

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL

REPORT

RADIOLOGICAL IMPACT ON MAN

FOR

THIRD AND FOURTH QUARTERS, 1978

VERMONT YANKEE NUCLEAR POWER STATION

7903290010

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VERMONT YANKEE
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT
RADIOLOGICAL IMPACT ON MAN
JULY - DECEMBER 1978

1.0 INTRODUCTION

Using actual measured effluent and meteorological data for the last six months of 1978, this report estimates potential doses from radioactive effluents that could affect individuals and the general population near the Vermont Yankee Nuclear Power Station. Tables 1 through 3 lists the recorded radioactive effluents and solid waste for this semi-annual period. Tables 4 and 5 report the cumulative joint frequency distribution of wind speed, wind direction, and atmospheric stability observed during the second half of 1978, while Table 6 lists the calculated X/Q and D/Q values at different points of interest based on the meteorological record presented in Tables 4 and 5 for both quarters. Table 7 summarizes the potential radiological dose commitments to individuals and the general population surrounding the plant. Supplemental information concerning the plant's regulatory release limits and the methods used in measuring released radioactivity is given in Appendix A.

All estimates of potential dose for the last six months of 1978 were within the dose objectives set forth in Appendix I to 10CFR50. This was accomplished while the plant realized net capacity factors (design MWe) of 31.9 percent and 69.7 percent for the third and fourth quarters, respectively.

2.0 METEOROLOGICAL DATA

Site meteorological data was collected during the third and fourth quarters from the new 300 foot on-site met tower. The tower is located approximately 2200 feet northwest of the reactor building, about 1,400 feet from the plant stack and about 2300 feet north from the original tower. The 300 foot tower is approximately the same height as the primary plant stack (94 meters) and is designed to meet the requirements of Regulatory Guide 1.23 for meteorological monitoring.

Implementation of the Central Meteorological Monitoring System was completed during the month of May, 1978. It is expected to improve data recoverability substantially by permitting routine daily (Monday through Friday) checking of data transmitted from the meteorological tower every 6 hours. In addition, the on-demand, tower call-up capability from the central system location will allow instantaneous monitoring of any sensor suspected of malfunction. This feature will permit more rapid recognition of sensor or equipment malfunction, thereby reducing instrument downtime.

X/Q and D/Q values were derived for all receptor points from the site meteorological record for each quarter using a straight-line airflow model. All dispersion and air concentration factors have been calculated employing appropriate source configuration considerations, as described in Regulatory Guide 1.111⁽¹⁾, plus a source depletion model as described in Meteorology and Atomic Energy (1968),⁽²⁾ and deposition velocities as

given by Pelletier and Zimbrick⁽³⁾. Changes in terrain elevations in the site environment were also factored into meteorological models. A full description of the methods used to evaluate air dispersion phenomenon at the plant site is given in Vermont Yankee's 10CFR Part 50, Appendix I evaluation⁽⁴⁾.

3.0 RADIOACTIVITY RELEASES

3.1 Liquid Releases

There were no liquid releases of radioactivity from the plant during this semi-annual period.

3.2 Gaseous Releases

All gaseous effluent recorded for the second half of the year are listed in Tables 1A through 1D. All gaseous effluents were recorded as continuous in nature, and were released to the environment via the 94 meter stack located approximately 875 feet north of the Reactor Building. As indicated in Table 1A, all gaseous effluents were well within the plants operating Technical Specification for gaseous releases of radioactivity.

In addition, there were no unplanned or non-routine releases of radioactivity in gaseous effluents during this reporting period.

4.0 DOSE ASSESSMENT

For the purpose of estimating doses in the environment, it has been assumed that if a reported radionuclide's activity was lower than the minimum detectable activity of a measuring instrument, the "less than" value for that measurement was the actual activity. This approach is conservative and generates maximum possible estimated doses. Actual doses are most likely below the calculated values.

4.1 Organ Doses to Individuals from Receiving-Water Exposure Pathways

There were no routine or accidental liquid releases from Vermont Yankee during either the third or fourth quarters of 1978. As a result, no receiving water exposure pathways could contribute to any whole-body or organ doses to individuals in unrestricted areas.

4.2 Individual Whole-Body and Skin Doses from Noble Gaseous Effluents

Based on the method of sector averaging discussed in "Meteorology and Atomic Energy - 1968", and utilizing the site meteorological data for the third and fourth quarters of 1978, the point of maximum off-site ground level air concentration of radioactive materials in gaseous effluents was determined for each quarter. Changing terrain heights in the vicinity of the effluent stack were taken into account in calculating these effluent ground level concentrations. For both the third and fourth quarters of 1978, the point of maximum ground level air concentration were determined to be approximately 2500 meters northwest of the plant stack. The undepleted X/Q 's at this location was calculated to be 7.61×10^{-7} sec/m³ and 1.22

$\times 10^{-6}$ sec/m³ for the third and fourth quarters of the year, respectively.

Whole-body and skin doses were calculated at this offsite point as a result of noble gas releases occurring in both quarters. The methodology applied to the dose calculations is consistent with that of Regulatory Guide 1.109⁽⁵⁾ for an elevated release point. Dose conversion factors for noble gases and daughters were taken from Table B-1 of this Regulatory Guide. For the beta contribution to the skin dose, a semi-infinite cloud model was used. The whole-body gamma dose was evaluated using a finite cloud sector average model with Gaussian activity distribution in the vertical plane. The gamma radiation received at a point of interest from a differential volume of the cloud is calculated. The radiation is then integrated over the entire cloud, taking into account of the geometry of the cloud, variation in concentration, attenuation by the interaction of photons with matter in the path between source and the receptor point, and scattering of radiation from material outside the direct path to the point of interest. An attenuation factor of 0.7 is also applied to the dose calculations to account for the dose reduction due to shielding which would be provided by a residential structure. No additional credit is taken for decay of radionuclides in transit to the receptor point.

For the third quarter, the skin and whole-body dose from exposure to noble gases at the point of maximum ground level air concentration were calculated to be 0.073 mrem and 0.054 mrem, respectively. For the noble gaseous effluent during the fourth quarter, the skin and whole-body dose at the point of maximum ground level air concentration were calculated to

be 0.25 mrem and 0.094 mrem, respectively.

In addition, the maximum nearest resident and site boundary whole-body and skin doses have been calculated due to noble gaseous effluents from the plant stack during the reporting period. The maximum whole-body and skin site boundary doses (0.15 mrem and 0.16 mrem respectively) for the third quarter of 1978 occurred in the southern sector, 0.24 miles from the stack. The fourth quarter maximum whole-body and skin site boundary doses (both 0.17 mrem) also occurred in the southern sector, 0.24 miles from the stack.

In the third quarter, the maximum skin and whole-body dose to the nearest resident (0.13 mrem and 0.12 mrem respectively) in any direction was determined to be in the southern sector, approximately 0.33 mile from the plant stack. As a result of the fourth quarter meteorology and noble gas effluents, the maximum whole-body and skin dose to the nearest resident (0.13 and 0.14 mrem respectively) in any sector also occurred to the resident 0.33 miles south of the plant stack.

The resultant doses due to noble gas effluents for the maximum site boundary location, maximum nearest resident, and point of maximum ground level air concentration are tabulated in Table 7. All doses are conservative in that they assume 100 percent occupancy at each point. Whole-body doses consider the gamma radiation received from the effluent plume overhead. The skin doses considers both the beta and gamma contributions at the receptor point. All doses from noble gaseous effluents are well below the dose criteria of 10CFR50, Appendix I.

4.3 Organ Doses to Individuals from Radioactive Iodine and Particulates in Gaseous Effluents

The critical pathway of internal exposure to radioactive iodine and particulates, including tritium, resulting from gaseous effluents for the third quarter is through the grass-milk pathway. It is assumed that milk animals are free to graze on open pasture during the third quarter with no supplemental feeding. This assumption is conservative since most of the milk animals inventoried in the site vicinity are fed stored feed throughout the entire year with only limited grazing allowed during the growing season.

During the winter months of the year, the dose commitment through the milk pathway and fresh vegetable ingestion is insignificant. The maximum length of annual growing season is approximately six months long in this part of New England. Therefore, the milk pathway and vegetable ingestion doses for the fourth quarter are the result of activity deposited on feed and vegetables grown during the growing season and allowed to decay while held in storage. As a result, the critical pathway of exposure for radioactive iodine and particulates during the fourth quarter is through inhalation.

As a result of the milk and fresh vegetable pathways, the maximum dose for the third quarter from gaseous releases of radioactive iodine and particulates was determined to occur at a farm 3.5 miles south-southeast of the plant. The critical organ was an infant thyroid with a calculated

dose of 2.4 mrem. For the fourth quarter, with inhalation being the principle pathway of exposure, the maximum organ dose was projected to also be at the farm, 3.5 miles south-southeast of the plant. The critical organ was a child's thyroid with a calculated dose of 0.013 mrem. The pathways of exposure which were assumed to exist during the third quarter at this farm include ground plane exposure, inhalation, fresh home grown vegetables and goat's milk. The pathways of exposure considered at the farm during the fourth quarter include continuous ground plane exposure, inhalation and small contributions from stored vegetables, and milk.

Table 7 shows the maximum calculated quarterly organ dose due to the combination of exposures from all pathways which have been identified at the farm. Table 7 also shows the calculated organ doses to the highest exposed nearby resident, and potential organ doses to individuals if assumed standing at the highest ground level air concentration point on the site boundary for the entire six-month reporting period. The site boundary doses only include exposure from inhalation, and direct radiation from the ground plane. The nearest resident is assumed to have a vegetable garden during the growing season which contributes to his ingestion dose. For all ground plane exposures, the activity is assumed to accumulate on the ground for 15 years at the rate equivalent to that observed during each quarter. This is a simplified method of approximating the average deposition over the life of the plant. The calculated dose from direct exposure to act on the ground thus represents the dose an individual would see in each quarter if the plant had been operating 15 years. This approach is very conservative, but shows the relative impact the plant would have on the

dose commitment over its operating life if the releases were to continue at the levels recorded during this reporting period.

The critical organ for the third and fourth quarters at the highest exposed nearest resident, and maximum site boundary location, was calculated to be a child's thyroid. The respective doses at these locations for the third quarter were 7.1×10^{-2} mrem (NW 1.4 miles) and 1.7×10^{-3} mrem (SSE 0.54 miles). For the fourth quarter, the respective doses were 8.1×10^{-3} mrem (NW 1.4 miles) and 2.6×10^{-4} mrem (NW 0.34 miles).

4.4 Whole-Body Doses in Unrestricted Areas from Direct Radiation

The major source of direct radiation (including sky shine) from the station is due to N-16 decay in the turbine building. Because of the orientation of the turbine building on the site, and the shielding effects of the adjacent reactor building, only the seven westerly sectors (SSW - NNW) see any significant direct radiation.

High pressure ionization chamber (HPIC) measurements have been made in the plant area in order to estimate the direct radiation from the station. The chamber was located at a point along the west site boundary which has been determined to receive the maximum direct radiation from the plant. Using measurements of dose rate made while the plant operated at different power levels, from shutdown to 100 percent, the total integrated dose from direct radiation over each three month period was determined by considering the quarterly gross megawatts generated. Field measurements of exposure, in units of Roentgen, were modified by multiplying by 0.6 to obtain whole

body dose equivalents, in units of rem, in accordance with recommendations of HASL report 305⁽⁶⁾ for radiation fields resulting from N-16 photons.

Estimates of the population exposure from direct radiation during the third and fourth quarters have been made out to two miles. Beyond two miles, the dose from the turbine building is negligible. As a result, the estimated population dose for each of the two quarters respectively was approximately 6.9×10^{-3} and 1.9×10^{-2} man-rem, for a total population of about 351 persons. The estimated direct radiation dose at the maximum site boundary location was approximately 1.3 mrem for the third quarter of 1978, and 2.4 mrem for the second. These hypothetical individual doses assume a 100 percent occupancy factor, taking no credit for the shielding effect of any residential structure. Table 7 summarizes these results.

4.5 Whole-Body Doses to the General Population from all Receiving Water Related Pathways

Since there were no radioactive liquid effluents released from the plant during the reporting period, there are no related population or individual doses from receiving-water pathways.

4.6 Doses to the General Population and Average Individual Within Fifty Miles from Gaseous Effluents

Using site meteorological data in Tables 4 and 5, quarterly average X/Q values were determined for each sector formed by placing radial rings from the plant at distances of one, two, three, four, five, ten, twenty, thirty, forty and fifty miles, and their intersection with radial lines

drawn to form each of the sixteen principal compass directions. For noble gases, whole-body and skin doses were calculated for each sector and multiplied by the estimated population within each sector to determine the sector man-rem. No credit for decay in transit of activity was assumed.

For the approximately 1.1×10^6 people within fifty miles of the plant, the third and fourth quarter whole-body doses from noble gas cloud exposure were estimated to be 0.85 man-rem and 7.0 man-rem, respectively. For the same two quarters, the average individual whole-body doses were 7.4×10^{-4} mrem and 6.1×10^{-3} mrem, respectively. The skin doses for the two quarters were 1.9 man-rem and 15 man-rem, respectively. The average individual skin dose was 1.6×10^{-3} and 1.3×10^{-2} mrem for the third and fourth quarters.

Table 7 also indicates the population whole-body and thyroid dose commitments from radioactive iodine and particulates (including tritium) released from the plant in gaseous waste. The pathways of exposure which have been considered for the 50 mile population include inhalation, ingestion of vegetables, milk and meat produced within 50 miles, and the direct exposure to activity deposited on the ground plane. The total whole-body and thyroid dose commitments for the third quarter were calculated to be 9.5×10^{-3} man-rem and 2.2 man-rem respectively. For the fourth quarter, these doses were 1.4×10^{-2} man-rem and 1.5×10^{-1} man-rem respectively.

REFERENCES

1. Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors", U.S. Nuclear Regulatory Commission, Office of Standards Development, March 1976.
2. Meteorology and Atomic Energy, 1968, Section 5-3.2.2, "Cloud Depletion", pg. 204. U. S. Atomic Energy Commission, July 1968.
3. C. A. Pelletier, and J. D. Zimbrick, "Kinetics of Environmental Radioiodine Transport Through the Milk-Food Chain", Environmental Surveillance in the Vicinity of Nuclear Facilities, Charles D. Thomas Publishers, Springfield, Illinois, 1970.
4. "Supplemental Information for the Purposes of Evaluation of 10CFR Part 50, Appendix I", Vermont Yankee Nuclear Power Corporation, June 2, 1976.
5. Regulatory Guide 1.109, "Calculation of Annual Doses to Man From Routine Release of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I", U. S. Nuclear Regulatory Commission, Office of Standards Development, Revision 1, October 1977.
6. W. M. Lowder, P. D. Raft, and G. dePlanque Burke, "Determination of N-16 Gamma Radiation Fields at BWR Nuclear Power Stations", Health and Safety Laboratory, Energy Research & Development Administration, Report No. 305, May 1976.

TABLE 1A

VERMONT YANKEE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

JULY - DECEMBER

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

| | Unit | Quarter 3rd | Quarter 4th | Est. Total Error, % |
|--|------|----------------|----------------|------------------------|
|--|------|----------------|----------------|------------------------|

A. Fission & activation gases

| | | | | |
|---|---------|-----------|-----------|----------|
| 1. Total release | Ci | <1.60E+03 | <1.78E+03 | ±1.0E+02 |
| 2. Average release rate for period | µCi/sec | <2.03E+02 | <2.26E+02 | |
| 3. Percent of technical specification limit | % | <7.61E-02 | <2.87E-01 | |

B. Iodines

| | | | | |
|---|---------|----------|----------|----------|
| 1. Total iodine-131 | Ci | 1.61E-01 | 4.68E-02 | ±5.0E+01 |
| 2. Average release rate for period | µCi/sec | 2.05E-02 | 5.95E-03 | |
| 3. Percent of technical specification limit | % | 4.27E+00 | 1.24E+00 | |

C. Particulates

| | | | | |
|---|---------|----------|----------|----------|
| 1. Particulates with half-lives > 8 days | Ci | 1.46E-03 | 2.47E-03 | ±5.0E+01 |
| 2. Average release rate for period | µCi/sec | 1.87E-04 | 3.15E-04 | |
| 3. Percent of technical specification limit | % | 3.54E-02 | 2.15E-02 | |
| 4. Gross alpha radioactivity | Ci | 6.40E-08 | 1.87E-07 | |

D. Tritium

| | | | | |
|---|---------|----------|----------|----------|
| 1. Total release | Ci | 2.17E+00 | 4.73E+00 | ±5.0E+01 |
| 2. Average release rate for period | µCi/sec | 2.76E-01 | 5.50E-01 | |
| 3. Percent of technical specification limit | % | NA | NA | |

TABLE 1B

VERMONT YANKEE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

JULY - DECEMBER

GASEOUS EFFLUENTS - ELEVATED RELEASE

CONTINUOUS MODE

BATCH MODE

| Nuclides Released | Unit | Quarter 3rd | Quarter 4th | Quarter 3rd | Quarter 4th |
|-------------------|------|----------------|----------------|----------------|----------------|
|-------------------|------|----------------|----------------|----------------|----------------|

1. Fission gases

| | | | | | |
|------------------|----|-----------|-----------|--|--|
| krypton-85 | Ci | (1) | (1) | | |
| krypton-85m | Ci | <1.44E+01 | <1.43E+01 | | |
| krypton-87 | Ci | <4.30E+01 | <3.72E+01 | | |
| krypton-88 | Ci | <3.64E+01 | <3.24E+01 | | |
| xenon-133 | Ci | <5.25E+02 | <6.55E+02 | | |
| xenon-135 | Ci | <1.05E+02 | <8.01E+01 | | |
| xenon-135m | Ci | <4.16E+02 | <2.66E+02 | | |
| xenon-138 | Ci | <4.50E+02 | <6.96E+02 | | |
| | Ci | | | | |
| unidentified | Ci | | | | |
| Total for period | Ci | <1.60E+03 | <1.78E+03 | | |

2. Iodines

| | | | | | |
|------------------|----|----------|----------|--|--|
| iodine-131 | Ci | 1.61E-01 | 4.68E-02 | | |
| iodine-133 | Ci | 8.50E-02 | 5.84E-02 | | |
| iodine-135 | Ci | 1.70E-02 | 1.81E-02 | | |
| Total for period | Ci | 2.63E-01 | 1.23E-01 | | |

3. Particulates

| | | | | | |
|----------------------|----|----------|-----------|--|--|
| strontium-89 | Ci | 7.99E-04 | 9.90E-04 | | |
| strontium-90 | Ci | 3.12E-06 | 4.20E-06 | | |
| cesium-134 | Ci | 4.76E-05 | 2.13E-04 | | |
| cesium-137 | Ci | 1.43E-04 | 3.83E-04 | | |
| barium-lanthanum-140 | Ci | 1.38E-04 | 1.95E-04 | | |
| cobalt-58 | Ci | 1.09E-05 | 1.72E-05 | | |
| cobalt-60 | Ci | 2.48E-04 | 5.97E-04 | | |
| zinc-65 | Ci | 5.92E-05 | 5.32E-05 | | |
| manganese-54 | Ci | 7.94E-06 | <4.33E-06 | | |
| | | | | | |
| | | | | | |
| | | | | | |

(1) Kr-85 not detected in offgas mix - limit of detectability = 1.05E-07 μ Ci/cc

TABLE 1C

VERMONT YANKEE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

JULY - DECEMBER

GASEOUS EFFLUENTS - ROUTINE GROUND LEVEL RELEASES*

* There were no routine measured ground level continuous, or batch mode, gaseous effluent releases during the reporting period.

TABLE 1D
VERMONT YANKEE
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978
JULY - DECEMBER
GASEOUS EFFLUENTS - NON-ROUTINE RELEASES*

* There were no non-routine or accidental gaseous effluent releases during the reporting period.

TABLE 2A

VERMONT YANKEE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1978

JULY - DECEMBER

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES*

* There were no routine or accidental liquid effluent releases during the reporting period.

TABLE 3

VERMONT YANKEE

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1978

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

| 1. Type of waste | Unit | 6-month Period | Est. Total Error, % |
|---|----------------------|----------------------|---------------------|
| a. Spent resins, filter sludges, evaporator bottoms, etc. | m ³ Ci | 6.71E+01 1.71E+02 | 7.5E+01 |
| b. Dry compressible waste, contaminated equip, etc. | m ³ Ci | 8.53E+01 9.21E+00 | 7.5E+01 |
| c. Irradiated components, control rods, etc. | m ³ Ci | | |
| d. Other (describe) | m ³ Ci | | |

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

| | | | |
|---------|------------|---|----------|
| a. + b. | Cesium-137 | % | 4.86E+01 |
| | Cesium-134 | % | 3.44E+01 |
| | Cobalt-60 | % | 7.60E+00 |
| | Zinc-65 | % | 4.10E+00 |
| | Iodine-131 | % | 3.10E+00 |
| | | % | |
| | | % | |
| | | % | |
| | | % | |
| | | % | |
| c. | | % | |
| | | % | |
| | | % | |
| d. | | % | |
| | | % | |
| | | % | |

3. Solid Waste Disposition

| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u> |
|----------------------------|-------------------------------|--------------------|
| 17 | Truck | Barnwell, S.C. |

B. IRRADIATED FUEL SHIPMENTS (Disposition)

| <u>Number of Shipments</u> | <u>Mode of Transportation</u> | <u>Destination</u> |
|----------------------------|-------------------------------|--------------------|
| | None | |

TABLE 4-A

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEP)

STABILITY CLASS A

CLASS FREQUENCY (PERCENT) = 51.07

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C=3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 2.765 | 4.425 | 3.650 | 1.991 | .442 | 0.000 | 13.274 |
| NNE | 0.000 | 1.217 | 1.327 | 1.106 | .553 | .442 | 0.000 | 4.646 |
| NE | 0.000 | 1.106 | .885 | .332 | 0.000 | 0.000 | 0.000 | 2.323 |
| ENE | 0.000 | .885 | .442 | .332 | 0.000 | 0.000 | 0.000 | 1.659 |
| E | 0.000 | .774 | .332 | 0.000 | 0.000 | 0.000 | 0.000 | 1.106 |
| ESE | 0.000 | 1.106 | 1.991 | .664 | .111 | 0.000 | 0.000 | 3.872 |
| SE | 0.000 | 1.217 | 4.757 | 1.991 | .221 | 0.000 | 0.000 | 8.186 |
| SSE | 0.000 | .774 | 3.319 | 2.765 | .221 | 0.000 | 0.000 | 7.080 |
| S | 0.000 | .996 | 3.208 | 8.850 | 5.199 | 1.438 | 0.000 | 19.690 |
| SSW | 0.000 | .442 | .664 | 2.765 | 1.217 | .111 | 0.000 | 5.199 |
| SW | 0.000 | 0.000 | .221 | 2.212 | 1.327 | 0.000 | 0.000 | 3.761 |
| WSW | 0.000 | .111 | .332 | .774 | .774 | .111 | 0.000 | 2.102 |
| W | 0.000 | 0.000 | .553 | .332 | .664 | 0.000 | 0.000 | 1.549 |
| WNW | 0.000 | .111 | .442 | 1.106 | 1.106 | 0.000 | 0.000 | 2.765 |
| NW | 0.000 | .553 | 1.659 | .111 | .664 | .332 | 0.000 | 3.319 |
| NNW | 0.000 | 1.217 | 8.186 | 4.425 | 2.987 | 1.659 | .996 | 19.469 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 13.274 | 32.743 | 31.416 | 17.035 | 4.535 | .996 | 100.000 |

NUMBER OF OBSERVATIONS = 904.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 4-B

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEP

STABILITY CLASS R

CLASS FREQUENCY (PERCENT) = 3.67

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 0.000 | 6.154 | 4.615 | 3.077 | 0.000 | 0.000 | 13.846 |
| NNE | 0.000 | 1.538 | 0.000 | 1.538 | 0.000 | 0.000 | 0.000 | 3.077 |
| NE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ENE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| E | 0.000 | 3.077 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 3.077 |
| ESE | 0.000 | 1.538 | 1.538 | 0.000 | 0.000 | 0.000 | 0.000 | 3.077 |
| SE | 0.000 | 3.077 | 1.538 | 0.000 | 0.000 | 0.000 | 0.000 | 4.615 |
| SSE | 0.000 | 3.077 | 6.154 | 3.077 | 0.000 | 0.000 | 0.000 | 12.308 |
| S | 0.000 | 1.538 | 1.538 | 12.308 | 1.538 | 1.538 | 0.000 | 18.462 |
| SSW | 0.000 | 0.000 | 0.000 | 3.077 | 0.000 | 0.000 | 0.000 | 3.077 |
| SW | 0.000 | 4.615 | 0.000 | 3.077 | 0.000 | 0.000 | 0.000 | 7.692 |
| WSW | 0.000 | 0.000 | 0.000 | 3.077 | 0.000 | 0.000 | 0.000 | 3.077 |
| W | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| WNW | 0.000 | 0.000 | 1.538 | 0.000 | 3.077 | 0.000 | 0.000 | 4.615 |
| NW | 0.000 | 0.000 | 1.538 | 1.538 | 0.000 | 0.000 | 0.000 | 3.077 |
| NNW | 0.000 | 3.077 | 10.769 | 3.077 | 3.077 | 0.000 | 0.000 | 20.000 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 21.538 | 30.769 | 35.385 | 10.769 | 1.538 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 65.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 4-C

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEP)

STABILITY CLASS C

CLASS FREQUENCY (PERCENT) = 2.26

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 5.000 | 5.000 | 5.000 | 2.500 | 0.000 | 0.000 | 17.500 |
| NNE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| NE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ENE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| E | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ESE | 0.000 | 2.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.500 |
| SE | 0.000 | 5.000 | 2.500 | 2.500 | 0.000 | 0.000 | 0.000 | 10.000 |
| SSE | 0.000 | 2.500 | 10.000 | 0.000 | 0.000 | 0.000 | 0.000 | 12.500 |
| S | 0.000 | 2.500 | 0.000 | 5.000 | 5.000 | 0.000 | 0.000 | 12.500 |
| SSW | 0.000 | 5.000 | 0.000 | 5.000 | 0.000 | 0.000 | 0.000 | 10.000 |
| SW | 0.000 | 2.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.500 |
| WSW | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| W | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| WNW | 0.000 | 0.000 | 0.000 | 5.000 | 2.500 | 0.000 | 0.000 | 7.500 |
| NW | 0.000 | 0.000 | 0.000 | 2.500 | 0.000 | 0.000 | 0.000 | 2.500 |
| NNW | 0.000 | 0.000 | 17.500 | 5.000 | 0.000 | 0.000 | 0.000 | 22.500 |
| VHCL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 25.000 | 35.000 | 30.000 | 10.000 | 0.000 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 40.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .20 MPH)

TABLE 4-D

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEPT)

STABILITY CLASS D

CLASS FREQUENCY (PERCENT) = 8.25

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 4.795 | 6.849 | 1.370 | 1.370 | 0.000 | 0.000 | 14.384 |
| NNE | 0.000 | 3.425 | 0.000 | 0.000 | .685 | 0.000 | 0.000 | 4.110 |
| NE | 0.000 | 0.000 | 0.000 | .685 | 0.000 | 0.000 | 0.000 | .685 |
| ENE | 0.000 | 1.370 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.370 |
| E | 0.000 | 1.370 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.370 |
| ESE | 0.000 | .685 | 1.370 | .685 | 0.000 | 0.000 | 0.000 | 2.740 |
| SE | 0.000 | 4.110 | .685 | .685 | 0.000 | 0.000 | 0.000 | 5.479 |
| SSE | 0.000 | .685 | 7.534 | 5.479 | 0.000 | 0.000 | 0.000 | 13.699 |
| S | 0.000 | 1.370 | .685 | 4.795 | .685 | 0.000 | 0.000 | 7.534 |
| SSW | 0.000 | .685 | 0.000 | 1.370 | 2.055 | .685 | 0.000 | 4.795 |
| SW | 0.000 | .685 | .685 | 1.370 | 2.055 | 0.000 | 0.000 | 4.795 |
| WSW | 0.000 | .685 | 0.000 | .685 | 0.000 | 0.000 | 0.000 | 1.370 |
| W | 0.000 | 0.000 | 0.000 | .685 | .685 | 0.000 | 0.000 | 1.370 |
| WNW | 0.000 | 0.000 | .685 | 0.000 | 1.370 | 0.000 | 0.000 | 2.055 |
| NNW | 0.000 | 1.370 | 3.425 | .685 | 0.000 | 0.000 | 0.000 | 5.479 |
| NNN | 0.000 | 5.479 | 12.329 | 6.849 | 4.110 | 0.000 | 0.000 | 28.767 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 26.712 | 34.247 | 25.342 | 13.014 | .685 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 146.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 4-E

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEPT)

STABILITY CLASS E

CLASS FREQUENCY (PERCENT) = 9.66

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GE 24 | TOTAL |
|-------|-------|--------|--------|--------|-------|-------|-------|---------|
| N | 0.000 | 6.433 | 7.602 | 2.339 | 0.000 | 0.000 | 0.000 | 16.374 |
| NNE | 0.000 | 2.924 | 1.170 | 0.000 | 0.000 | 0.000 | 0.000 | 4.094 |
| NE | 0.000 | 1.754 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.754 |
| ENE | 0.000 | 1.754 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.754 |
| E | 0.000 | 1.754 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.754 |
| ESE | 0.000 | 3.509 | 2.924 | 0.000 | 0.000 | 0.000 | 0.000 | 6.433 |
| SE | 0.000 | 2.924 | 4.094 | 0.000 | 0.000 | 0.000 | 0.000 | 7.018 |
| SSE | 0.000 | 2.924 | 9.942 | 1.754 | 0.000 | 0.000 | 0.000 | 14.620 |
| S | 0.000 | 0.000 | 2.924 | 4.678 | 1.170 | 0.000 | 0.000 | 8.772 |
| SSW | 0.000 | 0.000 | .585 | 3.509 | .585 | 0.000 | 0.000 | 4.678 |
| SW | 0.000 | 0.000 | 0.000 | 1.170 | 0.000 | 0.000 | 0.000 | 1.170 |
| WSW | 0.000 | .585 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | .585 |
| W | 0.000 | .585 | .585 | 2.339 | 1.754 | 0.000 | 0.000 | 5.263 |
| WNW | 0.000 | .585 | .585 | .585 | 1.754 | 0.000 | 0.000 | 3.509 |
| NW | 0.000 | 0.000 | .585 | 0.000 | .585 | 0.000 | 0.000 | 1.170 |
| NNW | 0.000 | 4.094 | 9.942 | 4.094 | 2.924 | 0.000 | 0.000 | 21.053 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 29.825 | 40.936 | 20.468 | 8.772 | 0.000 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 171.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 4-F

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEP)

STABILITY CLASS F

CLASS FREQUENCY (PERCENT) = 9.32

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|-------|-------|-------|---------|
| N | 0.000 | 4.242 | 11.515 | 3.636 | 0.000 | 0.000 | 0.000 | 19.394 |
| NNE | 0.000 | 1.818 | .606 | 0.000 | 0.000 | 0.000 | 0.000 | 2.424 |
| NE | 0.000 | 4.242 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 4.242 |
| ENE | 0.000 | 2.424 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.424 |
| E | 0.000 | 3.636 | .606 | 0.000 | 0.000 | 0.000 | 0.000 | 4.242 |
| ESE | 0.000 | 2.424 | .606 | 0.000 | 0.000 | 0.000 | 0.000 | 3.030 |
| SE | 0.000 | 4.848 | 7.879 | 1.212 | 0.000 | 0.000 | 0.000 | 13.939 |
| SSE | 0.000 | 3.030 | 8.485 | .606 | 0.000 | 0.000 | 0.000 | 12.121 |
| S | 0.000 | .606 | 3.636 | 1.212 | 0.000 | 0.000 | 0.000 | 5.455 |
| SSW | 0.000 | 2.424 | 0.000 | 1.818 | 0.000 | 0.000 | 0.000 | 4.242 |
| SW | 0.000 | 1.212 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.212 |
| WSW | 0.000 | 0.000 | 0.000 | 1.818 | .606 | 0.000 | 0.000 | 2.424 |
| W | 0.000 | 0.000 | .606 | .606 | 0.000 | .606 | 0.000 | 1.818 |
| WNW | 0.000 | 0.000 | 1.212 | 1.818 | 0.000 | 0.000 | 0.000 | 3.030 |
| NW | 0.000 | 1.212 | 1.212 | 1.212 | 0.000 | 0.000 | 0.000 | 3.636 |
| NNW | 0.000 | 4.242 | 7.273 | 4.242 | .606 | 0.000 | 0.000 | 16.364 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 36.364 | 43.636 | 18.182 | 1.212 | .606 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 165.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .50 MPH)

TABLE 4-G

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -

(JULY - SEPT)

297.0 FT WIND DATA

STABILITY CLASS G

CLASS FREQUENCY (PERCENT) = 15.76

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|-------|-------|-------|---------|
| N | 0.000 | 5.735 | 6.452 | 2.151 | .358 | 0.000 | 0.000 | 14.695 |
| NNE | 0.000 | 2.151 | 1.075 | 0.000 | 0.000 | 0.000 | 0.000 | 3.226 |
| NE | 0.000 | 1.075 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.075 |
| ENE | 0.000 | 1.075 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.075 |
| E | 0.000 | 2.867 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.867 |
| ESE | 0.000 | 2.151 | 2.151 | 0.000 | 0.000 | 0.000 | 0.000 | 4.301 |
| SE | 0.000 | 2.509 | 6.810 | .358 | 0.000 | 0.000 | 0.000 | 9.677 |
| SSE | 0.000 | 1.434 | 10.753 | 1.075 | 0.000 | 0.000 | 0.000 | 13.262 |
| S | 0.000 | 3.226 | 6.093 | 1.434 | 0.000 | 0.000 | 0.000 | 10.753 |
| SSW | 0.000 | 0.000 | 1.792 | 1.075 | 0.000 | 0.000 | 0.000 | 2.867 |
| SW | 0.000 | .717 | .358 | 1.075 | 0.000 | 0.000 | 0.000 | 2.151 |
| WSW | 0.000 | 1.075 | .717 | 1.434 | .358 | 0.000 | 0.000 | 3.584 |
| W | 0.000 | 1.075 | 1.075 | 1.075 | 0.000 | 0.000 | 0.000 | 3.226 |
| WNW | 0.000 | 0.000 | 3.226 | 1.434 | .717 | .358 | 0.000 | 5.735 |
| NW | 0.000 | 2.509 | 2.151 | 0.000 | 0.000 | 0.000 | 0.000 | 4.659 |
| NNW | 0.000 | 4.659 | 7.885 | 4.301 | 0.000 | 0.000 | 0.000 | 16.846 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 32.258 | 50.538 | 15.412 | 1.434 | .358 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 279.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 4-H

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(JULY - SEPT)

STABILITY CLASS ALL

CLASS FREQUENCY (PERCENT) = 100.00

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 3.642 | 5.989 | 3.164 | 1.356 | .226 | 0.000 | 14.576 |
| NNE | 0.000 | 1.751 | 1.017 | .621 | .339 | .226 | 0.000 | 3.955 |
| NE | 0.000 | 1.299 | .452 | .226 | 0.000 | 0.000 | 0.000 | 1.977 |
| ENE | 0.000 | 1.130 | .226 | .169 | 0.000 | 0.000 | 0.000 | 1.525 |
| E | 0.000 | 1.582 | .226 | 0.000 | 0.000 | 0.000 | 0.000 | 1.808 |
| ESE | 0.000 | 1.638 | 1.864 | .395 | .056 | 0.000 | 0.000 | 3.955 |
| SE | 0.000 | 2.316 | 4.802 | 1.299 | .113 | 0.000 | 0.000 | 8.531 |
| SSE | 0.000 | 1.412 | 6.215 | 2.373 | .113 | 0.000 | 0.000 | 10.113 |
| S | 0.000 | 1.299 | 3.333 | 6.271 | 2.994 | .791 | 0.000 | 14.689 |
| SSW | 0.000 | .621 | .678 | 2.429 | .847 | .113 | 0.000 | 4.689 |
| SW | 0.000 | .508 | .226 | 1.638 | .847 | 0.000 | 0.000 | 3.220 |
| WSW | 0.000 | .339 | .282 | .960 | .508 | .056 | 0.000 | 2.147 |
| W | 0.000 | .226 | .585 | .678 | .565 | .056 | 0.000 | 2.090 |
| WNW | 0.000 | .113 | 1.017 | 1.130 | 1.130 | .056 | 0.000 | 3.446 |
| NW | 0.000 | .904 | 1.695 | .339 | .395 | .169 | 0.000 | 3.503 |
| NNW | 0.000 | 2.712 | 8.870 | 4.520 | 2.316 | .847 | .508 | 19.774 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 21.495 | 37.458 | 26.215 | 11.582 | 2.542 | .508 | 100.000 |

NUMBER OF OBSERVATIONS = 1770.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

COMBINED DATA RECOVERABILITY FOR THIRD QUARTER 1978 - 80.2%

TABLE 5-A

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(OCT. - DEC.)

STABILITY CLASS A

CLASS FREQUENCY (PERCENT) = 44.86

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|-------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 1.356 | 2.712 | 5.989 | 3.277 | .565 | 0.000 | 13.898 |
| NNE | 0.000 | .904 | 1.017 | 2.825 | 1.017 | .113 | 0.000 | 5.876 |
| NE | 0.000 | .791 | .226 | .226 | 0.000 | 0.000 | 0.000 | 1.243 |
| ENE | 0.000 | .226 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | .226 |
| E | 0.000 | .565 | .339 | 0.000 | 0.000 | 0.000 | 0.000 | .904 |
| ESE | 0.000 | 1.243 | .678 | .339 | 0.000 | 0.000 | 0.000 | 2.260 |
| SE | 0.000 | 1.356 | 3.051 | 3.051 | .226 | 0.000 | 0.000 | 7.684 |
| SSE | 0.000 | .678 | 3.503 | 2.599 | .226 | 0.000 | 0.000 | 7.006 |
| S | 0.000 | .113 | .904 | 5.424 | 3.277 | 1.017 | 0.000 | 10.734 |
| SSW | 0.000 | 0.000 | .904 | .565 | 0.000 | 0.000 | 0.000 | 1.469 |
| SW | 0.000 | .452 | .113 | .226 | .226 | 0.000 | 0.000 | 1.017 |
| WSW | 0.000 | 0.000 | .339 | .791 | .226 | 0.000 | 0.000 | 1.356 |
| W | 0.000 | .113 | .226 | .904 | .791 | .113 | 0.000 | 2.147 |
| WNW | 0.000 | .339 | .791 | 2.825 | 5.537 | 1.695 | .565 | 11.751 |
| NW | 0.000 | .678 | .339 | 1.921 | 3.729 | 1.582 | .113 | 8.362 |
| NNW | 0.000 | 1.130 | 5.198 | 8.249 | 5.763 | 2.599 | 1.130 | 24.068 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 9.944 | 20.339 | 35.932 | 24.294 | 7.684 | 1.898 | 100.000 |

NUMBER OF OBSERVATIONS = 885.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .50 MPH)

TABLE 5-B

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FK WIND DATA

(OCT. - DEC.

STABILITY CLASS B

CLASS FREQUENCY (PERCENT) = 3.60

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 1.408 | 5.634 | 4.225 | 1.408 | 0.000 | 0.000 | 12.676 |
| NNE | 0.000 | 2.817 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.817 |
| NE | 0.000 | 2.817 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.817 |
| ENE | 0.000 | 2.817 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.817 |
| E | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ESE | 0.000 | 0.000 | 0.000 | 1.408 | 0.000 | 0.000 | 0.000 | 1.408 |
| SE | 0.000 | 1.408 | 0.000 | 1.408 | 0.000 | 0.000 | 0.000 | 2.817 |
| SSE | 0.000 | 1.408 | 2.817 | 4.225 | 0.000 | 0.000 | 0.000 | 8.451 |
| S | 0.000 | 1.408 | 2.817 | 7.042 | 2.817 | 0.000 | 0.000 | 14.085 |
| SSW | 0.000 | 0.000 | 0.000 | 1.408 | 1.408 | 0.000 | 0.000 | 2.817 |
| SW | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| WSW | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| W | 0.000 | 0.000 | 0.000 | 2.817 | 0.000 | 0.000 | 0.000 | 2.817 |
| WNW | 0.000 | 0.000 | 1.408 | 2.817 | 7.042 | 0.000 | 0.000 | 11.268 |
| NW | 0.000 | 1.408 | 1.408 | 5.634 | 2.817 | 0.000 | 0.000 | 11.268 |
| NNW | 0.000 | 2.817 | 4.225 | 11.268 | 5.634 | 0.000 | 0.000 | 23.944 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 18.310 | 18.310 | 42.254 | 21.127 | 0.000 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 71.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .50 MPH)

TABLE 5-C

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -

(OCT. - DEC.)

297.0 FT WIND DATA

STABILITY CLASS C

CLASS FREQUENCY (PERCENT) = 2.36

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 12.766 | 2.128 | 6.383 | 4.255 | 0.000 | 0.000 | 25.532 |
| NNE | 0.000 | 2.128 | 0.000 | 4.255 | 0.000 | 0.000 | 0.000 | 6.383 |
| NE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ENE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| E | 0.000 | 0.000 | 0.000 | 0.000 | 2.128 | 0.000 | 0.000 | 2.128 |
| ESE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| SE | 0.000 | 6.383 | 4.255 | 2.128 | 0.000 | 0.000 | 0.000 | 12.766 |
| SSE | 0.000 | 0.000 | 4.255 | 4.255 | 0.000 | 0.000 | 0.000 | 8.511 |
| S | 0.000 | 0.000 | 0.000 | 2.128 | 0.000 | 0.000 | 0.000 | 2.128 |
| SSW | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| SW | 0.000 | 0.000 | 0.000 | 2.128 | 0.000 | 0.000 | 0.000 | 2.128 |
| WSW | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| W | 0.000 | 0.000 | 0.000 | 2.128 | 0.000 | 0.000 | 0.000 | 2.128 |
| WNW | 0.000 | 0.000 | 0.000 | 2.128 | 6.383 | 0.000 | 0.000 | 8.511 |
| NW | 0.000 | 0.000 | 4.255 | 6.383 | 0.000 | 0.000 | 0.000 | 10.638 |
| NNW | 0.000 | 8.511 | 2.128 | 4.255 | 4.255 | 0.000 | 0.000 | 19.149 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 29.787 | 17.021 | 36.170 | 17.021 | 0.000 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 47.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .50 MPH)

TABLE 5-D

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION =

(OCT. - DEC. 197

297.0 FT WIND DATA

STABILITY CLASS D

CLASS FREQUENCY (PERCENT) = 7.51

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 3.378 | 2.703 | 4.730 | 1.351 | 0.000 | 0.000 | 12.162 |
| NNE | 0.000 | .676 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | .676 |
| NE | 0.000 | 0.000 | 0.000 | .676 | 0.000 | 0.000 | 0.000 | .676 |
| ENE | 0.000 | .676 | 0.000 | .676 | 0.000 | 0.000 | 0.000 | 1.351 |
| E | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| ESE | 0.000 | 2.027 | 3.378 | 0.000 | 0.000 | 0.000 | 0.000 | 5.405 |
| SE | 0.000 | 4.054 | 8.784 | 2.703 | 0.000 | 0.000 | 0.000 | 15.541 |
| SSE | 0.000 | .676 | 6.757 | 2.027 | 0.000 | 0.000 | 0.000 | 9.459 |
| S | 0.000 | 2.027 | 4.054 | 3.378 | .676 | .676 | 0.000 | 10.811 |
| SSW | 0.000 | 0.000 | .676 | 1.351 | 2.027 | 0.000 | 0.000 | 4.054 |
| SW | 0.000 | .676 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | .676 |
| WSW | 0.000 | .676 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | .676 |
| W | 0.000 | 0.000 | 0.000 | 2.027 | 0.000 | 0.000 | 0.000 | 2.027 |
| WNW | 0.000 | 0.000 | 0.000 | 4.054 | 6.081 | 2.027 | .676 | 12.838 |
| NW | 0.000 | 0.000 | .676 | 0.000 | 2.027 | 0.000 | 0.000 | 2.703 |
| NNW | 0.000 | 4.730 | 2.027 | 9.459 | 4.730 | 0.000 | 0.000 | 20.946 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 19.595 | 29.054 | 31.081 | 16.892 | 2.703 | .676 | 100.000 |

NUMBER OF OBSERVATIONS = 148.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5-E

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION =

(OCT. - DEC. 19

297.0 FT WIND DATA

STABILITY CLASS E

CLASS FREQUENCY (PERCENT) = 10.60

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 3.349 | 6.220 | 3.349 | .957 | 0.000 | 0.000 | 13.876 |
| NNE | 0.000 | 1.914 | .478 | 0.000 | 0.000 | 0.000 | 0.000 | 2.392 |
| NE | 0.000 | 1.435 | .957 | .478 | 0.000 | 0.000 | 0.000 | 2.871 |
| ENE | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| E | 0.000 | 1.435 | .478 | 0.000 | 0.000 | 0.000 | 0.000 | 1.914 |
| ESE | 0.000 | .478 | .478 | 0.000 | 0.000 | 0.000 | 0.000 | .957 |
| SE | 0.000 | 3.628 | 5.742 | .478 | 0.000 | 0.000 | 0.000 | 10.048 |
| SSE | 0.000 | 1.435 | 8.134 | 1.435 | 0.000 | 0.000 | 0.000 | 11.005 |
| S | 0.000 | 1.435 | .957 | 1.435 | 0.000 | .478 | 0.000 | 4.306 |
| SSW | 0.000 | 0.000 | 1.914 | .478 | .478 | 0.000 | 0.000 | 2.871 |
| SW | 0.000 | 1.435 | 0.000 | 0.000 | .478 | 0.000 | 0.000 | 1.914 |
| WSW | 0.000 | 0.000 | .478 | 0.000 | 0.000 | 0.000 | 0.000 | .478 |
| W | 0.000 | 1.435 | 2.392 | 1.435 | 2.392 | 0.000 | 0.000 | 7.656 |
| WNW | 0.000 | .957 | .957 | 3.349 | 4.785 | .478 | .478 | 11.005 |
| NW | 0.000 | 2.392 | 1.914 | 1.914 | .478 | 0.000 | 0.000 | 6.699 |
| NNW | 0.000 | 1.914 | 12.919 | 4.785 | 1.435 | .957 | 0.000 | 22.010 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 23.445 | 44.019 | 19.139 | 11.005 | 1.914 | .478 | 100.000 |

NUMBER OF OBSERVATIONS = 209.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5-F

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -
297.0 FT WIND DATA

(OCT. - DEC. 197

STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 9.74

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|-------|-------|-------|---------|
| N | 0.000 | 5.729 | 7.292 | 2.083 | 0.000 | 0.000 | 0.000 | 15.104 |
| NNE | 0.000 | 3.125 | 1.042 | 0.000 | 0.000 | 0.000 | 0.000 | 4.167 |
| NE | 0.000 | 1.042 | .521 | 0.000 | 0.000 | 0.000 | 0.000 | 1.563 |
| ENE | 0.000 | 2.083 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.083 |
| E | 0.000 | 1.563 | 1.042 | 0.000 | 0.000 | 0.000 | 0.000 | 2.604 |
| ESE | 0.000 | 4.688 | 2.083 | .521 | 0.000 | 0.000 | 0.000 | 7.292 |
| SE | 0.000 | 4.167 | 9.375 | 2.083 | 0.000 | 0.000 | 0.000 | 15.625 |
| SSE | 0.000 | 3.125 | 4.167 | .521 | 0.000 | 0.000 | 0.000 | 7.813 |
| S | 0.000 | 2.604 | .521 | .521 | 0.000 | 0.000 | 0.000 | 3.646 |
| SSW | 0.000 | 1.042 | 1.042 | 0.000 | 0.000 | 0.000 | 0.000 | 2.083 |
| SW | 0.000 | 2.604 | 1.042 | 0.000 | 0.000 | 0.000 | 0.000 | 3.646 |
| WSW | 0.000 | .521 | 0.000 | 1.042 | 0.000 | 0.000 | 0.000 | 1.563 |
| W | 0.000 | .521 | 1.563 | 2.083 | 1.042 | 0.000 | 0.000 | 5.208 |
| WNW | 0.000 | 1.563 | 0.000 | .521 | 0.000 | 0.000 | 0.000 | 2.083 |
| NW | 0.000 | 3.125 | 2.083 | .521 | 0.000 | 0.000 | 0.000 | 5.729 |
| NNW | 0.000 | 4.167 | 7.813 | 7.813 | 0.000 | 0.000 | 0.000 | 19.792 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 41.667 | 39.583 | 17.708 | 1.042 | 0.000 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 192.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5-G

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -

(OCT. - DEC. 1978)

297.0 FT WIND DATA

STABILITY CLASS G

CLASS FREQUENCY (PERCENT) = 21.30

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | 0-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|-------|-------|-------|---------|
| N | 0.000 | 2.857 | 3.810 | 1.905 | .714 | 0.000 | 0.000 | 9.286 |
| NNE | 0.000 | 2.857 | .238 | 0.000 | 0.000 | 0.000 | 0.000 | 3.095 |
| NE | 0.000 | 1.905 | .238 | 0.000 | 0.000 | 0.000 | 0.000 | 2.143 |
| ENE | 0.000 | 1.667 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 1.667 |
| E | 0.000 | 1.429 | .952 | 0.000 | 0.000 | 0.000 | 0.000 | 2.381 |
| ESE | 0.000 | 2.381 | .476 | 0.000 | 0.000 | 0.000 | 0.000 | 2.857 |
| SE | 0.000 | 4.762 | 10.238 | 3.333 | 0.000 | 0.000 | 0.000 | 18.333 |
| SSE | 0.000 | 2.381 | 8.571 | 3.333 | 0.000 | 0.000 | 0.000 | 14.286 |
| S | 0.000 | 1.905 | 4.762 | .952 | 0.000 | 0.000 | 0.000 | 7.619 |
| SSW | 0.000 | .952 | 2.619 | .476 | .238 | 0.000 | 0.000 | 4.286 |
| SW | 0.000 | .952 | 1.667 | .476 | 0.000 | 0.000 | 0.000 | 3.095 |
| WSW | 0.000 | 1.190 | 1.667 | .238 | 0.000 | 0.000 | 0.000 | 3.095 |
| W | 0.000 | .476 | .952 | .476 | .238 | 0.000 | 0.000 | 2.143 |
| WNW | 0.000 | 1.905 | 1.905 | 1.190 | .476 | 0.000 | 0.000 | 5.476 |
| NW | 0.000 | 2.381 | 1.905 | .714 | .714 | 0.000 | 0.000 | 5.714 |
| NNW | 0.000 | 1.429 | 7.143 | 5.238 | .476 | .238 | 0.000 | 14.524 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 31.429 | 47.143 | 18.333 | 2.857 | .238 | 0.000 | 100.000 |

NUMBER OF OBSERVATIONS = 420.

C = CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5-H

VERMONT YANKEE JOINT FREQUENCY DISTRIBUTION -

(OCT. - DEC. 1978)

297.0 FT WIND DATA

STABILITY CLASS ALL

CLASS FREQUENCY (PERCENT) = 100.00

WIND DISTRIBUTION SUMMARY (PERCENT FREQUENCY)

WIND SPEED (MILES/HOUR)

| DIR. | CALM | C-3 | 4-7 | 8-12 | 13-18 | 19-24 | GT 24 | TOTAL |
|-------|-------|--------|--------|--------|--------|-------|-------|---------|
| N | 0.000 | 2.738 | 3.854 | 4.310 | 1.978 | .254 | 0.000 | 13.134 |
| NNE | 0.000 | 1.724 | .659 | 1.369 | .456 | .051 | 0.000 | 4.260 |
| NE | 0.000 | 1.116 | .304 | .203 | 0.000 | 0.000 | 0.000 | 1.623 |
| ENE | 0.000 | .811 | 0.000 | .051 | 0.000 | 0.000 | 0.000 | .862 |
| E | 0.000 | .862 | .507 | 0.000 | .051 | 0.000 | 0.000 | 1.420 |
| ESE | 0.000 | 1.724 | .913 | .254 | 0.000 | 0.000 | 0.000 | 2.890 |
| SE | 0.000 | 2.941 | 5.432 | 2.637 | .101 | 0.000 | 0.000 | 11.511 |
| SSE | 0.000 | 1.369 | 5.375 | 2.485 | .101 | 0.000 | 0.000 | 9.331 |
| S | 0.000 | 1.065 | 1.978 | 3.398 | 1.623 | .558 | 0.000 | 8.621 |
| SSW | 0.000 | .304 | 1.318 | .558 | .304 | 0.000 | 0.000 | 2.485 |
| SW | 0.000 | .862 | .507 | .254 | .152 | 0.000 | 0.000 | 1.775 |
| WSW | 0.000 | .355 | .558 | .507 | .101 | 0.000 | 0.000 | 1.521 |
| W | 0.000 | .355 | .710 | 1.166 | .761 | .051 | 0.000 | 3.043 |
| WNW | 0.000 | .811 | .913 | 2.383 | 3.955 | .463 | .355 | 9.361 |
| NW | 0.000 | 1.420 | 1.166 | 1.623 | 2.130 | .710 | .051 | 7.099 |
| NNW | 0.000 | 2.079 | 6.339 | 7.302 | 5.499 | 1.318 | .507 | 21.045 |
| VRBL | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.000 | 20.538 | 50.933 | 28.499 | 15.213 | 3.905 | .913 | 100.000 |

NUMBER OF OBSERVATIONS = 1972.

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

COMBINED DATA RECOVERABILITY FOR FOURTH QUARTER 1978 - 89.3%

TABLE 6

VERMONT YANKEE
QUARTERLY AVERAGE χ/Q , D/Q AND GAMMA χ/Q
VALUES FOR SELECTED RECEPTORS

| POINT OF INTEREST | THIRD QUARTER | FOURTH QUARTER |
|--|---|---|
| A. Maximum offsite ground level air concentration location | Location: NW 1.55 miles χ/Q (undepleted)*: 7.61×10^{-7} χ/Q (depleted)*: 7.56×10^{-7} D/Q*: 1.88×10^{-9} Gamma χ/Q : 3.40×10^{-7} | Location: NW 1.55 miles χ/Q (undepleted): 1.22×10^{-6} χ/Q (depleted): 1.22×10^{-6} D/Q: 3.31×10^{-9} Gamma χ/Q : 4.75×10^{-7} |
| B. For whole body and skin doses from noble gases | | |
| 1) Maximum site boundary location | Location: South 0.24 miles χ/Q (undepleted): 2.07×10^{-9} χ/Q (depleted): 2.07×10^{-9} D/Q: 7.11×10^{-12} Gamma χ/Q : 9.51×10^{-7} | Location: South 0.24 miles χ/Q (undepleted): 4.14×10^{-11} χ/Q (depleted): 4.14×10^{-11} D/Q: 3.46×10^{-13} Gamma χ/Q : 8.33×10^{-7} |
| 2) Maximum nearest residence | Location: South 0.33 miles χ/Q (undepleted): 4.58×10^{-9} χ/Q (depleted): 4.57×10^{-9} D/Q: 2.04×10^{-11} Gamma χ/Q : 7.46×10^{-7} | Location: South 0.33 miles χ/Q (undepleted): 9.76×10^{-10} χ/Q (depleted): 9.76×10^{-10} D/Q: 7.63×10^{-12} Gamma χ/Q : 6.52×10^{-7} |
| C. For organ doses from iodine and particulates in gaseous effluents | | |
| 1) Maximum farm location | Location: SSE 3.5 miles χ/Q (undepleted): 2.89×10^{-7} χ/Q (depleted): 2.84×10^{-7} D/Q: 9.77×10^{-10} Gamma χ/Q : 1.88×10^{-7} | Location: SSE 3.5 miles χ/Q (undepleted): 2.67×10^{-7} χ/Q (depleted): 2.61×10^{-7} D/Q: 1.11×10^{-9} Gamma χ/Q : 1.71×10^{-7} |

TABLE 6
(continued)

| POINT OF INTEREST | THIRD QUARTER | FOURTH QUARTER |
|-----------------------------------|---|---|
| 2) Maximum nearest residence | Location: NW 1.4 miles X/Q (undepleted): 1.52×10^{-7} X/Q (depleted): 1.52×10^{-7} D/Q: 4.67×10^{-10} Gamma X/Q: 2.22×10^{-7} | Location: NW 1.4 miles (thyroid, GI(LLI), whole body) X/Q (undepleted): 1.82×10^{-7} X/Q (depleted): 1.81×10^{-7} D/Q: 6.18×10^{-10} Gamma X/Q: 2.97×10^{-7} Location: SSE 1.3 miles (bone) X/Q (undepleted): 9.61×10^{-8} X/Q (depleted): 9.60×10^{-8} D/Q: 6.34×10^{-10} Gamma X/Q: 2.64×10^{-7} |
| | Location: SSE 0.54 miles X/Q (undepleted): 1.75×10^{-8} X/Q (depleted): 1.75×10^{-8} D/Q: 1.28×10^{-10} Gamma X/Q: 5.11×10^{-7} | Location: NW 0.34 miles (thyroid) X/Q (undepleted): 7.85×10^{-9} X/Q (depleted): 7.85×10^{-9} D/Q: 2.37×10^{-11} Gamma X/Q: 5.87×10^{-7} Location: SSE 0.54 miles (bone, GI(LLI), whole body) X/Q (undepleted): 4.23×10^{-9} X/Q (depleted): 4.23×10^{-9} D/Q: 3.65×10^{-11} Gamma X/Q: 4.64×10^{-7} |
| 3) Maximum site boundary location | | |

* Depleted and undepleted X/Qs and Gamma X/Q are in units of sec./m^3

** Delta (D/Q) in units of $1/\text{m}^2$

TABLE 7

SUMMARY OF RADIOLOGICAL IMPACT ON MAN

Vermont Yankee Nuclear Power Station
Third and Fourth Quarters, 1978

| POTENTIAL PATHWAY OR TYPE OF EXPOSURE | ESTIMATED THIRD QUARTER DOSE COMMITMENT | ESTIMATED FOURTH QUARTER DOSE COMMITMENT |
|--|---|---|
| I. Maximum individual whole body and critical organ doses from receiving-water exposure pathways from liquid releases (mrem). | 0 (no liquid release) | 0 (no liquid release) |
| II. | | |
| A. Whole body and skin doses to individuals exposed at point of maximum offsite ground level air concentration of radioactive noble gaseous effluents. | (location approximately 2500 meters northwest of stack) | (location approximately 2500 meters northwest of stack) |
| 1. Skin dose (mrem) | 0.073 | 0.25 |
| 11. Whole body dose (mrem) | 0.054 | 0.094 |
| B. Whole body and skin doses at maximum site boundary location from radioactive noble gaseous effluents. | (south site boundary 0.24 miles) | (south site boundary 0.24 miles) |
| 1. Skin dose (mrem) | 0.16 | 0.17 |
| 11. Whole body dose (mrem) | 0.15 | 0.17 |
| C. Whole body and skin doses at maximum nearest residence from radioactive noble gaseous effluents. | (south 0.33 miles) | (south 0.33 miles) |
| 1. Skin dose (mrem) | 0.13 | 0.14 |
| 11. Whole body dose (mrem) | 0.12 | 0.13 |

TABLE 7
(continued)

| POTENTIAL PATHWAY OR TYPE OF EXPOSURE | ESTIMATED THIRD QUARTER DOSE COMMITMENT | ESTIMATED FOURTH QUARTER DOSE COMMITMENT |
|--|---|--|
| <p>III. Organ doses to individuals from radioactive iodine and particulates in gaseous effluents (including tritium).</p> <p>A. Maximum farm location.</p> <p>Maximum individual whole body and organ doses from all pathways.</p> <p>i. GI(LLI) (mrem) ii. Thyroid (mrem) iii. Bone (mrem) iv. Whole Body (mrem)</p> <p>B. Critical organ doses to maximum nearest resident from the inhalation, ingestion and ground plane exposure of iodine and particulates.</p> <p>i. Bone dose (mrem) ii. Thyroid dose (mrem) iii. GI(LLI) (mrem) iv. Whole body as critical organ (mrem)</p> | <p>(dairy farm 3.5 miles, SSE - all organs)</p> <p>9.0×10^{-4} (teen) 2.4×10^{-4} (infant) 7.1×10^{-3} (infant) 3.6×10^{-3} (infant)</p> <p>(resident 1.4 miles NW-all organs)</p> <p>8.9×10^{-4} (child) 7.1×10^{-2} (child) 2.5×10^{-4} (adult) 3.5×10^{-4} (child)</p> | <p>(dairy farm 3.5 miles SSE - all organs)</p> <p>1.0×10^{-3} (child) 1.3×10^{-2} (child) 2.6×10^{-3} (child) 1.2×10^{-3} (child)</p> <p>(resident 1.4 miles NW-thyroid, GI(LLI) and whole body; resident 1.3 mile SSE - bone)</p> <p>1.4×10^{-3} (child) 8.1×10^{-3} (child) 5.6×10^{-4} (child) 6.2×10^{-4} (child)</p> |

TABLE 7
(continued)

| POTENTIAL PATHWAY OR TYPE OF EXPOSURE | ESTIMATED THIRD QUARTER DOSE COMMITMENT | ESTIMATED FOURTH QUARTER DOSE COMMITMENT |
|--|--|--|
| <p>C. Organ doses to individuals at point of maximum ground level air concentration of gaseous effluents from inhalation and ground exposure of iodine and particulates.</p> <p>i. Bone dose (mrem) ii. Thyroid dose (mrem) iii. GI(LLI) (mrem) iv. Whole body as critical organ (mrem)</p> | <p>(2500 meters northwest)</p> <p>2.5×10^{-4} (child) 7.1×10^{-2} (child) 1.3×10^{-4} (teen) 1.9×10^{-4} (teen)</p> | <p>(2500 meters northwest)</p> <p>2.2×10^{-3} (child) 4.1×10^{-2} (child) 2.3×10^{-3} (teen) 2.3×10^{-3} (teen)</p> |
| <p>D. Organ doses to individuals at point of maximum site boundary air concentration of gaseous effluents from inhalation and ground exposure of iodine and particulates.</p> <p>i. Bone dose (mrem) ii. Thyroid dose (mrem) iii. GI(LLI) (mrem) iv. Whole body as critical organ</p> | <p>(0.54 miles SSE)</p> <p>4.1×10^{-5} (child) 1.7×10^{-3} (child) 3.8×10^{-5} (teen) 4.0×10^{-5} (teen)</p> | <p>(0.34 miles NW - thyroid 0.54 miles SSE - bone, GI(LLI) and whole body.</p> <p>2.2×10^{-5} (child) 2.6×10^{-4} (child) 2.3×10^{-5} (teen) 2.3×10^{-5} (teen)</p> |

TABLE 7
(Continued)

| POTENTIAL PATHWAY OR TYPE OF EXPOSURE | ESTIMATED THIRD QUARTER DOSE COMMITMENT | ESTIMATED FOURTH QUARTER DOSE COMMITMENT |
|---|---|--|
| <p>IV. Whole-body doses to individuals and populations in unrestricted areas from <u>direct</u> radiation from the facility.</p> <p>A. Maximum site boundary (mrem) (west of turbine building).</p> <p>B. Population dose (man-rem)</p> | <p>1.3</p> <p>6.9×10^{-3}</p> | <p>2.4</p> <p>1.9×10^{-2}</p> |
| <p>V. Whole-body dose to the population from all receiving-water related pathways from liquid releases. (man-rem)</p> | 0 (no liquid releases) | 0 (no liquid releases) |
| <p>VI. A. Whole-body doses to the population and average individual out to 50 miles from noble gaseous effluents.</p> <p>i. Whole body dose to population (man-rem)</p> <p>ii. Average individual whole body dose (mrem)</p> <p>iii. Skin dose to population (man-rem)</p> <p>iv. Average individual skin dose (mrem)</p> | <p>0.85</p> <p>7.41×10^{-4}</p> <p>1.9</p> <p>1.6×10^{-3}</p> | <p>7.0</p> <p>6.1×10^{-3}</p> <p>15.1</p> <p>1.3×10^{-2}</p> |

TABLE 7
(Continued)

| POTENTIAL PATHWAY OR TYPE OF EXPOSURE | ESTIMATED THIRD QUARTER DOSE COMMITMENT | ESTIMATED FOURTH QUARTER DOSE COMMITMENT |
|--|---|--|
| VI. (continued) | | |
| B. Organ doses to 50 mile population, and average individual, from inhalation, ingestion of milk, meat, and vegetables, and ground exposure to iodine and particulates in gaseous effluents. | | |
| i. Thyroid population dose (man-rem) | 2.2 | 1.5×10^{-1} |
| ii. Average individual thyroid dose (mrem) | 1.9×10^{-3} | 1.3×10^{-4} |
| iii. Whole body population dose (man-rem) | 9.5×10^{-3} | 1.4×10^{-2} |
| iv. Average individual whole-body dose (mrem) | 8.3×10^{-6} | 1.2×10^{-5} |

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

July - December 1978

Licensee: Vermont Yankee Nuclear Power Corporation

a. Fission and activation gases: $0.08/\bar{E}_Y$ Ci/sec.
b. Iodines: $0.48 \mu\text{C}/\text{sec}$.
c. Particulates, half-lives >8 days: $1.6\text{E}+3 \text{ MPC}^a$ Ci/sec.
d. Liquid effluents: $1.03\text{-}7 \mu\text{C}/\text{ml}$
(HTO: $3.0\text{E}-3 \mu\text{C}/\text{ml}$, dissolved Noble gases: $4.0\text{E}-5 \mu\text{C}/\text{ml}$).
Identified isotopic limits are found in 10CFR20 App. B,
Table II, Column 2.

- a. Fission and activation gases: No MPC limits
- b. Iodines: No MPC limits
- c. Particulates, half-lives >8 days: See 10CFR20, App. B, Table II, Column 1.
- d. Liquid effluents: See 10CFR20, App. B, Table II, Column 2.

b. Average beta energy: Not Applicable

Daily samples are drawn at the discharge of the Air Ejector. Isotopic breakdown of the releases are determined from these samples. A logarithmic

chart of the stack gas monitor is read daily to determine the gross release rate. At the very low release rates normally encountered during operation with the Augmented Off Gas system the error of release rates may be approximately $\pm 100\%$.

b. Iodines

Continuous isokinetic samples are drawn from the plant stack through a particulate filter and charcoal cartridge. The filters and cartridge are removed weekly (if releases are less than 4% of the Tech Spec limit), or daily (if they are greater than 4% of the limit), and are analyzed for radioiodine 131, 132, 133, 134, and 135. The iodines found on the filter are added to those on the charcoal cartridge. The error involved in these steps may be approximately $\pm 50\%$.

c. Particulates

The particulate filters described in b. above are also counted for particulate radioactivity. The error involved in this sample is also approximately $\pm 50\%$.

d. Liquid Effluents

Radioactive liquid effluents released from the facility are continuously monitored. Measurements are also made on a representative sample of each batch of radioactive liquid effluents released. For each batch, station records are retained of the total activity (mCi) released, concentration ($\mu\text{Ci/ml}$) of gross radioactivity, volume (liters), and approximate total quantity of water (liters) used to dilute the liquid effluent prior to release to the Connecticut River.

Each batch of radioactive liquid effluent released is analyzed for gross gamma and gamma isotopic radioactivity. A monthly proportional composite sample, comprising an aliquot of each batch released during a month, is also analyzed for tritium, SR-89, SR-90, gross beta and gross alpha radioactivity, in addition to gamma spectroscopy.

There were no liquid releases during the reporting period.

5. Batch Releases

a. Liquid

There were no routine liquid batch releases during the reporting period.

b. Gaseous

There were no routine gaseous batch releases during the reporting period.

6. Abnormal Releases

a. Liquid

There were no non-routine liquid releases during the reporting period.

b. Gaseous

There were no non-routine gaseous releases during the reporting period.