
10-13	Mallard	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	Widgeon	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	Pintail	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 11 (Continued)

CONCENTRATIONS OF BETA EMITTERS
IN WATERFOWL CONTRIBUTED BY HUNTERS - 1963
Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Beta</u>	<u>p³²</u>
<u>Reporting Limits</u>		<u>50</u>	<u>50</u>
<u>Scootney Reservoir</u>			
10-13	Pintail	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	"	-	-
10-13	Shoveler	-	-
<u>Yakima & Potholes</u>			
10-12	Mallard	-	-
10-12	"	-	-
10-12	"	-	-
10-12	"	-	-
10-12	"	-	-
10-12	"	100	100
10-12	"	-	-
10-12	"	-	-
10-12	"	-	-
10-12	"	-	-
10-27	Mallard	-	-
<u>Yakima River</u>			
11-13	Mallard	110	100
11-13	Teal	-	-
12-8	Pintail	-	-
12-8	"	-	-
12-8	Mallard	-	-
12-8	"	-	-
12-8	"	-	-
12-8	"	-	-
12-8	"	-	-
12-8	"	-	-
12-29	Mallard	-	-
12-29	"	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 12

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p32</u>	<u>Beta</u>	<u>p32</u>
Reporting Limits		50	50	50	50
<u>East Swamp</u>					
10-13	Pintail	-	-	-	-
10-13	Mallard	-	-	-	-
10-13	Mallard	120	-	180	-
10-13	Mallard	-	-	93	-
10-13	Mallard	-	-	-	-
11-8	Mallard	400	-	300	-
11-8	Ruddy Duck	-	-	-	-
11-8	Ruddy Duck	-	-	-	-
11-8	Coot	260	-	270	-
11-8	Coot	-	-	-	-
12-11	Merganser	3500	260	1600	250
12-11	Ruddy Duck	1100	-	870	-
12-19	Mallard	-	-	-	-
<u>West Swamp</u>					
10-23	Mallard	2300	-	640	-
10-23	Mallard	-	-	-	-
10-23	Coot	88	-	490	-
10-23	Ruddy Duck	800	-	1000	-
10-23	Shoveler	190	-	170	-
10-23	Widgeon	-	-	-	-
11-8	Coot	-	-	-	-
11-8	Coot	350	-	390	-
11-15	Ruddy Duck	4700	-	1800	-
11-15	Ruddy Duck	1800	-	1400	74
11-15	Golden Eye	210	66	140	83
12-11	Golden Eye	240	-	270	-
12-11	Golden Eye	200	-	68	-
12-11	Golden Eye	1600	360	1800	380
12-11	Golden Eye	-	-	-	-
12-11	Golden Eye	680	56	540	66
12-11	Golden Eye	170	-	370	-

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX A
TABLE 12 (Continued)

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p32</u>	<u>Beta</u>	<u>p32</u>
Reporting Limits		50	50	50	50
<u>West Swamp (continued)</u>					
12-11	Golden Eye	950	54	740	130
12-11	Golden Eye	300	70	190	-
12-11	Golden Eye	240	180	1100	460
12-11	Golden Eye	270	130	510	-
12-11	Golden Eye	530	-	430	-
12-11	Golden Eye	2500	-	1300	-
12-11	Golden Eye	210	-	220	-
<u>Hanford</u>					
12-12	Teal	6100	4800	5200	4600
12-12	Teal	1200	1100	1600	1300
12-12	Teal	1700	1400	2000	1700
12-12	Teal	3100	2600	3300	3100
12-12	Teal	1600	1400	1500	1500
12-12	Teal	2300	2000	2300	2200
12-12	Coot	340	340	320	270
12-12	Coot	290	270	280	220
<u>Upper River</u>					
10-4	Merganser	1100	1100	1100	920
10-4	Merganser	2700	2800	7400	7500
10-7	Merganser	2500	2500	2600	2300
10-7	Merganser	3500	3500	7800	7700
10-7	Merganser	1100	1100	2300	2400
10-7	Mallard	-	-	-	-
10-7	Canadian Goose	-	-	-	-
10-7	Asian Goose	-	-	-	-
10-8	Mallard	150	150	170	140
10-8	Mallard	120	110	110	94
10-8	Mallard	-	-	-	-
10-8	Coot	-	-	-	-
10-15	Merganser	1300	1100	1100	1000

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 12 (Continued)

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p32</u>	<u>Beta</u>	<u>p32</u>
Reporting Limits		50	50	50	50
<u>Upper River (continued)</u>					
10-15	Merganser	1100	980	1100	1000
10-15	Mallard	170	130	1300	1200
10-15	Goose	130	120	320	290
10-25	Lesser Goose	-	-	-	-
10-25	Lesser Goose	-	-	-	-
10-25	Merganser	330	320	280	280
11-1	Coot	68	54	340	99
11-1	Mallard	-	-	-	-
11-1	Mallard	380	370	340	320
11-1	Mallard	2800	2800	1900	2000
11-1	Mallard	75	69	-	-
11-7	Golden Eye	130	140	110	130
11-7	Golden Eye	250	220	200	240
11-7	Golden Eye	620	600	620	700
11-12	Merganser	950	900	1000	1000
11-26	Golden Eye	2400	2000	3100	3100
11-26	Golden Eye	2000	1900	2500	2700
11-26	Golden Eye	1400	1400	2000	1900
11-26	Golden Eye	3000	3200	4000	4400
11-26	Golden Eye	3000	3200	3200	3100
11-26	Golden Eye	4100	4200	5700	5800
11-26	Mallard	120	110	160	110
11-26	Mallard	-	-	-	-
11-26	Merganser	96	78	69	67
11-26	Coot	200	200	170	120
12-3	Goose	-	-	-	-
12-3	Goose	-	-	-	-
12-3	Goose	-	-	-	-
12-3	Mallard	-	-	58	-
12-3	Mallard	150	-	-	-
12-3	Mallard	1500	1400	1100	1000
12-3	Golden Eye	300	250	330	310
12-3	Golden Eye	250	220	360	380
12-19	Coot	-	-	-	-
12-20	Golden Eye	1000	1100	1200	1300

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 12 (Continued)

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p32</u>	<u>Beta</u>	<u>p32</u>
Reporting Limits		50	50	50	50
<u>Upper River (continued)</u>					
12-23	Goose	-	-	-	-
12-23	Merganser	120	120	110	110
<u>Lower River</u>					
9-27	Mallard	64	-	160	140
9-27	Mallard	61	-	-	-
9-27	Mallard	300	290	200	180
9-27	Merganser	720	640	620	590
9-27	Merganser	400	280	2200	2300
9-27	Merganser	840	850	590	600
9-27	Merganser	1700	1300	2000	2000
9-27	Coot	78	-	120	71
9-27	Coot	98	83	130	71
9-27	Coot	-	-	-	-
9-27	Coot	130	69	200	62
9-27	Shoveler	-	-	73	73
9-27	Scaup	-	-	-	-
9-27	Scaup	-	-	-	-
9-27	Scaup	-	-	-	-
9-27	Scaup	-	-	-	-
9-27	Scaup	-	-	-	-
9-27	Ruddy Duck	-	-	-	-
9-27	Pacific Loon	1500	1500	1700	1800
9-30	Merganser	1800	1400	1200	1100
9-30	Mallard	53	-	76	57
9-30	Mallard	53	-	-	-
10-1	Mallard	79	-	260	-
10-1	Blue Teal	210	-	6700	85
10-1	Coot	54	-	66	-
10-1	Coot	50	-	62	-
10-1	Coot	79	-	78	-
10-1	Coot	160	-	200	110
10-21	Coot	200	150	110	120

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX A
TABLE 12 (Continued)

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p³²</u>	<u>Beta</u>	<u>p³²</u>
Reporting Limits		50	50	50	50
<u>Lower River (continued)</u>					
10-21	Coot	-	-	-	-
10-21	Coot	-	-	-	-
10-21	Coot	-	-	-	-
10-21	Coot	-	-	-	-
10-21	Mallard	360	360	250	260
10-21	Mallard	65	61	-	54
10-21	Mallard	-	-	-	-
11-4	Coot	61	52	92	72
11-4	Coot	81	66	73	62
11-4	Coot	-	-	52	52
11-4	Coot	-	-	80	50
11-4	Coot	-	-	58	-
11-4	Coot	52	-	91	64
11-4	Merganser	400	400	380	410
11-4	Merganser	480	450	900	960
11-4	Merganser	1300	1200	1300	1400
11-4	Mallard	60	51	-	-
11-4	Mallard	-	-	-	-
11-4	Mallard	60	-	-	52
11-4	Mallard	-	-	-	-
11-4	Lesser Goose	-	-	-	-
11-11	Mallard	-	-	-	-
11-11	Mallard	70	75	-	64
11-11	Mallard	-	-	-	-
11-11	Mallard	-	-	-	-
11-11	Mallard	99	100	99	100
11-11	Mallard	-	-	-	-
11-11	Mallard	-	-	-	-
11-11	Mallard	95	110	77	74
11-11	Mallard	150	170	510	130
11-11	Lesser Goose	-	-	-	-
11-11	Ruddy Duck	2100	1900	1400	1600
11-11	Scaup	90	97	110	110
11-13	Mallard	-	-	-	-

Results less than reporting limit are indicated by a (-).

APPENDIX A
TABLE 12 (Continued)

CONCENTRATIONS OF BETA EMITTERS IN WATERFOWL HEADS
AND MUSCLES SAMPLED WITHIN THE HANFORD RESERVATION - 1963

Units of pc/g

<u>Date</u>	<u>Specie</u>	<u>Muscle</u>		<u>Head</u>	
		<u>Beta</u>	<u>p32</u>	<u>Beta</u>	<u>p32</u>
Reporting Limits		50	50	50	50
<u>Lower River (continued)</u>					
12-27	Ruddy Duck	270	280	290	400
12-27	Ruddy Duck	220	210	180	170
12-27	Gadwall	1300	1300	920	870
12-27	Golden Eye	510	410	620	650
12-27	Coot	240	200	390	340
12-27	Coot	1200	990	1100	1200
12-27	Coot	490	530	350	330
<u>Ringold</u>					
11-13	Mallard	-	-	-	-
11-13	Mallard	-	-	-	-
11-13	Mallard	-	-	-	-
11-13	Mallard	-	-	-	-
11-13	Mallard	330	380	260	250
11-13	Mallard	-	-	250	270
11-13	Mallard	70	69	-	-
11-13	Mallard	-	-	-	-
11-13	Mallard	-	-	-	-
11-13	Mallard	-	-	-	-
11-13	Lesser Goose	-	-	-	-
11-13	Coot	-	-	-	-
12-9	Mallard	-	-	-	-
12-9	Mallard	-	-	-	-
12-9	Mallard	-	51	-	-
12-9	Mallard	150	120	230	130
12-9	Mallard	-	-	62	-
12-9	Mallard	-	-	-	-
12-9	Mallard	250	270	180	190
12-9	Mallard	-	-	-	-
12-9	Cackler	-	-	-	-
<u>McNary</u>					
11-19	Teal	150	150	180	210
11-19	Widgeon	-	-	-	-

Results less than reporting limit are indicated by a (-).

VIII. APPENDIX B

ATMOSPHERIC AND BEEF THYROID
SAMPLE RESULTS

APPENDIX B

TABLE 1

AVERAGE BETA ACTIVITY ON FILTERS
FROM PACIFIC NORTHWEST STATIONS - 1963Units of pc/m^3 of Filtered Air

Week Ending Date	Benton City, Washington	Pasco, Washington	Kennewick, Washington	Byers Landing	Richland, Washington	Walla Walla, Washington	Yakima, Washington
1-4	7.8	8.1	5.6	4.9	7.4	8.2	3.2
1-11	3.6	3.2	2.3	3.6	6.1	6.6	6.2
1-18	10.	11.	6.9	3.7	5.7	4.7	5.4
1-25	12.	12.	10.	11.	15	15	8.7
2-1	14.	18.	12.	10.	14	13	8.7
2-8	7.5	8.8	7.6	4.5	6.4	7.2	
2-15	6.3	6.7	5.4	4.1	7.4	6.9	
2-22	4.7	5.8	4.6	1.3	2.6	4.0	2.2
3-2	3.2	3.8	2.8	2.5	3.3	4.0	2.2
3-8	3.4	3.8	2.7	4.0	5.4	4.2	2.2
3-15	7.2	7.5	6.3	6.4	6.9	6.1	5.9
3-22	4.8	4.9	4.5	2.9	4.2	5.8	5.5
3-31	6.1	5.1	6.1	5.6	5.4	7.0	3.7
4-7	3.0	4.4	4.7	4.7	5.9	5.0	4.9
4-14	2.1	3.9	4.6	3.4	5.4	6.7	4.9
4-20	2.7	6.1	7.3	5.7	5.3	6.9	1.5
4-26	0.8	1.3	3.0	6.4	7.7	7.5	5.5
5-3	4.7	5.2	8.2	8.2	7.3	9.2	6.0
5-10	2.7	5.0	5.3	6.1	7.6	6.6	
5-17	3.8	7.2	7.1	6.0	8.6	7.9	
5-24	5.8	9.1	14	12	14	17	14
5-31	5.4	12	16	13	12	9.3	12
6-7	3.2	8.0	5.6	4.2	4.9	9.3	4.2
6-14	1.7	5.5	4.6	4.0	4.4	6.7	6.4
6-21	4.1	9.3	8.4	10	9.1	11	6.4
6-28	3.0	1.0	3.5	3.1	3.8	4.3	4.0
7-5	3.7	5.0	4.6	5.3	6.7	7.3	4.0
7-12	5.5	3.5	6.9	5.7	5.5	4.9	4.0

No entry indicates no analysis made.

APPENDIX B
TABLE 1 (Continued)

AVERAGE BETA ACTIVITY ON FILTERS
FROM PACIFIC NORTHWEST STATIONS - 1963
Units of pc/m^3 of Filtered Air

<u>Week Ending Date</u>	<u>Benton City, Washington</u>	<u>Pasco, Washington</u>	<u>Kennewick, Washington</u>	<u>Byers Landing</u>	<u>Richland, Washington</u>	<u>Walla Walla, Washington</u>	<u>Yakima, Washington</u>
7-19	1.3	2.9	3.5	3.7	4.3	5.3	4.0
7-26	3.5	4.6	6.1	6.1	6.7	6.0	5.6
8-2	5.4	5.9	6.5	6.5	6.3	6.9	5.6
8-9	4.8	4.9	6.1	5.3	7.4	7.2	6.8
8-16	2.8	5.0	5.7	5.3	5.3	3.6	3.4
8-23	2.2	5.1	4.0	3.9	3.9	4.4	3.4
8-30	1.7	2.9	2.8	3.8	4.0	4.6	3.4
9-6	2.4	4.1	4.0	3.8	3.7	4.0	3.3
9-13	2.1	4.6	4.8	2.3	3.5	2.1	2.4
9-20	1.0	2.4	2.0	2.3	1.8	1.7	2.4
9-27	0.9	2.4	2.0	0.5	2.3	3.0	2.6
10-4	1.3	2.2	2.3	3.0	2.8	3.3	2.6
10-11	1.1	1.5	2.8	2.1	2.3	2.7	1.3
10-18	0.8	2.2	2.0	1.1	2.1	2.9	1.3
10-25	0.9	1.3	1.8	1.1	1.3	1.4	1.3
11-1	0.4	0.9	0.9	0.7	0.8	1.1	1.3
11-8	0.7	0.8	0.8	0.8	1.0	1.0	1.1
11-15	0.8	1.0	0.9	1.6	1.2	1.4	0.7
11-22	0.6	0.8	0.7	0.2	1.0	1.6	1.0
11-29	0.7	0.9	1.0	0.4	0.3	0.6	0.5
12-6	0.5	0.5	0.6	0.5	0.5	0.6	0.5
12-13	0.4	0.4	0.5	0.9	0.5	0.7	0.5
12-21	0.6	0.5	0.8	1.4	0.7	0.5	0.6
12-27	0.5	0.5	0.6	1.1	0.6	1.2	0.2

APPENDIX B
TABLE 1 (Continued)

AVERAGE BETA ACTIVITY ON FILTERS
FROM PACIFIC NORTHWEST STATIONS - 1963

Units of $\mu\text{Ci}/\text{m}^3$ of Filtered Air

Week Ending Date	Seattle, Washington	Spokane, Washington	Boise, Idaho	Lewiston Idaho	Meacham, Oregon	Klamath Falls, Oregon	Great Falls, Montana
1-4	4.0	6.1	9.7	7.6	7.2	7.6	10
1-11	14	4.0	10	7.3	8.6	10	8.5
1-18	5.7	5.2	6.3	4.2	2.8	4.3	8.6
1-25	11	14	13	13	13	8.6	10
2-1	12		13	11	7.9	8.6	10
2-8	9.7	7.6	7.8	4.3	7.1	8.6	10
2-15	14	7.3	19	16	14	10	12
2-22	5.1	1.8	8.0	3.4	4.9	3.0	6.1
3-2	4.2	1.8	7.4	4.0	5.6	6.5	5.2
3-8	4.5	3.9	5.9	5.3	4.4	6.5	4.9
3-15	8.7	6.1	7.1	6.0	5.5	8.2	7.7
3-22	3.9	3.8	3.2	5.0	4.6	5.4	8.6
3-31	4.4	4.5	9.2	6.3	7.4	5.4	10
4-7	2.1	4.7	4.5	5.8	4.5	5.4	8.4
4-14	2.1	5.1	15	8.5	7.1	5.8	5.8
4-20	2.1	5.3	7.2	9.9	7.9	3.6	5.8
4-26	2.6	7.0	8.5	7.5	7.7	15	5.6
5-3	2.5	6.1	7.2	8.1	6.2	2.6	
5-10	2.6	5.9	7.0	7.6	5.5	3.9	8.0
5-17	3.3	6.0	13	5.0	6.9	7.2	7.6
5-24	5.3	13	13	15	18	10	12
5-31	3.2	9.5	10	13	11	11	12
6-7	1.7	4.5	10	5.0	4.4	5.2	5.6
6-14	3.5	4.8	8.0	3.9	2.7	5.2	6.8
6-21	4.2	6.5	11	10	10	7.5	5.1
6-28	2.1	3.8	6.3	6.4	3.7	5.2	7.2
7-5	2.9		6.3	6.4	8.0	6.3	7.7
7-12	2.3	2.7	7.0	4.8	5.1	6.3	4.1

No entry indicates no analysis made.

APPENDIX B
TABLE 1 (Continued)

AVERAGE BETA ACTIVITY ON FILTERS
FROM PACIFIC NORTHWEST STATIONS - 1963
Units of pc/m³ of Filtered Air

Week Ending Date	Seattle, Washington	Spokane, Washington	Boise, Idaho	Lewiston, Idaho	Meacham, Oregon	Klamath Falls, Oregon	Great Falls, Montana
7-19	1.7	4.0	7.6	6.0	4.8	5.9	4.6
7-26	3.0	5.2	10	7.8	6.9	8.6	8.5
8-2	2.8	5.9	11	7.2	6.5	7.1	8.4
8-9	2.3	3.5	5.8	7.8	7.0	5.8	5.9
8-16	3.0	3.7	5.4	5.5	4.7	4.7	4.6
8-23	1.9	2.7	5.5	4.7	3.2	4.4	3.7
8-30	2.0	3.2	5.2	4.3	3.9	3.8	4.6
9-6	1.8	2.4	2.8	4.6	3.7	2.7	2.6
9-13	1.3	2.5	2.8	3.2	2.8	2.1	2.7
9-20	0.9	1.3	2.9	2.1	1.1	2.1	1.5
9-27	1.8		2.3	2.1	3.1	2.7	2.8
10-4	1.8	1.8	2.6	3.5	3.2	2.5	2.4
10-11	1.7	1.4	2.3	2.0	2.3	2.7	1.6
10-18	1.3	0.8	3.4	2.3	2.7	1.4	3.3
10-25	0.1	0.8	2.2	1.7	1.5	1.4	0.8
11-1	0.8	0.8	2.1	1.1	1.5	1.9	1.7
11-8	0.8	0.6	0.8	1.1	0.7	1.1	1.9
11-15	0.9	0.8	0.8	0.8	0.5	0.3	0.9
11-22	0.8	0.7	1.3	1.0	0.7	0.6	0.8
11-29	0.5	0.8	1.3	0.5	0.5	1.2	1.1
12-6	1.0	0.7	1.2	1.1	1.1		1.8
12-13	0.9	1.7	1.3	0.6	0.7		1.0
12-21	1.0	1.7	0.7	0.4	0.7		1.0
12-27	0.9	0.9	0.9	1.1	0.7	1.1	1.4

No entry indicates no analysis made.

4-9	0.013	0.015	0	0.010	0.009
4-16	0.010	0.007	0.015	0	0.001
4-23	0.008	0.004	0.009	0.010	0.018
4-30	0.010	0.019	0.005	0.007	0.057
5-7	0.003	0	0.007	0.020	0.004
5-14	0.004	0.013	0.001	0.008	0.018
5-21	0.005	0	0.037	0.005	0.008
5-28	0.014	0.005	0.016	0.020	0.011
6-4	0.021	0.018	0.026	0.007	0.015
6-11	0.015	0.003	0.011	0.009	0
6-18	0.072	0.040	0.031	0.051	0.064
6-25	0	0.011	0.004	0.004	0.054
7-2	0.001	0.011	0.011	0.10	0.021
7-9	0.016	0	0.004	0.010	0.004
7-16	0	0.006	0.002	0.009	0.015
7-23	0.007	0.003	0.005	0.005	0.010
7-30	0.008	0.003	0.006	0.009	0.011
8-6	0.002	0.004	0	0.006	0.011
8-13	0.005	0	0.002	0.015	0.229
8-20	0.006	0	0.017	0	0.005
8-27	0.015	0.018	0.018	0.005	0.018
9-3	0.114	0.078	0.056	0.026	0.005
9-7	0.237		0.142	0.083	0.120
9-10	0.025	0.099	0.006	0.019	0.032
9-17	0.017	0.004	0.012	0	0.017
9-24	0.025	0.001	0.025	0.001	0.079
					0.029

APPENDIX B
TABLE 2 (Continued)

CONCENTRATIONS OF ATMOSPHERIC I^{131}
IN THE VICINITY OF HANFORD - 1963

Units of pc/m^3

<u>Date</u>	<u>Richland</u>	<u>North Richland</u>	<u>Benton City</u>	<u>Pasco</u>	<u>Byers Landing</u>
10-1	0.018	0.001	0	0	0.009
10-7	0.018	Discontinued	0	0	0.014
		<u>Prosser Barricade</u>			
10-14	0.023	0.016	0.017	0.007	0.014
10-21	0.015	0.016	0.004	0.013	0.007
10-28	0.024	0.038	0.011	0.020	0.022
11-4	0.001	0.004	0	0	0.065
11-11	0.012	0.003	0.021	0.024	0.010
11-18	0.004	0.043	0.008	0.006	0.011
11-25	0.008	0.008	0.003	0	0.007
12-2	0.004	0.017	0.008	0.015	0.005
12-9	0.001	0.015	0.004	0.008	0.016
12-16	0.045	0.054	0.041	0.029	0.045
12-23	0.009	0.030	0.024	0.009	0.020
12-30	0.002	0.013	0.014	0	0.016

APPENDIX B
TABLE 3

QUANTITY OF I¹³¹ RELEASED
FROM THE SEPARATIONS AREAS - 1963

<u>Month</u>	<u>Average curies/day</u>
January	0.11
February	0.073
March	0.10
April	0.17
May	0.14
June	0.54
July	0.18
August	0.10
September	2.4
October	0.21
November	0.18
December	0.36

APPENDIX B
TABLE 4I¹³¹ IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date Sampled</u>	<u>Thyroid Wt (g)</u>	<u>I¹³¹ Concentration</u>	<u>Grazing Area</u>
<u>Pasco, Washington</u>			
5-27	29	10	Kennewick
5-27	44	8.4	Kennewick
7-27	35	31	Mesa
<u>Moses Lake, Washington</u>			
1-2	40	3.4	Warden
1-2	57	< 1.7	Moses Lake
1-2	46	26	Moses Lake
1-2	48	200	Moses Lake
1-2	53	100	Moses Lake
1-26	33	69	Wilson Creek
1-26	34	15	Othello
1-26	42	< 2.1	Moses Lake
1-26	23	18	Coulee City
1-26	48	< 1.9	Quincy
2-9	38	< 2.5	Quincy
2-9	33	3.1	Moses Lake
2-9	50	< 1.9	Moses Lake
2-9	46	2.3	Moses Lake
2-9	55	< 1.7	Moses Lake
2-23	41	11	Warden
2-23	27	6.8	Warden
2-23	31	11	Warden
2-23	27	11	Warden
2-23	26	11	Warden
3-9	42	3.3	Lind
3-9	33	< 2.9	Othello
3-9	41	11	Lind
3-9	38	< 2.5	Odessa
3-9	46	< 2.1	Warden
3-23	53	2.5	Douglas
3-23	42	2.8	Coulee City
3-23	32	3.9	Moses Lake
3-23	55	< 1.5	Quincy
3-23	29	< 2.9	Quincy
4-6	36	12	Warden
4-6	41	6.1	Warden
4-6	61	< 1.6	Ephrata
4-6	49	< 2.0	Moses Lake
4-6	44	< 2.2	Ephrata

APPENDIX B
TABLE 4 (Continued)

¹³¹I IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963
Units of pc/g

<u>Date</u> <u>Sampled</u>	<u>Thyroid</u> <u>Wt (g)</u>	¹³¹ I <u>Concentration</u>	<u>Grazing Area</u>
<u>Moses Lake, Washington (Continued)</u>			
4-20	33	6.1	Moses Lake Block 41
4-20	47	< 1.9	Moses Lake Block 89
4-20	47	4.0	Moses Lake Block 40
4-20	27	< 3.3	Moses Lake Block 41
4-20	34	3.5	Wilbur
5-4	44	14	Ritzville
5-4	64	4.6	Moses Lake
5-4	38	< 2.6	Ritzville
5-4	40	< 2.4	Moses Lake
5-4	55	9.9	Moses Lake
5-18	45	7.9	Ephrata
5-18	32	8.6	Quincy
5-18	48	7.0	Moses Lake
5-18	37	32	Ritzville
5-18	23	11	Quincy
6-1	20	< 4.5	Wilbur
6-1	19	< 4.8	Moses Lake
6-1	21	< 4.3	Moses Lake
6-1	50	4.2	Lind
6-1	25	< 3.6	Moses Lake
6-15	54	4.5	Moses Lake (grass)
6-15	54	< 1.7	Quincy
6-15	63	< 1.4	Hartline (grass)
6-15	53	4.1	Othello
6-15	49	< 1.8	Othello
6-29	17	< 5.1	Mattawa (grass)
6-29	12	< 7.3	Moses Lake (grass)
6-29	18	16	Quincy
6-29	16	< 5.5	Othello
6-29	23	14	Moses Lake (grain)
7-13	45	2.8	Othello
7-13	35	3.1	Othello
7-13	45	4.2	Coulee City
7-13	59	2.9	Lamona
7-13	47	5.2	LaCrosse
7-27	60	5.1	Moses Lake
7-27	39	4.0	Moses Lake
7-27	29	5.3	Grand Coulee
7-27	61	2.1	Quincy
8-10	48	< 1.9	Moses Lake
8-10	48	2.5	Moses Lake

APPENDIX B
TABLE 4 (Continued)

I^{131} IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963
Units of pc/g

<u>Date</u> <u>Sampled</u>	<u>Thyroid</u> <u>Wt (g)</u>	I^{131} <u>Concentration</u>	<u>Grazing Area</u>
<u>Moses Lake, Washington (Continued)</u>			
8-10	34	< 2.7	Wilson Creek
8-10	40	< 2.3	Moses Lake
8-10	33	< 2.7	Moses Lake
8-24	42	< 2.1	Moses Lake
8-24	55	2.2	Entiat
8-24	43	< 2.1	Ellensburg
8-24	41	< 2.2	Mesa
8-24	47	3.6	Connell
9-7	67	25	Ephrata
9-7	93	25	Moses Lake
9-7	43	3.6	Moses Lake
9-7	48	7.4	Mesa
9-7	48	13	Almira
9-21	45	8.8	Othello
9-21	35	< 2.6	Warden
9-21	52	6.5	Elmer City
9-21	49	5.2	Pasco
9-21	74	18	Wauconda
10-5	43	< 2.2	(Not given)
10-5	49	8.8	" "
10-5	55	< 1.8	" "
10-5	34	4.1	" "
10-5	49	4.5	" "
10-19	49	< 2.8	Wenatchee
10-19	43	< 3.2	Cunningham
10-19	50	< 2.8	Connell
10-19	52	< 2.7	Warden
10-19	69	3.5	Moses Lake
11-2	54	< 1.7	Othello
11-2	73	3.3	Othello
11-2	62	5.1	Moses Lake
11-2	45	6.3	Stratford
11-2	47	3.9	Electric City
11-16	70	< 1.8	Connell
11-16	40	< 3.2	Moses Lake
11-16	51	< 2.5	Moses Lake
11-16	92	< 1.4	Moses Lake
11-16	45	< 2.7	Moses Lake
11-30	37	8.6	Odessa
11-30	42	3.1	Connell

APPENDIX B
TABLE 4 (Continued)

¹³¹I IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date Sampled</u>	<u>Thyroid Wt (g)</u>	<u>¹³¹I Concentration</u>	<u>Grazing Area</u>
<u>Moses Lake, Washington (Continued)</u>			
11-30	83	< 1.5	Moses Lake
11-30	31	8.1	Ritzville
11-30	37	4.2	Warden
12-14	67	5.0	Palisades
12-14	57	< 2.6	Almira
12-14	56	16	Othello
12-14	52	< 2.8	Warden
12-14	60	< 2.4	Warden
12-28	41	5.2	Moses Lake
12-28	60	< 2.5	Ellensburg
12-28	55	< 2.7	Connell
12-28	28	< 5.2	Moses Lake
12-28	39	< 2.9	Mesa
<u>Wenatchee, Washington</u>			
1-2	37	250	S.E. Chelan
1-2	47	630	S.E. Chelan
1-2	46	25	Grant Co.
1-2	66	6.1	W. Douglas Co.
1-2	39	46	S. Grant Co.
1-15	36	9.3	S.E. Chelan Co.
1-15	33	8.5	S.E. Chelan Co.
1-15	57	2.0	W. Douglas Co.
1-15	36	240	W. Lincoln Co.
1-15	49	180	W. Lincoln Co.
1-30	39	2.3	S.E. Chelan Co.
1-30	35	< 2.6	S.E. Chelan Co.
1-30	35	3.0	S.E. Chelan Co.
1-30	50	4.2	S.E. Chelan Co.
1-30	21	4.4	S.E. Chelan Co.
2-13	47	48	S.E. Chelan Co.
2-13	39	2.6	S. Central Chelan Co.
2-13	38	< 2.6	S. Central Chelan Co.
2-13	71	1.6	S.E. Grant Co.
2-13	53	2.1	S.E. Grant Co.
2-26	38	< 2.7	N. Grant Co.
2-26	33	< 3.1	W. Douglas
2-26	84	4.8	W. Douglas
2-26	33	7.0	Grant Co.
2-26	43	6.4	W. Grant Co.

APPENDIX B
TABLE 4 (Continued)

¹³¹I IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date</u> <u>Sampled</u>	<u>Thyroid</u> <u>Wt (g)</u>	¹³¹ I <u>Concentration</u>	<u>Grazing Area</u>
<u>Wenatchee, Washington (Continued)</u>			
3-12	20	< 4.7	S.E. Chelan Co.
3-13	30	< 3.1	S.W. Douglas Co.
3-12	41	< 2.3	S.W. Douglas Co.
3-12	64	3.1	S.E. Chelan Co.
3-12	38	< 2.5	N.W. Grant Co.
3-25	28	3.9	W. Douglas Co.
3-25	39	2.5	W. Douglas Co.
3-25	32	< 2.7	W. Douglas Co.
3-25	26	5.5	S.E. Chelan Co.
3-25	32	9.3	N.C. Douglas Co.
4-11	99	< 0.9	E. Chelan Co.
4-11	49	< 1.8	N. Grant Co.
4-11	40	< 2.2	N. Grant Co.
4-11	57	< 1.6	N. C. Douglas Co.
4-11	67	< 1.3	N. C. Douglas Co.
10-29	26	5.3	Douglas Co.
10-29	61	2.3	S. Chelan Co.
10-29	44	< 2.6	W. Douglas Co.
10-29	42	7.4	S.E. Chelan Co.
10-29	61	2.3	S.W. Douglas Co.
11-12	25	< 4.2	S.E. Chelan Co.
11-12	31	< 3.4	S.E. Chelan Co.
11-13	55	< 1.8	S.E. Chelan Co.
11-13	67	< 1.5	S.E. Chelan Co.
11-13	82	< 1.2	S. Chelan Co.
11-27	57	< 2.5	S.E. Chelan Co.
11-27	59	< 2.4	W. Douglas Co.
11-27	54	< 2.6	W. Douglas Co.
11-27	32	< 4.4	S.E. Chelan Co.
11-27	39	< 3.6	S.E. Chelan Co.
12-11	41	< 2.5	S.E. Chelan
12-11	41	< 2.5	S.E. Chelan
12-11	53	< 2.0	S. E. Chelan
12-11	47	< 2.2	S. E. Chelan
12-11	43	< 2.4	S. E. Chelan
12-23	29	< 4.2	S.W. Grant Co.
12-23	39	< 3.1	E. Chelan Co.
12-23	37	< 3.3	S.E. Chelan Co.
12-23	34	< 3.6	S.E. Chelan Co.
12-23	44	< 2.8	S.E. Chelan Co.

APPENDIX B
TABLE 4 (Continued)

I^{131} IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date Sampled</u>	<u>Thyroid Wt (g)</u>	<u>I^{131} Concentration</u>	<u>Grazing Area</u>
<u>Walla Walla, Washington</u>			
2-20	45	16	Walla Walla State Pen
12-6	20	< 6.3	" " "
12-6	25	< 5.0	Lowden
12-6	37	< 3.4	Lowden
12-6	28	< 4.5	Dayton
12-6	37	< 3.4	Lowden
12-17	26	< 4.3	Prospect Heights
			Walla Walla
12-17	71	< 1.6	College Place
			Walla Walla
12-17	40	< 2.8	" "
12-17	55	< 2.1	Prospect Heights
			Walla Walla
12-17	33	< 3.4	College Place
			Walla Walla
12-31	50	2.5	Lowden
12-31	51	< 2.2	Burbank
<u>Toppenish, Washington</u>			
1-4	26	55	Wapato
1-4	37	3.6	Moxee
1-4	29	41	Wapato
1-4	15	120	White Swan
1-4	16	210	White Swan
1-18	28	5.9	Wapato
1-18	38	23	Wapato
1-18	37	27	Wapato
1-18	40	13	White Swan
2-15	60	< 1.6	Parker
2-15	42	< 2.3	Wapato
2-15	52	3.7	Toppenish
2-15	61	6.5	Toppenish
2-15	43	5.6	Yakima
3-1	27	< 3.5	Zillah
3-1	38	< 2.5	Naches
3-1	49	< 1.9	Toppenish
3-1	30	< 3.2	Wapato
3-1	47	< 2.0	Wapato
3-15	23	< 3.6	Selah
3-15	34	3.8	White Swan
3-15	63	< 1.3	Wapato

APPENDIX B
TABLE 4 (Continued)

I^{131} IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date Sampled</u>	<u>Thyroid Wt (g)</u>	<u>I^{131} Concentration</u>	<u>Grazing Area</u>
<u>Toppenish, Washington (Continued)</u>			
3-15	63	< 1.3	Wapato (Supp. Feed)
3-15	37	13	White Swan
4-5	32	< 3.3	White Swan
4-5	63	< 1.7	White Swan
4-5	34	< 3.1	White Swan
4-5	44	< 2.4	White Swan
4-26	60	< 1.5	Zillah
4-26	91	< 9.7	Yakima
4-26	50	< 1.8	Wapato
4-26	69	< 1.3	Wapato
4-26	49	< 1.8	Yakima
5-24	38	< 2.4	Moxee
5-24	44	< 2.1	Zillah
5-24	49	< 1.9	Wapato
5-24	54	< 1.7	Yakima
6-7	56	< 1.7	Wapato (Suppl. Feed)
6-7	55	< 1.8	Selah
6-7	35	< 2.8	Yakima (Suppl. Feed)
6-7	58	< 1.7	Selah
6-7	160	< 0.58	Yakima
6-21	36	< 2.8	Wapato
6-21	32	< 3.1	White Swan
6-21	50	< 2.0	Yakima
6-21	39	< 2.4	Toppenish
6-21	28	< 3.3	Satus
6-28	74	< 1.2	Wapato
6-28	56	2.0	Wahkiacus
6-28	44	< 2.0	White Swan (Suppl. Feed)
6-28	44	3.0	Wahkiacus
6-28	35	2.9	Wahkiacus
7-12	41	< 2.1	Wapato
7-12	65	2.1	Toppenish
7-12	53	1.8	Wapato
7-12	58	2.1	Toppenish
7-26	53	1.9	Wiley City
7-26	46	< 1.9	Wapato
7-26	45	< 2.0	Toppenish
8-2	70	1.6	Zillah
8-2	37	3.8	Satus
8-2	22	4.3	Satus
8-2	30	3.3	Satus

APPENDIX B
TABLE 4 (Continued)

¹³¹I IN BEEF THYROIDS FROM
CATTLE SLAUGHTERED AT SEVERAL LOCATIONS - 1963

Units of pc/g

<u>Date Sampled</u>	<u>Thyroid Wt (g)</u>	<u>¹³¹I Concentration</u>	<u>Grazing Area</u>
<u>Toppenish, Washington (Continued)</u>			
8-23	36	< 2.7	Toppenish
8-23	37	< 2.6	Toppenish
8-23	41	< 2.4	Moxee
8-23	74	< 1.3	Yakima
8-23	30	< 3.2	White Swan
9-13	60	47	Wapato
9-13	37	2.5	Wapato
9-13	61	63	Outlook, Wash.
9-13	33	14	Wapato
9-13	45	47	Brownstone, Wash.
9-27	59	32	Toppenish
9-27	65	< 1.4	Toppenish
9-27	56	21	Moxee
9-27	58	28	Yakima
9-27	35	17	Selah
10-11	60	< 1.6	Toppenish
10-11	62	4.2	Yakima
10-11	38	4.5	Yakima
10-11	39	5.4	Yakima
10-11	30	4.2	Union Gap
10-26	40	12	Toppenish
10-26	32	16	Toppenish
10-26	38	14	Toppenish
10-26	40	7.9	Wapato
10-26	27	7.8	Wapato
11-1	63	< 2.1	Yakima
11-1	43	< 3.1	Yakima
11-1	66	2.9	Yakima
11-1	56	3.1	Yakima
11-1	61	4.2	Moxee
11-12	37	< 2.5	Toppenish
11-12	65	< 1.5	Yakima
11-12	38	< 2.6	Wapato
11-12	37	< 2.6	Wapato
11-12	68	2.4	Union Gap
12-10	43	< 2.6	Yakima
12-10	47	< 2.4	Yakima
12-10	35	< 3.2	Yakima
12-10	49	< 2.3	Naches
12-10	84	< 1.3	Yakima

IX. APPENDIX C

FARM PRODUCE AND COMMERCIAL
FOODSTUFF RESULTS

APPENDIX C
TABLE 1

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Piverview Irrigation District</u>						
1-2	4	1400	260	44	-	3.5
1-8	-	1500	220	30	-	
1-16	-	1400	150	56	-	
1-22	3	1600	210	66	-	
1-30	7	1300	190	32	-	
2-5	4	1500	220	48	-	
2-13	-	1500	210	45	-	
2-19	5	1500	130	57	-	
2-27	-	1500	210	55	-	
3-5	-	1300	190	53	-	2.2
3-13	-	1700	180	79	-	
3-19	-	1500	140	52	-	
3-27	4	1400	180	53	-	
4-2	-	1500	260	41	-	4.7
4-10	-	1200	170	58	-	
4-16	-	1300	150	32	-	
4-24	-	1300	180	-	-	
4-30	-					
5-7	-	1600	120	45	-	4.7
5-15	6	1600	570	130		
5-22	-	1100	520	75		
5-28	-	1400	530	98		
6-5	3	1400	620	140	1300	15
6-11	6	1300	680	160		
6-19	9	1200	710	120		
6-25	5	1200	750	84		
7-1	6	1500	760	100		
7-9	4	1400	650	110	1200	< 6.0
7-15	3	1200	840	130		
7-23	4	1800	900	180		
7-31	6	1100	880	96		
8-6	-	1300	850	70	1100	11
8-14	-	1200	800	120		
8-20	-	1600	670	110		

Results less than reporting level are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Riverview Irrigation District (continued)</u>						
8-28	3	1600	860	150		< 3.8
9-5	40	1300	720	110	1200	< 8.1
9-11	37	1600	740	71		
9-19	12	1300	700	82		
9-25	7	1700	760	110		
10-1	5	1300	820	130	1800	9.2
10-9	10	1600	730	75		
10-15	11	1700	920	110		
10-23	7	1600	1200	68		
10-29	6	1400	1500	70		
11-6	-	1400	870	53	2500	4.6
11-12	3	1600	1000	66		
11-20	-	1600	440	53		
11-26	-	1700	350	70		
12-4	4	1700	320	98	-	2.0
12-10	-	1300	210	98		
12-18	4	1600	240	120		
12-26	-	1600	230	130		
<u>Ringold</u>						
6-11	14	590	1100	46		
6-19	9	890	600	35		
6-25	11	1200	560	-		
7-3	7	1000	660	47		
7-9	4	1200	830	110		
7-15	4	1400	690	140		
7-23	6	1900	720	130		
7-31	14	1500	820	57		
8-6	< 6	1700	1000	37		
8-14	-	1300	1100	57		
8-20	< 6	1900	1100	79		
8-28	6	1800	700	140		
9-4	16	1600	790	85	1600	21
9-5	30	1700	550	97		

Results less than reporting limit are indicated by a (-).
No entry indicates analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>P¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Ringold (continued)</u>						
9-6	36	1500	640	160		
9-7	33	1300	420	88		
9-8	28	1500	600	46		
9-9	89	1400	470	86		
9-10	23	1200	300	87		
9-11	15	1700	610	41		
9-12	12	2000	640	69		
9-13	8	1800	740	79		
9-16	6	1600	890	77		
9-17	32	1800	800	100		
9-18	8	1800	890	87		
9-19	12	1300	710	80		
9-20	31	1700	1100	110		
9-23	11	2000	970	85		
9-24	14	2000	1200	110		
9-25	9	2000	1300	110		
9-26	14	1600	1100	70		
9-27	11	6600	810	-		
9-30	5	1600	630	64		
10-1	4	1600	670	80		
10-9	7	2000	1200	110		
10-15	4	1900	1100	130		
10-23	10	1600	1200	160		
10-29	4	1500	1100	160		
11-6	-	1500	1100	150		
11-12	9	1600	1300	220		
11-20	14	2000	1200	240		
<u>Pasco</u>						
4-30	4					
5-1	4	680		91		
5-2	6	910		77		
5-3	3	1100		89		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Pasco (continued)</u>						
5-6	6	740		81		
5-7	-	900		110		
5-8	-	750		130	-	20
5-9	-	1200		170		
5-10	5	1400	-	150		
5-13	-	1500		130		
5-14	-	1400		150		
5-15	-	1500		140		
5-16	3	1200		130		
5-17	-	1600		130		
5-20	4	1200		100		
5-21	-	1400		97		
5-22	-	1300		90		
5-23	-	1300		57		
5-24	-	1400	-	95		
5-27	-	1800	-	57		
5-28	-	1200	-	50		
5-29	-	1600	-	55		
5-31	3	1300	-	51		
6-3	-	1500	130	56		
6-4	5	1300	170	59		
6-5	9	1600	180	55		6.9
6-6	8	1300	-	110		
6-7	4	1300	130	51		
6-10	-	1400	-	97		
6-11	4	1300	120	60		
6-12	7	1200	150	79		
6-13	8	1800	180	50		
6-14	11	1500	-	87		
6-17	6	1500	93	66		
6-18	6	1400	160	49		
6-19	6	1300	250	67		
6-20	6	1300	320	64		
6-21	7	1200	260	56		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Pasco (continued)</u>						
6-24	4	1400	170	66		
6-25	5	1300	180	31		
6-26	4	1300	210	40		
6-27	7	1400	280	50		
6-28	11	5600	210	53		
7-1	3	1500	320	42		
7-2	3	1400	330	63		
7-3	4	1600	230	68		
7-5	-	910	200	61		
7-9	-	1100	91	150		12
7-10	-	1300	120	140		
7-12	-	1300	86	96		
7-15	3	1400	160	84		
7-16	4	850	180	90		
7-17	3	1200	180	97		
7-19	-	1100	180	66		
7-22	-	1300	110	75		
7-23	4	1600	90	80		
7-24	7	1400	110	67		
7-26	11	1800	210	120		
7-29	7	1600	130	100		
7-30	7	1700	200	130		
7-31	9	1400	140	59		
8-1	10	1200	160	50		4.8
8-2	5	1300	100	45		
8-5	-	1800	210	40		
8-6	-	1400	260	40		
8-7	-	1400	180	32		
8-8	-	1100	220	45		
8-9	-	1300	160	-		
8-12	-	1400	120	49		
8-13	-	1300	140	55		
8-14	-	1100	160	40		
8-15	-	1600	160	51		
8-16	-	1200	170	51		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Pasco (continued)</u>						
8-19	-	1600	110	53		
8-20	-	1600	130	57		
8-21	-	1600	120	61		
8-22	-	1500	100	-		
8-23	-	1900	140	56		
8-26	-	1300	150	92		
8-27	-	1700	-	67		
8-28	5	1600	150	110		
8-29	-	1400	94	80		
8-30	-	1500	230	58		
9-3	-	1500	150	43		
9-4	19	1900	210	81		
9-5	23	1400	-	57		
9-6	17	1400	140	47		
9-7	14	1500	110	48		
9-8	17	1800	230	110		
9-9	37	1600	150	81		
9-10	21	1600	97	58		
9-11	14	1600	98	33		
9-12	14	1400	150	71		
9-13	20	1200	-	48		
9-14	8	1600	100	76		
9-16	4	1000	130	61		
9-17	5	1500	98	44		
9-18	5	1600	110	56		
9-19	7	1300	170	38		
9-20	6	1600	86	63		
9-23	3	1600	120	75		
9-24	4	1500	-	120		
9-25	5	1500	160	85		
9-26	8	1300	-	34		
9-27	6	1400	110	63		
9-30	5	1400	110	66		
10-1	5	1700	-	87		

3.8

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Pasco (continued)</u>						
10-2	4	1600	110	71		
10-3	5	1200	85	60		
10-4	4	1300	99	84		
10-7	7	1600	-	70		
10-8	3	1300	-	77		
10-9	6	1600	-	120		
10-10	5	1400	120	50		
10-11	4	1500	970	590		
10-14	5	1800	130	110		
10-15	5	1900	170	79		
10-16	3	1500	94	72		
10-18	4	1500	100	56		
10-21	-	1500	200	110		
10-22	-	1400	250	78		
10-23	-	1200	130	69		
10-24	-	1600	160	68		
10-25	-	1300	150	82		
10-28	-	1600	200	80		
10-29	-	1400	150	88		
10-30	-	1800	190	76		
10-31	-	1600	220	98		
11-1	-	1800	130	110		
11-4	-	1500	170	58		
11-5	-	980	150	94		
11-6	-	1400	160	81		
11-7	4	1300	150	54		
11-11	< 7	1500	140	72		
11-12	3	1600	130	73		
11-13	3	1500	160	76		
11-14	-	1400	170	54		
11-15	-	1700	190	120		
11-18	-	1500	200	110		
11-19	-	1200	170	79		
11-20	-	1200	190	90		

< 4.1

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Pasco (continued)</u>						
11-21	-	1500	170	100		
11-22	3	1700	160	100		
11-26	-	1800	130	91		
11-27	-	1700	100	72		
12-2	-	1600	190	63		
12-3	-	1600	210	110		
12-4	8	1500	140	69		
12-5	-	1700	250	110		
12-6	-	1700	220	100		
12-9	-	1700	210	100		
12-10	-	1700	240	93		
12-11	-	1900	240	130		
12-12	-	1000	190	84		
12-13	-	1700	160	73		
12-16	3	1800	260	76		
12-17	-	1600	290	85		
12-18	3	1500	290	60		
12-19	3	1800	320	99		
12-20	-	1400	300	100		
12-23	5	1700	280	93		
12-26	3	1700	210	74		
12-27	4	1800	260	83		
12-30	3	1500	210	82		
12-31	-					
<u>West Richland</u>						
9-12	140	1600	-	130		
9-13	120	1700	-	120		
9-14	95	1400	-	100		
9-16	48	1600	-	130		
9-17	65	1400	-	100		
9-18	43	1900	-	130		
9-19	54	1600	-	110		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>West Richland (continued)</u>						
9-20	52	1900	-	140		
9-23	39	1700	-	110		
9-24	31	1800	-	160		
9-25	33					
9-26	26	1200	-	45		
9-27	26	1900	-	110		
9-30	29	1800	-	110		
10-1	31	1300	-	100		
10-2		1500	-	83		
10-3	22	1400	-	93		
10-4	17	1600	-	99		
10-7	19	1400	-	110		
10-8	18	1400	-	96		
10-9	18	1400	110	81		
10-10	13	1500	-	110		
10-11	17	1600	-	110		
10-14	17	1500	-	98		
10-15	19	1800	-	100		
10-16	17	1700	-	130		
10-17	17	2000	92	150		
10-18	16	1700	-	120		
10-21	17	1600	-	140		
10-22	6	1700	-	130		
10-23	3	1300	-	150		
10-24	3	1900	-	160		
10-25	3	1700	-	130		
10-28	-	2000	-	140		
10-29	-	1800	-	150		
10-30	-	1600	-	140		
10-31	4	1500	-	150		
11-1	< 4	1700	-	140		
11-4	-	1500	-	110		
11-5	< 4	940	-	120		
11-6	4	1400	-	120		
11-7	< 16	1300	-	140		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>West Richland (continued)</u>						
11-8	3	1500	-	170		
11-11	< 11	1700	-	170		
11-12	11	1400	-	130		
11-13	4	1500	-	140		
11-14	5	1600	-	120		
11-15	4	1700	-	170		
11-18	-	1600	-	170		
11-19	3	1300	-	130		
11-20	5	1400	-	120		
11-21	3	1700	-	120		
11-22	9	2200	-	130		
11-26	-	1800	-	130		
11-27	10	1500	-	120		
12-2	6	1500	-	93		
12-5	10	1900	-	31		
12-13	-	1700	-	82		
12-18	15	1500	-	94		
12-27	11	940	-	63		
<u>Benton City</u>						
1-2	8	510	-	-	-	2.0
1-3	12					
1-4	10					
1-7	6					
1-9	5					
1-10	5					
1-11	7					
1-14	11					
1-15	6					
1-17	6					
1-18	4					
1-21	3					
1-23	3					
1-24	5					

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Benton City (continued)</u>						
1-25	5					
1-28	4					
1-31	4					
2-5	10					
2-6	7					
2-7	6					
2-8	3					
2-11	3					
2-12	-					
2-14	3					
2-15	4					
2-18	4					
2-19	-					
2-21	-					
2-25	3					
2-26	-					
2-27	-					
3-1	-					
3-4	-	1500	-	58	-	2.4
3-6	-					
3-7	-					
3-8	-					
3-11	-					
3-12	-					
3-14	-					
3-15	-					
3-18	3					
3-20	4					
3-21	-					
3-22	-	1500	-	50	-	3.6
3-25	5					
3-26	8					
3-27	-					
3-28	-					

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Benton City (continued)</u>						
3-29	-					
4-1	-					
4-3	-					
4-5	-					
4-8	-					
4-9	-					
4-10	5					
4-11	-					
4-12	-					
4-15	-					
4-16	-					
4-17	-					
4-18	-					
4-19	-					
4-22	-					
4-23	-					
4-25	-					
4-26	-					
4-29	-					
4-30	-					
5-1	-	630		-		
5-2	-	740		-		
5-3	-	770		-		
5-6	-	780		-		
5-8	-	690		-		
5-9	-	1300		33		
5-10	-	1500		33		
5-13	-	1200		-		
5-14	-	1200		-		
5-16	-	1200		-		
5-17	-	1400		30		
5-20	5	1100		38		
5-21	-	1400		40		
5-22	-	1100		33		
5-23	3	1500		-		
				39		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
 TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Benton City (continued)</u>						
5-24	5	2300		110		
5-27	-	1400	-	49		
5-29	-	1300	-	39		
5-31	3	3700	88	150		
6-3	-	1300	-	74		
6-4	-	1400	-	120		
6-6	-	1100	210	90		
6-7	-	1100	190	53		
6-10	-	1500	-	100		
6-12	3	1500	-	110		
6-14	-	1300	-	84		
6-17	7	1400	-	66		
6-18	6	1300	-	49		
6-20	5	1500	-	58		
6-21	6	1300	-	53		
6-24	5	1500	-	50		
6-26	4	1500	-	80		
6-27	5	1300	-	68		
6-28	23	1800	180	99		
7-1	-	1500	-	75		
7-2	6	1400	-	93		
7-3	7	1500	-	110		
7-5	7	700	-	64		
7-10	3	1300	-	170		
7-12	-	1100	-	130		
7-15	-	1200	-	130		
7-16	4	1200	-	100		
7-17	5	1200	-	110		
7-19	-	1300	-	110		
7-22	-	1200	-	100		
7-23	4	1200	-	110		
7-24	-	1300	-	110		
7-26	7	1500	-	120		
7-29	15	1200	-	110		
7-30	16	1800	-	140		

Results less than reporting limit are indicated by a (-).
 No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Benton City (continued)</u>						
7-31	28	1500	-	110		
8-1	17	1300	-	100		
8-2	-	1100	-	98		
8-5	4	1500	-	68		
8-9	-	1400	-	51		
8-20	-	1500	-	97		
8-28	3	1500	-	53		
9-4	65	1600	-	92		
9-5	120	1600	-	93		
9-6	110	1500	-	88		
9-7	97	1200	-	61		
9-8	78	1600	-	86		
9-9	69	1500	-	78		
9-10	34	1200	-	81		
9-11	29	1600	-	56		
9-12	23	1600	-	82		
9-13	20	1500	-	83		
9-14	16	1700	-	68		
9-16	25	1400	-	100		
9-17	22	1600	-	94		
9-18	20	1000	-	74		
9-19	20	1400	-	100		
9-20	19	1700	-	110		
9-23	19	1400	-	89		
9-24	14	1700	-	130		
9-25	11					
9-26	9	1300	-	48		
9-27	10	1500	-	89		
9-30	11	1600	-	100		
10-1	10	1400	-	93		
10-10	10	1600	-	67		
10-17	9	1600	-	91		
11-1	-	1600	-	87		
11-8	< 9	1500	-	35		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>p³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Benton City (continued)</u>						
11-13	6	1400	-	47		
11-21	-	1500	-	97		
12-2	-	1700	-	120		
12-13	3	1400	-	110		
12-17	12	1400	-	140		
12-18	4	1800	-	150		
12-27	5	1900	-	160		
<u>Byers Landing</u>						
1-16	-	1400	-	31		5.5
1-22	4	1800	-	94		
1-30	3	1500	-	76		
2-5	4	1500	-	84		
2-13	5	1600	-	110		
2-19	4	1600	-	110		
2-27	-	1400	-	44		
3-5	-	1600	-	93		13
3-13	5	1700	-	110		
3-19	-	1600	-	82		
3-27	-	1500	-	120		
4-2	4	1500	-	120		15
4-10	-	1400	-	110		
4-16	6	1400	-	95		
4-24	18	1500	-	170		
4-30	8					
5-15	8	1400	-	180		81
5-22	5	1400	-	120		
5-28	12	1500	-	90		
6-5	8	1500	-	100		20
6-11	46	1400	-	100		
6-19	84	1300	-	100		
6-25	27	1500	-	83		
7-3	18	1500	-	91		
7-9	7	1300	-	140		< 3.9

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
 TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Byers Landing (continued)</u>						
7-15	8	1900	-	160		
7-23	13	1400	-	140		
7-31	9	1500	-	87		
8-6		1400	-	-		6.2
8-14	-	1200	-	71		
8-20	-	1700	-	85		
8-28	11	1400	-	140		
9-4	10	1800	-	100		< 16
9-11	29	1400	-	79		
9-17	37	1100	-	130		
9-25	12					
10-1	4	1600	-	89		
10-9	15	1500	-	91		5.5
10-15	14	1600	93	170		
10-23	9	1500	-	110		
10-29	9	1400	-	100		
11-6	5	1300	-	37		3.9
11-12	9	1500	-	73		
11-20	-	1800	-	80		
<u>Mesa</u>						
1-2	8	530	-	59	-	5.7
1-8	6	1500	-	54	-	
1-16	6	1500	-	72	-	
1-22	4	1800	-	94	-	
1-30	5	1400	-	43	-	
2-5	7	1500	-	38	-	
2-13	7	1400	-	40	-	
2-19	3	1800	-	34	-	
2-27	-	1400	-	-	-	
3-5	-	1600	-	-	-	2.0
3-13	4	1700	-	61	-	
3-19	-	1600	-	-	-	

Results less than reporting limit are indicated by a (-).
 No entry indicates no analysis made.

APPENDIX C
TABLE I (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Mesa (continued)</u>						
3-27	3	1500	-	56	-	
4-2	-	1700	-	39	-	
4-10	-	1200	-	68	-	8.7
4-16	-	1400	-	47	-	
4-24	3	1500	-	85	-	
4-30	4					
5-7	7	1300		120	-	17
5-15	-	1500		55		
5-22	-	1400		80		
5-28	-	1400	-	59		
6-5	4	1500	-	66		
6-11	5	1400	-	64		7.3
6-19	16	1800	-	70		
6-25	32	1400	-	-		
7-1	28	1900	-	47		
7-9	15	1300	-	73		
7-15	9	1300	-	59		5.5
7-23	5	1700	-	140		
7-31	9	1400	-	76		
8-6	-	1400	-	-		
8-14	-	1300	-	50		4.5
8-20	-	1800	-	68		
8-28	-	2000	-	110		
9-5	4	1500	-	58		
9-11	34	2500	140	61		< 7.7
9-19	19	1200	-	-		
9-25	17	1600	-	35		
10-1	8	1900	-	94		
10-9	8	1600	-	49		3.5
10-15	4	1700	-	67		
10-23	-	1800	-	86		
10-29	-	1500	81	120		
11-6	-	1500	-	95		
11-12	14	1600	-	100		11
11-20	-	1700	-	89		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
 TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963						
Units of pc/l						
Date	I^{131}	K^{40}	Zn^{65}	Cs^{137}	P^{32}	Sr^{90}
Reporting Limits	3	300	80	30	100	2
<u>Etiopia</u>						
1-2	3	1200	-	37	-	2.1
1-8	-	1300	-	-	-	-
1-16	4	1300	-	37	-	-
1-22	4	1500	-	85	-	-
1-30	4	1300	-	-	-	-
2-5	6	1400	-	60	-	-
2-13	3	1500	-	71	-	-
2-19	-	1500	-	62	-	-
2-27	-	1400	-	65	-	-
3-13	-	1500	-	58	-	-
3-19	-	1400	-	-	-	-
3-27	-	1400	-	68	-	-
4-2	-	1300	-	40	-	-
4-10	-	1200	-	-	-	-
4-16	-	1400	-	-	-	-
4-24	-	1100	-	-	-	-
4-30	-	-	-	35	-	-
5-7	4	920	-	53	-	-
5-15	10	1400	-	110	-	7.6
5-22	7	1400	-	99	-	-
5-28	5	1300	-	100	-	-
6-5	4	1500	-	110	-	-
6-11	6	1200	-	120	-	4.2
6-19	14	1200	-	88	-	-
6-25	11	1300	-	68	-	-
7-1	16	1700	-	58	-	-
7-15	8	1500	-	90	-	-
7-23	7	1400	-	120	-	-
8-6	-	1200	-	30	-	-
8-14	-	1200	-	65	-	6.2
8-20	-	1600	-	33	-	-
8-28	12	1700	-	91	-	-
9-4	10	1600	-	79	-	-
9-11	10	1600	-	56	-	< 3.6

Results less than reporting limit are indicated by a (-).
 No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

<u>CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963</u>						
Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Eltopia</u>						
9-19	7	1600	80	76		
9-25	8	1500	-	60		
10-1	6	1200	-	63		4.5
10-9	5	1700	-	64		
10-15	-	1800	-	73		
10-23	-	1400	-	50		
10-29	4	1400	-	58		
11-6	-	1600	-	42		
11-20	8	1600	-	49		9.7
11-26	12	1700	-	54		
12-4	4	1600	-	42		
12-13	4	1800	-	87		< 15
12-26	-	1800	-	86		
<u>Milk Shed Samples</u>						
<u>Columbia Basin</u>						
1-9	5	1300	-	-	-	3.6
1-23	4		-	-	-	
2-7	-	1500	-	66	-	9.5
2-20	4		-		-	
3-6	-	1200	-	35	-	24
3-21	4		-		-	
4-3	-	1300	-	45	-	5.2
4-17	-		-		-	
5-1	-	780		50		
5-15	3	1300		90		18
5-29	-	1600	-	91		
6-12	4	1500	120	60		
6-25	11	1300	-	75		
7-10	5	1000	100	120		16
7-24	-	1500	-	130		
8-7	-	1200	-	83		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Milk Shed Samples</u>						
Prosser, Benton City (continued)						
9-7	59	1700	-	30		
9-17	20	1600	-	68		
10-2	5	1500	-	100		
10-16	5	1600	-	89		
10-30	6	1500	140	83		< 13
11-13	-	1500	-	110		7.3
12-13	3	1500	-	81		
12-27	5	1500	-	91		
<u>Local Purchase - Commercial Milk</u>						
Brand A						
1-7	3	1300	-	33	-	7.1
1-25	-					
2-1	-	1400	-	50	-	6.6
2-15	-					
3-12	-	1400	-	44	-	5.4
3-22	-					
4-8	-	1300	-	57	-	13
4-22	-					
5-9	-	1300		130	-	15
5-27	-	1300	-	100		
6-4	3	1400	86	110		18
6-11	-	1100	-	110		
7-9	3	1200	120	86		5.9
7-23	7	1300	-	140		
8-5	3	1300	-	110	-	15
8-12	-	1200	-	79		
9-16	12	1200	-	51		
9-26	4	1300	-	45		
10-15	3	1400	-	78		< 11

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l						
<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Local Purchase - Commercial Milk</u>						
Brand A (continued)						
11-21	5	1700	-	120		
12-10	-	1600	-	78		
12-30	-					< 2.6
Brand F						
1-4	4					
1-7	-	1400	-	-	-	5.4
1-15	3					
1-25	3					
2-1	10	1300	-	45	-	6.4
2-13	-					
2-26	-					
3-7	-					
3-12	-	1500	-	49	-	4.7
3-22	-					
3-28	-					
4-8	-	1400	-	31	-	5.0
4-22	-					
5-9	-	1500		85	-	18
5-27	-	1200	-	62		
6-4	-	1400	-	70		8.7
6-11	-	1400	-	47		
7-9	-	1100	-	110		12
7-23	4	1500	-	140		
8-5	-	1200	-	100	-	11
8-12	-	1300	-	100		
9-16	8	1100	-	71		
9-26	-	1200	-	43		
10-9	3	1700	-	110		
10-15	3	1500	-	85		12
11-7	-	1500	-	44		8.0

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 1 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN MILK - 1963

Units of pc/l

<u>Date</u>	<u>I¹³¹</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	3	300	80	30	100	2
<u>Local Purchase - Commercial Milk</u>						
Brand F (continued)						
11-21	-	1700	-	80		
12-10	-	1500	-	80		
12-30	-	1100	-	71		5.5
Brand H						
1-7	4	1300	-	73	-	9.7
1-25	4					
2-1	9	1100	-	58	-	10
2-15	-					
3-12	5	1300	-	82	-	23
3-22	-					
4-8	-	1600	-	120	-	19
4-22	-					
5-9	-	1300		190	-	29
5-27	-	1100	-	170		
6-4	-	1200	-	190		26
6-11	-	1200	-	140		
7-9	-	1100	-	160		19
7-23	-	1600	-	300		
8-5	-	1300	-	270	-	36
8-12	-	1100	-	220		
9-16	-	1400	-	260		
9-26	4	1100	-	260		
10-15	-	1500	-	240		11
10-22	-	1600	-	260		
11-7	< 17	1500	-	200		24
11-21	3	1500	-	210		
12-10	-	1500	-	160		17
12-30	5	1100	-	160		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g									
<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³⁺ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Riverview Irrigation District</u>									
4-2	17	0.21	35	1.1	22	-	-	0.42	
4-10	6.2	0.19	12	1.1	5.9	-	1.5	0.32	
4-16	6.4	-	9.6	0.75	6.3	0.06	3.3	0.20	
4-24	10	0.42	27	2.6	12	-	-	0.43	
4-30	26	1.4	50	6.4	15	-	-		
5-15	7.6		28	0.78	12	-	16	-	
5-22	9.3		21	-	9.1	-	5.2	0.19	
5-28	6.9		1.3	-	2.2	0.12	3.4	0.18	
6-5	12	-	66	1.5	40	-	23	0.29	
6-11	6.4	0.25	10	0.22	6.8	0.38	9.1	0.30	
6-19	8.2	-	21	0.67	14	-	27	-	
6-25	9.1	0.71	13	0.78	2.6	-	19	0.19	
7-1	9.7	0.82	21	1.2	7.5	-	36	0.28	
7-9	20	-	6.7	0.14	11	-	4.4	0.19	< 0.028
7-15	14	-	5.2	0.38	5.6	0.05	11	0.25	
7-23	16		4.9	0.34	2.7	0.33	8.8	0.78	
7-31	8.7	1.0	9.4	0.73	3.6	-	15		
8-6	19	2.6	4.3	0.71	-	0.05	29	0.70	0.161
8-14	25	4.6	4.8	0.89	-	0.66	12	2.2	
8-20	17	2.2	15	3.1	7.8	-	43	4.6	
8-28	14	1.1	10	2.2	9.3	-	32	3.9	
9-3	14	1.3	8.6	2.1	11	2.7	19		
9-5	9.0	1.2	16	3.6	9.7	0.50	46	4.2	
9-9	15	0.71	8.7	1.9	9.1	0.79	25		
9-19	6.6	0.42	4.7	0.88	10	0.90	31		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Riverview Irrigation District (continued)</u>									
9-25	26	0.74	3.9	1.1	2.1	0.32	12	97	
10-1	19	-	-	0.67	4.0	0.39	6.7	0.56	0.057
10-9	10	-	2.9	0.83	5.6	0.29	15	700	
10-15	16	2.4	8.3	2.3	11	0.37	27		
10-23	11	1.2	0.85	0.50	-	0.12	12	0.44	
10-29	10	1.4	3.8	1.2	3.4	1.3	8.7	0.55	
11-6	9.9	-	1.5	0.39	6.0	-	0.54	0.13	0.091
<u>Pingold</u>									
6-11	18	0.14	23	0.43	18	-	11	0.81	
6-19	7.8	0.39	6.3	0.21	5.5	0.18	12	0.46	
6-25	6.4	-	5.6	0.16	6.2	0.11	7.7	0.77	
7-3	6.7	-	7.9	0.34	9.5	-	9.8	0.82	
7-9	9.3	0.20	21	1.3	11	-	19	0.77	0.068
7-15	9.6	0.32	19	1.4	10	-	30	2.0	
7-23	12		9.0	0.55	7.1	0.07	18	1.4	
7-31	9.6		4.1	0.25	5.5	-	11		
8-6	9.4		2.6	-	12	-	21	3.1	0.06
8-14	29	21	18	3.5	-	-	41	4.0	
8-20	14	2.9	7.0	1.5	2.7	0.46	26	7.4	
8-28	13	1.5	7.5	1.8	4.6	0.12	23	-	
9-3	11	3.5	7.3	0.37	7.2	1.3	14	3.4	
9-4	11	1.4	8.6	1.2	4.3	0.20	20	3.7	0.12
9-5	12	-	3.9	0.67	9.5	0.50	13		
9-6	12	1.9	5.1	1.3	3.9	0.08	16		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Pu¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Ringold (continued)</u>									
9-7	15	1.7	4.3	1.1	4.3	0.46	14		
9-8	6.2	0.31	1.3	0.45	5.3	0.43	3.9		
9-9	13	2.2	5.5	1.3	3.8	0.47	21		
9-10	9.9	1.0	3.8	0.86	3.2	0.13	26		
9-11	14		3.9	0.37	11	0.37	13		
9-12	9.3	1.5	1.9	0.49	2.2	0.26	7.1		
9-13	11	1.3	2.5	0.45	3.9	-	9.0		
9-16	6.8	1.2	3.6	0.90	2.8	0.08	30		
9-19	9.3	1.1	2.5	0.61	2.0	0.15	21		
9-20	11	-	3.0	0.45	9.0	0.10	33		
9-23	19	0.86	3.4	0.76	4.7	0.32	19		
9-24	18	0.64	3.8	1.1	3.5	0.41	18		
9-25	12	0.59	5.3	1.3	7.2	0.47	28	5.0	
9-26	11	1.5	2.9	0.85	2.6	0.18	13		
9-27	12	3.2	2.2	1.2	-	0.32	23		
9-30								4.3	
10-1	14		2.5	0.64	4.1	0.13	18	5.1	0.069
10-9	12		3.9	0.83	14	0.18	13	8.4	
10-15	18		6.0	1.6	13	0.05	24		
10-23	16	1.7	4.8	1.4	15	0.63	24	3.0	
10-29	14	2.1	5.8	1.9	10	0.11	21	5.2	
11-6	7.8	0.63	2.7	1.1	7.0	0.17	11	1.0	0.37
11-12	11	2.3	8.8	3.6	19	-	26	1.4	
11-20	11	2.6	5.5	2.3	11	0.36	26		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g									
<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵ Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴ Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Pasco</u>									
4-30	6.8		19	1.1	6.9	-	15		
5-1	7.6		16	0.51	6.4	-	14		
5-2	8.1		38	1.1	14	-	7.5		
5-3	8.4		19	0.82	5.9	-	15		
5-6	6.1		14	1.2	4.4	-	14		
5-7	6.5		45	2.8	13	-	34		
5-8	6.8		20	1.2	6.0	-	13		
5-9	6.8		12	1.4	4.7	-	7.2		
5-10	6.1		14	1.1	4.7	-	14		
5-13	6.6		17	0.98	6.6	-	6.2		
5-14	7.2		17	1.9	6.1	-	11		
5-15	8.3		22	1.4	7.2	-	15		
5-16	7.3		29	2.0	9.6	-	19		
5-17	7.0		12	0.37	4.2	-	8.0		
5-20	9.2		13	1.1	4.9	-	11		
5-21	7.4		17	2.2	6.3	-	11		
5-22	10		18	0.76	6.0	-	9.1		
5-23	7.6		12	0.73	4.6	-	7.0		
5-24	8.1		6.7	0.32	2.8	-	4.6		
5-27	9.9		15	-	5.1	-	3.3		
5-28	10		9.2	0.47	8.7	-	6.4		
5-29	8.3		6.2	0.23	1.7	-	6.7		
5-31	4.5		5.9	0.29	2.1	0.05	11		
6-3	8.7		8.3	0.41	3.4	-	11		
6-4	8.5		6.7	0.50	3.1	-	12		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

Date	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Pasco (continued)</u>									
6-5	9.2		9.5	1.0	3.3	-	12		
6-6	8.7		8.4	1.5	3.6	-	8.8		
6-7	9.8		9.0	0.74	3.3	-	11		
6-10	8.7		21	1.1	9.6	-	19		
6-11	11		21	1.2	8.4	-	23		
6-12	9.4		18	0.78	7.2	-	18		
6-13	11		29	2.3	11	-	42		
6-14	10		16	0.78	6.5	-	18		
6-16	10		12	0.54	3.1	-	21		
6-18	6.7		7.0	0.20	2.5	-	16		
6-19	7.6	0.41	8.4	0.67	-	-	12		
6-20	13	0.22	21	0.34	5.7	-	32		
6-21	6.4		0.60	-	0.84	0.06	7.6		
6-24	8.5		5.2	-	2.6	0.17	13		
6-25	6.9		6.5	0.15	2.4	-	7.2		
6-26	7.1		7.2	0.22	2.6	0.79	15		
6-27	12		12	0.42	6.3	0.35	22		
6-28	12		8.0	0.35	4.7	0.47	20		
7-1	6.7		2.6	0.13	0.78	-	7.8		
7-2	8.2		26	1.3	11	-	35		
7-3	9.7		19	1.0	8.8	-	23		
7-5	7.3		12	0.58	5.0	-	19		
7-9	11		12	0.59	42	-	9.3		
7-10	7.8		17	1.1	7.3	-	28		
7-12	9.1		15	1.2	7.2	-	28		

< 0.04

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Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

Date	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³⁺ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Pasco (continued)</u>									
7-15	11		5.5	1.6	5.5	0.44	25		
7-16	8.2		11	0.62	4.4	-	19		
7-17	7.9		7.6	0.43	3.6	-	19		
7-19	9.5		9.3	0.34	4.2	-	17		
7-22	9.9		5.5	0.31	2.4	-	11		
7-23	15		20	1.1	9.3	-	23		
7-24	10		8.9	0.72	4.2	-	16		
7-26	5.1		6.9	-	2.8	-	4.5		
7-29	3.8		6.3	-	2.9	-	5.7		
7-30	8.2		4.7	0.26	2.0	0.20	11		
7-31	9.1		5.7	0.21	2.3	-	8.1		
8-1	7.8		4.0	0.20	1.7	-	12		
8-2	11		9.6	0.48	4.7	-	31		
8-5	12	0.84	8.7	0.74	1.1	-	32		
8-6	12		4.3	0.31	2.4	0.50	14		
8-7	10		1.1	0.07	1.2	-	8.1		0.013
8-8	17		1.2	0.05	0.57	-	13		
8-9	34		12	1.3	7.8	0.45	25		
8-12	26		6.5	0.96	4.8	-	9.5		
8-13	31		27	4.2	23	-	44		
8-14	42		28	4.4	31	0.26	49		
8-15	35		34	5.2	31	-	59		
8-16	27		7.2	1.0	5.4	0.07	14		
8-19	15		2.4	0.40	1.3	-	3.9		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Pasco (continued)</u>									
8-20	17		11	1.8	14	-	15		
8-21	11		2.3	0.36	1.4	-	6.9		
8-22	9.6		1.6	0.29	1.1	-	9.9		
8-23	6.0		3.2	0.83	3.1	0.07	20		
8-26	9.2		2.9	0.53	3.2	0.06	15		
8-27	9.8		13	2.5	9.1	0.09	48		
8-28	12	-	4.2	0.87	4.2	-	14		
8-29	11	-	7.1	1.4	6.8	-	20		
8-30	8.1		2.8	0.47	2.3	0.28	12		
9-1	10		4.7	0.87	4.9	0.47	16		
9-3	8.4		3.0	0.39	5.5	0.62	24		
9-4	12		4.5	0.90	4.4	0.37	20		
9-5	8.3		2.6	0.39	2.4	0.54	9.7		
9-6	6.4		1.8	0.23	1.8	0.28	8.1		
9-7	14		1.5	0.33	2.0	0.32	5.5		
9-8	8.5		2.3	0.46	5.8	0.61	8.5		
9-9	8.8		3.0	0.73	3.1	0.18	11		
9-10	8.6		2.4	0.51	3.5	0.18	8.8		
9-11	9.8		1.8	0.38	1.9	0.11	5.8		
9-12	6.6		2.7	0.61	2.8	0.33	8.8		
9-13	12		4.6	0.85	4.9	0.05	21		
9-14	8.3		2.4	0.62	2.0	0.13	5.4		
9-16	11		1.5	0.39	1.5	0.09	6.5		
9-17	6.6		2.3	0.51	2.7	0.13	15		
9-18	8.0		1.9	0.44	2.0	0.23	17		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

Date	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³⁺ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Pasco (continued)</u>									
9-19	10		3.1	0.69	3.2	0.30	17		
9-20	10		3.7	0.84	4.2	0.28	17		
9-23	14		3.1	0.75	3.0	-	11		
9-24	17		1.9	0.56	2.0	0.31	6.8		
9-25	20		1.8	0.47	3.0	0.22	5.6		
9-26	6.0		4.6	0.86	6.2	0.10	15		
9-27	7.5		1.5	0.38	1.1	0.10	7.0		
9-30	13		2.8	0.76	3.0	0.20	13		
10-1	10		4.9	1.4	5.1	0.23	20		0.02
10-2	8.2		1.9	0.49	2.2	0.33	7.7		
10-3	6.0		5.7	1.5	8.1	0.36	17		
10-4	5.2		2.6	0.51	2.1	0.31	7.5		
10-7	8.8		3.6	1.1	4.1	0.18	16		
10-8	8.0		5.6	1.4	7.1	0.19	16		
10-9	10		2.3	0.77	2.6	-	10		
10-10	10		5.3	1.5	5.0	0.26	23		
10-11	9.5		4.3	1.3	3.8	0.25	20		
10-14	10		3.5	1.1	3.5	0.14	24		
10-15	11	-	3.1	0.85	4.9	0.11	13		
10-16	8.9		3.5	0.99	3.2	0.15	17		
10-18	6.9		1.3	0.37	1.5	0.16	9.2		
10-21	11		2.3	0.74	4.5	-	13		
10-22	10		3.3	1.2	4.6	0.08	20		
10-23	7.2		2.0	0.67	2.3	0.18	10		
10-24	14	0.26	3.9	1.3	3.5	0.23	24		
10-25	8.0		3.1	0.95	3.3	0.19	13		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002

Pasco (continued)

10-28	7.0		2.6	0.91	3.2	0.22	18		
10-29	2.8		2.8	0.90	5.6	0.12	11		
10-30	30		3.8	1.3	6.9	-	9.4		
10-31	34		2.1	0.55	2.6	-	9.5		
11-1	38		4.8	1.9	6.4	-	8.5		
11-4	10		3.3	1.2	4.8	-	16		
11-5	13		4.1	3.2	5.2	0.54	23		
11-6	7.8		3.1	1.2	3.1	0.09	10		0.26
11-7	9.5		4.4	1.5	5.5	0.16	18		
11-11	6.9		2.4	0.93	2.8	-	25		
11-12	6.8		2.7	0.95	2.4	0.12	29		
11-13	6.3		1.9	0.79	2.7	0.09	8.7		
11-14	4.3		1.5	0.61	2.5	0.15	9.0		
11-15	5.3		2.5	0.95	3.6	0.19	12		
11-18	9.1		4.2	1.6	6.5	0.07	24		
11-19	7.1		3.4	1.2	5.9	0.10	18		
11-20	8.9		3.3	0.87	4.9	0.38	17		
11-21	6.3		2.8	0.97	6.3	0.38	15		
11-26	13		4.3	1.6	6.4	0.22	21		
11-27	9.0		3.2	1.2	5.2	0.07	25		

Byers Landing

4-2	36		190	5.9	69	-	-		
4-10	8.1		24	1.6	5.9	-	-		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵ Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴ Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Byers Landing (continued)</u>									
4-16	6.5		10	1.4	4.3	0.05	6.0		
4-24	12		49	4.4	17	-	-		
4-30	7.0		18	1.6	7.0	-	3.5		
5-15	8.0		19	1.2	7.7	-	-		
5-22	22		18	0.80	6.5	-	6.7		
5-28	10		18	0.72	6.9	-	9.3		
6-5	8.1		11	0.91	4.6	-	8.7		
6-11	6.6		6.4	0.30	3.1	0.08	6.6		
6-19	8.3		4.4	0.13	1.5	0.13	6.2		
6-25	7.8		24	1.4	11	-	30		
7-3	8.8		16	1.2	9.4	-	11		
7-9	5.8		14	1.2	7.3	-	16		< 0.047
7-15	6.3		13	1.1	6.6	-	23		
7-23	9.3		11	0.64	6.1	-	16		
7-31	8.4	-	2.7	0.15	1.3	0.24	5.1		
8-6	37		11	1.1	15	0.63	63		0.13
8-14	48		11	2.0	10	-	19		
8-20	12		5.9	1.2	4.0	-	15		
8-28	13		4.8	1.1	4.4	-	14		
9-3	9.3		2.3	0.73	2.9	0.30	7.9		
9-4	7.7		6.3	0.61	4.5	0.18	13		0.062
9-11	11		4.0	0.62	5.2	0.26	14		
9-17	7.1		3.6	0.89	4.7	0.25	18		
9-25	9.2		2.0	0.59	2.1	0.19	6.4		
10-1	6.3		1.2	0.32	1.5	0.12	6.1		0.061

Results less than reporting limit are indicated by a (-).
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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵ Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Pu¹⁰³ Pu¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴ Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Byers Landing (continued)</u>									
10-9	6.8		3.9	-	3.5	0.25	7.3		
10-15	5.8		1.9	0.27	1.7	-	7.9		
10-23	7.1		5.5	1.6	10	0.18	21		
10-29	8.9		2.3	0.67	3.9	0.11	9.1		
11-6	9.0		7.2	2.5	9.7	0.34	35		0.197
<u>West Richland</u>									
9-12	7.2		5.5	1.3	5.0	0.94	18		
9-13	6.7		5.1	1.2	6.6	0.24	9.1		
9-14	5.3		1.7	0.39	3.7	1.2	2.8		
9-16	4.7		5.4	1.4	5.9	0.39	20		
9-17	4.8		4.5	0.97	5.5	0.33	22		
9-18	8.1		5.7	1.3	8.3	0.99	30		
9-19	7.9		5.9	1.4	7.5	0.36	32		
9-20	11		5.4	1.4	8.3	0.50	30		
9-23	13		11	2.4	15	0.55	29		
9-24	16		3.4	0.87	5.9	0.84	11		
9-25	11		6.4	1.8	9.5	0.58	22		
9-26	10		5.1	1.3	6.7	1.0	38		
9-27	9.9		8.7	2.2	9.9	0.59	28		
9-30	13		8.7	2.2	11	0.37	25		
10-1	8.4		5.3	1.4	6.5	0.14	15		
10-2	9.0		13	3.4	15	0.42	38		
10-3	8.1		2.1	0.57	1.8	0.41	10		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g									
<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³⁺ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>p³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>West Richland (continued)</u>									
10-4	10		7.1	1.7	9.3	0.30	20		
10-7	8.6		5.8	1.5	6.9	0.27	21		
10-8	7.6		5.0	1.6	5.5	0.18	18		
10-9	6.2		1.6	2.5	7.1	0.49	25		
10-10	6.4		21	6.0	23	0.13	66		
10-11	8.9		10	2.8	11	0.23	35		
10-15	13		5.3	0.56	4.8	0.17	14		
10-16	8.8		8.5	0.90	12	0.27	19		
10-17	9.0		3.2	0.87	5.6	0.14	18		
10-18	10		3.3	0.87	6.2	0.42	27		
10-21	8.8		3.6	1.0	6.3	0.10	21		
10-22	11		7.1	2.2	11	0.19	30		
10-23	9.5		12	3.3	14	0.17	43		
10-24	14		5.1	1.8	10	0.93	31		
10-25	18		4.8	1.5	6.1	0.17	19		
10-28	9.4		9.7	3.1	12	0.15	39		
10-29	11		6.9	1.9	11	-	22		
10-30	8.8		5.8	1.7	9.2	0.19	35		
10-31	29		8.7	4.0	12	-	37		
11-1	10		5.8	2.0	9.8	-	18		
11-4	12		6.4	2.2	10	-	31		
<u>Benton City</u>									
5-1	6.6		11	0.47	3.8	-	11		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs 137</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Benton City (continued)</u>									
5-2	7.2		16	1.1	6.7	-	11		
5-3	7.4		12	1.1	4.9	-	5.6		
5-6	5.3		11	1.1	3.3	-	12		
5-8	7.1		22	1.7	8.2	-	22		
5-9	7.4		36	2.7	13	-	6.3		
5-10	6.2		33	2.6	12	-	32		
5-13	6.7		15	0.84	6.3	-	9.7		
5-16	8.3		8.2	0.19	3.3	-	5.2		
5-17	7.0		6.3	0.23	2.3	-	6.6		
5-20	8.3		5.9	0.50	2.7	-	7.6		
5-21	11		11	1.2	4.4	-	8.9		
5-22	11		6.6	-	2.3	-	2.4		
5-23	9.4		8.2	0.75	3.9	0.10	6.9		
5-24	8.7		3.0	0.18	1.3	-	5.6		
5-27	8.6		3.3	-	1.5	0.07	1.9		
5-29	8.3		3.5	0.16	1.2	-	6.1		
5-31	6.9		4.5	0.17	2.5	-	8.7		
6-3	5.7		13	0.40	5.0	-	21		
6-4	5.6		7.1	1.3	4.4	-	15		
6-6	5.8		11	0.63	4.3	-	15		
6-7	6.5		9.9	0.48	4.1	-	17		
6-10	6.0		10	0.30	5.1	-	14		
6-12	7.0		18	0.50	7.0	-	28		
6-14	7.0		6.8	0.40	2.7	-	14		
6-17	7.7		11	0.99	4.3	-	20		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵ Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴ Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Benton City (continued)</u>									
6-18	8.2		8.6	0.33	3.2	-	22		
6-20	8.4		2.9	0.09	0.8	-	13		
6-21	7.6		1.2	-	1.3	-	11		
6-24	8.2		3.3	-	2.2	0.18	8.8		
6-26	6.6		3.8	0.28	1.7	-	9.0		
6-27	8.7		5.1	0.58	2.9	0.28	12		
6-28	8.9		7.4	0.45	5.1	0.38	15		
7-1	18		5.2	0.33	2.1	-	8.1		
7-2	9.3		10	0.34	5.2	-	21		
7-3	39		4.7	0.24	-	-	-		
7-5	7.5		5.0	0.36	3.3	0.07	19		
7-10	8.4		16	1.1	7.1	-	23		
7-12	8.5		9.7	0.62	5.1	-	29		
7-15	7.9		14	1.0	6.8	-	32		
7-16	8.4		7.9	0.74	4.8	-	22		
7-17	8.9		5.8	0.32	3.5	0.05	19		
7-19	7.5		3.6	0.11	1.7	-	14		
7-22	7.7		8.1	0.53	4.1	-	13		
7-23	6.9		2.9	1.8	3.5	0.36	13		
7-24	6.8		4.2	0.19	2.4	-	11		
7-26	4.9		8.6	0.04	4.1	0.08	8.4		
7-29	4.9		9.5	0.12	4.9	-	12		
7-30	8.2		3.4	0.24	2.0	0.13	11		
7-31	11		7.3	0.37	3.5	-	14		
8-1	11	-	9.0	0.47	4.7	-	12		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Benton City (continued)</u>									
8-2	13		10	1.1	6.8	-	-		
8-5	7.5	0.45	2.9	0.30	-	-	18		
8-9	33		7.9	1.1	8.6	-	12		
8-20	15		3.1	0.78	1.5	-	7.7		
8-28	14		0.92	0.22	1.1	0.08	1.8		
9-4	8.8		2.2	0.54	3.6	1.5	12		
9-5	11		2.3	0.45	1.7	1.4	8.8		
9-6	8.3		2.5	0.46	2.8	1.8	21		
9-7	21		2.0	0.09	4.6	2.6	4.6		
9-8	11		3.4	0.76	6.5	1.0	8.7		
9-9	9.6		2.1	0.46	3.6	0.34	5.0		
9-10	6.9		1.5	0.35	1.9	0.39	4.1		
9-11	3.1		1.2	0.26	1.6	0.05	4.2		
9-12	8.1		1.3	0.33	1.4	0.38	3.4		
9-13	7.5		2.1	0.45	3.1	0.12	16		
9-14	12		6.6	1.6	6.8	0.20	15		
9-16	5.5		2.2	0.53	2.5	0.18	11		
9-17	8.9		6.4	1.4	10	0.37	29		
9-18	9.4		2.3	0.49	2.8	0.36	14		
9-19	11		3.8	0.75	5.4	0.37	22		
9-20	9.9		2.2	0.61	3.6	0.20	10		
9-23	16		2.4	0.51	3.5	0.22	7.0		
9-24	18		2.6	0.64	4.0	0.30	5.4		
9-25	12		2.9	0.78	5.5	0.61	9.4		
9-26	12		3.1	0.91	5.8	1.1	27		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Benton City (continued)</u>									
9-27	7.8		4.2	1.2	4.4	0.31	15		
9-30	8.6		1.8	0.51	3.3	0.24	5.7		
10-1	9.1		2.4	0.69	2.7	0.17	8.7		
10-10	11		9.1	4.6	14	0.34	25		
10-17	12		4.1	0.98	6.4	-	20		
11-1	21		4.0	1.3	6.0	-	4.6		
<u>Eltopia</u>									
4-2	13		31	1.7	8.8	-	-		
4-10	7.7		37	2.4	13	-	-		
4-16	6.2		20	1.5	6.3	0.06	9.8		
4-24	8.6		22	2.4	5.9	-	-		
4-30	5.9		13	1.3	5.1	-	4.0		
5-15	6.2		12	0.71	4.5	-	8.3		
5-22	7.2		4.1	-	1.9	0.09	2.7		
5-28	9.8		8.6	0.33	3.3	-	5.6		
6-5	14		21	0.69	9.8	-	8.1		
6-11	6.5		6.2	0.40	2.6	0.23	7.4		
6-19	7.3		2.3	0.19	0.94	0.38	3.2		
6-25	9.3		3.1	0.21	2.1	0.13	8.1		
7-1	6.4		4.0	0.22	1.9	-	15		
7-15	8.6		17	1.3	8.7	-	33		
7-23	6.8		8.5	0.67	4.6	0.18	20		
8-6	18		19	1.6	13	-	48		1.2

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>P³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Eltopia (continued)</u>									
8-14	29		7.0	0.98	7.8	-	4.6		
8-20	25		3.1	0.73	5.0	-	3.7		
8-28	28		6.5	1.2	8.0	-	16		
9-3	30		6.1	1.3	6.9	0.09	13		
9-4	5.7		7.4	0.72	4.9	0.17	20		0.056
9-11	14		3.0	0.66	2.4	0.20	11		
9-19	31		4.8	1.1	5.1	0.20	14		
9-25	9.2		1.9	0.42	2.5	0.16	7.1		
10-1	7.5		2.0	0.54	2.7	0.17	9.0		0.008
10-9	25		13	3.6	17	-	33		
10-15	17		3.8	0.40	3.3	-	6.4		
10-23	8.1		0.54	0.26	0.56	0.18	5.0		
10-29	32		2.8	0.86	4.8	0.06	9.8		
11-6	37		7.2	3.6	9.5	-	25		1.47
<u>Mesa</u>									
4-2	13		19	0.69	5.1	-	-		
4-10	7.2		17	1.6	7.1	-	6.3		
4-16	5.2		8.2	1.0	3.1	0.09	7.3		
4-24	10		29	2.9	9.6	-	-		
4-30	5.9		24	1.4	9.5	-	16		
5-15	6.8		12	1.4	5.4	0.06	12		
5-22	7.8		6.8	0.25	2.8	-	9.1		
6-5	5.6		4.1	0.16	1.2	-	3.1		

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 2 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN PASTURE GRASS - 1963

Units of pc/g

<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Cs¹³⁷</u>	<u>Ru¹⁰³+ Ru¹⁰⁶</u>	<u>I¹³¹</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>p³²</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.3	0.08	0.05	0.03	0.5	0.05	0.5	0.1	0.002
<u>Mesa (continued)</u>									
6-11	8.1		10	0.62	3.6	-	10		
6-19	7.6		2.3	0.22	1.2	0.26	4.1		
6-25	6.6		4.9	0.18	2.2	0.15	8.6		
7-1	6.8		5.8	0.57	3.4	-	7.7		
7-9	6.6		14	0.67	6.8	-	14		0.107
7-15	20		25	1.2	15	-	22		
7-23	23		24	1.4	13	-	19		
7-31	7.7	0.09	0.9	0.09	-	0.07	0.9		
8-6	24		30	2.2	20	-	67		0.777
8-14	20		20	3.5	16	-	40		
8-20	31		4.8	0.87	4.6	-	7.1		
8-28	26		9.4	1.8	9.2	0.08	28		
9-3	7.1		0.3	0.09	0.96	0.26	4.2		
9-5	7.4		1.0	0.20	1.0	0.25	4.4		
9-11	13		2.0	0.42	2.0	0.12	5.9		
9-19	7.1		1.1	0.33	1.2	0.19	16		
9-25	9.5		1.6	0.31	2.2	0.36	11		
10-1	7.9		0.47	0.15	0.53	-	2.3		
10-9	26		10	3.4	12	0.09	36		
10-15	27		9.5	0.90	9.7	0.05	11		
10-23	8.5		1.6	0.65	2.8	0.48	13		
10-29	26		1.1	0.44	0.97	0.07	35		
11-6	14		2.4	1.1	3.0	0.07	11		0.263

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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HW-80991

APPENDIX C
TABLE 3

CONCENTRATIONS OF RADIONUCLIDES IN GROUND BEEF PURCHASED FROM LOCAL MARKETS - 1963

Units of pc/g

<u>Date</u>	<u>P³²</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>I¹³¹</u>	<u>Cs¹³⁷</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Zn⁶⁵</u>	<u>K⁴⁰</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.1	0.5	0.05	0.03	0.05	0.08	0.4	0.002
1-7	-	-	-	0.06	-	-	3.0	0.003
1-7	-	-	-	0.05	-	-	2.7	0.004
1-16	-	-	-	0.24	-	4.8	2.6	0.01
2-1	-	-	-	0.17	-	0.09	2.8	-
2-1	-	-	0.06	0.11	-	0.11	3.5	-
3-8	-	-	-	0.06	-	-	3.3	-
3-8	-	-	-	0.16	-	-	3.1	-
4-25	-	-	-	0.17	-	-	3.1	-
4-25	-	-	-	0.08	-	-	3.3	0.003
5-2	-	0.5	-	0.12	-	0.08	2.9	0.003
5-2	-	0.7	-	0.15	-	0.13	3.4	0.003
5-2	-	-	-	0.76	-	0.15	3.3	0.012
5-2	-	0.9	-	0.25	-	0.08	3.1	0.004
5-2	-	0.6	-	0.33	0.05	0.28	3.7	0.004
5-2	-	-	-	0.11	-	0.23	2.6	0.006
5-2	-	0.5	-	0.23	-	0.08	3.0	0.005
6-17	-	-	-	0.15	-	0.09	3.1	0.002
6-17	-	-	-	0.16	-	-	3.5	-
6-17	-	0.5	-	0.84	-	-	3.0	0.003
7-9	-	-	-	0.16	-	-	3.3	0.009
7-9	-	-	-	0.07	-	-	2.9	0.013
7-9	-	-	0.14	0.11	-	0.08	0.5	0.012
8-5	-	-	-	0.11	-	-	3.0	0.002
8-5	-	1.0	-	0.09	-	-	2.4	0.005
8-5	-	-	-	0.09	-	-	2.8	0.002
9-26	-	-	-	0.15	-	0.11	3.1	< 0.008
9-26	-	-	-	0.12	-	-	3.4	< 0.014
10-15	-	-	0.09	0.13	-	0.11	3.3	< 0.008

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 3 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN GROUND BEEF PURCHASED FROM LOCAL MARKETS - 1963
Units of pc/g

<u>Date</u>	<u>P³²</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>I¹³¹</u>	<u>Cs¹³⁷</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Zn⁶⁵</u>	<u>K⁴⁰</u>	<u>Sr⁹⁰</u>
Reporting Limits	0.1	0.5	0.05	0.03	0.05	0.08	0.4	0.002
10-15	-		-	0.30		-	2.4	< 0.007
11-7	-		-	0.13		0.09	3.0	< 0.011
11-7	-		-	0.39		0.08	3.1	< 0.004
11-7	-		-	0.13		-	3.2	0.004
12-10	< 0.11		-	0.49		-	3.1	< 0.009
12-10	< 0.11		-	0.24		-	4.1	< 0.017
12-10	< 0.11		-	0.22		-	3.5	< 0.007

Results less than reporting limit are indicated by a (-),

APPENDIX C
TABLE 4

CONCENTRATIONS OF RADIONUCLIDES IN LOCALLY GROWN FARM PRODUCE - 1963

Units of pc/g

<u>Date</u>	<u>Product</u>	<u>P³²</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>I¹³¹</u>	<u>Cs¹³⁷</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Zn⁶⁵</u>	<u>K⁴⁰</u>	<u>Sr⁹⁰</u>
Reporting Limits		0.1	0.5	0.05	0.03	0.05	0.08	0.4	0.002
5-31	Strawberries		2.1	-	0.05	0.62		1.7	
5-31	Asparagus		1.2	-	-	0.07		2.3	
5-31	Asparagus	-	-	-	-	0.13		2.1	
5-31	Strawberries	-	1.3	-	0.11	0.79		1.4	
5-31	Strawberries	0.22	0.7	-	0.05	0.43		1.6	
5-31	Asparagus	-	-	-	-	0.06		2.6	
6-11	Lettuce	-	5.1	-	0.15	0.87	0.52	4.8	0.11
6-11	Beets	-	2.9	-	0.08	2.0	-	6.6	0.002
6-19	Cabbage		0.8	-	-	0.06		2.6	0.007
6-19	Lettuce		1.9	-	0.07	1.0		3.8	0.035
6-19	Parsnips		-	-	-	-		2.6	0.009
6-19	Cherries		-	-	0.05	0.13		3.0	0.009
6-19	Lettuce		4.4	-	0.2	2.7		4.7	0.039
6-19	Beet Tops		5.7	0.12	0.37	4.0		6.3	-
6-19	Beet Roots		1.7	-	-	0.21		3.6	
6-19	Onions		-	-	0.4	0.35		2.1	0.011
6-19	Carrots		0.9	-	0.04	0.36		5.4	0.012
6-19	Beet Greens	0.36	4.5	0.06	0.19	2.7	-	8.5	-
6-19	Beet Roots	-	-	-	-	0.07	-	5.9	
6-19	Lettuce	0.12	2.1	0.06	0.11	1.4	0.08	5.1	0.016
6-19	Cherries	-	-	-	-	0.06	-	-	0.007
6-25	Apples	-	-	-	-	-	-	1.3	0.003
7-3	Beans	0.11	3.3	-	0.14	0.27	0.58	3.8	0.009
7-9	Apricots		-	-	0.10	0.63		1.8	0.036
7-9	Apricots		1.1	-	0.08	0.6		2.0	0.035
7-11	Lettuce		9.6	-	0.24	2.9		5.1	0.083
7-11	Turnips		6.5	-	0.11	1.8		3.8	0.046

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Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

APPENDIX C
TABLE 4 (Continued)

CONCENTRATIONS OF RADIONUCLIDES IN LOCALLY GROWN FARM PRODUCE - 1963

Units of pc/g

Date	Product	<u>P³²</u>	<u>Ce¹⁴⁴- Pr¹⁴⁴</u>	<u>I¹³¹</u>	<u>Cs¹³⁷</u>	<u>Zr⁹⁵- Nb⁹⁵</u>	<u>Zn⁶⁵</u>	<u>K⁴⁰</u>	<u>Sr⁹⁰</u>
Reporting Limits		0.1	0.5	0.05	0.03	0.05	0.08	0.4	0.002
7-11	Apricots		0.8	-	0.04	0.36		2.9	0.019
7-11	Beans		1.8	-	-	0.19		2.0	0.012
7-11	Beet Tops							4.8	
7-11	Beet Roots		3.6	-	0.13	1.5		3.2	0.007
7-15	Apricots	0.44	1.3	-	0.07	0.5	-	1.5	0.045
7-15	Apples	-	0.6	-	-	0.16	-	3.0	0.018
7-31	Beans	0.37	-	0.06	-	-	0.16	1.6	0.011
7-31	Peaches	-	-	-	-	0.19	-	2.9	0.038
7-31	Apricots	0.11	1.2	-	0.06	0.45	0.21	2.4	0.012
8-1	Apricots		-	-	0.14	0.4		1.5	0.012
8-1	Prunes		-	-	-	0.05		5.6	0.012
8-1	Potatoes		-	-	-	-		3.0	0.012
8-1	Apricots		-	-	0.05	0.14		3.2	0.012
8-1	String beans		-	-	0.04	0.14		0.8	0.012
8-1	Berries		-	-	0.19	0.51		1.8	0.012
8-1	Cucumbers		1.0	0.1	-	-	1.3	3.9	0.012
8-1	Sweet Corn		1.0	-	-	0.36		1.3	0.012
8-1	Apples		-	-	0.05	0.11		2.6	0.039
8-1	Green Beans		0.6	-	-	-		3.5	0.039
8-1	Turnips		2.0	-	-	0.57		2.0	0.039
8-1	Cucumbers		-	-	-	-			
8-1	Okra		-	-	-	-			
8-1	Parsley		3.3	-	0.34	1.4	0.66	10.5	0.039
8-1	Squash		-	0.12	-	-		7.3	0.039
8-1	Sweet Corn		-	-	-	-		3.2	0.039
8-1	Beets		-	-	-	-		4.2	0.039
8-1	Lettuce		-	-	0.14	0.81		4.3	0.039
8-1	Radishes		-	-	-	-		3.4	0.039
8-1	Apricots		-	-	0.05	0.18		2.3	0.039
8-1	Peaches		-	-	0.03	0.09	0.11	2.5	0.010
9-12	Peaches	0.3	-	-	-	-	-	-	-

Results less than reporting limit are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 5

CONCENTRATION OF RADIONUCLIDES IN FOOD PURCHASED FROM LOCAL STORES - 1963

Units of pc/g

Date	Product	Ce ¹⁴⁴ -Pr ¹⁴⁴	I ¹³¹	Cs ¹³⁷	Zr ⁹⁵ -Nb ⁹⁵	Zn ⁶⁵	K ⁴⁰	Sr ⁹⁰
Reporting Limits*		0.5	0.05	0.03	0.05	0.08	0.4	0.002
6-12	Lettuce	0.8	0.05	-	-		3.0	0.003
6-12	Beet Tops	4.4	-	0.34	2.9		4.5	-
6-12	Beet Roots	-	-	-	0.16		2.6	0.018
6-12	Radishes	0.8	-		0.08		2.2	0.017
6-12	Rhubarb	-	-	0.04	0.11		2.9	0.025
6-12	Asparagus	-	-	0.03	-		2.7	0.003
8-1	Cucumbers	0.5	-	-	-	-	2.0	0.013
8-1	Beet Roots	0.7	0.10	-	-	-	4.0	0.013
8-1	Beet Tops	2.2	-	-	2.4	-	8.3	0.013
8-1	Carrots	-	0.08	-	-	-	2.9	0.013
8-1	Peaches	-	0.05	-	-	-	1.8	0.013
8-1	Potatoes	-	-	-	-	0.13	4.3	0.013
8-1	Green Peppers	1.3	0.22	-	-	-	2.1	0.013
8-1	Radishes	-	-	-	0.10	-	2.6	0.013
8-1	Celery	-	0.24	-	-	-	6.1	0.013
8-1	Cabbage	0.9	0.20	-	-	-	2.8	0.013
8-1	Plums	-	-	-	-	-	1.4	0.013
8-1	String Beans	-	-	-	0.1	-	2.5	0.013
8-1	Green Onions	3.6	0.35	0.08	0.15	0.10	5.1	0.013
8-1	Apples	-	-	-	-	-	1.2	
8-1	Sweet Corn	-	-	-	-	-	2.4	
8-1	Endive	-	0.43	-	0.24	-	2.4	
8-1	Tomatoes	-	0.05	-	-	-	2.0	
8-1	Blueberries	0.7	-	0.06	0.46	-	0.5	
8-1	Romaine	-	0.15	-	0.11	-	3.1	

*Results less than reporting limits are indicated by a (-).
No entry indicates no analysis made.

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APPENDIX C
TABLE 5 (Continued)

CONCENTRATION OF RADIONUCLIDES IN FOOD PURCHASED FROM LOCAL STORES - 1963
Units of pc/g

<u>Date</u>	<u>Product</u>	<u>Ce¹⁴⁴</u> <u>-Pr¹⁴⁴</u>	<u>I¹³¹</u>	<u>Cs¹³⁷</u>	<u>Zr⁹⁵</u> <u>-Nb⁹⁵</u>	<u>Zn⁶⁵</u>	<u>K⁴⁰</u>	<u>Sr⁹⁰</u>
Reporting Limits*		0.5	0.05	0.03	0.05	0.08	0.4	0.002
8-1	Strawberries	0.5	-	-	0.019	-	1.2	
8-1	Grapes	-	0.08	-	-	-	1.9	
8-1	Apricots	0.9	0.07	0.04	0.20	-	2.5	
8-1	Head Lettuce	0.5	0.07	0.04	-	0.22	2.0	

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APPENDIX C
TABLE 6

CONCENTRATION OF RADIONUCLIDES IN OYSTERS FROM
WILLAPA BAY, WASHINGTON - 1963

Units of pc/g						
<u>Date</u>	<u>K⁴⁰</u>	<u>Zn⁶⁵</u>	<u>Cs¹³⁷</u>	<u>P³²</u>	<u>Co⁵⁸</u>	<u>Co⁶⁰</u>
Reporting Limits*	0.3	0.1	0.03	0.1	0.7	0.6
1-8	5.6	46		1.9		
1-23	21	82		2.2		
2-7	1.7	22	0.12	2.1	-	
2-19	24	120	-	3.1	-	-
3-6	2.3	73	-	1.4	-	-
3-20	24	69	2.6	2.4	2.9	-
4-3	27	78	0.63	< 1.6	1.0	-
4-17	-	66	0.24	5.7	-	-
5-1	25	78	0.58	10	0.87	-
5-14	3.6	84	0.43	14	0.77	-
5-28	1.7	99	0.52	5.9	-	-
6-12	0.94	86	0.50	7.8	0.82	-
6-26	1.4	76		7.1		-
7-9	3.9	58	0.49	8.0	0.71	-
7-24	0.57	74	0.61	7.1	-	-
8-7	1.9	87	-	3.6	-	-
8-21	1.5	74	-	2.2	-	-
9-5	2.4	130	-	2.6	-	-
9-19	2.5	58	-	1.8	-	-
10-1	2.6	92	0.12	1.7	-	-
10-15	3.4	82	-	0.88	-	-
10-30	2.1	90	-	0.60	-	-
11-14	4.4	84	-	< 3.0	-	-
12-3	0.66	87	-	< 1.9	-	-
12-12	2.2	93	-	< 1.4	-	-
12-23	2.0	86	-	2.2	-	-

*Results less than the reporting limit are indicated by a (-).
No entry indicates no analysis made.

X. APPENDIX D

EXTERNAL RADIATION EXPOSURE RESULTS

APPENDIX D

TABLE 1

IONIZATION CHAMBER MEASUREMENTS
FOR THE HANFORD RESERVATION AND RICHLAND - 1963

Measurement Period	mr/day		Measurement Period	mr/day	
	Hanford	Pichland		Hanford	Richland
12/31/62-1/2/63	0.53	0.58	3/1-3/4	0.44	0.40
1/2-1/4	0.60	0.92	3/4-3/6	0.39	0.42
1/4-1/7	0.69	0.66	3/6-3/8	0.44	0.44
1/7-1/9	0.67	0.64	3/8-3/11	0.42	0.41
1/9-1/11	0.68	0.60	3/11-3/13	0.43	0.37
1/11-1/14	0.50	0.42	3/13-3/15	0.38	0.33
1/14-1/16	0.55	0.47	3/15-3/18	0.40	0.37
1/16-1/18	0.55	0.46	3/18-3/20	0.35	0.37
1/18-1/21	0.48	0.41	3/20-3/22	0.41	0.37
1/21-1/23	0.48	0.43	3/22-3/25	0.41	0.39
1/23-1/25	0.46	0.47	3/25-3/27	0.36	0.32
1/25-1/28	0.45	0.45	3/27-3/29	0.42	0.39
1/28-1/30	0.50	0.57	3/29-4/1	0.41	0.41
1/30-2/1	0.40	0.37	4/1-4/3	0.45	0.44
2/1-2/4	0.39	0.39	4/3-4/5	0.43	0.40
2/4-2/6	0.42	0.39	4/5-4/8	0.38	0.40
2/6-2/8	0.43	0.44	4/8-4/10	0.42	0.38
2/8-2/11	0.45	0.45	4/10-4/12	0.39	0.40
2/11-2/13	0.46	0.45	4/12-4/15	0.47	0.39
2/13-2/15	0.42	0.43	4/15-4/17	0.40	0.44
2/15-2/18	0.46	0.49	4/17-4/19	0.43	0.39
2/18-2/20	0.41	0.41	4/19-4/22	0.42	0.43
2/20-2/23	0.44	0.43	4/22-4/24	0.48	0.33
2/23-2/25	0.44	0.41	4/24-4/26	0.48	0.36
2/25-2/27	0.37	0.35	4/26-4/29	0.48	0.39
2/27-3/1	0.37	0.36	4/29-5/1	0.47	0.47

APPENDIX D
TABLE 1 (Continued)

IONIZATION CHAMBER MEASUREMENTS
FOR THE HANFORD PRESERVATION AND RICHLAND - 1963

Measurement Period	mr/day		Measurement Period	mr/day	
	Hanford	Richland		Hanford	Richland
5/1-5/3	0.44	0.31	7/1-7/3	0.70	0.66
5/3-4/6	0.44	0.48	7/3-7/5	0.59	0.73
5/6-5/8	0.45	0.40	7/5-7/8	0.71	0.68
5/8-5/10	0.45	0.52	7/8-7/10	0.77	0.95
5/10-5/13	0.52	0.46	7/10-7/12	0.61	0.58
5/13-5/15	0.50	0.48	7/12-7/15	0.51	0.61
5/15-5/17	0.50	0.45	7/15-7/17	0.59	0.52
5/17-5/20	0.48	0.54	7/17-7/19	0.50	0.52
5/20-5/22	0.50	0.48	7/19-7/22	0.56	0.52
5/22-5/24	0.47	0.50	7/22-7/24	0.55	0.53
5/24-5/27	0.50	0.50	7/24-7/26	0.51	0.50
5/27-5/29	0.41	0.51	7/26-7/29	0.50	
5/29-5/31	0.47	0.48	7/29-7/31	0.56	
5/31-6/3	0.48	0.52	7/31-8/2	0.49	0.57
6/3-6/5	0.49	0.48	8/2-8/5	0.58	0.52
6/5-6/7	0.43	0.42	8/5-8/7	0.48	0.45
6/7-6/10	0.49	0.51	8/7-8/9	0.59	0.51
6/10-6/12	0.48	0.48	8/9-8/12	0.50	0.56
6/12-6/14	0.51	0.46	8/12-8/14	0.51	0.51
6/14-6/18	0.43	0.48	8/14-8/16	0.41	0.55
6/18-6/19	0.44	0.47	8/16-8/19	0.41	0.54
6/19-6/21	0.40	0.44	8/19-8/21	0.48	0.47
6/21-6/24	0.67	0.64	8/21-8/23	0.44	0.51
6/24-6/26	0.52	0.60	8/23-8/26	0.55	0.53
6/26-6/28	0.67	0.61	8/26-8/28	0.45	0.50
6/28-7/1	0.63	0.65	8/28-8/30		0.55

No entry indicates no reading.

APPENDIX D
TABLE 1 (Continued)

IONIZATION CHAMBER MEASUREMENTS
FOR THE HANFORD RESERVATION AND RICHLAND -1963

Measurement Period	mr/day		Measurement Period	mr/day	
	Hanford	Richland		Hanford	Richland
9/3-9/4	0.43	0.45	11/1-11/4	0.56	0.55
9/4-9/6	0.54	0.51	11/4-11/6	0.46	0.46
9/6-9/9	0.47	0.52	11/6-11/8	0.46	0.46
9/9-9/11	0.50	0.51	11/8-11/11	0.46	0.49
9/11-9/13	0.43	0.56	11/11-11/13	0.54	0.51
9/13-9/16	0.54	0.54	11/13-11/15	0.52	0.53
9/16-9/18	0.48	0.53	11/15-11/18	0.48	0.49
9/18-9/20	0.52	0.52	11/18-11/20	0.47	0.48
9/20-9/23	0.50	0.57	11/20-11/22	0.56	0.50
9/23-9/25	0.51	0.55	11/22-11/26	0.46	0.48
9/25-9/27	0.52	0.54	11/26-11/27		0.54
9/27-9/30	0.53	0.51	12/2-12/4	0.57	0.51
9/30-10/2	0.43	0.48	12/4-12/6	0.47	0.49
10/2-10/4	0.45	0.48	12/6-12/9	0.47	0.48
10/4-10/7	0.45	0.49	12/9-12/11	0.39	0.47
10/7-10/9	0.49	0.50	12/11-12/13	0.47	0.49
10/9-10/11	0.46	0.50	12/13-12/16	0.46	0.50
10/11-10/14	0.48	0.48	12/16-12/18	0.41	0.44
10/14-10/16		0.52	12/18-12/20	0.41	0.47
10/16-10/18	0.49	0.53	12/20-12/23	0.48	0.48
10/18-10/21	0.52	0.52	12/23-12/26	0.53	
10/21-10/23	0.41	0.44	12/23-12/27		0.24
10/23-10/25	0.44		12/26-12/30	0.49	
10/25-10/28	0.52	0.52	12/27-12/30		0.47
10/28-10/30	0.51	0.50	12/30-12/31	0.49	0.49
10/30-11/1	0.53	0.53			

No entry indicates no reading.

APPENDIX D

TABLE 2

IONIZATION CHAMBER MEASUREMENTS
OF IMMERSION DOSE IN THE COLUMBIA RIVER - 1963

<u>Measurement Period</u>	<u>Mr/Day</u>	<u>Measurement Period</u>	<u>Mr/Day</u>	<u>Measurement Period</u>	<u>Mr/Day</u>
<u>Vernita Ferry</u>					
12/28/62-1/4/63	0.79	3/8-3/15	0.10	5/10-5/17	0.28
1/4-1/11	0.57	3/15-3/22	0.47	5/17-5/22	0.14
1/11-1/25	0.05	3/22-3/29	0.13	8/21-8/28	0.38
1/25-2/1	Lost	3/29-4/5	0.11	8/28-9/11	0.36
2/1-2/8	0.80	4/5-4/12	0.31	9/11-9/26	0.31
2/8-2/15	0.48	4/12-4/19	0.42	9/26-10/9	0.79
2/15-2/21	0.21	4/19-4/26	0.16	10/9-10/16	0.41
2/21-3/1	0.19	4/26-5/3	0.21	10/16-10/23	0.25
3/1-3/8	0.47	5/3-5/10	0.15	10/23-10/30	0.73
<u>Hanford Ferry</u>					
12/28/62-1/4/63	-	4/26-4/30	Lost	9/3-9/6	6.3
1/4-1/8	5.0	4/30-5/3	8.4	9/6-9/10	4.5
1/8-1/11	2.9	5/3-5/10	2.6	9/10-9/13	3.9
1/11-1/15	3.8	5/10-5/14	6.4	9/13-9/17	5.7
1/15-1/18	4.9	5/14-5/17	7.4	9/17-9/20	Lost
1/18-1/22	5.1	5/17-5/21	7.9	9/20-9/24	9.9
1/22-1/25	7.7	5/21-5/24	Lost	9/24-9/27	5.8
1/25-2/1	4.7	5/24-5/28	6.3	9/27-10/1	2.7
2/1-2/5	6.4	5/28-6/4	3.2	10/1-10/4	5.2
2/5-2/8	5.2	6/4-6/7	1.8	10/4-10/8	6.1
2/8-2/12	7.5	6/7-6/11	1.7	10/8-10/11	4.8
2/12-2/15	7.2	6/11-6/14	1.9	10/11-10/15	4.6
2/15-2/19	6.4	6/14-6/18	1.3	10/15-10/18	6.4
2/19-2/21	3.8	6/18-6/21	1.4	10/18-10/22	8.3
2/21-2/26	5.8	6/21-6/25	2.1	10/22-10/25	7.8
2/26-3/1	4.7	6/25-6/28	2.8	10/25-10/29	8.0
3/1-3/5	6.8	6/28-7/2	7.8	10/29-11/1	5.5
3/5-3/8	6.1	7/2-7/5	8.8	11/1-11/6	7.7
3/8-3/11	9.7	7/5-7/9	7.6	11/6-11/8	4.4
3/11-3/15	6.6	7/9-7/12	7.9	11/8-11/12	5.1
3/15-3/18	7.2	7/12-7/16	7.3	11/12-11/15	7.0
3/18-3/22	8.1	7/16-7/19	4.6	11/15-11/19	7.3
3/22-3/26	11	7/19-7/26	6.9	11/19-11/22	5.1
3/26-3/29	11	7/26-7/27	7.6	11/22-11/27	6.9
3/29-4/2	7.9	8/2-8/9	6.4	11/27-12/3	8.5
4/2-4/5	9.6	8/9-8/13	6.1	12/3-12/6	5.4
4/5-4/9	10	8/13-8/16	6.9	12/6-12/10	6.4
4/9-4/12	7.6	8/16-8/20	7.6	12/10-12/13	5.6
4/12-4/16	10	8/20-8/23	4.4	12/13-12/17	5.1
4/16-4/19	7.8	8/23-8/27	6.6	12/17-12/20	6.8
4/19-4/23	Lost	8/27-8/30	7.1	12/20-12/27	6.6
4/23-4/26	12	8/30-9/3	6.3	12/27-12/31	7.0

APPENDIX D
TABLE 2 (Continued)

IONIZATION CHAMBER MEASUREMENTS
OF IMMERSION DOSE IN THE COLUMBIA RIVER - 1963

Measurement Period	Mr/Day	Measurement Period	Mr/Day	Measurement Period	Mr/Day
<u>300 Area Dock</u>					
12/28/62-1/4/63	3.7	5/3-5/10	2.8	8/30-9/6	3.5
1/4-1/11	3.1	5/10-5/17	2.7	9/6-9/13	3.7
1/11-1/18	2.7	5/17-5/24	2.5	9/13-9/20	3.9
1/18-1/25	3.2	5/24-5/31	2.4	9/20-9/27	3.7
1/25-2/1	3.2	5/31-6/7	1.7	9/27-10/4	3.3
2/1-2/8	3.2	6/7-6/14	2.1	10/4-10/11	3.7
2/8-2/15	3.1	6/14-6/21	2.1	10/11-10/18	4.1
2/15-2/21	2.4	6/21-6/28	2.8	10/18-10/25	5.0
2/21-3/1	3.4	6/28-7/5	3.9	10/25-11/1	Lost
3/1-3/8	5.1	7/5-7/12	2.9	11/1-11/8	3.6
3/8-3/15	4.9	7/12-7/19	2.3	11/8-11/15	3.2
3/15-3/22	5.7	7/19-7/26	2.9	11/15-11/22	3.5
3/22-3/29	4.0	7/26-8/2	3.3	11/22-12/6	3.8
3/29-4/5	5.3	8/2-8/9	2.6	12/6-12/13	4.8
4/5-4/12	4.6	8/9-8/16	2.9	12/13-12/20	3.8
4/12-4/19	5.4	8/16-8/23	2.5	12/20-12/27	4.6
4/19-4/26	4.5	8/23-8/30	1.7	12/27-1/8/64	4.4
4/26-5/3	1.6				
<u>Pasco Pump House</u>					
12/28/62-1/4/63	1.2	4/12-4/26	Lost	8/9-8/16	1.6
1/4-1/11	1.3	4/26-5/10	2.4	8/16-8/23	1.4
1/11-1/18	1.0	5/3-5/10	1.1	8/23-8/30	0.49
1/18-1/25	1.4	5/10-5/17	1.4	8/30-9/3	3.7
1/25-2/1	1.2	5/17-5/24	1.1	9/3-9/5	1.9
2/1-2/8	1.3	5/24-5/31	1.1	9/5-9/13	1.5
2/8-2/15	Missing	5/31-6/7	0.64	9/13-9/27	1.7
2/15-2/21	0.65	6/7-6/14	0.53	9/27-10/4	1.9
2/21-3/1	0.89	6/14-6/21	0.99	10/4-10/11	1.7
3/1-3/8	0.83	6/21-6/28	0.87	10/11-10/18	1.8
3/8-3/15	1.4	6/28-7/5	0.40	10/18-10/25	5.7
3/15-3/22	1.6	7/5-7/12	1.1	10/25-11/1	Missing
3/22-3/29	1.7	7/12-7/19	0.96	11/1-11/8	1.5
3/29-4/5	1.4	7/19-8/2	1.6	11/8-11/15	1.4
4/5-4/12	1.3	8/2-8/9	1.2	11/15-11/22	1.7

APPENDIX D
TABLE 2 (Continued)

IONIZATION CHAMBER MEASUREMENTS
OF IMMERSION DOSE IN THE COLUMBIA RIVER - 1963

Measurement Period	Mr/Day	Measurement Period	Mr/Day	Measurement Period	Mr/Day
<u>Columbia Park Marina</u>					
12/28/62-1/4/63	0.39	5/17-5/24	Lost	9/6-9/13	0.55
1/4-1/11	0.68	5/24-5/29	0.88	9/13-9/20	0.47
1/11-2/1	Lost	5/29-6/7	0.92	9/20-9/27	0.43
2/1-2/8	2.4	6/7-6/14	Lost	9/27-10/4	0.53
2/8-2/15	0.43	6/14-6/21	0.26	10/4-10/11	0.67
2/15-2/21	0.58	6/21-6/28	0.07	10/11-10/18	1.1
2/21-3/1	0.42	6/28-7/5	0.25	10/18-10/25	Lost
3/1-3/8	0.57	7/5-7/12	0.16	10/25-11/1	1.8
3/8-3/15	0.44	7/12-7/19	0.37	11/1-11/8	0.91
3/15-3/22	0.62	7/19-7/26	0.15	11/8-11/15	1.2
3/22-3/29	1.3	7/26-8/2	0.62	11/15-11/22	0.82
3/29-4/5	0.98	8/2-8/9	0.41	11/22-12/6	1.8
4/5-4/12	0.93	8/9-8/16	0.61	12/6-12/13	0.97
4/12-4/26	Lost	8/16-8/23	0.51	12/13-12/20	1.6
4/26-5/3	0.87	8/23-8/30	0.54	12/20-12/27	0.88
5/3-5/10	0.40	8/30-9/6	0.50	12/27-1/10/64	1.3
5/10-5/17	0.77				
<u>Richland Marina</u>					
12/28/62-1/4/63	2.0	5/3-5/10	1.8	8/30-9/6	4.1
1/4-1/11	2.1	5/10-5/17	1.9	9/6-9/13	2.6
1/11-1/18	2.7	5/17-5/24	Lost	9/13-9/20	2.9
1/18-1/25	2.1	5/24-5/31	2.0	9/20-9/27	2.0
1/25-2/1	3.0	5/31-6/7	1.3	9/27-10/4	1.4
2/1-2/8	1.4	6/7-6/21	Lost	10/4-10/11	2.2
2/8-2/15	1.6	6/21-6/28	0.84	10/11-10/18	1.6
2/15-2/21	1.4	6/28-7/5	Lost	10/18-10/25	2.2
2/21-3/1	2.0	7/5-7/12	2.9	10/25-11/8	Lost
3/1-3/8	Missing	7/12-7/19	Lost	11/8-11/15	1.5
3/8-3/15	2.2	7/19-7/26	1.7	11/15-11/22	1.8
3/15-3/22	3.1	7/26-8/2	2.2	11/22-12/6	2.8
3/22-3/29	3.3	8/2-8/9	2.0	12/6-12/13	2.7
3/29-4/5	2.7	8/9-8/16	2.4	12/13-12/20	3.2
4/5-4/26	Lost	8/16-8/23	2.8	12/20-12/27	2.4
4/26-5/3	3.2	8/23-8/30	2.0	12/27-1/10/64	2.6

XI. APPENDIX E

ANALYTICAL METHODS

XI. APPENDIX E

ANALYTICAL METHODS1. Water Analyses

Water samples are analyzed for alpha emitters, beta emitters, and selected radionuclides. Alpha emitters are extracted with diethyl ether from 9N nitric acid. The gross alpha activity is measured with a zinc sulfide (ZnS) scintillation counter. Gross beta activity is determined by evaporating a sample to dryness and counting the residual salts on a gas-flow proportional beta counter operated in the proportional region.

Rare earths plus Y, I^{131} , P^{32} , and Sr^{90} are measured by beta counting after chemical separation. The rare earths are isolated as a group by hydroxide, fluoride, and oxalate precipitations; iodine is isolated by carbon tetrachloride extraction and precipitation as silver iodide; phosphorous by extraction of phosphomolybdate; and strontium by successive precipitation of the nitrate and the carbonate. Y^{90} is separated from the strontium as the oxalate and ignited to the oxide after secular equilibrium is established and is then measured to determine Sr^{90} . Beta decay curves are extrapolated to sampling time to determine the initial activity levels and to check separation effectiveness.

Sodium-24, Np^{239} , Cr^{51} , Cu^{64} , and Sc^{46} (used for Zn correction) are determined from a direct count of residual salts of an evaporated sample without chemical separation using a multichannel gamma energy spectrometer with a 3 by 3 in. thallium-activated sodium iodide [NaI(Tl)] scintillation crystal detector. Zinc-65 and Sc^{46} are determined from counting plates previously used for Na^{24} and Cu^{64} determinations. The Sc^{46} 0.89 and 1.12 Mev photons are counted by coincidence counting using two 3 in. NaI crystals and a Sc^{46} reference sample for adjustments. Zn^{65} is determined by counting with a 5 in. NaI crystal and using the scandium results for correction.

Copper-64 is determined from gamma-gamma coincidence counting measurement of the annihilation photons produced by positron emission. Sc^{46}

is measured by gamma-gamma coincidence counting of the 0.885 and 1.12 Mev photons.

Arsenic-76 is determined by evaporation of 500 to 1000 ml of sample to 50 to 75 ml and then acidifying with 9N HCl. It is then extracted into benzene, back extracted into water and precipitated as the metal, dried, weighed and counted on a gas-flow proportional counter.

If uranium analyses are required, concentrations are determined with a fluorophotometer using standard techniques.

2. Vegetation and Produce Analyses

Samples of pasture grass and farm products, including milk, are analyzed with a multichannel energy spectrometer for selected nuclides. A weighed amount, approximately 250 to 300 g, of shredded samples are packed into a 16 oz counting jar and gamma scanned using a 9 in. diameter well type NaI (Tl) scintillation crystal. Background analysis includes the effects of the jar which contains minute amounts of radioactivity. Weighed amounts of sample are used for chemical separation. Analysis for I^{131} in milk is routinely accomplished with a detection capability of approximately 2 pc/l when 3 gal aliquots are used. Analyses are performed in the following manner:

Iodine carrier and sodium bisulfite are added to the sample and then deaerated by cautiously applying vacuum. The sample is passed through an ion exchange column (polyethylene cup 2-1/2 x 4-1/2 in.) containing 345 ml of Dowex 1 x 8, 20 to 50 mesh Cl form, at a flow rate of 100 ml per minute. The resin is rinsed thoroughly with distilled water and then washed into a 500 ml polyethylene bottle for counting in a 9 in. NaI (Tl) well crystal. Recoveries of 90% or better in the resin column have been accomplished with sample sizes up to 12 gal.

Analysis for radiostrontium is performed in the following manner:

Barium and strontium carriers are added to weighed samples of produce and 1000 ml samples of milk. The produce samples are

then ashed at 500 to 550 C from 24 to 48 hours and the ash is then dissolved in nitric acid. The alkaline earths are precipitated from all samples as carbonates on addition of NaOH. Strontium and other alkaline earth metals are then precipitated with fuming nitric acid residual. Calcium is separated by washing with acetone. Strontium and remaining alkaline earths are dissolved and reprecipitated with fuming nitric acid. The rare earths are removed from an aqueous solution of the nitrates by a $\text{Fe}(\text{OH})_3$ precipitation and barium is removed as the chromate. Strontium is precipitated as a carbonate and then dried in a 1 in. stainless steel counting dish to constant weight. The strontium mixture is counted from 10 minutes to 1 hour in a low background (anticoincidence) gas-flow proportional beta counter.

Sr^{90} is allowed to reach secular equilibrium with its daughter, Y^{90} , which is then extracted with buffered TTA. Y^{90} is counted in the same manner as the strontium mixture. The Sr^{90} content of the original sample is calculated from the Y^{90} counting rate, and the Sr^{90} content from the difference in counting rates of total strontium and Sr^{90} .

The chemical separation for radiophosphorous is performed on samples of sufficient size to yield 40 to 50 mg of phosphorous:

The sample is dry ashed 24 hours at 500 C and the salts are dissolved with nitric acid. Phosphorous is precipitated from the acid solution as ammonium phosphomolybdate. The precipitate is dissolved in ammonium hydroxide, ammonium citrate is added to complex most of the remaining interfering elements, and the phosphorous is precipitated as magnesium ammonium phosphate. After dissolving the precipitate in hydrochloric acid, ammonium citrate is again added and phosphorous is reprecipitated with NH_4OH as magnesium ammonium phosphate.

The precipitate is dried in a 1-1/2 in. stainless steel counting dish under heat lamps and counted in a low background gas-flow proportional beta counter.

3. Air Sample Analyses

Airborne concentrations of radioactive materials are measured principally by I^{131} scrubber samplers. These samplers consist of a calibrated, electrically-driven vacuum pump which draws 1.5 cfm of air through 1 liter of 0.05N NaOH 0.05N Na_2CO_3 with 20 mg of I^- carrier. A balancing platform and siphon arrangement permits introduction of distilled water into the scrubber at a rate equal to the rate of evaporation. This water feeder helps maintain constant liquid head, air flow rates, and scrubber efficiency.

After 1 week of operation, the scrubber bottle is replaced and taken to the radiochemical analysis laboratory for determination of the I^{131} content. The analytical procedure used provides for the addition of an iodine carrier and bisulfite to the scrubber solution which is then acidified, the iodine precipitated with $AgNO_3$ and filtered. The radiation from the I^{131} on the filter is measured by a gas proportional counter. Atmospheric concentrations of I^{131} are then calculated from these counting rates by applying factors for counter calibration, chemical recovery of the I^{131} , scrubber efficiency and the volume of air sampled.

Measurements for concentrations of radioactive particulates in the atmosphere are made by drawing 1.5 cfm of air through a 2 x 4 in. HV-70 filter paper with a vacuum pump. The filters are changed on either a daily or weekly schedule, allowed to decay for 48 hours, and then counted with a gas proportional counter for gross beta radioactivity. Selected filters are also counted with a ZnS scintillation counter for gross alpha radioactivity.

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1	SOLOM (LEONARD)	1	UNIVERSITY OF ROCHESTER
1	SPACE TECHNOLOGY LABORATORIES, INC. (NASA)	1	UNIVERSITY OF TENNESSEE (UTA)
1	STANFORD UNIVERSITY (SLAC)	1	UNIVERSITY OF UTAH
1	STRATEGIC AIR COMMAND	1	UNIVERSITY OF WASHINGTON
1	SYLVANIA ELECTRIC PRODUCTS, INC.	1	WALTER REED ARMY MEDICAL CENTER
1	TENNESSEE VALLEY AUTHORITY	1	WAYNE STATE UNIVERSITY
1	TODD SHIPYARDS CORPORATION	1	WESTERN RESERVE UNIVERSITY
1	TULANE UNIVERSITY	2	WESTINGHOUSE BETTIS ATOMIC POWER LABORATORY
2	UNION CARBIDE CORPORATION (ORGD)	1	WESTINGHOUSE ELECTRIC CORPORATION
7	UNION CARBIDE CORPORATION (CRNL)	1	WESTINGHOUSE ELECTRIC CORPORATION (NASA)
		325	WHITE SANDS MISSILE RANGE
			DIVISION OF TECHNICAL INFORMATION EXTENSION
1	UNION CARBIDE CORPORATION (PADUCAH PLANT)		

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