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# ENVIRONMENTAL SURVEILLANCE AT HANFORD FOR CY-1974 DATA

Battelle
Pacific Northwest Laboratories
Richland, Washington 99352

APRIL 1975

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## DATA

Compiled
by

Jack J. Fix and Peggy J. Blumer

Occupational and Environmental Safety Department

April 1975

BATTELLE
PACIFIC NORTHWEST LABORATORIES
RICHLAND, WASHINGTON 99352

# PREFACE

This document contains detailed data collected by the Hanford Environmental Surveillance program during 1974. Summaries and evaluation of the data appear in the parent report BNWL-1910. 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 nonradiological parameters of Columbia River water and groundwater.

The data are presented in several appendixes under the following titles:

APPENDIX A - Radiological Parameters Measured in the Atmosphere

APPENDIX B - Nonradiological Parameters Measured in the Atmosphere

APPENDIX C - Radiological Parameters Measured in Columbia River Water

APPENDIX D - Nonradiological Parameters Measured in Columbia River Water

APPENDIX E - Radiological Parameters Measured in Drinking Water

APPENDIX F - Nonradiological Parameters Measured in Drinking Water

APPENDIX G - Radionuclides in Selected Foodstuffs

APPENDIX H - Radionuclides in Fish and Wildlife

APPENDIX I - Radionuclides in Soil and Vegetation

APPENDIX J - External Radiation Exposure Measurements

A brief description of the method of sample collection, a description of the locations of sample collection during 1974, and a list of tables are available at the beginning of each appendix. Any questions regarding specific entries should be referred to the authors.

# APPENDIX A

## RADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE DURING 1974

## APPENDIX A

## RADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE DURING 1974

Radioactivity in the atmosphere was sampled by a network of 15 perimeter and 6 distant continuous air samplers during 1974. These locations are shown in Figure A-1. Each air sampler maintains a flow of 2.5 $m^3$/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, and Cooke Bros.

Inner Southeast Quadrant: Consists of filters from Richland and Pasco.

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 and Ellensburg.

The following tables are included in Appendix A:

Table A-1. Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1974 (Page A-3)

Table A-2. Concentrations of Radioactive Alpha Particulates in the Air of the Hanford Environs - 1974 (Page A-7)

Table A-3. Concentrations of $^{131}I$ in the Air of the Hanford Environs - 1974 (Page A-11)

Table A-4. Concentrations of Specific Radionuclides on Selected Air Filter Composites - 1974 (Page A-13)

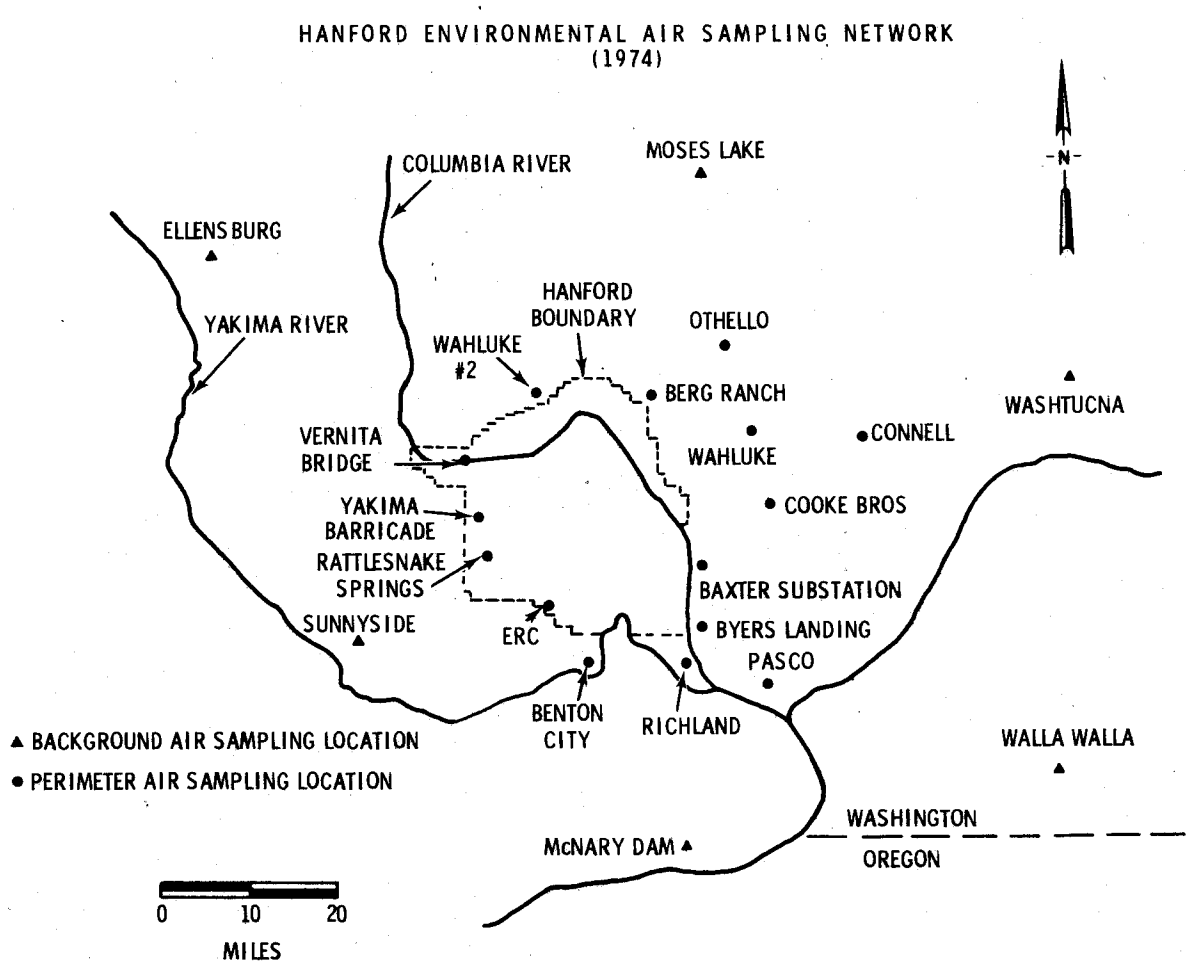


FIGURE A-1 Hanford Environmental Air Sampling Locations During 1974

## TABLE A-1 (Part A) Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1974[a]

### Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Perimeter Communities | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ringold[c] | Byers Landing | Richland | Pasco | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Benton City | Rattlesnake Springs | ERC | Yakima Barricade | Vernita | Wahluke #2 |
| 12/28 | 0.03 | 0.04 | 0.05 | 0.05 | 0.04 | 0.04 | 0.04 | 0.05 | 0.04 | 0.06 | 0.08 | 0.06 | 0.06 | 0.10 | 0.11 |
| 1/4 | 0.10 | | | | 0.12 | 0.12 | 0.08 | 0.10 | 0.10 | | 0.09 | 0.06 | 0.06 | | |
| 1/11 | | 0.10 | 0.11 | 0.11 | | | | | | 0.08 | | | | 0.03 | 0.02 |
| 1/18 | 0.03 | | | | 0.04 | 0.03 | * | 0.02 | 0.03 | | 0.05 | 0.04 | 0.04 | | |
| 1/25 | | 0.04 | 0.04 | 0.04 | | | | | | 0.03 | | | | 0.06 | 0.08 |
| 2/1 | 0.08 | | | | 0.07 | 0.08 | * | 0.01 | 0.07 | | 0.09 | 0.06 | 0.06 | | |
| 2/8 | | 0.07 | 0.08 | 0.07 | | | | | | 0.06 | | | | 0.06 | 0.07 |
| 2/15 | 0.07 | | | | 0.07 | 0.07 | 0.08 | 0.05 | 0.07 | | 0.08 | 0.06 | 0.03 | | |
| 2/22 | | 0.06 | 0.06 | 0.08 | | | | | | 0.06 | | | | 0.10 | 0.03 |
| 3/1 | 0.11 | | | | 0.11 | 0.12 | 0.11 | 0.12 | 0.12 | | 0.15 | 0.15 | 0.13 | | |
| 3/8 | | 0.13 | 0.15 | 0.12 | | | | | | 0.14 | | | | 0.19 | * |
| 3/15 | 0.22 | | | | 0.22 | 0.19 | 0.21 | 0.20 | 0.03 | | 0.12 | 0.20 | 0.20 | | |
| 3/22 | | 0.21 | 0.21 | 0.21 | | | | | | 0.22 | | | | 0.16 | 0.16 |
| 3/29 | 0.17 | | | | 0.15 | 0.14 | 0.15 | 0.14 | 0.09 | | 0.16 | 0.20 | 0.17 | | |
| 4/5 | | 0.10 | 0.14 | 0.15 | | | | | | 0.20 | | | | 0.27 | 0.19 |
| 4/12 | 0.28 | | | | 0.26 | 0.32 | 0.28 | 0.29 | 0.28 | | 0.30 | 0.34 | 0.30 | | |
| 4/19 | | 0.32 | 0.29 | 0.28 | | | | | | 0.25 | | | | 0.30 | 0.17 |
| 4/26 | 0.06 | | | | 0.26 | 0.32 | 0.31 | 0.23 | 0.26 | | 0.31 | 0.28 | 0.30 | | |
| 5/3 | | 0.32 | 0.14 | 0.33 | | | | | | 0.31 | | | | 0.22 | 0.17 |
| 5/10 | 0.23 | | | | 0.03 | 0.25 | 0.23 | 0.23 | 0.18 | | 0.28 | 0.30 | 0.28 | | |
| 5/17 | | 0.29 | 0.22 | 0.28 | | | | | | 0.33 | | | | 0.27 | 0.31 |
| 5/24 | 0.35 | | | | 0.31 | 0.33 | 0.32 | 0.33 | 0.31 | | 0.35 | 0.36 | 0.35 | | |
| 5/31 | | 0.37 | 0.10 | 0.34 | | | | | | 0.37 | | | | 0.33 | 0.34 |
| 6/7 | 0.34 | | | | 0.33 | 0.21 | 0.33 | 0.36 | 0.27 | | 0.32 | 0.36 | 0.36 | | |
| 6/14 | | 0.40 | * | 0.32 | | | | | | 0.37 | | | | 0.31 | 0.29 |
| 6/20 | 0.29 | 0.25 | 0.20 | | 0.10 | 0.03 | 0.29 | 0.27 | 0.20 | 0.26 | 0.28 | 0.28 | 0.25 | | |
| 6/21 | | 0.24 | 0.25 | 0.40 | | | | | | 0.24 | | | | | |
| 6/22 | | 0.25 | 0.29 | | | | | | | 0.27 | | | | | |
| 6/23 | | 0.48 | 0.56 | | | | | | | 0.35 | | | | | |
| 6/25 | | 0.41 | 0.97 | | | | | | | 0.56 | | | | | |
| 6/26 | | 0.47 | 0.58 | | | | | | | 0.50 | | | | | |
| 6/27 | | 0.14 | 0.14 | | | | | | | 0.13 | | | | | |
| 6/28 | | 0.30 | 0.31 | | | | | | | 0.37 | | | | | |

* Invalid sample.
(a) The tabled values are generally for two 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) Ringold Station switched to Baxter Substation during November 1974.

## TABLE A-1 (Part A Cont'd) Concentrations of Radioactive Beta Particulates in the Air of the Hanford Environs - 1974[a]

### Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx.[b] Wk. on Date | Perimeter Communities | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ringold[c] | Byers Landing | Richland | Pasco | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Benton City | Rattlesnake Springs | ERC | Yakima Barricade | Vernita | Wahluke #2 |
| 7/1 | | 0.24 | 0.29 | | | | | | | 0.27 | | | | | |
| 7/3 | 0.22 | 0.22 | 0.22 | | | | | | | 0.16 | | | | | |
| 7/5 | | 0.22 | 0.34 | | 0.26 | 0.20 | 0.22 | 0.23 | 0.16 | 0.39 | | | | 0.24 | 0.20 |
| 7/8 | 0.28 | 0.21 | 0.22 | 0.23 | | | | | | 0.21 | 0.24 | 0.21 | 0.22 | | |
| 7/19 | | | | | 0.23 | 0.04 | 0.28 | 0.26 | 0.04 | | | | | 0.21 | 0.27 |
| 7/26 | 0.14 | 0.28 | 0.26 | 0.25 | | | | | | 0.21 | 0.27 | 0.24 | 0.27 | | |
| 8/2 | | | | | 0.14 | * | 0.20 | 0.17 | 0.11 | | | | | 0.19 | 0.16 |
| 8/9 | 0.16 | 0.14 | 0.16 | 0.14 | | | | | | 0.11 | 0.16 | 0.14 | 0.15 | | |
| 8/16 | | | | | 0.09 | 0.14 | 0.17 | 0.13 | 0.14 | | | | | 0.15 | 0.16 |
| 8/23 | 0.14 | 0.14 | 0.16 | 0.14 | | | | | | 0.15 | 0.19 | 0.19 | 0.17 | | |
| 8/30 | | | | | 0.12 | 0.05 | 0.17 | * | 0.10 | | | | | 0.15 | 0.15 |
| 9/6 | 0.15 | 0.14 | * | 0.15 | | | | | | 0.12 | 0.12 | 0.12 | * | | |
| 9/13 | | | | | 0.24 | 0.09 | 0.14 | 0.10 | 0.20 | | | | | 0.14 | 0.15 |
| 9/20 | 0.11 | 0.15 | 0.12 | 0.15 | | | | | | 0.13 | 0.15 | 0.15 | * | | |
| 9/27 | | | | | 0.08 | 0.11 | 0.12 | 0.18 | 0.09 | | | | | 0.11 | 0.12 |
| 10/4 | 0.17 | * | 0.10 | 0.11 | | | | | | 0.11 | 0.14 | 0.14 | 0.10 | | |
| 10/11 | | | | | 0.11 | 0.13 | 0.15 | 0.17 | 0.13 | | | | | 0.36 | 0.16 |
| 10/18 | * | 0.17 | 0.14 | 0.15 | | | | | | 0.13 | 0.16 | 0.14 | 0.12 | | |
| 10/25 | | | | | 0.10 | 0.12 | 0.18 | 0.13 | 0.12 | | | | | 0.18 | 0.17 |
| 11/1 | * | 0.10 | 0.15 | 0.11 | | | | | | 0.09 | 0.12 | 0.10 | 0.08 | 0.11 | |
| 11/8 | | | | | 0.05 | 0.13 | 0.10 | 0.10 | 0.09 | | | | | | 0.10 |
| 11/15 | | 0.12 | 0.17 | 0.13 | | | | | | 0.10 | 0.13 | 0.10 | 0.11 | 0.10 | |
| 11/22 | 0.21 | | | | 0.15 | 0.13 | 0.18 | 0.16 | 0.15 | | | | | | 0.15 |
| 11/29 | | 0.09 | 0.09 | 0.22 | | | | | | 0.17 | 0.20 | 0.16 | 0.18 | 0.18 | |
| 12/06 | 0.12 | | | | 0.10 | 0.11 | 0.13 | 0.12 | 0.08 | | | | | | 0.16 |
| 12/13 | | 0.11 | 0.09 | 0.11 | | | | | | 0.09 | 0.11 | 0.08 | 0.13 | 0.10 | |
| 12/20 | 0.05 | | | | 0.06 | 0.07 | * | 0.08 | | | | | | | 0.04 |
| 12/27 | | 0.09 | 0.06 | 0.07 | | | | | 0.07 | 0.06 | 0.06 | 0.06 | 0.06 | 0.07 | |
| Annual Average | <0.17 | <0.17 | <0.16 | 0.18 | 0.14 | <0.14 | <0.18 | <0.16 | 0.13 | 0.17 | 0.18 | 0.17 | <0.17 | 0.17 | <0.15 |

* Invalid sample.
(a) The tabled values are generally for two 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) Ringold Station switched to Baxter Substation during November 1974.

TABLE A-1 (Part B) Concentration of Radioactive Beta Particulates in the Air of the Hanford Environs - 1974[a]

Units $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Distant Communities | | | | | |
|---|---|---|---|---|---|---|
| | Moses Lake | Washtucna | Walla Walla | McNary | Ellensburg | Sunnyside |
| 12/28 | 0.04 | 0.06 | 0.04 | 0.08 | 0.06 | 0.03 |
| 1/4 | 0.11 | | | | 0.04 | * |
| 1/11 | | 0.06 | 0.07 | 0.06 | | |
| 1/18 | 0.03 | | | | * | 0.08 |
| 1/25 | | | 0.07 | 0.06 | | |
| 2/1 | 0.08 | | | | | 0.07 |
| 2/8 | | 0.07 | 0.07 | 0.07 | | |
| 2/15 | 0.07 | | | | | 0.05 |
| 2/22 | | | 0.09 | 0.06 | | |
| 3/1 | 0.12 | 0.11 | | | | 0.10 |
| 3/8 | | | 0.17 | 0.14 | | |
| 3/15 | 0.19 | | | | 0.15 | 0.16 |
| 3/22 | | | | 0.16 | | |
| 3/29 | 0.15 | 0.14 | | | | 0.15 |
| 4/5 | | | 0.26 | 0.20 | 0.15 | |
| 4/12 | 0.29 | | | | | 0.24 |
| 4/19 | | 0.35 | | 0.21 | 0.21 | |
| 4/26 | 0.29 | | | | | 0.25 |
| 5/3 | | 0.28 | 0.32 | 0.29 | 0.21 | |
| 5/10 | 0.23 | | | | | 0.21 |
| 5/17 | | 0.29 | 0.35 | * | 0.20 | |
| 5/24 | 0.29 | | | | | 0.34 |
| 5/31 | | | 0.48 | 0.43 | | |
| 6/7 | | 0.37 | 0.42 | | | 0.33 |
| 6/14 | | | | 0.31 | 0.28 | |
| 6/21 | 0.25 | 0.41 | 0.28 | | | 0.15 |
| 6/28 | | | | 0.22 | 0.19 | |
| 7/5 | 0.19 | 0.22 | 0.22 | | | 0.21 |
| 7/12 | | | | 0.25 | 0.22 | |
| 7/19 | 0.23 | | 0.15 | | | 0.22 |
| 7/26 | | 0.23 | | 0.20 | 0.19 | |

* 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 A-1 (Part B Cont'd) Concentration of Radioactive Beta Particulates in the Air of the Hanford Environs - 1974[a]

Units $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Distant Communities | | | | | |
|---|---|---|---|---|---|---|
| | Moses Lake | Washtucna | Walla Walla | McNary | Ellensburg | Sunnyside |
| 8/2 | 0.18 | | | | | 0.16 |
| 8/9 | | 0.11 | | 0.13 | 0.13 | |
| 8/16 | 0.14 | | | | | 0.15 |
| 8/23 | | * | | 0.14 | 0.12 | |
| 8/30 | 0.12 | 0.17 | 0.06 | | | 0.15 |
| 9/6 | | 0.09 | | 0.13 | | |
| 9/13 | 0.16 | | 0.17 | | 0.12 | 0.12 |
| 9/20 | | | | 0.13 | | |
| 9/27 | 0.12 | | 0.15 | | 0.11 | 0.10 |
| 10/4 | | 0.06 | | 0.16 | | |
| 10/11 | 0.23 | | | | 0.09 | 0.11 |
| 10/18 | | 0.12 | | 0.19 | | |
| 10/25 | 0.11 | | 0.09 | | Discontinued | 0.12 |
| 11/1 | | | | 0.11 | | |
| 11/8 | 0.14 | 0.10 | 0.23 | | | 0.11 |
| 11/15 | | | | 0.13 | | |
| 11/22 | 0.18 | 0.16 | 0.15 | | | 0.11 |
| 11/29 | | | | | | |
| 12/6 | 0.07 | 0.09 | 0.09 | 0.13 | | 0.11 |
| 12/13 | | | | 0.10 | | |
| 12/20 | 0.07 | | 0.08 | | | 0.06 |
| 12/27 | | 0.10 | | 0.07 | | |
| Annual Average | 0.17 | <0.16 | 0.18 | <0.17 | <0.15 | <0.15 |

* 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 A-2 (Part A) Concentrations of Radioactive Alpha Particulates in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Perimeter Communities | | | |
|---|---|---|---|---|
| | Byers Landing | Richland | Berg Ranch | Benton City |
| 12/28 | 0.001 | 0.0009 | 0.001 | 0.0007 |
| 1/4 | | | 0.002 | |
| 1/11 | 0.003 | 0.002 | | 0.002 |
| 1/18 | | | ** | |
| 1/25 | 0.0005 | 0.002 | | 0.0008 |
| 2/1 | | | ** | |
| 2/8 | 0.004 | 0.002 | | ** |
| 2/15 | | | 0.004 | |
| 2/22 | 0.001 | 0.002 | | 0.001 |
| 3/1 | | | 0.001 | |
| 3/8 | 0.002 | 0.002 | | 0.003 |
| 3/15 | | | 0.002 | |
| 3/22 | 0.001 | 0.002 | | 0.002 |
| 3/29 | | | 0.001 | |
| 4/5 | 0.001 | 0.001 | | 0.001 |
| 4/12 | | | 0.002 | |
| 4/19 | 0.001 | 0.001 | | 0.0006 |
| 4/26 | | | 0.001 | |
| 5/3 | 0.002 | 0.001 | | 0.002 |
| 5/10 | | | ** | |
| 5/17 | 0.002 | 0.003 | | 0.001 |
| 5/24 | | | 0.001 | |
| 5/31 | 0.001 | * | | 0.0009 |
| 6/7 | | | 0.0008 | |
| 6/14 | 0.002 | * | | 0.002 |
| 6/20 | * | * | 0.001 | * |
| 6/21 | * | * | | * |
| 6/22 | * | * | | 0.01 |
| 6/23 | * | * | | * |

* Result was less than the analytical limit of 0.0004 x $10^{-12}$ μCi/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 A-2 (Part A Cont'd) Concentrations of Radioactive Alpha Particulates in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Perimeter Communities | | | |
|---|---|---|---|---|
| | Byers Landing | Richland | Berg Ranch | Benton City |
| 6/25 | 0.009 | 0.01 | | 0.01 |
| 6/26 | 0.02 | 0.003 | | 0.04 |
| 6/27 | * | 0.004 | | 0.02 |
| 6/28 | 0.003 | 0.002 | | 0.004 |
| 7/1 | * | * | | * |
| 7/3 | 0.01 | * | 0.0006 | 0.003 |
| 7/5 | 0.003 | 0.002 | | 0.002 |
| 7/8 | 0.001 | 0.001 | | * |
| 7/19 | | | 0.0007 | 0.0007 |
| 7/26 | 0.001 | 0.001 | | * |
| 8/2 | | | 0.0007 | |
| 8/9 | 0.002 | 0.001 | | 0.0008 |
| 8/16 | | | 0.001 | |
| 8/23 | 0.0009 | 0.002 | | 0.002 |
| 8/30 | | | 0.002 | |
| 9/6 | 0.0009 | * | | 0.0007 |
| 9/13 | | | 0.002 | |
| 9/20 | 0.002 | 0.001 | | 0.001 |
| 9/27 | | | 0.002 | |
| 10/4 | ** | 0.001 | | 0.002 |
| 10/11 | | | 0.002 | |
| 10/18 | 0.002 | 0.002 | | 0.002 |
| 10/25 | | | 0.003 | |
| 11/1 | 0.002 | 0.002 | | 0.001 |
| 11/8 | | | 0.002 | |
| 11/15 | 0.002 | 0.002 | | 0.001 |
| 11/22 | | | 0.001 | |
| 11/29 | 0.001 | 0.002 | | 0.002 |

* Result was less than the analytical limit of 0.0004 x $10^{-12}$ μCi/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 A-2 (Part A Cont'd) Concentrations of Radioactive Alpha Particulates in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Perimeter Communities | | | |
|---|---|---|---|---|
| | Byers Landing | Richland | Berg Ranch | Benton City |
| 12/6 | | | ** | |
| 12/13 | 0.0007 | 0.0006 | | 0.0005 |
| 12/20 | | | 0.001 | |
| 12/27 | * | 0.0005 | | 0.0004 |
| Annual Average[c] | <0.002 | <0.002 | 0.002 | <0.002 |

* Result was less than the analytical limit of 0.0004 x $10^{-12}$ μCi/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 A-2 (Part B) Concentrations of Radioactive Alpha Particulates in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Distant Communities: Walla Walla | McNary | Approx. Wk. on Date[b] | Walla Walla | McNary |
|---|---|---|---|---|---|
| 12/28 | 0.001 | 0.002 | 7/5 | 0.0008 | |
| 1/4 | | | 7/12 | | 0.001 |
| 1/11 | 0.002 | ** | 7/19 | 0.0006 | |
| 1/18 | | | 7/26 | | 0.001 |
| 1/25 | 0.002 | * | 8/2 | | |
| 2/1 | | | 8/9 | | 0.002 |
| 2/8 | 0.002 | 0.0006 | 8/16 | | |
| 2/15 | | | 8/23 | | 0.001 |
| 2/22 | 0.0008 | 0.0007 | 8/30 | 0.0009 | |
| 3/1 | | | 9/6 | | 0.001 |
| 3/8 | 0.001 | 0.002 | 9/13 | 0.003 | |
| 3/15 | | | 9/20 | | ** |
| 3/22 | | 0.0008 | 9/27 | 0.001 | |
| 3/29 | | | 10/4 | | 0.001 |
| 4/5 | 0.0009 | 0.001 | 10/11 | | |
| 4/12 | | | 10/18 | | 0.002 |
| 4/19 | | 0.001 | 10/25 | 0.003 | |
| 4/26 | | | 11/1 | | 0.001 |
| 5/3 | 0.001 | 0.005 | 11/8 | 0.001 | |
| 5/10 | | | 11/15 | | 0.002 |
| 5/17 | 0.002 | 0.002 | 11/22 | 0.001 | |
| 5/24 | | | 11/29 | | |
| 5/31 | 0.001 | 0.003 | 12/6 | 0.0003 | 0.002 |
| 6/7 | 0.002 | | 12/13 | | 0.0006 |
| 6/14 | | 0.002 | 12/20 | * | |
| 6/21 | 0.002 | | 12/27 | | 0.003 |
| 6/28 | | 0.001 | Annual Average[c] | <0.001 | <0.002 |

* Result was less than the analytical limit of 0.0004 x $10^{-12}$ μCi/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 A-3 (Part A) Concentrations of $^{131}I$ in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Ringold | Baxter Substation | Byers Landing | Richland | Cooke Bros. | Benton City |
|---|---|---|---|---|---|---|
| 12/28 | | | * | * | | * |
| 1/4 | * | | | | * | |
| 1/11 | | | * | * | | * |
| 1/18 | * | | | | * | |
| 1/25 | | | * | * | | * |
| 2/1 | * | | | | * | |
| 2/8 | | | * | * | | * |
| 2/15 | * | | | | * | |
| 2/22 | | | * | * | | * |
| 3/1 | * | | | | * | |
| 3/8 | | | * | * | | * |
| 3/15 | * | | | | * | |
| 3/22 | | | * | * | | * |
| 3/29 | * | | | | * | |
| 4/5 | | | * | * | | * |
| 4/12 | * | | | | * | |
| 4/19 | | | * | * | | * |
| 4/26 | * | | | | * | |
| 5/3 | | | * | * | | * |
| 5/10 | * | | | | * | |
| 5/17 | | | * | * | | * |
| 5/24 | * | | | | * | |
| 5/31 | | | * | * | | * |
| 6/7 | * | | | | * | |
| 6/14 | | | * | * | | * |
| 6/21 | * | | | | * | |
| 6/28 | | | * | * | | * |
| 7/5 | * | | | | * | |
| 7/12 | | | * | * | | * |
| 7/19 | * | | | | * | |
| 7/26 | | | * | * | | * |
| 8/2 | * | | | | * | |
| 8/9 | | | * | * | | * |
| 8/16 | * | | | | * | |
| 8/23 | | | * | * | | * |
| 8/30 | * | | | | * | |

* Indicates the results were less than the analytical limit of 0.07 x $10^{-12}$ μCi/ml.

(a) The tabled values are generally for two 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 A-3 (Part A Cont'd) Concentrations of $^{131}I$ in the Air of the Hanford Environs - 1974[a]

Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Approx. Wk. on Date[b] | Ringold | Baxter Substation | Byers Landing | Richland | Cooke Bros. | Benton City |
|---|---|---|---|---|---|---|
| 9/6 | | | * | * | | * |
| 9/13 | * | | | | * | |
| 9/20 | | | * | * | | * |
| 9/27 | * | | | | * | |
| 10/4 | | | * | * | | * |
| 10/11 | * | | | | * | |
| 10/18 | | | * | * | | * |
| 10/25 | Discon-tinued | | | | * | |
| 11/1 | | | * | * | | * |
| 11/8 | | | | | * | |
| 11/15 | | | * | * | | * |
| 11/22 | | * | | | * | |
| 11/29 | | | * | * | | * |
| 12/6 | | * | | | * | |
| 12/13 | | | * | * | | * |
| 12/20 | | * | | | * | |
| 12/27 | | | * | * | | * |
| Annual Average | * | * | * | * | * | * |

* Indicates the results were less than the analytical limit of 0.07 x $10^{-12}$ μCi/ml.

(a) The tabled values are generally for two 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 A-4 Concentrations of Specific Radionuclides on Selected Air Filter Composites - 1974

## Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Date | $^{7}Be$ | $^{54}Mn$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{95}ZrNb$ | $^{103}Ru$ | $^{106}Ru$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}BaLa$ | $^{141}Ce$ | $^{144}CePr$ | Total Pu |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analytical Limit(a) | 0.03 | 0.002 | 0.003 | 0.006 | 0.0002 | 0.002 | 0.003 | 0.04 | 0.12 | 0.01 | 0.003 | 0.15 | 0.007 | 0.03 | 0.000002 |
| **Inner Northeast Quadrant** | | | | | | | | | | | | | | | |
| 1/31 | 0.06 | 0.003 | * | * | | 0.006 | * | * | * | * | * | * | * | * | |
| 2/28 | * | 0.004 | * | * | | 0.01 | * | 0.11 | * | * | * | * | * | * | |
| 3/29 | 0.06 | 0.01 | * | * | 0.0006 | 0.04 | * | 0.12 | * | * | 0.002 | * | * | 0.05 | 0.00002 |
| 4/26 | * | * | * | * | | 0.05 | * | 0.19 | * | * | 0.005 | * | * | 0.09 | |
| 5/23 | * | 0.02 | * | * | | 0.05 | * | 0.18 | * | * | 0.005 | * | * | 0.11 | |
| 6/21 | * | 0.02 | * | 0.02 | 0.0005 | 0.06 | 0.02 | * | * | 0.007 | 0.01 | 0.33 | * | 0.18 | 0.000001 |
| 7/31 | 0.17 | 0.01 | * | * | | 0.03 | * | * | * | * | 0.008 | * | * | 0.11 | |
| 8/30 | 0.15 | 0.004 | * | 0.004 | | 0.02 | * | * | * | * | 0.005 | * | * | 0.07 | |
| 9/27 | 0.11 | 0.01 | * | * | 0.0002 | 0.05 | * | 0.06 | * | * | 0.004 | * | * | 0.04 | 0.000004 |
| 10/25 | 0.07 | * | * | * | | 0.03 | * | 0.19 | * | * | * | * | * | * | |
| 11/22 | * | * | * | * | | 0.04 | * | 0.12 | * | * | * | * | * | * | |
| 12/26 | 0.05 | 0.005 | * | * | 0.0005 | 0.02 | * | 0.08 | * | * | * | * | * | 0.02 | 0.00005 |
| Annual Average(b) | <0.06 | <0.007 | * | * | 0.0004 | 0.03 | <0.002 | <0.09 | * | <0.001 | <0.003 | <0.03 | * | <0.06 | 0.00002 |
| **Inner Southeast Quadrant** | | | | | | | | | | | | | | | |
| 1/21 | 0.07 | 0.003 | * | * | | 0.007 | * | * | * | * | * | * | * | * | |
| 2/19 | * | 0.006 | 0.009 | * | | 0.001 | * | 0.22 | * | * | * | * | * | * | |
| 3/18 | * | 0.005 | * | * | 0.0004 | 0.03 | * | 0.10 | * | * | * | * | * | * | 0.00002 |
| 4/29 | 0.04 | * | * | * | | 0.05 | * | 0.13 | * | * | 0.004 | * | * | 0.08 | |
| 5/28 | * | 0.02 | * | * | | 0.04 | * | 0.27 | * | * | 0.005 | * | * | 0.11 | |
| 6/28 | * | 0.008 | * | * | 0.003 | 0.04 | * | 0.28 | * | * | 0.006 | * | * | 0.13 | 0.00004 |
| 7/22 | 0.31 | * | * | * | | 0.04 | * | * | * | 0.04 | 0.008 | * | * | 0.10 | |
| 8/19 | 0.27 | 0.01 | 0.004 | 0.01 | | 0.03 | * | * | * | * | 0.01 | * | * | 0.13 | |
| 9/30 | 0.04 | * | * | * | 0.005 | 0.02 | * | 0.23 | * | * | * | * | * | 0.04 | 0.00006 |
| 10/28 | 0.13 | * | * | * | | 0.01 | * | 0.10 | * | * | * | * | * | * | |
| 11/25 | * | * | * | * | | 0.05 | * | 0.12 | * | * | * | * | * | * | |
| 12/23 | 0.11 | * | * | * | 0.001 | 0.05 | * | * | * | * | * | * | * | 0.04 | 0.00001 |
| Annual Average(b) | <0.08 | <0.002 | <0.002 | * | 0.002 | 0.03 | * | <0.12 | * | <0.004 | <0.002 | * | * | <0.06 | 0.00003 |
| **Outer Northeast Quadrant** | | | | | | | | | | | | | | | |
| 1/18 | 0.08 | * | * | * | | 0.006 | * | * | * | * | * | * | * | * | |
| 2/15 | * | 0.004 | * | * | | 0.009 | * | 0.11 | * | * | * | * | * | * | |
| 3/26 | 0.005 | 0.006 | * | * | 0.0004 | 0.02 | * | 0.09 | * | * | * | * | * | * | 0.00001 |
| 4/15 | * | * | * | * | | 0.04 | * | 0.18 | * | * | * | * | * | 0.07 | |
| 5/24 | * | 0.02 | * | * | | 0.06 | * | 0.23 | * | * | 0.007 | * | * | 0.14 | |
| 6/21 | * | 0.02 | * | * | 0.003 | 0.05 | * | 0.21 | * | * | 0.009 | 0.27 | * | 0.15 | 0.00005 |
| 7/23 | * | * | * | * | | 0.03 | * | * | * | * | * | * | * | 0.09 | |
| 8/24 | 0.21 | 0.007 | 0.004 | 0.007 | | 0.02 | * | * | * | * | 0.009 | * | * | 0.12 | |
| 9/13 | 0.16 | 0.007 | * | * | 0.0006 | 0.02 | * | * | * | * | 0.007 | * | * | * | 0.00005 |
| 10/25 | 0.05 | * | * | * | | 0.03 | * | 0.20 | * | * | * | * | * | * | |
| 11/27 | * | * | * | * | | 0.01 | * | 0.18 | * | * | * | * | * | * | |
| 12/20 | 0.11 | * | * | * | 0.001 | 0.02 | * | * | * | * | * | * | * | * | 0.00004 |
| Annual Average(b) | <0.009 | <0.005 | * | * | 0.001 | 0.03 | * | <0.10 | * | * | <0.003 | <0.02 | * | <0.05 | 0.00004 |

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 A-4 (Cont'd) Concentrations of Specific Radionuclides on Selected Air Filter Composites - 1974

### Units of $10^{-12}$ μCi/ml of Air (Continuous Samples)

| Date | $^{7}Be$ | $^{54}Mn$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{95}ZrNb$ | $^{103}Ru$ | $^{106}Ru$ | $^{131}I$ | $^{134}Cs$ | $^{137}Cs$ | $^{140}BaLa$ | $^{141}Ce$ | $^{144}CePr$ | Total Pu |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analytical Limit[a] | 0.03 | 0.002 | 0.003 | 0.006 | 0.0002 | 0.002 | 0.003 | 0.04 | 0.12 | 0.01 | 0.003 | 0.15 | 0.007 | 0.03 | 0.000002 |
| | | | | | | Outer Southeast Quadrant | | | | | | | | | |
| 1/25 | 0.06 | 0.004 | * | * | | 0.008 | * | * | * | * | * | * | * | * | |
| 2/22 | * | 0.006 | * | * | | 0.01 | * | 0.15 | * | * | * | * | * | * | |
| 3/22 | * | 0.006 | * | * | 0.0007 | 0.03 | * | 0.07 | * | * | * | * | * | * | 0.00002 |
| 4/19 | * | * | * | * | | 0.08 | * | 0.29 | * | * | * | * | * | 0.18 | |
| 5/31 | 0.18 | * | 0.003 | * | | 0.08 | * | * | * | * | 0.008 | * | * | * | |
| 6/28 | * | 0.005 | * | * | 0.003 | 0.07 | * | 0.29 | * | * | 0.01 | * | * | 0.19 | 0.00005 |
| 7/26 | 0.22 | * | * | * | | 0.04 | * | * | * | * | 0.005 | * | * | 0.12 | |
| 8/23 | 0.20 | * | * | * | | 0.03 | * | * | * | * | * | * | * | 0.12 | |
| 9/20 | 0.03 | * | * | * | 0.006 | 0.02 | * | 0.17 | * | * | * | * | * | 0.06 | 0.00002 |
| 10/25 | 0.07 | * | * | * | | 0.03 | * | 0.28 | * | * | * | * | * | * | |
| 11/22 | 0.05 | * | * | * | | 0.08 | * | 0.08 | * | * | * | * | * | 0.28 | |
| 12/27 | * | 0.007 | * | * | 0.0006 | 0.02 | * | 0.19 | * | * | * | * | * | * | 0.00001 |
| Annual Average[b] | <0.07 | <0.002 | <0.0004 | * | 0.002 | 0.04 | * | <0.13 | * | * | <0.002 | * | * | <0.08 | 0.00002 |
| | | | | | | Outer Western Quadrant | | | | | | | | | |
| 1/28 | 0.08 | * | * | * | | 0.005 | * | * | * | * | * | * | * | * | |
| 2/25 | * | * | * | * | | 0.01 | * | 0.15 | * | * | * | * | * | * | |
| 3/25 | * | 0.01 | * | * | 0.0006 | 0.04 | * | 0.13 | * | * | * | * | * | * | 0.000009 |
| 4/22 | * | * | * | * | | 0.04 | * | 0.19 | * | * | * | * | * | 0.06 | |
| 5/20 | * | 0.02 | * | * | | 0.05 | * | 0.18 | * | * | 0.007 | * | * | * | |
| 6/17 | * | 0.009 | * | * | 0.003 | 0.06 | * | 0.20 | * | * | 0.007 | * | * | 0.14 | 0.000002 |
| 7/29 | 0.16 | * | * | 0.008 | | 0.03 | * | * | * | * | 0.007 | * | * | 0.11 | |
| 8/26 | 0.20 | 0.007 | * | * | | 0.02 | * | * | * | * | 0.009 | * | * | 0.09 | |
| 9/13 | * | * | * | * | 0.007 | 0.02 | * | 0.19 | * | * | * | * | * | * | * |
| 10/23 | 0.10 | * | * | * | | 0.01 | * | 0.14 | * | * | 0.003 | * | * | 0.03 | |
| 11/18 | * | * | * | * | | 0.009 | * | * | * | * | * | * | * | * | |
| 12/16 | 0.22 | 0.006 | * | * | 0.001 | 0.02 | * | * | * | * | * | * | * | * | 0.00002 |
| Annual Average[b] | <0.06 | <0.005 | * | * | 0.003 | 0.02 | * | <0.10 | * | * | <0.003 | * | * | <0.04 | <0.00002 |

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 anlytical limit" value.

# APPENDIX B

## NONRADIOLOGICAL PARAMETERS MEASURED IN THE ATMOSPHERE

## APPENDIX B

## 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 1974 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 as well as suspended particulate collection on the roof of the Federal Building in Richland. HEHF documents should be referred to for greater detail but the following tables, obtained from HEHF, contain data obtained during 1974 regarding $NO_2$, $SO_2$, and particulate concentrations in the atmosphere of the Hanford Environs.

The following tables are included in Appendix B:

Table B-1. Suspended Partiuclates in the Air at Richland, Federal Building - 1974 (Page B-2)

Table B-2. Nitrogen Dioxide in the Air at the Hobkirk Ranch - 1974 (Page B-4)

Table B-3. Nitrogen Dioxide in the Air at the Gillum Ranch - 1974 (Page B-6)

Table B-4. Nitrogen Dioxide in the Air at the Sullivan Ranch - 1974 (Page B-9)

TABLE B-1 Suspended Particulates in the Air at Richland, Federal Building - 1974[a]

Units of $\mu g/m^3$ of Air (Continuous Samples)

| Date | Suspended Particulates | Date | Suspended Particulates |
|---|---|---|---|
| 1/15 | 8 | 3/21 | 60 |
| 1/16 | 9 | 3/22 | 45 |
| 1/17 | 25 | 3/25 | 64 |
| 1/18 | 20 | 3/26 | 44 |
| 1/21 | 34 | 3/27 | 56 |
| 1/22 | 16 | 4/2 | 68 |
| 1/23 | 10 | 4/3 | 20 |
| 1/24 | 10 | 4/4 | 17 |
| 1/30 | 23 | 4/5 | 22 |
| 1/31 | 9 | 4/9 | 16 |
| 2/1 | 25 | 4/10 | 76 |
| 2/4 | 20 | 4/12 | 30 |
| 2/5 | 18 | 4/15 | 67 |
| 2/6 | 26 | 4/16 | 49 |
| 2/7 | 37 | 4/17 | 67 |
| 2/8 | 49 | 4/18 | 46 |
| 2/11 | 26 | 4/22 | 23 |
| 2/12 | 44 | 4/23 | 15 |
| 2/13 | 14 | 4/24 | 22 |
| 2/14 | 21 | 4/26 | 19 |
| 2/19 | 9 | 4/29 | 54 |
| 2/20 | 22 | 4/30 | 43 |
| 2/21 | 48 | 5/2 | 38 |
| 2/22 | 20 | 5/3 | 50 |
| 2/25 | 30 | 5/6 | 56 |
| 2/26 | 13 | 5/7 | 60 |
| 2/27 | 18 | 5/8 | 58 |
| 3/1 | 32 | 5/9 | 54 |
| 3/4 | 570 | 5/10 | 27 |
| 3/13 | 24 | 5/13 | 33 |
| 3/14 | 17 | 5/14 | 39 |
| 3/15 | 21 | 5/16 | 26 |
| 3/18 | 36 | 5/17 | 24 |
| 3/19 | 160 | 5/20 | 40 |
| 3/20 | 52 | 5/21 | 60 |

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

TABLE B-1 (Cont'd) Suspended Particulates in the Air at Richland, Federal Building - 1974[a]

Units of $\mu g/m^3$ of Air (Continuous Samples)

| Date | Suspended Particulates | Date | Suspended Particulates |
|---|---|---|---|
| 5/22 | 56 | 7/23 | 55 |
| 5/23 | 39 | 7/24 | 82 |
| 5/24 | 36 | 7/25 | 79 |
| 5/30 | 37 | 7/26 | 68 |
| 5/31 | 62 | 7/29 | 110 |
| 6/3 | 88 | 7/30 | 70 |
| 6/4 | 16 | 7/31 | 44 |
| 6/5 | 16 | 8/9 | 67 |
| 6/6 | 35 | 8/12 | 58 |
| 6/7 | 41 | 8/13 | 45 |
| 6/10 | 70 | 8/14 | 54 |
| 6/11 | 69 | 8/15 | 76 |
| 6/13 | 68 | 8/16 | 290 |
| 6/14 | 91 | 8/19 | 59 |
| 6/17 | 75 | 8/20 | 59 |
| 6/18 | 200 | 8/21 | 70 |
| 6/26 | 49 | 8/22 | 62 |
| 6/27 | 110 | 8/23 | 55 |
| 6/28 | 52 | 8/26 | 96 |
| 7/1 | 70 | 8/27 | 110 |
| 7/2 | 56 | 8/29 | 130 |
| 7/3 | 49 | | |
| 7/5 | 38 | | |
| 7/8 | 45 | Average | 55. |
| 7/9 | 19 | | |
| 7/10 | 13 | | |
| 7/11 | 150 | | |
| 7/12 | 42 | | |
| 7/15 | 200 | | |
| 7/16 | 50 | | |
| 7/17 | 25 | | |
| 7/18 | 39 | | |
| 7/19 | 42 | | |
| 7/22 | 60 | | |

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

TABLE B-2 Nitrogen Doxide in the Air at the Hobkirk Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ | Date | Concentration, $No_2$ |
|---|---|---|---|
| 1/17 | 0.008 | 8/1 | 0.022 |
| 1/18 | 0.004 | 8/2 | 0.006 |
| 1/19 | 0.002 | 8/3 | 0.007 |
| 1/20 | 0.006 | 8/4 | 0.010 |
| 1/21 | 0.001 | 8/5 | 0.005 |
| 1/22 | 0.001 | 8/6 | 0.006 |
| 1/30 | 0.004 | 8/14 | 0.006 |
| 1/31 | 0.005 | 8/15 | 0.005 |
| | | 8/16 | 0.008 |
| 2/1 | 0.002 | 8/17 | 0.008 |
| 2/2 | 0.003 | 8/18 | 0.003 |
| 2/3 | 0.002 | 8/19 | 0.004 |
| 2/4 | 0.003 | 8/20 | 0.004 |
| 2/5 | 0.007 | 8/28 | 0.011 |
| | | 8/31 | 0.013 |
| 7/3 | 0.007 | | |
| 7/4 | 0.004 | 9/1 | 0.013 |
| 7/5 | 0.004 | 9/2 | 0.007 |
| 7/6 | 0.006 | 9/3 | 0.003 |
| 7/7 | 0.005 | | |
| 7/8 | 0.008 | 10/2 | 0.003 |
| 7/9 | 0.005 | 10/3 | 0.004 |
| 7/17 | 0.007 | 10/4 | 0.001 |
| 7/18 | 0.007 | 10/5 | 0.002 |
| 7/19 | 0.006 | 10/6 | 0.003 |
| 7/20 | 0.006 | 10/7 | 0.007 |
| 7/21 | 0.007 | 10/8 | 0.006 |
| 7/23 | 0.010 | 10/16 | 0.011 |
| 7/31 | 0.010 | 10/18 | 0.012 |
| | | 10/19 | 0.014 |

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

TABLE B-2 (Cont'd) Nitrogen Dioxide in the Air at the Hobkirk Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ |
|---|---|
| 10/20 | 0.004 |
| 10/21 | 0.007 |
| 10/22 | 0.007 |
| 11/13 | 0.005 |
| 11/14 | 0.006 |
| 11/15 | 0.005 |
| 11/16 | 0.008 |
| 11/17 | 0.003 |
| 11/19 | 0.004 |
| 12/11 | 0.005 |
| 12/12 | 0.006 |
| 12/13 | 0.003 |
| 12/14 | 0.002 |
| 12/15 | 0.004 |
| 12/16 | 0.008 |
| 12/17 | 0.005 |
| 12/26 | 0.005 |
| 12/27 | 0.003 |
| 12/28 | 0.004 |
| 12/29 | 0.002 |
| 12/30 | 0.005 |
| 12/31 | 0.006 |
| Average | 0.006 |

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

TABLE B-3 Nitrogen Dioxide in the Air at the Gillum Ranch - 1974 [a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ | Date | Concentration, $NO_2$ |
|---|---|---|---|
| 2/13 | 0.003 | 5/8 | 0.008 |
| 2/14 | 0.013 | 5/9 | 0.005 |
| 2/15 | 0.012 | 5/10 | 0.007 |
| 2/16 | 0.001 | 5/11 | 0.008 |
| 2/17 | 0.002 | 5/22 | 0.008 |
| 2/18 | 0.003 | 5/23 | 0.007 |
| 2/19 | 0.013 | 5/24 | 0.005 |
| | | 5/25 | 0.006 |
| 3/14 | 0.002 | 5/26 | 0.006 |
| 3/15 | 0.002 | 5/27 | 0.007 |
| 3/16 | 0.004 | 5/28 | 0.004 |
| 3/17 | 0.003 | | |
| 3/18 | 0.010 | 6/5 | 0.004 |
| 3/19 | 0.003 | 6/6 | 0.003 |
| 3/20 | 0.005 | 6/7 | 0.001 |
| 3/28 | 0.004 | 6/8 | 0.012 |
| 3/29 | 0.003 | 6/10 | 0.010 |
| 3/30 | 0.003 | 6/11 | 0.012 |
| 3/31 | 0.004 | | |
| | | 7/3 | 0.004 |
| 4/1 | 0.007 | 7/4 | 0.004 |
| 4/2 | 0.003 | 7/5 | 0.004 |
| 4/10 | 0.003 | 7/6 | 0.004 |
| 4/11 | 0.003 | 7/7 | 0.004 |
| 4/12 | 0.006 | 7/8 | 0.004 |
| 4/13 | 0.002 | 7/9 | 0.004 |
| 4/14 | 0.002 | 7/17 | 0.005 |
| 4/15 | 0.006 | 7/18 | 0.004 |
| 4/16 | 0.005 | 7/19 | 0.007 |

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

TABLE B-3 (Cont'd) Nitrogen Dioxide in the Air at the Gillum Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ | Date | Concentration, $NO_2$ |
|---|---|---|---|
| 7/20 | 0.004 | 10/2 | 0.003 |
| 7/21 | 0.005 | 10/3 | 0.004 |
| 7/22 | 0.004 | 10/4 | 0.002 |
| 7/23 | 0.018 | 10/5 | 0.002 |
| 7/31 | 0.004 | 10/6 | 0.003 |
| | | 10/7 | 0.006 |
| 8/1 | 0.010 | 10/8 | 0.005 |
| 8/2 | 0.005 | 10/16 | 0.012 |
| 8/3 | 0.005 | 10/18 | 0.010 |
| 8/4 | 0.011 | 10/19 | 0.009 |
| 8/5 | 0.005 | 10/20 | 0.009 |
| 8/6 | 0.006 | 10/21 | 0.005 |
| 8/14 | 0.005 | 10/22 | 0.007 |
| 8/15 | 0.004 | 10/30 | 0.020 |
| 8/18 | 0.004 | 10/31 | 0.008 |
| 8/19 | 0.004 | | |
| 8/20 | 0.003 | 11/1 | 0.006 |
| 8/28 | 0.008 | 11/2 | 0.006 |
| 8/29 | 0.006 | 11/3 | 0.008 |
| 8/30 | 0.006 | 11/4 | 0.005 |
| 8/31 | 0.003 | 11/5 | 0.005 |
| | | 11/13 | 0.004 |
| 9/1 | 0.003 | 11/14 | 0.006 |
| 9/2 | 0.004 | 11/15 | 0.005 |
| 9/3 | 0.005 | 11/16 | 0.007 |
| 9/18 | 0.004 | 11/17 | 0.004 |
| 9/19 | 0.004 | 11/18 | 0.001 |
| 9/20 | 0.004 | 11/19 | 0.004 |
| 9/21 | 0.004 | 11/27 | 0.008 |
| 9/22 | 0.006 | 11/28 | 0.008 |
| 9/23 | 0.014 | 11/29 | 0.007 |
| 9/24 | 0.007 | 11/30 | 0.004 |

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

TABLE B-3 (Cont'd) Nitrogen Dioxide in the Air at the Gillum Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ |
|---|---|
| 12/1 | 0.003 |
| 12/2 | 0.004 |
| 12/3 | 0.005 |
| 12/11 | 0.004 |
| 12/12 | 0.004 |
| 12/13 | 0.004 |
| 12/14 | 0.004 |
| 12/15 | 0.003 |
| 12/16 | 0.004 |
| 12/17 | 0.002 |
| 12/26 | 0.006 |
| 12/27 | 0.004 |
| 12/28 | 0.005 |
| 12/29 | 0.003 |
| 12/31 | 0.006 |
| Average | 0.006 |

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

TABLE B-4 Nitrogen Dioxide in the Air at the Sullivan Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ | Date | Concentration, $NO_2$ |
|---|---|---|---|
| 1/18 | 0.004 | 9/20 | 0.003 |
| 1/19 | 0.004 | 9/21 | 0.004 |
| 1/20 | 0.002 | 9/22 | 0.009 |
| 1/21 | 0.004 | 9/23 | 0.005 |
| 1/22 | 0.002 | 9/24 | 0.008 |
| 3/14 | 0.004 | 10/2 | 0.003 |
| 3/15 | 0.002 | 10/3 | 0.005 |
| 3/16 | 0.004 | 10/4 | 0.002 |
| 3/17 | 0.001 | 10/5 | 0.003 |
| 3/18 | 0.002 | 10/6 | 0.003 |
| 3/19 | 0.004 | 10/7 | 0.009 |
| 3/20 | 0.001 | 10/16 | 0.009 |
| | | 10/17 | 0.008 |
| 5/22 | 0.005 | 10/18 | 0.009 |
| 5/23 | 0.005 | 10/19 | 0.008 |
| 5/25 | 0.005 | 10/20 | 0.003 |
| 5/26 | 0.008 | 10/21 | 0.007 |
| 5/27 | 0.008 | 10/22 | 0.008 |
| | | 10/30 | 0.009 |
| 8/14 | 0.006 | 10/31 | 0.007 |
| 8/15 | 0.006 | | |
| 8/16 | 0.006 | 11/1 | 0.006 |
| 8/17 | 0.005 | 11/2 | 0.005 |
| 8/18 | 0.007 | 11/3 | 0.007 |
| 8/19 | 0.005 | 11/4 | 0.004 |
| 8/20 | 0.006 | 11/5 | 0.004 |
| | | 11/13 | 0.004 |
| 9/18 | 0.004 | 11/14 | 0.014 |
| 9/19 | 0.003 | 11/15 | 0.004 |

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

TABLE B-4 (Cont'd) Nitrogen Dioxide in the Air at the Sullivan Ranch - 1974[a]

(Units of ppm in Air)

| Date | Concentration, $NO_2$ |
|---|---|
| 11/16 | 0.005 |
| 11/17 | 0.004 |
| 11/18 | 0.001 |
| 11/19 | 0.002 |
| 11/28 | 0.003 |
| 11/29 | 0.005 |
| 11/30 | 0.003 |
| 12/1 | 0.004 |
| 12/2 | 0.005 |
| 12/3 | 0.004 |
| 12/11 | 0.003 |
| 12/12 | 0.003 |
| 12/13 | 0.003 |
| 12/14 | 0.003 |
| 12/15 | 0.004 |
| 12/16 | 0.003 |
| 12/17 | 0.004 |
| 12/26 | 0.005 |
| 12/27 | 0.002 |
| 12/28 | 0.004 |
| 12/29 | 0.005 |
| 12/30 | 0.004 |
| 12/31 | 0.004 |
| Average | 0.005 |

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

# APPENDIX C

## RADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

## APPENDIX C

## RADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

Columbia River water sampling locations during 1974 are as follows:

Vernita Bridge: Weekly grab sample.

100-B: Cumulative sample.

Below 100-N: Monthly grab sample.

Hanford Powerline: Monthly grab sample.

300 Area: Cumulative Sample.

300 Area: Continuous "Filter-Resin" sample.

Richland pumping dock: Cumulative 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 ($\sim$3 liters/hour) through a nylon filter which removes all macro ($>5\mu$) particles, through a series of fiberglass filters which remove all particles greater than $0.3\mu$, 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.

The following tables are included in this appendix:

Table C-1. Concentrations of Tritium in the Columbia River at Vernita (Monthly Composites of Weekly Grab Samples) - 1974 (Page C-3)

Table C-2. Concentrations of Radionuclides in the Columbia River at 100-B (Monthly Composite of Weekly Cumulative Samples) - 1974 (Page C-4)

Table C-3. Beta Activity in the Columbia River at 100-B (Cumulative Samples) - 1974 (Page C-5)

Table C-4. Beta Activity in the Columbia River Below 100-N and at Hanford Powerline Crossing (Grab Samples) - 1974 (Page C-6)

Table C-5. Concentrations of Radionuclides in the Columbia River at Hanford Powerline Crossing (Grab Samples) - 1974 (Page C-7)

Table C-6. Concentrations of Radionuclides in the Columbia River at the 300 Area - 1974
Filtration Ion Exchange Column - Soluble Samples (Page C-8)

Table C-7. Concentrations of Radionuclides in the Columbia River at the 300 Area - 1974
Filtration Ion Exchange Column - Particulate Samples (Page C-9)

Table C-8. Concentrations of Radionuclides in the Columbia River at Richland (Cumulative Samples) - 1974 (Page C-10)

Table C-9. Concentrations of Radionuclides in the Columbia River at Richland (Monthly Composite of Weekly Cumulative Samples) - 1974 (Page C-12)

Table C-10. Beta Activity in the Columbia River at Richland (Cumulative Samples) - 1974 (Page C-13)

Table C-11. Concentrations of Radionuclides in the Columbia River at Bonneville Dam (Monthly Composite of Weekly Cumulative Samples) - 1974 (Page C-14)

TABLE C-1 Concentrations of Tritium in the Comumbia River at Vernita (Monthly Composites of Weekly Grab Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^3H$ |
|---|---|
| Analytical Limit[a] | <330 |
| 1/29 | 330 |
| 2/26 | 320 |
| 3/26 | 290 |
| 4/24 | * |
| 5/31 | * |
| 6/27 | 430 |
| 7/30 | * |
| 8/27 | 710 |
| 9/17 | * |
| 10/22 | 150 |
| 11/26 | 360 |
| 12/31 | 620 |
| Annual Average[b] | <330 |

* 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 analytical limit" values.

TABLE C-2 Concentrations of Radionuclides in the Columbia River at 100-B (Monthly Composite of Weekly Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ | $^{239}Pu$ | Alpha |
|---|---|---|---|---|---|---|---|---|
| Analytical Limit[a] | 11 | 150 | 8.4 | 17 | 0.06 | 30 | 0.02 | 0.20 |
| 12/26-1/28 | * | * | * | * | 0.28 | * | 0.036 | 0.34 |
| 1/28-2/25 | * | * | * | * | 0.35 | * | | * |
| 2/25-3/25 | * | * | * | * | 0.74 | * | 0.031 | 0.84 |
| 3/25-4/29 | * | * | * | * | 0.28 | * | * | 0.90 |
| 4/29-5/21 | * | * | * | * | 0.36 | * | | 0.53 |
| 5/21-6/24 | * | * | * | * | 0.20 | * | | 0.28 |
| 6/24-7/29 | * | * | * | * | 0.29 | * | | * |
| 7/29-8/26 | * | * | * | * | 0.88 | * | | 0.56 |
| 8/26-9/30 | * | * | * | * | 2.5 | * | | 0.65 |
| 9/30-10/29 | | | | | 0.17 | | | 0.36 |
| 10/29-11/25 | * | * | * | * | 0.09 | * | | * |
| 11/25-11/30 | * | * | * | * | 0.13 | * | * | 0.21 |
| Annual Average[b] | * | * | * | * | 0.52 | * | <0.02 | <0.44 |

* 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.

No entry indicates no analysis was made.

TABLE C-3 Beta Activity in the Columbia River at 100-B (Cumulative Samples) - 1974

(Units of Counts/Minute/Milliliter)

| Date | Beta |
|---|---|
| Anal. Limit[a] | 0.0025 |
| 12/26-1/28 | * |
| 1/28-2/25 | * |
| 2/25-3/25 | * |
| 3/25-4/29 | 0.003 |
| 4/29-5/21 | * |
| 5/21-6/24 | * |
| 6/24-7/29 | * |
| 7/29-8/26 | * |
| 8/26-9/30 | * |
| 9/30-10/29 | 0.004 |
| 10/29-11/25 | * |
| 11/25-12/30 | * |
| Annual Average[b] | <0.002 |

* 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 C-4 Beta Activity in the Columbia River Below 100-N and at Hanford Powerline Crossing (Grab Samples) - 1974

(Units of Counts/Minute/Milliliter)

| Below 100-N | | Hanford Power Line Crossing | |
|---|---|---|---|
| Date | Beta | Date | Beta |
| Anal. Limit[a] | 0.01 | | 0.005 |
| 1/21 | * | 1/21 | 0.008 |
| 4/15 | * | 2/8 | * |
| 7/12 | 0.05 | 3/15 | * |
| 8/23 | 0.08 | 4/15 | * |
| 9/30 | 0.10 | 5/10 | * |
| 11/14 | 0.07 | 6/7 | * |
| 12/5 | 0.09 | 7/12 | * |
| | | 8/8 | * |
| | | 9/12 | * |
| Average[b] | <0.06 | 10/10 | * |
| | | Average | <0.002 |

* 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 C-5 Concentrations of Radionuclides in the Columbia River at Hanford Powerline Crossing (Grab Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{3}H$ | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|---|---|
| Anal. Limit[a] | 300 | 14 | 180 | 9.8 | 20 | 0.10 | 11 | 14 |
| 1/21 | 250 | * | * | * | * | 0.12 | * | |
| 2/8 | 460 | * | * | * | * | 0.24 | * | |
| 3/15 | 630 | * | * | * | * | 0.21 | * | |
| 4/15 | 670 | * | * | * | * | 0.25 | * | |
| 5/10 | 720 | * | * | * | * | 0.18 | * | |
| 6/7 | * | * | * | * | * | 0.27 | * | |
| 7/12 | 1100 | * | * | * | * | 0.19 | * | |
| 8/8 | * | * | * | * | * | 3.5 | * | |
| 9/12 | | * | * | * | * | 5.0 | * | |
| 10/10 | 290 | * | * | * | * | 0.24 | * | |
| 11/14 | * | * | * | * | * | 0.42 | * | 0.61 |
| 12/5 | 290 | * | * | * | * | * | * | 0.41 |
| Annual Average[b] | <460 | * | * | * | * | <0.89 | * | 0.51 |

* 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.

No entry indicates no analysis was made.

TABLE C-6 Concentrations of Radionuclides in the Columbia River at the 300 Area - 1974 Filtration Ion Exchange Column - Soluble Samples

(Units of $10^{-9}$ μCi/ml)

| Sampling Interval | $^{40}K$ | $^{54}Mn$ | $^{60}Co$ | $^{65}Zn$ | $^{95}ZrNb$ | $^{106}Ru$ | $^{137}Cs$ | $^{152}Eu$ | $^{226}Ra$ | $^{228}Th$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Approximate Detection Level | 0.009 | 0.014 | 0.00045 | 0.0045 | 0.0045 | 0.0045 | 0.0045 | 0.018 | 0.0023 | 0.00045 |
| 12/21-1/4 | 0.76 | * | 0.008 | * | * | 0.05 | * | * | 0.03 | * |
| 1/4-1/18 | 0.69 | * | 0.008 | * | * | 0.04 | * | * | 0.06 | 0.004 |
| 1/18-1/29 | 0.78 | * | 0.006 | * | 0.06 | 0.08 | * | * | 0.01 | 0.01 |
| 1/29-2/14 | 0.92 | * | 0.004 | * | 0.05 | 0.08 | * | * | 0.02 | 0.009 |
| 2/14-3/1 | 0.91 | * | 0.007 | * | 0.06 | 0.09 | * | * | * | 0.008 |
| 3/1-3/15 | 0.86 | * | 0.01 | 0.02 | 0.06 | 0.06 | * | * | 0.05 | 0.01 |
| 3/15-3/29 | 0.53 | * | 0.007 | * | 0.06 | 0.07 | * | * | 0.05 | 0.006 |
| 3/29-4/12 | 0.83 | * | 0.008 | 0.002 | 0.07 | 0.08 | * | 0.02 | 0.01 | 0.004 |
| 4/12-4/26 | 0.55 | * | 0.006 | * | 0.08 | 0.12 | * | * | 0.13 | 0.02 |
| 4/26-5/10 | 0.74 | * | 0.002 | * | 0.07 | 0.11 | * | * | 0.02 | 0.01 |
| 5/10-5/29 | 0.34 | * | 0.008 | * | 0.04 | 0.09 | * | * | 0.10 | 0.03 |
| 6/3-6/18 | 1.3 | * | 0.003 | * | 0.10 | 0.12 | * | * | 0.07 | 0.008 |
| 6/18-7/1 | 2.1 | * | 0.005 | * | 0.13 | 0.17 | * | * | 0.12 | 0.03 |
| 7/1-7/16 | 1.3 | * | 0.004 | * | * | 0.12 | * | * | 0.07 | 0.01 |
| 7/16-7/30 | 1.5 | * | 0.005 | * | * | 0.13 | * | * | 0.06 | 0.007 |
| 7/30-8/12 | 1.5 | * | 0.005 | * | * | 0.13 | * | * | 0.06 | 0.01 |
| 8/12-8/27 | 0.54 | * | 0.006 | * | * | 0.13 | * | * | * | 0.008 |
| 8/27-9/10 | 0.60 | * | 0.008 | * | * | 0.11 | * | * | 0.04 | 0.005 |
| 9/10-9/25 | 0.56 | * | 0.007 | * | * | 0.14 | * | * | * | 0.004 |
| 9/25-10/9 | 0.73 | * | 0.009 | * | * | 0.19 | * | * | 0.002 | 0.005 |
| 10/9-10/25 | 0.70 | * | 0.01 | * | * | 0.15 | * | * | 0.03 | 0.005 |
| 10/25-11/11 | 1.1 | * | 0.009 | * | 0.11 | 0.14 | * | * | 0.05 | 0.01 |
| Average | 0.90 | * | 0.007 | <0.005 | <0.05 | 0.11 | * | <0.01 | <0.05 | <0.01 |

* Less than the approximate detection level.

TABLE C-7 Concentrations of Radionuclides in the Columbia River at the 300 Area - 1974 Filtration Ion Exchange Column - Particulate Samples

(Units of $10^{-9}$ μCi/ml)

| Sampling Interval | $^{40}K$ | $^{54}Mn$ | $^{60}Co$ | $^{65}Zn$ | $^{95}ZrNb$ | $^{106}Ru$ | $^{137}Cs$ | $^{152}Eu$ | $^{226}Ra$ | $^{228}Th$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Approximate Detection Level | 0.009 | 0.014 | 0.00045 | 0.0045 | 0.0045 | 0.0045 | 0.0045 | 0.018 | 0.0023 | 0.00045 |
| 12/21-1/4 | 0.02 | * | 0.02 | 0.01 | 0.03 | 0.006 | * | * | 0.002 | 0.001 |
| 1/4-1/18 | * | * | 0.03 | 0.03 | 0.53 | 0.02 | * | * | 0.009 | 0.001 |
| 1/18-1/29 | 0.11 | * | 0.03 | 0.01 | 0.05 | 0.01 | * | * | 0.01 | 0.003 |
| 1/29-2/14 | 0.32 | * | 0.01 | 0.003 | 0.02 | 0.005 | * | * | 0.02 | 0.01 |
| 2/14-3/1 | 0.26 | * | 0.01 | 0.008 | 0.03 | 0.01 | 0.005 | * | 0.01 | 0.007 |
| 3/1-3/15 | 0.23 | * | 0.009 | 0.003 | 0.03 | 0.01 | 0.05 | * | 0.02 | 0.008 |
| 3/15-3/29 | 0.24 | * | 0.005 | * | 0.02 | 0.01 | * | * | 0.01 | 0.006 |
| 3/29-4/12 | 0.26 | * | 0.02 | 0.03 | 0.07 | 0.02 | * | * | 0.02 | 0.008 |
| 4/12-4/26 | 0.13 | * | 0.01 | 0.004 | 0.11 | 0.04 | * | * | 0.01 | 0.005 |
| 4/26-5/10 | 0.14 | * | 0.02 | 0.005 | 0.08 | 0.03 | * | * | 0.02 | 0.01 |
| 5/10-5/29 | 0.14 | * | 0.03 | 0.01 | 0.08 | 0.04 | * | * | 0.02 | 0.009 |
| 5/29-6/3 | * | * | 0.03 | 0.01 | 0.25 | 0.02 | * | * | 0.04 | 0.006 |
| 6/3-6/18 | 0.04 | * | 0.01 | * | 0.04 | 0.03 | * | * | 0.005 | 0.004 |
| 6/18-7/1 | 0.20 | * | 0.04 | * | 0.06 | 0.04 | 0.02 | 0.02 | 0.02 | 0.01 |
| 7/1-7/16 | 0.06 | * | 0.02 | 0.005 | 0.03 | 0.02 | 0.007 | * | 0.006 | 0.004 |
| 7/16-7/30 | 0.02 | * | 0.007 | * | 0.02 | 0.02 | * | * | * | 0.003 |
| 7/30-8/12 | 0.0009 | * | 0.01 | 0.001 | 0.02 | 0.02 | 0.005 | * | 0.0004 | 0.003 |
| 8/12-8/27 | * | * | 0.01 | 0.003 | 0.01 | 0.01 | * | * | * | 0.001 |
| 8/27-9/10 | * | * | 0.009 | 0.002 | 0.01 | 0.009 | * | * | 0.005 | 0.001 |
| 9/10-9/25 | 0.009 | * | 0.006 | 0.004 | * | 0.009 | * | * | 0.003 | 0.002 |
| 9/25-10/9 | * | * | 0.009 | 0.003 | * | 0.009 | * | * | * | * |
| 10/9-10/25 | * | * | 0.007 | 0.002 | * | 0.009 | * | * | * | 0.002 |
| 10/25-11/11 | * | * | 0.007 | 0.002 | * | 0.006 | | * | * | 0.001 |
| Annual Average | <0.10 | * | 0.02 | <0.007 | <0.07 | 0.02 | <0.009 | <0.006 | <0.01 | <0.005 |

* Less than the approximate detection level

TABLE C-8 Concentrations of Radionuclides in the Columbia River at Richland

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Analytical Limit[a] | 24 | 300 | 20 | 39 | 2 | 22 |
| 12/26-1/2 | * | * | * | * | | * |
| 1/2-1/8 | * | * | * | * | * | * |
| 1/8-1/15 | * | * | * | * | | * |
| 1/15-1/22 | * | * | * | * | * | * |
| 1/22-1/29 | * | * | * | * | | * |
| 1/29-2/5 | * | * | * | * | * | * |
| 2/5-2/12 | * | * | * | * | | * |
| 2/12-2/19 | * | * | * | * | * | * |
| 2/19-2/26 | * | * | * | * | | * |
| 2/26-3/5 | * | * | * | * | * | * |
| 3/5-3/12 | * | * | * | * | | * |
| 3/12-3/19 | * | * | * | * | * | * |
| 3/19-3/26 | * | * | * | * | | * |
| 3/26-4/2 | * | * | * | * | * | * |
| 4/2-4/9 | * | * | * | * | | * |
| 4/9-4/16 | * | * | * | * | * | * |
| 4/16-4/23 | * | * | * | * | * | * |
| 4/23-4/30 | * | * | * | * | * | * |
| 4/30-5/7 | * | * | * | * | | * |
| 5/7-5/14 | * | * | * | * | * | * |
| 5/14-5/21 | * | * | * | * | | * |
| 5/21-5/28 | * | * | * | * | * | * |
| 5/28-6/4 | * | * | * | * | | * |
| 6/4-6/11 | * | * | * | * | * | * |
| 6/11-6/18 | * | * | * | * | | * |
| 6/18-6/25 | * | * | * | * | * | * |
| 6/25-7/2 | | | | | | |
| 7/2-7/9 | * | * | * | * | * | * |
| 7/9-7/16 | * | * | * | * | | * |
| 7/16-7/23 | * | * | * | * | * | * |
| 7/23-7/30 | * | * | * | * | | * |
| 7/30-8/6 | * | * | * | * | * | * |
| 8/6-8/13 | * | * | * | * | | * |

* 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 C-8 (Cont'd) Concentrations of Radionuclides in the Columbia River at Richland

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Analytical Limit[a] | 24 | 300 | 20 | 39 | 2.8 | 22 |
| 8/13-8/20 | * | * | * | * | * | * |
| 8/20-8/27 | * | * | * | * | | * |
| 8/27-9/3 | * | * | * | * | * | * |
| 9/3-9/10 | * | * | * | * | | * |
| 9/10-9/17 | * | * | * | * | * | * |
| 9/17-9/24 | * | * | * | * | | * |
| 9/24-10/1 | * | * | * | * | * | * |
| 10/1-10/8 | * | * | * | * | | * |
| 10/8-10/15 | * | * | * | * | * | * |
| 10/15-10/22 | * | * | * | * | | * |
| 10/22-10/29 | * | * | * | * | * | * |
| 10/29-11/5 | * | * | * | * | | * |
| 11/5-11/12 | | | | | | |
| 11/12-11/19 | | | | | | |
| 11/19-11/26 | * | * | * | * | * | * |
| 11/26-12/3 | * | * | * | * | | * |
| 12/3-12/10 | * | * | * | * | * | * |
| 12/10-12/17 | * | * | * | * | * | * |
| 12/17-12/23 | * | * | * | * | * | * |
| 12/23-12/31 | * | * | * | * | | * |
| Annual Average[b] | * | * | * | * | * | * |

* 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.

No entry indicates no analysis was made.

TABLE C-9 Concentrations of Radionuclides in the Columbia River at Richland

(Units of $10^{-9}$ μCi/ml of Water)

| Date | Alpha | $^{3}H$ | $^{90}Sr$ | $^{137}Cs$ | $^{239}Pu$ |
|---|---|---|---|---|---|
| Analytical Limit[a] | 0.16 | 380 | 0.043 | 6.6 | 0.02 |
| 12/26-1/29 | 0.23 | 230 | 0.28 | * | |
| 1/29-2/26 | * | 470 | 0.21 | * | 0.038 |
| 2/26-3/26 | 0.87 | 2000 | 0.24 | * | |
| 3/26-4/23 | 0.35 | 470 | 0.23 | * | |
| 4/23-5/21 | 0.53 | * | 0.21 | * | * |
| 5/21-6/25 | 0.30 | * | 0.30 | * | |
| 6/25-7/30 | 0.24 | * | 0.37 | * | |
| 7/30-8/27 | 0.81 | * | 0.36 | * | * |
| 8/27-9/24 | 0.39 | * | 0.34 | * | |
| 9/24-10/29 | 0.26 | 210 | 0.33 | * | |
| 10/29-11/26 | 0.32 | 310 | 0.30 | * | |
| 11/26-12/31 | 0.61 | 860 | 0.17 | * | * |
| Annual Average[b] | <0.42 | <480 | 0.28 | * | <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 analytical limit" values.

No entry indicates no analysis was made.

TABLE C-10 Beta Activity in the Columbia River at Richland (Cumulative Samples) - 1974

(Units of Counts/Minute/Milliliter)

| Date | Beta | Date | Beta |
|---|---|---|---|
| Anal. Limit[a] | 0.005 | | |
| 12/26-1/2 | * | 7/30-8/6 | * |
| 1/2-1/8 | * | 8/6-8/13 | * |
| 1/8-1/15 | * | 8/13-8/20 | * |
| 1/15-1/22 | * | 8/20-8/27 | * |
| 1/22-1/29 | * | 8/27-9/3 | 0.005 |
| 1/29-2/5 | * | 9/3-9/10 | * |
| 2/5-2/12 | * | 9/10-9/17 | 0.006 |
| 2/12-2/19 | * | 9/17-9/24 | * |
| 2/19-2/26 | * | 9/24-10/1 | * |
| 2/26-3/5 | * | 10/1-10/8 | * |
| 3/5-3/12 | * | 10/8-10/15 | * |
| 3/12-3/19 | * | 10/15-10/22 | * |
| 3/19-3/26 | * | 10/22-10/29 | * |
| 3/26-4/2 | * | 10/29-11/5 | * |
| 4/2-4/9 | * | 11/5-11/12 | |
| 4/9-4/16 | * | 11/12-11/19 | |
| 4/16-4/23 | * | 11/19-11/26 | 0.006 |
| 4/23-4/30 | * | 11/26-12/3 | * |
| 4/30-5-7 | * | 12/3-12/10 | * |
| 5/7-5/14 | * | 12/10-12/17 | * |
| 5/14-5/21 | * | 12/17-12/23 | * |
| 5/21-5/28 | * | 12/23-12/31 | * |
| 5/28-6/4 | * | | |
| 6/4-6/11 | * | | |
| 6/11-6/18 | * | Annual Average[b] | <0.002 |
| 6/18-6/25 | * | | |
| 6/25-7/9 | * | | |
| 7/9-7/16 | * | | |
| 7/16-7/23 | * | | |
| 7/23-7/30 | * | | |

* 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.

(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 C-11 Concentrations of Radionuclides in the Columbia River at Bonneville Dam (Monthly Composite of Weekly Cummulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 44 | 410 | 23 | 40 | 20 | 1.5 |
| 12/29-1/28 | | | | * | | |
| 5/27-6/24 | * | * | * | * | * | * |
| 9/30-10/28 | * | * | * | * | * | |
| 10/28-11/25 | * | * | * | * | * | |
| Annual Average[b] | * | * | * | * | * | * |

* 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.

No entry indicates no analysis was made.

# APPENDIX D

## NONRADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

# APPENDIX D

## NONRADIOLOGICAL PARAMETERS MEASURED IN COLUMBIA RIVER WATER

Physical and chemical parameters measured during 1974 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 or Priest Rapids Dam and downstream of the majority of Hanford operations at the Hanford 300 Area or at Richland.

The following tables are included in Appendix D:


Table D-1. Water Quality Measurements of Columbia River at Vernita - 1974 (Page D-2)

Table D-2. Water Quality Measurements in Columbia River Water at the 300 Area - 1974 (Page D-4)

Table D-3. Nitrates in Columbia River Water at Vernita and Richland - 1974 (Page D-11)

Table D-4. Temperatures of Columbia River Water at Priest Rapids Dam and Richland (Page D-12)

Table D-5. Biological Measurements of Columbia River Water at Vernita and Richland - 1974 (Page D-13)

TABLE D-1 Water Quality Measurements of Columbia River at Vernita - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 1/2 | 8.7 | 1.4 | 9.5 |
| 1/15 | 8.5 | 2.5 | 9.7 |
| 1/22 | 8.4 | 7.5 | 9.4 |
| 1/29 | 8.0 | | 11.4 |
| 2/5 | 7.7 | 24 | 8.7 |
| 2/6 | 8.5 | | 8.4 |
| 2/7 | 7.9 | | 8.7 |
| 2/12 | 7.8 | 18 | 11.0 |
| 2/26 | 8.1 | 10 | 12.0 |
| 3/5 | 8.7 | 5.2 | 9.9 |
| 3/12 | 8.3 | 5.5 | 10.0 |
| 3/19 | 7.9 | 7.3 | 10.9 |
| 3/26 | 8.0 | 6.8 | 11.2 |
| 4/9 | 8.3 | 4.6 | 9.5 |
| 4/16 | 8.2 | 6.3 | 11.2 |
| 4/23 | 8.2 | 7.5 | 10.8 |
| 4/30 | 8.2 | 6.0 | 12.3 |
| 5/7 | 8.3 | 6.7 | 11.6 |
| 5/14 | 8.2 | 6.7 | 13.3 |
| 5/21 | 8.4 | 5.7 | |
| 6/4 | 8.1 | 3.5 | 11.7 |
| 6/11 | 8.0 | 2.8 | |
| 6/18 | 8.0 | 7.5 | |
| 6/25 | 7.9 | 8.7 | |
| 7/2 | 8.4 | 5.3 | |
| 7/9 | 7.8 | 3.4 | |
| 7/16 | 8.1 | 2.5 | |
| 7/23 | 8.2 | 2.6 | 11.2 |
| 7/24 | 7.7 | 2.6 | 11.4 |
| 7/25 | 7.7 | | 11.1 |
| 7/30 | 8.4 | 2.0 | 11.4 |
| 8/6 | 8.4 | 1.6 | 11.5 |
| 8/13 | 8.3 | | |
| 8/20 | 8.3 | 1.7 | |
| 8/27 | 8.4 | 1.5 | 11.3 |
| 9/10 | 8.2 | 1.3 | 10.8 |
| 9/17 | 8.1 | 1.5 | 10.6 |
| 9/24 | 8.15 | 1.3 | 10.6 |

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

TABLE D-1 (Cont'd) Water Quality Measurements of Columbia River at Vernita - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 10/1 | 8.3 | 1.5 | 10.7 |
| 10/8 | 7.9 | 1.5 | 10.6 |
| 10/15 | 8.1 | 1.4 | 10.9 |
| 10/22 | 8.0 | 1.2 | 10.4 |
| 10/29 | 7.8 | 1.2 | 10.6 |
| 11/5 | 7.8 | 1.0 | |
| 11/12 | 8.0 | 1.2 | 11.2 |
| 11/19 | 7.9 | | 10.4 |
| 11/26 | 7.9 | 1.1 | 10.6 |
| 12/3 | 8.1 | 1.0 | |
| 12/10 | 7.9 | 1.4 | 10.6 |
| 12/17 | 7.8 | 1.1 | 10.7 |
| 12/31 | 7.7 | 1.3 | 11.2 |
| Annual Average | 8.1 | 4.6 | 10.9 |

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

TABLE D-2 Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)[a] | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 1/2 | 8.3 | 3.6 | 9.3 |
| 1/3 | 8.0 | 2.9 | 8.1 |
| 1/4 | 7.9 | 1.0 | 7.75 |
| 1/7 | 8.1 | 1.2 | 7.3 |
| 1/9 | 8.0 | 1.2 | 6.4 |
| 1/10 | 8.0 | 1.7 | 7.8 |
| 1/11 | 7.7 | 3.0 | 7.7 |
| 1/14 | 8.5 | 2.8 | 7.5 |
| 1/15 | 8.5 | 2.4 | 9.6 |
| 1/17 | 8.4 | 6.7 | 8.3 |
| 1/18 | 8.4 | 6.5 | 8.3 |
| 1/22 | 8.1 | 7.4 | 8.6 |
| 1/24 | 8.1 | 8.3 | 9.0 |
| 1/25 | 7.9 | 8.7 | 9.5 |
| 1/28 | 8.0 | 7.5 | 7.9 |
| 1/29 | 7.4 | 9.7 | 11.6 |
| 1/30 | 7.4 | 9.4 | 9.6 |
| 2/1 | 7.6 | 9.5 | 10.0 |
| 2/4 | 7.8 | 20 | 7.0 |
| 2/5 | 7.4 | 23 | 8.8 |
| 2/11 | 7.8 | 21 | 7.0 |
| 2/12 | 8.0 | 20 | 11.0 |
| 2/13 | 8.0 | 16 | 12.6 |
| 2/14 | 7.9 | 15 | 11.3 |
| 2/15 | 7.8 | 13 | 11.6 |
| 2/19 | 7.8 | 14 | 10.6 |
| 2/20 | 7.8 | 13 | 11.2 |
| 2/21 | 7.9 | 13 | 9.9 |
| 2/22 | 7.8 | 13 | 11.4 |
| 2/25 | 7.9 | 10 | 10.5 |
| 2/26 | 7.8 | 10 | 10.0 |
| 2/27 | 7.7 | - | 9.8 |
| 2/28 | 7.8 | 10 | 10.3 |
| 3/1 | 7.9 | 5.3 | 10.3 |
| 3/4 | 7.8 | 5.5 | 10.8 |
| 3/5 | 7.8 | 5.3 | 10.0 |
| 3/6 | 8.1 | 5.2 | 9.9 |
| 3/7 | 7.8 | 5.2 | 9.7 |
| 3/8 | 7.9 | 4.5 | 12.0 |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 3/11 | 7.9 | 5.5 | 9.5 |
| 3/12 | 7.9 | 5.3 | 9.6 |
| 3/13 | 8.3 | 5.3 | 11.2 |
| 3/14 | 7.9 | 5.5 | 9.6 |
| 3/15 | 8.1 | 6.0 | 9.5 |
| 3/18 | 7.8 | 6.5 | 10.2 |
| 3/19 | 7.9 | 7.3 | 10.0 |
| 3/20 | 7.9 | 6.7 | 11.0 |
| 3/21 | 7.9 | 7.3 | 10.2 |
| 3/22 | 7.8 | 7.5 | 11.6 |
| 3/25 | 8.2 | 8.0 | 10.2 |
| 3/26 | 8.0 | 7.7 | 10.4 |
| 3/27 | 7.7 | 7.3 | 10.6 |
| 3/28 | 7.8 | 7.5 | 9.7 |
| 3/29 | 7.7 | 8.7 | 9.8 |
| 4/1 | 7.8 | 7.3 | 10.6 |
| 4/2 | 7.7 | 7.2 | 10.0 |
| 4/3 | 7.9 | 7.1 | 11.6 |
| 4/4 | 8.1 | 6.2 | 11.7 |
| 4/5 | 8.0 | 6.5 | 10.8 |
| 4/8 | 7.8 | 5.7 | 9.6 |
| 4/9 | 7.8 | 5.1 | 10.0 |
| 4/10 | 7.7 | 5.5 | 10.9 |
| 4/11 | 7.6 | 3.0 | 9.0 |
| 4/12 | 7.7 | 5.8 | 11.1 |
| 4/15 | 7.9 | 5.5 | 10.9 |
| 4/16 | 7.8 | 6.8 | 10.0 |
| 4/17 | 7.9 | 5.7 | 10.6 |
| 4/18 | 7.9 | 6.3 | 10.1 |
| 4/19 | 7.9 | 6.4 | 10.2 |
| 4/22 | 7.8 | 7.2 | 8.1 |
| 4/23 | 7.9 | 7.5 | 10.2 |
| 4/24 | 7.8 | 6.8 | 10.7 |
| 4/25 | 7.8 | 7.0 | 10.9 |
| 4.26 | 7.8 | 7.2 | 10.8 |
| 4/29 | 7.7 | 3.0 | |
| 4/30 | 7.8 | 5.6 | 12.0 |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | TURBIDITY (JTU)[a] | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 5/1 | 7.7 | 5.5 | 11.5 |
| 5/2 | 7.6 | 5.5 | 10.6 |
| 5/3 | 8.1 | 6.3 | 11.9 |
| 5/6 | 7.8 | 6.3 | 10.2 |
| 5/7 | 7.8 | 6.0 | 11.0 |
| 5/8 | 7.7 | 6.5 | 11.3 |
| 5/9 | 7.6 | 7.0 | 10.6 |
| 5/10 | 7.7 | 7.0 | 11.6 |
| 5/13 | 7.8 | 7.0 | 12.8 |
| 5/14 | 7.7 | 6.7 | 11.2 |
| 5/15 | 7.6 | 6.5 | 11.2 |
| 5/16 | 7.8 | 6.8 | 10.2 |
| 5/17 | 7.7 | 6.8 | 10.5 |
| 5/20 | 7.8 | 6.5 | 11.3 |
| 5/21 | 8.1 | 5.8 | |
| 5/22 | 7.8 | 4.5 | 11.7 |
| 5/23 | 8.0 | 4.2 | 11.3 |
| 5/24 | 7.6 | 4.5 | 11.9 |
| 5/28 | 8.2 | 3.8 | 11.2 |
| 5/29 | 8.0 | 3.2 | 12.6 |
| 5/30 | 8.0 | 3.2 | 11.2 |
| 5/31 | 8.2 | 4.0 | 12.5 |
| 6/3 | 8.3 | 4.3 | 11.9 |
| 6/4 | 8.0 | 3.5 | 10.4 |
| 6/5 | 8.1 | 3.5 | |
| 6/6 | 7.9 | 3.2 | |
| 6/7 | 7.9 | 2.8 | |
| 6/10 | 7.9 | 3.5 | |
| 6/11 | 8.0 | 2.8 | |
| 6/12 | 8.4 | 3.2 | |
| 6/13 | 7.9 | 3.5 | |
| 6/14 | 7.0 | 3.5 | |
| 6/17 | 7.9 | 5.5 | |
| 6/18 | 7.9 | 6.7 | |
| 6/19 | 7.9 | 8.6 | |
| 6/20 | 7.9 | 8.7 | |
| 6/21 | 7.75 | 22. | |
| 6/24 | 7.8 | 16. | |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 6/25 | 7.7 | 8.5 | |
| 6/26 | 7.9 | 7.2 | |
| 6/27 | 7.8 | 7.0 | 13.6 |
| 6/28 | 7.7 | 6.4 | 13.6 |
| 7/1 | 7.2 | 7.5 | 13.8 |
| 7/2 | 7.7 | 5.8 | 13.2 |
| 7/3 | 7.6 | 5.0 | 14.1 |
| 7/8 | 8.2 | 3.5 | 10.6 |
| 7/9 | 7.8 | 3.4 | |
| 7/10 | 7.9 | 3.3 | |
| 7/11 | 7.6 | 3.2 | |
| 7/12 | 8.3 | 2.6 | |
| 7/15 | 7.9 | 3.1 | |
| 7/16 | 8.3 | 2.7 | |
| 7/17 | 7.7 | 2.5 | 13.3 |
| 7/18 | 7.7 | 2.5 | 10.8 |
| 7/19 | 7.8 | 2.2 | 11.0 |
| 7/22 | 7.7 | 1.8 | 10.8 |
| 7/23 | 7.8 | 2.2 | 11.2 |
| 7/24 | 7.7 | 2.6 | 11.4 |
| 7/25 | 7.7 | 2.5 | 11.1 |
| 7/26 | 7.8 | 2.3 | 11.0 |
| 7/29 | 7.8 | 2.0 | 11.0 |
| 7/30 | 7.9 | 2.0 | 10.9 |
| 7/31 | 7.8 | 1.8 | 11.2 |
| 8/1 | 7.9 | 1.8 | 11.2 |
| 8/2 | 7.7 | 1.5 | 10.5 |
| 8/5 | 7.9 | 1.3 | 10.6 |
| 8/6 | 7.8 | 1.5 | 11.0 |
| 8/7 | 7.7 | 1.7 | |
| 8/8 | 7.6 | 1.6 | 10.3 |
| 8/9 | 7.6 | 1.7 | 11.2 |
| 8/12 | 7.8 | 1.6 | 10.8 |
| 8/13 | 8.1 | 1.7 | 10.3 |
| 8/14 | 7.7 | 1.7 | 10.6 |
| 8/15 | 7.8 | 2.4 | 10.6 |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 8/16 | 7.9 | 1.3 | 10.6 |
| 8/19 | 8.1 | 1.9 | 10.6 |
| 8/20 | 7.9 | 1.2 | 10.4 |
| 8/21 | 7.9 | 1.3 | 10.4 |
| 8/22 | 7.7 | 1.3 | 10.3 |
| 8/23 | 7.8 | 1.9 | 10.4 |
| 8/26 | 7.8 | 2.0 | 10.3 |
| 8/27 | 7.9 | 1.5 | 10.4 |
| 8/28 | 7.9 | 1.7 | 10.4 |
| 8/29 | 7.8 | 1.7 | 10.6 |
| 8/30 | 8.1 | 1.5 | 11.0 |
| 9/3 | 8.1 | 1.5 | 10.4 |
| 9/4 | 8.4 | 1.5 | 11.0 |
| 9/5 | 7.8 | 1.5 | 10.3 |
| 9/6 | 7.8 | 1.5 | 10.0 |
| 9/9 | 7.8 | 1.4 | 9.8 |
| 9/10 | 7.7 | 1.3 | 10.3 |
| 9/11 | 7.8 | 2.0 | 10.3 |
| 9/12 | 7.9 | 1.5 | 10.5 |
| 9/13 | 7.7 | 1.4 | 10.4 |
| 9/16 | 7.9 | 1.3 | 10.3 |
| 9/17 | 7.7 | 1.3 | 10.6 |
| 9/18 | 7.7 | 1.5 | 10.4 |
| 9/19 | 7.7 | 1.5 | 10.4 |
| 9/20 | 7.6 | 1.2 | 10.3 |
| 9/23 | 7.8 | 1.2 | 10.1 |
| 9/24 | 7.9 | 1.4 | 9.9 |
| 9/25 | 7.8 | 1.3 | 9.6 |
| 9/26 | 7.9 | 1.4 | 9.7 |
| 9/27 | 11.3 | 2.0 | 9.5 |
| 9/30 | 8.1 | 1.7 | 10.6 |
| 10/1 | 7.8 | 1.4 | 10.2 |
| 10/2 | 7.9 | 1.4 | 10.4 |
| 10/3 | 7.6 | 1.3 | 10.2 |
| 10/4 | 7.6 | 1.1 | 10.1 |
| 10/7 | 7.6 | 1.2 | 9.9 |
| 10/8 | 7.7 | 1.1 | 10.2 |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)(a) | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 10/9 | 7.8 | 1.7 | 10.1 |
| 10/10 | 7.8 | 1.6 | 10.2 |
| 10/11 | 8.1 | 1.3 | 11.0 |
| 10/14 | 7.9 | 1.0 | 10.8 |
| 10/15 | 7.6 | 1.5 | 10.6 |
| 10/16 | 7.9 | 1.4 | 9.8 |
| 10/17 | 7.7 | 1.3 | 10.8 |
| 10/18 | 8.1 | 1.3 | 11.5 |
| 10/21 | 7.8 | | 10.5 |
| 10/22 | 7.6 | 1.5 | 10.5 |
| 10/23 | 7.7 | 1.5 | 10.4 |
| 10/24 | 8.0 | 1.5 | 11.0 |
| 10/25 | 7.7 | 1.4 | 10.6 |
| 10/28 | 7.4 | 1.5 | 9.0 |
| 10/29 | 7.7 | 1.4 | 10.0 |
| 10/30 | 7.7 | 1.5 | 11.0 |
| 10/31 | 7.6 | 1.4 | 10.1 |
| 11/1 | 7.5 | 1.2 | 10.3 |
| 11/4 | 7.8 | 1.0 | 10.3 |
| 11/5 | 7.7 | 1.1 | |
| 11/6 | 7.1 | 1.2 | |
| 11/7 | 7.95 | 1.3 | 10.4 |
| 11/8 | 8.6 | 1.0 | 10.8 |
| 11/11 | 7.8 | 1.0 | 10.4 |
| 11/12 | 7.8 | 1.2 | 10.7 |
| 11/13 | 7.8 | 1.1 | 11.1 |
| 11/14 | 7.6 | 1.0 | 10.2 |
| 11/15 | 7.8 | 1.1 | 10.5 |
| 11/18 | 8.0 | 1.1 | 10.4 |
| 11/19 | 7.7 | 1.1 | 10.4 |
| 11/20 | 7.3 | 1.0 | 10.3 |
| 11/21 | 7.6 | 1.3 | 10.6 |
| 11/22 | 7.6 | 1.4 | 11.0 |
| 11/25 | 7.9 | 1.1 | 10.4 |
| 11/26 | 7.6 | 1.2 | 10.7 |
| 11/27 | 7.9 | 1.0 | 10.9 |
| 12/2 | 8.1 | 1.95 | |
| 12/3 | 8.1 | 1.2 | |

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

TABLE D-2 (Cont'd) Water Quality Measurements in Columbia River Water at the 300 Area - 1974

| Date | pH | Turbidity (JTU)[a] | Diss. $O_2$ (ppm) |
|---|---|---|---|
| 12/4 | 8.1 | 1.5 | |
| 12/5 | 8.1 | 1.2 | |
| 12/6 | 8.1 | 1.0 | 11.1 |
| 12/9 | 8.1 | 1.0 | 12.0 |
| 12/10 | 8.1 | 1.5 | 11.2 |
| 12/11 | 7.9 | 1.2 | 10.8 |
| 12/12 | 7.8 | 1.2 | 10.8 |
| 12/13 | 7.8 | 1.1 | 10.9 |
| 12/16 | 7.85 | 1.1 | 11.1 |
| 12/17 | 7.6 | 1.5 | 10.5 |
| 12/18 | 7.7 | 1.3 | 11.2 |
| 12/19 | 7.7 | 1.3 | 11.0 |
| 12/20 | 7.9 | 1.2 | 11.2 |
| 12/23 | 7.9 | 1.3 | 11.4 |
| 12/26 | 8.0 | 1.2 | 11.1 |
| 12/27 | 7.9 | 1.3 | 11.0 |
| 12/30 | 7.8 | 1.6 | 11.1 |
| 12/31 | 7.9 | 1.4 | 11.2 |
| Annual Average | 7.8 | 4.3 | 10.5 |

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

TABLE D-3 Nitrates in Columbia River Water at Vernita and Richland - 1974

(Units of ppm in Water)

| Date | Vernita | Richland | Date | Vernita | Richland |
|---|---|---|---|---|---|
| Analy. Limit | 0.10 | 0.10 | Analy. Limit | 0.10 | 0.10 |
| 1/2 | 0.55 | 0.95 | 7/2 | 0.12 | 0.21 |
| 1/8 | 0.49 | 0.53 | 7/9 | 0.20 | 0.11 |
| 1/15 | 0.66 | 0.65 | 7/16 | 0.10 | 0.25 |
| 1/22 | 0.65 | 0.68 | 7/23 | * | * |
| 1/29 | 0.61 | 0.65 | 7/30 | * | * |
| 2/5 | 1.1 | 1.2 | 8/6 | * | 0.10 |
| 2/12 | 0.88 | 0.95 | 8/13 | * | 0.10 |
| 2/19 | 0.75 | 0.74 | 8/20 | 0.11 | 0.16 |
| 2/26 | 0.75 | 0.68 | 8/27 | * | 0.10 |
| 3/5 | 0.50 | 0.54 | 9/3 | 1.4 | * |
| 3/12 | 0.68 | 0.68 | 9/10 | * | * |
| 3/19 | 0.64 | 0.68 | 9/17 | * | * |
| 3/26 | 0.56 | 0.74 | 9/24 | * | * |
| 4/2 | | | 10/1 | * | * |
| 4/9 | 0.65 | 0.76 | 10/8 | 0.18 | 0.19 |
| 4/16 | 0.57 | 0.56 | 10/15 | 0.15 | 0.22 |
| 4/23 | 0.55 | 0.63 | 10/22 | 0.20 | 0.24 |
| 4/30 | 0.34 | 0.30 | 10/29 | 0.16 | 0.20 |
| 5/7 | 0.29 | 0.42 | 11/5 | 0.21 | 0.23 |
| 5/14 | 0.23 | 0.28 | 11/12 | * | * |
| 5/21 | 0.19 | 0.23 | 11/19 | 0.24 | 0.24 |
| 5/28 | 0.21 | 0.19 | 11/26 | 0.23 | 0.20 |
| 6/4 | 0.14 | 0.16 | 12/3 | 0.27 | 0.29 |
| 6/11 | 0.13 | 0.14 | 12/10 | 0.31 | 0.30 |
| 6/18 | 0.11 | 0.15 | 12/17 | 0.29 | 0.29 |
| 6/25 | 0.10 | 0.23 | 12/23 | 0.26 | 0.38 |
| | | | 12/31 | 0.24 | 0.26 |
| | | | Annual Average | <0.35 | <0.36 |

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

TABLE D-4 Temperatures of Columbia River Water at Priest Rapids Dam and Richland - 1974

(Monthly Average °C)

| Date | Priest Rapids Dam | Richland |
|---|---|---|
| January | 4.0 | 3.2 |
| February | 3.0 | 3.2 |
| March | 4.9 | 5.2 |
| April | 7.7 | 8.2 |
| May | 10.8 | 11.3 |
| June | 13.6 | 13.7 |
| July | 17.2 | 17.3 |
| August | 18.7 | 19.4 |
| September | 18.4 | 18.7 |
| October | 15.5 | 15.4 |
| November | 11.8 | 11.5 |
| December | 8.2 | 7.8 |
| Annual Average | 11.2 | 11.2 |

TABLE D-5 Biological Measurements of Columbia River Water at Vernita and Richland - 1974

| | Vernita | | | Richland | | |
|---|---|---|---|---|---|---|
| Date | Coliform (per 100 ml) | Enterococci (per 100 ml) | BOD (mg/l) | Coliform (per 100 ml) | Enterococci (per 100 ml) | BOD (mg/l) |
| 1/8 | 9 | 3 | 3.2 | 4 | 4 | 3.2 |
| 2/13 | 18 | 12 | 2.2 | 50 | 50 | 2.6 |
| 3/5 | 18 | 14 | 1.5 | 39 | 74 | 1.9 |
| 4/3 | 22 | 16 | 3.4 | 49 | 30 | 3.9 |
| 4/30 | 13 | 10 | 2.7 | 27 | 17 | 3.3 |
| 6/26 | 120 | 64 | 2.5 | 150 | 194 | 3.0 |
| 7/9 | 96 | 43 | 1.5 | 44 | 64 | 1.4 |
| 8/6 | 32 | 20 | 2.8 | 46 | 72 | 2.3 |
| 9/3 | 70 | 54 | 1.4 | 84 | 91 | 1.3 |
| 10/7 | 26 | 47 | 1.3 | 82 | 62 | 2.4 |
| 11/12 | 62 | 41 | 2.8 | 34 | 30 | 3.2 |
| 12/10 | 24 | 21 | 4.4 | 40 | 47 | 5.1 |
| Annual Average | 42 | 29 | 2.5 | 54 | 61 | 2.8 |

# APPENDIX E

## RADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

# APPENDIX E

## RADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

In addition to the samples of river water collected at 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 and Richland were submitted on a weekly basis for gamma spectrometry, gross beta and gross alpha analyses. Samples from 100-N were submitted on a monthly interval for gamma spectrometry analysis and a weekly gross beta analysis.

The following tables are included in Appendix E:

Table E-1. Concentrations of Radionuclides in 100-N Drinking Water (Monthly Composite of Weekly Cumulative Samples) - 1974 (Page E-2)

Table E-2. Beta Activity in Drinking Water at Richland, 300 Area, and 100-N (Cumulative Samples) (Page E-3)

Table E-3. Concentrations of Radionuclides in 300 Area Drinking Water (Cumulative Samples) - 1974 (Page E-5)

Table E-4. Concentrations of Radionuclides in Richland Drinking Water (Cumulative Samples) - 1974 (Page E-7)

TABLE E-1 Concentrations of Radionuclides in 100-N Drinking Water (Monthly Composite of Weekly Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{3}H$ | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 24 | 300 | 19 | 39 | 22 |
| 9/30-10/28 | 440 | * | * | * | * | * |
| 10/28-11/25 | 320 | * | * | * | * | * |
| 11/25-12/30 | | * | * | * | * | * |
| Average [b] | 380 | * | * | * | * | * |

* 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 analytical limit" values.
No entry indicates no specific analysis was made.

TABLE E-2 Beta Activity in Drinking Water at Richland, 300 Area, and 100-N (Cumulative Samples) - 1974

(Units of Counts/Minute/Milliliter)

| Date | Richland | 300 Area | 100-N |
|---|---|---|---|
| Anal. Limit[a] | 0.005 | 0.005 | 0.005 |
| 12/31-1/7 | * | * | * |
| 1/7-1/14 | * | * | * |
| 1/14-1/21 | * | * | * |
| 1/21-1/28 | * | * | * |
| 1/28-2/4 | 0.003 | * | * |
| 2/4-2/11 | * | * | * |
| 2/11-2/19 | 0.003 | * | * |
| 2/19-2/25 | 0.005 | * | * |
| 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 | * | * | * |
| 5/13-5/20 | * | * | * |
| 5/20-5/28 | * | * | * |
| 5/28-6/3 | * | * | 0.005 |
| 6/3-6/10 | * | * | * |
| 6/10-6/17 | * | * | * |
| 6/17-6/24 | * | * | * |
| 6/24-7/1 | * | * | * |
| 7/1-7/8 | * | * | * |
| 7/8-7/15 | * | * | * |
| 7/15-7/22 | * | * | 0.006 |
| 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.

TABLE E-2 (Cont'd) Beta Activity in Drinking Water at Richland, 300 Area, and 100-N (Cumulative Samples - 1974)

(Units of Counts/Minute/Milliliter)

| Date | Richland | 300 Area | 100-N |
|---|---|---|---|
| Anal. Limit[a] | 0.005 | 0.005 | 0.005 |
| 7/29-8/5 | * | * | * |
| 8/5-8/12 | * | * | * |
| 8/12-8/19 | * | * | * |
| 8/19-8/26 | * | * | * |
| 8/26-9/3 | * | * | * |
| 9/3-9/9 | 0.005 | * | * |
| 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 | * | * | 0.005 |
| 11/4-11/11 | * | * | * |
| 11/11-11/18 | * | * | * |
| 11/18-11/25 | * | * | * |
| 11/25-12/2 | 0.006 | * | * |
| 12/2-12/9 | * | * | * |
| 12/9-12/16 | 0.005 | * | 0.005 |
| 12/16-12/23 | * | * | * |
| 12/23-12/30 | * | * | * |
| Annual Average[b] | <0.003 | * | <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 analytical limit" values.

TABLE E-3 Concentrations of Radionuclides in 300 Area Drinking Water (Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 24 | 300 | 19 | 39 | 22 | 0.27 |
| 12/31-1/7 | * | * | * | * | * | 1.3 |
| 1/7-1/14 | * | * | * | * | * | 1.5 |
| 1/14-1/21 | * | * | * | * | * | 0.47 |
| 1/21-1/28 | * | * | * | * | * | 0.25 |
| 1/28-2/4 | * | * | * | * | * | 1.4 |
| 2/4-2/11 | * | * | * | * | * | 0.43 |
| 2/11-2/19 | * | * | * | * | * | 0.26 |
| 2/19-2/25 | * | * | * | * | * | 0.65 |
| 2/25-3/4 | * | * | * | * | * | 0.58 |
| 3/4-3/11 | * | * | * | * | * | * |
| 3/11-3/18 | * | * | * | * | * | 0.88 |
| 3/18-3/25 | * | * | * | * | * | 0.74 |
| 3/25-4/1 | * | * | * | * | * | 0.88 |
| 4/1-4/8 | * | * | * | * | * | 0.51 |
| 4/8-4/15 | * | * | * | * | * | 0.76 |
| 4/15-4/22 | * | * | * | * | * | 0.60 |
| 4/22-4/29 | * | * | * | * | * | 1.1 |
| 4/29-5/6 | * | * | * | * | * | 0.29 |
| 5/6-5/13 | * | * | * | * | * | 0.64 |
| 5/13-5/20 | * | * | * | * | * | * |
| 5/20-5/28 | * | * | * | * | * | 0.32 |
| 5/28-6/3 | * | * | * | * | * | * |
| 6/3-6/10 | * | * | * | * | * | 0.32 |
| 6/10-6/17 | * | * | * | * | * | 0.28 |
| 6/17-6/24 | * | * | * | * | * | 0.22 |
| 6/24-7/1 | * | * | * | * | * | * |
| 7/1-7/8 | * | * | * | * | * | * |
| 7/8-7/15 | * | * | * | * | * | 0.41 |
| 7/15-7/22 | * | * | * | * | * | * |
| 7/22-7/29 | * | * | * | * | * | 0.47 |

* 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 E-3 (Cont'd) Concentrations of Radionuclides in 300 Area Drinking Water (Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 24 | 300 | 19 | 39 | 22 | 0.27 |
| 7/29-8/5 | * | * | * | * | * | 0.39 |
| 8/5-8/12 | * | * | * | * | * | * |
| 8/12-8/19 | * | * | * | * | * | 0.42 |
| 8/19-8/26 | * | * | * | * | * | 0.62 |
| 8/26-9/3 | * | * | * | * | * | 0.88 |
| 9/3-9/9 | * | * | * | * | * | 0.32 |
| 9/9-9/16 | * | * | * | * | * | 0.34 |
| 9/16-9/23 | * | * | * | * | * | 0.51 |
| 9/23-9/30 | * | * | * | * | * | 0.39 |
| 9/30-10/7 | | | | | | |
| 10/7-10/14 | * | * | * | * | * | 0.28 |
| 10/14-10/21 | * | * | * | * | * | * |
| 10/21-10/28 | * | * | * | * | * | 0.39 |
| 10/28-11/4 | * | * | * | * | * | 1.0 |
| 11/4-11/11 | * | * | * | * | * | 0.57 |
| 11/11-11/18 | * | * | * | * | * | 0.30 |
| 11/18-11/25 | * | * | * | * | * | 0.93 |
| 11/25-12/2 | * | * | * | * | * | * |
| 12/2-12/9 | * | * | * | * | * | 0.64 |
| 12/9-12/16 | * | * | * | * | * | 0.72 |
| 12/16-12/23 | * | * | * | * | * | 0.92 |
| 12/23-12/30 | * | * | * | * | * | 0.51 |
| Annual Average[b] | * | * | * | * | * | <0.52 |

* 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.

No entry indicates no analysis was made.

TABLE E-4 Concentrations of Radionuclides in Richland Drinking Water (Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|---|
| Anal. Limit[a] | 24 | 300 | 19 | 39 | 0.078 | 22 | 0.28 |
| 12/31-1/7 | * | * | * | * | | * | 0.92 |
| 1/7-1/14 | * | * | * | * | | * | * |
| 1/14-1/21 | * | * | * | * | 0.26 | * | 0.96 |
| 1/21-1/28 | * | * | * | * | | * | 2.6 |
| 1/28-2/4 | * | * | * | * | | * | 3.0 |
| 2/4-2/11 | * | * | * | * | | * | 0.50 |
| 2/11-2/19 | * | * | * | * | 0.07 | * | 1.1 |
| 2/19-2/25 | * | * | * | * | | * | 1.9 |
| 2/25-3/4 | * | * | * | * | | * | 0.62 |
| 3/4-3/11 | * | * | * | * | | * | * |
| 3/11-3/18 | * | * | * | * | | * | 1.3 |
| 3/18-3/25 | * | * | * | * | 0.57 | * | 0.74 |
| 3/25-4/1 | * | * | * | * | | * | 0.39 |
| 4/1-4/8 | * | * | * | * | | * | 0.67 |
| 4/8-4/15 | * | * | * | * | | * | 0.97 |
| 4/15-4/22 | * | * | * | * | * | * | 0.46 |
| 4/22-4/29 | * | * | * | * | | * | 0.32 |
| 4/29-5/6 | * | * | * | * | | * | 0.61 |
| 5/6-5/13 | * | * | * | * | | * | 0.35 |
| 5/13-5/20 | * | * | * | * | | * | 0.20 |
| 5/20-5/28 | * | * | * | * | | * | * |
| 5/28-6/3 | * | * | * | * | | * | 0.37 |
| 6/3-6/10 | * | * | * | * | | * | 0.30 |
| 6/10-6/17 | * | * | * | * | | * | * |
| 6/17-6/24 | * | * | * | * | 0.24 | * | * |
| 6/24-7/1 | * | * | * | * | | * | * |
| 7/1-7/8 | * | * | * | * | | * | * |
| 7/8-7/15 | * | * | * | * | | * | * |
| 7/15-7/22 | * | * | * | * | 0.40 | * | * |
| 7/22-7/29 | * | * | * | * | | * | * |

* 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.

No entry indicates no analysis was made.

TABLE E-4 (Cont'd) Concentrations of Radionuclides in Richland Drinking Water (Cumulative Samples) - 1974

(Units of $10^{-9}$ μCi/ml of Water)

| Date | $^{46}Sc$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ | Alpha |
|---|---|---|---|---|---|---|---|
| Anal. Limit[a] | 24 | 300 | 19 | 39 | 0.078 | 22 | 0.28 |
| 7/29-8/5 | * | * | * | * | | * | * |
| 8/5-8/12 | * | * | * | * | | * | * |
| 8/12-8/19 | * | * | * | * | | * | 0.35 |
| 8/19-8/26 | * | * | * | * | | * | * |
| 8/26-9/2 | * | * | * | * | | * | 0.61 |
| 9/2-9/9 | * | * | * | * | | * | * |
| 9/9-9/16 | * | * | * | * | | * | * |
| 9/16-9/23 | * | * | * | * | 0.54 | * | * |
| 9/23-9/30 | * | * | * | * | | * | 0.86 |
| 9/30-10/7 | * | * | * | * | | * | 0.66 |
| 10/7-10/14 | * | * | * | * | | * | 0.25 |
| 10/14-10/21 | * | * | * | * | | * | * |
| 10/21-10/28 | * | * | * | * | 0.28 | * | * |
| 10/28-11/4 | | | | | | | * |
| 11/4-11/11 | | | | | | | * |
| 11/11-11/18 | | | | | | | * |
| 11/18-11/25 | * | * | * | * | 0.34 | * | 0.88 |
| 11/25-12/2 | | | | | | | 0.25 |
| 12/2-12/9 | * | * | * | * | | * | 0.78 |
| 12/9-12/16 | | | | | | | 1.4 |
| 12/16-12/23 | | | | | | | * |
| 12/23-12/30 | * | * | * | * | 0.38 | * | * |
| Annual Average[b] | * | * | * | * | 0.31 | * | <0.54 |

* 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.

No entry indicates no analysis was made.

# APPENDIX F

## NONRADIOLOGICAL PARAMETERS MEASURED IN DRINKING WATER

# APPENDIX F

## 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.

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

The following table is included in Appendix F:

Table F-1. Nitrate Ion in 300 Area and Richland Drinking Water (Cumulative Samples) - 1974 (Page F-2)

TABLE F-1 Nitrate Ion in 300 Area and Richland Drinking Water (Cumulative Samples) - 1974

(Units of ppm of Water)

| Date | 300 Area | Richland | Date | 300 Area | Richland |
|---|---|---|---|---|---|
| 12/31-1/7 | 0.78 | 0.85 | 7/15-7/22 | | |
| 1/7-1/14 | 0.88 | 12. | 7/22-7/29 | 0.18 | 0.08 |
| 1/14-1/21 | 0.95 | 9.1 | 7/29-8/5 | 0.22 | 0.24 |
| 1/21-1/28 | 1.1 | 10. | 8/5-8/12 | 0.31 | 0.13 |
| 1/28-2/4 | 1.5 | 6.8 | 8/12-8/19 | 0.46 | 0.40 |
| 2/4-2/11 | 1.8 | 13. | 8/19-8/26 | 0.34 | 0.21 |
| 2/11-2/19 | 1.2 | 15. | 8/26-9/2 | 0.22 | 1.2 |
| 2/19-2/25 | 1.5 | 14. | 9/2-9/9 | 0.42 | 0.12 |
| 2/25-3/4 | 1.4 | 5.9 | 9/9-9/16 | 0.26 | 0.24 |
| 3/4-3/11 | 1.3 | 0.88 | 9/16-9/23 | | |
| 3/11-3/18 | 1.4 | 5.0 | 9/23-9/30 | 0.38 | 0.30 |
| 3/18-3/25 | 1.7 | 1.8 | 9/30-10/7 | | 0.33 |
| 3/25-4/1 | 1.4 | 2.0 | 10/7-10/14 | 0.18 | |
| 4/1-4/8 | 1.0 | 0.88 | 10/14-10/21 | 0.48 | 0.42 |
| 4/8-4/15 | 1.5 | 1.2 | 10/21-10/28 | 0.43 | 0.36 |
| 4/15-4/22 | 1.2 | 2.0 | 10/28-11/4 | 1.2 | 0.40 |
| 4/22-4/29 | 0.88 | 0.65 | 11/4-11/11 | 0.70 | 0.40 |
| 4/29-5/6 | 0.67 | 0.56 | 11/11-11/18 | 0.58 | 0.48 |
| 5/6-5/13 | 0.59 | 0.73 | 11/18-11/25 | 0.59 | 0.47 |
| 5/13-5/20 | 0.53 | 0.59 | 11/25-12/2 | 0.68 | 0.48 |
| 5/20-5/28 | 0.41 | 0.40 | 12/2-12/9 | 0.47 | 2.9 |
| 5/28-6/3 | 0.33 | 0.21 | 12/9-12/16 | 0.65 | 6.7 |
| 6/3-6/10 | 0.20 | 0.18 | 12/16-12/23 | 0.68 | 4.7 |
| 6/10-6/17 | 0.22 | 0.11 | 12/23-12/30 | 0.81 | 1.8 |
| 6/17-6/24 | | | | | |
| 6/24-7/1 | 0.23 | 0.17 | | | |
| 7/1-7/8 | 0.11 | 0.27 | | | |
| 7/8-7/15 | 0.20 | 0.24 | | | |
| | | | Annual Average | 0.71 | 2.5 |

No entry indicates no analysis was made.

# APPENDIX G

## RADIONUCLIDES IN SELECTED FOODSTUFFS

# APPENDIX G

## 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 Appendix G:

Table G-1. Concentrations of Radionuclides in Milk - 1974 (Page G-2)

Table G-2. Concentrations of Radionuclides in Locally Purchased Meat - 1974 (Page G-7)

Table G-3. Concentrations of Radionuclides in Locally Purchased Leafy Vegetables - 1974 (Page G-8)

Table G-4. Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1974 (Page G-9)

TABLE G-1 Concentrations of Radionuclides in Milk - 1974

(Units of $10^{-9}$ μCi/ml of Milk)

| Date | $^{40}K$ | $^{65}Zn$ | $^{89}Sr$ | $^{90}Sr$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 470 | 54 | 0.42 | 0.49 | 2.0 | 29 |
| | Riverview Irrigation District - Farm #1 | | | | | |
| 1/7 | 1,200 | * | | 0.002 | * | * |
| 1/21 | 1,100 | * | * | | * | * |
| 2/4 | 850 | * | | | * | * |
| 2/19 | 1,200 | * | | | * | * |
| 3/4 | 940 | * | | | * | * |
| 3/18 | 710 | * | | | * | * |
| 4/1 | 1,000 | * | | | * | * |
| 4/15 | 980 | * | * | 2.1 | * | * |
| 4/29 | 1,100 | * | | | * | * |
| 5/13 | 830 | | | | * | * |
| 5/28 | 920 | * | | | * | * |
| 6/10 | 1,000 | * | | | * | * |
| 6/24 | 1,100 | * | | | 3.0 | * |
| 7/8 | 1,000 | * | 3.1 | 2.6 | * | * |
| 7/22 | 1,000 | * | | | * | * |
| 8/5 | 1,100 | * | | | * | * |
| 8/19 | 860 | * | | | * | * |
| 9/3 | 1,200 | * | | | * | * |
| 9/16 | 980 | * | | | * | * |
| 10/3 | 880 | * | * | 2.1 | * | * |
| 10/14 | 760 | * | | | * | * |
| 10/28 | 900 | * | | | * | * |
| 11/11 | 1,000 | * | | | * | * |
| 11/25 | 880 | * | | | * | * |
| 12/9 | 1,000 | * | | | * | * |
| 12/23 | 1,400 | * | | | * | * |
| Annual Average | 1,000 | * | <0.8 | 1.7 | <0.4 | * |

* 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.

No entry indicates no specific analysis was made.

TABLE G-1 (Cont'd) Concentrations of Radionuclides in Milk - 1974

(Units of $10^{-9}$ μCi/ml of Milk)

| Date | $^{40}K$ | $^{65}Zn$ | $^{90}Sr$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|
| Anal. Limit[a] | 470 | 54 | 0.49 | 2 | 29 |
| | Wahluke Watermaster | | | | |
| 1/10 | 1,200 | * | | * | * |
| 1/24 | 1,000 | * | | * | * |
| 2/7 | 920 | * | * | * | * |
| 2/21 | 1,100 | * | | * | * |
| 3/7 | 920 | * | | * | * |
| 3/21 | 1,100 | * | | * | * |
| 4/4 | 1,100 | * | | * | * |
| 4/18 | 1,100 | * | | * | * |
| 5/2 | 1,200 | * | 4.6 | * | * |
| 5/16 | 1,100 | * | | * | * |
| 5/30 | 37[b] | * | | * | * |
| 6/13 | 1,300 | * | | * | * |
| 6/27 | 1,000 | * | | * | * |
| 7/11 | 1,100 | * | | * | * |
| 7/25 | 1,000 | * | | * | * |
| 8/8 | 1,100 | * | 1.6 | * | * |
| 8/22 | 1,200 | * | | * | * |
| 9/5 | 1,100 | * | | * | * |
| 9/19 | 860 | * | | * | * |
| 10/3 | 970 | * | | * | * |
| 10/17 | 150[b] | * | | * | * |
| 10/31 | 970 | * | 1.8 | * | * |
| 11/14 | 910 | * | | * | * |
| 11/26 | 950 | * | | * | * |
| 12/12 | 1,200 | * | | * | * |
| 12/19 | 1,100 | * | | * | * |
| Annual Average | 1,000 | * | <2.0 | * | * |

* 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) Result omitted in calculating annual average.
No entry indicates no specific analysis was made.

TABLE G-1 (Cont'd) Concentrations of Radionuclides in Milk - 1974

(Units of $10^{-9}$ μCi/ml of Milk)

| Date | $^{40}K$ | $^{65}Zn$ | $^{90}Sr$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|
| Anal. Limit[a] | 470 | 54 | 0.49 | 2 | 29 |
| | Benton City Composite | | | | |
| 1/3 | 1,100 | * | | * | * |
| 1/31 | 730 | * | | * | * |
| 2/14 | 1,100 | * | | * | * |
| 2/28 | 820 | * | * | * | * |
| 3/14 | 820 | * | | * | * |
| 3/28 | 720 | * | | * | * |
| 4/11 | 1,100 | * | | * | * |
| 4/25 | 1,000 | * | | * | * |
| 5/9 | 780 | * | | * | * |
| 5/23 | 1,000 | * | | * | * |
| 6/6 | 970 | * | 4.1 | * | * |
| 6/20 | 1,000 | * | | * | * |
| 7/3 | 880 | * | | * | * |
| 7/18 | 1,100 | * | | * | * |
| Average | 940 | * | <2.4 | * | * |
| | Benton City Farm #3 | | | | |
| 8/1 | 920 | * | | * | * |
| 8/15 | 990 | * | | * | * |
| 8/29 | 1,100 | * | 2.6 | * | * |
| 9/12 | 1,100 | * | | * | * |
| 9/26 | 960 | * | | * | * |
| 10/10 | 1,300 | * | | * | * |
| 10/24 | 1,100 | * | | * | * |
| 10/31 | 750 | * | | * | * |
| 11/14 | 800 | * | | * | * |
| 11/26 | 1,100 | * | 3.9 | * | * |
| 12/12 | 1,200 | * | | * | * |
| 12/19 | 1,100 | * | | * | * |
| Average | 1,000 | * | 3.2 | * | * |

* 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.

No entry indicates no specific analysis was made.

TABLE G-1 (Cont'd) Concentrations of Radionuclides in Milk - 1974

(Units of $10^{-9}$ μCi/ml of Milk)

| Date | $^{40}K$ | $^{65}Zn$ | $^{90}Sr$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|
| Anal. Limit[a] | 470 | 54 | 0.49 | 2 | 29 |
| | Benton City Farm #4 | | | | |
| 8/1 | 890 | * | | * | * |
| 8/15 | 1,100 | * | | * | * |
| 8/29 | 910 | * | 2.8 | * | * |
| 9/12 | 1,100 | * | | * | * |
| 9/26 | 910 | * | | * | * |
| 10/10 | 1,100 | * | | * | * |
| 10/24 | 1,000 | * | | * | * |
| 10/31 | 1,000 | * | | * | * |
| 11/14 | 830 | * | | * | * |
| 11/26 | 920 | * | | * | * |
| 12/12 | 960 | * | 3.6 | * | * |
| 12/19 | 990 | * | | * | * |
| Average | 970 | * | 3.2 | * | * |
| | West Richland Farm #1 | | | | |
| 5/2 | 1,000 | * | | * | * |
| 5/16 | 1,200 | * | | * | * |
| 5/30 | 38[b] | * | | * | * |
| 6/13 | 1,100 | * | | * | * |
| 6/27 | 1,000 | * | | * | * |
| Average | 918 | * | | * | * |

* 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) Result omitted in calculating annual average.
No entry indicates no specific analysis was made.

TABLE G-1 (Cont'd) Concentrations of Radionuclides in Milk - 1974

(Units of $10^{-9}$ μCi/ml of Milk)

| Date | $^{40}K$ | $^{65}Zn$ | $^{90}Sr$ | $^{131}I$ | $^{137}Cs$ |
|---|---|---|---|---|---|
| Anal. Limit[a] | 470 | 54 | 0.49 | 2 | 29 |
| | Commercial Brand H | | | | |
| 1/31 | 950 | * | * | * | * |
| 2/28 | 1,000 | * | | * | * |
| 4/11 | 960 | * | | * | * |
| 5/9 | 1,100 | * | 1.1 | * | * |
| 6/6 | 1,100 | * | | * | * |
| 7/3 | 1,100 | * | | * | * |
| 8/1 | 1,000 | * | 2.0 | * | * |
| 9/12 | 820 | * | | * | * |
| 10/10 | 1,300 | * | | * | * |
| 11/7 | 940 | * | 5.5 | * | * |
| 12/5 | 1,200 | * | | * | * |
| Annual Average | 1,000 | * | <2.2 | * | * |
| | Commercial Composite | | | | |
| 1/3 | 1,100 | * | | * | * |
| 1/31 | 770 | * | * | * | * |
| 2/28 | 1,100 | * | * | * | * |
| 4/11 | 930 | * | | * | * |
| 5/9 | 900 | * | * | * | * |
| 6/6 | 1,000 | * | 1.5 | * | * |
| 7/3 | 1,100 | * | | * | * |
| 8/1 | 820 | * | * | * | * |
| 8/29 | 960 | * | 3.2 | * | * |
| 9/12 | 850 | * | | * | * |
| 10/10 | 1,200 | * | | * | * |
| 11/7 | 860 | * | | * | * |
| 12/4 | * | * | 2.8 | * | * |
| Annual Average | 890 | * | <1.1 | * | * |

* 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.

No entry indicates no specific analysis was made.

TABLE G-2 Concentrations of Radionuclides in Locally Purchased Meat - 1974

(Units of $10^{-6}$ μCi/g of Meat (Wet Weight)

| Date | Type | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 0.42 | 0.03 | 0.05 | 0.001 | 0.03 |
| | | | Commercial | | | |
| 2/14 | Beef | 2.1 | * | * | * | * |
| 3/15 | Beef | 2.4 | * | * | * | * |
| 4/11 | Beef | 1.9 | * | * | * | * |
| 5/9 | Beef | 1.9 | * | * | * | * |
| 6/6 | Beef | 2.3 | * | * | 0.001 | 0.035 |
| 7/3 | Beef | 2.2 | * | * | * | * |
| 8/1 | Beef | 1.9 | * | * | * | * |
| 8/29 | Beef | 2.1 | * | * | * | * |
| 10/24 | Beef | 2.3 | * | * | * | * |
| 11/14 | Beef | 1.8 | * | * | * | * |
| 12/12 | Beef | 2.6 | * | * | * | * |
| Annual Average | | 2.1 | * | * | <0.0003 | <0.01 |
| | | | Riverview Farm | | | |
| 6/10 | Beef | 1.7 | * | * | * | * |

* 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 G-3 Concentrations of Radionuclides in Locally Purchased Leafy Vegetables - 1974

Units of $10^{-6}$ μCi/g of Leafy Vegetables (Wet Weight)

| Date | $^{40}K$ | $^{54}Mn$ | $^{60}Co$ | $^{65}Zn$ | $^{89}Sr$ | $^{90}Sr$ | $^{95}ZrNb$ | $^{106}Ru$ | $^{137}Cs$ | $^{144}CePr$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Anal. Limit[a] | 0.80 | 0.04 | 0.05 | 0.09 | 0.002 | 0.002 | 0.03 | 0.66 | 0.05 | 0.44 |
| | | | | | | Riverview Farm | | | | |
| 5/29 | 2.5 | * | * | * | | 0.015 | 0.07 | 0.96 | * | * |
| 6/6 | 3.6 | * | * | * | | | 0.11 | * | * | * |
| 7/11 | 2.1 | * | * | * | | | * | * | * | * |
| 8/8 | 1.7 | * | * | * | | 0.011 | * | * | * | * |
| 10/10 | 2.2 | * | * | * | | 0.016 | * | * | * | * |
| Average | 2.4 | * | * | * | | 0.01 | <0.04 | <0.25 | * | * |
| | | | | | | Benton City Farm | | | | |
| 5/29 | 7.9 | * | * | * | | | 0.04 | * | * | * |
| | | | | | | Commercial | | | | |
| 5/29 | 2.9 | * | * | * | * | 0.010 | 0.04 | * | * | * |
| 6/20 | 3.2 | 0.05 | * | * | | | 0.24 | * | * | * |
| 7/25 | 1.2 | * | * | * | | | * | * | * | * |
| 8/22 | 2.6 | * | * | * | | | * | * | * | * |
| 9/19 | 1.4 | 0.36 | 0.05 | * | * | 0.009 | 0.77 | * | * | * |
| 10/24 | 1.4 | * | * | * | | | * | * | * | * |
| Average | 2.1 | <0.07 | <0.01 | * | * | 0.010 | <0.18 | * | * | * |

* 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.
No entry indicates no specific analysis was made.

TABLE G-4 Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1974

Units of $10^{-6}$ μCi/g (Wet Weight)

| Date | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{106}Ru$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 0.40 | 0.03 | 0.05 | 0.001 | 0.67 | 0.03 |
| | Chicken (Riverview Farm) | | | | | |
| 3/7 | 2.0 | * | * | * | * | * |
| 5/30 | 1.0 | * | * | * | 0.76 | * |
| 9/5 | 2.0 | * | * | * | * | * |
| 12/12 | 2.0 | * | * | * | * | * |
| Average | 1.8 | * | * | * | <0.19 | * |
| | Eggs (Riverview Farm) | | | | | |
| 1/10 | 0.94 | * | * | | * | * |
| 2/7 | 0.80 | * | * | | * | * |
| 3/7 | 1.1 | * | * | * | * | * |
| 4/4 | 1.0 | * | * | | * | * |
| 5/2 | 0.78 | * | * | | * | * |
| 5/30 | 0.71 | * | * | 0.004 | * | * |
| 7/11 | 0.99 | * | * | | * | * |
| 8/8 | 0.92 | * | * | | * | * |
| 9/5 | 0.86 | * | * | 0.003 | * | * |
| 10/3 | 0.85 | * | * | | * | * |
| 12/12 | 0.84 | * | * | 0.004 | * | * |
| Average | 0.89 | * | * | <0.003 | * | * |
| | Chicken (Commercial) | | | | | |
| 2/28 | 1.5 | * | * | * | * | * |
| 9/12 | 1.6 | * | * | 0.0004 | * | * |
| Average | 1.6 | * | * | <0.0002 | * | * |

* 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.

No entry indicates no specific analysis was made.

TABLE G-4 (Cont'd) Concentrations of Radionuclides in Locally Purchased Chicken and Eggs - 1974

Units of $10^{-6}$ μCi/g (Wet Weight)

| Date | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{106}Ru$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 0.40 | 0.03 | 0.05 | 0.001 | 0.67 | 0.03 |
| | Eggs Commercial | | | | | |
| 2/28 | 1.0 | * | * | * | * | * |
| 9/12 | 0.95 | * | * | * | * | * |
| Average | 0.97 | * | * | * | * | * |

* 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.

# APPENDIX H

## RADIONUCLIDES IN FISH AND WILDLIFE

# APPENDIX H

## 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 Sr-90. 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 Sr-90 to determine the concentration of measurable radionuclides in muscle tissue.

Oysters were obtained from Willapa Bay during 1974, and the June samples were analyzed by gamma spectrometry.

The following tables are included in Appendix H:

Table H-1. Concentrations of Radionuclides in Muscle of Whitefish Taken from the Columbia River - 1974 (Page H-2)

Table H-2. Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1974 (Page H-3)

Table H-3. Concentrations of Radionuclides in Upland Game Bird Samples in the Hanford Environs - 1974 (Page H-6)

Table H-4. Concentration of Radionuclides in Oysters from Willapa Bay - 1974 (Page H-7)

TABLE H-1 Concentrations of Radionuclides in Muscle of Whitefish Taken From the Columbia River - 1974

Units of $10^{-6}$ μCi/g (wet weight)

| Date | $^{32}P$ | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | 1.0 | 1.0 | 0.06 | 0.11 | 0.002 | 0.06 |
| 1/25 | * | 2.4 | 0.08 | * | * | * |
| 2/22 | * | 3.0 | 0.14 | * | * | 0.09 |
| 3/28 | * | 3.3 | * | * | * | * |
| 4/19 | * | 3.2 | * | * | * | * |
| 5/3 | * | 2.8 | * | * | * | 0.06 |
| 6/12 | * | 3.7 | * | * | 0.006 | * |
| 7/26 | * | 2.9 | 0.11 | 0.13 | 0.006 | 0.11 |
| 8/7 | * | 3.1 | 0.09 | * | 0.007 | * |
| 9/19 | * | | | | | |
| 10/9 | * | 3.8 | * | * | * | * |
| 11/4 | * | 3.9 | 0.27 | 0.16 | 0.004 | 0.08 |
| 12/13 | * | 2.1 | * | * | * | 0.06 |
| Annual Average[b] | * | 3.1 | <0.08 | <0.06 | <0.002 | <0.06 |

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

TABLE H-2 Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1974

Units of $10^{-6}$ μCi/g (wet weight)

| Date | Species | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 1.4 | 0.08 | 0.16 | 0.005 | 0.09 |
| DUCKS 100 F | | | | | | |
| 1/9 | Mallard | 2.1 | * | * | * | * |
| 1/9 | Mallard | 2.6 | * | * | * | * |
| 1/9 | Mallard | 3.0 | * | * | * | * |
| 10/21 | Mallard | * | * | * | * | * |
| 10/21 | Mallard | * | * | * | 0.006 | * |
| 10/23 | Mallard | 2.2 | * | * | * | * |
| 10/23 | Mallard | 1.6 | * | * | * | * |
| 10/23 | Mallard | 2.0 | * | * | * | * |
| 11/1 | Mallard | 2.5 | * | * | * | * |
| 11/1 | Mallard | 2.1 | * | * | * | * |
| 11/1 | Mallard | 2.7 | * | * | * | * |
| Average[b] | | <2.2 | * | * | <0.002 | * |
| Hanford | | | | | | |
| 1/3 | Mallard | 2.5 | * | * | 0.003 | * |
| 10/21 | Mallard | 1.4 | * | * | * | * |
| 10/21 | Mallard | 2.0 | * | * | * | * |
| 10/21 | Mallard | 2.3 | * | * | * | * |
| 10/21 | Mallard | * | * | * | * | * |
| 10/21 | Mallard | * | * | * | * | * |
| 10/23 | Mallard | 1.9 | * | * | * | * |
| 10/23 | Mallard | 2.2 | * | * | * | * |
| 10/23 | Gr. Winged Teal | * | * | * | * | * |
| 10/23 | Gr. Winged Teal | * | * | * | * | * |
| 10/23 | Gr. Winged Teal | * | * | * | * | * |

* 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 analytical limit" values.

TABLE H-2 (Cont'd) Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1974

Units of $10^{-6}$ μCi/g (wet weight)

| Date | Species | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 1.4 | 0.08 | 0.16 | 0.005 | 0.09 |
| Hanford (cont'd) | | | | | | |
| 11/15 | Mallard | 2.3 | * | * | * | * |
| 11/15 | Mallard | 2.5 | * | * | * | * |
| 11/15 | Mallard | 2.5 | * | * | * | * |
| 11/18 | Gr. Winged Teal | * | * | * | * | * |
| 11/21 | Mallard | 2.5 | * | * | 0.007 | * |
| 11/21 | Mallard | 2.0 | * | * | * | 0.074 |
| 12/4 | Mallard | 2.8 | * | * | 0.007 | * |
| 12/4 | Mallard | 3.4 | * | * | * | * |
| 12/4 | Mallard | 3.0 | * | * | 0.009 | * |
| 12/4 | Mallard | 2.7 | * | * | * | * |
| Average[b] | | <2.3 | * | * | <0.004 | <0.01 |
| 300 Area | | | | | | |
| 4/24 | Mallard | 2.8 | 0.12 | * | <0.005 | * |
| GEESE 100B | | | | | | |
| 12/20 | Can. Lesser | 2.3 | * | 0.19 | | * |
| 12/20 | Can. Lesser | 2.5 | * | * | | * |
| 12/20 | Can. Lesser | 2.6 | * | * | | * |
| 12/20 | Can. Lesser | 2.5 | * | * | | * |
| Average[b] | | 2.5 | * | <0.03 | | * |

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

TABLE H-2 (Cont'd) Concentrations of Selected Radionuclides in the Muscle of Waterfowl Samples Along the River in the Hanford Environs - 1974

Units of $10^{-6}$ μCi/g (wet weight)

| Date | Species | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 1.4 | 0.08 | 0.16 | 0.005 | 0.09 |
| GEESE | | | | | | |
| Hanford | | | | | | |
| 11/18 | Can. Common | 2.7 | * | * | | * |
| 11/18 | Can. Common | 2.4 | * | * | | * |
| 11/18 | Can. Common | 2.2 | * | * | | * |
| 12/18 | Can. Common | 2.5 | * | * | | * |
| Average | | 2.4 | * | * | | * |
| 100-D | | | | | | |
| 12/17 | Can. Common | 3.1 | 0.09 | * | | * |
| 12/19 | Can. Common | 2.9 | * | * | | * |
| 12/19 | Can. Common | 3.4 | * | * | | 0.10 |
| Average[b] | | 3.1 | <0.07 | * | | <0.07 |
| 100-F | | | | | | |
| 12/17 | Can. Common | 2.7 | 0.06 | * | | * |
| White Bluffs | | | | | | |
| 12/4 | Can. Common | 3.3 | * | * | | * |
| 12/18 | Can. Common | 3.3 | 0.17 | 0.18 | | 0.21 |
| Average[b] | | 3.3 | <0.09 | <0.06 | | <0.14 |

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

TABLE H-3 Concentrations of Radionuclides in Upland Game Bird Samples in the Hanford Environs - 1974

Units of $10^{-6}$ μCi/g (wet weight)

| Date | Species | $^{40}K$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{137}Cs$ |
|---|---|---|---|---|---|---|
| Anal. Limit[a] | | 1.7 | 0.10 | 0.20 | 0.004 | 0.11 |
| 100-B | | | | | | |
| 12/20 | Pheasant | 2.1 | * | * | * | * |
| White Bluffs | | | | | | |
| 1/3 | Pheasant | 2.6 | * | * | * | * |
| 1/3 | Pheasant | 3.5 | * | * | * | * |
| 1/3 | Pheasant | 2.9 | * | * | * | * |
| 1/3 | Pheasant | 2.5 | * | * | * | * |
| 1/3 | Pheasant | 3.2 | * | * | * | * |
| 1/3 | Pheasant | 2.7 | * | * | * | * |
| 1/9 | Pheasant | 3.6 | * | * | * | * |
| 10/24 | Pheasant | 3.4 | * | * | * | * |
| 10/25 | Pheasant | 3.5 | * | * | * | * |
| 10/25 | Pheasant | 2.9 | * | * | * | * |
| Average | | 3.1 | * | * | * | * |
| Hanford | | | | | | |
| 1/3 | Pheasant | 3.2 | * | * | * | * |
| 10/21 | Pheasant | * | * | * | * | * |
| Average | | 2.4 | * | * | * | * |
| 100-D | | | | | | |
| 10/21 | Pheasant | 2.1 | * | * | * | * |
| 10/21 | Pheasant | 2.3 | * | * | * | * |
| Average | | 2.2 | * | * | * | * |

* 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 H-4 Concentration of Radionuclides in Oysters From Willapa Bay - 1974

Units of $10^{-6}$ μCi/g (Wet Weight)

| Date | $^{40}K$ | $^{51}Cr$ | $^{60}Co$ | $^{65}Zn$ | $^{137}Cs$ |
|---|---|---|---|---|---|
| Anal. Limit[a] | 0.39 | 0.33 | 0.03 | 0.04 | 0.02 |
| 6/26 | 1.6 | * | * | 0.14 | * |

* 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.

# APPENDIX I

## RADIONUCLIDES IN SOIL AND VEGETATION

# APPENDIX I

## RADIONUCLIDES IN SOIL AND VEGETATION

Surface soil and perennial vegetation samples were collected from 17 different locations during the autumn of 1974 for the purpose of measuring the levels of radioactivity due to fallout and natural causes as well as to assess any potential buildup of radioactivity from Hanford operations. These locations are shown in Figure I-1. 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 and 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 Sr-90 and uranium by specific analyses.

The following tables are included in Appendix I:

Table I-1. Concentrations of Radionuclides in Perimeter Soil Samples - 1974 (Page I-3)

Table I-2. Concentrations of Radionuclides in Perimeter Vegetation Samples - 1974 (Page I-4)

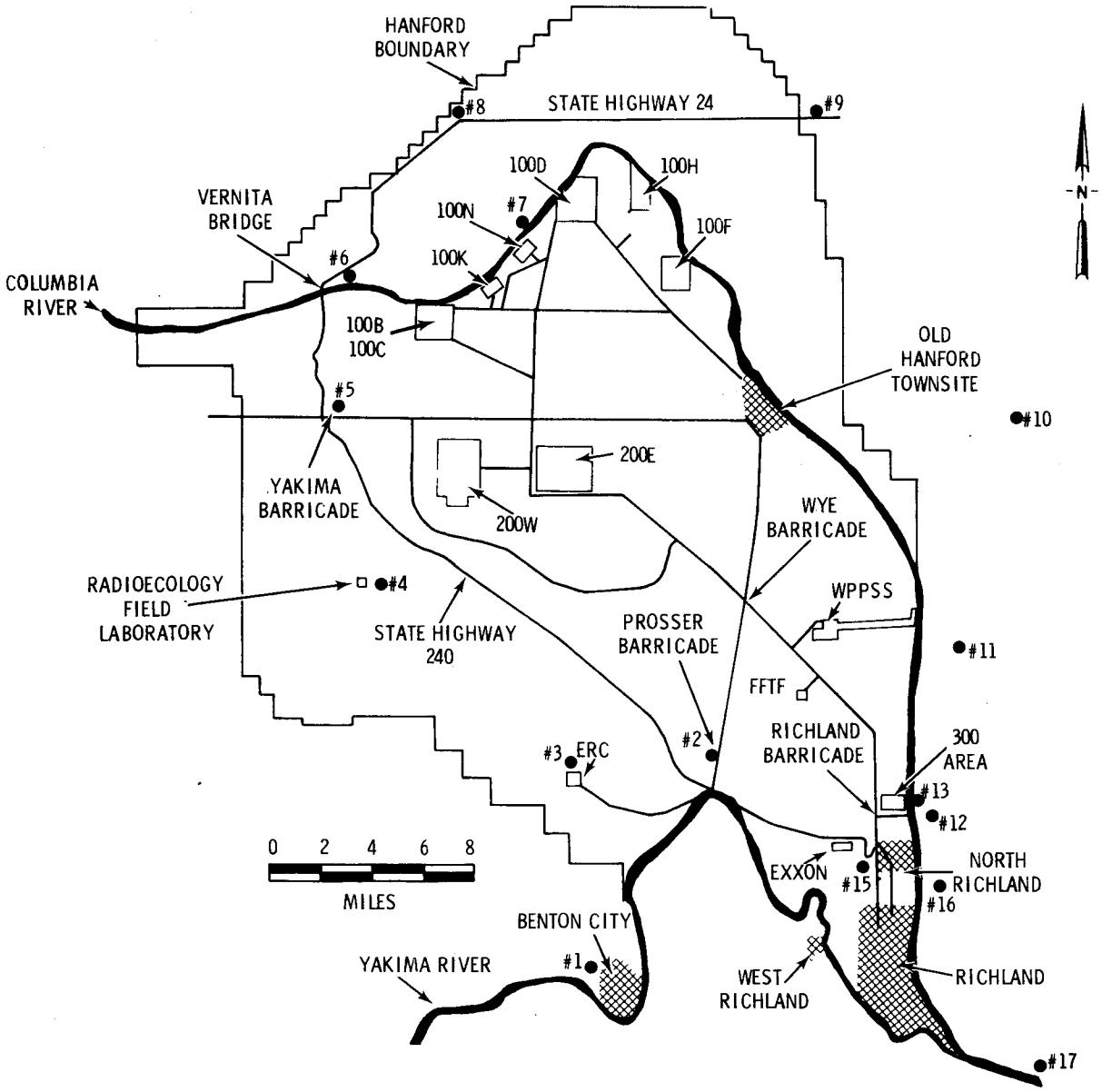


FIGURE I-1 Soil and Vegetation Sampling Locations During 1974

## TABLE I-1 Concentrations of Radionuclides in Perimeter Soil Samples - 1974

### Units of $10^{-6}$ μCi/g of Soil (Dry Weight)

| Sample Location | Map Location | Naturally Occurring Radionuclides | | | | Artificially Produced Radionuclides | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $^{40}K$ | $^{224}Ra$ | $^{226}Ra$ | U-total | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{95}Zr$ | $^{95}Nb$ | $^{106}RuRh$ | $^{134}Cs$ | $^{137}Cs$ | $^{144}Ce$ | $^{238}Pu$ | $^{239-240}Pu$ |
| Analytical Limit | | 0.50 | 0.04 | 0.11 | 0.034 | 0.03 | 0.03 | 0.07 | 0.002 | 0.10 | 0.10 | 0.40 | 0.03 | 0.03 | 0.10 | 0.003 | 0.001 |
| Benton City | 1 | 13 | 1.4 | 0.83 | 0.29 | * | * | 0.24 | 0.78 | * | * | 0.74 | * | 1.7 | 0.31 | * | 0.04 |
| Prosser Barricade | 2 | 14 | 0.92 | 0.48 | 0.13 | * | 0.04 | 0.23 | 0.48 | 0.20 | 0.11 | 0.75 | 0.06 | 0.91 | * | * | 0.01 |
| ERC | 3 | 13 | 0.95 | 0.73 | 0.70 | 0.02 | * | 0.21 | 0.02 | 0.24 | * | 0.40 | 0.05 | 0.11 | 0.13 | * | 0.002 |
| Radioecology Field Lab. | 4 | 12 | 0.71 | 0.46 | 0.32 | * | * | 0.08 | 0.34 | 0.13 | * | 0.50 | 0.06 | 0.96 | 0.32 | * | 0.02 |
| Yakima Barricade | 5 | 14 | 0.76 | 0.73 | 0.10 | * | * | * | 0.01 | 0.12 | * | 0.47 | * | 0.11 | 0.62 | * | 0.003 |
| Vernita Bridge | 6 | 18 | 0.81 | 0.46 | 0.13 | * | * | * | 0.02 | 0.16 | * | 0.68 | * | 0.10 | 0.33 | * | 0.004 |
| Wahluke Slope | 7 | 14 | 0.66 | 0.50 | 0.24 | * | * | * | 0.02 | 0.10 | * | 0.63 | 0.04 | 0.15 | 0.19 | * | 0.004 |
| Wahluke #2 | 8 | 13 | 5.9 | 0.91 | 0.11 | * | * | 0.08 | 0.02 | 0.15 | * | 0.85 | * | 0.23 | * | * | 0.01 |
| Berg Ranch | 9 | 12 | 1.4 | 0.72 | 0.07 | * | * | 0.15 | 0.05 | 0.29 | * | 0.43 | 0.12 | 0.45 | 0.11 | * | 0.007 |
| Cooke Bros. | 10 | 12 | 0.64 | 0.55 | 0.39 | * | * | 0.17 | 0.06 | * | * | 0.47 | * | 0.07 | 0.44 | * | 0.003 |
| Baxter Sub-station | 11 | 16 | 0.74 | 0.52 | 0.36 | 0.04 | * | 0.23 | 0.06 | 0.25 | * | 0.48 | 0.05 | 0.26 | 0.34 | 0.01 | 0.004 |
| Byers Landing | 12 | 12 | 0.97 | 0.46 | 0.39 | * | * | 0.35 | 0.25 | 0.12 | * | 0.54 | 0.06 | 0.69 | 0.20 | * | 0.006 |
| Byers Pump-house | 13 | 12 | 0.88 | 0.48 | 0.61 | * | 0.07 | 0.20 | 0.38 | 0.20 | 0.15 | 0.70 | * | 1.8 | 0.44 | * | 0.02 |
| 300 Area South Gate | 14 | 14 | 0.54 | 0.56 | 0.66 | 0.03 | 0.05 | 0.29 | 0.12 | * | * | 0.59 | * | 1.5 | 0.25 | * | 0.02 |
| North Richland | 15 | 14 | 0.92 | 0.72 | 0.26 | 0.03 | * | 0.18 | 0.26 | * | * | 0.98 | * | 0.48 | 0.16 | * | 0.007 |
| Island #340 | 16 | 12 | 0.76 | 0.78 | 0.45 | * | 2.4 | 0.19 | 0.08 | 0.33 | 0.17 | 0.62 | 0.04 | 1.9 | 0.17 | * | 0.04 |
| Riverview | 17 | 13 | 0.56 | 0.31 | 0.42 | * | 0.04 | 0.27 | 0.04 | 0.10 | * | 0.40 | 0.06 | 0.06 | * | * | 0.002 |
| Maximum | | 18 | 5.9 | 0.91 | 0.66 | 0.04 | 2.4 | 0.35 | 0.78 | 0.33 | 0.17 | 0.98 | 0.12 | 1.9 | 0.62 | 0.01 | 0.04 |
| Minimum | | 12 | 0.54 | 0.46 | 0.07 | * | * | * | 0.01 | * | * | 0.40 | * | 0.06 | * | * | 0.002 |
| Avr. ±2 Sample Deviations[a] | | 13±3 | 1.2±2.5 | 0.60±0.3 | 0.33±0.4 | <0.01 | <0.16 | <0.17 | <0.18±0.4 | <0.15 | <0.07 | 0.60±0.3 | <0.04 | 0.68±1 | <0.24 | <0.001 | 0.01±0.02 |

* 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 I-2 Concentrations of Radionuclides in Perimeter Vegetation Samples - 1974

### Units of $10^{-6}$ μCi/g of Vegetation (Dry weight)

| Sample Location | Map Location | Naturally Occuring Radionuclides | | Artificially Produced Radionuclides | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $^{40}K$ | U-total | $^{58}Co$ | $^{60}Co$ | $^{65}Zn$ | $^{90}Sr$ | $^{95}ZrNb$ | $^{106}RuRh$ | $^{131}I$ | $^{137}Cs$ | $^{140}BaLa$ | $^{144}CePr$ | $^{238}Pu$ | $^{239-240}Pu$ |
| Analytical Limit | | 1.0 | 0.034 | 0.06 | 0.07 | 0.13 | 0.002 | 0.05 | 1.0 | 1.1 | 0.06 | 2.1 | 0.62 | 0.003 | 0.001 |
| Benton City | 1 | 10 | 0.19 | * | * | 0.63 | 0.06 | 0.78 | * | * | 0.10 | 7.9 | * | * | 0.002 |
| Prosser Barricade | 2 | 9 | * | * | * | 0.80 | 0.04 | 0.28 | * | * | 0.18 | 14 | * | * | * |
| ERC | 3 | 13 | 0.12 | * | * | 0.98 | 0.02 | 0.14 | * | * | 0.13 | 14 | * | 0.003 | 0.001 |
| Radioecology Field Lab. | 4 | 9.0 | * | * | * | 0.52 | 0.05 | 0.28 | * | * | 0.16 | 11 | 0.58 | * | 0.003 |
| Yakima Barricade | 5 | 8.5 | * | 0.67 | * | 0.36 | 0.05 | 1.1 | * | * | 0.09 | 7.7 | * | * | 0.002 |
| Vernita Bridge | 6 | 11 | * | * | * | 0.77 | 0.06 | 1.3 | * | * | 0.24 | 14 | 1.2 | * | 0.001 |
| Wahluke Slope | 7 | 9.6 | 0.05 | * | * | 0.76 | 0.03 | 0.37 | * | * | 0.12 | 15 | 0.98 | * | * |
| Wahluke #2 | 8 | 11 | 0.08 | * | * | 0.80 | 0.13 | 0.30 | * | * | 0.15 | 17 | * | * | 0.001 |
| Berg Ranch | 9 | 11 | 0.16 | * | * | 0.84 | 0.06 | 0.22 | * | * | 0.12 | 15 | * | * | 0.003 |
| Cooke Bros. | 10 | 20 | 0.23 | * | * | 1.8 | 0.04 | 0.13 | * | * | 0.12 | 29 | 2.3 | * | * |
| Baxter Substation | 11 | 18 | 0.34 | * | * | 1.3 | 0.14 | 0.14 | * | * | 0.10 | 20 | * | * | 0.002 |
| Byers Landing | 12 | 10 | 7.2 | * | * | 0.79 | 0.02 | 0.30 | * | * | 0.19 | 11 | 0.52 | * | 0.002 |
| Byers Pumphouse | 13 | 11 | * | * | * | 1.0 | 0.02 | 4.0 | * | * | 0.46 | 15 | * | * | 0.001 |
| 300 Area South Gate | 14 | 11 | 0.21 | * | * | 0.63 | 0.17 | 0.52 | * | * | 0.46 | 10 | 2.2 | * | 0.005 |
| North Richland | 15 | 8.4 | 0.09 | * | * | 0.43 | 0.07 | 0.26 | * | * | 0.13 | 8.8 | 0.51 | * | 0.004 |
| Island #340 | 16 | 4.7 | 0.32 | * | * | * | 0.12 | 0.31 | 1.3 | * | 0.15 | 3.6 | 1.0 | 0.002 | 0.02 |
| Riverview | 17 | 10 | 0.22 | * | * | 0.45 | 0.06 | 0.32 | * | * | 0.14 | 9.7 | 0.41 | * | 0.002 |
| Maximum | | 20 | 7.2 | 0.67 | * | 1.8 | 0.17 | 4.0 | 1.3 | * | 0.46 | 29 | 2.3 | 0.003 | 0.02 |
| Minimum | | 4.7 | * | * | * | * | 0.02 | 0.14 | * | * | 0.09 | 3.6 | * | * | * |
| Avr. ±2 Sample Deviations[a] | | 11±7 | <0.55 | * | * | <0.76 | 0.07±0.09 | 0.63±1.9 | * | * | 0.18±0.2 | 13±11 | <0.43 | <0.0005 | <0.003 |

* 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.

# APPENDIX J

## EXTERNAL RADIATION EXPOSURE MEASUREMENTS

# APPENDIX J

## EXTERNAL RADIATION EXPOSURE MEASUREMENTS

External radiation levels in the Hanford environs were measured during 1974 with thermoluminescent dosimeters (TLDs) deployed at 13 perimeter and 6 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 $CaF_2$: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 Appendix J:


Table J-1. TLD Measurements at 3 Feet Above the Ground - 1974 (Page J-2)

Table J-2. TLD Measurements at 3 Feet Above Ground - 1974 (Page J-3)

Table J-3. TLD Measurements at 3 Feet Above Ground - 1974 (Page J-5)

Table J-4. TLD Measurements in the Columbia River - 1974 (Page J-9)

Table J-5. External Exposure Rate Measurement at 3 Feet Above the Columbia River Shoreline at Vernita, Richland, and Sacajawea Park - 1974 (Page J-11)

TABLE J-1 TLD Measurements at 3 Feet Above the Ground - 1974

(Units of mR/day)

| Week[a] on Date | Distant Communities | | | | | |
|---|---|---|---|---|---|---|
| | Sunnyside | Ellensburg | Moses Lake | Washtucna | Walla Walla | McNary Dam |
| 1/4 | 0.17 | 0.15 | 0.18 | 0.17 | 0.18 | 0.19 |
| 1/18 | 0.17 | 0.15 | 0.18 | 0.16 | 0.17 | 0.17 |
| 2/15 | 0.19 | 0.16 | 0.19 | 0.20 | 0.20 | 0.21 |
| 3/15 | 0.19 | 0.18 | 0.18 | 0.18 | 0.20 | 0.19 |
| 4/12 | 0.19 | (b) | 0.19 | 0.19 | 0.22 | 0.21 |
| 5/10 | 0.18 | 0.15 | 0.19 | 0.19 | 0.21 | 0.21 |
| 6/7 | 0.17 | 0.13 | 0.19 | 0.19 | 0.21 | 0.21 |
| 7/5 | 0.15 | 0.12 | 0.16 | 0.17 | (b) | 0.18 |
| 8/2 | 0.16 | 0.12 | 0.17 | 0.18 | 0.21 | 0.18 |
| 8/30 | 0.17 | 0.14 | 0.18 | 0.18 | 0.21 | 0.20 |
| 9/27 | 0.19 | 0.14 | 0.18 | 0.20 | 0.21 | 0.21 |
| 10/25 | 0.19 | (c) | 0.19 | 0.21 | 0.21 | 0.22 |
| 11/22 | 0.18 | | 0.18 | 0.19 | 0.20 | 0.20 |
| 12/20 | 0.18 | | 0.20 | 0.23 | 0.19 | 0.20 |
| Annual Average | 0.18 | 0.15 | 0.18 | 0.19 | 0.20 | 0.20 |

(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 "on date" to the next.
(b) TLD was vandalized.
(c) Discontinued.

TABLE J-2 TLD Measurements at 3 Feet Above Ground - 1974

(Units of mR/day)

Perimeter Locations

| Week[a] on Date | Yakima Barricade | Vernita | Wahluke #2 | Benton City | Baxter Substation |
|---|---|---|---|---|---|
| 1/4 | | 0.19 | 0.19 | | 0.20 |
| 1/11 | 0.19 | | | 0.15 | |
| 1/18 | | | | | 0.15 |
| 1/25 | | | | | |
| 2/1 | | 0.20 | 0.21 | | |
| 2/8 | 0.23 | | | 0.18 | |
| 2/15 | | | | | 0.20 |
| 2/22 | | | | | |
| 3/1 | | 0.23 | 0.22 | | |
| 3/8 | 0.22 | | | 0.18 | |
| 3/15 | | | | | 0.20 |
| 3/22 | | | | | |
| 3/29 | | (b) | 0.23 | | |
| 4/5 | 0.22 | | | 0.18 | |
| 4/12 | | | | | 0.19 |
| 4/19 | | | | | |
| 4/26 | | 0.23 | 0.23 | | |
| 5/3 | 0.22 | | | 0.17 | |
| 5/10 | | | | | 0.20 |
| 5/17 | | | | | |
| 5/24 | | 0.21 | 0.20 | | |
| 5/31 | 0.20 | | | 0.15 | |
| 6/7 | | | | | 0.19 |
| 6/14 | | | | | |
| 6/21 | | 0.21 | 0.22 | | |
| 6/28 | 0.20 | | | (b) | |
| 7/5 | | | | | 0.12 |
| 7-12 | | | | | |
| 7-19 | | 0.20 | 0.18 | | |
| 7-26 | 0.20 | | | 0.15 | |

(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 J-2 (Cont'd) TLD Measurements at 3 Feet Above Ground - 1974

(Units of mR/day)

| Week[a] on Date | Perimeter Locations | | | | |
|---|---|---|---|---|---|
| | Yakima Barricade | Vernita | Wahluke #2 | Benton City | Baxter Substation |
| 8/2 | | | | | 0.17 |
| 8/9 | | | | | |
| 8/16 | | 0.21 | 0.20 | | |
| 8/23 | 0.20 | | | 0.16 | |
| 8/30 | | | | | 0.18 |
| 9/6 | | | | | |
| 9/13 | | 0.23 | 0.23 | | |
| 9/20 | 0.23 | | | 0.17 | |
| 9/27 | | | | | 0.18 |
| 10/4 | | | | | |
| 10/11 | | 0.32 | 0.22 | | |
| 10/18 | 0.24 | | | 0.18 | |
| 10/25 | | | | | |
| 11/1 | | | | | |
| 11/8 | | | 0.23 | | 0.21 |
| 11/15 | 0.23 | 0.24 | | 0.17 | |
| 11/22 | | | | | |
| 11/29 | | 0.24 | | | |
| 12/6 | | | 0.22 | | 0.20 |
| 12/13 | 0.21 | 0.22 | | 0.17 | |
| 12/20 | | | | | |
| 12/27 | | 0.25 | | | |
| Annual Average | 0.22 | 0.23 | 0.21 | 0.17 | 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.

TABLE J-3 TLD Measurements at 3 Feet Above the Ground - 1974

(Units of mR/day)

Eastern Quadrant

| Week[a] on Date | Ringold | Byers Landing | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Eltopia | Pasco | Richland |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | (b) | | 0.16 | 0.17 | 0.19 | 0.19 | 0.20 | 0.16 | | |
| 1/11 | | 0.20 | | | | | | | 0.19 | 0.19 |
| 1/18 | | | 0.16 | 0.17 | | | 0.15 | | | |
| 1/25 | | | | | | | | | | 0.18 |
| 2/1 | 0.18 | | | | 0.20 | 0.21 | | 0.16 | | |
| 2/8 | | 0.19 | | | | | | | 0.18 | 0.15 |
| 2/15 | | | 0.18 | 0.19 | | | 0.19 | | | |
| 2/22 | | | | | | | | | | 0.17 |
| 3/1 | 0.11 | | | | 0.23 | 0.22 | | 0.18 | | |
| 3/8 | | 0.23 | | | | | | | 0.20 | 0.18 |
| 3/15 | | | 0.17 | 0.18 | | | 0.20 | | | |
| 3/22 | | | | | | | | | | 0.19 |
| 3/29 | 0.18 | | | | 0.24 | 0.21 | | 0.19 | | |
| 4/5 | | 0.23 | | | | | | | 0.21 | 0.19 |
| 4/12 | | | 0.17 | 0.19 | | | 0.19 | | | |
| 4/19 | | | | | | | | | | 0.18 |
| 4/26 | 0.19 | | | | 0.24 | 0.22 | | 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 J-3 (Cont'd) TLD Measurements at 3 Feet Above the Ground - 1974

(Units of mR/day)

Eastern Quadrant

| Week[a] on Date | Ringold | Byers Landing | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Eltopia | Pasco | Richland |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/3 | | 0.22 | | | | | | | 0.20 | 0.18 |
| 5/10 | | | 0.17 | 0.19 | | | 0.21 | | | |
| 5/17 | | | | | | | | | | 0.19 |
| 5/24 | 0.17 | | | | 0.21 | 0.19 | | 0.17 | | |
| 5/31 | | 0.21 | | | | | | | 0.19 | 0.18 |
| 6/7 | | | 0.17 | 0.20 | | | 0.19 | | | |
| 6/14 | | | | | | | | | | 0.16 |
| 6/21 | 0.18 | | | | 0.23 | 0.22 | | 0.18 | | |
| 6/28 | | 0.20 | | | | | | | 0.18 | 0.17 |
| 7/5 | | | 0.15 | 0.15 | | | 0.17 | | | |
| 7/12 | | | | | | | | | | 0.16 |
| 7/19 | 0.15 | | | | 0.19 | 0.18 | | 0.15 | | |
| 7/26 | | 0.19 | | | | | | | 0.18 | 0.16 |
| 8/2 | | | 0.16 | 0.16 | | | 0.16 | | | |
| 8/9 | | | | | | | | | | 0.15 |
| 8/16 | 0.18 | | | | 0.21 | 0.19 | | 0.16 | | |
| 8/23 | | 0.21 | | | | | | | 0.19 | 0.17 |
| 8/30 | | | 0.17 | 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 J-3 (Cont'd) TLD Measurements at 3 Feet Above the Ground - 1974

(Units of mR/day)

Eastern Quadrant

| Week[a] on Date | Ringold | Byers Landing | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Eltopia | Pasco | Richland |
|---|---|---|---|---|---|---|---|---|---|---|
| 9/6 | | | | | | | | | | 0.18 |
| 9/13 | 0.19 | | | | 0.23 | 0.22 | | 0.17 | | |
| 9/20 | | 0.22 | | | | | | | 0.20 | 0.19 |
| 9/27 | | | 0.17 | 0.19 | | | 0.20 | | | |
| 10/4 | | | | | | | | | | 0.21 |
| 10/11 | 0.18 | | | | 0.22 | 0.20 | | (c) | | |
| 10/18 | | 0.23 | | | | | | | 0.22 | 0.21 |
| 10/25 | | | 0.19 | 0.20 | | | 0.21 | | | |
| 11/1 | | | | | | | | | | 0.22 |
| 11/8 | (c) | | | | 0.26 | 0.23 | | | | |
| 11/15 | | 0.21 | | | | | | | 0.18 | 0.20 |
| 11/22 | | | 0.18 | 0.19 | | | 0.19 | | | |
| 11/29 | | | | | | | | | | 0.17 |
| 12/6 | | | | | 0.22 | 0.23 | | | | |

(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.
(c) Discontinued.

TABLE J-3 (Cont'd) TLD Measurements at 3 Feet Above the Ground - 1974

(Units of mR/day)

Eastern Quadrant

| Week[a] on Date | Ringold | Byers Landing | Othello | Connell | Berg Ranch | Wahluke Watermaster | Cooke Bros. | Eltopia | Pasco | Richland |
|---|---|---|---|---|---|---|---|---|---|---|
| 12/13 | | 0.24 | | | | | | | 0.21 | 0.19 |
| 12/20 | | | 0.20 | 0.20 | | | | | | |
| 12/27 | | | | | | | 0.20 | | | 0.21 |
| Annual Average | 0.17 | 0.21 | 0.17 | 0.18 | 0.22 | 0.21 | 0.19 | 0.17 | 0.19 | 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.

TABLE J-4 TLD Measurements in the Columbia River - 1974

(Units of mR/day)

| Measurement Period | | Exposure Rate | Measurement Period | | Exposure Rate |
|---|---|---|---|---|---|
| | | | **Coyote Rapids** | | |
| 12/7 | 1/21 | 0.15 | 8/8 | 9/12 | 0.14 |
| 1/21 | 2/8 | 0.11 | 9/12 | 10/10 | 0.14 |
| 2/8 | 3/15 | 0.09 | 10/10 | 11/14 | 0.13 |
| 3/15 | 4/15 | 0.11 | 11/14 | 12/5 | 0.17 |
| 4/15 | 5/10 | 0.11 | 12/5 | 1/9 | 0.13 |
| 5/10 | 6/7 | 0.09 | | | |
| 6/7 | 7/12 | | | | |
| 7/12 | 8/8 | | Annual Average | | 0.12 |
| | | | **Below 100-N** | | |
| 12/7 | 1/21 | 0.20 | 8/8 | 9/12 | 0.16 |
| 1/21 | 2/8 | 0.14 | 9/12 | 10/10 | 0.11 |
| 2/8 | 3/15 | 0.13 | 10/10 | 11/14 | 0.13 |
| 3/15 | 4/15 | 0.13 | 11/14 | 12/5 | 0.15 |
| 4/15 | 5/10 | 0.14 | 12/5 | 1/9 | 0.13 |
| 5/10 | 6/7 | 0.11 | | | |
| 6/7 | 7/12 | 0.09 | | | |
| 7/12 | 8/8 | 0.09 | Annual Average | | 0.13 |
| | | | **Hanford Powerline** | | |
| 12/7 | 1/21 | 0.19 | 8/8 | 9/12 | 0.14 |
| 1/21 | 2/8 | 0.23 | 9/12 | 10/10 | |
| 2/8 | 3/15 | 0.20 | 10/10 | 11/14 | 0.17 |
| 3/15 | 4/15 | 0.18 | 11/14 | 12/5 | 0.12 |
| 4/15 | 5/10 | 0.18 | 12/5 | 1/9 | 0.08 |
| 5/10 | 6/7 | | | | |
| 6/7 | 7/12 | | | | |
| 7/12 | 8/8 | 0.10 | Annual Average | | 0.16 |

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

TABLE J-4 (Cont'd) TLD Measurements in the Columbia River - 1974

(Units of mR/day)

| Measurement Period | | Exposure Rate | Measurement Period | | Exposure Rate |
|---|---|---|---|---|---|
| | | Richland Pump House | | | |
| 12/21 | 1/21 | 0.09 | 8/5 | 9/3 | 0.09 |
| 1/21 | 2/19 | 0.10 | 9/3 | 9/30 | 0.10 |
| 2/19 | 3/18 | 0.11 | 9/30 | 10/28 | 0.10 |
| 3/18 | 4/15 | 0.11 | 10/28 | 11/25 | 0.11 |
| 4/15 | 5/13 | 0.10 | 11/25 | 12/23 | 0.10 |
| 5/13 | 6/10 | 0.12 | | | |
| 6/10 | 7/8 | 0.11 | | | |
| 7/8 | 8/5 | 0.09 | Annual Average | | 0.10 |

TABLE J-5 External Exposure Rate Measurement* at 3 Feet Above the Columbia River Shoreline at Vernita, Richland, and Sacajawea Park - 1974

(Units of mR/day)

| Date | Exposure Rate | Date | Exposure Rate |
|---|---|---|---|
| Vernita | | Richland Pump House | |
| 1/8 | 0.22 | 1/21 | 0.29 |
| 4/2 | 0.31 | 2/8 | 0.24 |
| 4/30 | 0.31 | 3/15 | 0.24 |
| 6/11 | 0.31 | 4/15 | 0.31 |
| 7/9 | 0.72[a] | 5/10 | 0.29 |
| 7/16 | 0.24 | 6/7 | 0.22 |
| 8/6 | 0.29 | 7/12 | 0.34 |
| 10/8 | 0.12 | 8/8 | 0.29 |
| 11/12 | 0.19 | 9/12 | 0.26 |
| 12/10 | 0.19 | 10/10 | 0.29 |
| | | 11/14 | 0.24 |
| | | 12/5 | 0.26 |
| Annual Average | 0.26 | Annual Average | 0.26 |
| Sacajawea | | | |
| 1/11 | 0.36 | 7/26 | 0.26 |
| 1/25 | 0.29 | 8/9 | 0.24 |
| 2/8 | 0.29 | 8/23 | 0.31 |
| 2/22 | 0.29 | 9/6 | 0.29 |
| 3/8 | 0.19 | 10/4 | 0.26 |
| 3/22 | 0.24 | 10/18 | 0.26 |
| 4/5 | 0.22 | 11/1 | 0.29 |
| 4/19 | 0.24 | 11/15 | 0.24 |
| 5/3 | 0.29 | 12/2 | 0.29 |
| 5/17 | 0.60[a] | 12/13 | 0.22 |
| 5/31 | 0.26 | 12/27 | 0.31 |
| 6/14 | 0.29 | | |
| 6/28 | 0.26 | | |
| 7/12 | 0.29 | Annual Average | 0.29 |

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

(a)Instrument calibration in error.

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