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DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Federal Center, Lakewood, Colorado 80225

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT,  
AMCHITKA ISLAND, ALASKA, OCTOBER 1972

(Amchitka-40)  
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By

L. J. Schroder and Wilbur C. Ballance



*Traci,*

① Amchitka Island, Alaska

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ABSTRACT

The U.S. Geological Survey collected water samples from Amchitka Island, Alaska, during October 1972. Tritium determinations were made on all samples collected and gross alpha and gross beta/gamma determinations were made on 41 samples.

The gross alpha and gross beta determinations when compared with previously determined ranges for fresh waters on Amchitka Island show no trends.

INTRODUCTION

The U.S. Geological Survey established a sampling program on Amchitka Island in 1967 in cooperation with the U.S. Atomic Energy Commission. Water samples are analyzed routinely for tritium, gross alpha, and gross beta/gamma content. Frequency of sampling was semiannual prior to Cannikin and was bimonthly after the Cannikin event (November 6, 1971) through April 1972. The sampling frequency has been quarterly for the remainder of the first year (through November 1972). Sampling frequency will be changed to an annual basis approximately 1½ years after the event.

The techniques and procedures used for sample collection, identification, and analysis are described in Beetem, Washington, Janzer, and Schroder (1971) and in Schroder (1971). Radiochemical data obtained

from samples analyzed by the U.S. Geological Survey through November 1970 are reported in Beetem, Washington, Janzer, and Schroder (1971). Radiochemical data obtained from samples analyzed by the U.S. Geological Survey from September 1971 through July 1972 are reported in Schroder and Ballance (1972a,b, 1973). This report presents the radiochemical data from samples collected during October 1972.

## RESULTS

Figures 1, 2, and 3 show the locations of the sampling points. Table 1 correlates the location name and identification numbers with the dates samples were collected and the types of analyses performed. Table 2 presents the data obtained from analysis of these water samples.

The gross alpha activity, as U equivalent, ranged from less than 0.3 to 1.7 pCi/l (picocuries per liter) for the October 1972 sampling; one value was less than 2.7 pCi/l. This compares with a range from less than 0.1 to 23 pCi/l in fresh waters on Amchitka observed prior to detonation of Cannikin as reported by Beetem, Washington, Janzer, and Schroder (1971). Schroder and Ballance (1972a,b, 1973) reported a range of less than 0.1 to 3.0 pCi/l for samples obtained before and after the Cannikin event.



The gross beta activity in water as Cs-137 equivalent in the October 1972 samples ranged from 1.7 to 14 pCi/l. This range if compared to the range observed in fresh water samples obtained prior to Cannikin (less than 1.0 to 36 pCi/l as reported by Beetem, Washington, Janzer, and Schroder, 1971) shows no indication of event-related radioactivity. Schroder and Ballance (1972a,b, 1973) reported a range of 2.0 to 39 pCi/l for samples obtained before and after the Cannikin event.

The only water samples (except ST01-52) having detectable (greater than 640 pCi/l) tritium activity were those collected at the Long Shot site (table 2). The sample from ST01-52, Weir 1, which represents surface water drainage of the Long Shot site, had a tritium concentration of 790 pCi/l.

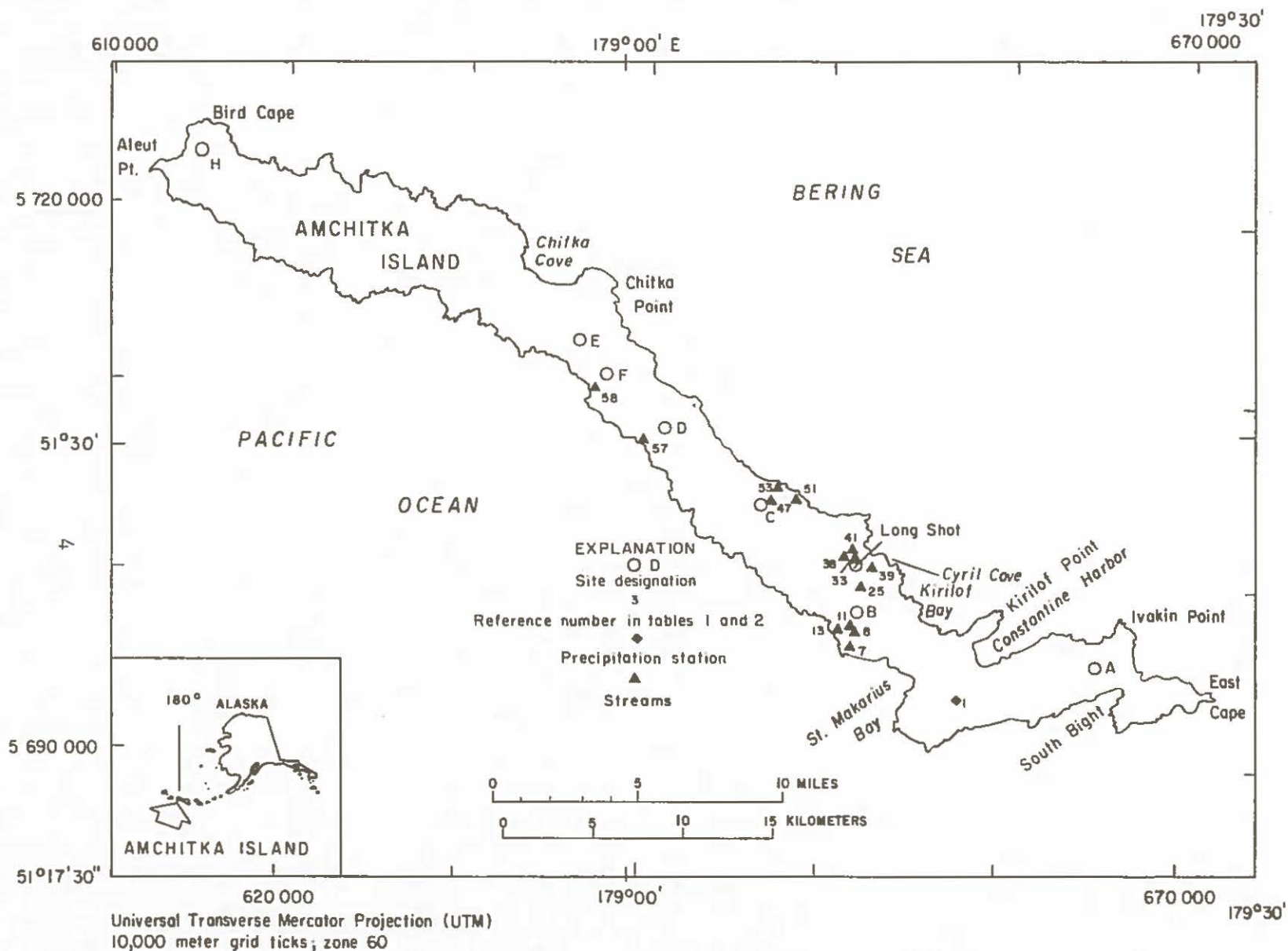


Figure 1.-- Precipitation and stream sampling stations for radiochemical monitoring, Amchitka Island, Alaska.



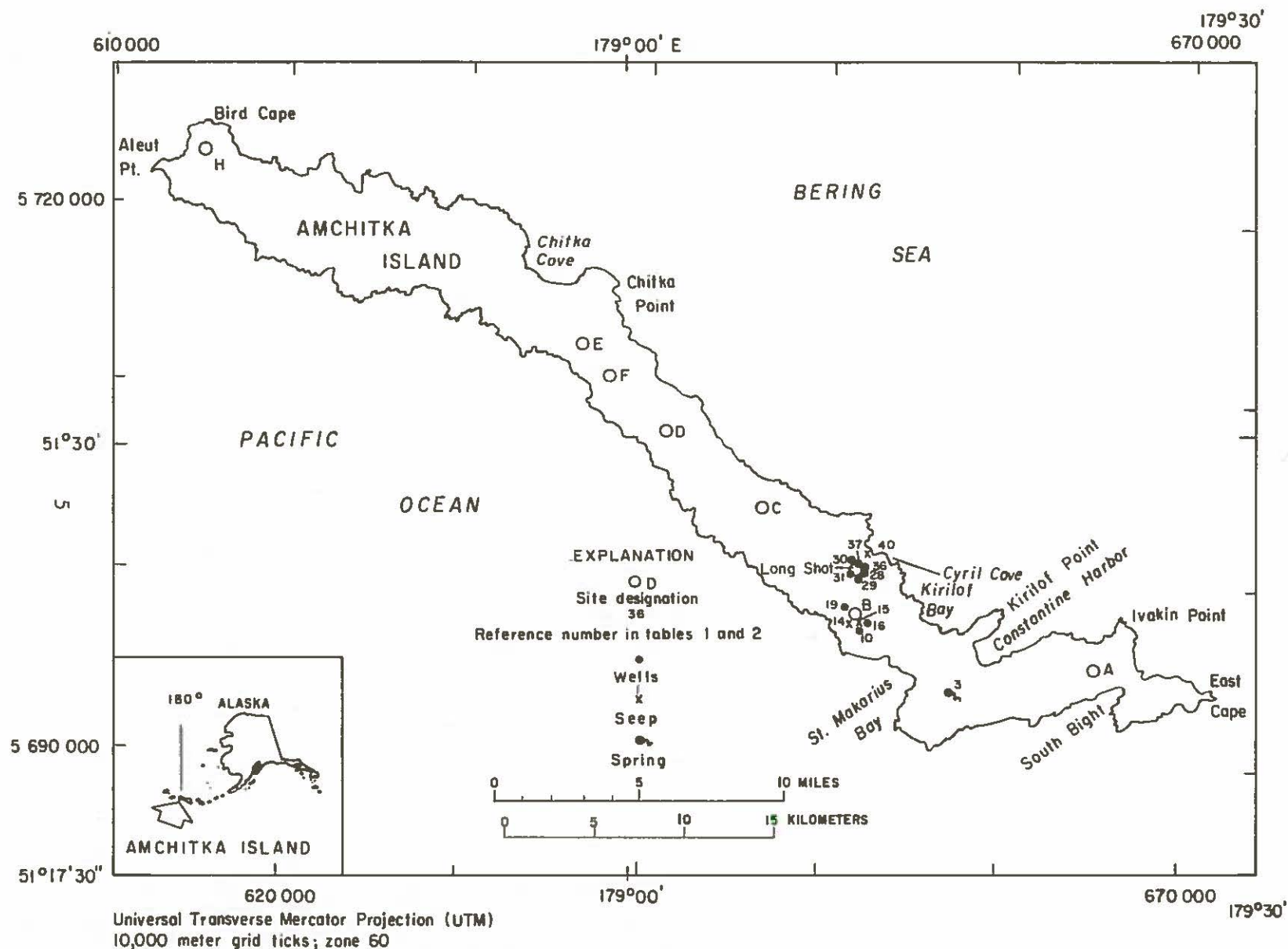


Figure 2.-- Well, spring, and seep sampling stations for radiochemical monitoring, Amchitka Island, Alaska.

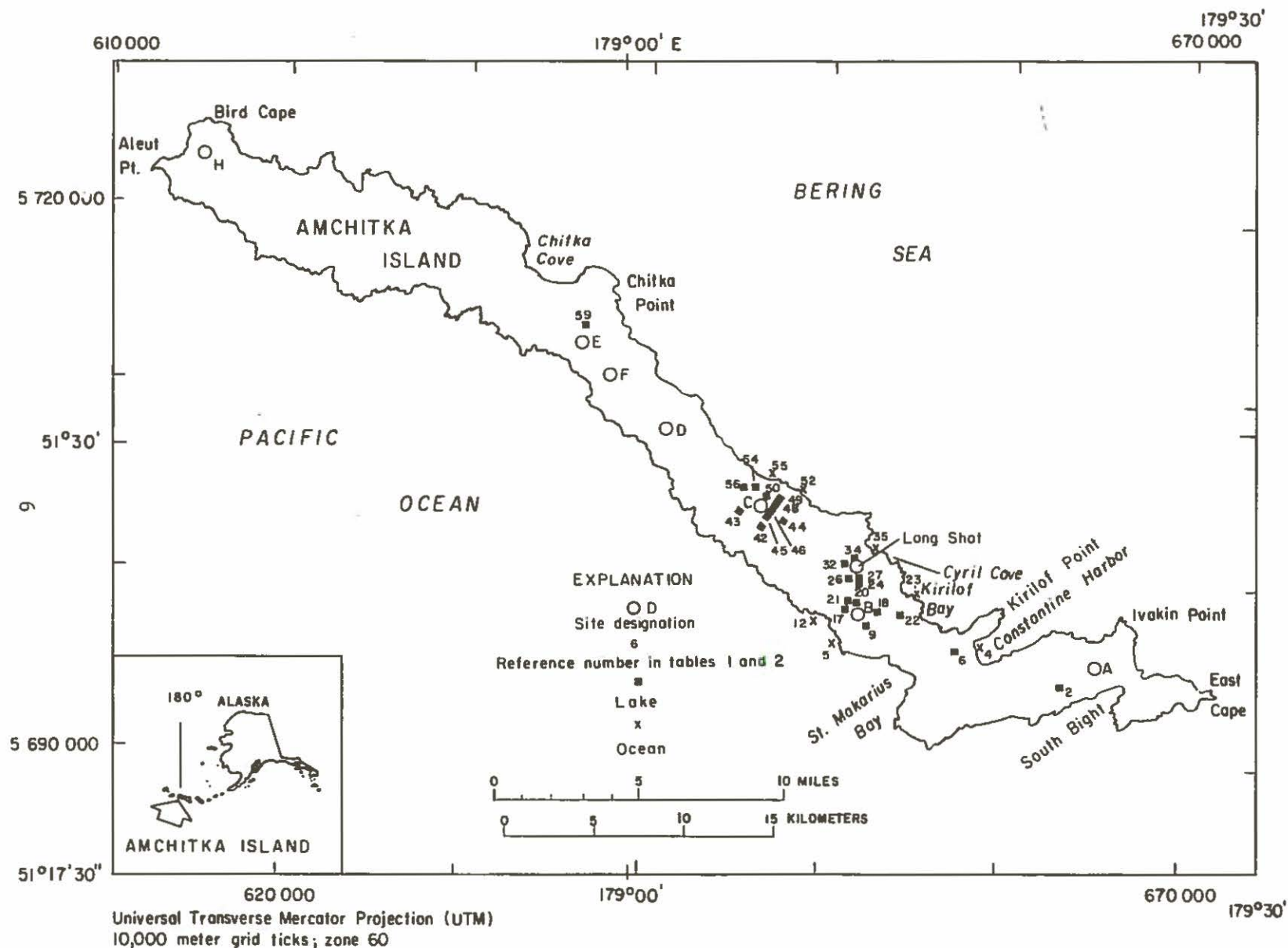


Figure 3.--Lake and ocean sampling stations for radiochemical monitoring, Amchitka Island, Alaska.

Table 1.--Radiochemical sampling stations and collection timetable  
for Cannikin event

(A, analyzed for gross alpha, gross beta/gamma, and tritium; T, analyzed for tritium; N, not collected; D, destroyed in shipment)

Ident. no.	Ref. no. 1/	Other identifying name	Collection timetable					
			Nov. (D+15)	Dec. (D+30)	Jan. (D+60)	April (D+120)	July (D+240)	Oct. (D+330)
PR93-57	1	Precipitation at South Hangar	T	T	T	T	T	N
LK94-62	2	Lake 145	A	A	A	A	A	A
SP94-56	3	Constantine Spring	A	A	A	A	A	A
OB96-58	4	Bering Sea	T	T	T	T	T	T
OP96-51	5	Pacific Ocean	T	N	T	T	T	T
LK96-57	6	Jones Lake	A	A	A	A	A	A
ST96-51	7	Clevenger Creek at road	A	A	A	A	A	A
ST97-51	8	Clevenger Creek at gage	A	A	A	A	A	A
LK97-52	9	Lake B-1	A	A	A	A	A	A
WE97-51	10	Well W-13	A	A	A	A	A	A
ST97-51A	11	Stream B-6	A	A	A	A	N	A
OP97-50	12	Pacific Ocean	T	T	T	T	T	T
ST97-50	13	Midden Creek	A	A	A	A	A	A
SE98-51	14	Seep B-13	A	A	A	A	A	A
SE98-51A	15	Seep B-18	N	A	N	A	A	A
WE98-51C	16	Well W-17	A	A	A	A	A	A
LK98-51B	17	Lake B-3	A	A	A	A	A	A
LK98-52A	18	Lake B-4	A	A	A	A	A	A
WE98-51K	19	Well W-11	A	A	A	A	A	A
LK98-51	20	Lake B-2	A	A	A	A	A	A
LK98-51A	21	Lake B-2A	A	A	A	A	T	A
LK98-53	22	Silver Salmon Lake	A	A	A	A	A	A
OB99-54	23	Bering Sea	T	T	T	T	T	T
LK00-52	24	Lake 130	N	N	N	N	N	N
ST00-51	25	Stream A-7	A	A	A	A	A	A
LK00-51B	26	Lake A-6	A	N	D	T	D	N
LK00-51A	27	Lake	A	A	T	A	A	A
WE00-51E	28	Well No. 10C	N	T	A	A	A	A
WE00-51	29	Well WL-2	T	T	A	A	A	N
WE00-51H	30	Well WL-1	T	N	A	A	A	N

Table 1.--Radiochemical sampling stations and collection timetable  
for Cannikin event--Continued

(A, analyzed for gross alpha, gross beta/gamma, and tritium; T, analyzed for tritium; N, not collected; D, destroyed in shipment)

Ident. no.	Ref. no. 1/	Other identifying name	Collection timetable					
			Nov. (D+15)	Dec. (D+30)	Jan. (D+60)	April (D+120)	July (D+240)	Oct. (D+330)
WE00-51F	31	Well No. 8A	N	T	A	A	A	A
LK00-51	32	Lake	N	A	T	A	A	A
ST00-51B	33	Long Shot drainage ditch, A-2	A	A	A	A	A	A
LK00-51D	34	Long Shot mudpit, A-3	A	A	A	A	A	A
OB01-52A	35	Bering Sea (F-11)	T	T	T	T	T	T
WE00-51I	36	Well No. 3	N	N	N	N	N	N
WE00-51J	37	Well No. 7	N	N	N	N	N	N
ST01-51	38	Stream at weir 2	A	A	A	A	A	A
ST01-52	39	Stream at weir 1	A	A	A	A	A	A
SE01-52	40	Seep 3	A	A	T	A	N	A
ST01-51A	41	Bridge Creek at gage	A	A	A	A	A	A
LK02-46	42	Lake C-2	A	A	A	A	A	A
LK03-45	43	Lake	A	A	A	A	A	A
LK03-47	44	Lake	A	A	A	A	T	N
LK04-46C	45	Lake	A	A	A	A	A	N
LK04-46D	46	Lake	A	A	A	A	A	A
ST04-47A	47	White Alice Creek	A	A	N	N	N	A
LK04-46B	48	Lake	A	A	A	A	N	N
LK04-46F	49	Lake	A	A	A	A	A	N
LK04-46E	50	Lake	A	A	A	A	A	D
ST04-47	51	White Alice Creek at gage	A	A	A	A	A	A <sup>2/</sup>
OB05-47	52	Bering Sea at out- let of White Alice Creek	T	T	T	T	T	T
ST05-47	53	Stream	A	A	A	A	A	A
LK05-46	54	Lake	A	A	A	A	A	A
OB05-46	55	Bering Sea north of UA-1-HTH-1	T	T	T	T	T	T
LK05-45	56	Lake	A	A	A	A	A	A
ST07-40	57	Falls Creek at gage	N	N	A	A	A	A
ST09-36	58	Limpet Creek at gage	A	A	A	A	A	A
LK14-36	59	Lake E-2	A	A	A	A	A	A

1/ Reference numbers used for locations on figures 1, 2, and 3.

2/ Tritium sample destroyed in shipment.



Table 2.--Radiochemical analyses of water samples collected on Amchitka Island, Alaska, October 1972

(Gross beta as cesium-137, gross alpha as U equivalent, and tritium, reported in picocuries per liter;  
<, less than)

Ident. no.	Ref. no. 1/	Latitude N.			Longitude E.			Date			Time	Gross beta	Gross alpha	Tritium
		Deg.	Min.	Sec.	Deg.	Min.	Sec.	Mo.	Da.	Yr.				
LK94-62	2	51	22	37	-179	20	25	10	13	72	0810	5.1	<0.5	<640
SP94-56	3	51	22	43	-179	14	59	10	13	72	1055	6.4	<.8	<640
OB96-58	4	51	24	08	-179	16	32	10	13	72	0835	--	--	<640
OP96-51	5	51	24	09	-179	10	17	10	13	72	0905	--	--	<640
LK96-57	6	51	24	11	-179	16	09	10	13	72	1055	4.5	<1.0	<640
ST96-51	7	51	24	16	-179	10	19	10	13	72	0910	6.3	<1.1	<640
ST97-51	8	51	24	35	-179	11	00	10	13	72	1430	4.5	<1.3	<640
LK97-52	9	51	24	43	-179	11	15	10	13	72	1450	5.4	<.7	<640
WE97-51	10	51	24	50	-179	10	58	10	13	72	1015	4.7	<1.3	<640
ST97-51A	11	51	24	51	-179	10	55	10	13	72	1010	2.0	<.4	<640
OP97-50	12	51	24	52	-179	09	44					--	--	<640
ST97-50	13	51	24	53	-179	09	49	10	13	72	0900	6.0	<.6	<640
SE98-51	14	51	24	56	-179	10	58	10	13	72	1005	1.7	<.5	<640
SE98-51A	15	51	24	56	-179	10	56	10	13	72	1000	1.8	<.5	<640
WE98-51C	16	51	24	57	-179	11	03.5	10	13	72	1025	3.0	<.6	<640
LK98-51B	17	51	25	01	-179	10	51	10	13	72	0955	3.8	<.3	<640
LK98-52A	18	51	25	03	-179	11	36	10	13	72	1045	4.6	<.5	<640
WE98-51K	19	51	25	04.5	-179	10	55	10	13	72	0945	5.0	<.3	<640
LK98-51	20	51	25	08	-179	10	59	10	13	72	0935	3.9	<.5	<640
LK98-51A	21	51	25	12	-179	10	59	10	13	72	1035	4.8	<.5	<640
LK98-53	22	51	25	17	-179	12	48	10	14	72	1310	14	1.6	<640
OB99-54	23	51	25	31	-179	13	28					--	--	<640
ST00-51	25	51	26	11	-179	11	11	10	13	72	1620	4.6	<.6	<640
LK00-51A	27	51	26	14	-179	11	00	10	13	72	1620	5.9	<.5	<640
WE00-51E	28	51	26	15	-179	10	59	10	13	72	1315	13	<2.7	<640

Table 2.--Radiochemical analyses of water samples collected on Amchitka Island, Alaska, October 1972--  
Continued

(Gross beta as cesium-137, gross alpha as U equivalent, and tritium, reported in picocuries per liter;  
<, less than)

Ident. no.	Ref. no. 1/	Latitude N.			Longitude E.			Date			Time	Gross beta	Gross alpha	Tritium
		Deg.	Min.	Sec.	Deg.	Min.	Sec.	Mo.	Da.	Yr.				
WE00-51F	31	51	26	17	-179	10	58	10	13	72	1325	1.9	<1.8	1.4x10 <sup>3</sup>
LK00-51	32	51	26	17	-179	10	45	10	13	72	1635	3.5	<.2	<640
ST00-51B	33	51	26	18	-179	11	04	10	13	72	1300	4.2	<.7	7.0x10 <sup>3</sup>
LK00-51D	34	51	26	18	-179	11	01	10	13	72	1310	2.6	<.8	960
OBO1-52A	35	51	26	22	-179	11	59	10	13	72	1550	--	--	<640
ST01-51	38	51	26	37	-179	10	47	10	13	72	1605	5.6	<.4	<640
ST01-52	39	51	26	45	-179	11	32	10	13	72	1545	4.3	<.7	790
SE01-52	40	51	26	53	-179	11	40	10	13	72	1555	1.8	<.8	<640
ST01-51A	41	51	26	54	-179	10	57	10	13	72	1615	6.2	<.4	<640
LK02-46	42	51	27	37	-179	06	32	10	15	72	0910	5.8	<.4	<640
LK03-45	43	51	28	05	-179	05	26	10	15	72	1100	4.0	<.5	<640
LK04-46D	46	51	28	14	-179	06	46	10	14	72	1335	7.6	<1.2	<640
ST04-47A	47	51	28	21	-179	06	59	10	15	72	0955	9.4	<.4	<640
LK04-46F	49	51	28	27	-179	06	49	10	15	72	1000	6.1	<.4	<640
ST04-47	51	51	28	41	-179	07	34	10	14	72	1320	4.3	1.7	2/ --
OBO5-47	52	51	28	47	-179	07	35	10	14	72	1323	--	--	<640
ST05-47	53	51	28	47	-179	07	16	10	14	72	1325	5.0	<.8	<640
LK05-46	54	51	28	57	-179	06	23	10	15	72	1010	5.3	<.5	<640
OBO5-46	55	51	29	00	-179	06	47	10	14	72	1320	--	--	<640
LK05-45	56	51	29	01	-179	05	55	10	15	72	1020	4.3	<.5	<640
ST07-40	57	51	30	04	-179	01	01	10	14	72	1435	4.5	<.6	<640
ST09-36	58	51	31	32	-179	58	24	10	14	72	1420	2.7	<.5	<640
LK14-36	59	51	33	58	-179	58	23	10	14	72	1400	3.3	<.4	<640

1/ Reference numbers used for location on figures 1, 2, and 3.

2/ Tritium sample destroyed in shipment.



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