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Environmental Surveillance at Hanford for CY-1975 Data

April 1976

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**Prepared for the Energy Research
and Development Administration
under Contract E(45-1):1830**

Battelle
Pacific Northwest Laboratories

BNWL-1980

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ENVIRONMENTAL SURVEILLANCE AT HANFORD
FOR CY-1975 DATA

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Occupational and Environmental Safety
Department

April 1976

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ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1975 DATA

INTRODUCTION

This document contains detailed data collected by the Hanford Environmental Surveillance program during 1975. Summaries and evaluation of the data appear in the parent report BNWL-1979. Environmental Surveillance responsibilities at Hanford are divided between Hanford Environmental Health Foundation (HEHF) and Battelle-Northwest (BNW). HEHF is responsible for measuring all nonradiological air quality and sanitary water parameters of interest. BNW is responsible for measuring radiological parameters in all environmental media of significance and for measuring both radiological and non-radiological parameters of Columbia River water and ground water.

A brief description of the method of sample collection, a description of the locations of sample collection during 1975, and a list of tables are available at the beginning of each section. Any questions regarding specific entries should be referred to the authors.

I. RADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE DURING 1975

I. RADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE DURING 1975

Radioactivity in the atmosphere was sampled by a network of 17 perimeter and 5 distant continuous air samplers during 1975. These locations are shown in Figure I-1. Each air sampler maintains a flow of 2.5 m³/hr. through a particle filter (Hollingsworth and Vose Company, HV-70) and a 6-inch long charcoal cartridge. The filters are collected biweekly and analyzed for gross beta and alpha activity after waiting 7 days to allow the short-lived radon and thoron daughters to decay. The filters are composited into groups according to geographical location and analyzed by gamma spectrometry monthly and for Sr-90 and plutonium quarterly. The composite groups are:

Inner Northeast Quadrant: Consists of filters from Othello, Connell, Berg Ranch, Wahluke Wm, and Cooke Bros.

Inner Southeast Quadrant: Consists of filters from Richland, Pasco, Byers Landing, Baxter Substation, RRC CP #63, and RRC CP #64.

Inner Southwest Quadrant: Consists of filters from Rattlesnake Spring, ERC, Benton City, and Prosser Barricade.

Inner Northwest Quadrant: Consists of filters from Yakima Barricade, Vernita, and Wahluke #2.

Outer Northeast Quadrant: Consists of filters from Moses Lake and Washtucna.

Outer Southeast Quadrant: Consists of filters from Walla Walla and McNary Dam.

Outer Western Quadrant: Consists of filters from Sunnyside.

The following tables are included in Section I:

Table I-1. Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1975

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FIGURE I-1. Hanford Environmental Air Sampling Locations During 1975

TABLE I-1, Part A. Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

(b)

Approx. Wk. on Date	Perimeter Communities																
	Benton City	ERC	Rattlesnake Springs	Yakima Barricade	Jernita Bridge	Wahluke #2	Othello	Connell	Berg Ranch	Wahluke Watermaster	Cooke Bros.	Baxter Substation	Byers Landing	Richland	Pasco	RRC CP#63	RRC CP#64
1/2						0.13	0.15	0.11	0.11	0.11		0.11					
1/8	0.16	0.12	0.13	0.06	0.12	0.17	0.16	0.14	0.14	0.15	0.16	0.13	0.17	0.14	0.12		
1/15																	
1/22	0.16	0.18	0.18	0.18	0.17	0.21	0.15	0.17	0.20	0.19	0.16	0.16	0.19	0.16	0.20		
1/29																	
2/5	0.19	0.18	0.13	0.22	0.17	0.16	0.17	0.16	0.28	0.15	0.16		*	0.16	0.20		
2/12																	
2/19	0.17	0.17	0.14	0.17	0.17	0.26	0.22	0.21	0.14	0.23	0.21	0.13	0.20	0.12	0.17		
2/26																	
3/5	0.20	0.18	0.21	0.18	0.21	0.12	0.15	0.14	0.17	0.13	0.18	0.08	0.22	0.12	0.21		
3/12																	
3/19	0.12	0.16	0.16	0.16	0.13	0.10	0.15	0.18	0.18	0.16	0.17	0.13	0.14	0.05	0.15		
3/26																	
4/2	0.17	*	*	0.19	0.14	0.16	0.15	0.16	0.20	*	0.17	0.15	0.16	0.18	0.18		
4/9																	
4/16	0.18	0.10	*	0.20	0.16	0.17	0.15	0.17	0.05	0.12	0.07	0.12	0.15	0.16	0.17		
4/23																	
4/30	0.18	0.23	0.11	0.21	0.20	0.13	0.15	0.14	0.22	0.11	0.18	0.13	0.17	0.25	0.18		
5/7																	
5/14	0.10	0.06	0.12	0.12	0.13	0.12	0.12	0.16	0.16	0.13	0.09	0.11	0.14	0.14	0.14		
5/21																	
5/28	0.14	0.18	0.15	0.15	0.14	0.09	0.17	0.12	0.09	0.09	0.13	0.08	0.14	0.12	0.14		
6/4																	
6/11	0.08	0.07	0.10	0.08	0.08	0.06	*	0.08	0.08	0.06	0.06	0.08	0.11	0.09	0.09		
6/18																	
6/25	0.08	0.11	0.08	0.13	0.08		0.10			0.09	0.10	0.07	0.09	0.06	0.11	0.08	0.09

* Invalid sample.

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.
(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-1, Part A. (Cont'd) Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. Wk. on Date	Perimeter Communities																
	Benton City	ERC	Rattlesnake Springs	Yakima Barricade	Vernita Bridge	Wahluke #2	Othello	Connell	Berg Ranch	Wahluke Watermaster	Cooke Bros.	Baxter Substation	Byers Landing	Richland	Pasco	RRC CP#63	RRC CP#64
7/2						0.09	0.13	0.10	0.12	0.14	0.14	0.09					
7/9	0.08	0.06	0.08	0.09	0.07	0.07	0.08			0.08	0.07		0.08	0.06	0.08	0.07	0.06
7/16						0.07	0.04	0.08	0.07	0.06	0.05	*					
7/23	0.06	0.06	0.06	0.07	0.06		0.05			0.06	0.07		0.06	0.05	*	0.04	0.05
7/30						*	0.04	0.06	0.03	0.03	0.05	0.04					
8/6	0.04	0.05	0.04	0.07	0.04		0.04			0.03	0.04		0.05	0.04	0.05	0.05	0.03
8/13						0.04	0.03	0.03	0.03	*		0.04					
8/20	0.03	0.04	0.02	0.04	0.03						0.02		0.03	*	0.03	0.03	0.03
8/27						0.05	0.03	0.05	0.05	0.04		0.04					
9/3	0.05	0.06	0.05	0.08	0.06	0.08	0.06	0.07	0.08	0.09	0.05	0.07	0.06	0.03	0.07	0.06	0.05
9/10																	
9/17	0.05	0.05	0.06	0.05	0.05		0.04	0.06	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.03	0.03
9/24						0.05	*	0.02	0.04	0.03	0.03	0.04	0.03	0.03	0.02	0.03	0.02
10/1	0.06	0.05	0.04	0.04	0.04						0.04		0.04	0.05	0.05	0.03	0.03
10/8						0.04		0.02	0.04	0.03		0.04	0.03	0.03	0.02	0.03	0.02
10/15	0.02	0.04	0.03	0.04	0.03		0.03	0.04	0.03	0.02	0.03	*	0.03	0.03	0.02	0.03	0.02
10/22						0.02	0.04	0.04	0.03		0.01		0.03	0.03	0.02	0.03	0.02
10/29	0.02	0.02	0.02	*	0.02		0.03	0.04	0.02	0.03	0.05	*	0.03	0.04	0.04	0.04	0.05
11/5						0.05	0.04	0.04	0.04	0.05			0.03	0.04	0.04	0.03	0.02
11/12	0.04	0.05	0.07	*	0.04		0.03	0.03	0.03	0.03	0.03	0.01	0.04	0.03	0.04	0.04	0.05
11/19						0.03	0.03	0.03	0.03	0.03	0.03		0.04	0.03	0.04	0.03	0.02
11/26	0.03	0.02	0.03	0.03	0.02		0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.04	0.04	0.05
12/3						0.05	0.05	0.05	0.04	0.04			0.04	0.05	0.04	0.04	0.05
12/10	0.05	0.05	0.04	0.05	0.05						0.04	0.04	0.04	0.05	0.04	0.04	0.05
12/17						0.05	0.05	0.05	0.04	0.04			0.04	0.05	0.04	0.03	0.03
12/23	0.04	0.03	0.05	0.05	0.07						0.05		0.04	0.05	0.04	0.03	0.03
Average ± 2 sample deviations	0.10 $\pm$ 0.12	0.09 $\pm$ 0.12	0.09 $\pm$ 0.11	0.11 $\pm$ 0.13	0.10 $\pm$ 0.12	0.10 $\pm$ 0.12	0.10 $\pm$ 0.13	0.10 $\pm$ 0.12	0.10 $\pm$ 0.15	0.09 $\pm$ 0.11	0.09 $\pm$ 0.11	0.09 $\pm$ 0.09	0.10 $\pm$ 0.12	0.09 $\pm$ 0.12	0.10 $\pm$ 0.13	0.05 $\pm$ 0.04	0.04 $\pm$ 0.04

* Invalid sample

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.
(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-1, Part B. Concentration of Radioactive Beta Particulates in the Air of the Hanford Environs - 1975(a)

Units 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. Wk. (b) on Date	Distant Communities				
	Moses Lake	Washtucna	Walla Walla	McNary	Sunnyside
1/3	0.09	0.10	0.11		0.09
1/10				0.15	
1/17	0.15	0.18			0.13
1/24				0.15	
1/31	0.19		0.18		0.18
2/7		0.17	0.17	0.17	
2/14	0.16				0.11
2/21		0.19	0.17	0.15	
2/28	0.22				0.20
3/7		0.20	0.16	0.17	
3/14	0.16				0.12
3/21		*	0.16	0.15	
3/28	0.18	0.06			0.18
4/4			0.15	0.19	
4/11	0.23	0.16			0.20
4/18			0.22	0.20	
4/25	0.18				0.17
5/2		0.09	0.19	0.20	
5/9	0.16				0.20
5/16			0.14	0.12	
5/23	0.16				0.12
5/30			0.14	0.13	
6/6	0.10				0.08
6/13			0.06	0.04	
6/20	0.07	0.07			0.06
6/27			0.07	0.08	

* Invalid sample

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-1, Part B. (cont'd) Concentration of Radioactive Beta Particulates
in the Air of the Hanford Environs - 1975(a)

Units 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. Wk. on Date	Distant Communities				
	Moses Lake	Washtucna	Walla Walla	McNary	Sunnyside
7/7	0.13				0.09
7/11		0.05		0.07	
7/18	0.06				0.07
7/25			0.06	0.04	
8/1	0.05	0.05			0.04
8/8			0.04	0.04	
8/15	0.04				
8/22		0.03	0.03	0.03	
8/29	0.04				0.04
9/5		0.04		0.05	
9/12	0.08		0.07		0.06
9/19				0.10	
9/26	0.05		0.04		0.05
10/3				0.03	
10/10	0.03	0.04	0.04		0.03
10/17				0.03	
10/24	0.03	0.03	0.04		0.04
10/31				0.04	
11/7	0.02	0.03	0.03		*
11/14				0.04	
11/21	0.04	0.03			0.03
11/28				0.02	
12/5	0.02	0.04	0.03		0.03
12/12				0.03	
12/19	0.04	0.04	0.03		*
12/26				0.08	
Average ± 2 sample standard deviations					
	0.10 $\pm$ 0.14	0.08 $\pm$ 0.12	0.10 $\pm$ 0.13	0.09 $\pm$ 0.13	0.10 $\pm$ 0.12

* Invalid sample

- (a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.
- (b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-2, Part A. Concentrations of Radioactive Alpha Particulates
in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. Wk. (b) on Date	Perimeter Communities			
	Richland	Byers Landing	Berg Ranch	Benton City
1/2			*	
1/8	0.001	0.002		0.001
1/15			0.0007	
1/22	0.001	0.002		0.0008
1/29			0.002	
2/5	0.002	**		0.002
2/12			0.002	
2/19	0.0009	*		0.002
2/26			*	
3/5	0.002	0.002		0.001
3/12			0.001	
3/19	*	0.002		0.001
3/26			0.002	
4/2	0.002	0.001		0.001
4/9			0.001	
4/16	0.002	0.001		*
4/23			*	
4/30	0.001	0.001		0.002
5/7			0.001	
5/14	0.001	*		0.001
5/21			0.001	
5/28	0.0008	0.0008		0.0008
6/4			0.0009	
6/11	0.001	0.0009		0.001
6/18			*	
6/25	0.002	0.001		0.001

* Result was less than the analytical limit of 0.0004×10^{-12} $\mu\text{Ci/ml}$.

** Invalid sample

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-2 Part A (cont'd) Concentrations of Radioactive Alpha Particulates
in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. Wk. on Date	Perimeter Communities			
	Richland	Byers Landing	Berg Ranch	Benton City
7/2			0.002	
7/9	0.0008	0.001		0.0009
7/16			0.001	
7/23	0.001	0.002		0.001
7/30			0.0005	
8/6	0.001	0.001		0.0008
8/13			0.0009	
8/20	**	0.001		0.002
8/27			0.001	
9/3	0.003	0.003		0.002
9/10			0.002	
9/17	0.001	0.002		0.001
9/24			0.0008	
10/1	0.001	0.001		0.0008
10/8			0.001	
10/15	0.001	0.001		0.0009
10/22			0.0009	
10/29	0.002	0.003		0.0006
11/5			0.0008	
11/12	0.001	0.001		0.002
11/19			0.001	
11/26	0.001	0.002		0.001
12/3			0.0006	
12/10	0.002	0.001		0.002
12/17			0.002	
12/23	0.003	0.002		0.001
Annual Average (c)	<0.001	<0.001	<0.001	<0.001

* Result was less than the analytical limit of 0.0004×10^{-12} $\mu\text{Ci/ml}$.

** Invalid sample.

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

(c) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

TABLE I-2, Part B. Concentrations of Radioactive Alpha Particulates
in the Air of the Hanford Environs - 1975^(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Distant Communities

Approx. (b) Wk. on Date	Walla Walla	McNary	Approx. (b) Wk. on Date	Walla Walla	McNary
1/3	0.0008				
1/10		0.001	7/4		
1/17			7/11		0.001
1/24		0.001	7/18		
1/31	0.002		7/25	0.002	0.001
2/7	0.002	0.002	8/1		
2/14			8/8	0.001	0.001
2/21	0.0005	0.0008	8/15		
2/28			8/22	0.001	0.002
3/7	0.001	0.002	8/29		
3/14			9/5		0.002
3/21	0.001	0.002	9/12	0.002	
3/28			9/19		0.002
4/4	0.0009	0.001	9/26	0.001	
4/11			10/3		0.0007
4/18	0.001	0.002	10/10	0.002	
4/25			10/17		0.002
5/2	0.001	0.0009	10/24	0.002	
5/9			10/31		0.002
5/16	0.002	0.001	11/7	0.001	
5/23			11/14		0.001
5/30	0.002	0.001	11/21		
6/7			12/5	0.0008	0.0006
6/13	0.0008	0.0005	12/12		0.002
6/20					
6/27	0.0008	0.002	Annual ^(c) Average	0.001 $\pm$ 0.001	0.001 $\pm$ 0.001

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

(c) Annual average $\pm$ 2 sample standard deviations.

TABLE I-3. Concentrations of ^{131}I in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. (b) Wk. on Date	Baxter Substation	Byers Landing	Richland	Benton City
1/2	*			
1/8		*	*	*
1/15	*			
1/22		*	*	*
1/29	*			
2/5		*	*	*
2/12	*			
2/19		*	*	*
2/26	*			
3/5		*	*	*
3/12	*			
3/19		*	*	*
3/26	*			
4/2		*	*	*
4/9	*			
4/16		*	*	*
4/23	*			
4/30		*	*	*
5/7	*			
5/14		*	*	*
5/21	*			
5/28		*	*	*
6/4	*			
6/11		*	*	*
6/18	*			
6/25		*	*	*

* Indicates the results were less than the analytical limit of 0.07×10^{-12} $\mu\text{Ci/ml}$.

- (a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.
- (b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

TABLE I-3 (Cont'd). Concentrations of ^{131}I in the Air of the Hanford Environs - 1975(a)

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Approx. (b) Wk. on Date	Baxter Substation	Byers Landing	Richland	Benton City
7/2	*			
7/9		*	*	*
7/16	*			
7/23		*	*	*
7/30	*			
8/6		*	*	*
8/13	*			
8/20		*	*	*
8/27	*			
9/3		*	*	*
9/10	*			
9/17		*	*	*
9/24	*			
10/1		*	*	*
10/8	*			
10/15		*	*	*
10/22	*			
10/27		*	*	*
11/5	*			
11/12		*	*	*
11/19	*			
11/26		*	*	*
12/3	*			
12/10		*	*	*
12/17	*			
12/24		*	*	*
Annual Average	*	*	*	*

* Indicates the results were less than the analytical limit of 0.07×10^{-12} $\mu\text{Ci/ml}$.

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

Table I-4. Concentrations of Tritium in the Air of the Hanford Environs - 1975(a)

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Approx. on Date	Berg Ranch	Vol. Water (ml)	Baxter Substation	Vol. Water (ml)	Richland	Vol. Water (ml)
Anal. Limit	370		370		370	
1/15	*	21	*	12		
1/22					*	20
1/29	*	20	*	20		
2/5					200	10
2/12	150	15	*	15		
2/19					4100	15
2/26	760	15	1700	15		
3/5					1300	12
3/12	570	10	320	10		
3/19					460	5
3/26	*	20	420	10		
4/2					550	18
4/9	210	15	190	20		
4/16					230	5
4/23	*	20	*	12		
4/30					520	8
5/7	270	10	630	22		
5/14					690	16
5/21	590	20	1900	10		
5/28					*	7
6/4	1900	12	500	5		
6/11					350	15
6/18	2100	5	400	12		
6/25					2800	4
7/2	*	18	5100	20		
7/9					*	7
7/16	470	10	*	5		
7/23					*	5
7/30	670	12	370	14		

* Result was less than the analytical limit.

- (a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.
- (b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

Table I-4 (Cont'd). Concentrations of Tritium in the Air of the Hanford Environs - 1975(a)

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Approx. on Date	Berg Ranch	Vol. Water (ml)	Baxter Substation	Vol. Water (ml)	Richland	Vol. Water (ml)
Anal. Limit	370		370		370	
8/6					760	10
8/13	410	14	320	18	**	**
8/20						
8/27	560	14	510	10	*	6
9/3						
9/10	530	10	3000	11	*	10
9/17						
9/24	30000	20	8300	12		
10/1					2100	7
10/8	1900	12	*	2		
10/15					660	20
10/22	*	28	*	20	*	20
10/29						
11/5	*	32	**	**	*	25
11/12						
11/19	*	15	**	**	*	22
11/26						
12/3	*	23	640	18	*	8
12/10						
12/17	*	30	100	17	*	38
12/26						
Annual Average ^(c)	<1600		<1100		<650	

* Result was less than the analytical limit.

** Invalid sample.

(a) The tabled values are generally for 2-week periods, the week in which the value is tabled and the following week.

(b) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated.

(c) The annual average has been calculated from the result reported for each analysis including less-than values.

TABLE I-5. Concentrations of Specific Radionuclides on Selected Air Filter Composites - 1975

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Date	⁷ Be	⁵⁴ Mn	⁶⁰ Co	⁶⁵ Zn	⁹⁰ Sr	⁹⁵ ZrNb	¹⁰⁶ Ru	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁴ CePr	Total Pu
Analytical Limit (a)	0.04	0.002	0.004	0.007	0.0002	0.003	0.06	0.02	0.004	0.04	0.000002
<u>Inner Southwest Quadrant</u>											
1/22	0.03	*	*	*		0.02	0.09	*	*	*	
2/19	*	*	*	*		0.03	*	*	*	0.03	
3/19	*	0.007	*	*	0.002	0.03	0.16	*	0.003	0.07	0.00001
4/30	0.05	0.003	*	*		0.02	0.09	*	0.005	0.04	
5/28	0.03	*	*	*		0.03	0.20	*	*	0.05	
6/25	0.09	*	*	*	0.002	0.01	0.09	*	*	0.03	0.00001
7/23	0.12	*	*	*		0.005	*	*	*	*	
8/20	*	*	*	*		*	0.15	*	*	*	
9/17	*	*	*	*	0.0008	*	0.23	*	*	*	0.000008
10/29	0.05	*	*	*		*	0.12	*	*	*	
11/26	0.03	*	*	*		*	0.10	*	*	*	
12/23	0.04	*	*	*	0.003	*	*	*	*	*	0.000003
Annual Average (b)	<0.04	<0.0009	*	*	0.002	<0.01	<0.11	*	<0.0006	<0.02	0.000008
<u>Inner Northwest Quadrant</u>											
1/29	*	*	*	*		0.02	0.12	*	*	*	
2/26	0.06	*	*	*		0.04	*	*	*	0.06	
3/31	0.10	0.01	*	*	0.0004	0.03	0.04	*	0.005	0.06	0.00002
4/30	0.08	0.004	*	*		0.02	0.04	*	0.006	0.03	
5/28	0.15	*	*	*		0.03	0.06	*	0.007	0.04	
6/25	0.07	*	*	*	0.002	0.01	0.13	*	*	*	0.00004
7/30	0.08	*	*	*		0.005	0.10	*	*	*	
8/27	*	*	*	*		*	0.10	*	*	*	
9/29	0.09	*	*	*	0.0007	*	0.11	*	*	*	0.000009
10/29	0.09	*	*	*		*	*	*	*	*	
11/26	*	*	*	*		*	0.08	*	*	*	
12/31	*	*	*	*	0.001	*	0.10	*	*	*	*
Annual Average (b)	<0.06	<0.001	*	*	0.001	<0.01	<0.08	*	<0.001	<0.02	<0.00002
<u>Inner Northeast Quadrant</u>											
1/31	0.03	*	*	*		0.02	0.09	*	*	0.02	
2/28	0.03	*	*	*		0.04	*	*	*	0.03	
3/28	0.05	*	*	*	0.0003	0.04	0.12	*	0.002	0.05	0.00002
4/25	0.08	0.005	*	*		0.03	0.11	*	0.006	0.05	
5/24	0.07	*	*	*		0.02	0.10	*	0.003	0.04	
6/24	0.03	*	*	*	0.003	0.01	0.20	*	*	0.04	0.00004
7/30	0.12	*	*	*		0.004	*	*	0.002	*	
8/29	0.04	*	*	*		*	0.06	*	*	*	
9/26	0.04	*	*	*	0.0004	*	0.18	*	*	*	0.000007
10/30	0.03	*	*	*		*	0.10	*	*	*	
11/25	0.06	*	*	*		*	0.04	*	*	*	
12/29	0.04	*	*	*	0.0002	*	0.08	*	*	*	*
Annual Average (b)	0.05	<0.0004	*	*	0.001	<0.01	<0.09	*	<0.0009	<0.02	<0.00002
<u>Inner Southeast Quadrant</u>											
1/20	*	*	*	*		0.02	0.22	*	*	*	
2/18	*	*	0.09	*		0.04	*	*	*	0.05	
3/31	*	*	*	*	0.002	0.03	*	*	0.003	0.05	0.00002
4/28	0.09	0.004	*	*		0.03	0.07	*	0.007	0.07	
5/27	0.04	*	*	*		0.02	0.16	*	0.004	0.03	
6/23	*	*	*	*	*	0.01	0.18	*	*	*	0.00009
7/30	0.06	*	*	*		0.004	0.10	*	*	*	
8/27	0.04	*	*	*		0.001	0.10	*	*	*	
9/29	0.04	*	*	*	0.00008	*	0.11	*	*	*	0.000008
10/31	0.04	*	*	*		*	0.12	*	*	*	
11/24	*	*	*	*		*	0.08	*	*	*	
12/29	0.04	*	*	*	0.0006	*	0.06	*	*	*	0.000006
Annual Average (b)	<0.03	<0.0003	<0.007	*	<0.0007	<0.01	<0.10	*	<0.0009	<0.02	0.00003

No entry indicates no analysis was made.

* Indicates result was less than analytical limit.

(a) The analytical limit shown is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

TABLE I-5. (Cont'd) Concentrations of Specific Radionuclides on Selected Air Filter Composites - 1975

Units of 10^{-12} $\mu\text{Ci/ml}$ of Air (Continuous Samples)

Date	^7Be	^{54}Mn	^{60}Co	^{65}Zn	^{90}Sr	$^{95}\text{ZrNb}$	^{106}Ru	^{134}Cs	^{137}Cs	$^{144}\text{CePr}$	Total Pu
Analytical Limit(a)	0.04	0.002	0.004	0.007	0.0002	0.003	0.06	0.02	0.004	0.04	0.000002
Outer Northeast Quadrant											
1/17	*	*	*	*		0.02	0.16	*	*	*	
2/21	*	*	*	*		0.03	*	*	*	*	
3/21	*	0.01	*	*	0.002	0.02	0.11	*	*	0.06	0.00002
4/25	0.10	0.004	*	*		0.02	*	*	0.006	*	
5/23	*	*	*	*		0.03	0.16	*	*	*	
6/20	*	*	*	*	0.003	0.01	0.15	*	*	*	0.0001
7/18	0.14	*	*	*		0.007	*	*	*	*	
8/29	*	*	*	*		*	0.09	*	*	*	
9/26	*	*	*	*	0.001	*	0.19	*	*	*	0.00002
10/24	*	*	*	*		*	0.14	*	*	*	
11/21	*	*	*	*		*	0.18	*	*	*	
12/19	*	*	*	*	0.001	*	*	*	*	*	*
Annual Average(b)	<0.03	<0.001	*	*	0.002	<0.01	<0.11	*	<0.0008	<0.01	<0.00004
Outer Southeast Quadrant											
1/24	*	*	*	*		0.02	0.19	*	*	*	
2/21	0.03	*	*	*		0.03	*	*	*	0.03	
3/21	*	*	*	*	0.002	0.03	0.20	*	*	*	0.00002
4/19	*	*	*	*		0.03	0.14	*	*	*	
5/30	0.07	*	*	*		0.03	0.16	*	*	*	
6/26	*	*	*	*	0.002	0.02	0.14	*	*	*	0.00004
7/25	0.09	*	*	*		0.005	0.10	*	*	*	
8/22	*	*	*	*		*	0.22	*	*	*	
9/26	0.06	*	*	*	0.0008	*	0.14	*	*	*	0.00002
10/31	*	*	*	*		*	0.15	*	*	*	
11/14	*	*	*	*		*	*	*	*	*	
12/20	0.05	*	*	*	0.001	*	0.05	*	*	*	0.000006
Annual Average(b)	<0.03	*	*	*	0.002	<0.01	<0.13	*	*	<0.005	0.00002
Outer Western Quadrant											
1/27	*	*	*	*		0.02	0.18	*	*	*	
2/24	*	*	*	*		0.03	*	*	*	*	
3/24	0.18	0.01	*	0.02	0.01	0.03	*	*	0.01	*	0.00002
4/21	0.12	*	*	*		0.03	*	*	*	*	
5/19	*	*	*	*		0.04	*	*	*	*	
6/16	*	*	*	*	0.003	*	0.27	*	*	*	0.00006
7/28	*	*	*	*		*	0.17	*	*	*	
8/27	*	*	*	*		*	*	*	*	*	
9/22	*	*	*	*	0.0005	*	*	*	*	*	0.000005
10/20	*	*	*	*		*	*	*	*	*	
11/17	*	*	*	*		*	*	*	*	*	
12/29	*	*	*	*	0.001	*	*	*	*	*	0.00005
Annual Average(b)	<0.03	<0.001	*	<0.001	0.004	<0.01	<0.09	*	<0.002	*	0.00003

No entry indicates no analysis was made.

* Indicates result was less than analytical limit.

(a) The analytical limit shown is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

II. NONRADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE

II. NONRADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE

HEHF, under contract to ERDA, has the responsibility for monitoring the nonradiological quality of the atmosphere in the Hanford environs. Monitoring activities during 1975 included 24-hour sequential sampling for NO_2 and SO_2 at three locations across the Columbia River from Richland, North Richland, and Hanford 300-Area operations. HEHF documents should be referred to for greater detail but the following tables, obtained from HEHF, contain data obtained during 1975 regarding NO_2 and SO_2 concentrations in the atmosphere of the Hanford environs.

The following tables are included in Section II:

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Table II-1. Nitrogen Dioxide in the Air at the Hobkirk Ranch - 1975	II-2
Table II-2. Nitrogen Dioxide in the Air at the Gillum Ranch - 1975	II-4
Table II-3. Nitrogen Dioxide in the Air at the Sullivan Ranch - 1975	II-6
Table II-4. Sulfur Dioxide in the Air of the Hobkirk Ranch, the Gillum Ranch and at the Sullivan Ranch - 1975(a)	II-8

TABLE II-1. Nitrogen Dioxide in the Air^(a)
at the Hobkirk Ranch - 1975

(Units of ppm in Air)

<u>Date</u>	<u>Concentration NO₂</u>	<u>Date</u>	<u>Concentration NO₂</u>
1/8	0.002	4/2	0.003
1/9	0.002	4/3	0.004
1/10	0.001	4/4	0.003
1/11	0.001	4/5	0.003
1/12	0.003	4/6	0.003
1/13	0.002	4/7	0.004
1/14	0.002	4/8	0.005
1/22	0.009	4/16	0.004
1/23	0.004	4/17	0.003
1/24	0.003	4/18	0.002
1/25	0.002	4/19	0.002
1/26	0.002	4/20	0.004
1/27	0.0003	4/21	0.004
2/7	0.004	4/22	0.003
2/8	0.002	4/30	0.005
2/9	0.003	5/1	0.004
2/10	0.003	5/2	0.003
2/11	0.004	5/3	0.002
2/19	0.004	5/4	0.002
2/20	0.002	5/5	0.002
2/21	0.004	5/6	0.003
2/22	0.004	5/14	0.006
2/23	0.001	5/15	0.004
2/24	0.010	5/16	0.004
2/25	0.002	5/17	0.003
3/5	0.003	5/18	0.002
3/6	0.002	5/19	0.002
3/7	0.002	5/20	0.003
3/8	0.002	5/28	0.006
3/9	0.003	5/29	0.005
3/10	0.003	5/30	0.004
3/11	0.002	5/31	0.004
3/19	0.004	6/1	0.006
3/20	0.003	6/2	0.004
3/21	0.004	6/3	0.003
3/23	0.002	6/11	0.004
3/25	0.002	6/12	0.002

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-1. (Cont'd) Nitrogen Dioxide in the Air
at the Hobkirk Ranch - 1975(a)

(Units of ppm in Air)

Date	Concentration NO ₂	Date	Concentration NO ₂
6/13	0.002	9/20	0.002
6/14	0.002	9/21	0.005
6/15	0.005	9/22	0.004
6/16	0.002	9/23	0.004
6/17	0.004	10/15	0.003
7/9	0.005	10/16	0.003
7/10	0.012	10/17	0.002
7/11	0.010	10/18	0.003
7/12	0.001	10/19	0.004
7/13	0.001	11/12	0.005
7/14	0.005	11/13	0.004
7/15	0.005	11/14	0.013
7/23	0.004	11/15	0.003
7/25	0.004	11/16	0.002
7/26	0.004	11/17	0.004
7/28	0.004	11/19	0.007
7/29	0.003	11/20	0.006
8/6	0.004	11/21	0.004
8/7	0.004	11/22	0.005
8/8	0.004	11/23	0.004
8/9	0.006	11/24	0.006
8/10	0.001	12/3	0.002
8/11	0.003	12/4	0.006
8/12	0.001	12/5	0.001
8/20	0.006	12/6	0.003
8/21	0.004	12/7	0.003
8/22	0.006	12/8	0.009
8/23	0.004	12/9	0.003
9/3	0.004	12/18	0.010
9/4	0.003	12/19	0.009
9/5	0.005	12/20	0.012
9/6	0.006	12/21	0.002
9/7	0.002	12/22	0.008
9/8	0.004	12/23	0.008
9/17	0.006		
9/18	0.003	Average	0.004
9/19	0.008		

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-2. Nitrogen Dioxide in the Air at
the Gillum Ranch - 1975(a)

(Units of ppm in Air)

<u>Date</u>	<u>Concentration NO₂</u>	<u>Date</u>	<u>Concentration NO₂</u>
1/8	0.002	4/8	0.003
1/9	0.002	4/16	0.004
1/10	0.007	4/17	0.003
1/11	0.001	4/18	0.003
1/12	0.004	4/19	0.002
1/13	0.004	4/20	0.002
1/14	0.002	4/21	0.004
1/22	0.006	4/22	0.004
1/23	0.004	4/30	0.005
1/24	0.003	5/1	0.004
1/25	0.002	5/2	0.002
1/26	0.002	5/3	0.001
1/27	0.003	5/4	0.002
2/19	0.006	5/5	0.002
2/20	0.002	5/14	0.003
2/21	0.007	5/15	0.006
2/22	0.006	5/16	0.004
2/24	0.005	5/17	0.004
2/25	0.006	5/18	0.002
3/5	0.002	5/19	0.002
3/6	0.002	5/20	0.004
3/8	0.002	6/25	0.004
3/9	0.003	6/26	0.003
3/10	0.002	6/27	0.002
3/11	0.003	6/28	0.002
3/19	0.005	6/30	0.003
3/20	0.003	7/9	0.008
3/21	0.004	7/10	0.006
3/23	0.002	7/11	0.008
3/24	0.002	7/12	0.004
3/25	0.002	7/23	0.003
4/2	0.004	7/25	0.003
4/3	0.003	7/26	0.004
4/4	0.002	7/27	0.004
4/5	0.003	7/28	0.002
4/6	0.004	7/29	0.002
4/7	0.004	8/6	0.004

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-2. (Cont'd) Nitrogen Dioxide in the Air at
the Gillum Ranch - 1975(a)

(Units of ppm in Air)

<u>Date</u>	<u>Concentration NO₂</u>	<u>Date</u>	<u>Concentration NO₂</u>
8/7	0.002	10/6	0.005
8/8	0.004	10/29	0.009
8/9	0.004	10/30	0.003
8/10	0.003	10/31	0.004
8/20	0.009	11/1	0.002
8/21	0.005	11/2	0.002
8/22	0.004	11/3	0.005
8/23	0.004	11/4	0.011
9/4	0.005	11/12	0.004
9/5	0.006	11/13	0.007
9/6	0.006	11/14	0.004
9/7	0.007	11/15	0.002
9/8	0.006	11/16	0.001
9/17	0.003	11/17	0.003
9/18	0.004	11/19	0.005
9/19	0.001	12/3	0.002
9/20	0.003	12/4	0.005
9/21	0.005	12/5	0.005
9/22	0.004	12/6	0.005
10/1	0.005	12/7	0.005
10/2	0.006	12/18	0.014
10/3	0.004	12/19	0.008
10/4	0.004	12/20	0.011
10/5	0.006		
		Average	0.004

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-3. Nitrogen Dioxide in the Air at
the Sullivan Ranch - 1975(a)

(Units of ppm in Air)

<u>Date</u>	<u>Concentration NO₂</u>	<u>Date</u>	<u>Concentration NO₂</u>
1/8	0.001	4/17	0.003
1/9	0.001	4/18	0.002
1/10	0.002	4/19	0.003
1/11	0.001	4/20	0.003
1/12	0.001	4/21	0.006
1/13	0.001	4/22	0.004
1/14	0.001	6/25	0.004
1/22	0.005	6/26	0.001
1/23	0.004	6/27	0.002
1/24	0.003	6/28	0.003
1/25	0.002	6/29	0.003
1/26	0.003	6/30	0.003
1/27	0.004	7/1	0.004
2/8	0.005	8/20	0.004
2/9	0.011	8/21	0.005
2/10	0.003	8/22	0.006
2/19	0.004	8/23	0.001
2/20	0.004	9/3	0.001
2/22	0.006	9/4	0.001
2/23	0.004	9/5	0.002
2/24	0.005	9/6	0.002
2/25	0.003	9/7	0.001
3/18	0.004	9/8	0.010
3/20	0.002	9/9	0.004
3/21	0.003	9/17	0.006
3/22	0.002	9/18	0.002
3/23	0.002	9/19	0.003
3/24	0.004	9/20	0.002
3/25	0.002	9/21	0.003
4/2	0.002	9/22	0.003
4/3	0.003	9/23	0.004
4/4	0.002	10/15	0.001
4/5	0.004	10/16	0.003
4/6	0.003	10/17	0.002
4/7	0.006	10/18	0.003
4/8	0.005	10/19	0.002
4/16	0.004	10/20	0.002

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-3. (Cont'd) Nitrogen Dioxide in the Air at the Sullivan Ranch - 1975(a)

(Units of ppm in Air)

<u>Date</u>	<u>Concentration NO₂</u>	<u>Date</u>	<u>Concentration NO₂</u>
10/21	0.002	11/19	0.003
10/29	0.003	12/3	0.001
10/30	0.003	12/4	0.002
10/31	0.002	12/5	0.003
11/1	0.001	12/6	0.002
11/2	0.002	12/7	0.009
11/3	0.002	12/8	0.009
11/4	0.004	12/18	0.011
11/12	0.003	12/19	0.006
11/13	0.004	12/20	0.004
11/14	0.002	12/21	0.004
11/15	0.001	12/22	0.008
11/16	0.001	12/23	0.008
11/17	0.002		
		Average	0.003

(a) HEHF supplied the tabled data. The reader is encouraged to refer to their documents for greater detail.

TABLE II-4. Sulfur Dioxide in the Air at
the Hobkirk Ranch, the Gillum
Ranch and at the Sullivan
Ranch - 1975^(a)

A total of 327 samples were collected from the sequential monitoring stations and analyzed for SO₂ during CY-1975. All 24-hour integrated concentrations were less than 0.005 ppm.

(a) HEHF supplied this data. The reader is encouraged to refer to their documents for greater detail.

III. RADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

III. RADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

Columbia River water sampling locations during 1975 are as follows:

Priest Rapids: Continuous "Filter-Resin" sample.

Vernita Bridge: Weekly grab sample.

100-B: Cumulative sample.

Hanford Powerline: Monthly grab sample.

300 Area: Cumulative sample.

300 Area: Continuous "Filter-Resin" sample.

Richland pumping dock: Cumulative sample.

Richland pumping dock: Weekly grab sample.

Bonneville Dam: Cumulative sample.

The grab samples are simply a collection of a desired quantity of river water on a single occasion during either a weekly or monthly time period. Cumulative samplers collect approximately 30 milliliters of water every 30 minutes from a constant stream of pumped river water. The "filter ion-exchange-resin" sampler is operated by Battelle's Radiological Chemistry Section. The sampler operates continuously during which the river water flows (~ 3 liters/hour) through a nylon filter which removes all macro ($>5\mu$) particles, through a series of fiberglass filters which remove all particles greater than 0.3μ , and then the filtered water flows through the resin to remove all soluble radionuclides with the obvious exception of tritium. The filters and resin are changed biweekly and counted by Battelle's Radiological Chemistry Section with a high sensitivity multi-dimensional (coincidence) gamma ray spectrometer to measure the different radionuclides. All of the other samples are analyzed by U. S. Testing Company.

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TABLE III-1. Concentrations of Radionuclides in the Columbia River at Priest Rapids - (Filtration Ion Exchange Column - Soluble Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Sampling Interval	<u>⁴⁰K</u>	<u>⁵⁴Mn</u>	<u>⁶⁰Co</u>	<u>⁶⁵Zn</u>	<u>⁹⁵Zr-Nb</u>	<u>¹⁰⁶Ru</u>	<u>¹³⁷Cs</u>	<u>¹⁵²Eu</u>	<u>²²⁶Ra</u>	<u>²²⁸Th</u>
Approximate Detection Level	0.009	0.014	0.00045	0.0045	0.0045	0.0045	0.0045	0.018	0.0023	0.00045
10/9 10/23	0.45	*	0.0032	*	*	0.06	*	*	0.01	0.004
10/23 11/6	0.41	*	*	*	*	0.06	*	*	0.01	0.002
11/6 11/20	0.69	*	*	*	*	0.05	*	*	0.04	0.001
11/20 12/4	0.62	*	0.00045	*	*	0.05	*	*	0.03	0.004
12/4 12/18	0.32	*	*	*	*	0.05	*	*	0.02	0.003
12/18 12/31	0.44	*	*	*	*	0.04	*	*	0.01	0.002
Average (b)	0.49 $\pm$ 0.28	*	<0.0009	*	*	0.05	*	*	0.02 $\pm$ 0.03	0.003 $\pm$ 0.002

* Less than the approximate detection level.

(a) ⁹⁰Sr and ²³⁹Pu data not available at time of publication.

(b) Average and two sample standard deviations shown if radionuclides detected in all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

TABLE III-2. Concentrations of Radionuclides in the Columbia River at Priest Rapids - (Filtration Ion Exchange Column - Particulate Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Sampling Interval	<u>^{40}K</u>	<u>^{54}Mn</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>$^{95}\text{ZrNb}$</u>	<u>^{106}Ru</u>	<u>^{137}Cs</u>	<u>^{152}Eu</u>	<u>^{226}Ra</u>	<u>^{228}Th</u>
Approximate Detection Level	0.009	0.014	0.00045	0.0045	0.0045	0.0045	0.0045	0.018	0.0023	0.00045
10/9 10/23	0.002	*	*	0.004	*	0.004	*	*	0.002	0.001
10/23 11/6	0.02	*	*		*	0.007	*	*	0.003	0.002
11/6 11/20	0.02	*	*	*	*	0.004	0.0009	*	0.004	*
11/20 12/4	*	*	*	*	*	*	*	*	0.002	0.0009
12/4 12/18	*	*	*	*	*	*	*	*	0.002	0.001
12/18 12/31	*	*	*	*	*	0.002	*	*	0.002	0.0004
Average ^(b)	<0.02	*	*	<0.001	*	<0.004	<0.003	*	0.002 $\pm$ 0.002	<0.001

* Less than the approximate detection level.

(a) ^{90}Sr and ^{239}Pu data not available at time of publication.

(b) Average and two sample standard deviations shown if radionuclide detected in all samples. Otherwise a less-than number is calculated from the other results including less-than values.

TABLE III-3. Concentrations of Tritium in the Columbia River
at Vernita (Monthly Composites of Weekly Grab
Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

<u>Date</u>	<u>^3H</u>
Analytical Limit(a)	240
1/28	400
2/25	*
3/25	470
4/29	670
5/27	*
6/24	400
7/29	390
8/26	260
9/30	*
10/28	860
11/25	550
12/30	*
Annual Average ^(b)	<370

* Result was less than the analytical limit.

(a) The analytical limit shown is the average of the individual
analytical limits for all samples.

(b) The annual average has been calculated from the result reported
for each analysis including less-than values.

TABLE III-4. Concentrations of Radionuclides in
the Columbia River at 100-B
(Monthly Composite of Weekly Cumulative Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Date	⁴⁶ Sc	⁵¹ Cr	⁶⁰ Co	⁶⁵ Zn	⁹⁰ Sr	¹³⁷ Cs	²³⁹ Pu	Alpha
Analytical Limit(a)	15	210	9.7	20	0.06	12	0.01	0.23
12/30 1/27	*	*	1.2	*	0.30	*		*
1/27 2/24	*	*	*	*	0.65	*		0.30
2/24 3/31	*	*	*	*	0.24	*	*	0.21
3/31 4/28	*	*	*	*	0.76	*		*
4/28 5/27	*	*	*	*	0.39	*		*
5/27 6/30	*	*	*	*	0.30	*		*
6/30 7/28	*	*	*	*	0.14	*		*
7/28 8/25	*	*	*	*	0.36	*		0.59
8/25 9/29	*	*	*	*	0.28	*	0.04	*
9/29 10/27	*	*	*	*	0.17	*		*
10/27 11/24	*	*	*	*	0.54	*		*
11/24 12/29	*	*	*	*	0.14	*		*
Annual Average (b)	*	*	<3.4	*	0.35±0.40	*	<0.02	<0.18

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two sample standard deviations shown if radionuclides detected in all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

No entry indicates no analysis was made.

TABLE III-5. Beta Activity in the Columbia River at 100-B
(Cumulative Samples) - 1975

(Units of Counts/Minute/Milliliter)

<u>Date</u>		<u>Beta</u>
Anal. Limit ^(a)		0.002
12/30	1/27	0.003
1/27	2/24	*
2/24	3/31	*
3/31	4/28	*
4/28	5/27	*
5/27	6/30	0.003
6/30	7/28	*
7/28	8/25	*
8/25	9/29	*
9/29	10/27	*
10/27	11/24	*
11/24	12/29	*
Annual Average ^(b)		<0.003

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

TABLE III-6. Concentrations of Radionuclides in the Columbia River at Hanford Powerline Crossing (Grab Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)								
<u>Date</u>	<u>^3H</u>	<u>^{46}Sc</u>	<u>^{51}Cr</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>	<u>Alpha</u>
Anal. Limit ^(a)	260	7	120	5	10	0.12	3.8	0.20
1/9	1200	*	*	*	*	0.37	*	0.16
2/14	*	*	*	*	*	0.27	*	0.16
3/6	360	*	*	*	*	0.51	*	0.90
4/10	510	*	*	*	*	0.22	*	*
5/8	500	*	*	*	*	0.57	*	*
6/5	*	*	*	*	*	1.5	1.8	*
7/10	*	*	*	*	*	4.8	*	*
8/8	*	*	*	*	*	0.17	*	*
9/4	*	*	*	*	*	0.40	*	0.18
10/9	*	*	*	*	*	0.26	*	*
11/6	900	*	*	*	*	0.28	*	0.24
12/5	*	*	*	*	*	0.29	*	0.69
Annual Average ^(b)	<360	*	*	*	*	0.80 $\pm$ 2.6	<0.36	<0.27

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two sample standard deviations shown if radionuclide detected in all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

No entry indicates no analysis was made.

TABLE III-7. Concentrations of Radionuclides in the Columbia River
at the 300 Area - (Filtration Ion Exchange Column -
Soluble Samples) - 1974-1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Sampling Interval	^{40}K	^{54}Mn	^{60}Co	^{65}Zn	$^{95}\text{ZrNb}$	^{106}Ru	^{134}Cs	^{137}Cs	$^{140}\text{BaLa}$	^{152}Eu	^{226}Ra	^{228}Th
Approximate Detection Level	0.009	0.01	0.005	0.005	0.005	0.005	0.0005	0.005	0.005	0.02	0.002	0.0005
1974 ^(a)												
11/11 12/3	0.67	*	0.007	0.003	0.006	0.14	*	*	*	*	0.04	*
12/3 12/18	0.64	*	0.007	*	0.02	0.12	*	*	*	*	0.05	0.002
12/18 1/2	0.65	*	0.008	*	0.02	0.13	*	*	*	*	0.04	*
1975												
2/26 3/14	0.65	*	0.004	0.002	0.05	0.09	*	*	*	*	0.04	0.003
3/14 3/28	0.41	*	0.005	0.002	0.04	0.09	*	*	*	*	0.04	0.002
3/28 4/17	0.43	*	0.006	0.002	0.04	0.08	*	*	*	*	0.05	0.002
4/17 5/9	0.39	*	0.004	*	0.03	0.10	*	*	*	*	0.03	0.003
5/9 5/28	0.22	*	0.02	*	0.05	0.16	*	*	*	*	0.06	0.002
5/28 6/17	0.70	0.05	0.009	0.003	0.07	0.12	0.06	0.29	0.24	*	*	0.0009
6/17 7/1	0.52	0.04	0.01	*	0.05	0.09	0.04	0.21	*	*	*	0.04
7/1 7/14	0.58	0.02	0.01	*	0.02	0.11	0.004	0.05	*	*	0.01	0.007
7/14 7/30	0.59	*	0.009	*	0.01	0.09	0.002	0.04	*	*	0.04	0.003
7/30 8/14	0.64	*	0.008	*	*	0.07	*	*	*	*	0.03	0.002
8/14 9/4	0.53	*	0.01	*	*	0.06	*	*	*	*	0.03	0.003
9/4 9/13	0.64	*	0.01	*	*	0.06	*	*	*	*	0.04	0.01
9/13 10/7	0.36	*	0.01	*	*	0.06	*	*	*	*	0.02	0.004
10/7 10/21	0.60	*	0.01	*	*	0.08	*	*	*	*	0.02	0.003
10/21 11/4	0.60	*	0.008	*	*	0.07	*	*	*	*	0.02	0.001
11/4 11/18	0.52	*	0.01	*	*	0.07	*	*	*	*	0.03	0.001
11/18 12/2	0.41	*	0.007	*	*	0.06	*	*	*	*	0.03	*
12/2 12/16	0.42	*	0.009	*	*	0.06	*	*	*	*	0.02	0.001
12/16 12/30	0.22	*	0.008	*	*	0.06	*	*	*	*	0.02	0.001
1975 Average ^(b)	0.50 $\pm$ 0.28	<0.01	0.009 $\pm$ 0.007	<0.004	<0.02	0.08 $\pm$ 0.05	<0.006	<0.04	<0.02	*	<0.03	<0.005

* Less than approximate detection level.

(a) November and December 1974 data is shown in this table as it was omitted in the 1974 data report.

(b) Average and two sample standard deviations shown if radionuclide detected in all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

TABLE III-8. Concentrations of Radionuclides in the Columbia River at the 300 Area (Filtration Ion Exchange Column - Particulate Samples) - 1974-1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Sampling Interval	^{40}K	^{54}Mn	^{60}Co	^{65}Zn	$^{95}\text{ZrNb}$	^{106}Ru	^{134}Cs	^{137}Cs	$^{140}\text{BaLa}$	^{152}Eu	^{226}Ra	^{228}Th
Approximate Detection Level	0.009	0.01	0.0005	0.005	0.005	0.005	0.0005	0.005	0.005	0.02	0.002	0.005
1974(a)												
11/11 12/3	*	*	0.005	0.001	0.008	0.007	*	*	*	*	*	0.005
12/3 12/18	*	*	0.003	0.002	0.02	0.006	*	*	*	*	*	0.001
12/18 1/2	*	*	0.005	0.004	0.01	0.006	*	*	*	*	*	0.001
1975												
2/26 3/14	*	*	0.002	*	0.02	0.006	*	*	*	*	*	0.0009
3/14 3/28	*	*	0.002	*	0.03	0.006	*	*	*	*	*	0.001
3/28 4/17	*	*	0.008	*	0.03	0.01	*	*	*	*	*	0.001
4/17 5/9	*	*	0.006	0.007	0.03	0.01	*	*	*	*	0.002	0.002
5/9 5/28	0.02	0.02	0.008	0.004	0.04	0.02	0.002	0.02	*	*	0.005	0.003
5/28 6/17	0.11	0.54	0.11	0.09	0.38	0.07	0.03	0.13	0.04	*	0.06	0.004
6/17 7/1	*	0.14	0.03	0.01	0.08	0.02	0.006	0.02	*	*	0.003	0.002
7/1 7/14	*	0.03	0.01	*	0.04	0.009	0.002	0.01	*	*	*	0.003
7/14 7/30	*	0.02	0.009	*	0.01	0.007	0.002	0.007	*	*	*	0.001
7/30 8/14	0.02	0.02	0.01	*	*	0.01	*	0.009	*	*	0.005	0.003
8/14 9/4	0.01	0.01	0.009	*	*	0.007	*	0.007	*	*	0.003	0.003
9/4 9/18	*	0.01	0.01	*	*	0.004	*	*	*	*	0.006	0.003
9/18 10/7	0.01	0.01	0.01	*	*	0.004	*	*	*	0.002	0.004	0.004
10/7 10/21	0.03	0.02	0.02	0.004	*	0.007	*	0.01	*	0.005	0.004	0.002
10/21 11/4	*	*	0.01	*	*	0.006	*	*	*	*	0.004	0.002
11/4 11/18	*	*	0.007	*	*	0.004	*	*	*	*	0.003	*
11/18 12/2	*	*	0.006	*	*	0.002	*	*	*	*	0.002	*
12/2 12/16	*	*	0.006	*	*	0.008	*	*	*	*	0.003	0.002
12/16 12/30	*	*	0.004	*	*	0.003	*	*	*	*	0.003	0.0007
1975 Average(b)	<0.02	<0.04	0.02 $\pm$ 0.05	<0.008	<0.04	0.01 $\pm$ 0.03	<0.002	<0.01	<0.006	<0.005	<0.006	<0.002

* Less than approximate detection level.

(a) November and December 1974 data is shown in this table as it was omitted in the 1974 data report.

(b) Average and two sample standard deviation shown if radionuclide detected in all samples. Otherwise a less-than number is calculated from the other results including less-than values.

TABLE III-9. Concentrations of ^{90}Sr and ^{239}Pu in the Columbia River at the 300 Area (Filtration Ion Exchange Column) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$)

<u>Sampling Interval</u>		^{90}Sr		^{239}Pu	
		<u>Soluble Sample</u>	<u>Particulate Sample</u>	<u>Soluble Sample</u>	<u>Particulate Sample</u>
7/1	10/7	0.18	0.0006	0.0013	0.000013
10/7	12/30	0.006	(a)	0.0012	(a)

(a) Data not available at time of publication.

TABLE III-10. Concentrations of Radionuclides in
the Columbia River at Richland
(Weekly Cumulative Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Date	^{46}Sc	^{51}Cr	^{60}Co	^{65}Zn	^{131}I	^{137}Cs
Analytical Limit(a)	30	360	24	47	0.5	26
12/31 1/7	*	*	*	*	*	*
1/7 1/14	*	*	*	*		*
1/14 1/21	*	*	*	*	*	*
1/21 1/28	*	*	*	*		*
1/28 2/4	*	*	*	*	*	*
2/4 2/11	*	*	*	*		*
2/11 2/18						
2/19 2/25	*	*	*	*		*
2/25 3/4	*	*	*	*	*	*
3/4 3/11	*	*	*	*		*
3/11 3/18	*	*	*	*	*	*
3/18 3/25	*	*	*	*		*
3/25 4/1	*	*	*	*	*	*
4/1 4/8	*	*	*	*		*
4/8 4/15	*	*	*	*	*	*
4/15 4/22	*	*	*	*		*
4/22 4/29	*	*	*	*	*	*
4/29 5/6	*	*	*	*		*
5/6 5/13	*	*	*	*	*	*
5/13 5/19	*	*	*	*		*
5/20 5/27	*	*	*	*	*	*
5/27 6/3	*	*	*	*		*
6/3 6/10	*	*	*	*	*	*
6/10 6/17	*	*	*	62		*
6/17 6/24	*	*	*	*	*	*
6/24 7/1	*	*	*	*		*
7/1 7/8	*	*	*	*	*	*
7/8 7/15	*	*	*	*		*
7/15 7/22	*	*	*	*	*	*
7/22 7/29	*	*	*	*		*
7/29 8/5	*	*	*	*	*	*
8/5 8/12	*	*	*	*		*
8/12 8/19	*	*	*	*		*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

No entry indicates no analysis was made.

TABLE III-10 (Cont'd). Concentrations of Radionuclides in
the Columbia River at Richland
(Weekly Cumulative Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Date	<u>^{46}Sc</u>	<u>^{51}Cr</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{131}I</u>	<u>^{137}Cs</u>
Analytical Limit(a)	30	360	24	47	0.5	26
8/19 8/26	*	*	*	*		*
8/26 9/2	*	*	*	*	*	*
9/2 9/9	*	*	*	*		*
9/9 9/16	*	*	*	*	*	*
9/16 9/23	*	*	*	*		*
9/23 9/30	*	*	*	*	*	*
9/30 10/7	*	*	*	*		*
10/7 10/14	*	*	*	*	*	*
10/14 10/21	*	*	*	*		*
10/21 10/28	*	*	*	*	*	*
10/28 11/4	*	*	*	*		*
11/4 11/11	*	*	*	*	*	*
11/11 11/18	*	*	*	*		*
11/18 11/25	*	*	*	*	*	*
11/25 12/2	*	*	*	*		*
12/2 12/9	*	*	*	*	*	*
12/9 12/16	*	*	*	*		*
12/16 12/23	*	*	*	*	*	*
12/23 12/30	*	*	*	*		*
Annual Average ^(b)	*	*	*	<3.6	*	*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

No entry indicates no analysis was made.

TABLE III-11. Concentrations of Radionuclides in
the Columbia River at Richland
(Monthly Composite of Weekly Cumulative
Samples) - 1975

		(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)				
<u>Date</u>		<u>Alpha</u>	<u>^3H</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>	<u>^{239}Pu</u>
Analytical Limit(a)		0.25	360	0.07	1.3	0.011
12/31	1/28	0.32	940	0.36	*	
1/28	2/25	0.37	220	0.56	*	
2/25	3/25	0.30	400	0.09	*	*
3/25	4/29	*	640	0.57	*	
4/29	5/27	*	550	0.91	*	
5/27	6/24	0.34	130	0.73	*	
6/24	7/29	*		0.21	*	
7/29	8/26	0.53	560	0.31	*	
8/26	9/30	0.53	*	0.39	*	0.02
9/30	10/28	0.24	*	0.14	*	
10/28	11/25	0.44	470	1.0	*	
11/25	12/30	0.83	*	0.28	*	
Annual Average ^(b)		<0.34	<370	0.46 ± 0.59	*	<0.01

* Result was less-than analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide detected all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

No entry indicates no analysis was made.

TABLE III-12. Concentrations of Tritium in the Columbia River at Richland (Monthly Composite of Weekly Grab Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

<u>Date</u>	<u>^3H</u>
Analytical ^(a) Limit	327
6/27	380
7/29	480
8/26	*
9/30	360
10/28	820
11/25	390
12/30	*
Annual Average ^(b)	<470

* Result was less-than analytical limit.

(a) The analytical limit shown is the average of the individual analytical limits for each sample.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

TABLE III-13. Beta Activity in the Columbia River at Richland
(Cumulative Samples) - 1975

(Units of Counts/Minute/Milliliter)

<u>Date</u>		<u>Beta</u>	<u>Date</u>		<u>Beta</u>
Anal. Limit ^(a)		0.005	7/29	8/4	*
12/31	1/7	*	8/4	8/12	*
1/7	1/14	*	8/12	8/19	*
1/14	1/21	*	8/19	8/26	*
1/21	1/28	*	8/26	9/2	*
1/28	2/4	*	9/2	9/9	*
2/4	2/11	*	9/9	9/16	*
2/11	2/18	*	9/16	9/23	*
2/18	2/25	*	9/23	9/30	*
2/25	3/4	*	9/30	10/7	*
3/4	3/11	*	10/7	10/14	*
3/11	3/18	*	10/14	10/21	*
3/18	3/25	*	10/21	10/28	*
3/25	4/1	*	10/28	11/4	*
4/1	4/8	*	11/4	11/11	*
4/8	4/15	*	11/11	11/18	*
4/15	4/22	*	11/18	11/25	*
4/22	4/29	*	11/25	12/2	*
4/29	5/6	*	12/2	12/9	*
5/6	5/12	*	12/9	12/16	*
5/12	5/19	*	12/16	12/23	*
5/19	5/27	*	12/23	12/30	*
5/27	6/3	*	Annual Average ^(b)		<0.003
6/3	6/10	*			
6/10	6/17	*			
6/17	6/24	*			
6/24	7/1	0.011			
7/1	7/8	*			
7/8	7/15	*			
7/15	7/22	*			
7/22	7/29	*			

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

No entry indicates no analysis was made.

TABLE III-14. Concentrations of Radionuclides in the
Columbia River at Bonneville Dam
(Composite of Weekly Cumulative Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

<u>Date</u>	<u>^{46}Sc</u>	<u>^{51}Cr</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	40	420	32	55	29
11/25/74 1/10/75 ^(a)	*	*	*	*	*

* Result was less than the analytical limit.

(a) Sample was discontinued.

IV. NONRADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

IV. NONRADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

Physical and chemical parameters measured during 1975 included pH, turbidity, dissolved oxygen, nitrate ion and temperature. Biological measurements included coliform organisms and BOD. Enterococci measurements were made to clarify the types of coliforms present.

All parameters were measured upstream of Hanford operations at Vernita Bridge and downstream of the majority of Hanford operations at the Hanford 300 Area or at Richland.

The following tables are included in Section IV:

	<u>Page</u>
Table IV-1. Water Quality Measurements of Columbia River at Vernita - 1975	IV-2
Table IV-2. Water Quality Measurements in Columbia River at the 300 Area - 1975	IV-4
Table IV-3. Nitrates in Columbia River Water at Vernita and Richland - 1975	IV-11
Table IV-4. Temperatures of Columbia River Water at Vernita Bridge and Richland - 1975	IV-12
Table IV-5. Biological Measurements of Columbia River Water at Vernita and Richland - 1975	IV-13

TABLE IV-1. Water Quality Measurements of
Columbia River at Vernita - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
1/7	7.7	1.4	11.3
1/21	8.0	1.4	11.6
1/28	8.1	1.2	12.6
2/11	8.3	1.2	12.5
2/25	8.1	1.2	13.2
3/4	7.7	0.8	12.8
3/11	7.8	1.0	13.0
3/18	8.2	0.7	13.8
3/25	8.1	0.4	
4/1	8.2	1.1	
4/8	8.2	1.3	
4/15	8.2	1.8	13.9
4/22	8.1	1.7	
4/29	8.3	1.9	13.9
5/6	8.4	3.2	13.4
5/13	8.2	3.4	13.8
5/20	8.1	5.4	12.5
6/3	8.3		12.4
6/10	7.8		9.8
6/17	8.3		11.4
6/24	8.1		11.8
7/1	8.5		11.3
7/8	7.9		11.6
7/15	7.7	2.6	
7/22	8.2	2.0	
8/5	7.7	2.7	10.5
8/12	8.0	1.4	10.5
8/19	8.3	1.8	10.7
8/27	7.8	3.0	10.3
9/2	8.3	1.8	
9/9	8.4	1.5	10.2
9/16	8.2	1.3	10.6
9/23	8.4	1.3	10.5
9/30	8.1	1.2	10.7

(a) Jackson Turbidity Units
No entry indicates no measurement was made.

TABLE IV-1 (Cont'd). Water Quality Measurements of
Columbia River at Vernita - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
10/7	8.5	1.8	11.2
10/14	8.2	1.1	11.0
10/21	7.8	1.3	
10/28	8.3	1.0	9.5
11/4	8.4	1.2	9.9
11/11	8.0	1.2	
11/18	7.8	1.1	11.5
11/25	8.1	1.0	11.4
12/2	8.2	1.2	11.4
12/9	7.8	6.5	12.3
12/16	7.9	1.4	12.4
12/23	7.7	1.2	12.6
12/30	7.6	1.3	11.6
Average ^(b)		1.7±2.3	- 11.7±2.4

(a) Jackson Turbidity Units

(b) Average and two sample standard deviations shown. No average is shown for pH because the arithmetic averaging process is not appropriate. pH is a log function ($\text{pH} = \log[\text{H}^+]$) and before determining an average pH, the hydrogen ion concentration, ($[\text{H}^+]$), must be determined for each entry.

No entry indicates no measurement was made.

TABLE IV-2. Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
1/2	7.9	1.5	11.2
1/3	7.8	1.2	11.4
1/6	7.9	1.3	11.1
1/7	7.9	1.4	11.3
1/8	7.8	1.9	11.8
1/9	7.8	1.4	11.4
1/10	8.2	1.4	11.4
1/13	8.5	1.2	11.5
1/14	8.1	1.7	11.5
1/15	8.0	1.5	12.0
1/16	7.8	1.4	11.9
1/17	7.8	1.4	12.3
1/20	8.1	1.3	12.1
1/21	8.6	1.4	11.3
1/22	7.9	1.4	12.5
1/23	7.9		11.8
1/24	8.2	2.1	12.2
1/27	8.0	2.4	12.6
1/28	7.9	1.2	12.2
1/29	8.1	1.1	12.3
1/30	8.0	1.1	12.1
1/31	8.1	1.2	12.2
2/3	8.3	1.0	13.7
2/4	8.0	1.1	12.0
2/5	8.0	1.2	11.7
2/6	7.9	1.0	11.0
2/7	8.8	1.2	
2/10	8.1	1.2	11.8
2/11	8.2	1.2	12.0
2/12	8.2	1.0	11.5
2/13	8.0	1.2	11.5
2/14	7.8	1.4	12.4
2/18	8.2	1.2	12.1
2/19	8.2	1.2	13.5
2/20	8.0	1.2	11.9
2/21	7.9	1.3	13.5

(a) Jackson Turbidity Units

No entry indicates no measurement was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
2/24	7.8	1.5	
2/25	8.4	1.5	13.6
2/26	8.0	0.6	12.3
2/27	7.9	0.6	14.0
2/28	7.8	0.7	12.6
3/3	8.0	0.7	12.9
3/4	7.7	0.8	12.8
3/5	7.9	0.8	13.7
3/6	8.0	1.3	14.0
3/7	7.8	1.1	12.4
3/10	8.0	1.4	12.8
3/11	7.7	1.0	12.8
3/12	7.9	1.0	14.1
3/13	7.9	0.9	13.5
3/14	8.8	1.1	13.5
3/17	8.0	0.7	13.1
3/18	7.9	0.7	13.6
3/19	8.0	0.7	13.0
3/20	8.0	1.1	12.6
3/21	8.1	0.8	12.8
3/24	8.2	1.1	12.6
3/25	8.0	0.4	13.4
3/26	8.0	0.4	12.8
3/27	8.2	0.4	13.2
3/28	7.9	1.1	
3/31	8.1	1.3	
4/1	8.1	1.1	13.8
4/2	8.0	1.0	13.7
4/3	8.6	1.2	
4/4	8.4	1.3	13.6
4/7	8.2	1.2	13.4
4/8	8.0	1.2	
4/10	8.1	1.3	
4/11	8.5	1.5	
4/14	8.5	1.8	13.5
4/15	8.1	1.7	13.5

(a) Jackson Turbidity Units
No entry indicates no measurements was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
4/16	8.0	2.2	13.0
4/17	8.0	1.8	14.0
4/18	8.2	1.8	13.9
4/21	8.1	0.7	13.6
4/22	8.0	2.2	13.8
4/23	8.0	3.3	13.6
4/24	7.9	3.2	13.4
4/25	8.0	2.7	13.8
4/28	8.2	2.0	13.3
4/29	8.0	2.0	13.3
4/30	8.2	2.0	14.1
5/1	8.1	2.2	13.8
5/2	8.1	3.1	
5/5	8.6	3.4	13.6
5/6	8.1	3.1	13.7
5/7	8.3	2.9	12.0
5/8	8.0	3.5	13.2
5/9	8.2	3.5	13.1
5/12	8.2	3.5	13.2
5/13	8.0	3.5	13.3
5/14	8.2	3.5	
5/15	8.4	4.2	12.8
5/16	7.9	3.6	13.2
5/19	8.2	3.1	12.2
5/20	7.8	3.7	12.2
5/21	8.1	5.0	14.0
5/22	7.8	5.2	13.3
5/23	7.9	4.5	12.4
5/27	7.9		13.6
5/28	7.9		13.2
5/29	8.0		13.8
5/30	7.6		13.2
6/2	7.9		12.4
6/3	8.1		13.0
6/4	8.1		13.3
6/5	7.8		12.8

(a) Jackson Turbidity Units
No entry indicates no measurement was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
6/6	7.7		12.2
6/9	8.0		12.0
6/10	7.8		12.0
6/11	8.5		10.2
6/12	8.0		11.0
6/13	7.8		10.8
6/16	8.4		11.6
6/17	8.3		11.3
6/18	7.9		11.2
6/19	8.0		10.6
6/20	7.8		12.0
6/23	7.6		10.2
6/24	7.7		11.2
6/25	7.9		11.3
6/26	7.5		11.6
6/27	7.4		11.6
6/30	7.9		11.5
7/1	7.6		11.8
7/2	7.7		12.0
7/7	8.2		11.8
7/8	8.6		12.1
7/9	8.2		12.2
7/10	7.9		10.7
7/11	7.8		
7/15	8.2		
7/16	8.2		10.6
7/17	7.9	2.0	
7/18	7.8	2.0	
7/21	8.2	1.6	
7/22	8.5	2.0	
7/23	8.0	1.9	
7/24	8.0	2.1	
7/25	8.5	1.9	
7/28	7.9	2.0	
7/29	7.8	2.2	
7/30	7.8	1.7	

(a) Jackson Turbidity Units
No entry indicates no measurement was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
7/31	7.9	2.0	10.1
8/1	8.1	1.7	10.7
8/4	8.3	1.9	10.5
8/5	8.5	3.0	11.0
8/6	8.0	2.3	10.7
8/7	8.1	1.8	10.8
8/8	8.2	2.3	10.9
8/11	7.8	1.9	10.3
8/12	8.6	2.0	10.9
8/13	8.5	2.2	10.6
8/14	7.7	2.1	10.6
8/15	8.0	1.5	11.1
8/18	7.9	2.0	10.3
8/19	7.8	1.3	10.1
8/20	7.8	1.7	10.2
8/21	7.8	1.8	10.5
8/22	7.9	1.8	10.9
8/25	7.7	4.3	9.7
8/26	7.7	3.3	10.1
8/27	7.4	2.4	10.1
8/28	7.6	2.3	10.0
8/29	7.6	2.3	9.9
9/2	7.5	2.0	9.8
9/3	8.0	1.6	11.4
9/4	8.0	1.9	11.4
9/5	7.8	2.2	11.6
9/8	8.4	2.8	9.8
9/9	7.9	3.2	10.0
9/10	7.7		9.8
9/11	8.0	2.1	9.8
9/12	7.8	1.4	10.0
9/15	8.4	1.1	10.4
9/16	8.1	1.0	10.3
9/17	8.2	1.2	9.5
9/18	8.0	1.2	10.4
9/19	8.0	1.2	11.1

(a) Jackson Turbidity Units
No entry indicates no measurement was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
9/22	7.7	1.2	10.6
9/23	8.4	1.3	10.0
9/24	8.4	1.3	10.5
9/25	7.8	1.6	11.2
9/26	8.4	1.3	10.7
9/29	8.8	1.3	11.3
9/30	8.6	1.4	12.4
10/1	8.8	1.4	12.7
10/2	8.5	1.9	11.4
10/3	8.6	1.7	10.4
10/6	8.4	1.7	10.4
10/7	8.5	1.7	10.5
10/8	8.4	1.4	10.9
10/9	8.5	1.6	10.4
10/10	8.3	1.8	10.1
10/13	8.4	1.3	10.8
10/14	8.5	1.5	11.6
10/15	7.4	1.7	11.0
10/16	8.3	1.6	11.1
10/17	7.5	1.4	10.7
10/20	7.8	1.5	
10/21	7.8	1.3	
10/24	7.7	2.8	
10/27	8.3	1.5	
10/28	8.3	1.2	9.4
10/29	8.1	1.0	8.6
10/30	8.2	1.0	
10/31	8.4	1.0	
11/3	7.7	1.3	8.6
11/4	8.4	1.1	9.4
11/5	7.3	1.0	9.4
11/6	7.8	1.2	10.1
11/7	8.1	1.3	10.8
11/10	7.9	1.1	10.5
11/11	7.6	1.1	
11/12	7.6	1.0	9.5

(a) Jackson Turbidity Units
No entry indicates no measurement was made.

TABLE IV-2 (Cont'd). Water Quality Measurements in Columbia River
Water at the 300 Area - 1975.

<u>Date</u>	<u>pH</u>	<u>Turbidity (JTU) (a)</u>	<u>Diss. O₂ (ppm)</u>
11/13	7.9	1.2	10.9
11/14	7.9	1.0	10.3
11/17	7.6	1.0	10.7
11/18	7.7	1.1	10.2
11/19	7.9	1.1	11.7
11/20	7.6	1.0	11.0
11/21	7.7	1.2	11.1
11/24	7.9	1.1	11.0
11/25	7.6	1.1	11.2
11/26	7.8	1.1	11.1
12/1	7.8	1.2	11.4
12/2	7.8	1.8	10.9
12/3	7.7	1.5	10.8
12/4	7.6	1.3	11.2
12/5	7.6	1.2	10.9
12/8	7.8		12.1
12/9	7.8	1.0	12.7
12/10	7.6	6.0	11.6
12/11	7.5	4.5	12.1
12/12	7.4	2.2	12.1
12/15	7.6	1.5	12.2
12/16	7.8	1.5	12.4
12/17	7.9	2.1	12.6
12/18	7.7	1.6	12.6
12/22	7.8	1.3	12.5
12/23	7.8	1.4	12.8
12/26	7.9	1.6	12.6
12/29	7.6	1.8	12.6
12/30	7.5	1.6	12.2
12/31	7.6	1.4	

Average $\pm$ 2
sample standard
deviations

(b)

1.7 $\pm$ 1.8

11.8 $\pm$ 2.5

(a) Jackson Turbidity Units.

(b) No average is shown for pH because the arithmetic averaging process is not appropriate. pH is a log function ($\text{pH} = \log[\text{H}^+]$) and before determining an average pH, the hydrogen ion concentration, ($[\text{H}^+]$), must be determined for each entry.

No entry indicates no measurement was made.

TABLE IV-3. Nitrates in Columbia River Water
at Vernita and Richland - 1975

(Units of ppm in Water)

<u>Date</u>	<u>Vernita</u>	<u>Richland</u>	<u>Date</u>	<u>Vernita</u>	<u>Richland</u>
Analytical Limit	0.10	0.10			
1/7	0.22	0.33	8/5	*	*
1/9		0.46	8/12	*	*
1/21	0.34	0.30	8/19	0.10	0.14
1/28	0.33	0.32	8/26	0.14	0.19
2/4	0.39	0.35	9/2	0.12	0.12
2/11	0.39	0.37	9/9	0.15	0.12
2/18	0.34	0.44	9/16	*	*
2/25	0.31	0.32	9/23	0.13	0.14
3/4	0.53	0.46	9/30	0.13	0.11
3/11	0.41	0.44	10/7	0.18	0.24
3/18	0.40	0.38	10/14	0.19	0.13
3/25	0.35	0.37	10/21	0.36	0.35
4/1	0.42	0.41	10/28	0.15	0.18
4/8	0.43	0.50	11/4	0.16	0.19
4/15	0.63	0.54	11/11	0.24	0.24
4/22	0.37	0.35	11/18	0.22	0.31
4/29	0.31	0.32	11/25	0.26	0.24
5/6	0.22	0.15	12/2	0.31	0.42
5/13	0.14	0.10	12/9	0.34	0.34
5/20	0.16	0.20	12/16	0.43	0.48
5/27	0.15	0.22	12/23	0.43	0.41
6/3	0.15	0.12	12/30	0.36	0.36
6/10	0.13	0.21			
6/17	0.14	0.10	Annual		
6/24	*	*	Average	<0.25	<0.26
7/1	*	*			
7/8	0.10	0.14			
7/15	*	*			
7/22	*	*			
7/29	*	*			

* Result was less than the analytical limit shown.
No entry indicates no analysis was made.

TABLE IV-4. Temperatures of Columbia River Water
at Vernita Bridge and Richland - 1975

(Monthly Average °C)

<u>Date</u>	<u>Vernita Bridge</u>	<u>Richland</u>
January	4.4	4.6
February	2.3	2.8
March	3.3	3.9
April	5.9	6.9
May	9.8	10.7
June	13.7	14.3
July	17.2	18.3
August	18.0	18.8
September	18.6	18.8
October	15.7	15.3
November	11.6	10.6
December	6.7	6.9
Average ± 2 sample standard deviations	10.6±11.7	11.0±11.7

TABLE IV-5. Biological Measurements of Columbia River
Water at Vernita and Richland - 1975

<u>Date</u>	<u>Vernita</u>			<u>Richland</u>		
	<u>Coliform</u> <u>(per 100 ml)</u>	<u>Enterococci</u> <u>(per 100 ml)</u>	<u>BOD</u> <u>(mg/l)</u>	<u>Coliform</u> <u>(per 100 ml)</u>	<u>Enterococci</u> <u>(per 100 ml)</u>	<u>BOD</u> <u>(mg/l)</u>
1/22	20	7	4.3	28	30	4.4
2/4				54	51	5.8
3/5	12	4	4.2	8	16	3.6
4/29	26	11	4.5	42	36	4.0
5/28	22	14	3.0	34	24	4.3
8/20	30	25	3.8	50	30	3.3
9/16	64	26	4.0	56	38	4.0
11/19	44	19	4.2	40	13	4.0
12/16	21	8	3.5	10	3	2.4
Average $\pm$ 2 standard deviations	30 $\pm$ 33	14 $\pm$ 17	3.9 $\pm$ 1.0	36 $\pm$ 35	27 $\pm$ 29	4.0 $\pm$ 1.8

V. RADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

V. RADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

In addition to the samples of river water collected at Priest Rapids, Vernita Bridge, 100-B, Hanford Powerline, 300 Area, and Richland, cumulative sanitary water sampling (30 milliliters every 30 minutes) was conducted at 100-N, 300 Area, and Richland. The samples collected at the 300 Area were submitted on a weekly basis for gamma spectrometry, gross beta, and gross alpha analyses. The Richland samples were submitted weekly for gross beta and gross alpha analyses and composited monthly for gamma spectrometry and ^{90}Sr analyses. Samples from 100-N were submitted weekly for gross beta analysis and composited monthly for gamma spectrometry and ^3H analyses.

The following tables are included in Section V:

	<u>Page</u>
Table V-1 Concentrations of Radionuclides in 100-N Drinking Water (Monthly Composite of Weekly Cumulative Samples) - 1975	V-2
Table V-2 Beta Activity in Drinking Water at Richland, 300 Area, and 100-N (Cumulative Samples) - 1975	V-3
Table V-3 Concentrations of Radionuclides in 300 Area Drinking Water (Cumulative Samples) - 1975	V-5
Table V-4 Concentrations of Radionuclides in Richland Drinking Water (Cumulative Samples) - 1975	V-7

TABLE V-1 Concentrations of Radionuclides in 100-N Drinking Water
(Monthly Composite of Weekly Cumulative Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Date	^3H	^{46}Sc	^{51}Cr	^{60}Co	^{65}Zn	^{137}Cs
Anal. Limit ^(a)	230	28	360	22	44	25
12/30 1/27	860					
1/27 2/24	480	*	*	*	*	*
2/24 3/24	560	*	*	*	*	*
3/24 4/28	490	*	*	*	*	*
4/28 5/27		*	*	*	*	*
5/27 6/23	460	*	*	*	*	*
6/23 7/28	550					
7/28 8/25	350					
8/25 9/29						
9/29 10/27	712					
10/27 11/24	420					
11/24 12/29		*	*	*	*	*
Avr $\pm$ 2 ^(b) standard deviations	540 $\pm$ 310	*	*	*	*	*

* Result was less than the analytical limit.

- (a) The analytical limit shown for each isotope is the average of the individual analytical limit for all samples.
- (b) Average and two sample standard deviations shown if radionuclides detected in all samples. Otherwise, a less-than number is calculated from the other results, including less-than values.

No entry indicates no specific analysis was made.

TABLE V-2 Beta Activity in Drinking Water at Richland, 300 Area,
and 100-N (Cumulative Samples) - 1975

(Units of Counts/Minute/Milliliter)

<u>Date</u>		<u>Richland</u>	<u>300 Area</u>	<u>100-N</u>
Anal. Limit ^(a)		0.005	0.005	0.005
12/30	1/6	*	*	*
1/6	1/13	*	*	*
1/13	1/20	*	*	*
1/20	1/27	*	*	*
1/27	2/3	*	*	*
2/3	2/10	*	*	*
2/10	2/18	*	*	*
2/18	2/24	*	*	*
2/24	3/3	*	*	*
3/3	3/10	*	*	*
3/10	3/17	*	0.005	*
3/17	3/24	*	*	*
3/24	3/31	*	*	*
3/31	4/7	*	*	*
4/7	4/14	*	*	*
4/14	4/21	*	*	*
4/21	4/28	*	*	*
4/28	5/5	*	*	*
5/5	5/12	*	*	*
5/12	5/19	*	*	*
5/19	5/27	*	*	*
5/27	6/2	*	*	*
6/2	6/9	*	*	*
6/9	6/16	*	*	*
6/16	6/23	*	*	*
6/23	6/30	*	0.007	0.006

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

TABLE V-2. (Cont'd) Beta Activity in Drinking Water at Richland,
300 Area and 100-N (Cumulative Samples) - 1975

(Units of Counts/Minute/Milliliter)

Date		Richland	300 Area	100-N
Anal. Limit ^(a)		0.005	0.005	0.005
6/30	7/7	*	*	*
7/7	7/14	*	*	0.006
7/14	7/21	*	*	*
7/21	7/28	*	*	*
7/28	8/4	*	*	*
8/4	8/11	*	*	*
8/11	8/18	*	*	*
8/18	8/25	*	*	*
8/25	9/2	*	*	*
9/2	9/8	*	*	*
9/8	9/15	*	*	*
9/15	9/22	*	*	*
9/22	9/29	0.006	*	*
9/29	10/6	*	*	*
10/6	10/13	*	*	*
10/13	10/20	*	*	*
10/20	10/27	*	*	*
10/27	11/3	*	*	0.006
11/3	11/10	*	*	*
11/10	11/17	*	*	*
11/17	11/24	*	*	0.005
11/24	12/1	*	*	*
12/1	12/8	*	*	*
12/8	12/15	*	*	*
12/15	12/22	*	*	*
12/22	12/29	*	*	0.024
Annual Average ^(b)		<0.003	<0.003	<0.005

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

TABLE V-3 Concentrations of Radionuclides in 300 Area Drinking Water
(Cumulative Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

<u>Date</u>		<u>^{46}Sc</u>	<u>^{51}Cr</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{137}Cs</u>	<u>Alpha</u>
Anal. Limit ^(a)		30	380	24	47	26	0.40
12/30	1/6	*	*	*	*	*	0.37
1/6	1/13	*	*	*	*	*	0.30
1/13	1/20	*	*	*	*	*	*
1/20	1/27	*	*	*	*	*	0.53
1/27	2/3	*	*	*	*	*	0.45
2/3	2/10	*	*	*	*	*	0.23
2/10	2/18	*	*	*	*	*	*
2/18	2/24	*	*	*	*	*	0.57
2/24	3/3	*	*	*	*	*	0.74
3/3	3/10	*	*	*	*	*	1.0
3/10	3/17	*	*	*	*	*	0.39
3/17	3/24	*	*	*	*	*	0.86
3/24	3/31	*	*	*	*	*	0.88
3/31	4/7	*	*	*	*	*	0.88
4/7	4/14	*	*	*	*	*	0.88
4/14	4/21	*	*	*	*	*	*
4/21	4/28	*	*	*	*	*	0.46
4/28	5/5	*	*	*	*	*	0.58
5/5	5/12	*	*	*	*	*	*
5/12	5/19	*	*	*	*	*	1.2
5/19	5/27	*	*	*	*	*	*
5/27	6/2	*	*	*	*	*	*
6/2	6/9	*	*	*	*	*	*
6/9	6/16	*	*	*	*	*	*
6/16	6/23	*	*	*	*	*	*
6/23	6/30	*	*	*	*	*	*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

TABLE V-3. (Cont'd) Concentrations of Radionuclides in 300 Area
Drinking Water (Cumulative Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Date		^{46}Sc	^{51}Cr	^{60}Co	^{65}Zn	^{137}Cs	Alpha
Anal. Limit ^(a)		30	380	24	47	26	0.40
6/30	7/7	*	*	*	*	*	0.53
7/7	7/14	*	*	*	*	*	*
7/14	7/21	*	*	*	*	*	*
7/21	7/28	*	*	*	*	*	*
7/28	8/4	*	*	*	*	*	0.53
8/4	8/11	*	*	*	*	*	*
8/11	8/18	*	*	*	*	*	0.62
8/18	8/25	*	*	*	*	*	0.62
8/25	9/2	*	*	*	*	*	*
9/2	9/8	*	*	*	*	*	0.56
9/8	9/15	*	*	*	*	*	0.69
9/15	9/22	*	*	*	*	*	0.65
9/22	9/29	*	*	*	*	*	0.62
9/29	10/6	*	*	*	*	*	0.47
10/6	10/13	*	*	*	*	*	*
10/13	10/20	*	*	*	*	*	0.63
10/20	10/27	*	*	*	*	*	1.2
10/27	11/3	*	*	*	*	*	*
11/3	11/10	*	*	*	*	*	0.79
11/10	11/17	*	*	*	*	*	0.97
11/17	11/24	*	*	*	*	*	0.51
11/24	12/1	*	*	*	*	*	0.90
12/1	12/8	*	*	*	*	*	0.57
12/8	12/15	*	*	*	*	*	0.69
12/15	12/22						*
12/22	12/29						0.83
Annual Average ^(b)		*	*	*	*	*	<0.51

* Result was less than the analytical limit.

(a) The analytical limit for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

No entry indicates no analysis was made.

TABLE V-4 Concentrations of Radionuclides in Richland
Drinking Water (Cumulative Samples) - 1975

(Units of 10^{-9} μ Ci/ml of Water)

Date		⁴⁶ Sc	⁵¹ Cr	⁶⁰ Co	⁶⁵ Zn	⁹⁰ Sr	¹³⁷ Cs	Alpha
Anal. Limit ^(a)		10	140	5.6	17	0.08	8.8	0.40
12/30	1/6							0.55
1/6	1/13							*
1/13	1/20							*
1/20	1/27	*	*	*	*	0.27	*	*
1/27	2/3							*
2/3	2/10							*
2/10	2/18							0.39
2/18	2/24					0.56		0.38
2/24	3/3							0.74
3/3	3/10							1.2
3/10	3/17							0.39
3/17	3/24	*	*	*	*	0.39	*	0.57
3/24	3/31							0.76
3/31	4/7							*
4/7	4/14							*
4/14	4/21							0.53
4/21	4/28	1.9	*	*	*	*	*	0.35
4/28	5/5							*
5/5	5/12							*
5/12	5/19							0.79
5/19	5/27	*	*	*	*	0.34	*	*
5/27	6/2							*
6/2	6/9							*
6/9	6/16							*
6/16	6/23	*	*	*	*	0.83	*	*
6/23	6/30							*

No entry indicates no analysis was made.

* Result was less than the analytical limit shown.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

TABLE V-4 (Cont'd) Concentrations of Radionuclides in Richland
Drinking Water (Cumulative Samples) - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

Date	^{46}Sc	^{51}Cr	^{60}Co	^{65}Zn	^{90}Sr	^{137}Cs	Alpha
Anal. Limit ^(a)	10	140	5.6	17	0.08	8.8	0.40
6/30 7/7							*
7/7 7/14							*
7/14 7/21							*
7/21 7/28	*	*	*	*	0.17	*	0.51
7/28 8/4							*
8/4 8/11							*
8/11 8/18							*
8/18 8/25	*	*	4.0	*		2.6	0.72
8/25 9/2							*
9/2 9/8							*
9/8 9/15							0.54
9/15 9/22							*
9/22 9/29	*	*	*	*	0.45	*	*
9/29 10/6							*
10/6 10/13							0.58
10/13 10/20							0.69
10/20 10/27	*	*	*	*	0.46	*	0.50
10/27 11/3							0.71
11/3 11/10							*
11/10 11/17							0.86
11/17 11/24	*	*	*	*	0.22	*	0.83
11/24 12/1							0.47
12/1 12/8							0.88
12/8 12/15							0.88
12/15 12/22	*	*	*	*		*	*
12/22 12/29	*	*	*	*		*	0.92
Annual Average ^(b)	*	*	<0.71	*	<0.37	<0.06	<0.42

No entry indicates no analysis was made.

* Result was less than the analytical limit shown.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including "less-than analytical limit" values.

VI. NONRADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

VI. NONRADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

HEHF routinely collects grab samples from all major sources of drinking water on the Hanford site for analyses of chemical and bacteriological purity. All bacteriological tests were negative and thus in compliance with the standard of no detectable coliform bacteria in Hanford drinking water.

HEHF routinely measures levels of nitrate ion in the 300 Area and Richland drinking water. These results are shown in Table VI-1; for greater detail, the reader is encouraged to refer to HEHF documents.

The following table is included in Section VI:

Table VI-1. Nitrate Ion in 300 Area and Richland
Drinking Water (Cumulative Samples) -
1975

Page

VI-2

TABLE VI-1 Nitrate Ion in 300 Area and Richland Drinking Water
(Cumulative Samples) - 1975

(Units of ppm of Water)

<u>Date</u>		<u>300 Area</u>	<u>Richland</u>	<u>Date</u>		<u>300 Area</u>	<u>Richland</u>
12/30	1/6	0.54	0.46	7/21	7/28		0.15
1/6	1/13	0.60	0.52	7/28	8/4	0.10	0.19
1/13	1/20	0.66	1.4	8/4	8/11	0.05	0.08
1/20	1/27	0.85	0.50	8/11	8/18	0.18	0.22
1/27	2/3	0.56	0.66	8/18	8/25	0.15	0.19
2/3	2/10	0.50	0.60	8/25	9/2		0.10
2/10	2/17	0.44	0.60	9/2	9/8		0.18
2/17	2/24	0.56	0.67	9/8	9/15	<0.10	0.12
2/24	3/3		0.50	9/15	9/22	0.17	0.18
3/3	3/10	0.60	0.61	9/22	9/29	<0.10	0.20
3/10	3/17	0.59	1.7	9/29	10/6		0.25
3/17	3/24	0.45	0.51	10/6	10/13	<0.10	0.10
3/24	3/31	0.53	0.56	10/13	10/20	0.23	0.26
3/31	4/7	0.29	0.58	10/20	10/27	0.27	0.24
4/7	4/14	0.85	0.60	10/27	11/3	0.26	0.32
4/14	4/21	0.72	0.74	11/3	11/10	0.20	0.29
4/21	4/28	0.50	0.60	11/10	11/17	0.36	0.46
4/28	5/5	0.30	0.45	11/17	11/24	0.25	0.32
5/5	5/12	0.19	0.24	11/24	12/1	0.29	0.36
5/12	5/19	0.13	0.19	12/1	12/8	0.38	0.53
5/19	5/26	<0.10	0.20	12/8	12/15	0.36	0.78
5/26	6/2		0.10	12/15	12/22	0.55	0.86
6/2	6/9	<0.10	0.12	12/22	12/29	0.57	2.8
6/9	6/16	<0.10	<0.10	Annual Average		<0.34	<0.46
6/16	6/23	0.19	0.24				
6/23	6/30	0.12	0.25				
6/30	7/7	<0.10	<0.10				
7/7	7/14	0.10	0.67				
7/14	7/21	0.14	0.11				

No entry indicates no analyses was made.

VII. GROUND WATER SURVEILLANCE ANALYSES DURING 1975

VII. GROUND WATER SURVEILLANCE ANALYSES DURING 1975

BNW routinely samples ground water from 5 wells adjacent to the Hanford Site. Four of these wells are located on the east side of the Columbia River and the fifth is in Richland. The locations are shown in Figure VII-1.

The ground water samples were analyzed for tritium and nitrate ion.

The following tables are included in Section VII:

	<u>Page</u>
Table VII-1. Concentrations of Tritium in the Wells in the Vicinity of Hanford - 1975	VII-2
Table VII-2. Nitrate Ion in the Wells in the Vicinity of Hanford - 1975	VII-2

▲GROUNDWATER SAMPLING LOCATIONS

FIGURE VII-1. Offsite Test Well Locations

TABLE VII-1. Concentrations of Tritium in the Wells in the Vicinity of Hanford - 1975.

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Water)

<u>Date</u>	<u>Webber</u>	<u>W-15</u>	<u>White Bluffs Association</u>	<u>Vail</u>	<u>Allison Manor</u>
4/4	*	*	*	*	*
10/3	*	*	*	*	*
Average	*	*	*	*	*

* Result was less than the analytical limit of 1.5×10^{-7} $\mu\text{Ci/ml}$ of water.

TABLE VII-2. Nitrate Ion in the Wells in the Vicinity of Hanford - 1975

(Units of ppm of Water)

<u>Date</u>	<u>Webber</u>	<u>W-15</u>	<u>White Bluffs Association</u>	<u>Vail</u>	<u>Allison Manor</u>
4/4	*	*	*	*	*
10/3	*	*	*	*	*
Average	*	*	*	*	*

* Result was less than the analytical limit of 0.5 ppm of water.

VIII. RADIONUCLIDES IN SELECTED FOODSTUFFS

VIII. RADIONUCLIDES IN SELECTED FOODSTUFFS

Foodstuffs, including milk, meat, chicken, eggs and leafy vegetables were collected from local farms and commercial outlets. Commercial milk was obtained from outlets representing two different watersheds: Commercial Brand H west of the Cascade Range, the other east.

The following tables are included in Section VIII:

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Table VIII-1. Concentrations of Radionuclides in Milk - 1975	VIII-2
Table VIII-2. Concentrations of Radionuclides in Locally Purchased Meat - 1975	VIII-9
Table VIII-3. Concentrations of Radionuclides in Locally Purchased Leafy Vegetables - 1975	VIII-10
Table VIII-4. Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1975	VIII-11

TABLE VIII-1. Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Milk)

Date	^{40}K	^{65}Zn	^{89}Sr	^{90}Sr	^{131}I	^{137}Cs
Anal. Limit ^(a)	560	65	0.99	0.73	0.40	35
<u>Riverview Irrigation District - Farm #1</u>						
1/6	1200	*			*	*
1/20	880	*	*	*	*	*
2/3	970	*			*	*
2/18	980	*			*	*
3/3	930	*			*	*
3/17	840	*			*	*
3/31	930	*			*	*
4/14	880	*	*	*	*	*
4/28	900	*			*	*
5/12	810	*			*	*
5/27	790	*			*	*
6/9	1100	*			*	*
6/23	1000	*			*	*
7/7	810	*	*	2.4	*	*
7/21	760	*			*	*
8/4	750	*			*	*
8/18	820	*			*	*
9/2	1100	*			0.28	*
9/15	760	*			*	*
9/29	940	*	*	3.2	*	*
10/13	760	*			*	*
10/27	750	*			*	*
11/10	880	*			*	*
11/24	720	*			*	*
12/8	740	*			*	*
12/22	820	*			0.41	*
Annual Average ^(b)	880 $\pm$ 250	*	*	<1.7	<0.19	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less than number is calculated including less-than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} μ Ci/ml of Milk)

Date	^{40}K	^{65}Zn	^{90}Sr	^{131}I	^{137}Cs
Anal. Limit (a)	560	65	0.87	0.40	35
<u>Wahlake Watermaster</u>					
1/2	1000	*		*	*
1/16	1100	*	370	*	*
1/30	1000	*		*	*
2/13	1000	*		*	*
2/27	1100	*		*	*
3/13	780	*		*	*
3/27	1100	*		*	*
4/10	1000	*	1.0	*	*
4/24	820	*		*	*
5/8	860	*			*
5/22	1100	*		*	*
6/5	880	*		*	*
6/19	1200	*		*	*
7/7	920	*	1.1	*	*
7/17				*	*
7/31	820	*		*	*
8/14	920	*		*	*
8/28	910	*		*	*
9/11	1100	*		*	*
9/25	880	*		*	*
10/9	930	*	3.7	*	*
10/23	990	*		*	*
11/6	990	*		*	*
11/20	910	*		0.42	*
12/4	790	*		*	*
12/18	980	*		*	*
12/30	1100	*		0.40	*
Annual Average (b)	970 $\pm$ 220	*	2.4 $\pm$ 3.0	<0.19	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less than number is calculated including less-than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975
(Units of 10^{-9} $\mu\text{Ci/ml}$ of Milk)

Date	^{40}K	^{65}Zn	^{90}Sr	^{131}I	^{137}Cs
Anal. Limit ^(a)	560	65	0.94	0.40	35
<u>Benton City Farm #3</u>					
1/2	1200	*		*	*
1/16	1100	*		*	*
1/30	980	*	6.1	*	*
2/13	1100	*		*	*
2/27	1100	*		*	*
3/13	630	*		*	*
3/27	910	*		*	*
4/10	880	*		*	*
4/24	1100	*		*	*
5/8	1000	*	2.6	*	*
5/22	830	*		*	*
6/5	970	*		*	*
6/19	1000	*		*	*
7/7	934	*		*	*
7/17	1000	*		*	*
7/31	1000	*	*	*	*
8/14	1000	*		*	*
8/29	1100	*		*	*
9/11	1100	*		*	*
9/25	820	*		*	*
10/9	900	*		*	*
10/23	1100	*		*	*
11/6	900	*	5.0	*	*
11/20	970	*		*	*
12/4	780	*		*	*
12/18	900	*		*	*
12/30	960	*		*	*
Annual Average ^(b)	980±250	*	<3.6	*	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated including less-than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Milk)

<u>Date</u> Anal. Limit (a)	<u>^{40}K</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{131}I</u>	<u>^{137}Cs</u>
	560	65	0.54	0.40	35
<u>Benton City Farm #4</u>					
1/2	810	*		*	*
1/16	920	*		*	*
1/30	990	*		*	*
2/13	760	*		*	*
2/27	830	*	1.2	*	*
3/13	870	*		*	*
3/27	860	*		*	*
4/10	970	*		*	*
4/24	980	*		*	*
5/8	870	*		*	*
5/22	940	*		*	*
6/5	300	*	1.2	*	*
6/19	820	*		*	*
7/7	710	*		*	*
7/17	*	*		*	*
7/31	800	*		*	*
8/14	790	*		*	*
8/29	*	*	1.1	*	*
9/11	*	*		*	*
9/25	720	*		*	*
Annual Average (b)	<820	*	1.2 ± 0.08	*	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less than number is calculated including less than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Milk)

<u>Date</u>	<u>^{40}K</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{131}I</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	660	77	1.4	0.28	41
<u>Benton City Farm #5</u>					
10/23	980	*		*	*
11/6	1100	*		0.57	*
11/20	770	*		0.43	*
12/4	*	*	1.4	0.22	*
12/18	970	*		*	*
12/30	850	*		*	*
Annual Average ^(b)	<880	*		<0.25	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) The annual average has been calculated from the results reported for each analysis including less-than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} μ Ci/ml of Milk)

Date	^{40}K	^{65}Zn	^{90}Sr	^{131}I	^{137}Cs
Anal. Limit (a)	560	65	0.59	0.40	35
<u>Commercial Brand H</u>					
1/2	1300	*		*	*
1/23	960	*		*	*
2/20	970	*	2.4	*	*
3/20	840	*		*	*
4/17	1000	*		*	*
5/15	1200	*	5.0	*	*
6/12	1200	*		*	*
7/10	1000	*		*	*
8/7	1100	*		*	*
9/4	920	*		0.37	*
10/2	1000	*		*	*
10/30	1100	*	0.007	*	*
11/25	820	*		*	*
12/22	1000	*		*	*
Annual Average (b)	1000 $\pm$ 270	*	2.4 $\pm$ 4.9	<0.15	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviation shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated including less-than values.

TABLE VIII-1 (Cont'd). Concentrations of Radionuclides in Milk - 1975

(Units of 10^{-9} $\mu\text{Ci/ml}$ of Milk)

<u>Date</u>	<u>^{40}K</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{131}I</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	560	65	0.81	0.40	35
<u>Commercial Composite</u>					
1/2	1000	*		*	*
1/23	840	*		*	*
2/20	880	*		*	*
3/20	790	*	*	*	*
4/17	1000	*		*	*
5/15	980	*		0.76	*
6/12	1000	*	2.0	*	*
7/10	930	*		*	*
8/7	980	*		*	*
9/4	880	*	5.4	*	*
10/2	1200	*		*	*
10/30	1100	*		*	*
11/25	730	*	2.4	*	*
12/22	1200	*		0.52	*
Annual Average ^(b)	960 $\pm$ 270	*	<2.6	<0.25	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviation shown if radionuclide is detected in all samples. Otherwise a less than number is calculated including less-than values.

TABLE VIII-2. Concentrations of Radionuclides in
Locally Purchased Meat - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ of Meat (Wet Weight)

<u>Date</u>	<u>Type</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		0.57	0.04	0.07	0.001	0.04
<u>Commercial</u>						
1/9	Beef	1.6	*	*	0.001	*
2/6	Beef	2.0	*	*	0.003	*
3/6	Beef	1.9	*	*	*	*
4/10	Beef	2.4	*	*	*	*
5/1	Beef	2.0	*	*	*	*
5/29	Beef	2.3	*	*	0.003	*
6/26	Beef	2.4	*	*	*	*
7/24	Beef	2.1	*	*	0.007	*
8/21	Beef	1.9	*	*	0.003	*
9/18	Beef	2.1	*	*	*	*
10/16	Beef	1.9	*	0.08	0.005	*
11/13	Beef	1.6	*	*	0.002	*
12/11	Beef	2.1	*	*	0.002	*
Annual Average ^(b)		2.0 $\pm$ 0.70	*	<0.02	<0.002	*
<u>Riverview Farm</u>						
5/27	Beef	1.9	*	*	0.002	0.03

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

(b) Average and two standard deviation shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated including less-than values.

TABLE VIII-3. Concentrations of Radionuclides in Locally Purchased Leafy Vegetables - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ of Leafy Vegetables (Wet Weight)

<u>Date</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{89}Sr</u>	<u>^{90}Sr</u>	<u>$^{95}\text{ZrNb}$</u>	<u>^{106}Ru</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	1.5	0.09	0.17	0.006	0.003	0.06	1.3	0.09
<u>Riverview Farm</u>								
6/5	3.3	*	*		0.02	*	*	*
8/7	2.5	*	*			*	*	*
9/4	2.6	*	*		0.06	*	*	*
10/9	2.1	*	*			*	*	*
Average	2.6	*	*		0.04	*	*	*
<u>Benton City Farm</u>								
9/4	1.4	*	*		0.02	*	*	*
<u>Commercial</u>								
5/22	2.4	*	*	*	0.004	*	*	*
6/19	2.1	*	*			*	*	*
7/24	2.2	*	*			*	*	*
8/21	3.2	*	*			*	*	*
9/18	5.1	*	*	*	0.03	*	*	*
10/23	4.9	*	*					
Average	3.3	*	*	*	0.02	*	*	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

TABLE VIII-4. Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (Wet Weight)					
<u>Date</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	0.53	0.03	0.06	0.002	0.03
<u>Chicken (Riverview Farm)</u>					
3/6	2.0	*	*	*	*
5/29	1.7	*	*	0.01	*
9/18	1.1	*	*	0.004	*
12/11	1.6	*	*	0.001	*
Average	1.6	*	*	<0.005	*
<u>Eggs (Riverview Farm)</u>					
1/9	0.64	*	*		*
2/6	0.97	*	*		*
3/6	0.97	*	*	0.001	*
4/3	0.96	*	*		*
5/1	0.79	*	*		*
5/29	1.0	*	*	*	*
6/27	0.83	*	*		*
7/24	0.94	*	*		*
8/21	0.87	*	*		*
9/18	0.94	*	*	0.001	*
10/16	1.0	*	*		*
11/13	1.1	*	*		*
12/11	0.95	*	*		*
Average	0.92	*	*	<0.0009	*

No entry indicates no specific analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

TABLE VIII-4 (Cont'd). Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (Wet Weight)					
<u>Date</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	0.53	0.03	0.06	0.002	0.03
<u>Chicken (Commercial)</u>					
2/27	1.5	*	*	*	*
9/11	1.3	*	*	0.006	*
Average	1.4	*	*	<0.004	*
<u>Eggs (Commercial)</u>					
2/27	0.78	*	*	0.001	*
9/11	0.80	*	*	0.003	*
Average	0.79	*	*	0.002	*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the analytical limits for all samples.

IX. RADIONUCLIDES IN FISH AND WILDLIFE

IX. RADIONUCLIDES IN FISH AND WILDLIFE

Wildlife, including fish and various game birds were collected from the Hanford environs and analyzed for levels of radioactivity. Fish, usually whitefish, were collected monthly from the Columbia River and the composite analyzed monthly by gamma spectrometry and a specific analysis for ^{90}Sr . Game birds, such as ducks, pheasants, and geese, were collected during hunting season along the Columbia River. The game bird samples were analyzed individually by gamma spectrometry and a specific analysis for ^{90}Sr to determine the concentration of measurable radionuclides in muscle tissue.

Oysters were obtained from Willapa Bay during 1975. The August samples were analyzed by gamma spectrometry. A ^{65}Zn analysis was made on the May and November samples.

The following tables are included in Section IX:

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Table IX-1. Concentrations of Radionuclides in Muscle of Whitefish Taken from the Columbia River - 1975	IX-2
Table IX-2. Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1975	IX-3
Table IX-3. Concentrations of Radionuclides in Upland Game Bird Samples in the Hanford Environs - 1975	IX-6
Table IX-4. Concentration of Radionuclides in Oysters from Willapa Bay - 1975	IX-8

TABLE IX-1. Concentrations of Radionuclides in Muscle of Whitefish Taken from the Columbia River - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>^{32}P</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	11	1.2	0.08	0.15	0.004	0.08
1/24	*	4.2	*	*	0.01	*
2/21	0.93	2.9	0.24	*	0.003	0.08
3/26	*	3.0	0.09	*	*	0.09
5/14	*	3.2	*	*	0.008	*
6/23	*	3.1	*	*	*	0.10
7/11	*	10.	0.23	*	0.02	0.43
8/22	*	2.8	0.17	*	0.18	0.21
9/5	*	3.4	*	*	*	0.14
10/8	*	3.4	*	*	*	0.13
Annual Average ^(b)	<5.0	4.0 $\pm$ 4.8	<0.10	*	<0.03	<0.13

No entry indicates no analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide detected in all samples. Otherwise a less-than number is calculated including less-than values.

TABLE IX-2. Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>Species</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		2.1	0.13	0.25	0.006	0.14
<u>Ducks</u>						
<u>100F</u>						
1/10	Mallard	3.4	*	*	0.005	*
1/10	Mallard	3.4	*	*	*	*
1/20	Mallard	2.9	*	*	*	*
1/20	Mallard	3.4	*	*	0.004	*
1/20	Mallard	3.6	*	*	*	*
11/10	Mallard	2.7	*	*	*	*
12/10	Widgeon	3.8	*	*	*	*
12/10	Widgeon	2.7	*	*	0.02	*
12/11	Mallard	3.9	*	*	0.01	*
12/11	Mallard	*	*	*	*	*
12/11	Mallard	3.3	*	*	*	*
12/11	Mallard	4.1	*	*	*	*
12/11	Mallard	*	*	*	*	*
12/12	Mallard	*	*	*	*	*
12/12	Mallard	*	*	*	0.04	*
12/12	Mallard	*	*	*	*	*
Average ^(b)		<3.1	*	*	<0.006	*
<u>300 Area</u>						
12/3	Mallard	2.7	*	*	0.009	*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limit for all samples.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

TABLE IX-2 (Cont'd). Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>Species</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		2.1	0.13	0.25	0.006	0.14
<u>Ducks</u>						
<u>Hanford</u>						
1/6	Mallard	3.6	*	*	*	0.15
1/6	Mallard	2.3	*	*	*	*
1/10	Mallard	3.9	*	*	0.009	0.12
1/23	Mallard	3.5	*	*	*	*
11/5	Mallard	3.7	*	*	*	*
11/5	Mallard	3.9	*	*	*	*
11/5	Mallard	2.7	*	*	0.02	*
11/5	Mallard	3.2	*	*	0.05	*
12/10	Mallard	3.1	*	*	*	*
12/10	Mallard	2.4	*	*	*	*
Average ^(b)		3.2 $\pm$ 1.2	*	*	<0.01	<0.05
<u>Geese</u>						
<u>100B</u>						
12/19	Can. Common	2.8	*	*		*
<u>100K</u>						
12/17	Can. Lesser	2.4	*	*		*
12/17	Can. Lesser	3.0	*	*		*
Average		2.7	*	*		*

No entry indicates no analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated from the other results, including less-than values.

TABLE IX-2 (Cont'd). Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>Species</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		2.1	0.13	0.25	0.006	0.14
<u>Geese</u>						
<u>100D</u>						
12/16	Can. Common	2.1	*	*		*
12/16	Can. Common	2.7	*	*		*
Average		2.4	*	*		*
<u>100F</u>						
1/6	Can. Common	3.1	*	*		0.16
1/6	Can. Common	2.5	*	*		0.08
1/20	Can. Common	2.6	*	*		*
1/20	Can. Common	2.7	*	*		*
1/20	Can. Common	2.0	*	*		*
11/7	Can. Common	2.5	*	*		0.17
Average ^(b)		2.6 $\pm$ 0.72	*	*		<0.07
<u>Hanford</u>						
12/10	Can. Common	2.7	*	*		*
12/10	Can. Common	3.2	*	*		*
12/10	Can. Common	2.7	*	*		*
12/10	Can. Common	3.0	*	*		*
Average ^(b)		2.9 $\pm$ 0.47	*	*		*
<u>White Bluffs</u>						
1/6	Can. Common	3.5	*	*		0.17
11/20	Can. Common	9.5	*	*		*
Average		6.5	*	*		<0.16

No entry indicates no analysis was made.

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two standard deviations shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated from the other results including less-than values.

TABLE IX-3. Concentrations of Radionuclides in Upland Game Bird Samples in the Hanford Environs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>Species</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		2.3	0.14	0.26	0.005	0.15
<u>100 B</u>						
1/7	Pheasant	3.8	*	*	*	*
12/15	Pheasant	3.4	*	*	*	*
Average		3.6	*	*	*	*
<u>100 D</u>						
11/20	Pheasant	2.9	*	*	*	*
12/3	Pheasant	*	*	*	*	*
12/10	Pheasant	*	*	*	0.009	*
Average		<2.2	*	*	<0.005	*
<u>100 F</u>						
1/7	Pheasant	2.7	*	*	*	0.09
11/10	Pheasant	3.0	*	*	*	*
Average		2.8	*	*	*	<0.09
<u>Hanford</u>						
1/6	Pheasant	2.9	*	*	*	*
1/7	Pheasant	3.2	*	*	*	*
1/7	Pheasant	2.8	*	*	*	0.10
1/7	Pheasant	2.5	*	*	*	*
11/10	Pheasant	3.5	*	*	*	*
Average ^(b)		3.0 $\pm$ 0.74	*	*	*	<0.07

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) Average and two standard deviation is shown if radionuclide is detected in all samples. Otherwise a less-than number is calculated from the other results including less-than values.

TABLE IX-3 (Cont'd). Concentrations of Radionuclides in Upland Game Bird Samples in the Hanford Environs - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (wet weight)

<u>Date</u>	<u>Species</u>	<u>^{40}K</u>	<u>^{60}Co</u>	<u>^{65}Zn</u>	<u>^{90}Sr</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)		2.3	0.14	0.26	0.005	0.15
<u>White Bluffs</u>						
11/7	Pheasant	3.1	*	*	*	*
11/10	Pheasant	*	*	*	0.009	*
11/20	Pheasant	*	*	*	0.01	*
11/20	Pheasant	*	*	*	0.08	*
Average ^(b)		<2.4	*	*	<0.02	*

* Result was less than the analytical limit.

(a) The analytical limit shown for each isotope is the average of the individual analytical limits for all samples.

(b) The annual average has been calculated from the result reported for each analysis including less-than values.

TABLE IX-4. Concentration of Radionuclides in
Oysters From Willapa Bay - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ (Wet Weight)

<u>Date</u>	<u>^{40}K</u>	<u>^{65}Zn</u>	<u>^{137}Cs</u>
Anal. Limit ^(a)	0.60	0.06	0.04
5/9		0.08	
8/7	1.7	*	*
11/18		*	
Average ^(a)		<0.06	

* Result was less than the analytical limit.

(a) The annual average has been calculated from the result reported for each analysis including less-than values.

X. RADIONUCLIDES IN SOIL AND VEGETATION

X. RADIONUCLIDES IN SOIL AND VEGETATION

Surface soil and perennial vegetation samples were collected from 8 different locations during the autumn of 1975. These samples were measured for radioactivity due to fallout and natural causes as well as to assess any potential buildup of radioactivity from Hanford operations. Each soil sample represents the composite of five "plugs" of soil from an approximate 10-meter square area. Each plug was approximately 2.5 centimeters (1 inch) in depth and 10 centimeters (4 inches) in diameter. The vegetation samples were collected in the immediate vicinity of each soil sampling location. Each sample consisted of approximately 2 kilograms of perennial vegetation, primarily the new growth from rabbit brush plants.

Both sets of samples were analyzed for gamma-emitting radionuclides using a lithium drifted Germanium detector, isotopes of plutonium using alpha spectroscopy, and ^{90}Sr and uranium by specific analyses.

Sediment samples from the Columbia River shoreline, islands, and slough areas were collected during 1975 at 21 different locations. Samples were collected from the top 1-inch of sediment at all locations and analyzed for gamma-emitting radionuclides. At 4 of the 21 locations, depth profiles of gamma-emitting radionuclides were obtained for 5 increments: 0-1", 1-2", 2-4", 4-6", and 6-8". ^{90}Sr , ^{238}Pu , and $^{239-240}\text{Pu}$ concentrations were also measured at the 4 locations in the 0-1" sediment sample. Replicate samples, consisting of 5 separate samples, were collected from one location and analyzed for gamma-emitting radionuclides.

Sample locations are shown in Figure X-1.

The following tables are included in Section X:

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Table X-1. Concentrations of Radionuclides in Perimeter Soil Samples - 1975	X-2
Table X-2. Concentrations of Radionuclides in Perimeter Vegetation Samples - 1975	X-3
Table X-3. Concentrations of Radionuclides in Sediment Sampled at Columbia River Island and Shoreline Locations - 1975	X-4
Table X-4. Depth Profile of Radionuclide Concen- trations in Sediment Sampled at Selected Columbia River Island and Shoreline Locations - 1975	X-5

FIGURE X-1. Soil, Sediment, and Vegetation Sampling Locations During 1975

TABLE X-1. Concentrations of Radionuclides in Perimeter Soil
Samples - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ of Soil (Dry Weight)

Sample Location	Map Location	Naturally Occurring Radionuclides			
		^{40}K	^{226}Ra	^{226}Ra	U-total
Analytical Limit		1.8	0.08	0.12	0.03
Exxon Site	30	13	0.59	0.38	0.14
Prosser Barricade	31	14	0.56	0.46	0.21
ALE Field Lab	32	13	1.3	0.80	0.15
Yakima Barricade	33	12	0.83	0.58	0.25
Wahluke #2	34	11	0.83	0.51	0.19
Berg Ranch	35	12	0.83	0.66	0.26
Ringold	36	12	0.83	0.62	0.21
300 Area 331 Bldg.	37	13	0.68	0.65	0.17
Maximum		14	1.3	0.80	0.26
Minimum		11	0.56	0.38	0.14
Avr. ± 2 Sample Deviations (a)		13 ± 1.5	0.80 ± 0.43	0.58 ± 0.26	0.20 ± 0.08

Sample Location	Map Location	Artificially Produced Radionuclides												
		⁵⁴ Mn	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁰ Sr	⁹⁵ ZrNb	¹⁰⁶ Ru-Rh	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵⁴ Eu	²³⁸ Pu	²³⁹⁻²⁴⁰ Pu
Analytical Limit		0.02	0.02	0.03	0.04	0.01	0.39	0.16	0.02	0.07	0.12	0.16	0.003	0.001
Exxon Site	30	*	*	*	0.14	0.56	*	0.29	*	0.67	0.20	*	*	0.02
Prosser Barricade	31	*	*	*	*	0.18	*	0.30	0.05	0.20	*	*	*	*
ALE Field Lab	32	*	*	*	*	0.47	0.20	*	*	1.6	0.27	*	*	0.01
Yakima Barricade	33	*	*	0.10	0.09	0.12	*	0.18	*	0.10	0.16	0.25	*	0.005
Wahluke #2	34	0.03	*	*	0.10	0.10	*	*	*	0.31	0.16	*	*	*
Berg Ranch	35	0.03	*	*	*	0.18	*	0.40	0.03	0.32	*	*	*	*
Ringold	36	*	0.03	*	*	0.07	*	0.30	*	0.17	0.11	*	*	0.004
300 Area 331 Bldg.	37	*	*	*	0.09	0.05	0.40	*	*	0.06	0.24	*	*	*
Maximum		0.03	0.03	0.10	0.14	0.56	0.40	0.40	0.05	1.6	0.27	0.25	*	0.02
Minimum		*	*	*	*	*	*	*	*	0.06	*	*	*	*
Avr. ± 2 Sample Deviations(a)		<0.01	<0.009	<0.01	<0.06	0.22±0.38	*	<0.17	<0.01	0.42±0.99	<0.16	<0.04	<0.0004	<0.007

* Indicates result was less than the analytical limit shown.

(a) Average and two sample standard deviations shown if radionuclide detected at all locations. Otherwise, a less-than number is calculated from the other results, including less-than values.

TABLE X-2. Concentrations of Radionuclides in Perimeter Vegetation
Samples - 1975

Units of 10^{-6} $\mu\text{Ci/g}$ of Vegetation (Dry Weight)

Sample Location	Map Location	Naturally Occurring Radionuclides		Artificially Produced Radionuclides				
		⁴⁰ K	U-total	⁵⁴ Mn	⁵⁸ Co	⁶⁰ Co	⁶⁵ Zn	⁹⁰ Sr
Analytical Limit		3	0.03	0.09	0.10	0.10	0.2	0.01
Exxon Site	30	11	0.04	*	*	0.10	*	0.03
Prosser Barricade	31	12	*	*	*	*	*	0.14
ALE Field Lab	32	4.3	*	*	*	*	*	0.24
Yakima Barricade	33	6.8	*	*	*	*	*	0.06
Wahluke #2	34	12	0.04	*	*	*	*	0.02
Berg Ranch	35	16	*	*	*	*	*	0.01
Ringold	36	16	*	*	*	0.11	*	0.02
300 Area 331 Bldg.	37	40	*	*	*	*	*	0.48
Maximum		40	0.04	*	*	0.11	*	0.48
Minimum		4.3	*	*	*	*	*	0.01
Avr ± 2 Sample Deviations (a)		15±22	<0.02	*	*	<0.04	*	0.13±0.35

Sample Location	Map Location	Artificially Produced Radionuclides								
		⁹⁵ ZrNb	¹⁰⁶ FuRh	¹³¹ I	¹³⁴ Cs	¹³⁷ Cs	¹⁴¹ Ce	¹⁴⁴ CePr	²³⁸ Pu	²³⁹⁻²⁴⁰ Pu
Analytical Limit		0.4	0.6	2.4	0.08	0.09	0.21	0.47	0.003	0.001
Exxon Site	30	*	*	*	*	*	0.25	0.56	*	.002
Prosser Barricade	31	*	*	*	*	0.10	*	0.34	*	.002
ALE Field Lab	32	*	*	*	*	*	*	0.58	*	.002
Yakima Barricade	33	*	*	*	*	0.17	*	0.92	*	.002
Wahluke #2	34	*	*	*	*	*	*	0.34	*	*
Berg Ranch	35	*	*	*	*	0.12	*	*	*	.001
Ringold	36	*	*	*	*	*	*	*	*	.001
300 Area 331 Bldg.	37	*	*	*	*	*	*	1.3	*	*
Maximum		*	*	*	*	0.17	0.25	1.3	*	0.002
Minimum		*	*	*	*	*	*	*	*	*
Avr ± 2 Sample Deviations (a)		*	*	*	*	<0.10	*	<0.54	*	<0.002

* Indicates result was less than the analytical limit shown.

(a) Average and two sample standard deviations shown if radionuclide detected at all locations. Otherwise, a less-than number is calculated from the other results, including less-than values.

TABLE X-3. Concentrations of Radionuclides in Sediment Sampled at Columbia River Island and Shoreline Locations - 1975

Units of pCi/g (dry weight)

River Mile	Map Location	Naturally Occurring Radionuclides			Artificially Produced Radionuclides									
		⁴⁰ K	²²⁴ Ra	²²⁶ Ra	⁵⁴ Mn	⁶⁰ Co	⁵⁵ Zn	¹⁰⁶ Ru	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵² Eu	¹⁵⁴ Eu	¹⁵⁵ Eu
	Detection Limit (a)	1.8	0.08	0.12	0.02	0.03	0.04	0.16	0.02	0.07	0.12	0.06	0.15	0.04
384.3	1	11	1.3	0.4	*	0.2	*	*	*	0.4	0.1	0.2	0.1	*
379.8	2	11	1.8	0.7	0.05	0.6	0.4	0.15	0.02	0.7	0.4	0.3	0.8	0.3
377.3	3	9	2.9	0.6	*	2.4	*	*	*	0.6	0.6	1.5	0.5	*
376.6	4	1	2.8	0.9	0.2	9.6	0.2	*	0.1	0.8	0.9	0.4	0.6	*
370.6	6	12	1.3	0.4	*	0.06	*	*	0.02	0.07	0.2	*	0.2	*
368.0	7	12	2.1	0.7	*	1.1	*	*	*	1.7	0.2	1.6	0.4	*
363.1	9	13	2.2	0.7	*	1.0	*	*	0.04	1.0	*	0.7	0.1	*
362.6	10	14	1.8	0.6	*	*	0.1	*	0.03	0.2	0.3	*	*	*
359.0	11	14	3.2	0.7	0.04	0.7	0.1	*	0.05	0.4	*	0.3	*	0.1
346.0	13	14	1.5	0.6	0.2	6.2	0.1	0.2	0.02	1.8	*	2.2	0.8	*
344.6	14	1	2.2	0.8	0.07	2.4	0.1	0.3	0.03	0.5	0.4	0.7	0.2	*
342.7	15	12	1.7	0.8	0.02	2.1	*	*	*	0.7	*	0.3	0.4	*
340.3	16	14	1.0	0.4	*	0.6	*	0.7	*	1.0	0.08	0.6	*	*
333.3	18	13	1.1	0.4	0.1	2.5	*	*	*	0.5	0.1	0.6	*	*
332.2	19	13	1.6	0.8	0.06	2.1	*	*	0.05	1.0	0.1	0.9	0.2	*
332.0	20	12	2.8	1.1	0.04	3.2	*	*	*	1.6	0.4	1.9	1.2	*
324.5	Replicates													
	21-1	11	1.9	0.6	0.04	0.6	*	0.1	*	1.2	*	0.6	0.1	*
	21-2	12	1.5	0.5	*	0.2	0.1	*	0.03	0.5	0.08	0.1	*	*
	21-3	14	2.2	0.6	*	0.6	*	*	*	1.2	0.15	0.8	0.2	*
	21-4	11	1.6	0.6	*	0.2	0.1	*	0.02	0.6	0.14	*	0.2	*
	21-5	13	1.3	0.4	*	*	0.1	*	*	0.3	*	0.1	*	*
	Averages (b)	12±3	1.9±1.2	0.6±0.4	<0.05	<1.73	<0.09	<0.12	<0.02	0.8±1.0	<0.23	<0.67	<0.31	<0.05

* Less than the analytical detection limit.

(a) The analytical detection limit listed is the average of individual analytical detection limit for each analyses.

(b) Average and two sample standard deviations shown if radionuclide detected at all locations. Otherwise, a less-than number is calculated from the other results, including less-than values.

TABLE X-4. Depth Profile of Radionuclide Concentrations in Sediment Sampled at Selectec Columbia River Island and Shoreline Locations - 1975

Units of pCi/g (dry weight)

River Mile	Map Location	Naturally Occurring Radionuclides			Artificially Produced Radionuclides													
		⁴⁰ K	²²⁴ Ra	²²⁶ Ra	⁵⁴ Mn	⁶⁰ Co	⁶⁵ Zn	¹⁰⁶ Ru	¹³⁴ Cs	¹³⁷ Cs	¹⁴⁴ Ce	¹⁵² Eu	¹⁵⁴ Eu	¹⁵⁵ Eu	⁹⁰ Sr	²³⁸ Pu	²³⁹⁻²⁴⁰ Pu	
Analytical Detection Limit(a)		1.8	0.08	0.12	0.02	0.03	0.04	0.16	0.02	0.07	0.12	0.06	0.16	0.04	0.01	0.003	0.001	
371.4	5 - 0-1"	14	7.5	1.1	*	1.0	0.06	*	0.06	1.6	0.5	0.7	0.2	0.05	0.05	*	0.004	
	1-2"	14	2.0	0.8	*	0.4	*	*	0.5	0.9	*	0.9	0.2	*	*	*		
	2-4"	12	1.4	0.5	*	0.6	*	0.2	*	1.9	0.1	1.2	*	*	*	*		
	4-6"	12	2.5	1.0	0.02	0.2	*	0.2	0.06	3.3	0.1	1.0	*	0.07	*	*		
	6-8"	12	5.7	1.1	*	0.1	*	*	*	0.6	0.2	0.6	*	*	*	*		
367.3	8 - 0-1"	12	2.5	0.9	0.04	3.3	0.05	0.3	0.06	1.7	*	2.8	1.0	*	0.03	*	0.013	
	1-2"	12	1.9	0.7	0.05	7.3	0.05	0.2	*	1.5	0.2	2.8	0.6	*	*	*		
	2-4"	13	1.8	0.6	*	1.6	*	*	0.08	1.2	*	2.7	0.7	*	*	*		
	4-6"	13	2.2	0.9	0.02	0.6	0.05	*	*	0.6	*	1.1	0.5	0.07	*	*		
	6-8"	14	1.9	0.6	*	0.08	0.08	*	*	0.05	0.2	0.07	0.3	*	*	*		
349.8	12 - 0-1"	12	2.0	0.7	*	1.7	*	*	0.07	1.8	0.1	1.8	0.3	*	0.3	*	<0.1	
	1-2"	12	1.5	0.9	0.13	1.5	*	0.2	0.06	0.5	1.0	2.6	6.0	1.6	*	*		
	2-4"	12	1.6	0.6	*	1.1	*	*	0.02	1.1	0.1	0.5	0.1	0.06	*	*		
	4-6"	13	2.0	0.5	*	0.2	*	*	0.02	0.5	0.2	0.1	*	*	*	*		
	6-8"	13	1.1	0.5	*	0.03	0.04	*	*	0.3	*	*	0.1	*	*	*		
340.0	17 - 0-1"	16	1.1	0.5	0.04	1.4	*	*	*	0.6	0.2	0.6	*	*	0.1	*	<0.1	
	1-2"	14	2.0	1.0	*	2.3	*	*	*	1.5	*	1.3	1.0	*	*	*		
	2-4"	12	2.8	1.1	*	2.8	0.07	*	*	2.6	0.2	3.1	0.7	*	*	*		
	4-6"	14	1.0	0.6	*	0.8	0.05	*	0.02	1.2	0.2	1.1	0.4	*	*	*		
	6-8"	12	1.3	0.6	*	0.2	0.05	*	0.04	0.9	0.2	0.3	*	*	*	*		
Averages (b)	0-1"	13.5±3.8	3.3±5.6	0.8±0.5	<0.03	1.9±2	<0.04	<0.2	<0.05	1.4±1.1	<0.2	1.5±2.1	<0.4	<0.05	0.12	0.25	*	<0.05
	1-2"	13.0±2.3	1.9±0.5	0.9±0.3	<0.05	2.9±6.1	<0.04	<0.2	<0.15	1.1±1.0	<0.3	1.9±1.9	2.0±5.4	<0.43	*	*		
	2-4"	12.3±1.0	1.9±1.2	0.7±0.5	*	1.5±1.9	<0.04	<0.1	<0.03	1.7±1.4	<0.1	1.9±2.5	<0.4	*	*	*		
	4-6"	13.0±1.6	1.9±1.3	0.8±0.5	<0.02	0.5±0.6	<0.04	<0.1	<0.03	1.4±2.6	<0.1	0.8±1.0	<0.3	<0.06	*	*		
	6-8"	12.8±1.9	4.0±4.3	0.7±0.5	*	0.1±0.1	<0.05	*	<0.02	0.5±0.7	0.2±0.0	<0.3	<0.1	*	*	*		

* Less than the analytical detection limit.

(a) The analytical detection limit listed is the average of individual analytical detection limit for each analyses.

(b) Average and two sample standard deviations shown if radionuclide detected at all locations. Otherwise, a less-than number is calculated from the other results, including less-than values.

XI. EXTERNAL RADIATION EXPOSURE MEASUREMENTS

XI. EXTERNAL RADIATION EXPOSURE MEASUREMENTS

External radiation levels in the Hanford environs were measured during 1975 with thermoluminescent dosimeters (TLDs) deployed at 12 perimeter and 5 distant locations. TLDs were also immersed at 4 locations in the Columbia River: Coyote Rapids, below 100-N, Hanford Powerline, and the Richland pumphouse. The TLD used consisted of 3 chips of $\text{CaF}_2:\text{Dy}$ (Harshaw TLD-200) encased in an opaque plastic capsule lined with 0.010" of tantalum and 0.002" of lead to flatten the lower energy response. The dosimeters are mounted approximately one meter above ground level and changed either biweekly or monthly. The dosimeters deployed in the Columbia River are contained in a plastic bottle and anchored to the river bottom with a chain and lead weight. The dosimeters are changed monthly.

Portable instrument surveys using a Nuclear Enterprises Model 2601 low-level gamma survey meter were made along the shoreline at Vernita Bridge, Richland, and Sacajawea Park.

The following tables are included in Section XI:

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TABLE XI-1. TLD Measurements at 3 Feet Above the Ground - 1975

(Units of mR/day)

Distant Communities

Week On ^(a) Date	<u>Walla Walla</u>	<u>McNary</u>	<u>Moses Lake</u>	<u>Washtucna</u>	<u>Sunnyside</u>
1/3					
1/10	0.19	0.20			
1/17			0.18	0.19	0.19
1/24					
1/31					
2/7	0.20	0.20			
2/14			0.19	0.20	0.19
2/21					
2/28					
3/7	0.20	0.20			
3/14			0.19	0.19	0.18
3/21					
3/28					
4/4	0.21	0.20			
4/11			0.18	0.18	0.16
4/18					
4/25					
5/2	0.21	0.20			
5/9			0.19	0.19	0.18
5/16					
5/23					
5/30	0.21	0.20			
6/6			0.16	0.16	0.18
6/13					
6/20					
6/27	0.18	0.19			

(a) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated. The measurements shown are continuous from one tabled value to the next tabled value.

TABLE XI-1 (Cont'd). TLD Measurements at 3 Feet Above the Ground - 1975

(Units of mR/day)

Distant Communities

Week On ^(a) Date	Walla Walla	McNary	Moses Lake	Washtucna	Sunnyside
7/7			0.18	0.19	0.19
7/14					
7/21					
7/28	0.20	0.18			
8/1			0.19	0.19	0.17
8/8					
8/15					
8/22	0.20	0.19			
8/29			0.18	0.17	0.17
9/5					
9/12					
9/19	0.20	0.19			
9/26			0.18	0.18	0.16
10/3					
10/10					
10/17	0.19	(b)			
10/24			0.18	0.18	0.18
10/31					
11/7					
11/14	0.21	0.21			
11/21			0.20	0.20	0.18
11/28					
12/5					
12/12	0.21	0.23			
12/19			0.19	0.19	0.19
12/26					
Average $\pm$ 2 standard deviations	0.20 $\pm$ 0.02	0.20 $\pm$ 0.02	0.18 $\pm$ 0.02	0.19 $\pm$ 0.02	0.18 $\pm$ 0.02

(a) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated. The measurements shown are continuous from one tabled value to the next tabled value.

(b) TLD was vandalized.

TABLE XI-2. TLD Measurements at 3 Feet Above Ground - 1975

(Units of mR/day)

Week On Date	Perimeter Communities											
	Benton City	Vernita	Berg Ranch	Othello	Connel	Wahluke Wm	Cooke Bros.	Baxter Substation	Ringold	Byers Landing	Richland	Pasco
1/2			0.23			(b)		0.19				
1/8	0.17	0.24								0.22	0.20	0.19
1/15				0.16	0.18							
1/22		0.22					0.19				0.19	
1/29			0.20			0.20		0.18				
2/5	0.17	0.25								0.20	0.19	0.20
2/12				0.18	0.19							
2/19		0.25					0.19				0.21	
2/26			0.23			0.21		0.19				
3/5	0.17	0.25							0.23	0.21	0.21	0.20
3/12				0.18	0.19							
3/19		0.24					0.19				0.20	
3/26			0.21			0.20		0.19				
4/2	0.17	0.25								0.21	0.20	0.19
4/9				0.16	0.17				0.24			
4/16		0.24					0.19				0.19	
4/23			0.23			0.21		0.20				
4/30	0.16	0.24								0.22	0.19	0.20
5/7				0.18	0.18				0.24			
5/14		0.27					0.19				0.20	
5/21			0.22			(b)		0.17				
5/28	0.16	0.25								0.21	0.21	0.19
6/4				0.15	0.15				0.21			
6/11		0.25					0.17				0.20	
6/18			0.20			0.19		0.17				
6/25	0.14	0.23								0.20	0.18	0.18

(a) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated. The measurements shown are continuous from one tabled value to the next tabled value.

(b) TLD was vandalized.

TABLE XI-2. (Cont'd) TLD Measurements at 3 Feet Above Ground - 1975

(Units of mR/day)

Perimeter Communities

Week On ^(a) Date	<u>Benton City</u>	<u>Vernita</u>	<u>Berg Ranch</u>	<u>Othello</u>	<u>Connell</u>	<u>Wahluke Wm</u>	<u>Cooke Bros.</u>	<u>Baxter Substation</u>	<u>Ringold</u>	<u>Byers Landing</u>	<u>Richland</u>	<u>Pasco</u>
7/2												
7/9		0.25		0.16	0.18		0.18		0.22		0.19	
7/16			0.20			0.19		0.16				
7/23	0.16	0.22								0.20	0.19	(b)
7/30				0.16	0.18							
8/6		0.24					0.18		0.24		0.17	
8/13			0.21			0.20		0.19				
8/20	0.15	0.21								0.21	0.19	0.18
8/27				0.16	0.17							
9/3		0.25					0.17		0.22		0.19	
9/10			0.21			0.19		0.18				
9/17	0.15	0.24								0.22	0.19	0.18
9/24				0.16	0.17							
10/1		0.25					0.18				0.19	
10/8			0.21			0.19		0.18	0.23			
10/15	0.16	0.23								0.21	0.19	0.19
10/22				0.17	0.18							
10/29		0.22					0.19				0.18	
11/5			0.22			0.20		0.18	0.24			
11/12	0.16	0.26								0.21	0.20	0.20
11/19				0.14	0.19							
11/26		0.24					0.20				0.19	
12/3			0.22			0.21		0.20	0.25			
12/10	0.19	0.23								0.25	0.20	0.22
12/17				0.19	0.19							
12/24							0.20				0.21	
Avr. ± 2 standard deviations	0.16±0.02	0.24±0.03	0.21±0.02	0.17±0.03	0.18±0.02	0.20±0.02	0.19±0.02	0.18±0.02	0.23±0.02	0.21±0.03	0.19±0.02	0.19±0.02

(a) As a result of sampling schedules, the on-date for some locations may differ by a few days from the date indicated. The measurements shown are continuous from one tabled value to the next tabled value.

(b) TLD was vandalized.

TABLE XI-3. TLD Measurements in the Columbia River - 1975

(Units of mR/day)

Measurement Period	Exposure Rate	Measurement Period	Exposure Rate
<u>Coyote Rapids</u>			
1/9 2/14	0.11	8/8 9/4	0.12
2/14 3/6	0.13	9/4 10/9	0.11
3/6 4/10	0.11	10/9 11/6	0.11
4/10 5/8	0.12	11/6 12/5	0.09
5/8 6/5	0.13	12/5 1/8	0.14
6/5 7/10	0.09	Annual Average ^(a)	0.11±0.03
7/10 8/8	0.10		
<u>Below 100 N</u>			
1/9 2/14		8/8 9/4	0.16
2/14 3/6	0.21	9/4 10/9	0.23
3/6 4/10	0.17	10/9 11/6	0.14
4/10 5/8	0.18	11/6 12/5	0.10
5/8 6/5	0.19	12/5 1/8	0.14
6/5 7/10		Annual Average ^(a)	0.17±0.07
7/10 8/8	0.17		
<u>Hanford Powerline</u>			
1/9 2/14	0.07	8/8 9/4	0.11
2/14 3/6	0.06	9/4 10/9	
3/6 4/10	0.08	10/9 11/6	0.11
4/10 5/8	0.09	11/6 1/12	0.14
5/8 6/5		Annual Average ^(a)	0.09±0.05
6/5 7/10	0.09		
7/8 8/8	0.09		
<u>Richland Pumphouse</u>			
12/23 1/20	0.09	7/7 8/8	0.10
1/20 2/18	0.11	8/8 9/2	0.10
2/18 3/17	0.10	9/2 9/29	0.09
3/17 4/14	0.09	9/29 10/27	0.08
4/14 5/12	0.09	10/27 11/24	0.09
5/12 6/9	0.09	11/24 12/22	0.10
6/9 7/7	0.10	Annual Average ^(a)	0.09±0.02

No entry indicates the TLD was not retrievable from the river.

(a) Annual Average is ± 2 sample standard deviations.

TABLE XI-4. External Exposure Rate Measurement* at 3 Feet Above the Columbia River Shoreline at Vernita, Richland, and Sacajawea Park - 1975

(Units of mR/day)

<u>Date</u>	<u>Exposure Rate</u>	<u>Date</u>	<u>Exposure Rate</u>
<u>Vernita</u>		<u>Richland Pump House</u>	
4/1	0.22	1/9	0.26
4/29	0.36	2/14	0.22
6/10	0.22	3/6	0.24
7/8	0.14	4/10	0.26
11/11	0.14	5/8	0.38
12/12	0.24	6/5	0.29
(b)		7/10	0.84(a)
Annual Average	0.22±0.16	8/8	0.34
		9/4	0.26
		10/9	0.24
		11/6	0.36
		12/5	0.19
		Annual Average (b)	0.28±0.12
<u>Sacajawea</u>			
1/10	0.31	7/11	0.29
1/24	0.29	7/25	0.48
2/21	0.29	8/8	0.24
3/7	0.38	8/22	0.34
3/21	0.31	9/5	0.26
4/4	0.24	10/3	0.29
4/18	0.36	10/17	0.29
5/2	0.29	12/1	0.24
5/16	0.29	12/26	0.22
5/30	0.31		
6/13	0.34	Annual Average (b)	0.30±0.12
6/27	0.34		

* Portable instrument surveys using a Nuclear Enterprises Model 2601 low-level Gamma Survey Meter

(a) Instrument Calibration in error

(b) Annual average ± 2 sample standard deviation

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