

50-331

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## ENCLOSURE

Revision # 3 to Semi-Annual Operating Rpt. for  
7-1-75 through 12-31-76....

(1 Signed Cy. Received)

(1 P &amp; 12 P Enc1.=13 Pages)

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PLANT NAME: Duane Arnold.

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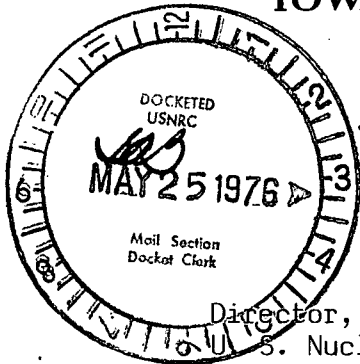
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5209

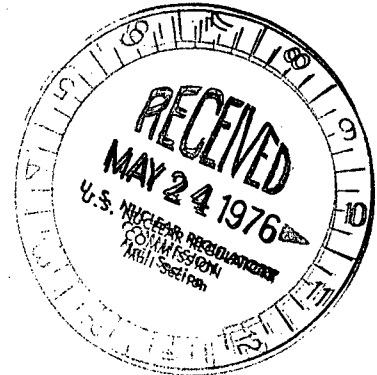
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# IOWA ELECTRIC LIGHT AND POWER COMPANY



DUANE ARNOLD ENERGY CENTER  
P. O. Box 351  
Cedar Rapids, Iowa 52406  
May 18, 1976  
DAEC- 76-152



Director, Office of Nuclear Reactor Regulation  
U. S. Nuclear Regulatory Commission  
1717 H Street N.W.  
Washington, D.C. 20545

Subject: Revision 3 to Semiannual Operating Report  
for the Duane Arnold Energy Center

File: A-118e

**50-331**

Dear Sir:

Please find enclosed three (3) copies of Revision 3 to the Duane Arnold Energy Center Semiannual Report for the period July 1, 1975 through December 31, 1975.

Revision 3 consists of changes to the following pages: H.1-1, H.1-3, H.1-4 and H.1-5.

The changes result from calculation errors made by the consultant who prepared portions of the report.

Very truly yours,

G. G. Hunt, Chief Engineer

GGH/DLW/mg  
Enclosures

cc: w/o enclosures  
D. Arnold  
J. Wallace  
E. Hammond  
D. Wilson

5209

H.1

Radiation Effluent Report  
July 1, 1975 to December 31, 1975

## 1. Gaseous Effluents

|  | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|--|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1 Gross Radioactivity Releases   | curies       | 1.04E+02    | 1.34E+02      | 1.24E+02         | 1.17E+02       | 1.18E+02        | 1.01E+02        | 6.98E+02     |
| a.2 Percent of Technical Specification Limit for Gases (1)                     | %            | ---         | ---           | 3.80E+00         | ---            | ---             | 4.00E+00        |              |
| a.3 Maximum gross radioactivity release during any one hour period.            | μCi/sec      | 1.51E+02    | 1.15E+02      | 1.12E+02         | 2.33E+01       | 8.93E+01        | 1.43E+02        |              |
| a.4 Gases Released by Nuclide  | curies       |             |               |                  |                |                 |                 |              |
| Xe-138   |              | 3.23E+01    | ---           | 4.16E+01         | 9.99E+01       | ---             | ---             | 1.74E+02     |
| Kr-87  |              | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| Kr-88  |              | 2.67E+01    | 3.67E+00      | 2.70E-01         | 1.80E+01       | 1.82E+00        | 2.58E+00        | 3.52E+01     |
| Kr-85m   |              | 4.16E+00    | 1.05E+00      | 1.10E-01         | 2.70E-01       | 7.00E-01        | 1.07E+00        | 7.36E+00     |
| Xe-135   |              | 3.26E+00    | 1.23E+01      | 1.35E+01         | 1.80E-01       | 6.58E+00        | 1.04E+01        | 4.62E+01     |
| Xe-133   |              | 1.53E+01    | 7.70E+01      | 2.57E+01         | 9.84E+00       | 6.39E+00        | 7.06E+01        | 2.62E+02     |
| Ar-41  |              | 2.22E+01    | 4.00E+01      | 4.26E+01         | 6.52E+00       | 3.20E+01        | 2.40E+01        | 1.64E+02     |
| N-13   |              | ---         | ---           | 2.20E-01         | 1.30E-01       | 7.00E-01        | ---             | 1.05E+00     |
| b.1 Iodine Releases  | curies       |             |               |                  |                |                 |                 |              |
| Iodine-131   |              | 1.72E-03    | 3.88E-03      | 3.51E-03         | 9.46E-04       | 3.71E-04        | 6.36E-04        | 1.11E-02     |
| Iodine-133   |              | ---         | ---           | 3.78E-10         | ---            | ---             | ---             | 3.78E-10     |
| Iodine-135   |              | ---         | ---           | ---              | ---            | 2.06E-10        | ---             | 2.06E-10     |
| b.2 Percent of Technical Specification Limit for Halogens and Particulates (1) | %            | ---         | ---           | 1.60E-01         | ---            | ---             | 8.00E-02        | ---          |

- (1) Technical Specification release limits are defined as:  
(Ref: E.T.S., Section 2.3.1.C.3.a)

- a. Quarterly average release rate for Halogens and  
Particulated ( $T_{1/2} > 8$  days)

$$\frac{Q_s}{1.3 \times 10^{-6}} + \frac{Q_v}{1.8 \times 10^{-7}} = 0.08$$

- b. Quarterly average release rate for Gaseous activity  
(except Halogens and Particulates)

$$\frac{Q_{SE}}{0.21} + \frac{Q_v}{1.4 \times 10^5 (\text{MPC}_i)} = 0.16$$

- (2) Sr-89 and Sr-90 analysis performed quarterly in accordance  
with Environmental Technical Specifications, Table 3.3-2.
- (3) Tritium analysis performed quarterly in accordance with  
Environmental Technical Specifications, Table 3.3-2.

# Radiation Effluents Report

July 1, 1975 to December 31, 1975

| 2. Liquid Effluents |                                 | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---------------------|---------------------------------|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1                 | Gross Radioactivity             | curies       | 2.00E-3     | ---           | ---              | ---            | ---             | ---             | 2.00E-3      |
| a.2                 | Average Concentration           | μCi/ml       | 3.77E-8     | ---           | ---              | ---            | ---             | ---             | 3.77E-8      |
| a.3                 | Maximum Concentration           | μCi/ml       | 2.20E-7     | ---           | ---              | ---            | ---             | ---             | 2.20E-7      |
| b.1                 | Total Tritium Radioactivity     | curies       | 3.25E-1     | ---           | ---              | ---            | ---             | ---             | 3.25E-1      |
| b.2                 | Average Tritium Concentration   | μCi/ml       | 4.34E-6     | ---           | ---              | ---            | ---             | ---             | 4.34E-6      |
| c.1                 | Total Alpha Radioactivity       | curies       | 1.99E-7     | ---           | ---              | ---            | ---             | ---             | 1.99E-7      |
| c.2                 | Average Alpha Concentration     | μCi/ml       | 2.26E-12    | ---           | ---              | ---            | ---             | ---             | 2.26E-12     |
| d.1                 | Noble Gas Radioactivity         | curies       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| d.2                 | Average Noble Gas Concentration | μCi/ml       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| e.1                 | Liquid Effluents                | liters       | 3.80E+5     | ---           | ---              | ---            | ---             | ---             | 3.80E+5      |
| f.1                 | Dilution Effluents Volume       | liters       | 7.45E+7     | ---           | ---              | ---            | ---             | ---             | 7.45E+7      |

Liquid Effluents (Con't)

|   | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| g.1 Activity Released<br>(by Nuclide)                         | curies       |             |               |                  |                |                 |                 |              |
| Cr-51   |              | 2.95E-4     | ---           | ---              | ---            | ---             | ---             | 2.95E-4      |
| Co-58   |              | 5.30E-4     | ---           | ---              | ---            | ---             | ---             | 5.30E-4      |
| Mn-54   |              | 1.42E-4     | ---           | ---              | ---            | ---             | ---             | 1.42E-4      |
| Co-60   |              | 4.17E-4     | ---           | ---              | ---            | ---             | ---             | 4.17E-4      |
| Zr-95   |              | 2.98E-5     | ---           | ---              | ---            | ---             | ---             | 2.98E-5      |
| Zr-97   |              | 4.60E-6     | ---           | ---              | ---            | ---             | ---             | 4.60E-6      |
| Fe-59   |              | 8.00E-5     | ---           | ---              | ---            | ---             | ---             | 8.00E-5      |
| Cs-134  |              | 4.45E-5     | ---           | ---              | ---            | ---             | ---             | 4.45E-5      |
| Cs-137  |              | 6.71E-5     | ---           | ---              | ---            | ---             | ---             | 6.71E-5      |
| Unidentified (Beta)   |              | 1.61E-4     | ---           | ---              | ---            | ---             | ---             | 1.61E-4      |
| h.1 Percent of Environ-<br>mental Technical<br>Specifications | %            | 2.43E+00    | ---           | ---              | ---            | ---             | ---             | 2.43E+00     |

H.1

Radiation Effluent Report  
July 1, 1975 to December 31, 1975

## 1. Gaseous Effluents

|  | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|--|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1 Gross Radioactivity Releases   | curies       | 1.04E+02    | 1.34E+02      | 1.24E+02         | 1.17E+02       | 1.18E+02        | 1.01E+02        | 6.98E+02     |
| a.2 Percent of Technical Specification Limit for Gases(1)                      | %            | ---         | ---           | 3.80E+00         | ---            | ---             | 4.00E+00        |              |
| a.3 Maximum gross radioactivity release during any one hour period.            | μCi/sec      | 1.51E+02    | 1.15E+02      | 1.12E+02         | 2.33E+01       | 8.93E+01        | 1.43E+02        |              |
| a.4 Gases Released by Nuclide  | curies       |             |               |                  |                |                 |                 |              |
| Xe-138   |              | 3.23E+01    | ---           | 4.16E+01         | 9.99E+01       | ---             | ---             | 1.74E+02     |
| Kr-87  |              | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| Kr-88  |              | 2.67E+01    | 3.67E+00      | 2.70E-01         | 1.80E+01       | 1.82E+00        | 2.58E+00        | 3.52E+01     |
| Kr-85m   |              | 4.16E+00    | 1.05E+00      | 1.10E-01         | 2.70E-01       | 7.00E-01        | 1.07E+00        | 7.36E+00     |
| Xe-135   |              | 3.26E+00    | 1.23E+01      | 1.35E+01         | 1.80E-01       | 6.58E+00        | 1.04E+01        | 4.62E+01     |
| Xe-133   |              | 1.53E+01    | 7.70E+01      | 2.57E+01         | 9.84E+00       | 6.39E+00        | 7.06E+01        | 2.62E+02     |
| Ar-41  |              | 2.22E+01    | 4.00E+01      | 4.26E+01         | 6.52E+00       | 3.20E+01        | 2.40E+01        | 1.64E+02     |
| N-13   |              | ---         | ---           | 2.20E-01         | 1.30E-01       | 7.00E-01        | ---             | 1.05E+00     |
| b.1 Iodine Releases  | curies       |             |               |                  |                |                 |                 |              |
| Iodine-131   |              | 1.72E-03    | 3.88E-03      | 3.51E-03         | 9.46E-04       | 3.71E-04        | 6.36E-04        | 1.11E-02     |
| Iodine-133   |              | ---         | ---           | 3.78E-10         | ---            | ---             | ---             | 3.78E-10     |
| Iodine-135   |              | ---         | ---           | ---              | ---            | 2.06E-10        | ---             | 2.06E-10     |
| b.2 Percent of Technical Specification Limit for Halogens and Particulates (1) | %            | ---         | ---           | 1.60E-01         | ---            | ---             | 8.00E-02        | ---          |

- (1) Technical Specification release limits are defined as:  
(Ref: E.T.S., Section 2.3.1.C.3.a)

- a. Quarterly average release rate for Halogens and  
Particulated ( $T_{1/2} > 8$  days)

$$\frac{Q_s}{1.3 \times 10^{-6}} + \frac{Q_v}{1.8 \times 10^{-7}} = 0.08$$

- b. Quarterly average release rate for Gaseous activity  
(except Halogens and Particulates)

$$\frac{Q_{SE}}{0.21} + \frac{Q_v}{1.4 \times 10^5 (\text{MPC}_i)} = 0.16$$

- (2) Sr-89 and Sr-90 analysis performed quarterly in accordance  
with Environmental Technical Specifications, Table 3.3-2.
- (3) Tritium analysis performed quarterly in accordance with  
Environmental Technical Specifications, Table 3.3-2.



# Radiation Effluents Report

July 1, 1975 to December 31, 1975

| 2. Liquid Effluents |                                    | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---------------------|------------------------------------|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1                 | Gross Radioactivity                | curies       | 2.00E-3     | ---           | ---              | ---            | ---             | ---             | 2.00E-3      |
| a.2                 | Average Concentration              | µCi/ml       | 3.77E-8     | ---           | ---              | ---            | ---             | ---             | 3.77E-8      |
| a.3                 | Maximum Concentration              | µCi/ml       | 2.20E-7     | ---           | ---              | ---            | ---             | ---             | 2.20E-7      |
| b.1                 | Total Tritium<br>Radioactivity     | curies       | 3.25E-1     | ---           | ---              | ---            | ---             | ---             | 3.25E-1      |
| b.2                 | Average Tritium<br>Concentration   | µCi/ml       | 4.34E-6     | ---           | ---              | ---            | ---             | ---             | 4.34E-6      |
| c.1                 | Total Alpha<br>Radioactivity       | curies       | 1.99E-7     | ---           | ---              | ---            | ---             | ---             | 1.99E-7      |
| c.2                 | Average Alpha<br>Concentration     | µCi/ml       | 2.26E-12    | ---           | ---              | ---            | ---             | ---             | 2.26E-12     |
| d.1                 | Noble Gas<br>Radioactivity         | curies       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| d.2                 | Average Noble Gas<br>Concentration | µCi/ml       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| e.1                 | Liquid Effluents                   | liters       | 3.80E+5     | ---           | ---              | ---            | ---             | ---             | 3.80E+5      |
| f.1                 | Dilution Effluents<br>Volume       | liters       | 7.45E+7     | ---           | ---              | ---            | ---             | ---             | 7.45E+7      |

Liquid Effluents (Con't)

|   | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| g.1 Activity Released<br>(by Nuclide)                         | curies       |             |               |                  |                |                 |                 |              |
| Cr-51   |              | 2.95E-4     | ---           | ---              | ---            | ---             | ---             | 2.95E-4      |
| Co-58   |              | 5.30E-4     | ---           | ---              | ---            | ---             | ---             | 5.30E-4      |
| Mn-54   |              | 1.42E-4     | ---           | ---              | ---            | ---             | ---             | 1.42E-4      |
| Co-60   |              | 4.17E-4     | ---           | ---              | ---            | ---             | ---             | 4.17E-4      |
| Zr-95   |              | 2.98E-5     | ---           | ---              | ---            | ---             | ---             | 2.98E-5      |
| Zr-97   |              | 4.60E-6     | ---           | ---              | ---            | ---             | ---             | 4.60E-6      |
| Fe-59   |              | 8.00E-5     | ---           | ---              | ---            | ---             | ---             | 8.00E-5      |
| Cs-134  |              | 4.45E-5     | ---           | ---              | ---            | ---             | ---             | 4.45E-5      |
| Cs-137  |              | 6.71E-5     | ---           | ---              | ---            | ---             | ---             | 6.71E-5      |
| Unidentified (Beta)   |              | 1.61E-4     | ---           | ---              | ---            | ---             | ---             | 1.61E-4      |
| h.1 Percent of Environ-<br>mental Technical<br>Specifications | %            | 2.43E+00    | ---           | ---              | ---            | ---             | ---             | 2.43E+00     |

H.1

Radiation Effluent Report  
July 1, 1975 to December 31, 1975

## 1. Gaseous Effluents

|  | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|--|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1 Gross Radioactivity Releases   | curies       | 1.04E+02    | 1.34E+02      | 1.24E+02         | 1.17E+02       | 1.18E+02        | 1.01E+02        | 6.98E+02     |
| a.2 Percent of Technical Specification Limit for Gases(1)                      | %            | ---         | ---           | 3.80E+00         | ---            | ---             | 4.00E+00        |              |
| a.3 Maximum gross radioactivity release during any one hour period.            | μCi/sec      | 1.51E+02    | 1.15E+02      | 1.12E+02         | 2.33E+01       | 8.93E+01        | 1.43E+02        |              |
| a.4 Gases Released by Nuclide  | curies       |             |               |                  |                |                 |                 |              |
| Xe-138   |              | 3.23E+01    | ---           | 4.16E+01         | 9.99E+01       | ---             | ---             | 1.74E+02     |
| Kr-87  |              | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| Kr-88  |              | 2.67E+01    | 3.67E+00      | 2.70E-01         | 1.80E+01       | 1.82E+00        | 2.58E+00        | 3.52E+01     |
| Kr-85m   |              | 4.16E+00    | 1.05E+00      | 1.10E-01         | 2.70E-01       | 7.00E-01        | 1.07E+00        | 7.36E+00     |
| Xe-135   |              | 3.26E+00    | 1.23E+01      | 1.35E+01         | 1.80E-01       | 6.58E+00        | 1.04E+01        | 4.62E+01     |
| Xe-133   |              | 1.53E+01    | 7.70E+01      | 2.57E+01         | 9.84E+00       | 6.39E+00        | 7.06E+01        | 2.62E+02     |
| Ar-41  |              | 2.22E+01    | 4.00E+01      | 4.26E+01         | 6.52E+00       | 3.20E+01        | 2.40E+01        | 1.64E+02     |
| N-13   |              | ---         | ---           | 2.20E-01         | 1.30E-01       | 7.00E-01        | ---             | 1.05E+00     |
| b.1 Iodine Releases  | curies       |             |               |                  |                |                 |                 |              |
| Iodine-131   |              | 1.72E-03    | 3.88E-03      | 3.51E-03         | 9.46E-04       | 3.71E-04        | 6.36E-04        | 1.11E-02     |
| Iodine-133   |              | ---         | ---           | 3.78E-10         | ---            | ---             | ---             | 3.78E-10     |
| Iodine-135   |              | ---         | ---           | ---              | ---            | 2.06E-10        | ---             | 2.06E-10     |
| b.2 Percent of Technical Specification Limit for Halogens and Particulates (1) | %            | ---         | ---           | 1.60E-01         | ---            | ---             | 8.00E-02        | ---          |

- (1) Technical Specification release limits are defined as:  
(Ref: E.T.S., Section 2.3.1.C.3.a)

- a. Quarterly average release rate for Halogens and  
Particulated ( $T_{1/2} > 8$  days)

$$\frac{Q_s}{1.3 \times 10^{-6}} + \frac{Q_v}{1.8 \times 10^{-7}} = 0.08$$

- b. Quarterly average release rate for Gaseous activity  
(except Halogens and Particulates)

$$\frac{Q_{SE}}{0.21} + \frac{Q_v}{1.4 \times 10^5 (\text{MPC}_i)} = 0.16$$

- (2) Sr-89 and Sr-90 analysis performed quarterly in accordance  
with Environmental Technical Specifications, Table 3.3-2.
- (3) Tritium analysis performed quarterly in accordance with  
Environmental Technical Specifications, Table 3.3-2.

# Radiation Effluents Report

July 1, 1975 to December 31, 1975

| 2. Liquid Effluents |                                    | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---------------------|------------------------------------|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| a.1                 | Gross Radioactivity                | curies       | 2.00E-3     | ---           | ---              | ---            | ---             | ---             | 2.00E-3      |
| a.2                 | Average Concentration              | μCi/ml       | 3.77E-8     | ---           | ---              | ---            | ---             | ---             | 3.77E-8      |
| a.3                 | Maximum Concentration              | μCi/ml       | 2.20E-7     | ---           | ---              | ---            | ---             | ---             | 2.20E-7      |
| b.1                 | Total Tritium<br>Radioactivity     | curies       | 3.25E-1     | ---           | ---              | ---            | ---             | ---             | 3.25E-1      |
| b.2                 | Average Tritium<br>Concentration   | μCi/ml       | 4.34E-6     | ---           | ---              | ---            | ---             | ---             | 4.34E-6      |
| c.1                 | Total Alpha<br>Radioactivity       | curies       | 1.99E-7     | ---           | ---              | ---            | ---             | ---             | 1.99E-7      |
| c.2                 | Average Alpha<br>Concentration     | μCi/ml       | 2.26E-12    | ---           | ---              | ---            | ---             | ---             | 2.26E-12     |
| d.1                 | Noble Gas<br>Radioactivity         | curies       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| d.2                 | Average Noble Gas<br>Concentration | μCi/ml       | ---         | ---           | ---              | ---            | ---             | ---             | ---          |
| e.1                 | Liquid Effluents                   | liters       | 3.80E+5     | ---           | ---              | ---            | ---             | ---             | 3.80E+5      |
| f.1                 | Dilution Effluents<br>Volume       | liters       | 7.45E+7     | ---           | ---              | ---            | ---             | ---             | 7.45E+7      |

Liquid Effluents (Con't)

|   | <u>Units</u> | <u>July</u> | <u>August</u> | <u>September</u> | <u>October</u> | <u>November</u> | <u>December</u> | <u>Total</u> |
|---|--------------|-------------|---------------|------------------|----------------|-----------------|-----------------|--------------|
| g.1 Activity Released<br>(by Nuclide)                         | curies       |             |               |                  |                |                 |                 |              |
| Cr-51   |              | 2.95E-4     | ---           | ---              | ---            | ---             | ---             | 2.95E-4      |
| Co-58   |              | 5.30E-4     | ---           | ---              | ---            | ---             | ---             | 5.30E-4      |
| Mn-54   |              | 1.42E-4     | ---           | ---              | ---            | ---             | ---             | 1.42E-4      |
| Co-60   |              | 4.17E-4     | ---           | ---              | ---            | ---             | ---             | 4.17E-4      |
| Zr-95   |              | 2.98E-5     | ---           | ---              | ---            | ---             | ---             | 2.98E-5      |
| Zr-97   |              | 4.60E-6     | ---           | ---              | ---            | ---             | ---             | 4.60E-6      |
| Fe-59   |              | 8.00E-5     | ---           | ---              | ---            | ---             | ---             | 8.00E-5      |
| Cs-134  |              | 4.45E-5     | ---           | ---              | ---            | ---             | ---             | 4.45E-5      |
| Cs-137  |              | 6.71E-5     | ---           | ---              | ---            | ---             | ---             | 6.71E-5      |
| Unidentified (Beta)   |              | 1.61E-4     | ---           | ---              | ---            | ---             | ---             | 1.61E-4      |
| h.1 Percent of Environ-<br>mental Technical<br>Specifications | %            | 2.43E+00    | ---           | ---              | ---            | ---             | ---             | 2.43E+00     |