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AMCHITKA RADIOBIOLOGICAL PROGRAM PROGRESS REPORT

JANUARY 1973 TO DECEMBER 1973

By

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ABSTRACT

The Amchitka Radiobiological Program, to collect biological and environmental samples for radiometric analyses, began in 1970 and is continuing. An account of the program from July, 1970, to December, 1972, has been given in three previous progress reports: Held (1971), Held (1972), and Held et al. (1973). This report extends the account of the program through December, 1973.

Recent results of analyses have been appended to previously prepared tables in Held et al. (1973) and include analyses for: (1) gamma-emitting radionuclides in air filters, seawater, freshwater, birds, lichens, terrestrial vegetation, marine algae, marine invertebrates, marine fish, sea otter, aufwuchs, and freshwater moss and plants; (2) strontium-90 (^{90}Sr) in rats and birds; and (3) tritium (^3H) in seawater and freshwater. Some tables from the previous reports were revised by adding data for cerium-144 (^{144}Ce) or europium-155 (^{155}Eu) and deleting radionuclides such as manganese-54 (^{54}Mn), cobalt-60 (^{60}Co), zirconium-95 (^{95}Zr), or niobium-95 (^{95}Nb), which were either not present in 1973 or were at levels less than 0.5 pCi per g, dry.

The conclusions from the results of the recent analyses are a reiteration of the results stated in Held et al. (1973); namely, "1) no new radionuclides are present; 2) the most abundant radionuclides are naturally occurring beryllium-7 (^7Be) and potassium-40 (^{40}K); 3) the trace quantities of fission products, induced radionuclides, and ^3H present are from world fallout; and 4) a trace of ^3H contamination remains in some Long Shot ponds, as previously reported." It is concluded from the results of analyses of samples collected between September, 1969, and December, 1973, as reported in this and the three previous progress reports, that there were no radionuclides of Milrow or Cannikin origin in the water, plants, or animals of Amchitka Island.

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE NO.</u>
ABSTRACT	i
1. INTRODUCTION	1
2. METHODS	2
3. RESULTS AND DISCUSSION	9
4. SUMMARY AND CONCLUSIONS	13
5. REFERENCES	93
6. TABLE AND MAP INDEX	94
7. DISTRIBUTION LIST	97

FIGURES

<u>FIGURE</u>		
1. LOCATION MAP		3
2. LOCATION OF COLLECTION SITES ON AND NEAR AMCHITKA ISLAND, ALASKA		4
3. AMCHITKA ISLAND BASE CAMP AREA		5
4. COLLECTION SITES. (OVERLAY OF LLL CHART OF JANUARY 1971, UMT COORDINATES 49-55 AND 96-02)		6
5. LONG SHOT GROUND ZERO VICINITY		7
6. COLLECTION SITES. (OVERLAY OF LLL CHART OF JANUARY 1971, UMT COORDINATES 43-48 AND 07-01)		8

TABLE OF CONTENTS (CONT.)

TABLES

<u>TABLE</u>		<u>PAGE NO.</u>
1.	SCIENTIFIC AND COMMON NAMES AND WET WEIGHT TO DRY WEIGHT RATIOS OF SOME AMCHITKA ISLAND ORGANISMS	15
2.	SOME GAMMA-EMITTING RADIONUCLIDES ON AIR FILTERS AT GROUND LEVEL AT THE AMCHITKA ISLAND BASE CAMP	23
3.	GAMMA-EMITTING RADIONUCLIDES IN THE FRESH- WATER MOSS <u>FONTINALIS</u> COLLECTED AT AMCHITKA ISLAND	28
4.	GAMMA-EMITTING RADIONUCLIDES IN THE FRESH- WATER PLANT <u>RANUNCULUS</u> COLLECTED AT AMCHITKA ISLAND	31
5.	SOME GAMMA-EMITTING RADIONUCLIDES IN THE MARINE ALGAE <u>FUCUS</u> COLLECTED AT AMCHITKA ISLAND	34
6.	GAMMA-EMITTING RADIONUCLIDES IN LICHENS COLLECTED AT AMCHITKA ISLAND	36
7.	SOME GAMMA-EMITTING RADIONUCLIDES IN INVERTE- BRATES COLLECTED AT AMCHITKA ISLAND	38
8.	GAMMA-EMITTING RADIONUCLIDES IN CRAB, <u>LITHODES</u> <u>AEQUISPINA</u> , COLLECTED AT AMCHITKA ISLAND	41
9.	^{137}CS AND ^{40}K IN MARINE FISH COLLECTED OFF AMCHITKA ISLAND	43
10.	^{137}CS AND ^{40}K IN SALMON COLLECTED IN THE BERING SEA OFF AMCHITKA ISLAND	59
11.	IRON-55 SPECIFIC ACTIVITY VALUES IN FISH COLLECTED AT AMCHITKA ISLAND	62
12.	IRON-55 SPECIFIC ACTIVITY VALUES IN CANNED SALMON FROM THE BRISTOL BAY PACK	65
13.	SOME GAMMA-EMITTING RADIONUCLIDES IN BIRDS COLLECTED AT AMCHITKA ISLAND	66
14.	EFFICIENCY OF A FILTER AND SORPTION BED SYSTEM FOR COLLECTION OF ^{95}Zr + ^{95}Nb FROM SEAWATER AND POND WATER AT AMCHITKA ISLAND, AUGUST 1971	69

TABLE OF CONTENTS (CONT.)

TABLES

<u>TABLE</u>		<u>PAGE NO.</u>
15.	GAMMA-EMITTING RADIONUCLIDES IN SAMPLES COLLECTED WITH A FILTER AND SORPTION BED SYSTEM FROM INTERTIDAL AREAS OF AMCHITKA ISLAND	70
16.	GAMMA-EMITTING RADIONUCLIDES IN SAMPLES COLLECTED WITH A FILTER AND SORPTION BED SYSTEM FROM LAKES ON AMCHITKA ISLAND	73
17.	SOME GAMMA-EMITTING RADIONUCLIDES IN SAMPLES COLLECTED WITH A FILTER AND SORPTION BED SYSTEM FROM LONG SHOT MUD PIT NO. 1 ON AMCHITKA ISLAND	76
18.	EFFICIENCY OF THE <u>IN SITU</u> PROBE AND REPRO- DUCIBILITY OF MEASUREMENTS FOR ^{40}K IN SEAWATER NEAR AMCHITKA ISLAND, AUGUST 1971	78
19.	STATIONS FOR <u>IN SITU</u> GAMMA-SPECTRUM MEASURE- MENTS, AMCHITKA ISLAND	79
20.	SOME GAMMA-EMITTING RADIONUCLIDES IN A SEA OTTER COLLECTED AT AMCHITKA ISLAND	80
21.	GAMMA-EMITTING RADIONUCLIDES IN FRESHWATER AUFWUCHS AND FILAMENTOUS ALGAE COLLECTED AT AMCHITKA ISLAND	81
22.	STRONTIUM-90 IN BONE FROM RATS AND PTARMIGAN COLLECTED AT AMCHITKA ISLAND	83
23.	GAMMA-EMITTING RADIONUCLIDES IN VEGETATION COLLECTED AT DOSIMETER STATIONS	84
24.	INSTRUMENT AND TLD MEASUREMENTS OF ENVIRON- MENTAL RADIATION AT AMCHITKA ISLAND, NOVEMBER- DECEMBER 1971	87
25.	TRITIUM VALUES FOR AMCHITKA SEAWATER SAMPLES, 1970-1973	88
26.	TRITIUM VALUES FOR AMCHITKA FRESHWATER SAMPLES, 1970-1973	89
27.	TRITIUM VALUES FOR AMCHITKA DOLLY VARDEN	92

1. INTRODUCTION

A synopsis of the Laboratory's program as stated in the 1972 Progress Report, Held et al. 1973, is still relevant.

"The present Amchitka Radiobiological Program was initiated in July 1970, by the University of Washington's Laboratory of Radiation Ecology at the request of the U.S. Atomic Energy Commission, Nevada Operations Office. The program is designed to provide a periodic documentation of radionuclides, both naturally occurring and man-made, in biological and environmental samples from Amchitka and its environs. Seafoods and radionuclides potentially available to man through the food web are emphasized. However, organisms other than food organisms are also collected and analyzed in a search for indicator organisms (species that significantly concentrate one or more radionuclides). Concentrations of radionuclides other than those potentially hazardous to man are measured as a means of providing clues to the origin of radionuclides at Amchitka. Unexpected combinations or concentrations of radionuclides would indicate the presence of newly added radionuclides to the environment, presumably from fresh world fallout, nuclear-powered vessels, or from nuclear detonations at Amchitka Island. The program is complemented by other Amchitka radiobiological surveillance studies being conducted by the U.S. Geological Survey, who is primarily concerned with the measurement of ^3H as the most likely indicator of seepage from the underground tests."

The first two Amchitka Radiobiological Program Progress Reports covered the period July, 1970, to February, 1972. These reports have been summarized by Held (1972), who concluded, "Artificial or man-made radionuclides (found at Amchitka) did not originate at Amchitka except for tritium, which has previously been reported to be present in pond water and test holes near the Long Shot SGZ site."

The third progress report reiterated the above conclusion and extended the account of the program through December, 1972. Conclusions of the third report, as stated by Held et al. (1973), are as follows:

- "a. Some of the ponds in the immediate vicinity of the Long Shot hole remain contaminated with ^3H .
- "b. An extensive search with sensitive instruments for radionuclides in biological and environmental samples--marine, terrestrial, freshwater--collected during the first 14 months after the Cannikin detonation of November 6, 1971, indicates that no other radionuclides have escaped to the surface environment."

In this, the fourth progress report, the format of the third report has been followed, but some minor changes have been made in the tables, in addition to appending new data. Some tables from the third report were revised by adding data for ^{144}Ce to the post-Cannikin or 1973 sections and by deleting from these same sections data for radionuclides such as ^{54}Mn , ^{60}Co , ^{95}Zr , or ^{95}Nb , which were either not detectable in 1973 or were at very low levels. Cerium-144 and ^{155}Eu appear in the more recent samples, not because of an increase of these radionuclides in the Amchitka environment, but because the more recent samples (except fish, marine invertebrates, and birds) were analyzed on a Ge(Li) diode system which is more sensitive than the NaI(TL) crystals previously used. Due to its better resolution of the gamma-energy spectrum, the Ge(Li) system can detect ^{144}Ce and ^{155}Eu , whereas the NaI(TL) crystals cannot. Also inserted into the tables were the results of recent analyses of samples that had been collected during the period covered by earlier reports. Thus, the tables in this report include: (1) the summarized pre-Cannikin data and the post-Cannikin data originally presented in the third progress report; (2) data for samples collected prior to 1973, but not included in previous reports; and (3) data for samples collected and analyzed in 1973.

Figure 1 shows the geographical location of Amchitka Island. Figure 2 shows general collection sites for the radiobiological program, while Figures 3 through 6 present the specific collection sites for the shaded areas shown in Figure 2.

2. METHODS

Most samples collected prior to July, 1972, and fish, marine invertebrates, and birds collected through 1973 were analyzed by gamma spectrometry with 3 x 3-inch NaI(TL) crystals and 200-channel, pulse-height analyzers. Samples (except fish, marine invertebrates, and birds) collected from July, 1972, through 1973 were analyzed with Ge(Li) diode systems and 4096-channel, pulse-height analyzers. Chemical separation and X-ray spectrometry were used for ^{55}Fe determinations, while chemical separation and liquid scintillation counting of ^{90}Y were used for ^{90}Sr determinations. Tritium in water samples was determined by vacuum distillation and liquid scintillation counting, as discussed in Held et al. (1973).

A system of filter and sorption beds developed by Battelle Northwest Laboratories was used to filter the large-volume water samples. The system consists of eight Millipore filters of 11.5-inch diameter and 0.3-micron porosity, arranged in parallel so that the water passes through the filters and then through two aluminum oxide beds in series.

All data presented in the tables have been corrected to the date of collection; however, for ^{95}Nb , the error introduced may be significant if the ^{90}Zr in the sample was produced at various unknown

FIGURE 1. Location Map

FIGURE 2. Location of Collection Sites on and near Amchitka Island, Alaska

FIGURE 3. Amchitka Island Base Camp Area

FIGURE 4. Collection Sites (Overlay of LLL Chart of January 1971, UTM Coordinates 49-55 and 96-02)

FIGURE 5. Long Shot Ground Zero Vicinity

FIGURE 6. Collection Sites (Overlay of LLL Charts of January 1971, UMT Coordinates, 43-48 and 07-01)

times and is not in equilibrium with its daughter, ^{95}Nb . In this case, an accurate decay correction factor cannot be made for ^{95}Nb , and the application of the standard decay correction factor for ^{95}Zr gives an estimate of the maximum possible amount of ^{95}Nb present at the time of collection. The problems of ^{95}Zr - ^{95}Nb analysis have been discussed extensively in Held et al. (1973).

The error term for single sample radionuclide concentrations is the combined counting error for the background, standard, and sample; hence, the term "propagated error." The error limits for the gamma-emitting radionuclides in single samples are "two-sigma" or two-standard deviations, while for the ^3H , ^{55}Fe , and ^{90}Sr data, the error limits are one-standard deviations and include errors associated with the chemical procedures, plus counting errors.

3. RESULTS AND DISCUSSION

The results of recent analyses were appended to the tables of the third progress report (Held et al., 1973) except for Tables 1, 8, 10, 12, 14, 18, 19, 24, and 27, which remain unchanged. In addition to adding the 1973 data, other minor revisions were made on some tables from Held et al. (1973). The specific revisions in the tables are as follows:

<u>TABLE</u>	<u>TITLE</u>	<u>REVISIONS</u>
2	Some Gamma-Emitting Radionuclides on Air Filters at Ground Level at the Amchitka Island Base Camp.	The table was updated to include 33 new samples. Also, data were added for ^{144}Ce and deleted for ^{95}Zr in the 1973 section of the table.
3	Gamma-Emitting Radionuclides in the Freshwater Moss <u>Fontinalis</u> Collected at Amchitka Island.	The table was updated to include 14 new samples and four new sampling stations. Also, data were added for ^{144}Ce and ^{155}Eu and deleted for ^{54}Mn and ^{60}Co in the post-Cannikin section of the table.
4	Gamma-Emitting Radionuclides in the Freshwater Plant <u>Ranunculus</u> Collected at Amchitka Island.	The table was updated to include nine new samples and one new sampling station.
5	Some Gamma-Emitting Radionuclides in Marine Algae <u>Fucus</u> Collected at Amchitka Island.	The table was updated to include seven new samples. Also, data were added for ^{144}Ce .

<u>TABLE</u>	<u>TITLE</u>	<u>REVISIONS</u>
6	Gamma-Emitting Radionuclides in Lichens Collected at Amchitka Island.	The table was updated to include seven new samples. Also, to the post-Cannikin section of the table, data were added for ^{144}Ce and ^{155}Eu and deleted for ^{54}Mn and ^{60}Co .
7	Some Gamma-Emitting Radionuclides in Invertebrates Collected at Amchitka Island.	The table was updated to include eight new samples. Also, to the 1973 section of the table, data were added for ^{144}Ce and deleted for ^{95}Zr .
9	^{137}Cs and ^{40}K in Marine Fish Collected off Amchitka Island.	This table was revised to include 61 new samples, 24 from 1973, 35 from 1972, and 2 from 1971. In addition, five samples of rock sole listed in the second progress report (Held, 1972) but not in the third were added for comparison with new rock sole data. Also, halibut erroneously reported in the third progress report as being collected in the Pacific Ocean off C-Site in August, 1972, are correctly listed in this report as being collected in the Bering Sea, off C-Site, in September, 1972.
11	Iron-55 Specific Activity Values in Fish Collected at Amchitka Island.	The table was updated to include 12 new samples.
13	Some Gamma-Emitting Radionuclides in Birds Collected at Amchitka Island.	The table was updated to include 15 new samples.

<u>TABLE</u>	<u>TITLE</u>	<u>REVISIONS</u>
15	Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed System from Intertidal Areas of Amchitka Islands.	The table was updated to include 13 new samples.
16	Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed System from Lakes on Amchitka Island.	The table was updated to include 15 new samples.
17	Some Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed System from Long Shot Mud Pit No. 1 on Amchitka Island.	The table was updated to include four new samples.
20	Some Gamma-Emitting Radionuclides in Sea Otter Collected at Amchitka Island.	The table was updated to include two new samples.
21	Gamma-Emitting Radionuclides in Freshwater Aufwuchs and Filamentous Algae Collected at Amchitka Island.	This table was updated to include seven new samples and three new sampling sites. Also, to the post-Cannikin section of the table, data for ^{144}Ce were added and data for ^{54}Mn were deleted.
22	Strontium-90 in Bone from Rats and Ptarmigan Collected at Amchitka Island.	This table was updated to include four new samples.
23	Gamma-Emitting Radionuclides in Vegetation Collected at Dosimeter Stations.	This table was revised to include five new samples. Also, to the 1973 section of the table, data for ^{144}Ce and ^{155}Eu were added, while data for ^{60}Co , ^{95}Zr , and ^{95}Nb were deleted.
25	Tritium Values for Amchitka Seawater Samples, 1970-1973.	This table was revised to include six new samples. Also, the sampling depth was added.
26	Tritium Values for Amchitka Freshwater Samples, 1970-1973.	This table was revised by deleting collection sites which were not sampled in 1973 and by including data for 48 new samples.

During September, 1973, the camp on Amchitka was closed and the air sampling program which had been continuous since February, 1972, was discontinued. The last air-sampling period was August 21-28. Levels of three fallout radionuclides, ^{95}Zr , ^{95}Nb , and ^{103}Ru , detected in the analyses of the 1972 air filters, decreased markedly in 1973 to near or below the limits of detection, while ^{137}Cs decreased slightly from 1972 levels but was still detectable in most samples (Table 2). The concentration of ^{144}Ce (reported in 1973 because of a change in counting equipment, as discussed in the Introduction) decreased from levels generally greater than 0.5 pCi per thousand cubic meters during the first part of 1973 to below the limits of the detection during June-August 1973. The amounts and kinds of radionuclides in the air filters or other samples did not appear to be influenced by the detonation of a nuclear device by The Peoples Republic of China on June 26, 1973.

The results of the analyses of the biological samples which were collected in April and August, 1973, showed the same general pattern of decreasing radionuclide levels shown in the more frequently collected air samples.

Radionuclides previously detected in most aquatic and terrestrial vegetation samples (Tables 3-6 and 23) but now near or below the limits of detection include ^{54}Mn , ^{60}Co , ^{95}Zr , ^{95}Nb , and ^{103}Ru . Cesium-137 remains readily detectable in most vegetative samples, but at decreasing levels. The lichens continue to be the best collectors of fallout radionuclides, with ^{106}Ru , ^{125}Sb , ^{137}Cs , ^{144}Ce , and ^{155}Eu still easily detectable, but declining (Table 6).

As in past years, naturally occurring ^{40}K , fission-produced ^{137}Cs , and neutron-induced ^{55}Fe are the three radionuclides consistently present in fish (Tables 9-12). Cesium-137 concentrations are less than 0.2 pCi/g, dry tissue and, with two exceptions, ^{55}Fe levels are below 1 pCi/g, dry, while ^{40}K levels average 14-15 pCi/g, dry, in the muscle tissue of fish.

Potassium-40, ^{137}Cs , and ^{90}Sr are the predominant radionuclides in birds (Tables 13 and 22), while only ^{40}K appears in recent sea otter samples (Table 20).

Water samples filtered through the large-volume water sampler (LVWS) also show a pattern of decreasing radionuclide content. This is especially true for the three intertidal sampling stations where no radionuclides were detected in the 1973 LVWS samples (Table 15). Of the man-produced radionuclides, only ^{137}Cs was detected in the 1973 lake and Long Shot pond LVWS samples (Tables 16 and 17).

The ^{90}Sr content in the bones of two rats and ptarmigan collected in 1973 appears to have decreased, compared to levels in samples collected in 1971, but the small number of samples analyzed precludes a definitive conclusion (Table 22).

The ^3H levels in seawater (Table 25) and freshwater (Table 26) samples collected in 1973 remained similar to those found in 1972, ranging from less than 13 to about 40 tritium units in seawater and to about 100 tritium units in freshwater, except at the Long Shot ponds where the maximum value in 1973 was 2200 tritium units. Tritium levels in samples from stations other than the Long Shot ponds are within the range of values expected due to tritium in rainfall at the latitude of Amchitka.

Samples of aquatic vegetation, greenling, and Dolly Varden are being held for analysis of bound and unbound tritium. The results of these analyses will be presented in a future report.

The changes and additions to the tables extend the data from sampling and analysis through December, 1973. These new data in no way change the conclusions of the three previous progress reports; namely, the radionuclides present in the biological and environmental samples analyzed are not of Cannikin or Milrow origin, and only some of the ponds in the immediate vicinity of the Long Shot SGZ remain contaminated with ^3H . The amounts of fission products and induced radionuclides detected point to their origin from worldwide fallout.

4. SUMMARY AND CONCLUSIONS

A program for periodical collection of biological and environmental samples at Amchitka and for analyses of these samples for radionuclide content began in July, 1970. Three previous progress reports gave an account of the results of this program through December, 1972, 14 months after the Cannikin detonation. In this, the fourth progress report, the account of the program is extended through December, 1973.

Tables from the last progress report were revised to include new data. These included the tables that related to gamma-emitting radionuclides in air filters, the freshwater moss Fontinalis, the freshwater plant Ranunculus, the marine alga Fucus, lichens, marine invertebrates, marine fish, birds, seawater, plants from dosimeter stations; ^{90}Sr in rats and ptarmigan; and ^3H in seawater and freshwater.

In addition to the new data in the tables, several other minor revisions were made in some of the tables. Cerium-144 and/or ^{155}Eu data were added to seven tables, while data for ^{54}Mn , ^{60}Co , ^{95}Zr , or ^{95}Nb were deleted from portions of six tables. New sampling stations were added to four tables and stations no longer sampled were deleted from one table.

Radionuclide concentrations for samples collected in 1973 were generally less than in 1972 and earlier. Two radionuclides, ^{95}Zr and ^{95}Nb , which were usually present in 1972, were usually absent in 1973. Levels of naturally occurring ^7Be and ^{40}K in 1973 were similar to levels present in 1972. The addition of new data and

the corrections made in the tables in no way changes the conclusions of the previous progress reports. As stated in Held et al. (1973), "All of the data--old, revised, new--point to the same general conclusions; namely,

- a. The most abundant radionuclides present are naturally occurring ^7Be and ^{40}K .
- b. Trace quantities of fission products and induced radionuclides have been detected in amounts that would be expected from world fallout.
- c. The abundance of fallout radionuclides continues to decline steadily from year to year and to fluctuate seasonally within years.
- d. No new radionuclides or unexpected radionuclides or radionuclide ratios have been detected.
- e. Tritium values in seawater and in freshwater are no different than the values that would be expected at an island station at the same latitude in the northern hemisphere.
- f. Some of the ponds in the immediate vicinity of the Long Shot hole remain contaminated with ^3H . The concentration is less than in the rainfall at Vienna, Austria, in 1963, and about twice as great as at Valentia, Ireland, in the same year.
- g. An extensive search with sensitive instruments for radionuclides in biological and environmental samples--marine, terrestrial, freshwater--collected during the first 14 months (26 months as of December, 1973) after the Cannikin detonation of November 6, 1971, indicates that no other radionuclides have escaped to the surface environment."

TABLE 1

Scientific And Common Names And Wet Weight to Dry
Weight Ratios of Some Amchitka Island Organisms

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>VERTEBRATES</u>			
<u>MAMMALS</u>			
<u>Enhydra lutris</u> Sea Otter	Liver	4.03	_____
	Skin	3.14	_____
	Kidney	5.00	_____
	Muscle	4.28	_____
<u>Rattus norvegicus</u> Rat	Bone	_____	_____
<u>FISH</u>			
<u>Salvelinus malma</u> Dolly Varden	Kidney	4.52	0.02
	Muscle	3.62	0.70
	Gonad	2.94	0.05
	Stomach contents	6.58	_____
	Viscera	4.20	0.42
	Remains	3.51	0.63
	Liver	3.24	0.19
<u>Oncorhynchus keta</u> Chum Salmon	Muscle	3.28	0.19
	Viscera	3.90	_____
	Liver	3.48	0.37
	Remains	2.60	_____
	Whole (eviscerated)	2.87	0.16
<u>Oncorhynchus nerka</u> Sockeye Salmon	Liver	3.25	0.51
	Muscle	3.67	0.54
<u>Oncorhynchus gorbuscha</u> Pink Salmon	Kidney	5.00	_____
	Gonad	4.51	_____
	Muscle	4.33	_____
	Liver	4.49	0.69

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>VERTEBRATES</u> (continued)			
<u>Oncorhynchus kisutch</u> Coho Salmon	Liver	3.52	0.58
	Muscle	3.83	—
	Gonad	4.30	—
<u>Oncorhynchus tshawytscha</u> King Salmon	Muscle	2.94	0.20
	Liver	3.06	—
<u>Lepidopsetta bilineata</u> Rock Sole	Liver	4.08	0.56
	Muscle	4.62	0.34
	Remains	3.90	0.01
	Gonad	5.70	—
	Kidney	5.30	—
<u>Hippoglossus stenolepis</u> Halibut	Kidney	4.90	—
	Gonad	5.30	—
	Remains	4.50	—
	Muscle	4.01	0.58
	Liver	3.63	0.04
	Skin	2.47	—
<u>Theragra chalcogramma</u> Alaskan Pollack	Muscle	5.08	0.44
Walleye Pollack	Liver	1.51	0.11
	Skin	3.42	0.24
<u>Sebastes alutus</u> Ocean Perch	Muscle	4.37	0.05
	Liver	2.89	0.15
	Gonad	2.90	—
	Skin	2.80	—
<u>Gadus macrocephalus</u> Pacific Cod	Liver	3.00	0.77
	Muscle	5.47	0.28
	Skin	3.36	0.27

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>VERTEBRATES</u> (continued)			
<u>Sebastes ciliatus</u> Dusky Rockfish	Liver	2.62	
	Muscle	4.42	0.08
	Remains	3.26	0.05
	Gonad	4.30	
<u>Hexagrammos lagocephalus</u> Rock Greenling	Liver	3.43	0.41
	Muscle	4.83	0.14
	Viscera	2.13	0.04
	Remains	4.08	0.87
	Kidney	5.22	0.12
	Gonad	5.42	0.42
	Skin	3.10	
	Whole (eviscerated)	4.40	
<u>Coryphaenoides sp.</u> Rattail	Liver	1.35	0.014
<u>Atheresthes stomias</u> Arrowtooth Flounder	Liver	3.28	
<u>Gasterosteus sp.</u> Stickleback	Evis. whole	3.76	0.75
	Viscera	2.54	
<u>Bathylagus stilbius</u> California Smooth Tongue	Entire	4.17	
<u>Stenobranchius leucopsaurus</u> Northern Lampfish	Entire	3.12	
<u>BIRDS</u>			
<u>Haematopus bachmani</u> Black Oystercatcher	Liver	3.36	
	Muscle	3.96	
<u>Uria lomvia</u> Thick-billed Murre	Muscle	1.67	
	Liver	3.31	

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>VERTEBRATES</u> (continued)			
<u>Cepphus columba</u>			
Pigeon Guillemot	Muscle	4.15	0.42
	Liver	3.33	0.24
<u>Lagopus mutus</u>			
Rock Ptarmigan	Liver	3.52	0.32
	Muscle	3.54	0.08
<u>Philacte canagica</u>			
Emperor Goose	Liver	3.15	0.08
	Muscle	3.21	0.14
<u>Larus glaucescens</u>			
Glaucous-winged Gull	Liver	3.11	—
	Muscle	3.58	—
<u>Troglodytes troglodytes</u>			
Wren (Winterwren)	Entire (b)	3.43	—
<u>Cyclorhynchus psittacula</u>			
Parakeet Auklet	Entire (b)	3.41	0.09
<u>Erolia ptilocnemis</u>			
Rock Sandpiper	Entire (b)	3.44	—
<u>Aethia pusilla</u>			
Least Auklet	Entire (b)	3.55	—
<u>Sterna paradisaea</u>			
Arctic Tern	Entire (b)	3.33	—
<u>Anas crecca</u>			
Common Teal	Muscle	3.74	—
	Liver	3.08	—
<u>Lunda cirrhata</u>			
Tufted Puffin	Muscle	3.41	—
	Liver	1.96	—

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>INVERTEBRATES</u>			
<u>Acanthomysis</u>			
Mysids	Entire	8.41	4.7
Plankton	Entire	20.98	2.72
Sponge (rust)	"	6.1	—
(yellow)	"	4.5	—
(buff)	"	4.9	—
(green)	"	9.5	—
Euphausiids			
Krill	Entire	5.2	—
Medusae			
(Cyanea)	"	26.8	—
(Aurellia)	"	10.1	—
<u>Pecten</u> sp.			
Scallop	Soft parts	5.9	—
Basket Star	Soft parts	4.51	—
" "	Gonads	4.37	—
" "	Remains	2.41	—
<u>Gonatus</u>			
Pelagic Squid	Entire	5.41	—
<u>Stronglocentrotus</u> sp.			
Urchin	Test	2.41	0.07
	Gonad	5.87	0.38
	Soft parts	6.19	1.97
<u>Octopus</u> sp.			
Octopus	Viscera	5.25	—
	Evis. whole	6.42	—
<u>Littorina</u> sp.			
Snail	Entire	2.16	0.20
<u>Thais</u> sp.			
Snail	Soft parts	4.0	—
	Shell	1.2	—

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>INVERTEBRATES</u> (continued)			
<u>Mytilus</u> sp.			
Mussel	Soft parts	6.21	0.92
	Shell	1.08	0.05
Isopoda	Entire	3.04	0.07
Amphipoda (Gammaridae)	Entire	4.42	0.01
<u>Parolithodes</u> sp.			
King Crab	Muscle	6.63	0.51
	Viscera	7.10	
	Exoskeleton	2.30	0.71
	Hepatopaneas	3.92	0.04
	Gonad	2.02	
<u>Lithodes</u> <u>aequispina</u>			
False King Crab	Exoskeleton	2.17	0.12
	Hepatopaneas	4.62	1.89
	Muscle	6.79	0.78
	Eggs	1.94	0.099
	Remainder	4.57	1.12
<u>Chionectes</u> <u>tanneri</u>			
Tanner Crab	Muscle	4.91	0.53
	Exoskeleton	2.40	0.23
	Hepatopaneas	4.71	1.70
	Remainder	4.55	1.65
<u>Erimacrus</u> <u>isenbeckii</u>			
Horse Crab	Exoskeleton	2.52	
	Hepatopaneas	6.67	
	Remainder	3.95	
<u>MARINE ALGAE</u>			
<u>Hypophyllum</u> <u>sessile</u>			
Marine algae	Entire	7.77	2.38
<u>Fucus</u> <u>distichus</u>			
Marine algae	Entire	4.94	1.4

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>MARINE ALGAE (continued)</u>			
<u>Halosaccion glandiforme</u> Marine algae	Entire	7.23	1.00
<u>Alaria</u> sp. Marine algae	Entire	5.95	0.99
<u>Porphyra</u> sp. Marine algae	Entire	4.5	—
<u>Corallina</u> sp. Coralline algae	Entire	2.1	—
<u>Constantina</u> sp. Marine algae	Entire	—	—
<u>Ulva</u> sp. Marine algae	Entire	8.54	0.86
<u>Thalassophyllum</u> sp. Marine algae	Entire	—	—
<u>Laminaria longipes</u> Marine algae	Entire	5.30	0.25
<u>FRESHWATER PLANTS</u>			
<u>Cladophora</u> sp. Filamentous algae	Entire	5.1	—
<u>Fontinalis</u> sp. Moss	Entire	4.83	0.89
<u>Ranunculus</u> sp. Freshwater plant	Entire	12.2	4.10
<u>AUFWUCHS</u>			
<u>Periphyton</u> and other organisms	Entire	7.27	2.40

See footnotes at end of table.

TABLE 1 (continued)

Species (a)	Tissue	Wet/Dry Ratio	Standard Deviation
<u>LAND PLANTS</u>			
<u>Cladonia</u> sp. Lichens	Entire	3.75	0.87
<u>Calomagrastis</u> sp. Grass	Entire	—	—
<u>Empetra</u> sp. Crowberry	Entire	—	—
<u>Agiostis</u> sp. Grass	Entire	—	—

(a) Names are from "Common and Scientific Names of Fishes from the United States and Canada" (Third Edition), 1970 American Fisheries Society Special Pub. No. 6.

(b) Less head, feathers, and skin.

TABLE 2

Some Gamma-Emitting Radionuclides on Air Filters at Ground Level at the Amchitka Island Base Camp

Collection Date	Δt^b	$10^3 m^3$	Gamma-Emitting Radionuclides (pCi/thousand cubic meters) ^a					
			7Be	$^{95}Zr^c$	$^{95}Nb^c$	^{103}Ru	^{137}Cs	
Post-Cannikin								
Oct 29 - Nov 12, 1971	6	17.8	23 ± 2.6	1.1 ± 0.1	2.1 ± 0.3	---	0.56 ± 0.13	
Feb 23 - 28, 1972	8	5.3	29 ± 15	0.5 ± 0.2	1.1 ± 0.4	---	0.70 ± 0.47	
Feb 28 - March 6, 1972	4	8.9	16 ± 3.4	0.2 ± 0.1	0.5 ± 0.2	---	---	
March 6 - 13, 1972	4	9.9	47 ± 3.0	0.4 ± 0.1	0.8 ± 0.2	---	0.86 ± 0.25	
March 13 - 20, 1972	7	13.2	22 ± 1.5	0.2 ± 0.1	0.3 ± 0.1	---	0.45 ± 0.15	
March 20 - 27, 1972	4	13.2	17 ± 3.2	0.1 ± 0.03	0.2 ± 0.05	---	0.38 ± 0.15	
March 27 - April 3, 1972	7	13.2	19 ± 1.5	---	---	---	---	
April 3 - 10, 1972	8	13.1	42 ± 2.3	0.6 ± 0.1	1.2 ± 0.2	0.46 ± 0.15	0.69 ± 0.14	
April 10 - 17, 1972	7	12.1	32 ± 2.5	0.4 ± 0.1	0.8 ± 0.2	---	0.60 ± 0.20	
April 17 - 24, 1972	3	11.1	36 ± 2.2	2.1 ± 0.2	4.3 ± 0.4	1.1 ± 0.2	0.72 ± 0.18	
April 24 - May 1, 1972	11	11.1	19 ± 1.8	0.5 ± 0.1	1.0 ± 0.3	---	0.45 ± 0.18	
May 1 - 9, 1972	6	13.0	12 ± 1.5	0.3 ± 0.1	0.6 ± 0.2	0.38 ± 0.08	0.38 ± 0.08	
May 9 - 15, 1972	5	9.3	10 ± 1.6	2.4 ± 0.2	5.2 ± 0.4	0.75 ± 0.22	---	
May 15 - 22, 1972	8	11.1	20 ± 0.9	1.5 ± 0.1	3.2 ± 0.2	1.6 ± 0.2	0.54 ± 0.09	
May 22 - 29, 1972	7	11.1	36 ± 5.3	2.7 ± 0.3	5.8 ± 0.7	0.82 ± 0.76	0.54 ± 0.17	
May 29 - June 5, 1972	6	11.1	31 ± 1.1	6.2 ± 0.3	7.0 ± 0.3	3.3 ± 0.2	---	
June 5 - 12, 1972	7	11.2	13 ± 1.4	2.1 ± 0.4	3.0 ± 0.3	1.5 ± 0.2	0.36 ± 0.18	
June 12 - 19, 1972	3	10.9	19 ± 1.8	3.9 ± 0.5	4.6 ± 0.1	---	0.56 ± 0.17	
June 19 - 26, 1972	7	11.2	6.2 ± 0.6	2.1 ± 0.2	1.3 ± 0.1	0.93 ± 0.07	0.11 ± 0.05	
June 26 - July 3, 1972	4	11.2	10 ± 1.2	1.9 ± 0.4	1.6 ± 0.2	---	0.21 ± 0.11	
July 3 - 10, 1972		11.1	Data Missing					
July 10 - 17, 1972	8	11.1	3.3 ± 1.0	0.40 ± 0.27	1.3 ± 0.2	0.49 ± 0.12	---	
July 17 - 24, 1972	7	11.2	3.8 ± 0.9	---	0.85 ± 0.17	0.57 ± 0.14	---	
July 24 - 31, 1972	4	11.2	---	---	0.23 ± 0.11	0.25 ± 0.11	---	

See footnotes at end of table.

TABLE 2 (continued)

Collection Date	Δt^b	$10^3 m^3$	Gamma-Emitting Radionuclides (pCi/thousand cubic meters) ^a				
			^7Be	$^{95}\text{Zr}^c$	$^{95}\text{Nb}^c$	^{103}Ru	^{137}Cs
July 31 - Aug 7, 1972	4	11.0	4.2 ± 0.9	---	0.46 ± 0.11	0.44 ± 0.11	---
Aug 7 - 14, 1972	4	11.2	5.3 ± 0.9	0.61 ± 0.24	0.85 ± 0.17	0.57 ± 0.11	---
Aug 14 - 21, 1972	8	11.2	5.3 ± 0.9	---	0.73 ± 0.17	0.36 ± 0.14	---
Aug 21 - 28, 1972	3	11.1	7.5 ± 1.2	0.49 ± 0.24	1.2 ± 0.2	0.79 ± 0.14	0.16 ± 0.11
Aug 28 - Sept 4, 1972	4	11.2	7.4 ± 1.2	---	0.79 ± 0.17	---	0.11 ± 0.05
Sept 4 - 11, 1972	3	11.0	15 ± 1.5	---	1.1 ± 0.1	0.58 ± 0.07	---
Sept 11 - 18, 1972	4	11.2	7.6 ± 1.2	---	0.62 ± 0.12	0.33 ± 0.11	---
Sept 18 - 25, 1972	4	11.1	6.1 ± 1.1	---	0.99 ± 0.15	0.29 ± 0.10	---
Sept 25 - Oct 2, 1972	4	11.2	16 ± 1.6	0.55 ± 0.26	0.91 ± 0.26	0.42 ± 0.12	0.29 ± 0.13
Oct 2 - 9, 1972	4	11.0	11 ± 1.4	---	0.39 ± 0.14	---	---
Oct 9 - 16, 1972	5	11.2	9.8 ± 1.3	---	0.33 ± 0.12	---	0.18 ± 0.12
Oct 16 - 23, 1972	3	11.1	12 ± 1.4	0.36 ± 0.18	0.28 ± 0.13	---	0.11 ± 0.10
Oct 23 - 30, 1972	3	11.3	21 ± 1.4	0.39 ± 0.15	0.34 ± 0.11	0.18 ± 0.08	0.22 ± 0.09
Oct 30 - Nov 6, 1972	5	11.0	12 ± 1.0	---	0.21 ± 0.08	0.09 ± 0.07	0.09 ± 0.08
Nov 6 - 13, 1972	8	11.2	14 ± 1.2	0.22 ± 0.19	0.48 ± 0.12	0.18 ± 0.09	0.24 ± 0.09
Nov 13 - 20, 1972	10	10.4	5.0 ± 0.9	---	---	---	0.13 ± 0.08
Nov 20 - 27, 1972	4	11.5	25 ± 1.5	---	0.86 ± 0.14	0.20 ± 0.08	0.41 ± 0.10
Nov 27 - Dec 4, 1972	4	11.1	19 ± 1.4	---	0.31 ± 0.10	0.08 ± 0.07	0.18 ± 0.09
Dec 4 - 11, 1972	4	11.1	15 ± 1.5	---	0.55 ± 0.15	---	0.14 ± 0.10
Dec 11 - 19, 1972	16	12.6	22 ± 1.5	---	0.23 ± 0.12	---	0.15 ± 0.09
Dec 19 - 26, 1972	7	11.4	17 ± 1.7	---	0.12 ± 0.11	---	0.15 ± 0.11
Jan 3 - 10, 1973	6	11.1	14.1 ± 1.4	---	---	---	0.13 ± 0.09

See footnotes at end of table.

TABLE 2 (continued)

Collection Date	Δt^b	$10^3 m^3$	Gamma-Emitting Radionuclides (pCi/thousand cubic meters) ^a				
			^7Be	$^{95}\text{Nb}^c$	^{103}Ru	^{137}Cs	^{144}Ce
Jan 3 - 10, 1973	6	11.1	14 $\pm$ 1.4	---	---	0.13 $\pm$ 0.09	---
Jan 10 - 17, 1973	10	11.2	16 $\pm$ 1.5	---	---	0.14 $\pm$ 0.10	0.63 $\pm$ 0.46
Jan 17 - 24, 1973	9	11.1	22 $\pm$ 1.8	---	---	0.20 $\pm$ 0.10	0.94 $\pm$ 0.28
Jan 24 - 31, 1973	12	11.1	36 $\pm$ 2.4	0.43 $\pm$ 0.17	0.16 $\pm$ 0.13	0.37 $\pm$ 0.15	---
Jan 31 - Feb 7, 1973	11	11.1	17 $\pm$ 1.7	0.19 $\pm$ 0.12	---	0.30 $\pm$ 0.12	2.0 $\pm$ 0.49
Feb 7 - 14, 1973	11	11.1	26 $\pm$ 2.0	0.21 $\pm$ 0.15	---	---	0.55 $\pm$ 0.50
Feb 14 - 21, 1973	13	11.2	14 $\pm$ 1.3	---	---	0.30 $\pm$ 0.09	0.53 $\pm$ 0.42
Feb 21 - 28, 1973	9	11.1	21 $\pm$ 1.8	---	---	0.24 $\pm$ 0.11	0.88 $\pm$ 0.48
Feb 29 - Mar 7, 1973	10	11.1	15 $\pm$ 1.6	---	---	---	0.64 $\pm$ 0.48
Mar 7 - 14, 1973	9	10.7	17 $\pm$ 1.7	---	---	0.20 $\pm$ 0.14	---
Mar 14 - 21, 1973	10	10.9	9.8 $\pm$ 1.3	---	---	0.12 $\pm$ 0.10	0.52 $\pm$ 0.43
Mar 21 - 26, 1973	10	8.4	6.3 $\pm$ 1.4	---	---	---	---
March 26 - Apr 2, 1973	6	7.4	36 $\pm$ 2.9	---	---	0.48 $\pm$ 0.19	1.7 $\pm$ 0.73
Apr 2 - 9, 1973	8	11.8	26 $\pm$ 1.7	---	---	0.41 $\pm$ 0.12	1.2 $\pm$ 0.45
Apr 9 - 17, 1973	14	12.3	18 $\pm$ 1.6	---	---	0.11 $\pm$ 0.11	---
Apr 17 - 23, 1973	7	9.5	34 $\pm$ 2.4	---	---	0.17 $\pm$ 0.16	0.80 $\pm$ 0.59
Apr 23 - 30, 1973	7	11.1	37 $\pm$ 2.3	---	---	0.42 $\pm$ 0.12	1.3 $\pm$ 0.52
Apr 30 - May 7, 1973	7	11.6	20 $\pm$ 1.4	---	---	0.20 $\pm$ 0.09	0.57 $\pm$ 0.41
May 7 - 14, 1973	10	11.1	18 $\pm$ 1.7	---	0.18 $\pm$ 0.08	0.16 $\pm$ 0.10	0.62 $\pm$ 0.46
May 14 - 21, 1973	7	11.4	7.7 $\pm$ 1.2	---	0.12 $\pm$ 0.09	---	---
May 21 - 29, 1973	10	12.4	20 $\pm$ 1.0	---	---	0.24 $\pm$ 0.07	0.41 $\pm$ 0.27
May 29 - June 5, 1973	14	11.1	10 $\pm$ 1.1	---	---	0.11 $\pm$ 0.08	---
June 5 - 12, 1973	10	11.2	12 $\pm$ 1.2	---	---	0.13 $\pm$ 0.09	---
June 12 - 19, 1973	7	11.1	16 $\pm$ 1.3	---	---	0.21 $\pm$ 0.08	---
June 19 - 26, 1973	4	11.1	11 $\pm$ 1.3	---	---	0.22 $\pm$ 0.12	---
June 26 - July 3, 1973	10	11.1	3.0 $\pm$ 1.1	---	---	---	---

See footnotes at end of table.

TABLE 2 (continued)

Collection Date	Δt^b	$10^3 m^3$	Gamma-Emitting Radionuclides (pCi/thousand cubic meters) ^a				
			7Be	$^{95}Nb^c$	^{103}Ru	^{137}Cs	^{144}Ce
July 3 - 10, 1973	4	11.1	3.8 ± 1.0	---	0.16 ± 0.10	---	---
July 10 - 17, 1973	5	11.2	12 ± 1.5	---	0.25 ± 0.11	---	---
July 17 - 24, 1973	13	11.0	3.2 ± 1.0	---	---	---	---
July 24 - 31, 1973	8	11.1	6.0 ± 0.9	---	---	0.10 ± 0.07	0.56 ± 0.33
July 31 - Aug 8, 1973	10	12.7	4.4 ± 0.9	---	---	---	---
Aug 8 - 14, 1973	6	9.6	11 ± 0.9	---	0.08 ± 0.06	0.07 ± 0.06	---
Aug 14 - 21, 1973	18	11.0	4.7 ± 1.1	---	0.14 ± 0.10	0.11 ± 0.09	---
Aug 21 - 28, 1973	10	16.4	13 ± 1.2	0.12 ± 0.07	0.14 ± 0.07	0.14 ± 0.07	---

See footnotes at end of table.

TABLE 2 (continued)

Period and Statistics	Δt^b	$10^3 m^3$	Gamma-Emitting Radionuclides (pCi/thousand cubic meters)						
			7Be	$^{95}Zr^c$	$^{95}Nb^c$	^{103}Ru	^{137}Cs	^{144}Ce	
Comparison of Pre- and Post-Cannikin Data									
Pre-Cannikin ^d									
Range	4-131	16.3 - 30.0	4.2 - 42.0	0.5 - 6.6	1.1 - 14.1	NS - 4.3	0.22 - 1.3	---	
Mean $\pm$ SD	19	24.5 $\pm$ 3.7	20 $\pm$ 9	2.8 $\pm$ 2.1	5.9 $\pm$ 4.5	0.7 $\pm$ 1.1	0.7 $\pm$ 0.3	---	
Post-Cannikin									
1972 Range ^e	---	5.3 - 17.8	3.3 - 47	NS - 6.2	NS - 7.0	NS - 3.3	NS - 0.86	---	
1972 Mean $\pm$ SD ^e	---	11.3 $\pm$ 1.6	16.8 $\pm$ 10.6	0.7 $\pm$ 1.2	1.3 $\pm$ 1.6	0.37 $\pm$ 0.59	0.24 $\pm$ 0.24	---	
1973 Range ^f	---	7.4 - 16.4	3.0 - 37	---	NS - 0.63	NS - 0.25	NS - 0.48	NS - 2.0	
1973 Mean $\pm$ SD ^f	---	11.1 $\pm$ 1.4	15.9 $\pm$ 9.6	---	0.04 $\pm$ 0.09	0.04 $\pm$ 0.07	0.16 $\pm$ 0.13	0.42 $\pm$ 0.53	

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. The time in days between the collection and counting of a sample.

c. Air filters taken before May 29, 1972, were counted on NaI detectors. The ^{95}Zr and ^{95}Nb values from the filters counted on a NaI detector were calculated as discussed in the text. Filters after May 29, 1972, were counted on a Ge(Li) detector.

d. Twenty-eight samples were taken in the pre-Cannikin period, October 1970 to October 1971.

e. Forty-five samples were taken in the post-Cannikin period, November 1971 to January 10, 1973.

f. Thirty-four samples were taken in 1973.

TABLE 3

Gamma-Emitting Radionuclides in the Freshwater
Moss Fontinalis Collected at Amchitka Island

Location and Date	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry) ^a									
		⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵⁵ Eu
Post-Cannikin ^d											
Clevenger Creek											
December 1971	62	3.8±1.1	6.6±0.5	0.3 ±0.1	0.6 ±0.1	---	1.5 ±0.3	0.9 ±0.2	3.6 ±0.1	---	---
February 1972	49	9.9±2.1	5.1±0.8	0.5 ±0.1	1.2 ±0.2	0.81±0.4	1.2 ±0.6	---	1.7 ±0.1	---	---
April 1972 ^e	98	---	9.3±0.3	1.0 ±0.4	5.3 ±1.0	---	---	---	1.3 ±0.2	3.5 ±0.5	---
July 1972 ^e	52	---	3.7±1.7	0.9 ±0.3	2.4 ±0.4	0.46±0.2	---	---	0.6 ±0.1	2.0 ±0.3	---
October 1972	105	---	6.2±0.9	0.3 ±0.1	0.7 ±0.2	2.1 ±1.5	---	---	2.5 ±0.1	---	---
April 1973 ^e	101	5.2±1.1	5.5±1.0	---	---	---	0.87±0.33	0.25±0.08	3.0 ±0.1	1.1 ±0.02	0.22±0.07
August 1973 ^e	56	3.7±0.7	5.2±1.1	---	0.29±0.07	0.14±0.09	0.61±0.38	0.21±0.09	1.5 ±0.1	0.58±0.15	0.22±0.07
Bridge Creek											
28 December 1971	57	5.6±1.5	7.5±0.4 _f	0.7 ±0.1	1.4 ±0.2	0.6 ±0.3	2.9 ±0.4	1.3 ±0.2	5.5 ±0.1	---	---
February 1972	47	9.0±1.2	5.2±1.2 _f	2.0 ±0.3	4.4 ±0.3	1.9 ±0.2	---	---	3.5 ±0.2	---	---
April 1972	34	9.2±1.7	6.6±0.9	0.7 ±0.1	1.6 ±0.2	---	2.0 ±0.7	0.7 ±0.3	2.8 ±0.1	---	---
July 1972 ^e	41	2.8±1.2	6.8±0.9	1.1 ±0.3	2.9 ±0.4	0.3 ±0.2	0.5 ±0.3	---	2.2 ±0.2	2.6 ±0.4	---
October 1972	100	4.6±4.3	7.7±0.7	0.3 ±0.1	0.7 ±0.1	---	---	---	2.7 ±0.1	---	---
April 1973 ^e	100	6.1±1.7	5.5±1.4	---	---	---	---	0.27±0.14	3.6 ±0.2	1.4 ±0.2	0.21±0.10
August 1973 ^e	73	4.1±1.0	6.0±1.3	---	0.15±0.11	---	---	---	0.97±0.09	0.72±0.18	---
Duck Cove Creek											
December 1971	59	7.3±1.3	6.8±0.5	0.4 ±0.1	0.9 ±0.1	---	2.4 ±0.4	1.7 ±0.2	2.9 ±0.1	---	---
February 1972	48	14 ±4	6.0±1.0	0.7 ±0.1	1.4 ±0.3	1.9 ±0.7	1.4 ±0.8	1.2 ±0.4	0.8 ±0.1	---	---
April 1972	35	7.9±2.1	4.8±0.9 _f	0.6 ±0.1	1.3 ±0.2	---	1.9 ±0.7	0.9 ±0.3	1.4 ±0.1	---	---
July 1972 ^e	55	2.6±1.0	6.3±0.8 _f	0.8 ±0.3	2.6 ±0.4	0.2 ±0.2	0.5 ±0.1	0.4 ±0.1	1.0 ±0.1	1.6 ±0.1	---
October 1972	101	---	6.4±0.9	0.2 ±0.1	0.5 ±0.1	2.4 ±1.2	---	1.4 ±0.4	2.4 ±0.1	---	---
April 1973 ^e	97	12 ±1.5	6.6±1.2	---	---	---	1.3 ±0.4	0.48±0.09	1.6 ±0.1	1.8 ±0.2	0.18±0.09
August 1973 ^e	49	2.1±0.7	6.1±1.5	---	---	---	---	0.15±0.13	0.89±0.11	---	---

See footnotes at end of table.

TABLE 3 (continued)

Location and Date	Gamma-Emitting Radionuclides (pCi/g, dry) ^a										
	Δt ^b	⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵⁵ Eu
Falls Creek ^g											
April 1973 ^e	124	3.4±1.4	4.8±1.0	---	0.19±0.11	---	0.65±0.34	0.23±0.08	1.6 ±0.1	1.0 ±0.2	0.22±0.08
August 1973 ^e	78	5.3±0.8	6.0±1.4	---	0.16±0.07	0.15±0.10	0.44±0.30	0.20±0.07	0.64±0.05	0.90±0.16	0.14±0.05
MP 12 Creek											
April 1973 ^e	113	15 ±1.9	6.1±1.6	---	0.33±0.13	---	1.3 ±0.4	0.24±0.10	2.8 ±0.1	1.9 ±0.2	0.17±0.06
August 1973 ^e	75	2.9±1.0	3.3±1.3	---	---	---	---	---	1.1 ±0.1	0.83±0.20	---
Ice Box Lake Inlet											
April 1973 ^e	120	4.7±1.3	6.4±1.4	---	---	---	0.50±0.34	0.24±0.07	1.1 ±0.1	0.95±0.17	0.11±0.05
August 1973 ^e	70	3.5±0.7	5.0±1.4	---	0.15±0.06	---	0.50±0.32	0.32±0.07	1.9 ±0.1	0.78±0.16	0.23±0.05
Cannikin Lake Outlet											
April 1973 ^e	114	6.9±1.4	6.7±1.6	---	---	---	---	0.17±0.10	0.67±0.07	0.89±0.21	---
August 1973 ^{e,h}	71	7.6±1.0	5.7±1.4	0.32±15	0.17±0.06	0.13±0.12	1.1 ±0.4	0.42±0.09	7.2 ±0.2	1.4 ±0.2	0.29±0.05

See footnotes at end of table.

TABLE 3 (continued)

Location and Statistics	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry)									
		^7Be	^{40}K	^{54}Mn	^{60}Co	$^{95}\text{Zr}^c$	$^{95}\text{Nb}^c$	^{103}Ru	^{106}Ru	^{125}Sb	^{137}Cs
Summary of Pre-Cannikin Data											
Clevenger Creek ⁱ											
Range	41 to 76	3-12	1.7-8.9	0.09-0.24	0.04-0.11	0.5-2.7	0.8-6.1	NS-1.1	2.0-4.8	0.7-2.1	2.1-5.8
Mean $\pm$ SD	58	8 $\pm$ 4	5.8 $\pm$ 3.0	0.16 $\pm$ 0.08	0.07 $\pm$ 0.04	1.4 $\pm$ 1.0	2.9 $\pm$ 2.3	0.28 $\pm$ 0.54	3.2 $\pm$ 1.2	1.4 $\pm$ 0.6	4.0 $\pm$ 1.5
Bridge Creek ^j											
Range	45 to 76	5-14	5.4-11	0.15-0.22	0.08-0.15	0.8-3.4	2.1-7.4	---	2.5-7.3	0.6-2.1	2.7-7.6
Mean $\pm$ SD	63	10 $\pm$ 5	7.3 $\pm$ 3.2	0.18 $\pm$ 0.04	0.12 $\pm$ 0.04	1.7 $\pm$ 1.4	3.9 $\pm$ 3.1	---	4.4 $\pm$ 2.5	1.2 $\pm$ 0.8	4.1 $\pm$ 3.0
Duck Cove Creek ^j											
Range	47 to 63	5-11	3.6-8.2	0.06-0.30	NS-0.09	0.6-2.5	1.3-5.4	NS-1.2	1.6-4.5	0.8-1.7	1.3-3.3
Mean $\pm$ SD	55	8 $\pm$ 3	6.6 $\pm$ 2.6	0.16 $\pm$ 0.12	0.05 $\pm$ 0.04	1.3 $\pm$ 1.1	2.7 $\pm$ 2.3	0.5 $\pm$ 0.6	2.8 $\pm$ 1.5	1.4 $\pm$ 0.5	2.6 $\pm$ 1.1

- a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- b. The time in days between the collection and counting of a sample.
- c. Zirconium-95 and ^{95}Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.
- d. Traces of ^{60}Co and ^{54}Mn were also present in some 1971 and 1972 post-Cannikin samples in concentrations similar to those in the summary of the pre-Cannikin data.
- e. Samples counted on Ge(Li) detector. All other samples were counted on NaI detector.
- f. Potassium-40 value from NaI detector.
- g. Traces of ^{226}Ra , ^{232}Th , and ^{238}U (0.3 to 0.8 pCi/g, dry) were also detected in the samples from Falls Creek.
- h. This sample was not completely washed and contained sediment which was not present in other *Fontinalis* samples. This sediment may have contributed to the higher than normal ^{137}Cs concentration in the sample.
- i. Four samples were taken between September 1970 and November 1971.
- j. Three samples were taken between February 1971 and November 1971.

TABLE 4

Gamma-Emitting Radionuclides in the Freshwater
Plant Ranunculus Collected at Amchitka Island

Location and Date	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry) ^a									
		⁷ Be	⁴⁰ K	⁵⁴ Mn	⁶⁰ Co	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs
Post-Cannikin											
Clevenger Creek											
December 1971	60	---	16 ±0.8	---	0.06±0.05	0.1 ±0.1	0.3 ±0.1	0.7 ±0.5	---	0.6 ±0.2	1.8 ±0.1
February 1972	47	20 ±3	19 ±1.0	0.2 ±0.1	---	1.2 ±0.1	2.6 ±0.2	1.2 ±0.6	1.8 ±0.7	0.6 ±0.3	1.5 ±0.1
April 1972 ^d	22	4.9±1.4	16 ±0.7	0.09±0.04	0.04±0.04	0.4 ±0.1	0.9 ±0.2	0.8 ±0.3	---	1.3 ±0.2	2.7 ±0.1
July 1972 ^d	58	---	15 ±0.6 ^e	---	---	---	0.95±0.33	---	1.0 ±0.5	---	0.90±0.15
October 1972 ^{d,f}	100	---	15 ±3.4	---	---	0.12±0.06	0.20±0.15	---	---	---	1.2 ±0.1
April 1973 ^{d,f}	98	3.8±1.4	24 ±2.3	---	---	---	---	---	---	---	1.1 ±0.1
August 1973 ^d	74	---	19 ±1.9	---	---	---	---	---	---	---	0.43±0.07
Bridge Creek											
December 1971	58	---	22 ±1	---	0.09±0.08	0.2 ±0.1	0.5 ±0.3	---	---	---	1.8 ±0.1
February 1972	52	10 ±2	14 ±0.9	0.1 ±0.06	0.07±0.05	0.6 ±0.1	1.3 ±0.2	0.7 ±0.4	2.0 ±0.6	0.9 ±0.3	4.1 ±0.1
April 1972	23	8.2±1.4	14 ±1	---	---	0.6 ±0.1	1.3 ±0.2	---	1.1 ±0.6	0.7 ±0.3	3.0 ±0.1
July 1972	31	---	24 ±1.5	---	---	0.15±0.03	0.32±0.06	0.24±0.19	---	---	0.43±0.04
October 1972 ^{d,f}	105	---	32 ±1.3	---	---	0.25±0.15	0.49±0.31	---	---	---	1.8 ±0.1
April 1973 ^{d,f}	118	4.7±1.5	29 ±2.3	---	---	---	---	---	---	---	1.2 ±0.1
Duck Cove Creek											
December 1972	61	2.0±1.1	26 ±0.5	---	---	0.25±0.06	0.52±0.13	0.4 ±0.3	0.7 ±0.3	0.7 ±0.1	1.7 ±0.1
February 1972	42	21 ±3	17 ±0.8	0.1 ±0.06	0.1 ±0.05	0.8 ±0.1	1.8 ±0.2	1.6 ±0.5	2.0 ±0.7	1.1 ±0.3	2.5 ±0.1
April 1972 ^d	24	8.1±1.6	18 ±0.8	0.1 ±0.05	---	0.4 ±0.1	0.8 ±0.2	0.6 ±0.3	1.3 ±0.5	0.9 ±0.2	1.0 ±0.1
July 1972 ^d	61	---	23 ±0.5 ^e	---	---	0.45±0.24	1.2 ±0.3	---	0.33±0.19	---	0.4 ±0.1
October 1972 ^{d,f}	93	---	14 ±0.7	---	---	0.19±0.05	0.4 ±0.1	---	---	0.5 ±0.3	2.2 ±0.1
April 1973 ^{d,f}	123	6.0±1.5	20 ±1.5	---	---	---	---	---	---	0.26±0.09	2.9 ±0.1

See footnotes at end of table.

TABLE 4 (continued)

Location and Date	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry) ^a									
		⁷ Be	⁴⁰ K	⁵⁴ Mn	⁶⁰ Co	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs
Clevenger Lake Outlet											
December 1971	58	2.8±1.1	11 ±0.5	0.1 ±0.03	0.06±0.03	0.32±0.06	0.69±0.13	---	1.7 ±0.4	0.3±0.2	1.2 ±0.1
February 1972	52	37 ±7	15 ±2	0.2 ±0.1	0.1 ±0.09	0.9 ±0.2	1.9 ±0.4	3.1 ±1.0	1.6 ±1.4	---	0.9 ±0.2
April 1972	23	9.4±1.6	14 ±0.8	0.07±0.05	---	0.5 ±0.1	1.0 ±0.2	---	1.1 ±0.6	0.4±0.3	1.2 ±0.1
July 1972	31	5.8±1.8	19 ±0.6 ^e	---	---	2.2 ±0.5	6.6 ±0.6	1.2 ±0.3	0.7 ±0.4	---	1.2 ±0.2
October 1972	105	6.1±1.7	34 ±3.1	---	---	---	2.4 ±0.5	0.3 ±0.2	1.0 ±0.6	---	1.1 ±0.1
August 1973 ^d	73	3.4±1.0	20 ±2.1	---	---	---	---	---	---	---	0.32±0.06

Location and Statistics	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry)									
		⁷ Be	⁴⁰ K	⁵⁴ Mn	⁶⁰ Co	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs

Summary of Pre-Cannikin Data

Clevenger Creek^g

Range	39-76	NS- 8.4	15-24	0.1 -0.4	NS-0.1	NS-1.8	NS-3.6	---	NS-3.6	NS-1.3	0.5 -3.2
Mean ± SD	60	4.1± 4.7	21± 4	0.2 ±0.1	0.06±0.04	0.6 ±0.8	1.3 ±1.6	NS	1.9 ±1.8	0.3±0.6	1.7 ±1.1

Bridge Creek^h

Range	45-77	4-15	14-19	NS-0.2	---	0.6 -1.4	1.3 -3.2	---	1.5 -2.5	NS-1.0	3.0 -3.4
Mean ± SD	64	8.4± 5.8	17± 3	0.1 ±0.1	NS	1.0 ±0.4	2.3 ±1.0	NS	2.1 ±0.5	0.5±0.5	3.2 ±0.2

Duck Cove Creekⁱ

Range	62-77	NS- 6.3	7-22	NS-0.2	---	0.25-0.55	0.52-1.14	---	NS-2.0	0.4-1.2	0.9 -1.7
Mean ± SD	70	4.0± 3.5	15± 8	0.09±0.10	NS	0.41±0.15	0.86±0.32	NS	1.0 ±1.0	0.7±0.5	1.3 ±0.4

See footnotes at end of table.

TABLE 4 (continued)

Location and Statistics	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry)											
		^7Be	^{40}K	^{54}Mn	^{60}Co	$^{95}\text{Zr}^c$	$^{95}\text{Nb}^c$	^{103}Ru	^{106}Ru	^{125}Sb	^{137}Cs		
Summary of Pre-Cannikin Data													
Clevenger Lake Outlet [†]													
Range	40-57	NS-	4.9	2.8-	7.7	NS-0.1	---	0.33-0.43	0.70-0.92	NS-0.7	NS-0.9	0.5-0.6	NS-1.1
Mean $\pm$ SD	49	2.5 $\pm$	2.2	5.3 $\pm$	3.5	0.05 $\pm$ 0.05	NS	0.39 $\pm$ 0.07	0.81 $\pm$ 0.16	0.4 $\pm$ 0.5	0.5 $\pm$ 0.6	0.6 $\pm$ 0.1	0.6 $\pm$ 0.8

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

- 33 b. The time in days between the collection and counting of a sample.
- c. Zirconium-95 and ^{95}Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.
- d. Samples counted on Ge(Li) detector. All other samples were counted on NaI detector.
- e. Potassium-40 value from NaI detector.
- f. Cerium-144 (0.6-0.9 pCi/g, dry) and ^{155}Eu (<0.15 pCi/g, dry) were also detected in the April 1973 samples for reasons discussed in the text.
- g. Four samples were taken between September 1970 and November 1971.
- h. Three samples were taken between February 1971 and November 1971.
- i. Two samples were taken between September 1970 and November 1971.

TABLE 5

Some Gamma-Emitting Radionuclides in the Marine
Algae Fucus Collected at Amchitka Island

Location and Date	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry) ^a					
		⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹³⁷ Cs	¹⁴⁴ Ce
Post-Cannikin							
Constantine Harbor							
February 1972	44	5.0 ±1.8	33±1.0	---	---	---	---
April 1972	29	2.3 ±1.2	36±0.7	0.07±0.05	0.16±0.10	---	---
June 1972	57	---	32±0.6	0.07±0.04	0.13±0.07	---	---
October 1972	99	2.7 ±2.6	36±0.8	---	---	---	---
April 1973 ^d	117	---	34±2.1	---	---	---	---
August 1973 ^d	48	---	33±3.0	---	---	0.05±0.03	---
Duck Cove							
December 1971	42	2.0 ±1.4	30±0.8	0.06±0.06	0.14±0.11	---	---
February 1972	36	2.5 ±1.1	33±1.0	0.03±0.03	0.07±0.06	---	---
April 1972	30	---	41±0.7	0.07±0.04	0.14±0.08	---	---
June 1972	61	1.1 ±0.1	34±0.5	0.08±0.02	0.16±0.04	0.06±0.02	---
September 1972	101	4.1 ±3.7	39±0.9	---	---	---	---
April 1973 ^d	110	---	40±2.1	---	---	---	0.24±0.17
July 1973 ^d	8	0.77±0.25	24±1.8	---	---	---	---
August 1973 ^d	49	0.65±0.43	42±2.6	---	---	0.09±0.04	---
IA-2 or -3							
November 1971	103	---	28±0.6	0.06±0.06	0.12±0.12	---	---
December 1971	42	1.8 ±1.2	29±1.0	0.07±0.03	0.15±0.06	---	---
February 1972	45	4.7 ±1.4	30±0.9	0.18±0.03	0.36±0.06	---	---
April 1972	124	7.7 ±2.3	28±0.5	0.45±0.08	0.98±0.16	0.05±0.03	---
June 1972	67	7.1 ±1.9	18±0.6	0.49±0.08	1.0 ±0.2	---	---
September 1972	15	1.4 ±0.9	23±0.6	0.04±0.03	0.06±0.06	---	---
April 1973 ^d	122	---	36±2.0	---	---	---	0.32±0.16
August 1973 ^d	55	---	33±2.3	---	---	---	---

See footnotes at end of table.

TABLE 5 (Continued)

Location and Statistics	Δt^b	Gamma-Emitting Radionuclides (pCi/g, dry)				
		^7Be	^{40}K	$^{95}\text{Zr}^c$	$^{95}\text{Nb}^c$	^{137}Cs
Summary of Pre-Cannikin Data						
Constantine Harbor ^e						
Range	30-51	0.40-0.65	20-31	0.03-0.19	0.04-0.38	0.03-0.06
Mean $\pm$ SD	43	0.52 $\pm$ 0.18	25 $\pm$ 6	0.10 $\pm$ 0.08	0.21 $\pm$ 0.17	0.05 $\pm$ 0.02
Duck Cove ^e						
Range	37-102	NS-1.0	21-24	0.02-0.09	0.04-0.23	0.02-0.06
Mean $\pm$ SD	66	0.8 $\pm$ 0.3	23 $\pm$ 2	0.07 $\pm$ 0.04	0.15 $\pm$ 0.10	0.04 $\pm$ 0.02
IA-2 or -3 ^f						
Range	32-158	NS-2.4	16-34	0.04-0.17	0.06-0.36	0.03-0.11
Mean $\pm$ SD	73	0.09 $\pm$ 0.09	26 $\pm$ 6	0.08 $\pm$ 0.06	0.17 $\pm$ 0.14	0.06 $\pm$ 0.03

- a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- b. The time in days between the collection and counting of a sample.
- c. Zirconium-95 and ^{95}Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.
- d. Sample counted on a Ge(Li) detector. All other samples were counted on a NaI detector.
- e. Three samples were taken between September 1970 and May 1971.
- f. Five samples were taken between September 1970 and November 1971.

TABLE 6

Gamma-Emitting Radionuclides in Lichens
Collected at Amchitka Island

Location and Date		Gamma-Emitting Radionuclides (pCi/g, dry) ^a									
		Δt^b	⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁴ Ce
Post-Cannikin ^d											
Clam Lake											
December 1971	45	24 ±6.4	16 ±1.5	1.9 ±0.3	4.0 ±0.8	1.6 ±1.2	10 ±1.8	9.6 ±0.1	67 ±0.5		
February 1972	81	8.1±5.2	4.9±1.4	0.6 ±0.2	1.4 ±0.4	---	2.0 ±1.3	2.2 ±0.6	20 ±0.3		
April 1972	34	6.4±2.4	3.5±0.8	0.3 ±0.1	0.6 ±0.2	---	2.9 ±0.8	2.1 ±0.4	19 ±0.2		
July 1972	32	3.2±2.2	4.2±0.7	0.8 ±0.1	1.7 ±0.2	0.8 ±0.4	---	1.8 ±0.4	14 ±0.2		
October 1972 ^e	106	7.0±2.2	2.6±0.9	---	0.8 ±0.2	---	3.0 ±0.5	1.1 ±0.2	15 ±0.3	9.0±0.4	1.5 ±0.14
April 1973 ^e	116	4.7±2.0	3.8±0.9	---	0.21±0.10	---	0.96±0.44	0.69±0.11	15 ±0.3	5.2±0.3	0.87±0.09
July 1973 ^e	6	5.6±0.6	3.5±1.5	0.08±0.06	0.12±0.04	0.10±0.04	1.3 ±0.4	0.45±0.10	5.4±0.2	2.7±0.2	0.24±0.06
August 1973 ^e	48	5.6±0.9	3.3±0.8	---	---	---	0.91±0.37	0.65±0.10	1.5±0.3	3.3±0.3	0.56±0.06
Ice Box Lake											
October 1972	101	---	2.8±1.2	0.7±0.1	1.4 ±0.3	3.8 ±2.0	---	2.6 ±0.7	14 ±0.2		
April 1973 ^e	108	5.9±1.8	1.1±0.7	---	---	---	1.2 ±0.4	0.94±0.11	16 ±0.3	5.0±0.3	0.75±0.11
August 1973 ^e	57	5.5±1.0	---	---	---	---	1.4 ±0.4	0.77±0.10	15 ±0.3	3.5±0.2	0.50±0.06
Cannikin Lake											
July 1972	29	5.3±1.7	2.0±0.7	0.7±0.1	1.6 ±0.1	0.6 ±0.3	---	0.2 ±0.4	21 ±0.2		
April 1973 ^e	112	4.4±2.0	2.2±0.8	---	---	---	1.3 ±0.5	0.86±0.12	15 ±0.3	5.2±0.4	0.85±0.13
August 1973 ^e	56	6.2±0.9	2.3±1.3	---	---	0.13±0.10	1.2 ±0.4	0.94±0.09	16 ±0.2	3.0±0.2	0.61±0.06

See footnotes at end of table.

TABLE 6 (continued)

Gamma-Emitting Radionuclides (pCi/g, dry)											
Statistics	Δt^b	^7Be	^{40}K	^{54}Mn	^{60}Co	$^{95}\text{Zr}^c$	$^{95}\text{Nb}^c$	^{103}Ru	^{106}Ru	^{125}Sb	^{137}Cs
Summary of Pre-Cannikin Data at Clam Lake ^f											
Range	23-109	7-20	2-19	0.07-0.59	0.05-0.56	0.3-3.1	0.7-6.4	NS-8.2	NS-11.8	1.8-21.5	13-122
Mean $\pm$ SD	64	14.7 $\pm$ 6.1	4.5 $\pm$ 6.4	0.19 $\pm$ 0.18	0.16 $\pm$ 0.18	1.0 $\pm$ 1.0	2.1 $\pm$ 1.9	1.5 $\pm$ 3.1	5.4 $\pm$ 3.2	5.6 $\pm$ 7.2	37 $\pm$ 39

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. The time in days between the collection and counting of a sample.

37 c. Zirconium-95 and ^{95}Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.

d. Traces of ^{60}Co and ^{54}Mn were also present in some 1971 and 1972 post-Cannikin samples in concentrations similar to those in the summary of the pre-Cannikin data.

e. Samples counted on Ge(Li) detector. All other samples were counted on NaI detector.

f. Seven samples were taken between September 1970 and November 1971.

TABLE 7

Some Gamma-Emitting Radionuclides in Invertebrates
Collected at Amchitka Island

Collection Date	At ^b	Specimen No.	Collection Site	Organism	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
						⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c
May 1971	62	245	IA-3	Littorina	Entire	0.25±0.22	2.1±0.2	0.03±0.02	0.05±0.04
Sept. 1971	86	576	IA-3	Plankton	Entire	---	11 ±1.1	---	---
Sept. 1971	88	605	IA-3	Plankton	Entire	---	15 ±0.8	---	---
Sept. 1971	95	581	Off Sea Otter Pt.	Scallop	Soft Parts	---	13 ±1.2	---	---
Sept. 1971	106	580	Off Sea Otter Pt.	Scallop	Shell	---	0.3±0.3	---	---
Sept. 1971	145	730	Off Bat Island	Sea Urchin	Soft Parts	---	13 ±1.4	---	---
Sept. 1971	150	760	Crown Reefer Pt.	Sea Urchin	Soft Parts	---	11 ±0.7	---	---
Sept. 1971	151	762	Crown Reefer Pt.	Sea Urchin	Gonad	---	11 ±1.5	0.45±0.30	1.0 ±0.6
Sept. 1971	153	755	Off C-site	Sea Urchin	Soft Parts	---	10 ±0.8	0.16±0.05	0.35±0.14
Sept. 1971	163	756	St. Makarius Bay	Sea Urchin	Soft Parts	---	11 ±1.2	0.63±0.23	1.3 ±0.6
Sept. 1971	163	758	Off C-site	Sea Urchin	Soft Parts	---	12 ±1.4	0.63±0.34	1.3 ±0.8
Sept. 1971	173	798	Off East Cape	Plankton	Entire	3.1 ±2.9	9.9±0.6	---	---
Oct. 1971	31	454	Off Kirilloff Pt.	Scallop	Soft Parts	32 ±5	11 ±4.9	0.5 ±0.4	1.0 ±0.8
Oct. 1971	32	487	Off Bat Island	Horse Crab	Muscle	---	15 ±0.8	---	---
Oct. 1971	44	551	Off Bat Island	Sea Urchin	Soft Parts	---	64 ±5	0.46±0.27	1.0 ±0.6
Oct. 1971	56	485	Off Bat Island	Tanner Crab	Skeleton	---	5.2±1.2	0.22±0.11	0.44±0.22
Oct. 1971	56	488	Off Bat Island	Horse Crab	Skeleton	---	6.6±0.9	---	---
Oct. 1971	57	555	Off Bat Island	Sea Urchin	Soft Parts	1.6 ±1.1	11 ±1	0.09±0.07	0.22±0.13
Oct. 1971	60	550	Off Bat Island	Sea Urchin	Test.	---	2 ±0.4	0.04±0.02	0.08±0.04
Oct. 1971	63	553	Off Bat Island	Sea Urchin	Test.	---	3 ±0.5	0.04±0.03	0.08±0.06
Oct. 1971	63	554	Off Bat Island	Sea Urchin	Gonad	---	6 ±1.3	---	---
Oct. 1971	66	486	Off Bat Island	Tanner Crab	Remainder	---	6.2±0.9	---	---
Oct. 1971	66	490	Off Bat Island	Horse Crab	Remainder	---	---	1.1±0.8	2.3 ±1.7
Oct. 1971	77	480	Off Bat Island	Tanner Crab	Skeleton	---	5.8±1.2	---	---
Oct. 1971	125	728	Kirilloff Point	Scallop	Soft Parts	---	8.8±2.2	---	---

See footnotes at end of table.

TABLE 7 (continued)

Collection Date	Δt^b	Specimen No.	Collection Site	Organism	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
						⁷ Be	⁴⁰ K	⁹⁵ Zr ^c	⁹⁵ Nb ^c
Nov. 1971	103	764	Off St. Makarius Point	Octopus	Viscera	---	13 ±1.5	0.27±0.21	0.54±0.48
Nov. 1971	131	765	Off St. Makarius Point	Octopus	Remainder	---	7.8±0.4	---	---
Dec. 1971	49	727	Duck Cove	Green sponge	Entire	2.4±0.6	8.4±0.6	0.07±0.05	0.15±0.10
Feb. 1972	210	085	Duck Cove	Green sponge	Entire	6.4±5.9	9.5±0.7	---	---
April 1972	113	003	Duck Cove	Green sponge	Entire	---	15 ±0.7	---	---
June 1972	59	058	Sand Beach Cove	Green sponge	Entire	---	6.8±1.7	0.24±0.13	0.54±0.28
June 1972	65	060	Sand Beach Cove	Mussel	Shell	---	---	---	---
June 1972	66	039	Duck Cove	Green sponge	Entire	2.0±0.4	9.7±0.3	0.14±0.04	0.28±0.06
Aug. 1972	76	123	Off Kiriloff Pt.	Plankton	Entire	---	9 ±0.5	---	---
Sept. 1972	53	121	Off Kiriloff Pt.	Plankton	Entire	---	17 ±0.7	---	---
Sept. 1972	60	107	Off Kiriloff Pt.	Plankton	Entire	0.7±0.6	10 ±0.6	---	---
Sept. 1972	61	108	Off Kiriloff Pt.	Plankton	Entire	0.6±0.5	10 ±0.5	---	---
Sept. 1972	73	109	Off Kiriloff Pt.	Plankton	Entire	2.1±1.9	11 ±0.6	---	---
Sept. 1972	75	115	Off C-site	Plankton	Entire	---	12 ±0.4	---	---
Sept. 1972	86	122	Off Kiriloff Pt.	Plankton	Entire	---	10 ±0.8	---	---

TABLE 7 (continued)

Collection Date	Δt^b	Specimen No.	Collection Site	Organism	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
						⁷ Be	⁴⁰ K	⁹⁵ Nb ^c	¹⁴⁴ Ce
April 1973	101	345	Duck Cove	Green sponge	Entire	1.9±0.9	9.8±1.7	---	0.39±0.19
April 1973	100	346	Sand Beach Cove	Green sponge	Entire	---	12 ±1.7	---	0.31±0.17
April 1973	88	348	Square Bay	Green sponge	Entire	---	10 ±1.7	---	0.43±0.18
April 1973	102	340	Constantine Hbr.	Mussel	Soft parts	---	13 ±0.6	---	---
Aug. 1973	63	459	Square Bay	Green sponge	Entire	1.3±0.5	9.3±1.5	---	0.26±0.15
Aug. 1973	68	460	Duck Cove	Green sponge	Entire	1.1±0.6	9.7±1.6	---	0.44±0.15
Aug. 1973 ^d	49	467	Rifle Range Pt.	Mussel	Soft parts	---	9.3±0.7	---	---
Aug. 1973 ^e	58	468	Rifle Range Pt.	Mussel	Shell	---	2.4±0.7	---	---

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. The time in days between the collection and counting of a sample.

c. Zirconium-95 and ⁹⁵Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.

d. This sample also had a ²²⁶Ra concentration of 0.28 pCi/g, dry.

e. This sample also had ²²⁶Ra and ⁶⁵Zn concentrations of 0.20 and 0.21 pCi/g, dry, respectively.

TABLE 8

Gamma-Emitting Radionuclides in Crab, Lithodes aequispina,
Collected at Amchitka Island

Collection Date	Specimen No.	Tissue	Grams Dry Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
				⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr- ⁹⁵ Nb	¹³⁷ Cs
October 1971	446	Muscle	16.8	0.4 ± 0.09	-----	2.6 ± 0.6	2.4 ± 0.4
" "	"	Eggs	15.0	-----	-----	-----	0.2 ± 0.1
" "	451	Muscle	25.1	0.3 ± 0.1	0.4 ± 0.30	0.3 ± 0.1	0.2 ± 0.1
" "	"	"Liver" ^b	13.4	-----	-----	0.4 ± 0.2	0.3 ± 0.1
" "	456	Muscle	27.0	0.28 ± 0.08	0.5 ± 0.30	0.3 ± 0.1	0.2 ± 0.1
" "	"	"Liver"	18.5	-----	0.4 ± 0.2	0.1 ± 0.1	-----
" "	"	Eggs	22.7	-----	-----	-----	-----
" "	"	Remainder	51.1	-----	-----	-----	-----
" "	462	Muscle	22.5	0.3 ± 0.1	-----	0.3 ± 0.1	0.2 ± 0.1
" "	"	Skeleton	40.0	0.31 ± 0.09	0.5 ± 0.3	0.4 ± 0.1	0.2 ± 0.1
" "	"	Remainder	23.9	-----	-----	-----	-----
" "	466	Muscle	17.0	-----	-----	-----	-----
" "	"	Eggs	21.1	-----	-----	-----	0.08 ± 0.07
" "	"	Skeleton	40.1	0.21 ± 0.07	0.5 ± 0.3	0.2 ± 0.1	0.16 ± 0.09
" "	476	Skeleton	40.5	-----	-----	-----	-----
" "	500	Muscle	28.5	-----	-----	-----	-----
" "	"	"Liver"	5.0	-----	-----	-----	-----
" "	"	Eggs	18.3	0.18 ± 0.07	-----	-----	-----
" "	"	Remainder	50.0	-----	-----	-----	-----

See footnotes at end of table.

TABLE 8 (continued)

Collection Date	Specimen No.	Tissue	Grams Dry Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
				⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr- ⁹⁵ Nb	¹³⁷ Cs
October 1971	506	Muscle	28.9	-----	-----	0.3 ± 0.1	-----
" "	"	Remainder	50.0	0.06 ± 0.05	-----	-----	-----
" "	515	Skeleton	47.9	0.13 ± 0.04	-----	0.14 ± 0.08	-----
Nov. 18, 1971 ^c	666	"Liver"	13.4	0.11 ± 0.09	0.6 ± 0.3	0.4 ± 0.2	-----
" " " ^c	670	"Liver"	23.8	0.12 ± 0.06	-----	0.2 ± 0.1	-----

42

a. The error values are two-sigma, propagated, counting errors for single samples. The dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. Hepatopancreas

c. Post-Cannikin

TABLE 9

 ^{137}Cs and ^{40}K in Marine Fish Collected Off Amchitka Island

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)		
					⁴⁰ K	¹³⁷ Cs	
Pre-Cannikin ^a							
May 1971	Constantine Harbor	Greenling (21-31)	19	Muscle	16 ± 0.7	0.37 ± 0.42	
May 1971	Constantine Harbor	Greenling (21-31)	19	Liver	10 ± 1.4	0.03 ± 0.04	
May 1971	Constantine Harbor	Greenling (21-31)	19	Bone	8.6 ± 1.3	---	
May 1971	Constantine Harbor	Greenling (21-31)	19	Stomach content	15 ± 2.1	0.17 ± 0.23	
May 1971	Constantine Harbor	Greenling (21-31)	19	Viscera	13 ± 0.7	0.15 ± 0.05	
May 1971	Constantine Harbor	Greenling (21-31)	19	Gonad	9.8 ± 1.7	0.04 ± 0.05	
May 1971	Constantine Harbor	Greenling (21-31)	19	Remainder	7.5 ± 0.4	0.06 ± 0.01	
May 1971	Sand Beach Cove	Greenling (23-31)	27	Muscle	15 ± 1.2	0.07 ± 0.02	

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
May 1971	Sand Beach Cove	Greenling (23-31)	27	Liver	12 ± 3.5	0.05 ± 0.09
May 1971	Sand Beach Cove	Greenling (23-31)	27	Bone	8 ± 1.2	0.04 ± 0.06
May 1971	Sand Beach Cove	Greenling (23-31)	27	Stomach content	13 ± 1.5	0.19 ± 0.17
May 1971	Sand Beach Cove	Greenling (23-31)	27	Viscera	13 ± 0.6	0.02 ± 0.02
May 1971	Sand Beach Cove	Greenling (23-31)	27	Gonad	9.7 ± 1.2	0.02 ± 0.03
May 1971	Sand Beach Cove	Greenling (23-31)	27	Remainder	8.7 ± 0.3	0.05 ± 0.04
Aug 1971	Bering Sea (Off C-site)	Halibut (67-123)	4	Muscle	18 ± 1.7	0.06 ± 0.08
Aug 1971	Bering Sea (Off C-site)	Halibut (67-123)	4	Liver	13 ± 5.9	0.27 ± 0.28

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Oct 1971	Bering Sea (51°30'N, 179°20'E)	Rattail (91)	3	Liver	1.3 ± 1.1	---
Oct 1971	Pacific Ocean ^b	Ocean Perch (19-29)	5	Liver	9.5 ± 1.1	0.05 ± 0.05
Oct 1971	Pacific Ocean ^b	Ocean Perch (19-29)	4	Muscle	14 ± 0.5	0.06 ± 0.04
Oct 1971	Pacific Ocean ^b	Ocean Perch (19-29)	2	Viscera	8.8 ± 1.2	0.06 ± 0.01
Oct 1971	Pacific Ocean ^b	Pacific Cod (47-70)	3	Liver	3.8 ± 0.1	---
Oct 1971	Pacific Ocean ^b	Pacific Cod (47-70)	2	Muscle	16 ± 0.6	0.04 ± 0.06
Oct 1971	Pacific Ocean ^b	Pollack (42-44)	3	Liver	3.1 ± 0.5	---
Oct 1971	Pacific Ocean ^b	Pollack (42-44)	3	Muscle	15 ± 0.5	0.10 ± 0.03

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)		
					⁴⁰ K	¹³⁷ Cs	
Post-Cannikin ^c							
Dec 1971	Constantine Harbor	Greenling (20-28)	10	Muscle	14 ± 0.4	0.06 ± 0.02	
Dec 1971	Constantine Harbor	Greenling (20-28)	10	Liver	13 ± 1.6	0.21 ± 0.12	
Feb 1972	Constantine Harbor	Greenling (29)	1	Muscle	14 ± 0.5	---	
Feb 1972	Constantine Harbor	Greenling (33)	1	Muscle	15 ± 0.6	0.06 ± 0.04	
Feb 1972	Constantine Harbor	Greenling (31)	1	Muscle	14 ± 0.5	0.05 ± 0.03	
Feb 1972	Constantine Harbor	Greenling (29)	1	Muscle	16 ± 0.9	0.11 ± 0.06	
April 1972	Constantine Harbor	Greenling (27)	1	Muscle	14 ± 0.8	---	
April 1972	Constantine Harbor	Greenling (27)	1	Muscle	15 ± 1.2	---	
April 1972	Constantine Harbor	Greenling (28)	1	Muscle	15 ± 0.6	---	

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
April 1972	Constantine Harbor	Greenling (29)	1	Muscle	14 ± 0.6	0.11 ± 0.04
April 1972	Constantine Harbor	Greenling (32)	1	Muscle	15 ± 0.5	0.05 ± 0.04
July 1972	Constantine Harbor	Greenling (26)	1	Muscle	12 ± 0.5	---
July 1972	Constantine Harbor	Greenling (27)	1	Muscle	15 ± 0.7	---
July 1972	Constantine Harbor	Greenling (26)	1	Muscle	17 ± 0.8	---
July 1972	Constantine Harbor	Greenling (29)	1	Muscle	14 ± 0.8	---
Oct 1972	Constantine Harbor	Greenling (24-33)	6	Muscle	17 ± 0.6	0.09 ± 0.04
April 1973	Constantine Harbor	Greenling (27-29)	5	Muscle	19 ± 0.6	0.09 ± 0.03
April 1973	Constantine Harbor	Greenling (27-29)	5	Liver	---	---
Aug 1973	Constantine Harbor	Greenling (23-26)	4	Muscle	15 ± 0.3	---

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Aug 1973	Constantine Harbor	Greenling (23-26)	4	Viscera	9.1 ± 0.6	---
Nov 1971	Sand Beach Cove	Greenling (30)	1	Muscle	12 ± 1.4	---
Nov 1971	Sand Beach Cove	Greenling (33)	1	Muscle	13 ± 1.1	---
Nov 1971	Sand Beach Cove	Greenling (32)	1	Muscle	16 ± 0.9	0.09 ± 0.06
Nov 1971	Sand Beach Cove	Greenling (32)	1	Muscle	14 ± 0.8	---
Feb 1972	Sand Beach Cove	Greenling (26)	1	Muscle	14 ± 0.7	0.08 ± 0.05
Feb 1972	Sand Beach Cove	Greenling (27)	1	Muscle	17 ± 1.1	---
Feb 1972	Sand Beach Cove	Greenling (28)	1	Muscle	15 ± 0.7	---
Feb 1972	Sand Beach Cove	Greenling (26)	1	Muscle	13 ± 0.7	---
April 1972	Sand Beach Cove	Greenling (25)	1	Muscle	15 ± 0.7	---

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
April 1972	Sand Beach Cove	Greenling (26)	1	Muscle	14 ± 0.5	0.07 ± 0.03
April 1972	Sand Beach Cove	Greenling (27)	1	Muscle	16 ± 0.6	---
April 1972	Sand Beach Cove	Greenling (27)	1	Muscle	14 ± 0.8	---
April 1972	Sand Beach Cove	Greenling (29)	1	Muscle	15 ± 0.8	---
July 1972	Sand Beach Cove	Greenling (17-27)	6	Muscle	18 ± 0.5	0.09 ± 0.03
July 1972	Sand Beach Cove	Greenling (17-27)	6	Liver	21 ± 2.9	---
Oct 1972	Sand Beach Cove	Greenling (18-29)	7	Muscle	16 ± 0.5	0.12 ± 0.03
April 1973	Sand Beach Cove	Greenling (21-29)	6	Muscle	18 ± 0.5	0.09 ± 0.03
April 1973	Sand Beach Cove	Greenling (21-29)	6	Liver	13 ± 0.6	---
Aug 1973	Sand Beach Cove	Greenling (22-33)	6	Muscle	16 ± 0.3	---

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Aug 1973	Sand Beach Cove	Greenling (22-33)	6	Viscera	11 ± 0.4	---
Feb 1972	Duck Cove	Greenling (29)	1	Muscle	17 ± 0.7	---
Feb 1972	Duck Cove	Greenling (28)	1	Muscle	14 ± 0.6	0.13 ± 0.04
April 1972	Duck Cove	Greenling (28)	1	Muscle	15 ± 0.5	---
April 1972	Duck Cove	Greenling (26)	1	Muscle	15 ± 0.6	0.05 ± 0.04
April 1972	Duck Cove	Greenling (28)	1	Muscle	15 ± 0.6	---
April 1972	Duck Cove	Greenling (30)	1	Muscle	16 ± 0.5	0.11 ± 0.03
April 1972	Duck Cove	Greenling (29)	1	Muscle	16 ± 0.5	0.05 ± 0.03
Oct 1972	Duck Cove	Greenling (21-29)	7	Muscle	17 ± 1.0	0.13 ± 0.06

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
April 1973	Duck Cove	Greenling (27-35)	4	Muscle	17 ± 0.4	0.07 ± 0.02
April 1973	Duck Cove	Greenling (27-35)	4	Liver	---	---
Aug 1973	Duck Cove	Greenling (22-30)	4	Muscle	13 ± 0.5	0.08 ± 0.03
Aug 1973	Duck Cove	Greenling (22-30)	4	Viscera	12 ± 0.5	0.13 ± 0.03
Nov 1971	Bering Sea (Off C-site)	Halibut (33)	1	Muscle	19 ± 1.1	---
Nov 1971	Bering Sea (Off C-site)	Halibut (49)	1	Muscle	19 ± 0.7	0.08 ± 0.04
Nov 1971	Bering Sea (Off C-site)	Halibut (49)	1	Liver	5.8 ± 1.0	---
Nov 1971	Pacific Ocean (Off C-site)	Halibut	1	Muscle	19 ± 0.9	0.18 ± 0.06
Sept 1972	Bering Sea (Off C-site)	Halibut (119)	1	Muscle	16 ± 1.0	---
Sept 1972	Bering Sea (Off C-site)	Halibut (119)	1	Testes	28 ± 1.1	0.09 ± 0.06

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Sept 1972	Bering Sea (Off C-site)	Halibut (119)	1	Liver	4.1 ± 1.6	---
Sept 1972	Bering Sea (Off C-site)	Halibut (119)	1	Bone	3.5 ± 0.5	---
Sept 1972	Bering Sea (Off C-site)	Halibut (123)	1	Muscle	16 ± 1.0	0.06 ± 0.05
Sept 1972	Bering Sea (Off C-site)	Halibut (123)	1	Testes	28 ± 1.0	---
Sept 1972	Bering Sea (Off C-site)	Halibut (123)	1	Liver	4.8 ± 1.0	---
Sept 1972	Bering Sea (Off C-site)	Halibut (123)	1	Bone	7.9 ± 1.3	---
Sept 1972	Bering Sea (Off C-site)	Halibut (150)	1	Muscle	15 ± 0.9	---
Sept 1972	Bering Sea (Off C-site)	Halibut (150)	1	Liver	7.9 ± 1.7	---
Sept 1972	Bering Sea (Off C-site)	Halibut (150)	1	Ovary	6.4 ± 0.9	---
Sept 1972	Bering Sea (Off C-site)	Halibut (150)	1	Bone	7.2 ± 1.5	---

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Sept 1972	Bering Sea (Off C-site)	Halibut (126)	1	Muscle	18 ± 0.9	---
Sept 1972	Bering Sea (Off C-site)	Halibut (126)	1	Ovary	26 ± 1.2	0.17 ± 0.09
Sept 1972	Bering Sea (Off C-site)	Halibut (126)	1	Liver	9.5 ± 0.4	---
Sept 1972	Bering Sea (Off C-site)	Halibut (126)	1	Bone	7.4 ± 1.2	---
Sept 1972	Bering Sea (Off C-site)	Halibut (100)	1	Muscle	15 ± 1.1	---
Sept 1972	Bering Sea (Off C-site)	Halibut (100)	1	Liver	8.6 ± 0.8	---
Sept 1972	Bering Sea (Off C-site)	Halibut (100)	1	Bone	8.7 ± 1.5	---
Sept 1972	Bering Sea (Off C-site)	Halibut (99)	1	Muscle	18 ± 1.2	---
Sept 1972	Bering Sea (Off C-site)	Halibut (99)	1	Liver	8.4 ± 0.5	---
Sept 1972	Bering Sea (Off C-site)	Halibut (99)	1	Ovary	33 ± 3.2	0.36 ± 0.25

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Sept 1972	Bering Sea (Off C-site)	Halibut (99)	1	Bone	12 ± 2.3	---
Sept 1972	Bering Sea (Off C-site)	Halibut (87)	1	Muscle	15 ± 0.8	---
Sept 1972	Bering Sea (Off C-site)	Halibut (87)	1	Liver	4.4 ± 2.3	---
Sept 1972	Bering Sea (Off C-site)	Halibut (87)	1	Ovary	30 ± 8.4	---
Sept 1972	Bering Sea (Off C-site)	Halibut (87)	1	Bone	12 ± 2.3	---
Aug 1973	Bering Sea (Off C-site)	Halibut (65)	1	Muscle	20 ± 0.6	0.09 ± 0.03
Aug 1973	Bering Sea (Off C-site)	Halibut (65)	1	Liver	4.7 ± 0.6	---
Aug 1973	Bering Sea (Off C-site)	Halibut (99)	1	Muscle	18 ± 0.5	0.12 ± 0.03
Aug 1973	Bering Sea (Off C-site)	Halibut (99)	1	Liver	8.1 ± 0.6	0.08 ± 0.05
Aug 1973	Bering Sea (Off C-site)	Halibut (116)	1	Muscle	18 ± 0.7	0.08 ± 0.04

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Aug 1973	Bering Sea (Off C-site)	Halibut (116)	1	Liver	7.1 ± 0.4	0.04 ± 0.02
Aug 1973	Bering Sea (Off C-site)	Halibut (126)	1	Muscle	17 ± 0.5	0.10 ± 0.03
Aug 1973	Bering Sea (Off C-site)	Halibut (126)	1	Liver	7.3 ± 0.7	0.10 ± 0.05
Aug 1973	Bering Sea (Off C-site)	Halibut (126)	1	Gonad	8.7 ± 0.5	0.07 ± 0.03
Aug 1973	Bering Sea (Off C-site)	Halibut (147)	1	Muscle	18 ± 0.6	0.14 ± 0.04
Aug 1973	Bering Sea (Off C-site)	Halibut (147)	1	Liver	7.3 ± 0.7	---
Aug 1973	Bering Sea (Off C-site)	Halibut (147)	1	Gonad	24 ± 1.0	0.17 ± 0.07
Aug 1972	Bering Sea (Off C-site)	Pacific Cod (32-39)	4	Muscle	18 ± 0.9	0.07 ± 0.05
Aug 1972	Bering Sea (Off C-site)	Pacific Cod (32-39)	4	Liver	12 ± 1.0	0.08 ± 0.07
Aug 1972	Bering Sea (Off C-site)	Pacific Cod (32-39)	4	Bone	11 ± 0.7	0.07 ± 0.05

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Aug 1972	Off St. Makarius Point	Pacific Cod (44)	1	Muscle	17 ± 1.8	---
Aug 1972	Off St. Makarius Point	Pacific Cod (44)	1	Liver	8.1 ± 2.7	---
Aug 1972	Off St. Makarius Point	Pacific Cod (48)	1	Muscle	17 ± 0.5	0.10 ± 0.03
Aug 1972	Off St. Makarius Point	Pacific Cod (48)	1	Liver	13 ± 1.8	---
Aug 1972	Off St. Makarius Point	Pacific Cod (44-47)	4	Muscle	17 ± 0.9	---
Aug 1972	Off St. Makarius Point	Pacific Cod (44-47)	4	Liver	9.2 ± 1.5	---
Aug 1972	Off Kirilof Pt.	Walleye Pollock (37)	1	Muscle	16 ± 0.5	0.06 ± 0.03
Aug 1972	Off Kirilof Pt.	Walleye Pollock (37)	1	Viscera	16 ± 3.9	---
Aug 1972	Off Kirilof Pt.	Walleye Pollock (37)	1	Remainder	10 ± 0.4	0.08 ± 0.03
Aug 1972	Off Kirilof Pt.	Walleye Pollock (38-48)	10	Muscle	12 ± 0.04	0.04 ± 0.02

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Nov 1971	Bering Sea	Lantern Fish (4-10)	35	Entire	6.3 ± 0.5	0.06 ± 0.04
Aug 1972	Off Kirilof Pt.	Lantern Fish (7-10)	40	Eviscerated Whole	6.3 ± 0.4	---
Aug 1972	Off Kirilof Pt.	Lantern Fish (7-10)	40	Viscera	4.8 ± 0.4	---
Nov 1971	Bering Sea	Smelt (12-14)	5	Entire	11 ± 1.8	---
Aug 1972	Off Kirilof Pt.	Smelt (12-14)	5	Eviscerated whole	7.7 ± 0.7	0.10 ± 0.05
Nov 1971	Pacific Ocean ^d	Rock Sole (30)	1	Muscle	18 ± 0.9	---
Nov 1971	Pacific Ocean ^d	Rock Sole (29)	1	Muscle	15 ± 0.7	---
Nov 1971	Pacific Ocean ^d	Rock Sole (32)	1	Muscle	18 ± 0.8	---
Nov 1971	Pacific Ocean ^d	Rock Sole (36)	1	Muscle	17 ± 0.7	0.11 ± 0.05
Nov 1971	Pacific Ocean ^d	Rock Sole (30-33)	5	Muscle	15 ± 0.8	0.09 ± 0.05

See footnotes at end of table.

TABLE 9 (continued)

Period and Collection Date	Collection Site	Common Name (size cm)	No. of Fish	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Aug 1972	Bering Sea (Off C-site)	Rock Sole (15-25)	10	Muscle	13 ± 0.6	---
Aug 1972	Bering Sea (Off C-site)	Rock Sole (15-25)	10	Liver	15 ± 3.6	---
Aug 1972	Bering Sea (Off C-site)	Rock Sole (15-25)	10	Bone	9.1 ± 1.0	---
Sept 1972	Bering Sea (Off Bat Island)	Rock Sole (19-31)	5	Muscle	15 ± 0.3	0.06 ± 0.02
Sept 1972	Bering Sea (Off Bat Island)	Rock Sole (19-31)	5	Liver	20 ± 3.0	0.24 ± 0.21
Sept 1972	Bering Sea (Off Bat Island)	Rock Sole (19-31)	5	Bone	8.0 ± 0.8	---

- a. Pre-Cannikin ⁴⁰K and ¹³⁷Cs values are given as the mean ± SD. The dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- b. These fish were caught within the area bounded by 179°9'E to 179°21'E longitude and 51°14'N to 51°15.5'N latitude in the Pacific Ocean off Amchitka.
- c. Post-Cannikin error values are two-sigma, propagated, counting errors for single samples.
- d. These fish were caught within the area bounded by 179°9'E to 179°21'E longitude and 51°14'N to 51°15.5'N latitude in the Pacific Ocean off Amchitka.

TABLE 10

 ^{137}Cs and ^{40}K in Salmon Collected in the Bering Sea off Amchitka Island^a

Collection Date	Common Name	No. of Fish	Fish Size (cm)	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry) ^b	
					⁴⁰ K	¹³⁷ Cs
Post-Cannikin						
Nov 1971 ^c	Sockeye	7	37-51	Muscle	13 ± 1.1	0.04 ± 0.03
Nov 1971 ^c	Sockeye	4	37-44	Liver	10 ± 1.1	0.27 ± 0.08
Aug 1972	Chum	1	67	Muscle	11 ± 0.9	---
Aug 1972	Chum	1	63	Muscle	12 ± 0.9	---
Aug 1972	Pink	1	44	Muscle	14 ± 1.0	---
Aug 1972	Pink	1	43	Muscle	13 ± 1.1	---
Aug 1972	Pink	1	43	Muscle	11 ± 1.0	---
Aug 1972	Pink	1	43	Muscle	12 ± 1.0	---
Aug 1972	Pink	1	43	Muscle	21 ± 2.2	---
Aug 1972	Pink	1	48	Muscle	13 ± 1.0	---
Aug 1972	Pink	1	40	Muscle	15 ± 1.0	---
Aug 1972	Pink	1	40	Muscle	13 ± 1.2	---

See footnotes at end of table.

TABLE 10 (continued)

Statistic	Common Name	No. of Fish	Fish Size (cm)	Tissue	Gamma-Emitting Radionuclides (pCi/g, dry)	
					⁴⁰ K	¹³⁷ Cs
Summary of September 1971 Pre-Cannikin Data						
Range	Chum	29	37-75	Muscle	8 - 14	NS - 0.12
Range	Chum	29	37-75	Liver	7 - 12	NS - 0.23
Range	Chum	2	38-55	Ovary	3.1 - 4.6	NS - 0.10
Range	Chinook	2	68-78	Muscle	7.6 - 11	NS - 0.05
Mean ± SD ^b	Chum	29	37-75	Muscle	11 ± 1.7	0.04 ± 0.03
Mean ± SD ^b	Chum	29	37-75	Liver	9.8 ± 1.8	0.10 ± 0.08
Mean ± SD ^b	Chum	2	38-55	Ovary	3.9 ± 1.1	0.05 ± 0.06
Mean ± SD ^b	Chum	1	67	Testes	25 ± 1.6	---
Mean ± SD ^b	Chinook	2	68-78	Muscle	9.3 ± 2.4	0.03 ± 0.03
Mean ± SD ^b	Chinook	1	78	Liver	10 ± 1	0.11 ± 0.07
Mean ± SD ^b	Pink	1	57	Muscle	15 ± 0.8	0.10 ± 0.05
Mean ± SD ^b	Pink	1	57	Testes	11 ± 1.4	---

See footnotes at end of table.

TABLE 10 (continued)

- a. All salmon were collected in the Bering Sea with the exception of one Chinook salmon which was from the Pacific side of Amchitka.
- b. The error values for single fish are two-sigma, propagated counting errors. The dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- c. The values for November 1971 sockeye are the mean $\pm$ SD.

TABLE 11

Iron-55 Specific Activity Values in Fish Collected
at Amchitka Island

Species	N	September - October 1969			Sept. - Oct. 1970		
		⁵⁵ Fe (pCi)	Fe (mg)	⁵⁵ Fe (pCi)	N ^a	⁵⁵ Fe (pCi)	
		g, Dry	g, Dry	mg Fe		g, Dry	mg Fe
Pre-Cannikin							
Halibut							
Muscle	1	0.31	0.031	10.1	1/26	0.117	12.7
Liver	-	-	-	-	2/27	2.48	13.4
Greenling							
Muscle	-	-	-	-	5/60	0.559	13.2
Liver	-	-	-	-	5/60	8.33	14.3
Kidney	-	-	-	-	4/45	13.2	28.1
Gonad	-	-	-	-	4/55	12.5	45.4
Pacific Ocean Perch (1969); rockfish (1970)							
Muscle	1	3.55	0.014	254	2/11	1.84	173
Liver	1	66.8	0.31	216	2/11	16.9	41.4
Kidney	-	-	-	-	2/11	21.0	65.5
Dolly Varden							
Muscle	11	0.19 ± 0.19	0.025 ± 0.007	7.82 ± 9.01	2/22	1.63	91.3 _b
Liver	7	10.8 ± 14.6	0.71 ± 0.30	16.3 ± 20.3	2/22	3.70	78.4 _b
Pink Salmon							
Muscle	2	6.70 ± 4.29	0.074 ± 0.051	93.1 ± 6.6	-	-	-
Liver	2	58.8 ± 8.0	0.59 ± 0.03	99.6 ± 9.1	1/1	55	65.1
Silver Salmon							
Muscle	1	1.60	0.048	33.5	-	-	-
Liver	1	18.1	0.19	95.1	1/1	21.1	83.8
Chum Salmon							
Muscle	7	1.64 ± 1.22	0.026 ± 0.008	59.8 ± 28.5	-	-	-
Liver	7	71.8 ± 45.2	0.68 ± 0.24	100 ± 31	-	-	-
Sockeye Salmon							
Muscle	5	1.31 ± 0.45	0.023 ± 0.004	58.0 ± 22.4	-	-	-
Liver	6	76.8 ± 25.6	0.85 ± 0.41	102 ± 36	-	-	-
Rock Sole (1969); sole (1970)							
Muscle	3	0.12 ± 0.02	0.015 ± 0.007	9.71 ± 4.61	2/46	1.76	185
Liver	3	7.04 ± 2.20	0.20 ± 0.003	33.6 ± 10.3	1/26	1.41	4.95
Kidney	-	-	-	-	1/26	16.1	45.7
Gonad	-	-	-	-	1/26	23.2	516
Alaska Pollock							
Muscle	2	0.90 ± 0.25	0.013 ± 0.000	71.8 ± 21.8	-	-	-
Pacific Cod							
Muscle	7	0.69 ± 0.52	0.012 ± 0.006	69.5 ± 55.3	-	-	-
Liver	6	5.64 ± 5.81	0.10 ± 0.06	71.8 ± 86.8	-	-	-

See footnotes at end of table.

TABLE 11 (continued)

		August - October 1972		
Species	Location	⁵⁵ Fe (pCi)	Fe (mg)	⁵⁵ Fe (pCi)
		g, Dry	g, Dry	mg Fe
Post-Cannikin ^c				
Chum Salmon				
Muscle	Off Kirilof Pt.	0.45 ± 0.02	.025	18.0
Muscle	" " "	0.56 ± 0.03	.026	21.5
Liver	" " "	7.1	.31	22.9
Pink Salmon				
Muscle	Midden Cove	0.54 ± 0.02	.029	18.6
Muscle	" "	1.06 ± 0.02	.051	20.8
Muscle	" "	0.39 ± 0.02	.024	16.2
Muscle	" "	0.46 ± 0.04	.032	14.4
Liver	" "	14.5 ± 0.1	.678	21.4
Dolly Varden				
Muscle	DE-45 Lake	0.49 ± 0.10	.039	12.6
Muscle	" "	0.23 ± 0.02	.042	5.5
Greenling				
Muscle	Constantine Harbor	0.05 ± 0.02	.029	1.72
Muscle	Sand Beach Cove	0.17 ± 0.02	.018	.94
Muscle	Duck Cove	0.04 ± 0.01	.053	.75
Halibut				
Muscle	Sand Beach Cove	0.35 ± 0.02	.051	6.86
Liver	" " "	3.07 ± 0.08	.099	31.0
Muscle	Off Kirilof Pt.	0.36 ± 0.02	.034	10.6
Liver	" " "	3.07 ± 0.06	.146	21.0
Pacific Cod				
Muscle	Off St. Makarius Pt.	0.05 ± 0.02	.055	0.91
Muscle	" " " "	0.11 ± 0.02	.021	5.24

TABLE 11 (continued)

		April - August 1973 ^d		
Species	Location	⁵⁵ Fe (pCi)	Fe (mg)	⁵⁵ Fe (pCi)
		g, Dry	g, Dry	mg Fe
Post-Cannikin ^c				
Greenling				
Muscle	Sand Beach Cove	0.051± 0.008	0.018	2.8
Liver	" " "	0.51 ± 0.06	0.83	0.61
Muscle	Constantine Harbor	0.049± 0.007	0.029	1.7
Liver	" "	3.1 ± 0.22	2.7	1.1
Muscle	Duck Cove	0.022± 0.007	0.029	0.76
Liver	" "	0.62 ± 0.09	1.3	0.48
Halibut				
Muscle	Off Sand Beach Cove	0.014± 0.008	0.014	1.0
Liver	" " " "	0.28 ± 0.04	0.073	3.8
Muscle	" " " "	0.16 ± 0.01	0.037	4.3
Liver	" " " "	0.80 ± 0.02	0.12	6.7
Ovary	" " " "	0.66 ± 0.01	0.075	8.8
Dolly Varden				
Muscle	Silver Salmon Outlet	0.049± 0.011	0.031	1.6
Liver	Silver Salmon Outlet	2.1 ± 0.1	1.1	1.9

- a. Number of pooled samples/total number of fish in all samples.
- b. N equals 1/4. No stable Fe value for 18 fish in one pooled sample.
- c. Single samples.
- d. Greenling samples were collected in April. All other samples are from August.

TABLE 12
Iron-55 Specific Activity Values in Canned Salmon from the
Bristol Bay Pack

Species	N	⁵⁵ Fe (pCi/g, dry)		pCi ⁵⁵ Fe/mg Fe	
		Range	Mean ± SD	Range	Mean ± SD
1971 Pack ^a					
Sockeye	14	0.61 - 1.34	0.98 ± 0.23	16.7 - 35.6	26.8 ± 5.9
Chinook	8	0.45 - 1.05	0.65 ± 0.20	15.2 - 28.4	22.8 ± 4.0
Chum	9	0.71 - 1.58	1.21 ± 0.23	21.9 - 37.0	31.9 ± 4.9
All Species	31	0.45 - 1.58	0.96 ± 0.30	15.2 - 37.0	27.3 ± 6.1

Species	Location	⁵⁵ Fe (pCi) g, Dry	Fe (mg) g, Dry	⁵⁵ Fe (pCi) mg Fe
1972 Pack ^b				
Sockeye	Egegik	0.69	0.035	19.7
"	Nushagak	1.22	0.049	24.9
"	Togiak	0.83	0.032	25.9
Chinook	Nushagak	3.68	0.029	127
"	Togiak	0.66	0.027	24.4
Chum	Nushagak	0.76	0.030	25.3
"	Togiak	1.03	0.042	24.5
"	Naknek	1.30	0.025	52.0

a. Ugashik, Egegik, Naknek, Nushagak, and Togiak.

b. Single samples.

TABLE 13

Some Gamma-Emitting Radionuclides in Birds Collected at Amchitka Island

Collection Date	Common Name	Tissue	No. of Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a			
				⁴⁰ K	⁶⁰ Co	¹³⁷ Cs	
Pre-Cannikin							
June 1971	Herring Gull	Liver	1	7.7 ± 1.1	---	---	
June 1971	Herring Gull	Muscle	1	8.3 ± 0.6	---	0.09 ± 0.05	
June 1971	Tufted Puffin	Liver	1	7.2 ± 1.8	---	---	
June 1971	Tufted Puffin	Muscle	1	11 ± 0.7	0.10 ± 0.05	---	
June 1971	Murre	Liver	1	7.6 ± 1.4	---	---	
June 1971	Murre	Muscle	1	11 ± 0.5	0.03 ± 0.03	---	
Dec 1971	Rock Ptarmigan	Muscle	1	9.9 ± 0.8	---	0.65 ± 0.05	
Post-Cannikin							
Feb 1972	Rock Ptarmigan	Muscle	1	13 ± 0.5	---	0.73 ± 0.03	
Feb 1972	Rock Ptarmigan	Muscle	1	11 ± 0.7	---	0.72 ± 0.05	
Feb 1972	Rock Ptarmigan	Feathers	1	0.6 ± 0.5	---	0.14 ± 0.04	
Feb 1973	Rock Ptarmigan	Muscle	1	12 ± 0.7	---	0.38 ± 0.05	
Feb 1973	Rock Ptarmigan	Muscle	1	11 ± 0.8	---	0.64 ± 0.06	
April 1973	Rock Ptarmigan	Muscle	1	12 ± 0.7	---	0.76 ± 0.05	
Aug 1973	Rock Ptarmigan	Muscle	1	10 ± 0.7	---	0.18 ± 0.04	

See footnote at end of table.

TABLE 13 (continued)

Collection Date	Common Name	Tissue	No. of Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a		
				⁴⁰ K	⁶⁰ Co	¹³⁷ Cs
Sept 1973	Rock Ptarmigan	Muscle	1	11 ± 0.8	---	0.21 ± 0.06
Feb 1972	Herring Gull	Feathers	1	0.5 ± 0.2	---	0.02 ± 0.01
Feb 1972	Herring Gull	Muscle	1	10 ± 0.7	---	0.06 ± 0.05
Feb 1972	Herring Gull	Liver	1	8.1 ± 0.9	---	---
Feb 1972	Herring Gull	Feathers	1	0.3 ± 0.2	---	2.1 ± 0.03
Feb 1972	Herring Gull	Muscle	1	9.9 ± 0.7	---	0.08 ± 0.06
Feb 1972	Herring Gull	Liver	1	7.8 ± 0.7	---	0.09 ± 0.04
Jan 1973	Emperor Goose	Muscle	1	13 ± 0.6	---	0.04 ± 0.03
Jan 1973	Emperor Goose	Liver	1	9.0 ± 0.9	---	---
April 1973	Emperor Goose	Muscle	1	13 ± 0.4	---	---
April 1973	Emperor Goose	Liver	1	10 ± 0.8	---	---
April 1973	Emperor Goose	Muscle	1	12 ± 0.4	---	---
April 1973	Emperor Goose	Liver	1	8.3 ± 0.7	0.07 ± 0.05	---
Jan 1973	Goldeneye	Muscle	1	11 ± 0.3	---	0.38 ± 0.02
Jan 1973	Goldeneye	Liver	1	7.7 ± 0.6	---	1.2 ± 0.04

See footnote at end of table.

TABLE 13 (continued)

Collection Date	Common Name	Tissue	No. of Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a		
				⁴⁰ K	⁶⁰ Co	¹³⁷ Cs
Feb 1973	Oyster Catcher	Muscle	1	13 ± 0.5	---	---
Feb 1973	Oyster Catcher	Liver	1	---	---	---

Statistic	Common Name	Tissue	No. of Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a		
				⁴⁰ K	⁶⁰ Co	¹³⁷ Cs
Summary of Pre-Cannikin Data Between December 1970 and April 1971						
Range	Rock Ptarmigan	Liver	1	---	---	---
Range	Rock Ptarmigan	Muscle	4	11 - 12	---	0.26 - 1.7
Range	Rock Ptarmigan	Bone	1	2.6	0.09	0.17
Range	Rock Ptarmigan	Feathers	4	NS - 1.5	NS - 0.23	0.12 - 0.28
Mean ± SD	Rock Ptarmigan	Liver	1	---	---	---
Mean ± SD	Rock Ptarmigan	Muscle	4	11 ± 0.5	---	1.0 ± 0.6
Mean ± SD	Rock Ptarmigan	Bone	1	2.6 ± 1.1	0.09 ± 0.07	0.17 ± 0.08
Mean ± SD	Rock Ptarmigan	Feathers	4	1.0 ± 0.7	0.09 ± 0.10	0.17 ± 0.07

a. These single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

TABLE 14

Efficiency of a Filter and Sorption Bed System for Collection of $^{95}\text{Zr} + ^{95}\text{Nb}$
from Seawater and Pond Water at Amchitka Island, August 1971

Location	Liter Sampled	Filter and Sorption Bed System ^a (pCi/liter) ^b				Collection Efficiency of Al ₂ O ₃ (pCi/liter) ^b (1-B/A) ^c
		System A		System B		
		Filter	Al ₂ O ₃	Filter	Al ₂ O ₃	
Constantine ^c Harbor Dock (Station 1)	1395	0.0038 ± 0.0016	0.052 ± 0.0074	Background	0.0094 ± 0.0050	0.82 ± 0.10
"	"	0.0038 ± 0.0012	0.044 ± 0.0080	"	0.0137 ± 0.0088	0.69 ± 0.21
51°27.6' North 179°13.0' East (Station 2)	1786	0.0044 ± 0.0014	0.064 ± 0.0048	"	0.024 ± 0.0064	0.63 ± 0.10
51°26.6' North 179°14.3' East (Station 3)	2832	0.0038 ± 0.0006	0.040 ± 0.0024	"	0.0171 ± 0.0036	0.57 ± 0.09
Long Shot Mud Pit 1	63	4.7 ± 0.10	Background	"	Background	-----

a. Systems A and B were connected in series with the water flowing first through System A, then through System B.

b. The error values are two-sigma, propagated, counting errors for single samples.

c. Samples collected the morning and afternoon of the same day.

TABLE 15

Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed
System from Intertidal Areas of Amchitka Island

Location and Date	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter) ^a					
				⁷ Be	⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Post-Cannikin									
Constantine Harbor									
Dec 1971	27	524	Part.	---	---	---	0.005±.004	0.013±.009	---
Dec 1971	32	524	Sol.	0.49 ±0.48	---	---	---	---	0.09 ±0.03
Feb 1972	35	1190	Part.	---	---	---	0.002±.001	0.004±.003	0.004±0.002
Feb 1972	38	1190	Sol.	0.19 ±0.16	---	0.036±.032	---	---	---
April 1972	38	1520	Part.	---	---	0.006±.004	---	---	---
April 1972 ^e	26	1520	Sol.	---	---	0.035±.028	0.009±.008	0.021±.020	---
July 1972 ^e	23	341	Part.	---	---	---	---	---	---
July 1972 ^e	21	341	Sol.	---	---	---	---	---	---
Sept 1972 ^e	102	83	Part.	---	---	---	---	---	---
Sept 1972 ^e	123	83	Sol.	---	---	---	---	---	---
April 1973 ^e	179	1332	Part.	---	---	---	---	---	---
April 1973 ^e	180	1332	Sol.	---	---	---	---	---	---
Aug 1973 ^e	74	1223	Part.	---	---	---	---	---	---
Aug 1973 ^e	50	1223	Sol.	---	---	---	---	---	---
Duck Cove									
May 1971	6	931	Part.	0.035±0.022	---	---	0.007±.002	0.016±.004	---
May 1971	7	931	Sol.	---	---	---	---	---	---
Nov 1971	35	391	Part.	---	---	---	---	---	---
Nov 1971 ^f	35	391	Sol.	---	---	0.008±.007	0.003±.002	0.006±.005	---
Nov 1971 ^f	13	420	Part.	---	---	---	---	---	0.021±0.020
Nov 1971 ^f	11	420	Sol.	---	---	---	---	---	---
Dec 1971	24	380	Part.	---	---	---	---	---	0.007±0.006
Dec 1971	10	380	Sol.	---	---	0.035±.027	0.013±.012	0.027±.024	---
Feb 1972	32	353	Part.	0.19 ±0.09	---	---	0.006±.002	0.013±.005	---
Feb 1972	18	353	Sol.	---	---	---	---	---	---

See footnotes at end of table.

TABLE 15 (Continued)

Location and Date	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter) ^a					
				⁷ Be	⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Duck Cove (Cont.)									
April 1972	27	513	Part.	---	---	0.018±.013	---	---	---
April 1972	27	513	Sol.	---	---	---	---	---	---
July 1972 ^e	34	44	Part.	---	---	---	---	---	---
July 1972 ^e	41	44	Sol.	---	---	---	---	---	---
Sept 1972 ^e	109	121	Part.	---	---	---	---	---	---
Sept 1972 ^e	127	121	Sol.	---	---	---	---	---	---
April 1973 ^e	179	937	Part.	---	---	---	---	---	---
April 1973 ^e	180	937	Sol.	---	---	---	---	---	---
Aug 1973 ^e	76	150	Part.	---	---	---	---	---	---
Aug 1973 ^e	56	150	Sol.	---	---	---	---	---	---
Sand Beach Cove									
Nov 1971 ^f	23	566	Part.	---	---	---	---	---	0.008±0.004
Nov 1971 ^f	17	566	Sol.	---	---	---	---	---	---
Dec 1971	19	479	Part.	---	0.007±.003	---	---	---	---
Dec 1971	9	479	Sol.	---	---	0.11 ±.09	---	---	---
Feb 1972	33	832	Part.	---	---	---	---	---	0.008±0.003
Feb 1972	34	832	Sol.	0.43±0.22	0.013±.010	---	---	---	---
April 1972	14	589	Part.	---	---	---	0.013±.005	0.028±.008	---
April 1972	18	589	Sol.	---	---	0.12 ±.08	---	---	0.017±0.007
July 1972 ^e	30	352	Part.	---	---	---	0.01 ±.01	0.02 ±.01	---
July 1972 ^e	18	352	Sol.	---	---	---	---	---	---
Sept 1972 ^e	105	145	Part.	---	---	---	---	---	---
Sept 1972 ^e	130	145	Sol.	---	---	---	---	---	---
April 1973 ^e	189	242	Part.	---	---	---	---	---	---
April 1973 ^e	181	242	Sol.	---	---	---	---	---	---
Aug 1973 ^e	64	681	Part.	---	---	---	---	---	---
Aug 1973 ^e	63	681	Sol.	---	---	---	---	---	---

See footnotes at end of table.

TABLE 15 (Continued)

Statistic	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter)					
				⁷ Be	⁶⁰ Co	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Summary of Pre-Cannikin Data Collected in Constantine Harbor ^g									
Range	7-139	950-5,974	Part.	NS-0.63	NS-0.09	NS-0.12	NS-0.006	NS-0.012	NS-0.004
Range	8-222	950-5,974	Sol.	NS-2.4	NS- .11	NS-1.4	NS-0.02	NS-0.04	NS-0.11
Mean $\pm$ SD	54	2,590	Part.	0.009 $\pm$ 0.011	0.013 $\pm$ 0.030	0.019 $\pm$ 0.040	0.002 $\pm$ 0.008	0.006 $\pm$ 0.007	0.001 $\pm$ 0.001
Mean $\pm$ SD	64	2,590	Sol.	0.38 $\pm$ 0.81	0.018 $\pm$ 0.037	0.20 $\pm$ 0.47	0.003 $\pm$ 0.017	0.012 $\pm$ 0.015	0.002 $\pm$ 0.035

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. The time in days between the collection and counting of a sample.

72 c. Part. (particulate)--that portion retained by the 0.3 micron porosity filter.
Sol. (soluble)--that portion which passes through the 0.3 micron filter and is absorbed by the Al₂O₃.
Traces of ⁶⁰Co, ¹⁰³Ru, ¹⁰⁶Ru-¹⁰⁶Rh, and ¹⁴⁴Ce-¹⁴⁴Pr were also identified in some samples, but quantitative determinations have not been made.

d. Zirconium-95 and ⁹⁵Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.

e. Sample counted on a Ge(Li) detector. All other samples were counted on a NaI detector.

f. Post-Cannikin

g. Ten samples of each fraction were taken between September 1970 and November 1971.

TABLE 16

Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed
System from Lakes on Amchitka Island

Location and Date	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (cPi/liter) ^a				
				⁷ Be	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Post-Cannikin								
Jones Lake								
Dec 1971	49	277	Part.	0.4 ±0.1	---	---	---	0.02 ±0.01
Dec 1971	77	277	Sol.	6.4 ±3.6	---	0.34±0.16	0.75±0.34	0.23 ±0.20
Feb 1972	34	109	Part.	0.7 ±0.4	---	0.02±0.01	0.04±0.02	---
Feb 1972	47	109	Sol.	---	0.03±0.01	0.02±0.01	0.03±0.01	---
April 1972	29	251	Part.	---	0.03±0.02	0.02±0.01	0.05±0.03	---
April 1972	28	251	Sol.	---	---	---	---	---
July 1972 ^e	24	79	Part.	---	---	---	---	---
July 1972 ^e	47	79	Sol.	---	---	---	---	---
Sept 1972 ^e	102	53	Part.	---	---	---	---	---
Sept 1972 ^e	125	53	Sol.	---	---	---	---	---
April 1973 ^e	177	151	Part.	---	---	---	---	0.052±0.017
April 1973 ^e	178	151	Sol.	---	---	---	---	---
Aug 1973 ^e	67	193	Part.	---	---	---	---	0.031±0.008
Aug 1973 ^e	56	193	Sol.	---	---	---	---	---
Lake DK-45								
Nov 1971 ^f	---	201	Part.	Data missing				
Nov 1971 ^f	---	201	Sol.	Data missing				
Dec 1971	17	98	Part.	0.43±0.35	---	0.01±0.01	0.02±0.01	---
Dec 1971	15	98	Sol.	---	---	---	---	---
Feb 1972	30	375	Part.	0.36±0.14	---	0.02±0.01	0.05±0.01	0.02 ±0.01
Feb 1972	17	375	Sol.	20. ±7.8	---	---	---	---
April 1972	28	152	Part.	---	0.06±0.04	0.11±0.03	0.23±0.07	0.35 ±0.02
April 1972	20	152	Sol.	---	0.50±0.21	---	---	---

See footnotes at end of table.

TABLE 16 (Continued)

Location and Date	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (cPi/liter) ^a				
				⁷ Be	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Lake DK-45 (cont)								
July 1972 ^e	24	79	Part.	---	---	0.22±0.05	0.47±0.13	---
July 1972 ^e	48	79	Sol.	---	---	---	---	---
Oct 1972 ^e	107	38	Part.	---	---	---	---	---
Oct 1972 ^e	124	38	Sol.	---	---	---	---	---
April 1973 ^e	191	114	Part.	---	---	---	---	0.11 ±0.025
April 1973 ^e	182	114	Sol.	---	---	---	---	---
Aug 1973 ^e	74	106	Part.	---	---	---	---	0.038±0.015
Aug 1973 ^e	63	106	Sol.	---	---	---	---	---
Cannikin Lake								
Feb 1972	68	8	Part.	---	---	0.33±0.14	0.68±0.29	---
April 1972 ^e	88	10	Part.	---	---	---	---	---
April 1973 ^e	174	72	Part.	---	---	---	---	0.080±0.022
April 1973 ^e	176	72	Sol.	---	---	---	---	---
Aug 1973 ^e	68	95	Part.	---	---	---	---	---
Aug 1973 ^e	66	95	Sol.	---	---	---	---	0.16 ±0.09
Ice Box Lake								
Oct 1972 ^e	110	31	Part.	---	---	---	---	---
Oct 1972 ^e	126	31	Sol.	---	---	---	---	---

See footnotes at end of table.

TABLE 16 (Continued)

Statistic	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter)				
				⁷ Be	⁶⁵ Zn	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Summary of Pre-Cannikin Data Collected in Jones Lake ^g								
Range	17-148	76-219	Part.	NS-1.5	NS-0.06	NS-0.1	NS-0.19	NS-0.08
Range	---	76-219	Sol.	---	NS-0.09	NS-0.03	NS-0.07	NS-0.05
Mean $\pm$ SD	65	278	Part.	---	0.02 $\pm$ 0.03	0.05 $\pm$ 0.04	0.11 $\pm$ 0.08	0.02 $\pm$ 0.04
Mean $\pm$ SD	12	278	Sol.	---	0.02 $\pm$ 0.04	0.01 $\pm$ 0.01	0.02 $\pm$ 0.02	0.02 $\pm$ 0.02

- a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- b. The time in days between the collection and counting of a sample.
- c. Part. (particulate)--that portion retained by the 0.3 micron porosity filter.
Sol. (soluble)--that portion which passes through the 0.3 micron filter and is absorbed by the Al₂O₃.
Traces of ⁶⁰Co, ¹⁰³Ru, ¹⁰⁶Ru-¹⁰⁶Rh, and ¹⁴⁴Ce-¹⁴⁴Pr were also identified in some samples, but quantitative determinations have not been made.
- d. Zirconium-95 and ⁹⁵Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.
- e. Sample counted on Ge(Li) detector. All other samples were counted on a NaI detector.
- f. Pre-Cannikin.
- g. Four samples were collected between February 1971 and October 1971.

TABLE 17

Some Gamma-Emitting Radionuclides in Samples Collected with a Filter and Sorption Bed System from Long Shot Mud Pit No. 1 on Amchitka Island

Collection Date	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter) ^a			
				⁷ Be	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Post-Cannikin							
Dec 1971	42	66	Part.	3.2± 1.0	0.06 ±0.03	0.13 ±0.008	---
Dec 1971	39	66	Sol.	---	---	---	---
Feb 1972	33	125	Part.	1.2± 0.1	0.06 ±0.03	0.14 ±0.04	---
Feb 1972	27	125	Sol.	2.2± 1.5	---	---	---
April 1972	20	29	Part.	---	0.58 ±0.14	1.2 ±0.3	0.16 ±0.14
April 1972	16	29	Sol.	---	---	---	---
July 1972 ^e	46	34	Part.	1.4± 0.5	0.55 ±0.16	0.93 ±0.15	---
July 1972 ^e	104	34	Sol.	---	---	---	---
Sept 1972 ^e	78	28	Part.	---	---	---	---
Sept 1972 ^e	118	28	Sol.	---	---	---	---
April 1973 ^e	172	31	Part.	2.7± 1.9	---	---	0.084±0.032
April 1973 ^e	179	31	Sol.	---	---	---	---
Aug 1973 ^e	65	38	Part.	1.3± 0.7	---	---	---
Aug 1973 ^e	61	38	Sol.	---	---	---	---

See footnotes at end of table.

TABLE 17 (continued)

Statistic	Δt^b	Liters Sampled	Fraction ^c	Gamma-Emitting Radionuclides (pCi/liter)			
				⁷ Be	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹³⁷ Cs
Summary of Pre-Cannikin Data ^f							
Range	19-150	63-950	Part.	NS-10	0.01 -1.3	0.03 -2.7	NS-0.06
Range	14-212	63-950	Sol.	NS-41	NS-0.01	NS-0.03	NS-0.45
Mean $\pm$ SD	81	418	Part.	4.0 $\pm$ 4.7	0.4 $\pm$ 0.6	0.9 $\pm$ 1.2	0.02 $\pm$ 0.03
Mean $\pm$ SD	103	418	Sol.	10.9 $\pm$ 17.6	0.002 $\pm$ 0.003	0.006 $\pm$ 0.009	0.08 $\pm$ 0.18

a. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

b. The time in days between the collection and counting of a sample.

c. Part. (particulate)--that portion retained by the 0.3 micron porosity filter.
Sol. (soluble)--that portion which passes through the 0.3 micron filter and is absorbed by the Al₂O₃.
Traces of ⁶⁰Co, ¹⁰³Ru, ¹⁰⁶Ru-¹⁰⁶Rh, and ¹⁴⁴Ce-¹⁴⁴Pr were also identified in some samples, but quantitative determinations have not been made.

d. Zirconium-95 and ⁹⁵Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.

e. Sample counted on a Ge(Li) detector. All other samples were counted on a NaI detector.

f. Six samples of each fraction were taken between September 1970 and October 1971.

TABLE 18

Efficiency of the In Situ Probe and Reproducibility of
Measurements for $^{40}\text{K}^{\text{a}}$ in Seawater Near Amchitka Island,
August 1971

Station No.	^{40}K net c/m ^b	Salinity ^c	^{40}K pCi/liter ^d	Efficiency c/m/pCi/liter
2	52.8 ± 0.6	33.6	311	0.170
3	52.9 ± 0.6	33.5	310	0.170
4	53.8 ± 0.6	33.5	310	0.174
5	53.0 ± 0.6	33.5	310	0.171
6	52.8 ± 0.6	33.4	310	0.170
7 ^e	50.6 ± 0.5	33.5	310	0.163
8	52.0 ± 0.5	33.4	310	0.168
9	53.2 ± 0.6	33.6	311	0.171
10	54.4 ± 0.6	33.6	311	0.175
11	52.8 ± 0.6	33.4	310	0.170
Avg ± SD	52.8 ± 1.0	33.5 ± 0.08	310 ± 0.7	0.170 ± 0.003

Counts at Station 1 (Constantine Harbor Boat Dock)

Date	Time Count Started	Minutes Counted	^{40}K net c/m ^a
August 5, 1971	2115	525	54.2 ± 0.3
August 7, 1971	1650	780	54.1 ± 0.3
August 9, 1971	0650	730	54.9 ± 0.3
" " "	1907	672	53.8 ± 0.3
August 10, 1971	1755	180	54.8 ± 0.6
" " "	2055	180	54.9 ± 0.6
" " "	2355	180	55.0 ± 0.6
August 11, 1971	0255	180	54.8 ± 0.6
Avg ± SD	----	---	54.56±0.46

- No other radionuclides were detected.
- The error values are one-sigma counting errors for individual determinations.
- Measured with an ST probe, parts per thousand.
- Calculated from salinity values.
- The spectrum was degraded because of an error in operation of the pulse height analyzer.

TABLE 19

Stations for In Situ Gamma-Spectrum Measurements, Amchitka Island

Station No.	Date	Time Started	Water Depth (meters)	Gamma Probe Depth	Latitude N	Longitude E
1	a	a	----	12	----	----
2	August 6, 1971 _b	0825	22	15	51°27.6'	179°13'
3	" " " "	1300	40	38	51°26.6'	179°14.3'
4	August 7, 1971 ^c	0800	57	46	51°07.1'	179°14'
5	" " "	1215	64	55	51°27'	179°15.3'
6	August 8, 1971 ^d	0940	18	12	51°23.1'	179°08.5'
7	" " "	1410	70	64	51°22.7'	179°06.9'
8	" " "	1820	27	23	51°25.2'	179°04.3'
9	" " "	2220	70	64	51°24'	179°03'
10	August 10, 1971	0825	25	21	51°29.2'	179°08.5'
11	" " "	1245	27	24	51°30'	179°06.5'

a. Gamma counts were made on August 5, 7, 9, and 10, 1971. See Table 18 for information.

b. Strong offshore current; cable angle on ST probe 45°-60°.

c. Very strong offshore current; could not keep ST probe down.

d. ST probe angle 30°-50°.

TABLE 20

Some Gamma-Emitting Radionuclides in a Sea Otter
Collected at Amchitka Island

Collection Date	Tissue	No. of Samples	Gamma-Emitting Radionuclides (pCi/g, dry) ^a		
			⁴⁰ K	⁶⁰ Co	¹³⁷ Cs
Feb 1971	Liver	1	8.6±1.1	0.16±0.07	0.27±0.08
Feb 1971	Skin	1	1.1±0.9	---	---
Feb 1971	Kidney	1	9.8±1.0	---	---
Feb 1971	Muscle	1	10. ±0.5	---	---
Apr 1973	Muscle	1	6.8±0.3	---	---
Apr 1973	Liver	1	6.7±0.5	---	---

- a. The error values are two-sigma, propagated, counting errors for single samples. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated, counting error.

TABLE 21

Gamma-Emitting Radionuclides in Freshwater Aufwuchs
and Filamentous Algae Collected at Amchitka Island^a

		Gamma-Emitting Radionuclides (pCi/g, dry) ^b								
Location and Date	Δt^c	⁷ Be	⁴⁰ K	⁹⁵ Zr ^d	⁹⁵ Nb ^d	¹⁰³ Ru	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁴ Ce
Post-Cannikin										
Long Shot Pond										
Dec 1971	288	---	12 ±0.2	---	---	---	---	0.4±0.2	0.6 ±0.2	2.2 ±0.5
Feb 1972	39	7.4±1.1	8.4±1.5	1.4 ±0.2	3.7 ±0.4	1.2 ±0.2	---	0.2±0.1	0.5 ±0.1	3.4 ±0.4
April 1972 ^e	34	2.5±2.0	9.9±0.9	0.2 ±0.1	0.4 ±0.3	---	---	0.5±0.3	0.5 ±0.1	---
July 1972 ^e	52	6.0±1.5	11 ±0.5 ^f	2.3 ±0.5	6.6 ±0.7	0.76±0.23	---	---	0.3 ±0.1	---
Sept 1972 ^e	97	---	11 ±0.5	0.1 ±0.1	0.3 ±0.1	---	0.9 ±0.4	0.8±0.2	0.4 ±0.1	---
April 1973	106	2.2±1.0	9.5±1.2	---	---	---	---	---	0.28±0.05	0.60±0.17
August 1973	57	5.2±0.9	10 ±1.6	---	0.17±0.09	---	---	---	0.25±0.06	0.23±0.17
MP 12 Creek										
July 1972	56	7.8±1.7	5.2±0.5 ^f	3.5 ±0.4	6.4 ±0.5	1.7 ±0.3	0.76±0.28	---	2.0 ±0.2	3.8 ±0.4
August 1973	61	8.3±0.9	9.6±1.6	0.29±0.11	0.34±0.08	0.24±0.09	---	---	2.7 ±0.1	0.36±0.17
White Alice Inlet to Cannikin Lake										
August 1973	55	23 ±1.5	6.1±1.4	0.59±0.13	1.1 ±0.14	0.91±0.15	---	---	0.72±0.09	1.4 ±0.2
Cannikin GZ Creek										
April 1973	106	6.2±1.7	8.6±1.6	---	---	---	---	---	0.68±0.09	0.65±0.23
August 1973	58	4.3±1.0	10 ±1.8	---	---	---	---	---	0.41±0.08	0.19±0.18

See footnotes at end of table.

TABLE 21 (continued)

		Gamma-Emitting Radionuclides (pCi/g, dry)								
Statistic	Δt^c	^7Be	^{40}K	^{54}Mn	$^{95}\text{Zr}^d$	$^{95}\text{Nb}^d$	^{103}Ru	^{106}Ru	^{125}Sb	^{137}Cs
Summary of Pre-Cannikin Data										
Range	27-137	NS-36	46-15	0.08-0.06	1.1-6.5	2.1-13.4	NS-7.2	1.9-13	NS-2.9	0.7-3.4
Mean $\pm$ SD	65	15 $\pm$ 12	9 $\pm$ 4	0.28 $\pm$ 0.17	3.1 $\pm$ 1.8	6.7 $\pm$ 3.9	2.1 $\pm$ 2.7	5.8 $\pm$ 4.1	1.5 $\pm$ 0.9	1.8 $\pm$ 0.9

- a. Aufwuchs samples were collected from Long Shot Pond and MP 12 Creek, while the algae samples were collected at the inlets of White Alice and Cannikin GZ Creeks into Cannikin Lake.
- b. Single sample error values are two-sigma, propagated, counting errors. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.
- c. The time in days between the collection and counting of a sample.
- d. Zirconium-95 and ^{95}Nb values, from samples counted on NaI detectors, were calculated as discussed in the text.
- e. Samples counted on Ge(Li) detector. All other samples were counted on NaI detector.
- f. Potassium-40 value from NaI detector.

TABLE 22

Strontium-90 in Bone from Rats and Ptarmigan Collected at Amchitka Island

Collection Date	Location	Organism	pCi/g, ash ^a	pCi/g, dry ^b	pCi/g, Ca ^c
October 13, 1971	Sand Beach Cove	Rat	1.0±0.2	0.7	---
October 13, 1971	Sand Beach Cove	Rat	3.8±0.2	2.5	---
December 5, 1971	Sand Beach Cove	Rat	14.8±0.6	10.1	---
December 5, 1971	Sand Beach Cove	Rat	2.5±0.3	1.6	---
November 4, 1971	Clevenger Creek	Ptarmigan	43.7±1.3	27.0	---
November 4, 1971	Baker Runway	Ptarmigan	50.4±1.5	35.2	---
December 1, 1971	Base Camp	Ptarmigan	30.4±0.9	18.3	---
December 3, 1971	C-site (Cannikin)	Ptarmigan	43.9±1.3	30.7	170
April 16, 1973	Sand Beach Cove	Rat	4.1±1.0	1.9	---
August 27, 1973	Main Dump	Rat	2.8±0.1	1.8	---
August 31, 1973	Silver Salmon Lake	Ptarmigan	29.6±0.4	13.9	---
September 3, 1973	Clam Lake	Ptarmigan	25.1±0.4	11.0	---

- a. Errors are one-sigma, analytical errors. Strontium-90 concentrations are given in both pCi/g, ash, and pCi/g, dry, because the original data output is in pCi/g, ash, while values in pCi/g, dry, are needed for comparison with data in other tables.
- b. Based on individual dry/ash ratios.
- c. Based on total calcium for C-site ptarmigan.

TABLE 23

Gamma-Emitting Radionuclides in Vegetation Collected at Dosimeter Stations^a

Location & Miles from C-Site ^c	Dominant Vegetation	Time of Collection ^d	Gamma-Emitting Radionuclides (pCi/g, dry) ^b							
			⁷ Be	⁴⁰ K	⁶⁰ Co	⁹⁵ Zr ^e	⁹⁵ Nb ^e	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs
Engineer Rd. (13.7)	Grass, <u>Calo-</u> <u>magrastis</u> sp.	Pre	---	3.9±1.1	0.17±.08	---	---	1.6 ±1.4	3.7 ±0.6	24 ±.3
		Post	---	5.1±0.9	0.17±.06	0.54± .44	1.2±0.9	1.7 ±1.0	2.8 ±0.4	23 ±.2
White house (9.4)	Grass, <u>Calo-</u> <u>magrastis</u> sp.	Pre	---	11 ±1.0	---	0.51± .28	1.0±0.6	2.3 ±0.9	0.74±0.3	6.9±.2
		Post	---	11 ±0.7	0.06±.04	0.34± .04	0.7±0.4	0.84±0.5	0.84±0.2	3.4±.1
Kirilof Pt. (9.3)	Moss	Pre	---	7.4±1.3	---	---	---	---	2.8 ±0.6	19 ±.3
		Post	14 ± 9.6	6.6±1.2	0.14±.08	0.98± .33	2.0 ±0.7	2.4 ±1.2	1.9 ±0.5	18 ±.3
Jones Lake Outlet(8.7)	Moss	Pre	27 ±13	4.7±1.2	---	1.2 ± .4	2.4 ±0.9	3.9 ±1.3	2.7 ±0.5	12 ±.3
		Post	---	3.5±1.0	0.12±.06	0.79± .48	1.7 ±1.0	2.2 ±1.0	3.6 ±0.4	13 ±.2
St. Makarius Pt. (8.9)	Crowberry, <u>Empetra</u> sp.	Pre	---	2.4±0.9	---	0.71±0.54	1.5 ±1.1	2.3 ±1.1	2.5 ±0.4	8.6±.2
		Post	---	2.9±0.8	0.11±.05	---	---	1.6 ±0.9	1.9 ±0.3	5.7±.1
Square Bay (4.2)	Crowberry, <u>Empetra</u> sp. & Moss	Pre	20 ±14	3.7±1.2	---	1.1 ±0.4	2.3 ±0.9	3.4 ±1.3	2.7 ±0.6	17 ±.3
		Post	---	4.6±0.8	0.11±.05	0.79±0.42	1.6 ±1.0	1.0 ±0.9	2.7 ±0.4	23 ±.2
Milrow (5.0)	Grass, <u>Agios-</u> <u>tis</u> sp.	Pre	---	5.8±0.8	0.06±.05	1.0 ±0.38	2.1 ±0.8	1.7 ±0.9	2.4 ±0.4	9.9±.2
		Post	---	3.9±0.6	0.08±.04	0.28±0.23	0.7 ±0.6	1.7 ±0.7	1.7 ±0.3	8.7±.1
Long Shot SGZ (4.0)	Grass, <u>Calo-</u> <u>magrastis</u> sp.	Pre	---	4.6±0.9	0.15±.06	0.88±0.52	1.9 ±1.0	2.1 ±1.1	3.1 ±0.4	21 ±.2
		Post	---	3.0±0.8	0.09±.05	0.44±0.34	1.0 ±0.8	2.5 ±0.9	2.3 ±0.4	10 ±.2

See footnotes at end of table.

TABLE 23 (Continued)

Location & Miles from C-Site ^c	Dominant Vegetation	Time of Collection ^d	Gamma-Emitting Radionuclides (pCi/g, dry) ^b							
			⁷ Be	⁴⁰ K	⁶⁰ Co	⁹⁵ Zr ^e	⁹⁵ Nb ^e	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs
CTB No. 21 (1.1)	Crowberry, <u>Em- petra</u> sp. & Grass, <u>Calo- magrastis</u> sp.	Pre	---	5.9±0.9	0.06±.06	---	---	1.2 ±1.0	2.2 ±0.4	14 ±.2
		Post	---	7.7±1.1	0.15±.07	0.59±0.29	1.2±0.6	1.2 ±1.0	2.2 ±0.4	13 ±.2
CTB No. 20 (0.7)	Moss, Crow- berry, <u>Empetra</u> sp.	Pre	---	3.4±1.0	---	---	---	1.3 ±1.1	1.0 ±0.4	7.1±.2
		Post	---	3.5±1.2	---	0.63±0.32	1.3±0.7	---	1.8 ±0.4	11 ±.2
Sandia Trailer Park (1.2)	Moss, Crow- berry, <u>Em- petra</u> sp.	Pre	13 ± 8.2	2.0±1.0	0.08±.06	0.40±0.27	0.9±0.5	1.9 ±1.0	2.0 ±0.4	16 ±.2
		Post	---	3.1±1.1	0.08±.07	0.60±0.33	1.3±0.7	---	1.7 ±0.4	10 ±.2
CTB No. 16 (3.4)	Moss, Crow- berry, <u>Em- petra</u> sp.	Pre	---	3.8±1.1	0.10±.07	---	---	---	2.3 ±0.5	13 ±.3
		Post	12 ± 9.8	5.2±0.9	0.12±.06	0.71±0.30	1.4±0.7	---	2.5 ±0.4	14 ±.2
CTB No. 10 (9.0)	Moss	Pre	---	5.7±0.9	0.08±.06	---	---	---	2.5 ±0.4	13 ±.2
		Post	---	5.8±0.8	0.22±.05	0.79±0.39	1.7±0.8	2.1 ±0.9	1.6 ±0.4	9.7±.2
Microwave Relay Station (16.0)	Moss, Crow- berry, <u>Em- petra</u> sp.	Pre	15 ± 9.6	3.5±1.0	0.14±.06	0.66±0.31	1.5±0.6	2.1 ±1.1	2.8 ±0.5	18 ±.2
		Post	3.4± 1.6	2.7±0.8	0.08±.05	0.68±0.26	1.5±0.6	1.2 ±0.7	1.9 ±0.4	20 ±.2
Northwest Camp (22.6)	Moss, Crow- berry, <u>Em- petra</u> sp.	Pre	9.6± 6.6	2.1±0.8	---	0.65±0.19	1.5±0.5	1.8 ±0.8	1.9 ±0.4	11 ±.2
		Post	1.5± 1.0	2.6±0.8	---	0.32±0.13	0.7±0.3	---	1.2 ±0.3	6.7±.1
S-8 near Generator House (4.8)	Moss	Pre	11 ± 9.4	3.0±1.2	---	0.81±0.32	1.8±0.7	2.7 ±1.2	2.3 ±0.5	11 ±.2
		Post	26 ±14	3.6±1.4	0.09±.09	1.1 ±0.4	2.2±0.9	2.5 ±1.4	2.4 ±0.6	11 ±.2

See footnotes at end of table.

TABLE 23 (Continued)

Location & Miles from C-Site ^c	Dominant Vegetation	Time of Collection	Gamma-Emitting Radionuclides (pCi/g, dry) ^b						
			⁷ Be	⁴⁰ K	¹⁰⁶ Ru	¹²⁵ Sb	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵⁵ Eu
S-8 (4.8)	Moss	April 1973	---	6.4±1.4	1.0 ±0.4	0.75±0.09	10 ±0.2	3.4±0.2	0.45±0.06
Square Bay (4.2)	Moss, Crowberry	April 1973	8.9±2.0	4.5±1.4	2.3 ±0.5	0.97±0.10	15 ±0.2	5.5±0.3	0.71±0.06
Long Shot SGZ (4.0)	Grass, <u>Calomagrastis</u> sp.	April 1973	11 ±1.9	5.7±1.4	2.2 ±0.5	0.70±0.09	5.9±0.2	7.3±0.3	0.46±0.06
Sandia Trailer Park (1.2)	Moss, Crowberry	April 1973	---	3.5±1.4	0.43±0.39	0.65±0.09	11 ±0.2	1.2±0.2	0.37±0.06
CTB No. 10 ^f (9.0)	Moss	April 1973	---	6.2±1.6	1.1 ±0.5	0.49±0.10	5.5±0.2	2.8±0.3	0.35±0.07

a. Pre- and Post-Cannikin test.

b. The error values are two-sigma, propagated, counting errors for single samples. Dashes in the body of the table indicate the sample count is not significant, i.e., the net sample count is less than the two-sigma, propagated counting error.

c. Straight-line distance.

d. Pre-Cannikin collections were made on November 4, 1971; post-Cannikin collections were made on December 7, 1971, except Stations 14 and 15 which were made on April 21, 1972.

e. The ⁹⁵Zr and ⁹⁵Nb values were calculated as discussed in the text.

f. This sample also contained ²²⁶Ra (0.22±0.07 pCi/g, dry) and ²³⁸U (1.3±0.7 pCi/g, dry).

TABLE 24

Instrument and TLD Measurements of Environmental Radiation at
Amchitka Island, November-December 1971^a

Station No.	Location & Miles from C-Site	Instrument Readings, CPM ^b			TLD Readings ^c mrad
		D-2	D+1	D+30	
1	South Bight (13.7)	275	---	300	9, 9, 8, 9
2	Main Camp (9.4)	475	---	500	11, 8, 10, 10
3	Kirilof Point (9.3)	300	---	275	11, 11, 12, 12
4	Jones Lake (8.7)	325	---	275	8, 8, 8, 8
5	St. Makarius Point (8.9)	250	---	250	9, 10, 10, 10
6	Square Bay (4.2)	250	---	225	14, 15, 13, 13
7	Milrow Surface Zero (5)	300	300	300	Data Missing
8	Long Shot Surface Zero (4)	250	250	225	9, 10, 10, 10
9	CTB 21 (1.1)	225	---	225	12, 11, 13, 10
10	CTB 20 (0.7)	225	---	225	9, 9, 8, 7
11	Sandia Trailer Park (1.2)	250	---	225	10, 11, 12, 13
12	CTB 16 (3.4)	325	---	325	13, 23, 12, 11
13	CTB 10 (9)	400	---	425	11, 16, 19, 20
14	Microwave Relay Station (16)	425	---	d	d
15	Northwest Camp (22.6)	275	---	"	"
16	Generator, S-8 Beach (4.8)	225	---	"	"

a. Summarized from memo of December 14, 1971, from K. W. Gustafson, Eberline Instrument Co. to Test Manager's Representative.

b. Eberline PRM-4; 1 x 1 1/4 inch NaI crystal detector; natural background, 225 to 500 CPM; D = November 6, 1971.

c. Readings for each of 4 chips per packet; TLD's set out on D-2, retrieved on D+30 and read on D+34; background not subtracted.

d. Not recovered or no reading because of snow.

TABLE 25
Tritium Values for Amchitka Seawater Samples
1970-1973

Collection Date	Collection Site	Sampling Depth	Tritium Units ^a
April 19, 1972	Constantine Harbor	Surface	28±13
July 17, 1972	Constantine Harbor	"	16±13
September 29, 1972	Constantine Harbor	"	<13
April 13, 1973	Constantine Harbor	"	<13
August 30, 1973	Constantine Harbor	"	38±14
February 11, 1972	Small Boat Dock	"	99±14
May 20, 1972	Small Boat Dock	"	75±14
September 19, 1970	Off Mouth, Clevenger Creek	"	78±13
July 17, 1972	St. Makarius Bay	"	<13
September 20, 1970	Duck Cove Fault Line	"	21±13
September 18, 1970	Duck Cove	"	36±13
April 19, 1972	Duck Cove	"	33±14
July 17, 1972	Duck Cove	"	26±14
September 30, 1972	Duck Cove	"	<13
April 13, 1973	Duck Cove	"	16±13
August 29, 1973	Duck Cove	"	<13
May 21, 1971	IA-1 (near buoy)	"	<16
December 6, 1971	Square Bay	"	54±13
February 21, 1972	Square Bay Point	"	33±13
February 21, 1972	Sand Beach Cove	"	27±13
April 20, 1972	Sand Beach Cove	"	<13
April 20, 1972	Sand Beach Cove	"	<13
April 20, 1972	Sand Beach Cove	"	<13
July 17, 1972	Sand Beach Cove	"	<13
September 30, 1972	Sand Beach Cove	"	<13
April 13, 1973	Sand Beach Cove	"	41±14
August 31, 1973	Sand Beach Cove	"	<13
September 19, 1970	Shallow Station, 50 fm 51°23'N 178°59'E	10m	19±12
September 19, 1970	" "	40m	18±12
September 19, 1970	" "	80m	40±13
September 19, 1970	Deep Station, 150 fm 51°25'N 178°59'E	Surface	43±13
September 19, 1970	" "	40m	23±12
September 19, 1970	" "	80m	30±13

a. The error shown is a one-sigma counting error.

TABLE 26
Tritium Values for Amchitka Freshwater Samples
1970-1973

Collection Date	Collection Site	Tritium Units ^a
December 6, 1971	Jones Lake Outlet	62±13
February 21, 1972	Jones Lake Outlet	36±13
July 17, 1972	Jones Lake Outlet	40±13
September 18, 1972	Jones Lake Outlet	54±13
April 14, 1973	Jones Lake Outlet	46±13
August 29, 1973	Jones Lake Outlet	41±14
April 11, 1973	Clevenger Lake Outlet	46±13
August 30, 1973	Clevenger Lake Outlet	62±14
September 21, 1970	Clevenger Creek	110±13
September 19, 1970	Clevenger Creek	73±13
February 16, 1971	Clevenger Creek	85±13
May 21, 1971	Clevenger Creek	87±14
July 17, 1972	Clevenger Creek	57±13
April 11, 1973	Clevenger Creek	48±13
September 1, 1973	Clevenger Creek	68±14
September 20, 1970	Clam Lake	180±14
February 16, 1971	Clam Lake	78±14
May 21, 1971	Clam Lake	<13
April 11, 1973	Clam Lake	51±13
August 31, 1973	Clam Lake	60±14
September 18, 1970	Duck Cove Creek	130±13
February 16, 1971	Duck Cove Creek	24±13
May 21, 1971	Duck Cove Creek	140±14
December 6, 1971	Duck Cove Creek	81±13
February 21, 1972	Duck Cove Creek	50±13
July 17, 1972	Duck Cove Creek	52±14
April 11, 1973	Duck Cove Creek	72±13
August 29, 1973	Duck Cove Creek	70±14
September 20, 1970	Long Shot Mud Pit 1 ^b	1600±33
September 20, 1970	Long Shot Mud Pit 2	2300±35
September 20, 1970	Long Shot Mud Pit 3	3100±52
May 20, 1971	Long Shot Mud Pit 1 No. 18	2100±38
May 20, 1971	Long Shot Mud Pit 2 No. 17	3000±49
May 20, 1971	Long Shot Mud Pit 3 No. 16	4000±68
August 13, 1971	Long Shot Mud Pit 1	1700±31
August 13, 1971	Long Shot Mud Pit 2	2500±42
August 13, 1971	Long Shot Mud Pit 3	3400±55
December 7, 1971	Long Shot Mud Pit 1	480±17
February 21, 1972	Long Shot Mud Pit 1 Outlet	170±14
February 21, 1972	Long Shot Mud Pit 1	2100±38
April 18, 1972	Long Shot Mud Pit 1	2200±35
July 17, 1972	Long Shot Mud Pit 1	2200±33

See footnotes at end of table.

TABLE 26 (continued)

Collection Date	Collection Site	Tritium Units ^a
September 29, 1972	Long Shot Mud Pit 1	1700±31
April 16, 1973	Long Shot Mud Pit 1	2200±41
August 31, 1973	Long Shot Mud Pit 1	1600±32
February 16, 1971	Bridge Creek	78±14
May 21, 1971	Bridge Creek	100±14
July 17, 1972	Bridge Creek	67±14
April 11, 1973	Bridge Creek	72±13
August 29, 1973	Bridge Creek	74±14
July 17, 1972	MP-12 Creek	82±14
April 11, 1973	MP-12 Creek	98±13
February 20, 1972	Cannikin Lake Inlet from Ground Zero	<13
April 11, 1973	Cannikin Lake Inlet from Ground Zero	71±13
August 30, 1973	Cannikin Lake Inlet from Ground Zero	36±13
April 15, 1973	Cannikin Lake Inlet from Drillback	40±13
August 31, 1973	Cannikin Lake Inlet from Drillback	53±13
August 31, 1973	Cannikin Lake Inlet from Drillback	67±13
April 11, 1973	Cannikin Lake White Alice Inlet	44±13
August 31, 1973	Cannikin Lake White Alice Inlet	39±13
April 13, 1973	Cannikin Lake #1 Surface	54±13
April 13, 1973	Cannikin Lake #1 Bottom	51±13
April 13, 1973	Cannikin Lake #2 Surface	53±13
April 13, 1973	Cannikin Lake #2 Bottom	40±13
April 13, 1973	Cannikin Lake #3 Surface	49±13
April 13, 1973	Cannikin Lake #3 Bottom	40±13
April 13, 1973	Cannikin Lake #4 Surface	53±13
April 13, 1973	Cannikin Lake #4 Bottom	37±13
August 31, 1973	Cannikin Lake #1 Surface	32±13
August 31, 1973	Cannikin Lake #1 Bottom	27±13
August 31, 1973	Cannikin Lake #2 Surface	56±14
August 31, 1973	Cannikin Lake #2 Bottom	30±13
August 31, 1973	Cannikin Lake #3 Surface	26±13
August 31, 1973	Cannikin Lake #3 Bottom	18±13
August 31, 1973	Cannikin Lake #4 Surface	37±13
August 31, 1973	Cannikin Lake #4 Bottom	16±13
April 11, 1973	Cannikin Lake White Alice Outlet	71±13
August 31, 1973	Cannikin Lake White Alice Outlet	20±13
April 11, 1973	White Alice Creek Gauge Station	57±13
August 31, 1973	White Alice Creek Gauge Station	42±13
October 1, 1972	Ice Box Lake (Lake 04-47)	43±14
September 18, 1972	Ice Box Lake (Lake 04-47) A	52±13
September 18, 1972	Ice Box Lake (Lake 04-47) B	58±13
September 18, 1972	Ice Box Lake (Lake 04-47) C	44±13
April 11, 1973	Ice Box Lake - Inlet	60±14
August 31, 1973	Ice Box Lake - Inlet	52±13

See footnotes at end of table.

TABLE 26 (continued)

Collection Date	Collection Site	Tritium Units ^a
September 18, 1972	Ice Box Lake Outlet	56±13
April 11, 1973	Ice Box Lake Outlet	66±13
August 31, 1973	Ice Box Lake Outlet	61±13
July 17, 1972	DK-45 Lake	49±14
October 1, 1972	DK-45 Lake	33±14
February 21, 1972	DK-45 Lake Outlet	54±13
April 19, 1972	DK-45 Lake Outlet	46±14
April 15, 1973	DK-45 Lake	37±13
August 29, 1973	DK-45 Lake	70±14

a. The error shown is a one-sigma counting error.

b. The locations of the Long Shot mud pits and ponds are shown in Figure 5.

TABLE 27

Tritium Values for Amchitka Dolly Varden

Collection Date	Collection Site	Tritium Units ^a
October 1, 1972	Ice Box Lake	43±13
October 1, 1972	Ice Box Lake	55±13
October 1, 1972	Ice Box Lake	38±13

a. The error shown is a one-sigma counting error.

5. REFERENCES

- a. Held, E. E. 1971. Amchitka Radiobiological Program Progress Report, July 1970 to April 1971. NVO-269-11. University of Washington, College of Fisheries, Laboratory of Radiation Ecology. 36 p.
- b. Held, E. E. 1972. Amchitka Radiobiological Program Progress Report, May 1971 to February 1972. NVO-269-17. University of Washington, College of Fisheries, Laboratory of Radiation Ecology. 50 p.
- c. Held, E. E., V. A. Nelson, W. R. Schell, and A. H. Seymour. 1973. Amchitka Radiobiological Program Progress Report, March 1972 to December 1972. NVO-269-19. University of Washington, College of Fisheries, Laboratory of Radiation Ecology. 92 p.

6. TABLE AND MAP INDEX

<u>Collection Site</u>	<u>Figure No.(s)</u>	<u>Table No.(s)</u>	<u>Remarks</u>
Baker Runway	3	22	Part of Base Camp
Base Camp	2 & 3	2 & 22	
Bering Sea	1 & 2	1, 7, 9, 11, 14, 18, & 19	Collection sites located: a) Off C-Site, b) at 51° 30'N 179° 20'E, c) Off Bat Island, d) Off East Cape, e) Off Sea Otter Point, f) At Station 2 (51° 28'N 179° 13'E), g) At Station 3 (51° 27'N 179° 14'E), h) At 51° 29'N 179° 18'E, and i) Off Kirilof Point
Bridge Creek	4	3, 4, & 26	
Cannikin Lake	6	6 & 16	
Cannikin Lake Outlet	6	3 & 26	
Cannikin Lake Inlet			
From GZ	6	21 & 26	
Cannikin Lake Inlet			
from Drillback	6	26	
Cannikin Lake Inlet from			
White Alice Inlet	6	21 & 26	
Cannikin Site	2 & 6	22 & 26	
Clam Lake	4	6 & 26	
Clevenger Creek	4	3, 4, 22, & 26	
Clevenger Lake Outlet	3	4	
Constantine Harbor	2 & 3	5, 9, 11, 15, & 25	
Constantine Harbor			
Boat Dock	3	14 & 18	Station 1
Creek	4 & 6	26	Collection sites located: a) 0.8 mile SE of Bridge Creek, b) Near CTB 20 & 21, and c) Between Milepost 11 & 12 (near Cannikin)
Crown Reefer Point	2 & 4	7	
CTB 10	2	23 & 24	Station 13
CTB 16	2	23 & 24	Station 12
CTB 17	2	26	
CTB 20	6	23 & 24	Station 10
CTB 21	6	23 & 24	Station 9
Cyril Cove	4		
Duck Cove	4	5, 7, 9, 11 & 15	
Duck Cove Creek	4	3, 4, & 26	
Duck Cove Fault Line	None	25	
Egegik	1	12	Bristol Bay Area
Engineer Road	2 & 3	23	Part of Base Camp

<u>Collection Site</u>	<u>Figure No. (s)</u>	<u>Table No. (s)</u>	<u>Remarks</u>
Falls Creek	2	3	
Generator	4	24	S-8 Beach (Station 16)
IA-1	4	25	Near Buoy
IA-2	6	5	
IA-3	6	5 & 7	
Ice Box Lake	6	6 & 26	Lake 04-47
Ice Box Lake Inlet	6	3 & 26	
Infantry Road	2, 4-6	None	
Jones Lake	3	16, 24, & 26	
Jones Lake Outlet	3	23 & 26	
Kirilof Point	2 & 3	3, 23, & 24	
Lakes	2, 3, & 6	26	Collection sites located: a) Near Engineer Pit (1/4 mile N of pit), b) 1/4 mile SW of CTB 16, c) South of Lake DK-45 (below Pan Am Photo Tower), d) Near CTB 7 (1 mile N of Microwave Re- lay Station) and CTB 13, and e) Near TLD Station (Northwest Camp)
Lake DK-45	6	11, 16, & 26	
Lake DK-45 Outlet	6		
Long Shot	2, 4, & 5	14, 17, 21, 23, 24, & 26	Collection sites located at: a) Station 8; b) Mud Pits Nos. 1, 2, & 3; c) Ponds A, B, & C; and d) Wells WL-1, WL-2, and No. 1, 8, & 9. Station 2, Part of Base Camp
Main Camp	3	24	
Microwave Relay			
Station	1	23 & 24	Station 14
Midden Cove	2	11	
Milrow	2 & 4	23, 24, & 26	Collection sites located at: a) Station 7; b) Ponds near Well Nos. 2, 3, & 17; c) The Seep (between GZ & Well No. 2)
Naknek	1	12	Bristol Bay Area
MP 12 Creek	6	3, 21 & 26	
Northwest Camp	2	23, 24, & 26	Collection sites located at: a) Station 15 and b) 200 meters south of bunker
Nushagek	1	12	Bristol Bay Area
Pacific Ocean	1, 2, & 4	7, 9, 11, & 25	Collection sites located: a) Off Clevenger Creek Mouth, b) At Deep Station (150 fm) 51° 25'N 178° 59'E, c) At Shallow Station (50 fm) 51° 23'N 178° 59'E, d) Off C-Site, and e) Off St. Makarius Point.

<u>Collection Site</u>	<u>Figure No.(s)</u>	<u>Table No.(s)</u>	<u>Remarks</u>
Ponds	2, 3, & 6	26	Collection sites located: a) On St. Makarius Point; b) Near White House, CTB 20, and Cannikin Lake; and c) On Kirilof Point.
Pump	6	26	Near Cannikin Lake
Quonset Lake	4	26	
St. Makarius Bay	2 & 3	7 & 25	Station 5
St. Makarius Point	2	23 & 24	
Sand Beach Cove	6	7, 9, 11, 22, & 25	
Sandia Trailer Park	6	23, 24, & 26	Station 11
Sink	3	26	FRI Lab. at Hus Key Camp (Main Camp)
Small Boat Dock	3	25	Located in Constantine Harbor
South Bight	2	24	Station 1
Spring	4	26	Cyril Cove
Square Bay	4	23, 24, & 25	
Square Bay Point	4	25	
Station 1	None	19	
Station 4	None	18 & 19	
Station 5	None	18 & 19	
Station 6	None	18 & 19	
Station 7	None	18 & 19	
Station 8	None	18 & 19	
Station 9	None	18 & 19	
Station 10	None	18 & 19	
Station 11	None	18 & 19	
S-8	4	23	Near Generator House
Ugashik	1	12	Bristol Bay Area

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