North Atlantic

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The Northeast Utilities System

April 30, 2002

Docket No. 50-443
NYN-02043

U.S. Nuclear Regulatory Commission
Attn.: Document Control Desk
Washington, DC 20555-0001

Seabrook Station
Annual Radioactive Effluent Release Report

North Atlantic Energy Service Corporation (North Atlantic) hereby submits the Annual Radioactive Effluent Release Report for 2001. This report is submitted pursuant to 10CFR 50.36(a)(2) and Technical Specification 6.8.1.4. A copy of the Offsite Dose Calculation Manual (ODCM) is also provided pursuant to Technical Specification 6.13.c. A summary of the changes to the ODCM is included in Enclosure 1, Appendix A.

The following information is provided in the enclosures:

| | |
|---|---|
| Enclosure 1 | Effluent release data as required by Regulatory Guide 1.21 |
| Enclosure 2 | Joint frequency distributions of wind speed, wind direction and atmospheric stability |
| Enclosure 3 | Radiation dose assessment |
| Enclosure 4 | Offsite Dose Calculation Manual (ODCM), Revision 22 |

Should you have any questions regarding this letter, please contact Peter J. Harvey, Manager – Chemistry Department, at (603) 773-7320.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

James M. Peschel
Manager – Regulatory Programs

IE25

cc:

H. J. Miller, NRC Region I Administrator
R.D. Starkey, NRC Project Manager, Project Directorate I-2
G.T. Dentel, NRC Senior Resident Inspector

**ENCLOSURE 1 TO NYN-02043**

# Effluent Release Data as Required by Regulatory Guide 1.21

# EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT

Supplemental Information 2001

Facility: Seabrook Station Unit 1 Licensee: North Atlantic Energy Service Corporation

1. Regulatory Limits

A. Gaseous Effluents

a. 5.0 mrad per quarter gamma air dose.
b. 10.0 mrad per quarter beta air dose.
c. 7.5 mrem per quarter to any organ.

B. Liquid Effluents

a. 1.5 mrem per quarter total body.
b. 5.0 mrem per quarter any organ.
c. 2.0E-04 μCi/ml dissolved or entrained gas.

2. Maximum Permissible Concentrations

Provide the MPC's used in determining allowable release rates or concentrations.

a. Fission and activation gases: 1 MPC
b. Iodines: 1 MPC
c. Particulates, half-lives >8 days: 1 MPC
d. Liquid Effluents: 1 MPC

3. Average Energy

Not applicable

4. Measurements and Approximations of Total Radioactivity

Provide the methods used to measure or approximate the total radioactivity in effluents and the methods used to determine radionuclide composition.

A. Fission and activation gases: Determined by gamma spectroscopy. Total error is based on stack flow error, analytical error, and calculated sampling error.

B. Iodines: Determined by collection on charcoal with subsequent gamma spectroscopy analysis. Total error is based on stack flow error, analytical error, and calculated sampling error.

C. Particulates: Determined by collection on fixed filter with subsequent gamma spectroscopy analysis. Strontium is determined by composite analysis of filters by liquid scintillation, gross alpha by proportional counter and iron 55 by liquid scintillation. Total error is based on stack flow error, analytical error, and calculated sampling error.

D. Liquid Effluents: Determined by gamma spectroscopy. A composite sample is analyzed for strontium by liquid scintillation, tritium by liquid scintillation, gross alpha by proportional counter and iron 55 by liquid scintillation. Total error is based on the volume discharge error and analytical error.

E. ND: None Detected or No Detectable Activity

5. Batch Releases

Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

A. Liquid

a. Number of batch releases: 125
b. Total time for batch releases: 26960 minutes
c. Maximum time period for batch release: 945 minutes
d. Average time period for batch release: 216 minutes
e. Minimum time period for batch release: 37 minutes
f. Average stream flow during periods of release of effluents into a flowing stream: 1.62E+06 liters per minute

B. Gaseous

a. Number of batch releases: 49
b. Total time for batch releases: 82794 minutes
c. Maximum time period for batch release: 12996 minutes
d. Average time period for batch release: 1338 minutes
e. Minimum time period for batch release: 2 minutes

6. Abnormal Releases

A. Liquid

a. Number of releases: 0
b. Total activity released: N/A

B. Gaseous

a. Number of releases: 0
b. Total activity released: N/A

## TABLE 1A

## EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2001

## GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

| | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Est. Total Error, % |
|---|---|---|---|---|---|---|
| A. Fission and activation gases | | | | | | |
| 1. Total releases | Ci | 8.17E-01 | 9.07E-01 | 1.82E+01 | 3.05E+01 | 1.70E+01 |
| 2. Average release rate for period | uCi/sec | 1.04E-01 | 1.15E-01 | 2.31E+00 | 3.87E+00 | |
| 3. Percent of applicable Technical Specification limit | % | 1.27E-02 | 7.78E-04 | 2.09E-02 | 1.82E-02 | |
| B. Iodines | | | | | | |
| 1. Total release | Ci | ND | ND | ND | 2.60E-06 | 1.50E+01 |
| 2. Average release rate for period | uCi/sec | N/A | N/A | N/A | 3.30E-07 | |
| 3. Percent of applicable Technical Specification limit | % | 4.89E-01 | 4.77E-01 | 4.08E-01 | 7.45E-01 | |
| C. Particulates | | | | | | |
| 1. Total release | Ci | 4.88E-06 | ND | ND | 7.75E-06 | 1.80E+01 |
| 2. Average release rate for period | uCi/sec | 6.19E-07 | N/A | N/A | 9.82E-07 | |
| 3. Percent of applicable Technical Specification limit | % | 3.04E-01 | 6.65E-01 | 3.09E-01 | 2.96E-01 | |
| 4. Total alpha radioactivity | Ci | ND | ND | ND | ND | |
| D. Tritium | | | | | | |
| 1. Total release | Ci | 2.26E+01 | 2.52E+01 | 2.31E+01 | 2.22E+01 | 1.60E+01 |
| 2. Average release rate for period | uCi/sec | 2.86E+00 | 3.19E+00 | 2.93E+00 | 2.81E+00 | |
| 3. Percent of applicable Technical Specification limit | % | 3.04E-01 | 6.65E-01 | 3.09E-01 | 2.96E-01 | |

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT (2001)

GASEOUS EFFLUENTS-ELEVATED RELEASES

BATCH

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| **1. Fission and activation gases** | | | | | |
| argon-41 | Ci | 6.08E-01 | 3.32E-02 | 7.48E-02 | 2.65E-01 |
| krypton-85 | Ci | ND | 2.31E-04 | 1.14E+00 | 5.71E+00 |
| krypton-85m | Ci | 4.69E-04 | ND | ND | ND |
| krypton-87 | Ci | 6.08E-04 | ND | ND | ND |
| krypton-88 | Ci | 1.02E-03 | ND | ND | ND |
| xenon-131m | Ci | ND | ND | 8.09E-03 | 1.23E-01 |
| xenon-133 | Ci | 1.75E-01 | 5.39E-02 | 2.48E+00 | 4.00E+00 |
| xenon-133m | Ci | 1.43E-04 | ND | 7.41E-03 | 1.86E-02 |
| xenon-135 | Ci | 3.08E-02 | 2.05E-03 | 1.12E-02 | 4.67E-02 |
| xenon-135m | Ci | 8.23E-04 | ND | ND | ND |
| xenon-138 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 8.17E-01 | 8.94E-02 | 3.72E+00 | 1.02E+01 |
| **2. Iodines** | | | | | |
| iodine-131 | Ci | ND | ND | ND | ND |
| iodine-133 | Ci | ND | ND | ND | ND |
| iodine-135 | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **3. Particulates** | | | | | |
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | ND |
| cesium-137 | Ci | ND | ND | ND | ND |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT (2001)

GASEOUS EFFLUENTS-ELEVATED RELEASES

CONTINUOUS

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| 1. Fission and activation gases | | | | | |
| argon-41 | Ci | ND | ND | ND | ND |
| krypton-85 | Ci | ND | ND | ND | ND |
| krypton-85m | Ci | ND | ND | ND | ND |
| krypton-87 | Ci | ND | ND | ND | ND |
| krypton-88 | Ci | ND | ND | ND | ND |
| xenon-131m | Ci | ND | ND | ND | ND |
| xenon-133 | Ci | ND | 4.07E-04 | 1.44E+01 | 2.19E+00 |
| xenon-133m | Ci | ND | ND | ND | ND |
| xenon-135 | Ci | ND | 1.37E-04 | 4.68E-04 | 1.32E-03 |
| xenon-135m | Ci | ND | ND | ND | ND |
| xenon-138 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 5.44E-04 | 1.44E+01 | 2.19E+00 |
| 2. Iodines | | | | | |
| iodine-131 | Ci | ND | ND | ND | ND |
| iodine-133 | Ci | ND | ND | ND | ND |
| iodine-135 | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 3. Particulates | | | | | |
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | ND |
| cesium-137 | Ci | ND | ND | ND | ND |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| cobalt-58 | Ci | ND | ND | ND | ND |
| cobalt-60 | Ci | ND | ND | ND | ND |
| chromium-51 | Ci | ND | ND | ND | ND |
| manganese-54 | Ci | ND | ND | ND | ND |
| niobium-95 | Ci | ND | ND | ND | ND |
| iron-59 | Ci | ND | ND | ND | ND |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT (2001)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

BATCH

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| 1. Fission and activation gases | | | | | |
| argon-41 | Ci | ND | ND | ND | 4.20E-05 |
| krypton-85 | Ci | ND | ND | ND | ND |
| krypton-85m | Ci | ND | ND | ND | ND |
| krypton-87 | Ci | ND | ND | ND | ND |
| krypton-88 | Ci | ND | ND | ND | ND |
| xenon-131m | Ci | ND | ND | ND | ND |
| xenon-133m | Ci | ND | ND | ND | ND |
| xenon-133 | Ci | ND | ND | ND | 3.48E-05 |
| xenon-135 | Ci | ND | ND | ND | 1.58E-05 |
| xenon-135m | Ci | ND | ND | ND | ND |
| xenon-138 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.26E-05 |
| 2. Iodines | | | | | |
| iodine-131 | Ci | ND | ND | ND | 1.65E-06 |
| iodine-132 | Ci | ND | ND | ND | 9.50E-07 |
| iodine-133 | Ci | ND | ND | ND | ND |
| iodine-135 | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.60E-06 |
| 3. Particulates | | | | | |
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | 3.39E-06 |
| cesium-136 | Ci | ND | ND | ND | ND |
| cesium-137 | Ci | ND | ND | ND | 4.36E-06 |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| cobalt-57 | Ci | ND | ND | ND | ND |
| cobalt-58 | Ci | ND | ND | ND | ND |
| cobalt-60 | Ci | 4.88E-06 | ND | ND | ND |
| manganese-54 | Ci | ND | ND | ND | ND |
| iron-59 | Ci | ND | ND | ND | ND |
| niobium/zirconium-95 | Ci | ND | ND | ND | ND |
| chromium-51 | Ci | ND | ND | ND | ND |
| technetium-99m | Ci | ND | ND | ND | ND |
| bromine-82 | Ci | ND | ND | ND | ND |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 4.88E-06 | 0.00E+00 | 0.00E+00 | 7.75E-06 |

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT (2001)

GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

CONTINUOUS

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| 1. Fission and activation gases | | | | | |
| argon-41 | Ci | ND | ND | ND | ND |
| krypton-85 | Ci | ND | ND | ND | ND |
| krypton-85m | Ci | ND | ND | ND | ND |
| krypton-87 | Ci | ND | ND | ND | ND |
| krypton-88 | Ci | ND | ND | ND | ND |
| xenon-133 | Ci | ND | ND | ND | ND |
| xenon-135 | Ci | ND | ND | ND | ND |
| xenon-135m | Ci | ND | ND | ND | ND |
| xenon-138 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 2. Iodines | | | | | |
| iodine-131 | Ci | ND | ND | ND | ND |
| iodine-133 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| 3. Particulates | | | | | |
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | ND |
| cesium-136 | Ci | ND | ND | ND | ND |
| cesium-137 | Ci | ND | ND | ND | ND |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| cobalt-58 | Ci | ND | ND | ND | ND |
| cobalt-60 | Ci | ND | ND | ND | ND |
| | Ci | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period | Ci | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2001

LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

| | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Est. Total Error, % |
|---|---|---|---|---|---|---|
| A. Fission and activation products | | | | | | |
| 1. Total releases | Ci | 4.60E-02 | 1.11E-02 | 1.51E-02 | 6.50E-02 | 6.00E+00 |
| 2. Average diluted concentration during period | uCi/ml | 2.91E-10 | 3.15E-11 | 3.38E-11 | 2.80E-10 | |
| 3. Percent of applicable limit | % | 3.33E-02 | 7.53E-03 | 1.15E-02 | 2.95E-02 | |
| B. Tritium | | | | | | |
| 1. Total release | Ci | 1.50E+02 | 4.74E+01 | 4.34E+01 | 1.31E+02 | 8.00E+00 |
| 2. Average diluted concentration during period | uCi/ml | 9.49E-07 | 1.35E-07 | 9.71E-08 | 5.65E-07 | |
| 3. Percent of applicable limit | % | 1.14E-03 | 3.15E-04 | 4.34E-04 | 7.45E-04 | |
| C. Dissolved and entrained gases | | | | | | |
| 1. Total release | Ci | ND | ND | ND | ND | 1.90E+01 |
| 2. Average diluted concentration during period | uCi/ml | N/A | N/A | N/A | N/A | |
| 3. Percent of applicable limit | % | N/A | N/A | N/A | N/A | |
| D. Gross alpha radioactivity | | | | | | |
| 1. Total release | Ci | ND | ND | ND | ND | 1.00E+01 |
| E. Volume of waste released (prior to dilution) | liters | 4.37E+07 | 1.66E+07 | 1.41E+07 | 2.02E+07 | 1.30E+00 |
| F. Volume of dilution water used during period | liters | 1.58E+11 | 3.52E+11 | 4.47E+11 | 2.32E+11 | 9.00E+00 |

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2001

LIQUID EFFLUENTS

BATCH MODE

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | 3.44E-05 |
| cesium-137 | Ci | 3.56E-06 | ND | 4.29E-06 | 4.02E-05 |
| iodine-131 | Ci | ND | ND | ND | ND |
| iodine-133 | Ci | ND | ND | ND | ND |
| cobalt-57 | Ci | ND | ND | ND | ND |
| cobalt-58 | Ci | 1.23E-03 | 8.88E-04 | 8.28E-04 | 4.40E-04 |
| cobalt-60 | Ci | 3.67E-04 | 2.93E-04 | 1.36E-03 | 6.25E-04 |
| chromium-51 | Ci | 7.54E-05 | ND | ND | 8.11E-05 |
| iron-55 | Ci | 2.50E-03 | 1.18E-03 | 2.39E-03 | 3.00E-03 |
| iron-59 | Ci | 9.49E-06 | ND | ND | ND |
| zinc-65 | Ci | ND | ND | ND | ND |
| manganese-54 | Ci | 5.38E-06 | 5.25E-06 | 6.62E-05 | 1.24E-05 |
| zirconium-niobium-95 | Ci | 5.07E-06 | ND | ND | 2.25E-06 |
| molybdenum-99 | Ci | ND | ND | ND | ND |
| technetium-99m | Ci | ND | ND | ND | ND |
| silver-110m | Ci | ND | ND | 1.17E-04 | ND |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| cerium-141 | Ci | ND | ND | ND | ND |
| antimony-124 | Ci | 4.78E-04 | 6.30E-05 | ND | 2.48E-05 |
| antimony-125 | Ci | 3.88E-02 | 7.23E-03 | 1.03E-02 | 6.06E-02 |
| niobium-97 | Ci | ND | ND | ND | ND |
| tin-117m | Ci | ND | ND | ND | ND |
| sodium-24 | Ci | ND | ND | ND | ND |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period(above) | Ci | 4.35E-02 | 9.66E-03 | 1.51E-02 | 6.49E-02 |
| xenon-133 | Ci | ND | ND | ND | ND |
| xenon-135 | Ci | ND | ND | ND | ND |

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2001

LIQUID EFFLUENTS

CONTINUOUS MODE

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|---|
| strontium-89 | Ci | ND | ND | ND | ND |
| strontium-90 | Ci | ND | ND | ND | ND |
| cesium-134 | Ci | ND | ND | ND | 3.44E-05 |
| cesium-137 | Ci | ND | ND | ND | 4.45E-05 |
| iodine-131 | Ci | ND | ND | ND | 1.67E-05 |
| iodine-133 | Ci | ND | ND | ND | 9.63E-06 |
| cobalt-58 | Ci | ND | ND | ND | ND |
| cobalt-60 | Ci | 1.03E-04 | ND | ND | ND |
| iron-55 | Ci | 2.49E-03 | 1.45E-03 | ND | ND |
| iron-59 | Ci | ND | ND | ND | ND |
| zinc-65 | Ci | ND | ND | ND | ND |
| manganese-54 | Ci | ND | ND | ND | ND |
| chromium-51 | Ci | ND | ND | ND | ND |
| zirconium-niobium-95 | Ci | ND | ND | ND | ND |
| molybdenum-99 | Ci | ND | ND | ND | ND |
| technetium-99m | Ci | ND | ND | ND | ND |
| barium-lanthanum-140 | Ci | ND | ND | ND | ND |
| cerium-141 | Ci | ND | ND | ND | ND |
| | | | | | |
| unidentified | Ci | ND | ND | ND | ND |
| Total for period(above) | Ci | 2.59E-03 | 1.45E-03 | 0.00E+00 | 1.05E-04 |
| xenon-131m | Ci | ND | ND | ND | ND |
| xenon-133m | Ci | ND | ND | ND | ND |
| xenon-133 | Ci | ND | ND | ND | ND |
| xenon-135 | Ci | ND | ND | ND | ND |

# EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT 2001
# SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

## A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

| 1. Type of waste | | Unit | Est. Total Error, % |
|---|---|---|---|
| a. | Spent resins, filter sludges, evaporator Bottoms, etc. | 6.81 $m^3$<br>77.6 Ci | 2.00E+01 |
| b. | Dry compressible waste, contaminated Equip, etc. | 25.28 $m^3$<br>5.0 Ci | 2.50E+01 |
| c. | Irradiated components, control Rods, etc. | 0 $m^3$<br>0 Ci | NA |
| d. | Other (describe): Dewatered Cartridge Filters | 7.09 $m^3$<br>122.8 Ci | 2.88E+01 |

**2. Estimate of major nuclide composition (by waste type)**

| | Nuclide | % | Ci |
|---|---|---|---|
| **a.** | H-3 | 6.77E-02 | 5.25E-02 |
| | C-14 | 1.25E-02 | 9.70E-03 |
| | Mn-54 | 1.96E+00 | 1.52E+00 |
| | Fe-55 | 1.76E+00 | 1.37E+00 |
| | Co-57 | 8.62E-02 | 6.69E-02 |
| | Co-58 | 6.19E-02 | 4.80E-02 |
| | Co-60 | 9.56E+00 | 7.42E+00 |
| | Ni-59 | 4.15E-01 | 3.22E-01 |
| | Ni-63 | 6.94E+01 | 5.38E+01 |
| | Sr-89 | 3.43E-05 | 2.66E-05 |
| | Sr-90 | 2.36E-02 | 1.83E-02 |
| | Sb-125 | 3.18E-01 | 2.47E-01 |
| | Cs-134 | 4.58E+00 | 3.55E+00 |
| | Cs-137 | 1.12E+01 | 8.69E+00 |
| | Ce-144 | 5.88E-01 | 4.56E-01 |
| | Pu-238 | 4.59E-05 | 3.56E-05 |
| | Pu-239 | 2.37E-05 | 1.84E-05 |
| | Pu-241 | 2.86E-03 | 2.22E-03 |
| | Am-241 | 1.23E-05 | 9.56E-06 |
| | Cm-242 | 4.13E-06 | 3.20E-06 |
| | Cm-243 | 1.54E-05 | 1.19E-05 |

| | Nuclide | % | Ci |
|---|---|---|---|
| **b.** | Cr-51 | 7.75E-34 | 3.87E-35 |
| | Mn-54 | 3.64E-01 | 1.82E-02 |
| | Fe-55 | 2.12E+01 | 1.06E+00 |
| | Fe-59 | 1.83E-21 | 9.13E-23 |
| | Co-57 | 2.35E-02 | 1.17E-03 |
| | Co-58 | 4.26E-01 | 2.13E-02 |
| | Co-60 | 4.27E+00 | 2.13E-01 |
| | Ni-63 | 7.09E+01 | 3.54E+00 |
| | Zr-95 | 3.10E-02 | 1.55E-03 |
| | Nb-95 | 2.68E-02 | 1.34E-03 |
| | Sn-113 | 1.06E-02 | 5.29E-04 |
| | Sb-125 | 2.67E-01 | 1.34E-02 |
| | Cs-137 | 1.83E+00 | 9.15E-02 |
| | Cs-134 | 6.82E-01 | 3.41E-02 |
| | Ag-110m | 1.47E-03 | 7.35E-05 |

| | | | |
|---|---|---|---|
| **c.** | NA | NA | NA |

| | Nuclide | % | Ci |
|---|---|---|---|
| **d.** | H-3 | 5.43E-01 | 6.66E-01 |
| | Cr-51 | 3.63E-04 | 4.46E-04 |
| | Mn-54 | 1.13E+00 | 1.39E+00 |
| | Fe-55 | 6.07E+01 | 7.46E+01 |
| | Fe-59 | 1.40E-04 | 1.72E-04 |
| | Co-57 | 9.60E-02 | 1.18E-01 |
| | Co-58 | 4.17E-01 | 5.12E-01 |
| | Co-60 | 1.11E+01 | 1.36E+01 |
| | Ni-63 | 2.51E+01 | 3.08E+01 |
| | Zr-95 | 1.20E-02 | 1.47E-02 |
| | Nb-95 | 9.13E-05 | 1.12E-04 |
| | Sn-113 | 1.41E-03 | 1.74E-03 |
| | Sb-125 | 1.43E-01 | 1.75E-01 |
| | Cs-137 | 7.85E-01 | 9.63E-01 |

**3. Solid Waste Disposition**

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| 7 | Truck | Chem-Nuclear Barnwell, SC |
| 1 | Truck | Duratek, Oak Ridge, TN |

## B. IRRADIATED FUEL SHIPMENTS (Disposition)

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| NA | NA | NA |

# LIST OF APPENDICES

| Appendix | Title |
|---|---|
| A | Offsite Dose Calculation Manual |
| B | Process Control Program |
| C | Radioactive Liquid Effluent Monitoring Instrumentation |
| D | Radioactive Gaseous Effluent Monitoring Instrumentation |
| E | Liquid Holdup Tanks |
| F | Radwaste Treatment Systems |
| G | Unplanned Releases |

# Appendix – A

## OFF-SITE DOSE CALCULATION MANUAL

### Radiological Effluent Control Section

During 2001 the Offsite Dose Calculation Manual (ODCM) was revised once.

The changes improve the accuracy of dose calculations for radiation monitor setpoints, provide appropriate clarification for radiological discharge monitoring:

1. Clarification of the Steam Generator Blowdown Flash Tank discharge flow path and monitoring. The radiation monitor required for this discharge, the use of a flow monitoring device in the effluent path, and ACTION statements that are applicable are also clarified. The requirements for SGBD demineralizer rinses using blowdown water are identified more precisely.
2. The methodology for calculating the setpoints for the Wide Range Gas Monitor (WRGM) and the Condenser Air Removal (CAR) monitor was changed. The change accounts for the simultaneous contribution to the offsite dose by these flow paths due to noble gasses during hogging and normal operation (CAR serves as the noble gas monitor for the Turbine Gland Seal Exhaust). It also provides clarification for the setpoint determination during normal operation if the CAR Exhaust is vented to the turbine building vent versus the plant vent. The change provides examples of how to perform the set point calculations using a fractional factor for each of the gaseous flowpaths.
3. The liquid discharge flow path dose calculation with no, or low, flow in the discharge tunnel is provided with default value options which are much more representative of the actual flow conditions.

### REMP SECTION

For this period, the REMP was conducted as specified in the ODCM. The Land Use Census for 2001 reflects the continued use of Global Positioning Technology that more accurately locates and verifies residences and gardens as to distance and sector from containment.

1. In 2001, the ODCM was changed to include a sampling point for REMP in Table A.9.1-3 dealing with sampling for tritium, and an administrative limit based on the EPA drinking water standard (there are no technical requirements in either 10CFR or 40CFR for the sampling or limit for this type of sample).

# Appendix - B

## PROCESS CONTROL PROGRAM

During 2001, all Waste Service Department Instructions were administratively changed to reflect the name change from CNSI to Duratek. Liquid wastewater (CNSI) filters have been included in the natural drying time process for spent filters that may preclude dewatering due to exposure levels. These filters are essentially identical to the previously evaluated 0.1-micron polysulfone pleated filters that were evaluated in HPSTID 99-012.

There were no changes to the PCP itself.

# Appendix C

## Radioactive Liquid Effluent Monitoring Instrumentation

**Requirement:**

Radioactive Liquid Effluent Monitoring Instrumentation channels are required to be operable in accordance with Technical Requirement Program TRP 5.2-C.5.1. With less than the minimum number of channels operable for 30 days, Technical Requirement Program TRP 5.2-C.5.1 requires an explanation for the delay in correcting the inoperability in the next Annual Radiological Effluent Release Report in accordance with Technical Specification 6.8.1.4.

**Response:**

A review of the action statement tracking system for the period of January 1, 2001 to December 31, 2001 indicated that each of the Technical Requirement Program TRP 5.2-C.5.1 or C.5.2 monitors were not out of service for a period greater than 30 consecutive days.

# Appendix D

## Radioactive Gaseous Effluent Monitoring Instrumentation

**Requirement:**

Radioactive gaseous effluent monitoring instrumentation channels are required to be operable in accordance with Technical Requirement Program TRP 5.2-C.5.2. With less than the minimum number of channels operable for 30 days, Technical Requirement Program TRP 5.2-C.5.2 requires an explanation for the delay in correcting the inoperability in the next Annual Effluent Release Report in accordance with Tech. Spec. 6.8.1.4.

**Response:**

A review of the Action Statement tracking system for the period from January 1, 2001 through December 31, 2001 indicated there were no occurrences where any TRP 5.2 C.5.1 or C.5.2 monitors were out of service for a period of greater than 30 consecutive days.

On July 17, 2001, during performance of compensatory sampling in accordance with TRP 5.2-C.5.2, Table A.5.2-1 Item 4a/b (Turbine Gland Seal Condenser Exhaust), Action Statement 35, the sample line became disconnected for a period of not more than 3 hours. There was no detected radioactivity in any of the samples taken before and after the 3 hour interruption.

# Appendix E

## Liquid Holdup Tanks

**Requirement:**

Technical Specification 3.11.1.4 limits the quantity of radioactive material contained in any outside temporary tank. With the quantity of radioactive material in any outside temporary tank exceeding the limits of Technical Specification 3.11.1.4, a description of the events leading to this condition is required in the next Annual Radiological Effluent Release Report in accordance with Technical Specification 6.8.1.4.

**Response:**

From January 1, 2001 through December 31, 2001, there was no radioactive material stored in any temporary outdoor tank that exceeded the limits of TS 3.11.1.4.

# Appendix F

## Radwaste Treatment Systems

**Requirement:**

Technical Specification 6.14.1.a requires that licensee initiated changes to the Radwaste Treatment Systems (liquid, gaseous, and solid) be submitted to the Commission in the Annual Radioactive Effluent Release Report for the period in which the change was made. Licensees may choose to submit the information called for in Technical Specification 6.14 as part of the FSAR update, pursuant to 10CFR50.71.

**Response:**

For 2001, North Atlantic will submit any changes to the Radwaste Treatment Systems (liquid, gaseous, and solid) as part of the FSAR update.

# Appendix G

## Unplanned Releases

**Requirement:**

Technical Specification 6.8.1.4 requires a list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period.

**Response:**

A review of the January 1, 2001 to December 31, 2001 time period indicated there were no unplanned, unanticipated or abnormal releases from the site to UNRESTRICTED AREAS of radioactive materials of gaseous or liquid effluents.

**ENCLOSURE 2 TO NYN-02043**

# Joint Frequency Distributions of Wind Speed, Wind Direction and Atmospheric Stability

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = 2.54

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 |
| (1) | .00 | .00 | .45 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .45 | .00 | .00 | .91 |
| (2) | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .02 |
| 4-7 | 1 | 0 | 1 | 1 | 5 | 5 | 12 | 3 | 0 | 3 | 1 | 1 | 0 | 2 | 1 | 2 | 0 | 38 |
| (1) | .45 | .00 | .45 | .45 | 2.27 | 2.27 | 5.45 | 1.36 | .00 | 1.36 | .45 | .45 | .00 | .91 | .45 | .91 | .00 | 17.27 |
| (2) | .01 | .00 | .01 | .01 | .06 | .06 | .14 | .03 | .00 | .03 | .01 | .01 | .00 | .02 | .01 | .02 | .00 | .44 |
| 8-12 | 0 | 1 | 3 | 3 | 26 | 17 | 47 | 8 | 1 | 4 | 13 | 7 | 8 | 5 | 4 | 6 | 0 | 153 |
| (1) | .00 | .45 | 1.36 | 1.36 | 11.82 | 7.73 | 21.36 | 3.64 | .45 | 1.82 | 5.91 | 3.18 | 3.64 | 2.27 | 1.82 | 2.73 | .00 | 69.55 |
| (2) | .00 | .01 | .03 | .03 | .30 | .20 | .54 | .09 | .01 | .05 | .15 | .08 | .09 | .06 | .05 | .07 | .00 | 1.77 |
| 13-18 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 2 | 4 | 1 | 10 | 3 | 0 | 0 | 26 |
| (1) | .45 | .00 | .00 | .45 | .45 | .00 | .91 | .00 | .45 | .00 | .91 | 1.82 | .45 | 4.55 | 1.36 | .00 | .00 | 11.82 |
| (2) | .01 | .00 | .00 | .01 | .01 | .00 | .02 | .00 | .01 | .00 | .02 | .05 | .01 | .12 | .03 | .00 | .00 | .30 |
| 19-24 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| (1) | .00 | .00 | .45 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .45 |
| (2) | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 2 | 1 | 6 | 5 | 32 | 22 | 61 | 11 | 2 | 7 | 16 | 12 | 9 | 17 | 9 | 8 | 0 | 220 |
| (1) | .91 | .45 | 2.73 | 2.27 | 14.55 | 10.00 | 27.73 | 5.00 | .91 | 3.18 | 7.27 | 5.45 | 4.09 | 7.73 | 4.09 | 3.64 | .00 | 100.00 |
| (2) | .02 | .01 | .07 | .06 | .37 | .25 | .70 | .13 | .02 | .08 | .18 | .14 | .10 | .20 | .10 | .09 | .00 | 2.54 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS B CLASS FREQUENCY (PERCENT) = 2.95

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| (1) | .78 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .78 |
| (2) | .02 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .02 |
| 4-7 | 1 | 2 | 1 | 1 | 8 | 4 | 7 | 4 | 4 | 3 | 4 | 4 | 1 | 2 | 5 | 6 | 0 | 57 |
| (1) | .39 | .78 | .39 | .39 | 3.14 | 1.57 | 2.75 | 1.57 | 1.57 | 1.18 | 1.57 | 1.57 | .39 | .78 | 1.96 | 2.35 | .00 | 22.35 |
| (2) | .01 | .02 | .01 | .01 | .09 | .05 | .08 | .05 | .05 | .03 | .05 | .05 | .01 | .02 | .06 | .07 | .00 | .66 |
| 8-12 | 1 | 2 | 0 | 2 | 27 | 8 | 17 | 5 | 2 | 11 | 27 | 13 | 14 | 15 | 12 | 5 | 0 | 161 |
| (1) | .39 | .78 | .00 | .78 | 10.59 | 3.14 | 6.67 | 1.96 | .78 | 4.31 | 10.59 | 5.10 | 5.49 | 5.88 | 4.71 | 1.96 | .00 | 63.14 |
| (2) | .01 | .02 | .00 | .02 | .31 | .09 | .20 | .06 | .02 | .13 | .31 | .15 | .16 | .17 | .14 | .06 | .00 | 1.86 |
| 13-18 | 0 | 1 | 8 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 6 | 5 | 3 | 5 | 1 | 0 | 33 |
| (1) | .00 | .39 | 3.14 | .39 | .39 | .39 | .00 | .00 | .00 | .00 | .39 | 2.35 | 1.96 | 1.18 | 1.96 | .39 | .00 | 12.94 |
| (2) | .00 | .01 | .09 | .01 | .01 | .01 | .00 | .00 | .00 | .00 | .01 | .07 | .06 | .03 | .06 | .01 | .00 | .38 |
| 19-24 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| (1) | .00 | .00 | .78 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .78 |
| (2) | .00 | .00 | .02 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .02 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 4 | 5 | 11 | 4 | 36 | 13 | 24 | 9 | 6 | 14 | 32 | 23 | 20 | 20 | 22 | 12 | 0 | 255 |
| (1) | 1.57 | 1.96 | 4.31 | 1.57 | 14.12 | 5.10 | 9.41 | 3.53 | 2.35 | 5.49 | 12.55 | 9.02 | 7.84 | 7.84 | 8.63 | 4.71 | .00 | 100.00 |
| (2) | .05 | .06 | .13 | .05 | .42 | .15 | .28 | .10 | .07 | .16 | .37 | .27 | .23 | .23 | .25 | .14 | .00 | 2.95 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS C CLASS FREQUENCY (PERCENT) = 6.11

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 0 | 2 | 1 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 12 |
| (1) | .00 | .38 | .19 | .38 | .00 | .19 | .00 | .19 | .00 | .19 | .19 | .19 | .00 | .00 | .19 | .19 | .00 | 2.27 |
| (2) | .00 | .02 | .01 | .02 | .00 | .01 | .00 | .01 | .00 | .01 | .01 | .01 | .00 | .00 | .01 | .01 | .00 | .14 |
| 4-7 | 7 | 1 | 1 | 3 | 10 | 10 | 18 | 6 | 1 | 4 | 14 | 25 | 11 | 15 | 17 | 4 | 0 | 147 |
| (1) | 1.32 | .19 | .19 | .57 | 1.89 | 1.89 | 3.40 | 1.13 | .19 | .76 | 2.65 | 4.73 | 2.08 | 2.84 | 3.21 | .76 | .00 | 27.79 |
| (2) | .08 | .01 | .01 | .03 | .12 | .12 | .21 | .07 | .01 | .05 | .16 | .29 | .13 | .17 | .20 | .05 | .00 | 1.70 |
| 8-12 | 1 | 2 | 8 | 15 | 34 | 13 | 15 | 9 | 2 | 10 | 29 | 40 | 39 | 30 | 37 | 5 | 0 | 289 |
| (1) | .19 | .38 | 1.51 | 2.84 | 6.43 | 2.46 | 2.84 | 1.70 | .38 | 1.89 | 5.48 | 7.56 | 7.37 | 5.67 | 6.99 | .95 | .00 | 54.63 |
| (2) | .01 | .02 | .09 | .17 | .39 | .15 | .17 | .10 | .02 | .12 | .34 | .46 | .45 | .35 | .43 | .06 | .00 | 3.34 |
| 13-18 | 1 | 0 | 7 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 7 | 12 | 3 | 12 | 26 | 2 | 0 | 76 |
| (1) | .19 | .00 | 1.32 | .57 | .57 | .00 | .00 | .00 | .00 | .00 | 1.32 | 2.27 | .57 | 2.27 | 4.91 | .38 | .00 | 14.37 |
| (2) | .01 | .00 | .08 | .03 | .03 | .00 | .00 | .00 | .00 | .00 | .08 | .14 | .03 | .14 | .30 | .02 | .00 | .88 |
| 19-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 5 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .57 | .38 | .00 | .00 | .95 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .03 | .02 | .00 | .00 | .06 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 9 | 5 | 17 | 23 | 47 | 24 | 33 | 16 | 3 | 15 | 51 | 78 | 53 | 60 | 83 | 12 | 0 | 529 |
| (1) | 1.70 | .95 | 3.21 | 4.35 | 8.88 | 4.54 | 6.24 | 3.02 | .57 | 2.84 | 9.64 | 14.74 | 10.02 | 11.34 | 15.69 | 2.27 | .00 | 100.00 |
| (2) | .10 | .06 | .20 | .27 | .54 | .28 | .38 | .18 | .03 | .17 | .59 | .90 | .61 | .69 | .96 | .14 | .00 | 6.11 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS D CLASS FREQUENCY (PERCENT) = 41.64

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 21 | 17 | 16 | 10 | 7 | 3 | 7 | 12 | 16 | 20 | 20 | 15 | 36 | 26 | 39 | 17 | 0 | 282 |
| (1) | .58 | .47 | .44 | .28 | .19 | .08 | .19 | .33 | .44 | .56 | .56 | .42 | 1.00 | .72 | 1.08 | .47 | .00 | 7.83 |
| (2) | .24 | .20 | .18 | .12 | .08 | .03 | .08 | .14 | .18 | .23 | .23 | .17 | .42 | .30 | .45 | .20 | .00 | 3.26 |
| 4-7 | 112 | 49 | 64 | 61 | 94 | 49 | 107 | 76 | 73 | 86 | 77 | 99 | 107 | 128 | 136 | 97 | 0 | 1415 |
| (1) | 3.11 | 1.36 | 1.78 | 1.69 | 2.61 | 1.36 | 2.97 | 2.11 | 2.03 | 2.39 | 2.14 | 2.75 | 2.97 | 3.55 | 3.77 | 2.69 | .00 | 39.27 |
| (2) | 1.29 | .57 | .74 | .70 | 1.09 | .57 | 1.24 | .88 | .84 | .99 | .89 | 1.14 | 1.24 | 1.48 | 1.57 | 1.12 | .00 | 16.35 |
| 8-12 | 46 | 26 | 126 | 56 | 70 | 42 | 40 | 36 | 10 | 50 | 157 | 119 | 123 | 220 | 224 | 68 | 0 | 1413 |
| (1) | 1.28 | .72 | 3.50 | 1.55 | 1.94 | 1.17 | 1.11 | 1.00 | .28 | 1.39 | 4.36 | 3.30 | 3.41 | 6.11 | 6.22 | 1.89 | .00 | 39.22 |
| (2) | .53 | .30 | 1.46 | .65 | .81 | .49 | .46 | .42 | .12 | .58 | 1.81 | 1.38 | 1.42 | 2.54 | 2.59 | .79 | .00 | 16.33 |
| 13-18 | 5 | 8 | 65 | 25 | 15 | 1 | 0 | 0 | 0 | 4 | 25 | 18 | 35 | 91 | 107 | 16 | 0 | 415 |
| (1) | .14 | .22 | 1.80 | .69 | .42 | .03 | .00 | .00 | .00 | .11 | .69 | .50 | .97 | 2.53 | 2.97 | .44 | .00 | 11.52 |
| (2) | .06 | .09 | .75 | .29 | .17 | .01 | .00 | .00 | .00 | .05 | .29 | .21 | .40 | 1.05 | 1.24 | .18 | .00 | 4.80 |
| 19-24 | 0 | 0 | 19 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 20 | 13 | 0 | 0 | 62 |
| (1) | .00 | .00 | .53 | .08 | .00 | .00 | .00 | .00 | .00 | .00 | .03 | .03 | .14 | .56 | .36 | .00 | .00 | 1.72 |
| (2) | .00 | .00 | .22 | .03 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .06 | .23 | .15 | .00 | .00 | .72 |
| GT 24 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 16 |
| (1) | .00 | .00 | .39 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .03 | .03 | .00 | .00 | .00 | .44 |
| (2) | .00 | .00 | .16 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .00 | .00 | .00 | .18 |
| ALL SPEEDS | 184 | 100 | 304 | 155 | 186 | 95 | 154 | 124 | 99 | 160 | 280 | 252 | 307 | 486 | 519 | 198 | 0 | 3603 |
| (1) | 5.11 | 2.78 | 8.44 | 4.30 | 5.16 | 2.64 | 4.27 | 3.44 | 2.75 | 4.44 | 7.77 | 6.99 | 8.52 | 13.49 | 14.40 | 5.50 | .00 | 100.00 |
| (2) | 2.13 | 1.16 | 3.51 | 1.79 | 2.15 | 1.10 | 1.78 | 1.43 | 1.14 | 1.85 | 3.24 | 2.91 | 3.55 | 5.62 | 6.00 | 2.29 | .00 | 41.64 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS E CLASS FREQUENCY (PERCENT) = 29.34

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 3 | 3 | 0 | 0 | 13 |
| (1) | .08 | .04 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .08 | .00 | .04 | .04 | .12 | .12 | .00 | .00 | .51 |
| (2) | .02 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .02 | .00 | .01 | .01 | .03 | .03 | .00 | .00 | .15 |
| C-3 | 18 | 17 | 24 | 25 | 13 | 10 | 22 | 15 | 35 | 38 | 46 | 38 | 52 | 57 | 52 | 25 | 0 | 487 |
| (1) | .71 | .67 | .95 | .98 | .51 | .39 | .87 | .59 | 1.38 | 1.50 | 1.81 | 1.50 | 2.05 | 2.24 | 2.05 | .98 | .00 | 19.18 |
| (2) | .21 | .20 | .28 | .29 | .15 | .12 | .25 | .17 | .40 | .44 | .53 | .44 | .60 | .66 | .60 | .29 | .00 | 5.63 |
| 4-7 | 41 | 21 | 31 | 29 | 31 | 25 | 34 | 47 | 66 | 114 | 154 | 259 | 225 | 186 | 145 | 55 | 0 | 1463 |
| (1) | 1.61 | .83 | 1.22 | 1.14 | 1.22 | .98 | 1.34 | 1.85 | 2.60 | 4.49 | 6.07 | 10.20 | 8.86 | 7.33 | 5.71 | 2.17 | .00 | 57.62 |
| (2) | .47 | .24 | .36 | .34 | .36 | .29 | .39 | .54 | .76 | 1.32 | 1.78 | 2.99 | 2.60 | 2.15 | 1.68 | .64 | .00 | 16.91 |
| 8-12 | 6 | 7 | 12 | 9 | 8 | 3 | 5 | 2 | 4 | 36 | 106 | 109 | 63 | 81 | 44 | 5 | 0 | 500 |
| (1) | .24 | .28 | .47 | .35 | .32 | .12 | .20 | .08 | .16 | 1.42 | 4.17 | 4.29 | 2.48 | 3.19 | 1.73 | .20 | .00 | 19.69 |
| (2) | .07 | .08 | .14 | .10 | .09 | .03 | .06 | .02 | .05 | .42 | 1.23 | 1.26 | .73 | .94 | .51 | .06 | .00 | 5.78 |
| 13-18 | 0 | 5 | 7 | 1 | 7 | 0 | 0 | 0 | 0 | 1 | 9 | 5 | 4 | 13 | 3 | 1 | 0 | 56 |
| (1) | .00 | .20 | .28 | .04 | .28 | .00 | .00 | .00 | .00 | .04 | .35 | .20 | .16 | .51 | .12 | .04 | .00 | 2.21 |
| (2) | .00 | .06 | .08 | .01 | .08 | .00 | .00 | .00 | .00 | .01 | .10 | .06 | .05 | .15 | .03 | .01 | .00 | .65 |
| 19-24 | 0 | 1 | 10 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 |
| (1) | .00 | .04 | .39 | .12 | .08 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .63 |
| (2) | .00 | .01 | .12 | .03 | .02 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .18 |
| GT 24 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| (1) | .00 | .00 | .16 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .16 |
| (2) | .00 | .00 | .05 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .05 |
| ALL SPEEDS | 67 | 52 | 88 | 67 | 61 | 38 | 61 | 64 | 105 | 191 | 315 | 412 | 345 | 340 | 247 | 86 | 0 | 2539 |
| (1) | 2.64 | 2.05 | 3.47 | 2.64 | 2.40 | 1.50 | 2.40 | 2.52 | 4.14 | 7.52 | 12.41 | 16.23 | 13.59 | 13.39 | 9.73 | 3.39 | .00 | 100.00 |
| (2) | .77 | .60 | 1.02 | .77 | .70 | .44 | .70 | .74 | 1.21 | 2.21 | 3.64 | 4.76 | 3.99 | 3.93 | 2.85 | .99 | .00 | 29.34 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 9.50

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 6 |
| (1) | .12 | .00 | .00 | .00 | .00 | .12 | .00 | .00 | .00 | .12 | .24 | .00 | .00 | .00 | .12 | .00 | .00 | .73 |
| (2) | .01 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .01 | .02 | .00 | .00 | .00 | .01 | .00 | .00 | .07 |
| C-3 | 11 | 13 | 9 | 19 | 12 | 1 | 4 | 1 | 11 | 18 | 43 | 62 | 82 | 69 | 34 | 19 | 0 | 408 |
| (1) | 1.34 | 1.58 | 1.09 | 2.31 | 1.46 | .12 | .49 | .12 | 1.34 | 2.19 | 5.23 | 7.54 | 9.98 | 8.39 | 4.14 | 2.31 | .00 | 49.64 |
| (2) | .13 | .15 | .10 | .22 | .14 | .01 | .05 | .01 | .13 | .21 | .50 | .72 | .95 | .80 | .39 | .22 | .00 | 4.72 |
| 4-7 | 6 | 1 | 4 | 5 | 2 | 1 | 1 | 3 | 2 | 12 | 37 | 82 | 81 | 98 | 43 | 24 | 0 | 402 |
| (1) | .73 | .12 | .49 | .61 | .24 | .12 | .12 | .36 | .24 | 1.46 | 4.50 | 9.98 | 9.85 | 11.92 | 5.23 | 2.92 | .00 | 48.91 |
| (2) | .07 | .01 | .05 | .06 | .02 | .01 | .01 | .03 | .02 | .14 | .43 | .95 | .94 | 1.13 | .50 | .28 | .00 | 4.65 |
| 8-12 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 6 |
| (1) | .00 | .00 | .00 | .00 | .12 | .00 | .00 | .00 | .00 | .00 | .12 | .24 | .00 | .24 | .00 | .00 | .00 | .73 |
| (2) | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .01 | .02 | .00 | .02 | .00 | .00 | .00 | .07 |
| 13-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 19-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 18 | 14 | 13 | 24 | 15 | 3 | 5 | 4 | 13 | 31 | 83 | 146 | 163 | 169 | 78 | 43 | 0 | 822 |
| (1) | 2.19 | 1.70 | 1.58 | 2.92 | 1.82 | .36 | .61 | .49 | 1.58 | 3.77 | 10.10 | 17.76 | 19.83 | 20.56 | 9.49 | 5.23 | .00 | 100.00 |
| (2) | .21 | .16 | .15 | .28 | .17 | .03 | .06 | .05 | .15 | .36 | .96 | 1.69 | 1.88 | 1.95 | .90 | .50 | .00 | 9.50 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS G CLASS FREQUENCY (PERCENT) = 7.92

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 1 | 0 | 8 |
| (1) | .00 | .00 | .00 | .15 | .15 | .00 | .00 | .00 | .00 | .00 | .00 | .29 | .00 | .15 | .29 | .15 | .00 | 1.17 |
| (2) | .00 | .00 | .00 | .01 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .02 | .00 | .01 | .02 | .01 | .00 | .09 |
| C-3 | 7 | 13 | 5 | 4 | 5 | 2 | 3 | 1 | 3 | 10 | 37 | 75 | 152 | 126 | 53 | 12 | 0 | 508 |
| (1) | 1.02 | 1.90 | .73 | .58 | .73 | .29 | .44 | .15 | .44 | 1.46 | 5.40 | 10.95 | 22.19 | 18.39 | 7.74 | 1.75 | .00 | 74.16 |
| (2) | .08 | .15 | .06 | .05 | .06 | .02 | .03 | .01 | .03 | .12 | .43 | .87 | 1.76 | 1.46 | .61 | .14 | .00 | 5.87 |
| 4-7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 11 | 20 | 28 | 66 | 37 | 3 | 0 | 169 |
| (1) | .29 | .15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .15 | 1.61 | 2.92 | 4.09 | 9.64 | 5.40 | .44 | .00 | 24.67 |
| (2) | .02 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .13 | .23 | .32 | .76 | .43 | .03 | .00 | 1.95 |
| 8-12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 13-18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 19-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 9 | 14 | 5 | 5 | 6 | 2 | 3 | 1 | 3 | 11 | 48 | 97 | 180 | 193 | 92 | 16 | 0 | 685 |
| (1) | 1.31 | 2.04 | .73 | .73 | .88 | .29 | .44 | .15 | .44 | 1.61 | 7.01 | 14.16 | 26.28 | 28.18 | 13.43 | 2.34 | .00 | 100.00 |
| (2) | .10 | .16 | .06 | .06 | .07 | .02 | .03 | .01 | .03 | .13 | .55 | 1.12 | 2.08 | 2.23 | 1.06 | .18 | .00 | 7.92 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

43.0 FT WIND DATA STABILITY CLASS ALL CLASS FREQUENCY (PERCENT) = 100.00

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 2 | 3 | 1 | 4 | 6 | 1 | 0 | 27 |
| (1) | .03 | .01 | .00 | .01 | .01 | .01 | .00 | .00 | .00 | .03 | .02 | .03 | .01 | .05 | .07 | .01 | .00 | .31 |
| (2) | .03 | .01 | .00 | .01 | .01 | .01 | .00 | .00 | .00 | .03 | .02 | .03 | .01 | .05 | .07 | .01 | .00 | .31 |
| C-3 | 59 | 62 | 56 | 60 | 37 | 17 | 36 | 30 | 65 | 87 | 147 | 191 | 322 | 278 | 180 | 74 | 0 | 1701 |
| (1) | .68 | .72 | .65 | .69 | .43 | .20 | .42 | .35 | .75 | 1.01 | 1.70 | 2.21 | 3.72 | 3.21 | 2.08 | .86 | .00 | 19.66 |
| (2) | .68 | .72 | .65 | .69 | .43 | .20 | .42 | .35 | .75 | 1.01 | 1.70 | 2.21 | 3.72 | 3.21 | 2.08 | .86 | .00 | 19.66 |
| 4-7 | 170 | 75 | 102 | 100 | 150 | 94 | 179 | 139 | 146 | 223 | 298 | 490 | 453 | 497 | 384 | 191 | 0 | 3691 |
| (1) | 1.96 | .87 | 1.18 | 1.16 | 1.73 | 1.09 | 2.07 | 1.61 | 1.69 | 2.58 | 3.44 | 5.66 | 5.24 | 5.74 | 4.44 | 2.21 | .00 | 42.66 |
| (2) | 1.96 | .87 | 1.18 | 1.16 | 1.73 | 1.09 | 2.07 | 1.61 | 1.69 | 2.58 | 3.44 | 5.66 | 5.24 | 5.74 | 4.44 | 2.21 | .00 | 42.66 |
| 8-12 | 54 | 38 | 149 | 85 | 166 | 83 | 124 | 60 | 19 | 111 | 333 | 290 | 247 | 353 | 321 | 89 | 0 | 2522 |
| (1) | .62 | .44 | 1.72 | .98 | 1.92 | .96 | 1.43 | .69 | .22 | 1.28 | 3.85 | 3.35 | 2.85 | 4.08 | 3.71 | 1.03 | .00 | 29.15 |
| (2) | .62 | .44 | 1.72 | .98 | 1.92 | .96 | 1.43 | .69 | .22 | 1.28 | 3.85 | 3.35 | 2.85 | 4.08 | 3.71 | 1.03 | .00 | 29.15 |
| 13-18 | 7 | 14 | 87 | 31 | 27 | 2 | 2 | 0 | 1 | 5 | 44 | 45 | 48 | 129 | 144 | 20 | 0 | 606 |
| (1) | .08 | .16 | 1.01 | .36 | .31 | .02 | .02 | .00 | .01 | .06 | .51 | .52 | .55 | 1.49 | 1.66 | .23 | .00 | 7.00 |
| (2) | .08 | .16 | 1.01 | .36 | .31 | .02 | .02 | .00 | .01 | .06 | .51 | .52 | .55 | 1.49 | 1.66 | .23 | .00 | 7.00 |
| 19-24 | 0 | 1 | 32 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 23 | 15 | 0 | 0 | 86 |
| (1) | .00 | .01 | .37 | .07 | .02 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .06 | .27 | .17 | .00 | .00 | .99 |
| (2) | .00 | .01 | .37 | .07 | .02 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .06 | .27 | .17 | .00 | .00 | .99 |
| GT 24 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 20 |
| (1) | .00 | .00 | .21 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .00 | .00 | .00 | .23 |
| (2) | .00 | .00 | .21 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .00 | .00 | .00 | .23 |
| ALL SPEEDS | 293 | 191 | 444 | 283 | 383 | 197 | 341 | 229 | 231 | 429 | 825 | 1020 | 1077 | 1285 | 1050 | 375 | 0 | 8653 |
| (1) | 3.39 | 2.21 | 5.13 | 3.27 | 4.43 | 2.28 | 3.94 | 2.65 | 2.67 | 4.96 | 9.53 | 11.79 | 12.45 | 14.85 | 12.13 | 4.33 | .00 | 100.00 |
| (2) | 3.39 | 2.21 | 5.13 | 3.27 | 4.43 | 2.28 | 3.94 | 2.65 | 2.67 | 4.96 | 9.53 | 11.79 | 12.45 | 14.85 | 12.13 | 4.33 | .00 | 100.00 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = 2.63

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| 4-7 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 0 | 11 |
| (1) | .00 | .45 | .45 | .45 | .91 | .45 | .45 | .00 | .00 | .00 | .45 | .00 | .00 | .00 | .91 | .45 | .00 | 5.00 |
| (2) | .00 | .01 | .01 | .01 | .02 | .01 | .01 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .02 | .01 | .00 | .13 |
| 8-12 | 1 | 0 | 3 | 1 | 11 | 23 | 31 | 8 | 1 | 3 | 3 | 5 | 1 | 4 | 4 | 1 | 0 | 100 |
| (1) | .45 | .00 | 1.36 | .45 | 5.00 | 10.45 | 14.09 | 3.64 | .45 | 1.36 | 1.36 | 2.27 | .45 | 1.82 | 1.82 | .45 | .00 | 45.45 |
| (2) | .01 | .00 | .04 | .01 | .13 | .27 | .37 | .10 | .01 | .04 | .04 | .06 | .01 | .05 | .05 | .01 | .00 | 1.20 |
| 13-18 | 2 | 1 | 0 | 1 | 1 | 9 | 18 | 16 | 2 | 2 | 10 | 7 | 5 | 6 | 5 | 4 | 0 | 89 |
| (1) | .91 | .45 | .00 | .45 | .45 | 4.09 | 8.18 | 7.27 | .91 | .91 | 4.55 | 3.18 | 2.27 | 2.73 | 2.27 | 1.82 | .00 | 40.45 |
| (2) | .02 | .01 | .00 | .01 | .01 | .11 | .22 | .19 | .02 | .02 | .12 | .08 | .06 | .07 | .06 | .05 | .00 | 1.06 |
| 19-24 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 4 | 1 | 6 | 1 | 0 | 0 | 18 |
| (1) | .00 | .00 | .45 | .45 | .00 | .00 | 1.36 | .45 | .00 | .00 | .00 | 1.82 | .45 | 2.73 | .45 | .00 | .00 | 8.18 |
| (2) | .00 | .00 | .01 | .01 | .00 | .00 | .04 | .01 | .00 | .00 | .00 | .05 | .01 | .07 | .01 | .00 | .00 | .22 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .91 | .00 | .00 | .00 | .91 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .02 | .00 | .00 | .00 | .02 |
| ALL SPEEDS | 3 | 2 | 5 | 4 | 14 | 33 | 53 | 25 | 3 | 5 | 14 | 16 | 7 | 18 | 12 | 6 | 0 | 220 |
| (1) | 1.36 | .91 | 2.27 | 1.82 | 6.36 | 15.00 | 24.09 | 11.36 | 1.36 | 2.27 | 6.36 | 7.27 | 3.18 | 8.18 | 5.45 | 2.73 | .00 | 100.00 |
| (2) | .04 | .02 | .06 | .05 | .17 | .39 | .63 | .30 | .04 | .06 | .17 | .19 | .08 | .22 | .14 | .07 | .00 | 2.63 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS B CLASS FREQUENCY (PERCENT) = 3.02

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| (1) | .40 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .40 |
| (2) | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| 4-7 | 1 | 1 | 3 | 0 | 2 | 0 | 3 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 4 | 0 | 20 |
| (1) | .40 | .40 | 1.19 | .00 | .79 | .00 | 1.19 | .40 | .40 | .79 | .00 | .40 | .00 | .00 | .40 | 1.58 | .00 | 7.91 |
| (2) | .01 | .01 | .04 | .00 | .02 | .00 | .04 | .01 | .01 | .02 | .00 | .01 | .00 | .00 | .01 | .05 | .00 | .24 |
| 8-12 | 1 | 1 | 0 | 2 | 16 | 21 | 13 | 6 | 2 | 8 | 14 | 9 | 5 | 6 | 7 | 4 | 0 | 115 |
| (1) | .40 | .40 | .00 | .79 | 6.32 | 8.30 | 5.14 | 2.37 | .79 | 3.16 | 5.53 | 3.56 | 1.98 | 2.37 | 2.77 | 1.58 | .00 | 45.45 |
| (2) | .01 | .01 | .00 | .02 | .19 | .25 | .16 | .07 | .02 | .10 | .17 | .11 | .06 | .07 | .08 | .05 | .00 | 1.37 |
| 13-18 | 2 | 1 | 0 | 3 | 3 | 1 | 5 | 10 | 0 | 5 | 15 | 11 | 11 | 12 | 10 | 2 | 0 | 91 |
| (1) | .79 | .40 | .00 | 1.19 | 1.19 | .40 | 1.98 | 3.95 | .00 | 1.98 | 5.93 | 4.35 | 4.35 | 4.74 | 3.95 | .79 | .00 | 35.97 |
| (2) | .02 | .01 | .00 | .04 | .04 | .01 | .06 | .12 | .00 | .06 | .18 | .13 | .13 | .14 | .12 | .02 | .00 | 1.09 |
| 19-24 | 0 | 1 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 4 | 2 | 5 | 1 | 0 | 25 |
| (1) | .00 | .40 | 1.98 | .40 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 2.37 | 1.58 | .79 | 1.98 | .40 | .00 | 9.88 |
| (2) | .00 | .01 | .06 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .07 | .05 | .02 | .06 | .01 | .00 | .30 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .40 | .00 | .00 | .00 | .00 | .40 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .01 |
| ALL SPEEDS | 5 | 4 | 8 | 6 | 21 | 22 | 21 | 17 | 3 | 15 | 29 | 27 | 21 | 20 | 23 | 11 | 0 | 253 |
| (1) | 1.98 | 1.58 | 3.16 | 2.37 | 8.30 | 8.70 | 8.30 | 6.72 | 1.19 | 5.93 | 11.46 | 10.67 | 8.30 | 7.91 | 9.09 | 4.35 | .00 | 100.00 |
| (2) | .06 | .05 | .10 | .07 | .25 | .26 | .25 | .20 | .04 | .18 | .35 | .32 | .25 | .24 | .27 | .13 | .00 | 3.02 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS C CLASS FREQUENCY (PERCENT) = 6.24

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 1 | 0 | 3 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 10 |
| (1) | .19 | .00 | .57 | .00 | .19 | .38 | .00 | .00 | .00 | .00 | .00 | .19 | .19 | .00 | .00 | .19 | .00 | 1.92 |
| (2) | .01 | .00 | .04 | .00 | .01 | .02 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .00 | .00 | .01 | .00 | .12 |
| 4-7 | 3 | 1 | 0 | 2 | 2 | 7 | 7 | 0 | 0 | 3 | 5 | 4 | 3 | 4 | 6 | 4 | 0 | 51 |
| (1) | .57 | .19 | .00 | .38 | .38 | 1.34 | 1.34 | .00 | .00 | .57 | .96 | .77 | .57 | .77 | 1.15 | .77 | .00 | 9.77 |
| (2) | .04 | .01 | .00 | .02 | .02 | .08 | .08 | .00 | .00 | .04 | .06 | .05 | .04 | .05 | .07 | .05 | .00 | .61 |
| 8-12 | 2 | 4 | 6 | 13 | 20 | 25 | 23 | 15 | 3 | 6 | 26 | 38 | 25 | 21 | 15 | 10 | 0 | 252 |
| (1) | .38 | .77 | 1.15 | 2.49 | 3.83 | 4.79 | 4.41 | 2.87 | .57 | 1.15 | 4.98 | 7.28 | 4.79 | 4.02 | 2.87 | 1.92 | .00 | 48.28 |
| (2) | .02 | .05 | .07 | .16 | .24 | .30 | .27 | .18 | .04 | .07 | .31 | .45 | .30 | .25 | .18 | .12 | .00 | 3.01 |
| 13-18 | 1 | 1 | 5 | 7 | 4 | 0 | 2 | 8 | 5 | 0 | 16 | 21 | 24 | 28 | 28 | 5 | 0 | 155 |
| (1) | .19 | .19 | .96 | 1.34 | .77 | .00 | .38 | 1.53 | .96 | .00 | 3.07 | 4.02 | 4.60 | 5.36 | 5.36 | .96 | .00 | 29.69 |
| (2) | .01 | .01 | .06 | .08 | .05 | .00 | .02 | .10 | .06 | .00 | .19 | .25 | .29 | .33 | .33 | .06 | .00 | 1.85 |
| 19-24 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 6 | 6 | 9 | 14 | 3 | 0 | 46 |
| (1) | .38 | .00 | .19 | .19 | .00 | .00 | .00 | .00 | .00 | .00 | .77 | 1.15 | 1.15 | 1.72 | 2.68 | .57 | .00 | 8.81 |
| (2) | .02 | .00 | .01 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .05 | .07 | .07 | .11 | .17 | .04 | .00 | .55 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 0 | 0 | 8 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .96 | .57 | .00 | .00 | 1.53 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .06 | .04 | .00 | .00 | .10 |
| ALL SPEEDS | 9 | 6 | 15 | 23 | 27 | 34 | 32 | 23 | 8 | 9 | 51 | 70 | 59 | 67 | 66 | 23 | 0 | 522 |
| (1) | 1.72 | 1.15 | 2.87 | 4.41 | 5.17 | 6.51 | 6.13 | 4.41 | 1.53 | 1.72 | 9.77 | 13.41 | 11.30 | 12.84 | 12.64 | 4.41 | .00 | 100.00 |
| (2) | .11 | .07 | .18 | .27 | .32 | .41 | .38 | .27 | .10 | .11 | .61 | .84 | .71 | .80 | .79 | .27 | .00 | 6.24 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS D CLASS FREQUENCY (PERCENT) = 41.09

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 5 | 6 | 11 | 1 | 8 | 3 | 6 | 5 | 3 | 6 | 7 | 4 | 7 | 11 | 9 | 8 | 0 | 100 |
| (1) | .15 | .17 | .32 | .03 | .23 | .09 | .17 | .15 | .09 | .17 | .20 | .12 | .20 | .32 | .26 | .23 | .00 | 2.91 |
| (2) | .06 | .07 | .13 | .01 | .10 | .04 | .07 | .06 | .04 | .07 | .08 | .05 | .08 | .13 | .11 | .10 | .00 | 1.20 |
| 4-7 | 44 | 35 | 32 | 41 | 40 | 51 | 52 | 35 | 30 | 40 | 40 | 55 | 50 | 57 | 49 | 39 | 0 | 690 |
| (1) | 1.28 | 1.02 | .93 | 1.19 | 1.16 | 1.48 | 1.51 | 1.02 | .87 | 1.16 | 1.16 | 1.60 | 1.45 | 1.66 | 1.43 | 1.13 | .00 | 20.07 |
| (2) | .53 | .42 | .38 | .49 | .48 | .61 | .62 | .42 | .36 | .48 | .48 | .66 | .60 | .68 | .59 | .47 | .00 | 8.25 |
| 8-12 | 87 | 54 | 81 | 64 | 51 | 66 | 84 | 71 | 53 | 82 | 110 | 95 | 97 | 125 | 114 | 64 | 0 | 1298 |
| (1) | 2.53 | 1.57 | 2.36 | 1.86 | 1.48 | 1.92 | 2.44 | 2.07 | 1.54 | 2.39 | 3.20 | 2.76 | 2.82 | 3.64 | 3.32 | 1.86 | .00 | 37.75 |
| (2) | 1.04 | .65 | .97 | .76 | .61 | .79 | 1.00 | .85 | .63 | .98 | 1.31 | 1.14 | 1.16 | 1.49 | 1.36 | .76 | .00 | 15.51 |
| 13-18 | 40 | 29 | 95 | 29 | 14 | 3 | 29 | 35 | 11 | 25 | 116 | 80 | 95 | 183 | 142 | 43 | 0 | 969 |
| (1) | 1.16 | .84 | 2.76 | .84 | .41 | .09 | .84 | 1.02 | .32 | .73 | 3.37 | 2.33 | 2.76 | 5.32 | 4.13 | 1.25 | .00 | 28.18 |
| (2) | .48 | .35 | 1.14 | .35 | .17 | .04 | .35 | .42 | .13 | .30 | 1.39 | .96 | 1.14 | 2.19 | 1.70 | .51 | .00 | 11.58 |
| 19-24 | 10 | 6 | 28 | 7 | 7 | 1 | 1 | 0 | 0 | 4 | 12 | 18 | 39 | 79 | 59 | 8 | 0 | 279 |
| (1) | .29 | .17 | .81 | .20 | .20 | .03 | .03 | .00 | .00 | .12 | .35 | .52 | 1.13 | 2.30 | 1.72 | .23 | .00 | 8.12 |
| (2) | .12 | .07 | .33 | .08 | .08 | .01 | .01 | .00 | .00 | .05 | .14 | .22 | .47 | .94 | .71 | .10 | .00 | 3.33 |
| GT 24 | 0 | 10 | 17 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 20 | 33 | 10 | 0 | 0 | 102 |
| (1) | .00 | .29 | .49 | .29 | .00 | .00 | .00 | .00 | .00 | .00 | .03 | .03 | .58 | .96 | .29 | .00 | .00 | 2.97 |
| (2) | .00 | .12 | .20 | .12 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .01 | .24 | .39 | .12 | .00 | .00 | 1.22 |
| ALL SPEEDS | 186 | 140 | 264 | 152 | 120 | 124 | 172 | 146 | 97 | 157 | 286 | 253 | 308 | 488 | 383 | 162 | 0 | 3438 |
| (1) | 5.41 | 4.07 | 7.68 | 4.42 | 3.49 | 3.61 | 5.00 | 4.25 | 2.82 | 4.57 | 8.32 | 7.36 | 8.96 | 14.19 | 11.14 | 4.71 | .00 | 100.00 |
| (2) | 2.22 | 1.67 | 3.16 | 1.82 | 1.43 | 1.48 | 2.06 | 1.74 | 1.16 | 1.88 | 3.42 | 3.02 | 3.68 | 5.83 | 4.58 | 1.94 | .00 | 41.09 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS E CLASS FREQUENCY (PERCENT) = 29.48

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 6 | 5 | 6 | 6 | 2 | 5 | 6 | 7 | 8 | 6 | 5 | 4 | 3 | 7 | 5 | 6 | 0 | 87 |
| (1) | .24 | .20 | .24 | .24 | .08 | .20 | .24 | .28 | .32 | .24 | .20 | .16 | .12 | .28 | .20 | .24 | .00 | 3.53 |
| (2) | .07 | .06 | .07 | .07 | .02 | .06 | .07 | .08 | .10 | .07 | .06 | .05 | .04 | .08 | .06 | .07 | .00 | 1.04 |
| 4-7 | 27 | 13 | 18 | 17 | 12 | 24 | 28 | 20 | 28 | 29 | 25 | 21 | 17 | 20 | 29 | 21 | 0 | 349 |
| (1) | 1.09 | .53 | .73 | .69 | .49 | .97 | 1.13 | .81 | 1.13 | 1.18 | 1.01 | .85 | .69 | .81 | 1.18 | .85 | .00 | 14.15 |
| (2) | .32 | .16 | .22 | .20 | .14 | .29 | .33 | .24 | .33 | .35 | .30 | .25 | .20 | .24 | .35 | .25 | .00 | 4.17 |
| 8-12 | 50 | 36 | 27 | 18 | 11 | 12 | 21 | 56 | 72 | 107 | 140 | 134 | 104 | 147 | 138 | 54 | 0 | 1127 |
| (1) | 2.03 | 1.46 | 1.09 | .73 | .45 | .49 | .85 | 2.27 | 2.92 | 4.34 | 5.67 | 5.43 | 4.22 | 5.96 | 5.59 | 2.19 | .00 | 45.68 |
| (2) | .60 | .43 | .32 | .22 | .13 | .14 | .25 | .67 | .86 | 1.28 | 1.67 | 1.60 | 1.24 | 1.76 | 1.65 | .65 | .00 | 13.47 |
| 13-18 | 23 | 5 | 12 | 8 | 2 | 2 | 5 | 9 | 7 | 58 | 144 | 186 | 135 | 142 | 57 | 5 | 0 | 800 |
| (1) | .93 | .20 | .49 | .32 | .08 | .08 | .20 | .36 | .28 | 2.35 | 5.84 | 7.54 | 5.47 | 5.76 | 2.31 | .20 | .00 | 32.43 |
| (2) | .27 | .06 | .14 | .10 | .02 | .02 | .06 | .11 | .08 | .69 | 1.72 | 2.22 | 1.61 | 1.70 | .68 | .06 | .00 | 9.56 |
| 19-24 | 2 | 7 | 3 | 3 | 5 | 1 | 0 | 0 | 0 | 3 | 7 | 5 | 11 | 21 | 8 | 0 | 0 | 76 |
| (1) | .08 | .28 | .12 | .12 | .20 | .04 | .00 | .00 | .00 | .12 | .28 | .20 | .45 | .85 | .32 | .00 | .00 | 3.08 |
| (2) | .02 | .08 | .04 | .04 | .06 | .01 | .00 | .00 | .00 | .04 | .08 | .06 | .13 | .25 | .10 | .00 | .00 | .91 |
| GT 24 | 1 | 6 | 9 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 1 | 2 | 1 | 0 | 0 | 28 |
| (1) | .04 | .24 | .36 | .04 | .12 | .00 | .00 | .00 | .00 | .00 | .12 | .04 | .04 | .08 | .04 | .00 | .00 | 1.13 |
| (2) | .01 | .07 | .11 | .01 | .04 | .00 | .00 | .00 | .00 | .00 | .04 | .01 | .01 | .02 | .01 | .00 | .00 | .33 |
| ALL SPEEDS | 109 | 72 | 75 | 53 | 35 | 44 | 60 | 92 | 115 | 203 | 324 | 351 | 271 | 339 | 238 | 86 | 0 | 2467 |
| (1) | 4.42 | 2.92 | 3.04 | 2.15 | 1.42 | 1.78 | 2.43 | 3.73 | 4.66 | 8.23 | 13.13 | 14.23 | 10.99 | 13.74 | 9.65 | 3.49 | .00 | 100.00 |
| (2) | 1.30 | .86 | .90 | .63 | .42 | .53 | .72 | 1.10 | 1.37 | 2.43 | 3.87 | 4.20 | 3.24 | 4.05 | 2.84 | 1.03 | .00 | 29.48 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 9.49

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| C-3 | 1 | 0 | 1 | 0 | 3 | 6 | 2 | 7 | 3 | 1 | 3 | 2 | 1 | 0 | 0 | 4 | 0 | 34 |
| (1) | .13 | .00 | .13 | .00 | .38 | .76 | .25 | .88 | .38 | .13 | .38 | .25 | .13 | .00 | .00 | .50 | .00 | 4.28 |
| (2) | .01 | .00 | .01 | .00 | .04 | .07 | .02 | .08 | .04 | .01 | .04 | .02 | .01 | .00 | .00 | .05 | .00 | .41 |
| 4-7 | 11 | 12 | 11 | 3 | 5 | 1 | 6 | 13 | 17 | 9 | 15 | 17 | 8 | 16 | 10 | 6 | 0 | 160 |
| (1) | 1.39 | 1.51 | 1.39 | .38 | .63 | .13 | .76 | 1.64 | 2.14 | 1.13 | 1.89 | 2.14 | 1.01 | 2.02 | 1.26 | .76 | .00 | 20.15 |
| (2) | .13 | .14 | .13 | .04 | .06 | .01 | .07 | .16 | .20 | .11 | .18 | .20 | .10 | .19 | .12 | .07 | .00 | 1.91 |
| 8-12 | 21 | 7 | 6 | 1 | 0 | 4 | 4 | 6 | 19 | 32 | 47 | 42 | 53 | 76 | 66 | 23 | 0 | 407 |
| (1) | 2.64 | .88 | .76 | .13 | .00 | .50 | .50 | .76 | 2.39 | 4.03 | 5.92 | 5.29 | 6.68 | 9.57 | 8.31 | 2.90 | .00 | 51.26 |
| (2) | .25 | .08 | .07 | .01 | .00 | .05 | .05 | .07 | .23 | .38 | .56 | .50 | .63 | .91 | .79 | .27 | .00 | 4.86 |
| 13-18 | 9 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 14 | 21 | 37 | 42 | 46 | 9 | 0 | 192 |
| (1) | 1.13 | .63 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | 1.13 | 1.76 | 2.64 | 4.66 | 5.29 | 5.79 | 1.13 | .00 | 24.18 |
| (2) | .11 | .06 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .11 | .17 | .25 | .44 | .50 | .55 | .11 | .00 | 2.29 |
| 19-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .13 | .00 | .00 | .00 | .00 | .00 | .00 | .13 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 42 | 24 | 18 | 4 | 8 | 11 | 12 | 26 | 39 | 51 | 80 | 82 | 99 | 134 | 122 | 42 | 0 | 794 |
| (1) | 5.29 | 3.02 | 2.27 | .50 | 1.01 | 1.39 | 1.51 | 3.27 | 4.91 | 6.42 | 10.08 | 10.33 | 12.47 | 16.88 | 15.37 | 5.29 | .00 | 100.00 |
| (2) | .50 | .29 | .22 | .05 | .10 | .13 | .14 | .31 | .47 | .61 | .96 | .98 | 1.18 | 1.60 | 1.46 | .50 | .00 | 9.49 |

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS G CLASS FREQUENCY (PERCENT) = 8.04

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .15 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .15 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| C-3 | 3 | 3 | 6 | 3 | 2 | 3 | 2 | 2 | 3 | 1 | 2 | 5 | 8 | 3 | 1 | 2 | 0 | 49 |
| (1) | .45 | .45 | .89 | .45 | .30 | .45 | .30 | .30 | .45 | .15 | .30 | .74 | 1.19 | .45 | .15 | .30 | .00 | 7.28 |
| (2) | .04 | .04 | .07 | .04 | .02 | .04 | .02 | .02 | .04 | .01 | .02 | .06 | .10 | .04 | .01 | .02 | .00 | .59 |
| 4-7 | 13 | 14 | 7 | 2 | 6 | 2 | 2 | 9 | 19 | 15 | 25 | 14 | 16 | 20 | 9 | 8 | 0 | 181 |
| (1) | 1.93 | 2.08 | 1.04 | .30 | .89 | .30 | .30 | 1.34 | 2.82 | 2.23 | 3.71 | 2.08 | 2.38 | 2.97 | 1.34 | 1.19 | .00 | 26.89 |
| (2) | .16 | .17 | .08 | .02 | .07 | .02 | .02 | .11 | .23 | .18 | .30 | .17 | .19 | .24 | .11 | .10 | .00 | 2.16 |
| 8-12 | 24 | 20 | 1 | 0 | 0 | 0 | 1 | 5 | 17 | 22 | 38 | 31 | 41 | 57 | 43 | 40 | 0 | 340 |
| (1) | 3.57 | 2.97 | .15 | .00 | .00 | .00 | .15 | .74 | 2.53 | 3.27 | 5.65 | 4.61 | 6.09 | 8.47 | 6.39 | 5.94 | .00 | 50.52 |
| (2) | .29 | .24 | .01 | .00 | .00 | .00 | .01 | .06 | .20 | .26 | .45 | .37 | .49 | .68 | .51 | .48 | .00 | 4.06 |
| 13-18 | 6 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 9 | 9 | 11 | 15 | 30 | 15 | 0 | 102 |
| (1) | .89 | .15 | .15 | .00 | .00 | .00 | .00 | .15 | .00 | .59 | 1.34 | 1.34 | 1.63 | 2.23 | 4.46 | 2.23 | .00 | 15.16 |
| (2) | .07 | .01 | .01 | .00 | .00 | .00 | .00 | .01 | .00 | .05 | .11 | .11 | .13 | .18 | .36 | .18 | .00 | 1.22 |
| 19-24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| GT 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| ALL SPEEDS | 46 | 38 | 15 | 5 | 8 | 5 | 5 | 17 | 40 | 42 | 74 | 59 | 76 | 95 | 83 | 65 | 0 | 673 |
| (1) | 6.84 | 5.65 | 2.23 | .74 | 1.19 | .74 | .74 | 2.53 | 5.94 | 6.24 | 11.00 | 8.77 | 11.29 | 14.12 | 12.33 | 9.66 | .00 | 100.00 |
| (2) | .55 | .45 | .18 | .06 | .10 | .06 | .06 | .20 | .48 | .50 | .88 | .71 | .91 | 1.14 | .99 | .78 | .00 | 8.04 |

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(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

SEABROOK JAN01-DEC01 MET DATA JOINT FREQUENCY DISTRIBUTION (210-FOOT TOWER)

209.0 FT WIND DATA STABILITY CLASS ALL CLASS FREQUENCY (PERCENT) = 100.00

WIND DIRECTION FROM

| SPEED MPH | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | VRBL | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| (1) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| (2) | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .01 |
| C-3 | 17 | 14 | 27 | 10 | 16 | 19 | 16 | 21 | 17 | 14 | 17 | 16 | 20 | 21 | 15 | 21 | 0 | 281 |
| (1) | .20 | .17 | .32 | .12 | .19 | .23 | .19 | .25 | .20 | .17 | .20 | .19 | .24 | .25 | .18 | .25 | .00 | 3.36 |
| (2) | .20 | .17 | .32 | .12 | .19 | .23 | .19 | .25 | .20 | .17 | .20 | .19 | .24 | .25 | .18 | .25 | .00 | 3.36 |
| 4-7 | 99 | 77 | 72 | 66 | 69 | 86 | 99 | 78 | 95 | 98 | 111 | 112 | 94 | 117 | 106 | 83 | 0 | 1462 |
| (1) | 1.18 | .92 | .86 | .79 | .82 | 1.03 | 1.18 | .93 | 1.14 | 1.17 | 1.33 | 1.34 | 1.12 | 1.40 | 1.27 | .99 | .00 | 17.47 |
| (2) | 1.18 | .92 | .86 | .79 | .82 | 1.03 | 1.18 | .93 | 1.14 | 1.17 | 1.33 | 1.34 | 1.12 | 1.40 | 1.27 | .99 | .00 | 17.47 |
| 8-12 | 186 | 122 | 124 | 99 | 109 | 151 | 177 | 167 | 167 | 260 | 378 | 354 | 326 | 436 | 387 | 196 | 0 | 3639 |
| (1) | 2.22 | 1.46 | 1.48 | 1.18 | 1.30 | 1.80 | 2.12 | 2.00 | 2.00 | 3.11 | 4.52 | 4.23 | 3.90 | 5.21 | 4.63 | 2.34 | .00 | 43.49 |
| (2) | 2.22 | 1.46 | 1.48 | 1.18 | 1.30 | 1.80 | 2.12 | 2.00 | 2.00 | 3.11 | 4.52 | 4.23 | 3.90 | 5.21 | 4.63 | 2.34 | .00 | 43.49 |
| 13-18 | 83 | 43 | 113 | 48 | 24 | 15 | 59 | 79 | 25 | 103 | 324 | 335 | 318 | 428 | 318 | 83 | 0 | 2398 |
| (1) | .99 | .51 | 1.35 | .57 | .29 | .18 | .71 | .94 | .30 | 1.23 | 3.87 | 4.00 | 3.80 | 5.12 | 3.80 | .99 | .00 | 28.66 |
| (2) | .99 | .51 | 1.35 | .57 | .29 | .18 | .71 | .94 | .30 | 1.23 | 3.87 | 4.00 | 3.80 | 5.12 | 3.80 | .99 | .00 | 28.66 |
| 19-24 | 14 | 14 | 38 | 13 | 12 | 2 | 4 | 1 | 0 | 7 | 24 | 39 | 61 | 117 | 87 | 12 | 0 | 445 |
| (1) | .17 | .17 | .45 | .16 | .14 | .02 | .05 | .01 | .00 | .08 | .29 | .47 | .73 | 1.40 | 1.04 | .14 | .00 | 5.32 |
| (2) | .17 | .17 | .45 | .16 | .14 | .02 | .05 | .01 | .00 | .08 | .29 | .47 | .73 | 1.40 | 1.04 | .14 | .00 | 5.32 |
| GT 24 | 1 | 16 | 26 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 22 | 42 | 14 | 0 | 0 | 141 |
| (1) | .01 | .19 | .31 | .13 | .04 | .00 | .00 | .00 | .00 | .00 | .05 | .02 | .26 | .50 | .17 | .00 | .00 | 1.69 |
| (2) | .01 | .19 | .31 | .13 | .04 | .00 | .00 | .00 | .00 | .00 | .05 | .02 | .26 | .50 | .17 | .00 | .00 | 1.69 |
| ALL SPEEDS | 400 | 286 | 400 | 247 | 233 | 273 | 355 | 346 | 305 | 482 | 858 | 858 | 841 | 1161 | 927 | 395 | 0 | 8367 |
| (1) | 4.78 | 3.42 | 4.78 | 2.95 | 2.78 | 3.26 | 4.24 | 4.14 | 3.65 | 5.76 | 10.25 | 10.25 | 10.05 | 13.88 | 11.08 | 4.72 | .00 | 100.00 |
| (2) | 4.78 | 3.42 | 4.78 | 2.95 | 2.78 | 3.26 | 4.24 | 4.14 | 3.65 | 5.76 | 10.25 | 10.25 | 10.05 | 13.88 | 11.08 | 4.72 | .00 | 100.00 |

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(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

**ENCLOSURE 3 TO NYN-02043**

# Radiation Dose Assessment

# Seabrook Station
# Radiological Effluent Impact Assessment For 2001
# (Annual Radioactive Effluent Release Report)

## I. Summary

Seabrook Technical Specification Sections 6.7.6.g.4 & 9 require that limitations be placed on the quarterly and annual doses or dose commitments to Members of the Public from radioactive materials in liquid and gaseous effluents released from the station to Unrestricted Areas at or beyond the site boundary conforming to the dose objectives of Appendix I to 10 CFR Part 50. Technical Specification 6.7.6.g.8 requires limitations on the quarterly and annual air doses resulting from noble gases released in gaseous effluents to areas beyond the site boundary also conform to Appendix I to 10 CFR Part 50. In a similar fashion, Technical Specification 6.7.6.g.11 requires limitations on the annual dose or dose commitment to any Member of the Public due to radioactivity and radiation from uranium fuel cycle sources conforming to the EPA Radiation Standards in 40 CFR Part 190. The following table details the above referenced effluent dose limits.

DOSE OBJECTIVE CRITERIA FOR COMPLIANCE

| EFFLUENT TYPE | DOSE TYPE | QUARTERLY LIMITS | ANNUAL LIMITS |
|---|---|---|---|
| LIQUIDS (10CFR50, APP. I) | Total Body | 1.5 mrem | 3 mrem |
| | Max. Organ | 5 mrem | 10 mrem |
| NOBLE GAS (10CFR50, APP. I) | Gamma Air | 5 mrad | 10 mrad |
| | Beta Air | 10 mrad | 20 mrad |
| GAS PARTICULATE (10CFR50, APP. I) | Max. Organ | 7.5 mrem | 15 mrem |
| TOTAL DOSE (40CFR190) [liquids, gas, direct] | Total Body & organ | --- | 25 mrem |
| | Thyroid | | 75 mrem |

Technical Specification 6.8.1.4 and the Seabrook Offsite Dose Calculation Manual (ODCM) Part A, Section 10.2, provides that the Station's Annual Radioactive Effluent Release Report include a demonstration of compliance with the above off-site dose limitations, as well as the determination of dose impacts to Members of the Public who may be associated with permitted activities inside the site boundary.

Doses resulting from actual liquid and gaseous effluents from Seabrook Station during 2001 were calculated in accordance with Method II as defined in the Station Offsite Dose Calculation Manual. The calculation methods follow the models in Regulatory Guide 1.109 (Reference 1). The assessments included maximum whole body doses and organ doses from all liquid releases, maximum offsite organ doses resulting from airborne iodines, tritium and particulate radionuclides with half-lives greater than eight days, and maximum offsite beta air and gamma air doses from airborne noble gases. In addition, the potential direct dose from fixed radiation sources from plant operations was evaluated as part of the assessment required under 40 CFR part 190 for doses from the uranium fuel cycle.

Doses were also calculated for the special receptor locations inside the site boundary where the public can have access for recreational or educational purposes. The Science and Nature Center is located in the southwest portion of the site and offers educational opportunities on nuclear power and the environment. The "Rocks" is an area northeast of the main plant facilities where the public has access to Brown's Creek and the tidal marsh that borders the site. It should be noted that following the terrorist attacks in New York and Washington on September 11, 2001, site access to the public has been restricted for security reasons. However, the calculated dose potentials have not reflected any reduced occupancy time assumptions for members of the public on-site.

All calculated liquid and gaseous pathway doses for the 2001 reporting period are well below the dose criteria of 10CFR50, Appendix I, and the dose limits for effluent releases stated in the ODCM. In addition, the total dose to the most limiting Member of the Public due to the combined exposure to plant-related direct radiation, and liquid and gaseous effluents, was below the dose standards of 40CFR190.

## II. Method for Calculating the Total Body and Maximum Organ Doses Resulting from Liquid Releases

Liquid waste generated during plant operations is processed and discharged to the environment via the station's circulating water cooling system. The cooling system utilizes an offshore submerged multiport diffuser discharge for rapid dissipation and mixing of liquid effluents in the ocean environment. A 22-port diffuser section of the discharge system is located in approximately 50 to 60 feet of water with each nozzle 7 to 10 feet above the sea floor. Eleven riser shafts, with two diffuser nozzles each, are spaced about 100 feet apart over a distance of about 1000 feet. Water is discharged in a generally eastward direction away from the shoreline through the multiport diffuser, beginning at a location over one mile off-shore. During power operations, these high velocity jets passively entrain about ten volumes of fresh water into the near field jet mixing region before the plume reaches the water surface. This arrangement also effectively prevents the discharge plume (at least to the 1 degree or 40 to 1 dilution isopleth) from impacting the shoreline over the tidal cycle.

During shutdown periods, the high velocity jet mixing created by the normal circulating water flow at the diffuser nozzles is reduced. However, mixing within the discharge tunnel water volume is significantly increased due to the long transit time for batch discharges to travel the three miles from the plant through the 19-foot diameter tunnels to the diffuser nozzles. Additional mixing of the effluent in the near field assures that an equivalent overall 10 to 1 dilution occurs by the time reaches the ocean surface.

The exposure pathways considered in the calculations of total body and maximum organ doses resulting from liquid discharges from Seabrook Station are limited to ingestion of aquatic foods and exposure to shoreline deposits. The dose calculations do not include the ingestion of potable water or irrigated vegetation as potential exposure pathways because the liquid effluents from the plant are discharged into salt water.

The dose assessment models utilized in the Offsite Dose Calculation Manual (ODCM) (Reference 2) are taken from Regulatory Guide 1.109 (Reference 1). The total body and organ doses are evaluated for each of the four age groups (i.e., infant, child, teen and adult) to determine the maximum total body dose and maximum organ dose via all existing exposure pathways (i.e., fish and aquatic invertebrate ingestion, and shoreline exposure) to an age-dependent individual from all detected radionuclides in plant releases. The values for the various factors considered in the model equations are provided in Regulatory Guide 1.109 and the ODCM (see Table D). The flow rate of the liquid effluent (F) and the radionuclide activities ($Q_i$) are measured specifically prior to each liquid release. The values for half-lives for radionuclides ($T_{1/2}$) and their radioactive decay constants ($\lambda_i$) have been taken from Kocher (Reference 3).

Table A presents the calculated liquid pathway doses for each calendar quarter and total for the year. The calculated annual doses as a percent of the applicable regulatory limits are shown in Table C. The estimated quarterly and annual doses resulting from liquid effluents to members of the public are well below all dose limit criteria.

III. Method for Calculating the Gamma and Beta Air Doses from Noble Gases

Gamma and beta air doses due to noble gases in gaseous effluents are calculated for several receptor locations when noble gases are recorded in effluents. Those locations include the points of estimated highest off-site ground level air concentration of radioactive material, site boundary (or nearest point on the opposite shoreline in directions which are bordered by the tidal marsh), nearest resident, nearest vegetable garden, and nearest milk animal within five miles for each of the sixteen principle compass directions. The special on-site receptor locations (Science and Nature Center and the "Rocks") are also included.

Atmospheric dispersion factors (i.e., X/Q factors) calculated from recorded concurrent site meteorological data (i.e., meteorological data measurements taken during the time of the release) are used in the estimation of receptor specific air concentrations due to station effluents. The atmospheric dispersion estimations utilize methodology generally consistent with US NRC Regulatory Guide 1.111 (Reference 4). Beta air doses use undepleted X/Q's and assume a semi-infinite plume at the point of exposure. Gamma air doses are calculated using the finite cloud model presented in "Meteorology and Atomic Energy – 1968" (Reference 5). That model is implemented through the definition of an effective gamma atmospheric dispersion factor [X/Q$\gamma$] (Reference 6) and the replacement of the undepleted X/Q in the infinite cloud dose equation by [X/Q$\gamma$].

The release point of effluents is also considered in the atmospheric dispersion calculation. The primary vent stack is treated as a "mixed-mode" release, as defined in Regulatory Guide 1.111. These effluents are considered to be part-time ground level / part-time elevated releases depending on the ratio of primary vent stack exit velocity relative to the speed of prevailing wind. All other release points (e.g., Turbine Building and Chemistry lab hoods) are considered ground-level releases. The beta air and gamma air dose calculations are consistent with the models presented in Regulatory Guide 1.109 (Reference 1). The values for the dose factors, $DF_i^{\gamma}$ and $DF_i^{\beta}$, have been taken from Table B-1 in Regulatory Guide 1.109.

Table A presents the calculated maximum off-site gamma air and beta air doses for each calendar quarter and year. The calculated annual doses as a percent of the applicable regulatory limit are shown in Table C. The estimated quarterly and annual air doses resulting from noble gas effluents are well below all dose limit criteria.

## IV. Method for Calculating the Critical Organ Dose Resulting from Iodines, Tritium and Particulates with $T_{1/2}$ Greater than 8 Days in Gaseous Releases

Regulatory Guide 1.109 dose models are applied in the calculation of the critical organ doses from iodines, tritium and particulate radionuclides released into the atmosphere during reporting period. Atmospheric dispersion and deposition factors (i.e., depleted X/Q and D/Q factors) calculated with concurrent meteorological data (i.e., meteorological data measurements taken during the time of the release) are used in the determination of gaseous pathway doses. The dispersion models are described in Section B.7.3.2 & .3 of the Seabrook ODCM.

Potential exposure pathways associated with gaseous effluent are (i) external irradiation from radioactivity deposited on the ground surface, (ii) inhalation, and (iii) ingestion of vegetables (both fresh leafy and stored), meat, and milk. Dose estimates were determined for the site boundary and for the locations of the nearest resident, vegetable garden, and milk animal in each of the sixteen principle compass directions. The locations of the nearest resident, vegetable garden and milk animal in each sector were identified by the 2001 Annual Land Use Census as required by ODCM Control C.9.2.1 (see Table F). Additionally, doses were calculated at the point of approximate maximum ground level air concentration of radioactive materials in gaseous effluent. Conservatism in the dose estimates was maintained by assuming that the vegetable garden pathway was active at each milk animal location. Though not required to be part of the land use census, meat animal (cattle) locations are included in the assessment when identified. Meat and milk animals were assumed to receive their entire intake from pasture during the second and third quarters. This is a conservative assumption because most dairy operations utilize supplemental feeding when animals are on pasture, or actually restrict animals to full time silage feeding throughout the entire year. Table E provides the reference sources for dose model parameter assumptions used in the dose assessment.

The maximum organ doses were determined by summing the contributions from all exposure pathways at each location, and sorting in descending order. Doses were calculated for the whole body, GI-LLI, bone, liver, kidney, thyroid, lung, and skin for adults, teenagers, children, and infants. The estimated quarterly and annual organ doses due to iodines, tritium and particulates at the location of the maximally exposed individual are reported in Table A.

The estimated organ doses from iodines, tritium and particulates in gaseous effluents are well below the 10CFR50, Appendix I dose criteria for the reporting period (See Table C for calculated dose as a percentage of annual limit).

V. Total Dose (40 CFR Part 190)

40 CFR 190 states that the annual dose equivalent should not exceed 25 mrem to the whole body, 75 mrem to the Thyroid, or 25 mrem to any other organ of any Member of the Public from all uranium fuel cycle sources. To show compliance with this standard, the maximum doses for both the liquid and gaseous pathways from Seabrook Station are added together with the whole body dose from noble gas releases and any direct radiation component attributed to plant fixed sources to the maximum receptor location. Since there are no other uranium fuel cycle facilities within five miles of Seabrook, no additional impacts from sources beyond Seabrook Station need be considered.

The sum of the maximum annual whole body doses to Members of the Public from all exposure pathways for liquid and gaseous effluents, plus the direct external dose from station fixed sources, was 1.98E-02 mrem to a hypothetical individual at or beyond the site boundary. The maximum organ dose (including the thyroid) to any age group from all exposure pathways including direct radiation was 2.07E-02 mrem.

Table B illustrates the total dose projections from all station sources to the maximum potential off-site individual for the year 2001 and demonstrates compliance with the EPA's environmental radiation standard for the uranium fuel cycle per 10 CFR Part 190 (See Table C for total dose as a percentage of annual limit).

VI. References


1. Regulatory Guide 1.109, Revision 1,"Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10CFR Part 50, Appendix I", USNRC, October 1977.

2. Seabrook Station Offsite Dose Calculation Manual (ODCM), Revision 22.

3. Kocher, D.C., Dose-Rate Conversion Factors for Exposure to Photons and Electrons, Health Physics, Vol. 45, No. 3, Sept. 1983.

4. Regulatory Guide 1.111, Revision 1, "Method for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors", USNRC, July 1977.

5. Slade, D.H., "Meteorology and Atomic Energy – 1968", USAEC, July 1968.

6. Hamawi, J.N., "AEOLUS-2 A computer Code for the Determination of Continuous and Intermittent-Release Atmospheric Dispersion and Deposition of Nuclear Power Plant Effluents in Open-Terrain Sites, Coastal Sites, and Deep-River Valleys for the Assessment of Ensuing Doses and Finite-Cloud Gamma Radiation Exposures", Entech Engineering, Inc., March 1988.

Table A

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Maximum[a] Off-Site Doses and Dose Commitments to Members of the Public

| | | Dose (mrem)[b] | | | | |
|---|---|---|---|---|---|---|
| Release Type | | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Year[c] |
| Liquid Effluents: | | | | | | |
| Total Body Dose | | 1.51E-04 (1) | 4.28E-05 (2) | 4.22E-05 (1) | 8.45E-05 (1) | 3.21E-04 |
| Organ Dose | | 6.11E-04 (3) | 1.88E-04 (3) | 1.62E-04 (3) | 2.50E-04 (4) | 1.21E-03 |
| Airborne Effluents: | | | | | | |
| Organ Dose from Iodines, Tritium, and Particulates | | 6.13E-03 (5) | 6.56E-03 (5) | 3.66E-03 (6) | 2.66E-03 (7) | 1.90E-02 |
| Noble Gases | Beta Air (mrad) | 6.90E-05 (8) | 1.07E-05 (9) | 1.05E-03 (10) | 4.85E-04 (11) | 1.61E-03 |
| | Gamma Air (mrad) | 1.15E-04 (12) | 1.46E-05 (10) | 4.27E-04 (10) | 1.84E-04 (11) | 7.41E-04 |
| Doses (mrem) at Receptor Locations Inside Site Boundary[d]: | | | | | | |
| Science and Nature Center (SW, 488m): Organ Dose (mrem) | | 5.18E-06 (d1) | 5.26E-06 (d1) | 2.18E-06 (d1) | 1.69E-06 (d1) | 1.43E-05 |
| The "Rocks" (NE/ENE, 244m): Organ Dose (mrem) | | 1.32E-04 (d1) | 1.30E-04 (d1) | 1.77E-04 (d1) | 1.73E-04 (d1) | 6.12E-04 |
| Direct Dose From Plant Operation[e] | | | | | | 0 |

Table A (continued)

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Maximum(a) Off-Site Doses and Dose Commitments to Members of the Public

NOTES:

(a) "Maximum means the largest fraction of corresponding 10CFR50, Appendix I, dose design objective.

(b) The numbered footnotes indicate the age group, organ, and location (compass sector and distance from stack in meters) of the dose receptor, where appropriate.

(1) Adult.
(2) Child.
(3) Bone of a child.
(4) GI-LLI of an adult.
(5) Liver, kidney, lung, GI-LLI, thyroid, and whole body of a child, SW 1130m.
(6) Liver, kidney, lung, GI-LLI, thyroid, and whole body of a child, W 1315m.
(7) Liver, kidney, lung, GI-LLI, thyroid, and whole body of a child, ENE 2313m.
(8) SW 1022m.
(9) N 914m.
(10) W 974m.
(11) SSE 914m.
(12) SE 2276m.

(c) "Maximum" dose for the year is the sum of the maximum doses for each quarter. This results in a conservative yearly dose estimate, but still well within the limits of 10CFR50.

(d) For each special receptor location, the whole body and organ doses calculated for the airborne effluent releases were adjusted by the occupancy factor provided in Seabrook's ODCM (i.e., 0.0014 for the Science and Nature Center and 0.0076 for the "Rocks"). Where appropriate, the numbered footnotes indicate the organ and age group of the dose receptor:

(d1) Liver, kidney, lung, GI-LLI, thyroid, and whole body of a teen

(e) Only station sources are considered since there are no other facilities within five miles of Seabrook Station. 2001 data for the closest off-site environmental TLD locations in each sector (as listed in Table B.4-1 of Seabrook's ODCM) were compared to preoperation data from 1986-1988 for the same locations. No statistical difference which could be attributed to station sources was identified.

Table B

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Total Dose to Maximum Off-Site Individual
(40CFR190)

| Release Source | Total Body (mrem) | Maximum Organ[a] (mrem) |
|---|---|---|
| Liquids | 3.21E-04 | 1.21E-03 |
| Noble Gases | 4.54E-04 | 4.54E-04 |
| Gas Iodines, Tritium & Particulates | 1.90E-02 | 1.90E-02 |
| Direct Radiation | 0.00E+00 | 0.00E+00 |
| Annual Total | 1.98E-02 | 2.07E-02 |

(a) Maximum organ includes consideration of the thyroid.

Table C

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Calculated 2001 Maximum Doses Versus Applicable Limits

| Receptor | Applicable ODCM Control | ODCM Annual Limit | | Calculated Annual (2001) Dose | | Percent of Limit |
|---|---|---|---|---|---|---|
| Offsite | | | | | | |
| Liquid Effluents | | | | | | |
| Whole Body Dose | C.6.2.1.b | 3 | mrem | 3.21e-04 | mrem | 0.01% |
| Organ Dose | C.6.2.1.b | 10 | mrem | 1.21e-03 | mrem | 0.01% |
| Airborne Effluents | | | | | | |
| Organ Dose (iodines, tritium, and part.) | C.7.3.1.b | 15 | mrem | 1.90e-02 | mrem | 0.13% |
| Gamma Air Dose (noble gases) | C.7.2.1.b | 10 | mrad | 7.41e-04 | mrad | 0.007% |
| Beta Air Dose (noble gases) | C.7.2.1.b | 20 | mrad | 1.61e-03 | mrad | 0.008% |
| All Plant Sources (a) | | | | | | |
| Whole Body Dose | C.8.1.1 | 25 | mrem | 1.98e-02 | mrem | 0.08% |
| Organ Dose | C.8.1.1 | 25 | mrem | 2.07e-02 | mrem | 0.08% |
| Onsite (Science and Nature Center, 488m SW) | | | | | | |
| Airborne Effluents | | | | | | |
| Organ Dose (iodines, tritium, and part.) | C.7.3.1.b(b) | 15 | mrem | 1.43e-05 | mrem | 0.0001% |
| Onsite (The "Rocks", 244m NE/ENE) | | | | | | |
| Airborne Effluents | | | | | | |
| Organ Dose (iodines, tritium, and part.) | C.7.3.1.b(b) | 15 | mrem | 6.12e-04 | mrem | 0.004% |

(a) The "all plant sources" doses are the sum of the whole body doses and maximum organ doses from liquid, noble gas, and iodines/tritium/particulate releases as well as direct radiation from fixed station sources.

(b) ODCM Part A, Section 10.2 states that the annual effluent report shall include an assessment of the radiation doses from radioactive liquids and gaseous effluents to members of the public due to their activities inside the site boundary during the report period. The referenced limits (C.7.2.1.b & C.7.3.1.b) are the acceptable doses from liquid and gaseous effluents to areas at and beyond the site boundary and are considered to be appropriate for comparison purposes.

Table D

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Sources of the Values of Factors Used in Liquid Dose Equations

| Factor | Definition | Source |
|---|---|---|
| $U_{ap}$ | Usage factor | Table B.7-1, Station ODCM |
| $M_p$ | Mixing ratio | Section B.7.1, Station ODCM (value=0.1 for aquatic foods and 0.025 for shoreline) |
| $B_{ip}$ | Equilibrium bioaccumulation factor | Table A-1, Reg. Guide 1.109 |
| $D_{aipj}$ | Dose factor | Tables E-11 through E-14, R.G. 1.109 |
| $t_p$ | Nuclide transit time | Table E-15, Reg. Guide 1.109 |
| $K_c$ | Transfer coefficient from water to sediment | Reg. Guide 1.109 |
| $t_b$ | Period of activity buildup in sediment or soil | Table B.7-2, Station ODCM |
| W | Shoreline width factor | Table A-2, Reg. Guide 1.109 (value=0.5) |

Table E

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Sources of Values for the Factors Used in Dose Equations for Gaseous Releases

| Factor | Definition | Source |
|---|---|---|
| $t_b$ | Period of activity buildup in sediment or soil | Table B.7-2, Station ODCM |
| $\lambda_i$ | Nuclide decay constant | Kocher (Reference 3) |
| $DFG_{ij}$ | Ground plane dose factor | Table E-6, Reg. Guide 1.109 |
| $[X/Q]^D$ | Atmospheric dispersion factor | Calculated following Reg. Guide 1.111 |
| $R_a$ | Breathing rate | Table B.7-3, Station ODCM |
| $DFA_{ija}$ | Inhalation dose factor | Tables E-7 through E-10, Reg. Guide 1.109 |
| $d_i$ | Nuclide deposition rate | Reg. Guide 1.109 |
| P | Soil surface density | Table B.7-2, Station ODCM |
| $t_e$ | Crop, leafy vegetable, or pasture grass exposure period | Table B.7-2, Station ODCM |
| $t_h$ | Average time from crop harvest to consumption | Table B.7-2, Station ODCM |
| $Y_v$ | Agricultural productivity by unit area | Table B.7-2, Station ODCM |
| r | Fraction of deposited activity retained on crops, leafy vegetables, or pasture grass | Table E-15, Reg. Guide 1.109 |
| $B_{iv}$ | Stable element transfer coefficient from soil to produce, leafy vegetable, or pasture grass | Table E-1, Reg. Guide 1.109 |
| p | Fractional equilibrium ratio | Reg. Guide 1.109 |
| H | Ambient absolute humidity | Table B.7-2, Station ODCM |
| $F_m$ | Stable element transfer coefficient from feed to milk | Tables E-1 and E-2, Reg. Guide 1.109 |

Table E (continued)

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Sources of Values for the Factors Used in Dose Equations for Gaseous Releases

| Factor | Definition | Source |
|---|---|---|
| $t_f$ | Average time from feed to milk to consumption | Reg. Guide 1.109 |
| $f_p$ | Fraction of the year that animals graze on pasture | Table B.7-2, Station ODCM |
| $f_s$ | Fraction daily feed pasture grass | Table B.7-2, Station ODCM |
| $F_f$ | Stable element transfer coefficient from feed to meat | Table E-1, Reg. Guide 1.109 |
| $t_s$ | Average time from meat animal slaughter to consumption | Table E-15, Reg. Guide 1.109 |
| $DFI_{ija}$ | Ingestion dose factor | Tables E-11 through E-14, R.G.1.109 |
| $U_a^v$ | Annual intake of produce | Table B.7-3, Station ODCM |
| $U_a^m$ | Annual intake of milk | Table B.7-3, Station ODCM |
| $U_a^F$ | Annual intake of meat | Table B.7-3, Station ODCM |
| $U_a^L$ | Annual intake of leafy vegetables | Table B.7-3, Station ODCM |
| $f_g$ | Ingestion rate fractions for garden produce | Reg. Guide 1.109 |
| $f_l$ | Ingestion rate fractions for garden leafy vegetables | Reg. Guide 1.109 |
| $\lambda_w$ | Rate constant for activity removal from plant and leaf surfaces by weathering | Table E-15, Reg. Guide 1.109 |
| $Q_F$ | Animal consumption rate | Table E-3, Reg. Guide 1.109 |

Table F

Seabrook Station
2001 Annual Radioactive Effluent Release Report

Receptor Locations* for Seabrook Station

| Sector | Nearest Resident mile (km) | Nearest Garden mile (km) | Milk Animals within 5 Mile Radius mile (km) |
|---|---|---|---|
| N | 2.69 (4.34) | 2.83 (4.55) | --- |
| NNE | 1.89 (3.04) | 1.95 (3.15) | --- |
| NE | 1.82 (2.92) | 1.89 (3.04) | --- |
| ENE | 1.44 (2.31) | --- | --- |
| E | 1.60 (2.58) | --- | --- |
| ESE | 1.70 (2.73) | --- | --- |
| SE | 1.46 (2.36) | --- | --- |
| SSE | 2.13 (3.43) | --- | --- |
| S | 0.75 (1.21) | 2.09 (3.36) | --- |
| SSW | 0.69 (1.12) | 0.88 (1.42) | --- |
| SW | 0.70 (1.13) | 1.07 (1.73) | 3.26 (5.24) |
| WSW | 1.02 (1.64) | 1.43 (2.31) | --- |
| W | 0.82 (1.32) | 0.87 (1.40) | --- |
| WNW | 0.69 (1.11) | 0.85 (1.37) | 3.80 (6.12)<br>4.73 (7.61) |
| NW | 0.79 (1.27) | 0.79 (1.27) | 4.30 (6.93) |
| NNW | 0.63 (1.01) | 0.75 (1.21) | 3.30 (5.32) |

* Locations based on 2001 Land Use Census.

**ENCLOSURE 4 TO NYN-02043**

# Offsite Dose Calculation Manual

Revision 22

RMD Controlled Copy _____

North Atlantic

# Technical Requirements Program (TRP) 5.2

# Offsite Dose Calculation Manual

FOR INFORMATION ONLY

SORC Review: 01-063 Date: 10/10/01

Effective Date: 10-19-01

ODCM
Rev. 22

Manual Owner:
D. A. Robinson

## ABSTRACT

The Offsite Dose Calculation Manual (ODCM) contains details to implement Technical Requirements Program (TRP)5.2, "Radiological Effluent Controls and Environmental Monitoring Program." TRP5.2 implements the requirements of Technical Specifications 6.7.6g and 6.7.6h.

The Offsite Dose Calculation Manual (ODCM) is divided into two parts: (1) the Radioactive Effluent Controls Program for both in-plant radiological effluent monitoring of liquids and gases, along with the Radiological Environmental Monitoring Program (REMP) (Part A); and (2) approved methods to determine effluent monitor setpoint values and estimates of doses and radionuclide concentrations occurring beyond the boundaries of Seabrook Station resulting from normal Station operation (Part B).

The sampling and analysis requirements of the Radioactive Effluent Controls Program, specified in Part A, provide the inputs for the models of Part B in order to calculate offsite doses and radionuclide concentrations necessary to determine compliance with the dose and concentration requirements of the Station Technical Specification 6.7.6g. The REMP required by Technical Specification 6.7.6h, and as specified within this manual, provides the means to determine that measurable concentrations of radioactive materials released as a result of the operation of Seabrook Station are not significantly higher than expected.

OFFSITE DOSE CALCULATION MANUAL
(ODCM)

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PART A

RADIOLOGICAL EFFLUENT CONTROL AND ENVIRONMENTAL MONITORING PROGRAMS

## TRP5.2-1.0 INTRODUCTION

The Offsite Dose Calculation Manual (ODCM) contains details to implement Technical Requirements Program (TRP)5.2, "Radiological Effluent Controls and Environmental Monitoring Program." TRP5.2 implements the requirements of Technical Specifications 6.7.6g and 6.7.6h.

The purpose of this manual is to contain details for the implementation of the Radiological Effluent Technical Requirement Program (RETRP) and the Radiological Environmental Monitoring Program (REMP). These programs are required by Technical Specifications 6.7.6g and 6.7.6h.

Part A of this manual defines specific concentrations, sampling regimes and frequencies for both the RETRP and the REMP. These activities are the defined surveillances for radiological releases. Part A also defines specific sampling locations for the RETRP. The information contained in Part A is used as input into the models that are used in Part B. The Part B models identify the calculational methods for determining radiation monitor setpoints, offsite doses and effluent concentrations of radionuclides. Part B also defines sampling locations for the REMP. The data resulting from the surveillance and monitoring programs described in Part A provide a means to confirm that concentrations of radioactive material released, as a result of routine Seabrook Station operations, do not contribute to effluent dose significantly different than as postulated in Part B.

## TRP5.2-2.0 RESPONSIBILITIES (PART A)

All changes to the ODCM shall be reviewed by the Station Operation Review Committee (SORC), approved by the Station Director, and documented per Administrative Control 6.13 of the Technical Specifications. The change process is controlled by the Regulatory Compliance Manual (NARC) Chapter 6, §6.0, "Review, Approval, and Issue of Technical Requirements." Changes made to Part A shall be submitted to the NRC for its information in the Annual Radioactive Effluent Release Report for the period in which the change(s) was made effective, pursuant to T.S. 6.13.

It shall be the responsibility of the Station Director to ensure that the ODCM is used in the performance of the Radioactive Effluent Control and Environmental Monitoring Program implementation requirements, as identified under Administrative Controls 6.7.6g and 6.7.6h of the Technical Specifications.

## TRP5.2-3.0 DEFINITIONS

The defined terms of this section appear in capitalized type and are applicable throughout these Controls. Terms used in these Controls and not defined herein have the same definition as listed in the Technical Specifications and/or Technical Requirements. If a conflict in definition exists, the definition in the Technical Specifications takes precedence.

## TRP5.2-4 CONTROL AND SURVEILLANCE REQUIREMENTS

NOT USED

## TRP5.2-5.0 RADIOACTIVE EFFLUENT MONITORING INSTRUMENTATION

### TRP5.2-5.1 Liquids

CONTROLS

C.5.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table A.5.1-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Control C.6.1.1 are not exceeded. The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM), Part B.

APPLICABILITY: At all times.

ACTION:

a. With a radioactive liquid effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above specification, immediately suspend the release of radioactive liquid effluents monitored by the affected channel, or declare the channel inoperable.

b. With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table A.5.1-1. Restore the inoperable instrumentation to OPERABLE status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report pursuant to Technical Specification 6.8.1.4 and Part A, Section 10.2, of the ODCM, why this inoperability was not corrected in a timely manner.

SURVEILLANCE REQUIREMENTS

S.5.1 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL OPERATIONAL TEST at the frequencies shown in Table A.5.1-2.

BASES

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

Table A.5.1-2 Item 3a of Technical Requirement Program TRP5.2-C.5.1 requires that a Channel Operational Test be performed on the radioactivity monitors (RM-R-6515 and RM-R-6516) for the PCCW System. This channel operational test is a digital channel operational test and requires that it shall demonstrate automatic isolation of the pathway and control room alarm annunciation.

For Seabrook Station, these two radioactivity monitoring channels provide control room annunciation, but do not provide automatic isolation of the release pathway. This particular item was discussed in detail with the NRC staff reviewers. For this particular reason, the words "But Not Termination of Release" were added to Item 3 of Table A.5.1-2. The purpose of adding the above words to Item 3 was to preclude the addition of another Table Notation to Table A.5.1-2. Therefore, the channel operational test for these monitors only requires that they provide control room alarm annunciation.

The CHANNEL CHECK for Flow Rate Measurement Devices (Table A.5.1-2, items 2.a. and 2.b. ) is required "at least once per 24 hours on **days when continuous, periodic, or batch releases are made.**" Additionally, ACTION 31 of Table A.5.1-1 is only applicable during actual releases.

Based on the above requirements, these instruments are only required to be OPERABLE during actual releases. Therefore, the CHANNEL CHECK is only required during periods when continuous, periodic, or batch releases are being made.

The Primary Component Cooling Water (PCCW) System is monitored by radiation monitors, which are required by Technical Specifications 3.3.3.1 and C.5.1 to be OPERABLE, or sampling of the PCCW and Service Water (SW) Systems is required. Clarification of this requirement needs to be made for certain PCCW System conditions. Below is a list of 3 conditions and their corresponding requirements.

1) If the PCCW System is shut down but not drained, grab samples shall be taken of PCCW and SW, as required in Technical Specification Table 3.3-6, Items 6a and 6b (Action 28).

2) During transition times when the PCCW system is in the process of being drained, grab samples, as required by Technical Specification Table 3.3-6, shall be taken until such time as sampling of PCCW is no longer possible. At this time neither PCCW nor SW need to be sampled. During transition times when the PCCW system is being filled, the taking of grab samples shall commence as soon as physically possible and continue in accordance with the requirements of Technical Specifications 3.3.3.1 and C.5.1 until PCCW is in service, the pumps are operating, and monitors are operable.

3) When PCCW is drained, there are no sampling requirements.

The above statements are consistent with the Technical Specification definition of OPERABILITY and with the Bases for Technical Specification 3.3.3.1.

The following actions are required when the Service Water side of the Primary Component Cooling Water (PCCW) Heat Exchanger is drained and grab samples of the Service Water System are required:

a. Grab samples from the Service Water System will be obtained at the frequencies specified in Technical Specification 3.3.3.1 and C.5.1 as the Service Water System is being drained until obtaining these samples is not physically possible.

b. Grab samples are not required once the Service Water System is drained such that it is not physically possible to obtain the samples.

c. When refilling the Service Water System, grab samples shall resume as soon as physically possible, at the intervals specified in the aforementioned sources, and continue until the PCCW radiation monitors (1-RM-6515 and 1-RM-6516) are OPERABLE.

Sampling of the PCCW system with the Service Water system drained and the PCCW system in operation shall continue per the requirements of Technical Specification 3.3.3.1 and this Technical Requirement.

The purpose of the plant radiation monitors is to sense radiation levels in selected plant systems and locations and determine whether or not predetermined limits are being exceeded. In the case of the Primary Component Cooling Water (PCCW) loops, the radiation monitors (1-RM-6515 and 1-RM-6516) sense radiation in the PCCW system which could leak into the Service Water System and be discharged to the environment via the multiport diffuser. Per Technical Requirement C.6.1.1, the concentration of radioactive material released in liquid effluents at the point of discharge from the multiport diffuser must be within specified limits. This limitation provides assurance that the levels of radioactive materials in unrestricted areas will not pose a threat to the health and safety of the public.

Based on the importance of maintaining radioactive effluent releases within limits that guarantee the health and safety of the public will not be at risk, the PCCW radiation monitors are required to be in operation at all times. When a radiation monitor is inoperable, grab samples from the PCCW and Service Water systems must be obtained and analyzed as a compensatory measure in accordance with Technical Specification 3.3.3.1, Table 3.3-6 Action 28, and this Technical Requirement. If the service water system is drained, there is no potential for inadvertent radioactive liquid effluent release through the service water system to the environment via the multiport diffuser. Thus, when the system is drained there is no need to obtain the grab sample. However, when the system is being filled, grab samples must be obtained as soon as possible to ensure that the water discharged to the environment is in compliance with Technical Requirement TRP5.2-C.6.1.1.

The purpose of the PCCW monitors is to detect radioactivity indicative of a leak from the Reactor Coolant System or from one of the other radioactive systems which exchange with the PCCW System. These monitors are required to be operable at all times. Grab samples of PCCW are required when the PCCW monitors are not operable. Since the purpose of obtaining the PCCW samples is to provide an indication of a leak of radioactive liquid into the PCCW system, draining of the Service Water system does not remove the reason for obtaining the PCCW grab samples. These samples shall be obtained as specified in Technical Specification 3.3.3.1 and this Technical Requirement. This determination is consistent with the Bases for Technical Specification 3.3.3.1.

The temporary lowering of an RDMS channel setpoint, by RDMS data base manipulation to verify alarm/trip functions, does not prevent the channel from continuously monitoring radiation levels (except WRGM). Additionally, when the setpoint is lowered below background radiation levels the associated trip functions will actuate equipment in their required operating mode as if a high radiation condition exists. The channel remains OPERABLE because monitoring and associated trip functions are not inhibited. Refer to TS-142 for further details.

When the SGBD demineralizers are being rinsed to the ocean using SGBD water, the SGBD flash tank radiation monitor (RM-6519) may become inoperable in this alignment from decreased backpressure to run the monitor sample pump. If this happens, the sampling requirements of Table A.5.1-1 ACTION 30 must be performed.

RM-6509, although in the flowpath of the SGBD demineralizer rinse, cannot perform the function of RM-6519 because it cannot achieve the same sensitivity to radiation. However, RM-6509 shall have its setpoints established per plant procedures since the discharge flow path is through the SGBD demineralizers (where a potential to acquire radioactivity exists), but after RM-6519.

If RM-6509 is inoperable, then in addition to the periodic sampling requirements of Table A.5.1-1 ACTION 30 for RM-6519, the batch sample and lineup verification of ACTION 29 would also have to be complied with, for RM-6509.

It should be noted that, during a SGBD demineralizer rinse to the discharge transition structure with SB liquid, SB-FE-1918 is not in the flow path. It is acceptable to use a flow monitoring device in the final flow path (such as WL-FIT-1458) so that Table A.5.1-1 ACTION 31 does **NOT** have to be entered.

The Note which corresponds to Table A.5.1-1 "**" states that pump performance curves generated in place "should" be used to estimate flow. Hence, there is no requirement to use the pump curves as described in these tables.

## TABLE A.5.1-1

## RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

| INSTRUMENT | MINIMUM CHANNELS OPERABLE | ACTION |
|---|---|---|
| 1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | |
| a. Liquid Radwaste Test Tank Discharge | 1 | 29 |
| b. Steam Generator Blowdown Flash Tank Drain | 1* | 30 |
| c. Turbine Building Sump Effluent Line | 1 | 30 |
| 2. Flow Rate Measurement Devices | | |
| a. Liquid Radwaste Test Tank Discharge | 1 | 31 |
| b. Steam Generator Blowdown Flash Tank Drain | 1* | 31 |
| c. Circulating Water Discharge | 1** | N.A. |
| 3. Radioactivity Monitors Providing Alarm but Not Termination of Release | | |
| a. Primary Component Cooling Water System (in lieu of service water monitors) | 1 | 32 |
| 4. Rate of Change Monitor | | |
| a. Primary Component Cooling Water System Head Tank (in lieu of service water monitors) | 1 | 33 |

*Only applicable when steam generator blowdown is directed to the discharge transition structure without intermediate collection. The required radiation monitoring channel is RM-6519. The flow path must include a flow indicator which can be used to provide total flow discharged during period of interest.
**Pump performance curves generated in place should be used to estimate flow.

TABLE A.5.1-1

(Continued)

ACTION STATEMENTS

ACTION 29 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided that prior to initiating a release

a. At least two independent samples are analyzed in accordance with Surveillance S.6.1.1, and

b. At least two technically qualified members of the station staff independently verify the release rate calculations and discharge line valving.

Otherwise, suspend release of radioactive effluents via this pathway.

ACTION 30 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are analyzed for radioactivity at a lower limit of detection of no more than $10^{-7}$ microCurie/ml

a. At least once per 12 hours when the specific activity of the secondary coolant is greater than 0.01 microCurie/gram DOSE EQUIVALENT I-131, or

b. At least once per 24 hours when the specific activity of the secondary coolant is less than or equal to 0.01 microCurie/gram DOSE EQUIVALENT I-131.

ACTION 31 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves generated in place may be used to estimate flow.

ACTION 32 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, collect grab samples daily from the Primary Component Cooling Water System and the Service Water System and analyze the radioactivity until the inoperable channel(s) is restored to OPERABLE status.

ACTION 33 - With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the radioactivity level is determined at least once per 12 hours during actual releases.

TABLE A.5.1-2

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| INSTRUMENT | CHANNEL CHECK | SOURCE CHECK | CHANNEL CALIBRATION | CHANNEL OPERATIONAL TEST |
|---|---|---|---|---|
| 1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release | | | | |
| a. Liquid Radwaste Test Tank Discharge | D | P | R(2) | P(1) |
| b. Steam Generator Blowdown Flash Tank Drain | D | M | R(2) | Q(1) |
| c. Turbine Building Sumps Effluent Line | D | M | R(2) | Q(1) |
| 2. Flow Rate Measurement Devices | | | | |
| a. Liquid Radwaste Test Tank Discharge* | D(3) | N.A. | R | N.A. |
| b. Steam Generator Blowdown Flash Tank Drain*** | D(3) | N.A. | R | N.A. |
| c. Circulating Water Discharge | ** | N.A. | N.A. | N.A. |
| 3. Radioactivity Monitor Providing Alarm but Not Termination of Release | | | | |
| a. Primary Component Cooling Water System (in lieu of service water monitors) | D | M | R(2) | Q(1) |
| 4. Rate of Change Monitor | | | | |
| a. Primary Component Cooling Water System (in lieu of service water monitors) | D(4) | N.A. | R | N.A |

*Isolation of the flow path is accomplished by the Waste Test Tank Discharge Pump Trip Circuitry.
**Pump curves may be used to estimate flow.
***Applies to the flow indicator used in the discharge path when steam generator blowdown is directed to the discharge transition structure without intermediate collection.

TABLE A.5.1-2
(Continued)

TABLE NOTATIONS

(1) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occurs if the instrument indicates measured levels above the normal or Surveillance test Alarm/Trip Setpoint.

(2) The initial channel calibration for radioactivity measurement instrumentation shall include the use of a known (traceable to National Institute for Standards and Technology) liquid radioactive source positioned in a reproducible geometry with respect to the sensor. These standards shall permit calibrating the system over its normal operating range of energy and rate. For subsequent channel calibrations, sources that have been related to the initial calibration shall be used.

(3) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once per 24 hours on days on which continuous, periodic, or batch releases are made.

(4) CHANNEL CHECK shall consist of verifying indication of tank level during periods of release. CHANNEL CHECK shall be made at least once per 24 hours.

## TRP5.2-5.2 Radioactive Gaseous Effluent Monitoring Instrumentation

CONTROLS

C.5.2 The radioactive gaseous effluent monitoring instrumentation channels shown in Table A.5.2-1 shall be OPERABLE with their Alarm/Trip Setpoints set to ensure that the limits of Control C.7.1.1 are not exceeded. The Alarm/Trip Setpoints of these channels meeting Control C.7.1.1 shall be determined and adjusted in accordance with the methodology and parameters in the ODCM (Part B).

APPLICABILITY: As shown in Table A.5.2-1.

ACTION:

a. With a radioactive gaseous effluent monitoring instrumentation channel Alarm/Trip Setpoint less conservative than required by the above specification, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel, or declare the channel inoperable.

b. With the number of OPERABLE radioactive gaseous effluent monitoring instrumentation channels less than the Minimum Channels OPERABLE, take the ACTION shown in Table A.5.2-1. Restore the inoperable instrumentation to OPERABLE status within 30 days or, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report pursuant to Technical Specification 6.8.1.4 and Part A, Section 10.2, of the ODCM, why this inoperability was not corrected in a timely manner.

SURVEILLANCE REQUIREMENTS

S.5.2 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated OPERABLE by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION and CHANNEL OPERATIONAL TEST at the frequencies shown in Table A.5.2-2.

BASES

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM (Part B) to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. The sensitivity of any noble gas activity monitors used to show compliance with the gaseous effluent release requirements of Control C.7.2.1 shall be such that concentrations as low as $1 \times 10^{-6}$ μCi/cc are measurable.

The main condenser air evacuation radiation monitor, RM-6505, is identified in the footnotes of Tables A.5.2-1 and A.5.2. Hence, RM-6505 is a TR radiation monitor. Table A.5.2-1 defines the minimum channels operable and the required actions for the radioactive gaseous effluent monitoring instrumentation. Table A.5.2-2 lists the surveillance requirements for this instrumentation. As a conservative action, Chemistry procedures incorporate compensatory sampling requirements in the event RM-6505 is not functional. Since RM-6505 is a TR radiation monitor, it must comply with the requirements of C.5.2 Action b. Specifically, if the monitor is out-of-service for greater than 30 days, then an explanation must be included in the Annual Radioactive Effluent Release Report why this out-of-service condition was not corrected in a timely manner. The sampling frequency is once per 12 hours, with analysis to be performed within 24 hours. This is consistent with the sampling frequency for effluent monitors subject to surveillance requirements.

It is recommended that the out-of-service time for RM-6505 be tracked for reporting per C.5.2. (Reference ACR 96-197).

The Plant Vent Wide Range Gas Monitor (WRGM) design includes three ranges of noble gas monitors and two ranges of iodine and particulate sampling filters. The noble gas monitor, the equipment necessary to provide flow through three ranges of the noble gas monitors, and the iodine and particulate sample filters all affect the operability of the WRGM. The various combinations of out-of-service components are addressed in this clarification.

The WRGM noble gas activity monitor has three overlapping detector ranges: low, mid, and high.

UFSAR Table 12.3-15 lists the following ranges for the WRGM:

Low Range $10^{-7}$ - $10^{-1}$ µCi/cc
Mid Range $10^{-3}$ - $10^{3}$
High Range $10^{-1}$ - $10^{5}$

The minimum number of operable channels for the noble gas activity monitor, the flow rate monitors and the iodine sampler and particulate sampler is one, respectively .

The TRP5.2 Controls do not list the specific WRGM noble gas activity monitor, the iodine/particulate sampler or the flow rate monitor channels separately by an instrumentation identification tag number.

Heat tracing of the sample lines, from the plant vent to the WRGM, is not listed as a Technical Requirement for WRGM operability. However, these circuits are necessary to ensure that the particulate and iodine concentration of the sample reaching the WRGM is representative of the effluent. The heat tracing maintains the sample lines at a temperature of approximately 120°F, ensuring that the lines are free of moisture due to condensation. The low temperature alarm setpoint is 105°F. The ability to detect of noble gases is not affected by the operational status of the heat tracing circuits.

The heat tracing on the sample lines within the PAB (CP 433, circuit 55) is not required for WRGM operation. (Engineering Evaluation, SS-EV-960017)

The following equipment normally defines an operational WRGM:

During routine releases,

-Sample flow through one of the particulate and iodine (P&I) filters F-156-1,2,3 and channel 1 (low range) noble gas (NG) detectors using pump P-240-2, and

-Sample flow through P&I filters F-156-7,8 using pump RM-P-391.

or in the event the noble gas activity is in the mid/high range,

-Sample flow through one of the particulate/iodine (P&I) filters F-156-4,5,6 and channels 2 or 3 (mid/high range) NG detectors using pump P-240-1, and

-Sample flow bypassing P&I filters F-156-7,8 using pump RM-P-391.

At all times,

-Heat tracing (HT) on the sample lines from the plant vent to the WRGM.

Note: Dewpoint measurements may be used if heat tracing is out of service. (See the following table)

-Vent stack flow rate monitor.

-WRGM sample flow rate for the channel(s) in service.

The table below lists the action required in the event that a WRGM component is out of service.

| Out of Service Component | Action |
|---|---|
| Low range NG detector | Enter Action 33. Perform grab sampling as required. |
| High range NG detector | Enter Action 33. The actions required by Action 33 are satisfied provided the Low range NG detector provides continuous indication of the effluent concentrations, grab sampling not required. In the unlikely event that elevated effluent concentrations above the capability of the low range detector are present, then grab sampling or backup monitoring will/may be required. |
| Mid range NG detector | No action required, detection capability met by the overlapping ranges of the low and high NG detectors. (May need to ensure that the high range pump [RM-P-240-1] starts on increasing activity.) |
| RM-P-391 | Enter Action 35. The mid and high range particulate and iodine sampling capability is lost. If a low range P&I filter F-156-1,2 or 3 is in service then no further action is required. If the low range P&I filters are out of service then comply with Action 35 within one hour. |

| | |
|---|---|
| P-240-1 (High range pump) | Enter Action 33 and 35. Action 33 is satisfied provided the low range NG detector provides continuous indication of the effluent concentrations, grab sampling is not required. Action 35 is satisfied if P-240-2 , and filters F-156-1,-2, or -3 are in service. If these P&I filters are out of service and the NG activity is in the low range, then ensure compliance with Action 35 within one hour of identifying the out of service condition. In the unlikely event that elevated effluent concentrations above the capability of the low range detector are present, then, with P-391 operating, install a portable sample pump across valves V28 and V29 to facilitate P&I grab sampling using filters F-156-4,-5, or -6, and noble gas sampling using the medium and high range detectors. |
| P-240-2 (Low range pump) | Enter Action 33 and 35. Action 33 is satisfied by performing grab samples. Action 35 is satisfied by ensuring the operation of P-391 with filters F-156-7 & 8 in service within one hour of identifying the out-of-service condition. |
| HT circuit:<br>CP-434 Ckt. 28.<br>(Sample line temperature less than 105°F.) | Enter Action 36. Action 36 is satisfied and the WRGM may remain OPERABLE with CP-434 Ckt 28 out of service provided that CP-426 Ckt. 46 is energized within 1 hr of the out-of-service condition. |
| Flow rate monitor and/or sampler flow rate monitor. | Comply with Action 32. |

Action Statement 35 provides no guidance with regard to time required to initiate auxiliary sampling upon failure of a monitor. A finite time is required to take the appropriate actions to initiate auxiliary sampling. An interval of 60 minutes is a reasonable period of time in which to accomplish these actions provided that no activity occurs during this period which could result in an increase in radiation release levels.

Since the intent of Action 35 is to allow continued release of gaseous effluents provided an alternate means of continuous monitoring/collection capability is on-going during the release of radioactive gaseous effluents, the 60 minute time frame for auxiliary sampling to be established is still a reasonable period of time to complete the necessary manual actions to establish auxiliary sampling. If auxiliary sampling cannot be established within 60 minutes then the initial action of immediately suspending the release of radioactive gaseous effluents should be done, as specified in Action a. of C.5.2. It should be noted that for lack of specified criteria the 60 minute time period is solely based on prudent engineering judgment for completion of manual actions in order to satisfy the intent of Action 35. Operation beyond 60 minutes without auxiliary sampling service would need to be justified by engineering calculation to ensure continued compliance with 10 CFR Part 20 limits.

On those occasions when a radiation monitor or any system/component must be rendered inoperable to perform a surveillance test, the Station Management Manual (SSMM) policy regarding "the use of ACTION requirements to perform maintenance or a test" applies.

When a surveillance test must be performed on the WRGM, rendering it inoperable, Action 35 cannot be fully satisfied because of the nature of testing is incompatible with the Action 35 required installation of auxiliary sampling equipment. However, because the performance of the WRGM surveillance renders it inoperable for only a short period of time (e.g., less than one hour), it is reasonable to allow the surveillance test to be performed without the installation of the auxiliary sampling equipment. It should be noted that neither C.5.2 Action a. nor Action b. requires the immediate establishment of auxiliary sampling. However, if there is concern that the results of surveillance testing activities will identify the instrumentation as inoperable then it would be prudent to set up the auxiliary sampling equipment prior to surveillance testing. The prudent action would prevent the potential situation of continued release of gaseous effluents beyond 60 minutes without continuous monitoring/collection capability.

The current procedural method of collecting the grab sample from the plant vent release pathway requires the shutdown of the compensatory sampling equipment pump (for pressure equilibrium purposes) whenever a grab sample is to be withdrawn into the sample bottle. Shutting down the pump raises the question as to whether this action contradicts the "continuous collection" requirement of Action 35.

Action 35 allow effluent release to continue provided samples are continuously collected (as required in Table A.7.1-1) with auxiliary equipment whenever the number of channels OPERABLE is less than the Minimum Channels OPERABLE requirement. Table A.7.1-1 requires that the sampling frequency be continuous for iodine and particulate and a monthly grab sample for noble gasses (Kr and Xe). The ODCM also requires that the ratio of the sample flow rate to the sampled stream flow rate be known/determined for the time period covered by each dose or dose rate calculation made in accordance with TR C.7.1.1, C.7.2.1, and C.7.3.1 (i.e., weekly and/or monthly).

It must be noted that Action 35 pertains to the iodine and particulate samplers. For noble gas collection, Action 33 is applicable which requires grab samples be taken once per 12 hours and analyzed for radioactivity within 24 hours. Action 33 does not specify that auxiliary sampling for noble gas must be continuous; therefore, the concern for "continuous" monitoring/collection is not applicable for auxiliary sampling of noble gas.

Whenever the station is operating under the auspices of Action 35 the process of collecting grab samples by the auxiliary sampling method necessitates, on occasions, the temporary disablement of permanent and/or temporary equipment (e.g., installation, and disconnection of auxiliary sampling equipment, pressure equalization, etc.) in order to achieve and comply with the requirements of Action 35. Therefore, actions required (e.g. temporarily shutting down the sample pump in order to install / remove / equalize sample bottles, thus interrupting continuous flow) to obtain a grab sample are not considered actions that are contrary in meeting the intent of Action 35.

The temporary lowering of an RDMS channel setpoint, by RDMS data base manipulation to verify alarm/trip functions, does not prevent the channel from continuously monitoring radiation levels (except WRGM). Additionally, when the setpoint is lowered below background radiation levels the associated trip functions will actuate equipment in their required operating mode as if a high radiation condition exists. The channel remains OPERABLE because monitoring and associated trip functions are not inhibited. Refer to TS-142 for further details. Therefore, during performance of a RDMS channel DCOT, the LCO remains satisfied. Entering an ACTION statement is not appropriate nor required (except for WRGM DCOT). However, because the channel is in alarm status, increased operator vigilance is required to note any increase in radiation levels during the DCOT surveillance period and to take remedial actions if required.

TRC.5.2 ACTION Statement #33 is applied if RM-6504 is inoperable. The intent of the last sentence is that RM-6503 may be used instead of taking a grab sample. It is not intended that RM-6503 be used in place of RM-6504 and ACTION Statement #33 not entered.

RM-6504 monitors the radiation level of the gas stream at the outlet of the waste gas compressors. If a high radiation level is detected, RM-6504 automatically closes WG-FV-1602. The closing of WG-FV-1602 isolates a potential radiological release path to the environment. RM-6503, located at the inlet to the waste gas compressor, provides alarm and monitoring functions only. It does not have the ability to terminate a radiological release. Therefore, it cannot be used as a substitute for RM-6504.

TRC.5.2 ACTION b. permits operations to continue for up to 30 days with an inoperable instrument channel. If the inoperable instrument is not returned to OPERABLE status within this time, a report must be submitted explaining why the inoperability was not corrected in a timely manner. If RM6503 were considered a alternate for RM-6504 then operations could continue indefinitely without the ability to automatically terminate a radiological release. This is clearly not the intent of TRC.5.2 ACTION Statement #33.

Table A.5.2-1, Radioactive Gaseous Effluent Monitoring Instrumentation, specifically lists RM-6504 as the instrument required to satisfy the Limiting Condition for operation. This table also states that the monitor provide the functions of alarm and automatic termination of release.

## TABLE A.5.2-1

## RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

| INSTRUMENT | | MINIMUM CHANNELS OPERABLE | APPLICABILITY | ACTION |
|---|---|---|---|---|
| 1. | (Not Used) | | | |
| 2. | PLANT VENT-WIDE RANGE GAS MONITOR | | | |
| | a. Noble Gas Activity Monitor | 1 | * | 33 |
| | b. Iodine Sampler | 1 | * | 35 |
| | c. Particulate Sampler | 1 | * | 35 |
| | d. Flow Rate Monitor | 1 | * | 32 |
| | e. Sampler Flow Rate Monitor | 1 | * | 32 |
| 3. | GASEOUS WASTE PROCESSING SYSTEM (Providing Alarm and Automatic Termination of Release - RM-6504) | | | |
| | a. Noble Gas Activity Monitor (Process) | 1 | * | 33 |
| 4. | TURBINE GLAND SEAL CONDENSER EXHAUST# | | | |
| | a. Iodine Sampler | 1 | *** | 35 |
| | b. Particulate Sampler | 1 | *** | 35 |
| | c. Sampler Flow Rate Indicator | | *** | 32 |

* At all times.
** (Not Used.)
*** When the gland seal exhauster is in operation.
\# Noble Gas Monitor for this release point is based on the main condenser air evacuation monitor (RM-6505) when the gland seal exhauster is in operation. See Action 34.

TABLE A.5.2-1
(Continued)

ACTION STATEMENTS

ACTION 32 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided the flow rate is estimated at least once per 4 hours.

ACTION 33 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided grab samples are taken at least once per 12 hours and these samples are analyzed for radioactivity within 24 hours. For RM-6504, RM-6503 may be used instead of taking grab samples (see Bases for reporting requirements).

ACTION 34 - With RM-6505 INOPERABLE and the gland seal exhauster in operation, effluent releases via the turbine gland seal condenser exhaust may continue provided grab samples from condenser air evacuation pump effluent are taken at least once per 12 hours, and analyzed for radioactivity within 24 hours.

ACTION 35 - With the number of channels OPERABLE less than the Minimum Channels OPERABLE requirement, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in this document.

Auxiliary sampling must be initiated within 60 minutes. Additionally, the auxiliary sampling equipment need not be installed during surveillance activities provided the surveillance testing is completed in less than one hour. Actions required (e.g., temporarily shutting down the sample pump in order to install / remove / equalize sample bottles, thus interrupting continuous flow) to obtain a grab sample are not considered actions that are contrary in meeting the intent of this Action.

ACTION 36 - If, for any reason, the sample line temperature cannot be maintained above 105°F, the WRGM may remain OPERABLE provided dewpoint measurements are obtained every 12 hours verifying that conditions do not exist for condensation in the sample line with the inservice operating sample pump. (CX0901.38)

## TABLE A.5.2-2

## RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

| INSTRUMENT | CHANNEL CHECK | SOURCE CHECK | CHANNEL CALIBRATION | CHANNEL OPERATIONAL TEST | MODES FOR WHICH SURVEILLANCE IS REQUIRED |
|---|---|---|---|---|---|
| 1 (Not Used) | | | | | |
| 2. PLANT VENT-WIDE RANGE GAS MONITOR | | | | | |
| a. Noble Gas Activity Monitor | D | M | R(3) | Q(2) | * |
| b. Iodine Sampler | W | N.A | N.A. | N.A. | * |
| c. Particulate Sampler | W | N.A. | N.A. | N.A. | * |
| d. Flow Rate Monitor | D | N.A. | R | Q**** | * |
| e. Sampler Flow Rate Monitor | D | N.A. | R | Q**** | * |
| 3. GASEOUS WASTE PROCESSING SYSTEM (Providing Alarm and Automatic Termination of Release) | | | | | |
| a. Noble Gas Activity Monitor (Process) | D | N.A. | R(5) | Q(1) | * |
| 4. TURBINE GLAND SEAL CONDENSER EXHAUST# | | | | | |
| a. Iodine Sampler | W | N.A. | N.A. | N.A. | *** |
| b. Particulate Sampler | W | N.A. | N.A. | N.A. | *** |
| c. Sampler Flow Rate Indicator | D | N.A. | N.A. | N.A. | *** |

TABLE A.5.2-2
(Continued)

TABLE NOTATIONS

* At all times.

** (Not Used.)

*** When the gland seal exhauster is in operation.

**** The CHANNEL OPERATIONAL TEST for the flow rate monitor shall consist of a verification that the Radiation Data Management System (RDMS) indicated flow is consistent with the operational status of the plant.

\# Noble Gas Monitor for this release point is based on the main condenser air evacuation monitor.

(1) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occurs if the instrument indicates measured levels above the normal or Surveillance test Alarm/Trip Setpoint.

(2) The DIGITAL CHANNEL OPERATIONAL TEST shall also demonstrate that Control Room alarm annunciation occurs if the instrument indicates measured levels above the normal or Surveillance test Alarm Setpoint.

(3) The initial channel calibration for radioactivity measurement instrumentation shall include the use of a known (traceable to National Institute for Standards and Technology) radioactive source positioned in a reproducible geometry with respect to the sensor. These standards should permit calibrating the system over its normal operating range of rate capabilities. For subsequent channel calibrations, sources that have been related to the initial calibration shall be used.

(4) (Not Used).

(5) The CHANNEL CALIBRATION shall be performed using sources of various activities covering the measurement range of the monitor to verify that the response is linear. Sources shall be used to verify the monitor response only for the intended energy range.

## TRP5.2-6.0 RADIOACTIVE LIQUID EFFLUENTS

### TRP5.2-6.1 Concentration

CONTROLS

C.6.1.1 The concentration of radioactive material released in liquid effluents at the point of discharge from the multiport diffuser (see Technical Specifications Figure 5.1-3) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2 \times 10^{-4}$ microCurie/ml total activity.

APPLICABILITY: At all times.

ACTION:

With the concentration of radioactive material released in liquid effluents at the point of discharge from the multiport diffuser exceeding the above limits, restore the concentration to within the above limits within 15 minutes.

SURVEILLANCE REQUIREMENTS

S.6.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program specified in Table A.6.1-1.

S.6.1.2 The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in Part B of the ODCM to assure that the concentrations at the point of release are maintained within the limits of Control C.6.1.1.

BASES

This Control is provided to ensure that the concentration of radioactive materials released in liquid waste effluents at the point of discharge from the multipart diffuser will be less than the concentration levels specified in 10 CFR Part 20, Appendix B to 20, Table II, Column 2 (most restrictive). This limitation provides additional assurance that the levels of radioactive materials in bodies of water in UNRESTRICTED AREAS will result in exposures within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to a MEMBER OF THE PUBLIC, and (2) the limits of Appendix I, 10 CFR Part 20.106(e) to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

Technical Requirements C.6.1.1 and C.5.1 provide controls to ensure that the concentration of radioactive materials released in liquid waste effluents at the point of discharge from the multiport diffuser will be less than the concentration levels specified in 10CFR20, Appendix B, Table II, Column 2. As no LLD is specified for the compensatory samples taken for an inoperable PCCW Head Tank Rate of Change Monitor, the LLD for these samples must ensure that these limits are met.

Although the periodic Service Water System sample is counted to an LLD of $5x10^{-7}\mu Ci/cc$, the compensatory samples for inoperable SGBD Flash Tank and Turbine Building Sump Monitors are required to be counted to an LLD of $1x10^{-7}\mu Ci/cc$. This more restrictive limit will ensure that the limits of 10CFR20 are met during periods of PCCW Head Tank Rate of Change Monitor inoperability, thereby ensuring compliance with the requirements of the Technical Requirements.

Counting the required grab samples to an LLD of $1x10^{-7}\mu Ci/cc$ is therefore an acceptable method of complying with these requirements; it is not necessary to meet the LLD of $1x10^{-8}\mu Ci/cc$ specified as the equivalent sensitivity of the PCCW Head Tank Rate of Change Monitor.

For technical requirements associated with the release of liquid and gaseous effluents, the method currently in use for controlling releases to within the "old" 10CFR20.106, Appendix B concentration MPC limits based on "instantaneous" concentration values is suitable for demonstrating conformance to the requirements of the "new" 10CFR Part 20, Appendix B ECL concentration limits. Controlling liquid and gaseous effluents to within the MPC values based on an instantaneous release rate (i.e., no time averaging of effluent concentrations ) is considered to be more conservative than the requirements of the new Part 20 which have limits stated as effluent concentrations averaged over a year. In other words, if discharged liquid and gaseous effluents remain within instantaneous concentration limits as required in the Technical Requirements during the times that discharge actually take place, then, we are confident that the annual average limits associated with the new Part 20 ECL values will also be met. This position is based on an NRC issued letter, dated June 30, 1993, from Thomas E. Murley, then Director, Office of Nuclear Reactor Regulation, to Thomas E. Tipton of NEI, formally NUMARC, in which the Nuclear Regulatory Commission responded to an industry inquiry on promulgation of a new Part 20. In the letter the Nuclear Regulatory Commission stated:

"After careful review of your position and other relevant factors, we have determined that it is acceptable to the staff for licensees to retain their existing level of effluent control as implementing the ALARA requirement after January 1, 1994, without submitting individual requests for amending their technical specifications to comply with new 10 CFR 20.1101(b)."

The letter goes on to say, "... we are preparing a Generic Letter to provide model Technical Specification wording to ensure conformance with the revised Part 20 requirements." and, "The model changes for Technical Specifications that will be in the Generic Letter are intended to eliminate possible confusion or improper implementation of revised Part 20 requirements."

Since then, the NRC has canceled its plan to issue a Generic Letter so as to devote more resources to conversion reviews and additional reviews to the Improved Standard Technical Specifications (ITS). Seabrook Station will continue to comply to the requirements of "old" Part 20, i.e., 10 CFR 20.1 - 20.601, and its Appendices for release of radioactive liquid and gaseous effluents. All other effluent controls must abide by the requirements of "new" Part 20.

TABLE A.6.1-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

| Liquid Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection (LLD) [1] (μCi/ml) |
|---|---|---|---|---|
| A. Liquid Radwaste Test Tanks | P Each Batch | P Each Batch | Principal Gamma Emitters[3] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| (Batch Release)[2] | P One Batch/M | M | Dissolved and Entrained Gases (Gamma Emitters) | $1x10^{-5}$ |
| | P Each Batch | M[4] Composite | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | P Each Batch | Q[4] Composite | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1x10^{-6}$ |
| B. Turbine Building Sump Effluent[8] | W Grab Sample | W | Principal Gamma Emitters[3] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| (Continuous Release)[5] | W Grab Sample | M | Dissolved and Entrained Gases (Gamma Emitters) | $1x10^{-5}$ |

TABLE A.6.1-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
(Continued)

| Liquid Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection (LLD) [1] (μCi/ml) |
|---|---|---|---|---|
| B. (Continued) | W Grab Sample | M | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | W Grab Sample | Q (9) | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1X10^{-6}$ |
| C. Steam Generator Blowdown Flash Tank[6][8] (Continuous Release)[5] | W Grab Sample | W | Principal Gamma Emitters[3] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| | W Grab Sample | M | Dissolved and Entrained Gases (Gamma Emitters) | $1x10^{-5}$ |
| | W Grab Sample | M | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | W Grab Sample | Q(9) | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1x10^{-6}$ |

TABLE A.6.1-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
(Continued)

| Liquid Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection (LLD) [1] ($\mu$Ci/ml) |
|---|---|---|---|---|
| D. Service Water[7] | W Grab Sample | W | Principal Gamma Emitters[3] | $5x10^{-7}$ |
| | | | I-131 | $1x10^{-6}$ |
| | W Grab Sample | M | Dissolved and Entrained Gases (Gamma Emitters) | $1x10^{-5}$ |
| | W Grab Sample | M | H-3 | $1x10^{-5}$ |
| | | | Gross Alpha | $1x10^{-7}$ |
| | W Grab Sample | Q | Sr-89, Sr-90 | $5x10^{-8}$ |
| | | | Fe-55 | $1x10^{-6}$ |

P - Prior to Discharge
W - Weekly
M - Monthly
Q - Quarterly

TABLE A.6.1-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
(Continued)

Notations

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\, S_b}{E \times V \times 2.22 \times 10^6 \times Y \times \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microcurie per unit mass or volume),

4.66 = a constant derived from the $K_{alpha}$ and $K_{beta}$ values for the 95% confidence level;

$S_b$ = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

$2.22 \times 10^6$ = the number of disintegrations per minute per microcurie,

Y = the fractional radiochemical yield, when applicable,

$\lambda$ = the radioactive decay constant for the particular radionuclide ($s^{-1}$), and

$\Delta t$ = the elapsed time between the midpoint of sample collection and the time of counting(s).

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

(2) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling.

TABLE A.6.1-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
(Continued)

Notations
(Continued)

(3) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report in accordance with Technical Specification 6.8.1.4. Isotopes which are not detected should be reported as "not detected." Values determined to be below detectable levels are not used in dose calculations.

(4) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

(5) A continuous release is the discharge of liquid wastes of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

(6) Sampling and analysis is only required when Steam Generator Blowdown is directed to the discharge transition structure.

(7) Principal gamma emitters shall be analyzed weekly in Service Water. Sample and analysis requirements for dissolved and entrained gases, tritium, gross alpha, strontium 89 and 90, and Iron 55 shall only be required when analysis for principal gamma emitters exceeds the LLD.

The following are additional sampling and analysis requirements:

a. PCCW sampled and analyzed weekly for principal gamma emitters.

b. Sample Service Water System (SWS) daily for principal gamma emitters whenever primary component cooling water (PCCW) activity exceeds $1x10^{-3}$ μC/cc.

c. With the PCCW System radiation monitor inoperable, sample PCCW and SWS daily for principal gamma emitters.

d. With a confirmed PCCW/SWS leak and PCCW activity in excess of $1x10^{-4}$ μC/cc, sample SWS every 12 hours for principal gamma emitters.

e. The setpoint on the PCCW head tank liquid rate-of-change alarm will be set to ensure that its sensitivity to detect a PCCW/SWS leak is equal to or greater than that of an SWS radiation monitor, located in the unit's combined SWS discharge, with an LLD of $1x10^{-8}$ μC/cc. If this sensitivity cannot be achieved, the SWS will be sampled once every 12 hours.

TABLE A.6.1-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM
(Continued)

Notations
(Continued)

(8) If the Turbine Building Sump (Steam Generator Blowdown Flash Tank) isolate due to high concentration of radioactivity, that liquid stream will be sampled and analyzed for Iodine-131 and principal gamma emitters prior to release.

(9) Quarterly composite analysis requirements shall only be required when analysis for principal gamma emitters indicate positive radioactivity.

**TRP5.2-6.2 Dose**

CONTROLS

C.6.2.1 The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS (see Technical Specification Figure 5.1-3) shall be limited

a. During any calendar quarter to less than or equal to 1.5 mrems to the whole body and to less than or equal to 5 mrems to any organ, and

b. During any calendar year to less than or equal to 3 mrems to the whole body and to less than or equal to 10 mrems to any organ.

APPLICABILITY: At all times.

ACTION:

With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.8.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

SURVEILLANCE REQUIREMENTS

S.6.2.1 Cumulative dose contributions from liquid effluents for the current calendar quarter and the current calendar year shall be determined in accordance with the methodology and parameters in Part B of the ODCM at least once per 31 days.

This Control is provided to implement the requirements of Sections II.A, III.A, and IV.A of Appendix I to 10 CFR Part 50. The Control implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept as low as is reasonably achievable. The dose calculation methodology and parameters in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

**TRP5.2-6.3 Liquid Radwaste Treatment System**

CONTROLS

C.6.3.1 The Liquid Radwaste Treatment System shall be OPERABLE and appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses due to the liquid effluent to UNRESTRICTED AREAS (see Technical Specification Figure 5.1-3) would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period.

APPLICABILITY: At all times.

ACTION:

With radioactive liquid waste being discharged without treatment and in excess of the above limits and any portion of the Liquid Radwaste Treatment System which could reduce the radioactive liquid waste discharged not in operation, prepare and submit to the Commission within 30 days, pursuant to Specification 6.8.2, a Special Report that includes the following information:

a. Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability,

b. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

c. Summary description of action(s) taken to prevent a recurrence.

SURVEILLANCE REQUIREMENTS

S.6.3.1 Doses due to liquid releases from each unit to UNRESTRICTED AREAS shall be projected at least once per 31 days in accordance with the methodology and parameters in Part B of the ODCM when Liquid Radwaste Treatment Systems are not being fully utilized.

S.6.3.2 The installed Liquid Radwaste Treatment System shall be considered OPERABLE by meeting Controls C.6.1.1 and C.6.2.1.

The OPERABILITY of the Liquid Radwaste Treatment System ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept as low as is reasonably achievable. This specification implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix A to 10 CFR Part 50 for liquid effluents.

## TRP5.2-7.0 RADIOACTIVE GASEOUS EFFLUENTS

### TRP5.2-7.1 Dose Rate

CONTROLS

C.7.1.1 The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY (see Technical Specification Figure 5.1-1) shall be limited to the following:

a. For noble gases: Less than or equal to 500 mrems/yr to the whole body and less than or equal to 3000 mrems/yr to the skin, and

b. For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrems/yr to any organ.

APPLICABILITY: At all times.

ACTION:

With the dose rate(s) exceeding the above limits, decrease the release rate within 15 minutes to within the above limit(s).

SURVEILLANCE REQUIREMENTS

S.7.1.1 The dose rate due to noble gases in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and parameters in Part B of the ODCM.

S.7.1.2 The dose rate due to Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents shall be determined to be within the above limits in accordance with the methodology and parameters in the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table A.7.1-1.

This Control is provided to ensure that the dose at any time at and beyond the SITE BOUNDARY from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 to UNRESTRICTED AREAS. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II, Column I. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of a MEMBER OF THE PUBLIC in an UNRESTRICTED AREA, either within or outside the SITE BOUNDARY, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106[b]). For MEMBERS OF THE PUBLIC who may at times be within the SITE BOUNDARY, the occupancy of the MEMBER OF THE PUBLIC will usually be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the SITE BOUNDARY. Examples of calculations for such MEMBERS OF THE PUBLIC, with the appropriate occupancy factors, shall be given in the ODCM. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrems/year to the whole body or to less than or equal to 3000 mrems/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background to a child via the inhalation pathway to less than or equal to 1500 mrems/year.

TABLE A.7.1-1
RADIOACTIVE GASEOUS WASTE SAMPLING
AND ANALYSIS PROGRAM

| Gaseous Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection[1] (LLD) (μCi/cc) |
|---|---|---|---|---|
| 1. Plant Vent | M[3][4] Grab Sample | M | Principal Gamma Emitters[2] | $1x10^{-4}$ |
| | | | H-3 | $1x10^{-6}$ |
| | Continuous[5] | W[6] Charcoal Sample | I-131 | $1x10^{-12}$ |
| | Continuous[5] | W[6] Particulate Sample | Principal Gamma Emitters[2] | $1x10^{-11}$ |
| | Continuous[5] | M Composite Particulate Sample | Gross Alpha | $1x10^{-11}$ |
| | Continuous[5] | Q Composite Particulate Sample | Sr-89, Sr-90 | $1x10^{-11}$ |
| 2. Condenser Air Removal Exhaust | M[7] Grab Sample | M[7] Noble Gases | Principal Gamma Emitters[2] | $1x10^{-4}$ |
| | | | H-3 | $1x10^{-6}$ |

TABLE A.7.1-1
RADIOACTIVE GASEOUS WASTE SAMPLING
AND ANALYSIS PROGRAM
(Continued)

| Gaseous Release Type | Sampling Frequency | Minimum Analysis Frequency | Type of Activity Analysis | Lower Limit of Detection[1] (LLD) (μCi/cc) |
|---|---|---|---|---|
| 3. Gland Steam Packing Exhauster | Continuous | W Particulate Sample | Principal Gamma Emitters[2] | $1x10^{-11}$ |
| | Continuous | W Charcoal Sample | I-131 | $1x10^{-12}$ |
| | Continuous | M Composite Particulate Sample | Gross Alpha | $1x10^{-11}$ |
| | Continuous | Q Composite Particulate Sample[8] | Sr-89, Sr-90 | $1x10^{-11}$ |
| 4. Containment Purge | P[3] Each Purge Grab Sample | P Each Purge | Principal Gamma Emitters[2] | $1x10^{-4}$ |
| | | | H-3 (oxide) | $1x10^{-6}$ |

TABLE A.7.1-1
RADIOACTIVE GASEOUS WASTE SAMPLING
AND ANALYSIS PROGRAM
(Continued)

Notations

(1) The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\, S_b}{E \times V \times 2.22 \times 10^6 \times Y \times \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microcurie per unit mass or volume),

4.66 = a constant derived from the $K_{alpha}$ and $K_{beta}$ values for the 95% confidence level;

$S_b$ = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

$2.22 \times 10^6$ = the number of disintegrations per minute per microcurie,

Y = the fractional radiochemical yield, when applicable,

$\lambda$ = the radioactive decay constant for the particular radionuclide ($s^{-1}$), and

$\Delta t$ = the elapsed time between the midpoint of sample collection and the time of counting(s).

Typical values of E, V, Y, and $\Delta t$ should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

TABLE A.7.1-1
RADIOACTIVE GASEOUS WASTE SAMPLING
AND ANALYSIS PROGRAM
(Continued)

Notations
(Continued)

(2) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, Ce-141 and Ce-144 in iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radioactive Effluent Release Report in accordance with Technical Specification 6.8.1.4 and Part A, Section 10.2 of the ODCM. Isotopes which are not detected should be reported as "not detected." Values determined to be below detectable levels are not used in dose calculations.

(3) Sampling and analysis shall also be performed following shutdown, startup, or a THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER within a one hour period unless; 1) analysis shows that the DOSE EQUIVALENT I-131 concentrations in the primary coolant has not increased more than a factor of 3; 2) the noble gas activity monitor for the plant vent has not increased by more than a factor of 3. For containment purge, requirements apply only when purge is in operation.

(4) Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.

(5) The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with Controls C.7.1.1, C.7.2.1, and C.7.3.1.

(6) Samples shall be changed at least once per seven (7) days and analyses shall be completed within 48 hours after changing, or after removal from sampler. Sampling shall also be performed at least once per 24 hours for at least seven (7) days following each shutdown, startup, or THERMAL POWER change exceeding 15 percent of RATED THERMAL POWER within a one-hour period and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement does not apply if 1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

(7) Samples shall be taken prior to start-up of condenser air removal system when there have been indications of a primary to secondary leak.

(8) Quarterly composite analysis requirements shall only be required when analysis for principal gamma emitters indicate positive radioactivity.

**TRP5.2-7.2 Dose - Noble Gases**

CONTROLS

C.7.2.1 The air dose due to noble gases released in gaseous effluents to areas at and beyond the SITE BOUNDARY (see Technical Specification Figure 5.1-1) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 5 mrads for gamma radiation and less than or equal to 10 mrads for beta radiation, and

b. During any calendar year: Less than or equal to 10 mrads for gamma radiation and less than or equal to 20 mrads for beta radiation.

APPLICABILITY: At all times.

ACTION:

With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.8.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

SURVEILLANCE REQUIREMENTS

S.7.2.1 Cumulative dose contributions for the current calendar quarter and current calendar year for noble gases shall be determined in accordance with the methodology and parameters in Part B of the ODCM at least once per 31 days.

This Control is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I to 10 CFR Part 50. The Control implements the guides set forth in Section I.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I at the SITE BOUNDARY that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept as low as reasonably achievable. The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977, and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

## TRP5.2-7.3 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

CONTROLS

C.7.3.1 The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released to areas at and beyond the SITE BOUNDARY (see Technical Specification Figure 5.1-1) shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrems to any organ, and

b. During any calendar year: Less than or equal to 15 mrems to any organ.

APPLICABILITY: At all times.

ACTION:

With the calculated dose from the release of Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.8.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

SURVEILLANCE REQUIREMENTS

S.7.3.1 Cumulative dose contributions for the current calendar quarter and current calendar year for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters in Part B of the ODCM at least once per 31 days.

This Control is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I to 10 CFR Part 50. The Controls are the guides set forth in Section II.C of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents at the SITE BOUNDARY will be kept as low as reasonably achievable. The ODCM calculation methods specified in the Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977, and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man in the areas at and beyond the SITE BOUNDARY. The pathways that were examined in the development of the calculations were

(1) individual inhalation of airborne radionuclides,

(2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man,

(3) deposition of radionuclides onto grassy areas where milk animals and meat-producing animals graze followed by human consumption of that milk and meat, and

(4) deposition of radionuclides on the ground followed by subsequent human exposure.

**TRP5.2-7.4 Gaseous Radwaste Treatment System**

CONTROLS

C.7.4.1 The VENTILATION EXHAUST TREATMENT SYSTEM and the GASEOUS RADWASTE TREATMENT SYSTEM shall be OPERABLE and appropriate portions of these system shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases to areas at and beyond the SITE BOUNDARY (see Technical Specification Figure 5.1-1) would exceed

a. 0.2 mrad to air from gamma radiation, or

b. 0.4 mrad to air from beta radiation, or

c. 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

APPLICABILITY: At all times.

ACTION:

With radioactive gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to Specification 6.8.2, a Special Report that includes the following information:

a. Identification of any inoperable equipment or subsystems, and the reason for the inoperability,

b. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

c. Summary description of action(s) taken to prevent a recurrence.

SURVEILLANCE REQUIREMENTS

S.7.4.1 Doses due to gaseous releases from each unit to areas at and beyond the SITE BOUNDARY shall be projected at least once per 31 days in accordance with the methodology and parameters in Part B of the ODCM when Gaseous Radwaste Treatment Systems are not being fully utilized.

S.7.4.2 The installed VENTILATION EXHAUST TREATMENT SYSTEM and GASEOUS RADWASTE TREATMENT SYSTEM shall be considered OPERABLE by meeting Controls C.7.1.1, and C.7.2.1, or C.7.3.1.

The OPERABILITY of the GASEOUS RADWASTE TREATMENT SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept as low as is reasonably achievable. This Control implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I to 10 CFR Part 50, for gaseous effluents.

## TRP5.2-8.0 TOTAL DOSE

CONTROL

C.8.1.1 The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems.

APPLICABILITY: At all times.

ACTION:

With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of Controls C.6.2.1.a, C.6.2.1.b, C.7.2.1.a, C.7.2.1.b, C.7.3.1.a, or C.7.3.1.b, calculations shall be made including direct radiation contributions from the units and from outside storage tanks to determine whether the above limits of Control C.8.1.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.8.2, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR 20.405(c), shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

SURVEILLANCE REQUIREMENTS

S.8.1.1 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with Surveillance Requirement S.6.2.1, S.7.2.1, and S.7.3.1, and in accordance with the methodology and parameters in Part B of the ODCM.

S.8.1.2 Cumulative dose contributions from direct radiation from the units and from radwaste storage tanks shall be determined in accordance with the methodology and parameters in Part B of the ODCM. This requirement is applicable only under conditions set forth in ACTION a. of Control C.8.1.1.

This Control is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46FR18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units (including outside storage tanks, etc.) are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site are within a radius of 8 km must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in Controls C.6.1.1 and C.7.1.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

## TRP5.2-9.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

### TRP5.2-9.1 Monitoring Program

CONTROL

C.9.1.1 The Radiological Environmental Monitoring Program (REMP) shall be conducted as specified in Table A.9.1-1.

APPLICABILITY: At all times.

ACTION:

a. With the REMP not being conducted as specified in Table A.9.1-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report required by Technical Specification 6.8.1.3 and Part A, Section 10.1 of the ODCM, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.

b. With the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table A.9.1-3 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from receipt of the laboratory analyses, pursuant to Technical Specification 6.8.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose* to a MEMBER OF THE PUBLIC is less than the calendar year limits of Control C.6.2.1, C.7.2.1, or C.7.3.1. When more than one of the radionuclides in the REMP are detected in the sampling medium, this report shall be submitted if

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those listed in the REMP are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to a MEMBER OF THE PUBLIC from all radionuclides is equal to or greater than the calendar year limits of Control C.6.2.1, C.7.2.1, or C.7.3.1. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report required by Technical Specification 6.8.1.3 and Part A, Section 10.1 of the ODCM.

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*The methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC shall be indicated in this report.

ACTION: (Continued)

With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by the REMP, identify specific locations for obtaining replacement samples and add them within 30 days to the REMP given in the ODCM. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Pursuant to Technical Specification 6.13, and Part A, Section 10.2, of the ODCM, submit in the next Annual Radioactive Effluent Release Report documentation for a change in the ODCM including a revised figure(s) and table for the ODCM reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples and justifying the selection of the new locations(s) for obtaining samples.

SURVEILLANCE REQUIREMENTS

S.9.1.1 The radiological environmental monitoring samples shall be collected pursuant to Table A.9.1-1 from the specific locations given in the table and figure(s) in Part B of the ODCM, and shall be analyzed pursuant to the requirements of Table A.9.1-1 and the detection capabilities required by Table A.9.1-2.

BASES

The REMP required by this Control provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the plant operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50, and thereby supplements the REMP by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979. The initially specified monitoring program will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

Detailed discussion of the LLD and other detection limits can be found in Currie, L.A., "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," NUREG/CR-4007 (September 1984).

TABLE A.9.1-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[a] | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 1. DIRECT RADIATION[b] | 40 routine monitoring stations with two or more dosimeters placed as follows:<br><br>An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY;<br><br>An outer ring of stations, one in each meteorological sector, generally in the 6 to 8-km range from the site;<br><br>The balance of the stations to be placed in special interest areas such as population centers, nearby residences, schools, and control locations. | Quarterly. | Gamma dose quarterly. |
| 2. AIRBORNE<br><br>Radioiodine and Particulates | Samples from five locations[d]:<br><br>Three samples from close to the three SITE BOUNDARY locations, in different sectors, of high calculated long-term average ground-level D/Q.<br><br>One sample from the vicinity of a community having the highest calculated long-term average ground-level D/Q. | Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading. | Radioiodine Canister:<br><br>I-131 analysis weekly.<br><br>Particulate Sampler:<br><br>Gross beta radioactivity analysis following filter change[c];<br>Gamma isotopic analysis[e] of composite (by location) quarterly. |

TABLE A.9.1-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Continued)

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[a] | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 2. (Continued) | One sample from a control location, as for example 15-30 km distant and in the least prevalent wind direction. | | |
| 3. WATERBORNE | | | |
| a. Surface | One sample in the discharge area. One sample from a control location. | Monthly grab sample. | Gamma isotopic analysis[e] monthly. Composite for tritium analysis quarterly. |
| b. Sediment from shoreline | One sample from area with existing or potential recreational value. | Semiannually. | Gamma isotopic analysis[e] semiannually. |
| c. Subsurface water | One sample beneath plant structures at PAB | Quarterly | Gamma isotopic and tritium. |
| 4. INGESTION | | | |
| a. Milk | Samples from milking animals in three locations within 5 km distance having the highest dose potential. If there are none, then, one sample from milking animals in each of three areas between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per yr.[f]<br><br>One sample from milking animals at a control location, as for example, 15-30 km distant and in the least prevalent wind direction. | Semimonthly when milking animals are on pasture, monthly at other times. | Gamma isotopic[e] and I-131 analysis on each sample. |

TABLE A.9.1-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Continued)

| Exposure Pathway and/or Sample | Number of Representative Samples and Sample Locations[a] | Sampling and Collection Frequency | Type and Frequency of Analysis |
|---|---|---|---|
| 4. (Continued)<br>b. Fish and Invertebrates | One sample of each of three commercially and recreationally important species in vicinity of plant discharge area.<br><br>One sample of similar species in areas not influenced by plant discharge. | Sample in season, or semiannually if they are not seasonal. | Gamma isotopic analysis[e] on edible portions. |
| c. Food Products | Samples of three (if practical) different kinds of broad leaf vegetation[g] grown nearest each of two different off-site locations of highest predicted long-term average ground-level D/Q if milk sampling is not performed. | Monthly, when available. | Gamma isotopic[e] and I-131 analysis. |
| | One sample of each of the similar broad leaf vegetation[g] grown at a control location, as for example 15-30 km distant in the least prevalent wind direction, if milk sampling is not performed. | Monthly, when available. | Gamma isotopic[e] and I-131 analysis. |

TABLE A.9.1-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
(Continued)

Table Notations

a. Specific parameters of distance and direction sector from the centerline of the Unit 1 reactor, and additional description where pertinent, shall be provided for each and every sample location in Table B.4-1 in the ODCM, Part B. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability and malfunction of automatic sampling equipment. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report as specified in Part A, Section 10.1. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program. Identify the cause of the unavailability of samples for that pathway and identify the new location(s), if available, for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report as specified in Part A, Section 10.2 and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

b. A thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters.

c. Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

d. Optimal air sampling locations are based not only on D/Q but on factors such as population in the area, year-round access to the site, and availability of power.

e. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

f. The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM, Part B.

g. If broad leaf vegetation is unavailable, other vegetation will be sampled.

TABLE A.9.1-2

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS[a,f,g]

Lower Limit of Detection (LLD)[b]

| Analysis | Water (pCi/kg) | Airborne Particulate or Gas (pCi/kg, wet) | Fish and Invertebrates (pCi/kg, wet) | Milk (pCi/kg) | Food Products (pCi/kg, wet) | Sediment (pCi/kg, dry) |
|---|---|---|---|---|---|---|
| Gross Beta | 4 | 0.01 | | | | |
| H-3 | 3,000 | | | | | |
| Mn-54 | 15 | | 130 | | | |
| Fe-59 | 30 | | 260 | | | |
| Co-58, 60 | 15 | | 130 | | | |
| Zn-65 | 30 | | 260 | | | |
| Zr-Nb-95 | 15[c] | | | | | |
| I-131 | 15 | 0.07 | | 1 | 60[e] | |
| Cs-134 | 15 | 0.05 | 130 | 15 | 60 | 150 |
| Cs-137 | 18 | 0.06 | 150 | 18 | 80 | 180 |
| Ba-La-140 | 15[c,d] | | | 15[c,d] | | |

TABLE A.9.1-2
DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS
(Continued)

Table Notations

a. This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report.

b. The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\,Sb}{E \times V \times 2.22 \times 10^{6} \times Y \times \exp(-\lambda \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above, as picocuries per unit mass or volume;

4.66 is a constant derived from the $K_{alpha}$ and $K_{beta}$ values for the 95% confidence level;

$s_b$ is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute;

E is the counting efficiency, as counts per disintegration;

V is the sample size in units of mass or volume;

2.22 is the number of disintegrations per minute per picocurie;

Y is the fractional radiochemical yield, when applicable;

$\lambda$ is the radioactive decay constant for the particular radionuclide as per second; and

$\Delta$ t for environmental samples is the elapsed time between sample collection and time of counting, as seconds.

Typical values of E, V, Y, and $\Delta$ t should be used in the calculation.

In calculating the LLD for a radionuclide determined by gamma ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., Potassium-40 in milk samples).

TABLE A.9.1-2

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

(Continued)

Table Notations

(Continued)

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. This does not preclude the calculation of an a posteriori LLD for a particular measurement based upon the actual parameters for the sample in question and appropriate decay correction parameters such as decay while sampling and during analysis. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report per Part A, Secion 10.1.

c. Parent only.

d. The Ba-140 LLD and concentration can be determined by the analysis of its short-lived daughter product La-140 subsequent to an eight-day period following collection. The calculation shall be predicated on the normal ingrowth equations for a parent-daughter situation and the assumption that any unsupported La-140 in the sample would have decayed to an insignificant amount (at least 3.6% of its original value). The ingrowth equations will assume that the supported La-140 activity at the time of collection is zero.

e. Broad leaf vegetation only.

f. If the measured concentration minus the three standard deviation uncertainty is found to exceed the specified LLD, the sample does not have to be analyzed to meet the specified LLD.

g. Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with recommendations of Regulatory Guide 4.13, Revision 1, July 1977.

TABLE A.9.1-3

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

| Analysis | Water (pCi/kg) | Airborne Particulate or Gas (pCi/kg, wet) | Fish and Invertebrates (pCi/kg, wet) | Milk (pCi/kg) | Food Products (pCi/kg, wet) |
|---|---|---|---|---|---|
| H-3 | 30,000*** | | | | |
| Mn-54 | 1,000 | | 30,000 | | |
| Fe-59 | 400 | | 10,000 | | |
| Co-58 | 1,000 | | 30,000 | | |
| Co-60 | 300 | | 10,000 | | |
| Zn-65 | 300 | | 20,000 | | |
| Zr-Nb-95 | 400* | | | | |
| I-131 | 100 | 0.9 | | 3 | 100** |
| Cs-134 | 30 | 10 | 1,000 | 60 | 1,000 |
| Cs-137 | 50 | 20 | 2,000 | 70 | 2,000 |
| Ba-La-140 | 200* | | | 300* | |

* Parent only.

** Broad leaf vegetation only.

***Plant dewatering reporting level = 20,000 pCi/kg (2E-05 µCi/ml)

**TRP5.2-9.2 Land Use Census**

CONTROL

C.9.2.1 A Land Use Census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence, and the nearest garden** of greater than 50 $m^2$ (500 $ft^2$) producing broad leaf vegetation.

APPLICABILITY: At all times.

ACTION

a. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Surveillance S.7.3.1 pursuant to Technical Specification 6.8.1.4 and Part A, Section 10.2, of the ODCM, identify the new location(s) in the next Annual Radioactive Effluent Release Report.

b. With a Land Use Census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with Control C.9.1.1, add the new location(s) within 30 days to the REMP given in the ODCM, if permission from the owner to collect samples can be obtained and sufficient sample volume is available. The sampling location(s), excluding the Control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted. Pursuant to Technical Specification 6.13 and Part A, Section 10.2 of the ODCM, submit in the next Annual Radioactive Effluent Release Report documentation for a change in the ODCM including a revised figure(s) and table(s) for the ODCM reflecting the new location(s) with information supporting the change in sampling locations.

SURVEILLANCE REQUIREMENTS

S.9.2.1 The Land Use Census shall be conducted during the growing season at least once per 12 months using a method such as by a door-to-door survey, aerial survey, or by consulting local agriculture authorities, as described in the ODCM. The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report pursuant to Part A, Section 10.1 of the ODCM.

**Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted relative deposition values (D/Qs) in lieu of the garden census. Specifications for broad leaf vegetation sampling in the REMP shall be followed, including analysis of control samples.

BASES

This specification is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the REMP given in the ODCM are made if required by the results of this census. Information from methods such as the door-to-door survey, from aerial survey, of from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 $m^2$ provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored, since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broad-leaf vegetation (i.e., similar to lettuce and cabbage), and (2) there was a vegetation yield of 2 $kg/m^2$.

**TRP5.2-9.3 Interlaboratory Comparison Program**

CONTROL

C.9.3.1 In accordance with Technical Specification 6.7.6h.3, analyses shall be performed on all radioactive materials supplied as part of an Interlaboratory Comparison Program, that has been approved by the Commission, that correspond to samples required by REMP.

APPLICABILITY: At all times.

ACTION:

With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report pursuant to Part A, Section 10.1 of the ODCM.

SURVEILLANCE REQUIREMENTS

S.9.3.1 The Interlaboratory Comparison Program shall be identified in Part B of the ODCM. A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Part A, Section 10.1 of the ODCM.

BASES

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the Quality Assurance Program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

## TRP5.2-10.0 REPORTS

### TRP5.2-10.1 Annual Radiological Environmental Operating Report

Routine Annual Radiological Environmental Operating Reports covering the operation of the station during the previous calendar year shall be submitted prior to May 1 of each year pursuant to Technical Specification 6.8.1.3.

The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental Surveillance activities for the report period, including a comparison with preoperational studies, with operational Controls, as appropriate, and with previous environmental Surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of the Land Use Census required by Control C.9.2.1.

The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in Part B of the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the Radiological Environmental Monitoring Program; at least two legible maps**** covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor; the results of licensee participation in the Interlaboratory Comparison Program and the corrective action taken if the specified program is not being performed as required by Control C.9.3.1; reason for not conducting the Radiological Environmental Monitoring Program as required by Control C.9.1.1, and discussion of all deviations from the sampling schedule; discussion of environmental sample measurements that exceed the reporting levels but are not the result of plant effluents, pursuant to ACTION b. of Control C.9.1.1; and discussion of all analyses in which the LLD required was not achievable.

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****One map shall cover locations near the SITE BOUNDARY; the more distant locations shall be covered by one or more additional maps.

**TRP5.2-10.2 Annual Radioactive Effluent Release Report**

A routine Annual Radioactive Effluent Release Report covering the operation of the station during the previous calendar year of operation shall be submitted by May 1 of each year, pursuant to Technical Specification 6.8.1.4.

The Annual Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the station as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes, the format for Table 3 in Appendix B shall be supplemented with three additional categories: class of solid wastes (as defined by 10 CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity) and SOLIDIFICATION agent or absorbent (e.g., cement).

The Annual Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.***** This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY Technical Specification (Figure 5.1-3) during the report period. All assumptions used in making these assessments, i.e., specific activity, exposure time, and location, shall be included in these reports. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

The Annual Radioactive Effluent Release Report shall also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 1, October 1977.

*****In lieu of submission with the Annual Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

The Annual Radioactive Effluent Release Report shall include a list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period.

The Annual Radioactive Effluent Release Report shall include any changes made during the reporting period to the PROCESS CONTROL PROGRAM and the ODCM, pursuant to Technical Specifications 6.12 and 6.13, respectively, as well as any major change to Liquid, Gaseous, or Solid Radwaste Treatment Systems pursuant to Control 11.0. It shall also include a listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to Control C.9.2.

The Annual Radioactive Effluent Release Report shall also include the following: an explanation as to why the inoperability of liquid or gaseous effluent monitoring instrumentation was not corrected within the time specified in Control C.5.1 or C.5.2, respectively; and description of the events leading to liquid holdup tanks or gas storage tanks exceeding the limits of Technical Specification 3.11.1.4.