

EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

1/1/79 - 6/30/79

FLORIDA POWER CORPORATION

CRYSTAL RIVER - UNIT 3

FACILITY OPERATING LICENSE NO. DPR-72

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## I INTRODUCTION

This Effluent and Waste Disposal Report is submitted as required by Technical Specification 5.6.1.B of Appendix B to the Crystal River - Unit 3 Facility Operating License No. DPR-72. The data in this report covers the period from January 1 to June 30, 1979.

There have been no changes to the Technical Specification Requirements for effluents and waste disposal in Appendix B of the Facility Operating License during the period of this report.

Crystal River - Unit 3 has had no measurable radiological impact on the surrounding environment during the reporting period. This is based on the Radiological Environmental Monitoring Program showing no increases over preoperational data and the doses calculated for individuals and the population due to effluent releases being significantly below the levels required by 10 CFR 50, Appendix I.

The summations of gaseous and liquid effluents, solid waste shipments and meteorological data are in accordance with the tables in Regulatory Guide 1.21 (Rev. 1, 6/74) Appendix B.

The individual and population doses were calculated using the GASPAR (for gaseous effluents) and the LADTAP (for liquid effluents) computer codes obtained from the Nuclear Regulatory Commission and revised to include site specific data wherever possible. These doses are summarized in Tables I-1A and B.

The values reported for the activity of nuclides released are the actual measured activities. If no activity for a nuclide was detected for a quarter, the total of the lower limits of detection for all samples is reported as "<X.XXE-X". The totals of activity released is a total of only the nuclides that had measured activity.

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TABLE 1-1A  
SUMMATION OF DOSES TO INDIVIDUALS FROM  
GASEOUS AND LIQUID EFFLUENT RELEASES

First Quarter						
Beta Air Dose = 2.56E-01 mrad/yr (Design Objective = 2.00E+01 mrad/yr)						
Gamma Air Dose = 1.24E-01 mrad/yr (Design Objective = 1.00E+01 mrad/yr)						
Effluent Release	Distance (Mi.) and Direction	Age Group	Organ	Dose (mrem/yr)	Design Objectives (mrem/yr)	
Whole Body Dose						
Continuous Gaseous	4.50 @ E	infant	N/A	7.47E-02	5.00E+00	
Batch Gaseous	4.50 @ E	child	N/A	3.29E-03		
Continuous Liquid	N/A	teen	N/A	2.20E-04	5.00E+00	
Batch Liquid	N/A	adult	N/A	5.86E-03		
Organ Dose						
Continuous Gaseous	4.50 @ E	infant	thyroid	6.69E-01	1.50E+01	
Batch Gaseous	4.50 @ E	child	skin	9.39E-03		
Continuous Liquid	N/A	teen	bone	9.01E-04	5.00E+00	
Batch Liquid	N/A	adult	thyroid	8.00E-02		
Second Quarter						
Beta Air Dose = 4.94E-02 mrad/yr (Design Objective = 2.00E+01 mrad/yr)						
Gamma Air Dose = 5.08E-02 mrad/yr (Design Objective = 1.00E+01 mrad/yr)						
Effluent Release	Distance (Mi.) and Direction	Age Group	Organ	Dose (mrem/yr)	Design Objectives (mrem/yr)	
Whole Body Dose						
Continuous Gaseous	4.50 @ E	infant	N/A	9.26E-03	5.00E+00	
Batch Gaseous	4.50 @ E	child	N/A	2.15E-03		
Continuous Liquid	N/A	teen	N/A	4.86E-03	5.00E+00	
Batch Liquid	N/A	adult	N/A	3.80E-02		
Organ Dose						
Continuous Gaseous	4.50 @ E	infant	thyroid	1.91E-01	1.50E+01	
Batch Gaseous	4.50 @ E	child	skin	5.97E-03		
Continuous Liquid	N/A	teen	bone	2.10E-02	5.00E+00	
Batch Liquid	N/A	adult	GI-LLI	2.84E-01		

TABLE 1-1B

SUMMATION OF DOSES TO THE POPULATION  
FROM GASEOUS AND LIQUID EFFLUENT RELEASES

<u>Effluent Release</u>	<u>Whole Body Dose</u>			<u>Organ Dose</u>		
	<u>Dose</u> (MAN-REM/YR)	<u>Design Objectives</u> (MAN-REM/YR)	<u>Organ</u>	<u>Dose</u> (MAN-REM/YR)	<u>Design Objectives</u> (MAN-REM/YR)	
<u>First Quarter</u>						
Continuous Gases	1.43E+00	5.00E+02	thyroid	1.68E+00	5.00E+02	
Batch Gaseous	5.94E-02		skin	1.94E-01		
Continuous Liquid	1.85E-01	N/A	bone	7.49E-02	N/A	
Batch Liquid	6.51E-01	N/A	thyroid	5.13E+00	N/A	
<u>Second Quarter</u>						
Continuous Gaseous	1.14E-01	5.00E+02	thyroid	1.67E-01	5.00E+02	
Batch Gaseous	2.69E-02		skin	9.17E-02		
Continuous Liquid	4.01E-01	N/A	bone	1.74E+00	N/A	
Batch Liquid	3.96E+00	N/A	GI-LLI	3.15E+01	N/A	

## II RELEASES OF AND DOSES FROM GASEOUS EFFLUENTS

There are three normal methods of releasing gaseous effluents to the atmosphere: 1) continuous release via the Auxiliary Building Exhaust; 2) batch release from the Waste Gas Decay Tanks, and 3) Reactor Building purge. All three methods release to the atmosphere from one point, the Plant Vent.

### 1. Regulatory Limits

The Technical Specification limits for gaseous effluent releases are as follows:

#### Specification 2.4.2

The terms used in these Specifications are as follows:

subscripts v, refers to vent releases

i, refers to individual noble gas nuclide

(Refer to Table 2.4-5 for the noble gas nuclides considered)

$Q_T$  = the total noble gas release rate (Ci/sec)

=  $\sum_i Q_i$  sum of the individual noble gas radionuclides determined to be present by isotopic analysis

$\bar{K}$  = the average total body dose factor due to gamma emission (rem/yr per Ci/sec)

$\bar{L}$  = the average skin dose factor due to beta emissions (rad/yr per Ci/sec)

$\bar{M}$  = the average air dose factor due to beta emissions (rad/yr per Ci/sec)

$\bar{N}$  = the average air dose factor due to beta emissions (Rad/yr per Ci/sec)

The values of  $\bar{K}$ ,  $\bar{L}$ ,  $\bar{M}$  and  $\bar{N}$  are to be determined each time isotopic analysis is required as delineated in Specification 2.4.2.J. Determine the following using the results of the noble gas radionuclide analysis:

$$\bar{K} = (1/Q_T) \sum_i Q_i K_i$$

$$\bar{L} = (1/Q_T) \sum_i Q_i L_i$$

$$\bar{M} = (1/Q_T) \sum_i Q_i M_i$$

$$\bar{N} = (1/Q_T) \sum_i Q_i N_i$$

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where the values of  $K_i$ ,  $L_i$ ,  $M_i$  and  $N_i$  are provided in Table 2.4-5 and are site dependent gamma and beta dose factors.

Table 2.4-5

GAMMA AND BETA DOSE FACTORS FOR CRYSTAL RIVER UNIT 3

$x/Q = 1.46 \times 10^6 \text{ sec/m}^3$  at 1450 meters, ENE

Noble Gas Radionuclide	Dose Factors for Vent			
	$K_{iv}$	$L_{iv}$	$M_{iv}$	$N_{iv}$
	Total Body $\frac{\text{rem/yr}}{\text{Ci/sec}}$	Skin $\frac{\text{rem/yr}}{\text{Ci/sec}}$	Beta Air $\frac{\text{rad/yr}}{\text{Ci/sec}}$	Gamma Air $\frac{\text{rad/yr}}{\text{Ci/sec}}$
Kr-83m	$7.0 \times 10^{-5}$	0	0.92	0.035
Kr-85m	0.80	2.1	2.9	0.84
Kr-85	0.0096	2.0	2.8	0.010
Kr-87	2.5	14	15	2.6
Kr-88	6.1	3.5	4.3	6.4
Kr-89	2.79	15	15	0.83
Xe-131m	2.28	0.69	1.6	0.35
Xe-133m	0.22	1.5	2.2	0.29
Xe-133	0.26	0.55	1.5	0.31
Xe-135m	1.2	1.0	1.1	1.1
Xe-135	1.2	2.7	3.6	1.3
Xe-137	0.12	18	19	0.12
Xe-138	2.4	6.0	6.9	2.5

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Q = The measured release rate of the radioiodines and radioactive materials in particulate forms with half-lives greater than eight days. (Ci/sec)

- A. (1) The release rate limit of noble gases from the site shall be such that

$$2.0 (Q_{TV} \bar{K}_V) \leq 1$$

and

$$0.33 (Q_{TV} (\bar{L}_V + 1.1 \bar{N}_V)) \leq 1$$

- (2) The release rate limit of all radioniodines and radioactive materials in particulate form with half-lives greater than eight days, released to the environs as part of the gaseous wastes from the site shall be such that

$$3.5 \times 10^4 Q_V \leq 1$$

- B. (1) The average release rate of noble gases from the site during any calendar quarter shall be such that

$$13 (Q_{TV} \bar{N}_V) \leq 1$$

and

$$6.3 (Q_{TV} \bar{M}_V) \leq 1$$

- (2) The average release rate of noble gases from the site during any 12 consecutive months shall be

$$25 (Q_{TV} \bar{N}_V) \leq 1$$

and

$$13 (Q_{TV} \bar{M}_V) \leq 1$$

- (3) The average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter shall be such that

$$13 (3.5 \times 10^4 Q_V) \leq 1$$

- (4) The average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any period of 12 consecutive months shall be that

$$25 (3.5 \times 10^4 Q_V) \leq 1$$

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- (5) The amount of iodine-131 released during any calendar quarter shall not exceed 2 Ci/reactor.
  - (6) The amount of iodine-131 released during any period of 12 consecutive months shall not exceed 4 Ci/reactor.
- C. Should any of the conditions of 2.4.2.C(1), (2) or (3) listed below exist, the licensee shall make an investigation to identify the causes of the release rates, define and initiate a program of action to reduce the release rates to design objective levels listed in Section 2.4, and report these actions to the NRC within 30 days from the end of the quarter during which the releases occurred.
- (1) If the average release rate of noble gases from the site during any calendar quarter is such that
 
$$50 (Q_{TV} \bar{N}_V) > 1$$
 or
 
$$25 (Q_{TV} \bar{M}_V) > 1$$
  - (2) If the average release rate per site of all radioiodines and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter is such that
 
$$50 (3.5 \times 10^4 Q_V) > 1$$
  - (3) If the amount of iodine-131 released during any calendar quarter is greater than 0.5 Ci/reactor.
- D. During the release of gaseous wastes from the primary system waste gas holdup system the effluent monitor for the Waste Gas Storage Tanks shall be operated and set to alarm and to initiate the automatic closure of the waste gas discharge valve prior to exceeding the limits specified in 2.4.2.A above. The operability of each automatic isolation valve listed in Table 2.4-4 shall be demonstrated quarterly.
- E. The maximum activity to be contained in one waste gas storage tank shall not exceed 47,000 curies (considered as Xe-133).

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## 2. Maximum Permissible Concentrations

The maximum permissible concentrations of nuclides in gaseous releases is based on the resultant doses at the site boundary as determined from the concentrations of nuclides at the release point. The Technical Specifications provide the equations and dose factors that relate the gaseous activity to be released to doses at the site boundary and restrictions are placed on instantaneous, quarterly and yearly release rates. The gaseous releases do not exceed the concentration limits specified in 10CFR20 and are as low as reasonable achievable in accordance with the requirements of 10CFR50.

## 3. Measurements and Approximations of Total Radioactivity

The gaseous effluent release via the Auxiliary Building Exhaust is treated as a continuous release subdivided into discrete periods of filter changes and the radioactivity measured as follows:

- A. Fission and Activation Gases - The total activity released is determined from the net count rate of the gaseous monitor [RMA-2G], its calibration factor, and the total exhaust flow. The activity of radiogas is determined by the fraction of that radiogas in the isotopic analysis of the Auxiliary Building atmosphere for that period.
- B. Iodines - The activity released as Iodine-131, 133, and 135 is based on the charcoal cartridge activities (RMA-2I), the particulate filters activities (RMA-2P) and the total vent flow.
- C. Particulates - The activity released via particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters (RMA-2P) and the total vent flow.
- D. Tritium - The activity released as tritium is based on monthly grab sample analysis and total vent flow.

The radioactivity released by batch releases of the Waste Gas Decay Tanks via the Auxiliary Building Exhaust is measured as follows:

- A. Fission and Activation Gases - The activity released is based on the volume released and the activity of the individual nuclides obtained from an isotopic analysis of the grab sample taken prior to the release.
- B. Iodines - The iodines from batch releases are included in the iodine determination from the continuous Auxiliary Building releases.
- C. Particulates - The particulates from batch releases are included in the particulate determination from the continuous Auxiliary Building release.
- D. Tritium - The activity released as tritium is based on the grab sample analysis of each batch and the batch volume.

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The radioactivity released by purge releases of the Reactor Building through the Reactor Building vent is measured as follows:

- A. Fission and Activation Gases - The activity released is determined from the net count rate of the gaseous monitor (RMA-1G), the monitor calibration factor and the total vent flow. The release of each radiogas is a product of the total curies released times the fraction of that radiogas in the isotopic analysis for that purge.
- B. Iodines - The total curies released as iodine-131, 133 and 135 was determined from the charcoal cartridge activities (RMA-1I) and the particulate filter activities (RMA-1P).
- C. Particulate - The total curies released via particulates with half-lives greater than eight days is determined by isotopic analysis of each purge particulate filter (RMA-1P).
- D. Tritium - The total curies released as tritium is based on grab samples taken for each purge (or the average if more than one grab sample was taken).

Estimated errors are based on errors in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, non-steady release rates, chemical yield factors and sample losses for such items as charcoal cartridges.

- A. Fission and Activation Gas Total Release as calculated from process monitor readings and grab sample isotopics.

Monitor Statistical Error	30%
Monitor Error in Calibration	50%
Vent Flow Rate	10%
Non-Steady Release Rate	20%
	<u>110%</u>

- B. I-131 Total Release as calculated from charcoal and particulate filter activity.

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rate	10%
Vent Sample Flow Rate	10%
Non-Steady Release Rate	10%
Losses from Charcoal Cartridge	10%
	<u>110%</u>

- C. Particulates with half-lives greater than eight days Release as calculated from particulate filter activities.

Statistical Error	60%
Counting Equipment Calibration	10%
Vent Flow Rate	10%
Vent Sample Flow Rate	10%
Non-Steady Release Rate	10%
	<u>100%</u>



- D. Total Tritium Release as calculated from periodic grab sample analyses.

Water Vapor in Sample Stream	
Determination	20%
Vent Flow Rate	10%
Counting Calibration and Statistics	10%
Non-Steady Release Rate	50%
	<u>90%</u>

#### 4. Batch and Unplanned Releases

The batch gaseous effluent releases may be summarized as follows:

	First Quarter	Second Quarter
Number of Batch Releases	2.80E+01	3.60E+01
Total time for all releases (minutes)	2.05E+04	1.26E+05
Maximum time for any one release (minutes)	1.83E+03	1.15E+04
Average time for all releases (minutes)	7.34E+02	3.51E+03
Minimum time for any one release (minutes)	1.00E+00	2.00E+00
Number of Unplanned Releases	1.10E+01	3.00E+00
Total Unplanned Activity Released (Curies)	2.16E+02	1.89E+01

The summation of gaseous effluent releases is in Table II-1 and the summation of nuclides in gaseous effluent ground level releases is in Table II-2.

The doses to individuals from continuous and batch gaseous effluent releases are in Tables II-3 and II-4, respectively. The doses to the population from continuous and batch gaseous effluent releases are in Tables II-5 and II-6, respectively.

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The unplanned releases for the first and second quarters of 1979 are listed below giving the date, the Non Conforming Operations Report Number, and the cause of each release:

January 10, 1979	NCOR 79-15	Removal of Makeup and Purification prefilter relief valve for maintenance.
January 15, 1979	NCOR 79-22	Draining of Spent Fuel Pool heat exchanger "A" for repair of SFV-124.
January 23, 1979	NCOR 79-34	Blown loop seal on Miscellaneous Waste Storage Tank.
January 26, 1979	NCOR 79-39	Makeup and Purification relief valve relieved to Auxiliary Buildup Sump.
January 27, 1979	NCOR 79-41	Makeup and Purification relief valve relieved to Auxiliary Buildup Sump.
January 29, 1979	NCOR 79-42	RCS sample valve leaked.
January 29, 1979	NCOR 79-43	RCS sample valve leaked.
January 30, 1979	NCOR 79-44	Unknown.
February 5, 1979	NCOR 79-50	Restarting of Auxiliary Building fans after maintenance.
February 24, 1979	NCOR 79-61	Draining of drain pot on Waste Gas Header.
March 8, 1979	NCOR 79-73	Restarting of Auxiliary Building fans after maintenance.
April 10, 1979	NCOR 79-118	Unknown (Waste gas release in progress).
April 14, 1979	NCOR 79-122	Draining of drain pot on Waste Gas Header.
April 16, 1979	NCOR 79-126	Draining of drain pot on Waste Gas Header.

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TABLE II-1  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1979  
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est.Total Error, %
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A. Fission and Activation Gases

1. Total Release	Ci	3.71E+04	7.52E+03	1.10E+02
2. Average Release Rate for Period	μCi/sec	4.77E+03	9.56E+02	
3. Percent of Technical Specification Limit	%	7.88E+00	1.30E+00	

B. Iodines

1. Total Iodine - 131	Ci	8.99E-03	2.24E-03	1.10E+02
2. Average Release Rate for Period	μCi/sec	1.16E-03	3.54E-04	
3. Percent of Technical Specification Limit	%	4.49E-01	1.12E-01	

C. Particulates

1. Particulates with half-lives > 8 days	Ci	2.18E-05	1.69E-05	1.00E+02
2. Average Release Rate for Period	μCi/sec	2.80E-06	2.15E-06	
3. Percent of Technical Specification Limit	%	1.27E-04	1.62E-02	
4. Gross Alpha Radioactivity	Ci	7.45E-08	1.62E-06	

D. Tritium

1. Total Release	Ci	1.12E+01	3.98E+00	9.00E+01
2. Average Release Rate for Period	μCi/sec	1.44E+00	5.06E-01	
3. Percent of Technical Specification Limit	%	N/A	N/A	

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TABLE II-2  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1979  
GASEOUS EFFLUENTS - GROUND-LEVEL RELEASES

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
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1. Fission gases

krypton-85	Ci	<3.14E+04	<5.52E+03	3.56E+01	1.30E+00
krypton-85m	Ci	3.47E+02	<1.09E+02	3.35E+00	2.54E+00
krypton-87	Ci	1.05E+02	<3.75E+01	6.81E-01	2.23E-01
krypton-88	Ci	3.19E+02	1.14E+01	2.46E+00	1.27E+00
xenon-133	Ci	2.98E+04	5.62E+03	2.11E+03	1.37E+03
xenon-135	Ci	2.57E+03	1.39E+02	3.95E+01	3.81E+01
xenon-135m	Ci	<5.08E+02	7.33E+00	3.25E-02	<5.38E-01
xenon-138	Ci	<1.66E+03	<2.72E+02	<1.17E+01	<1.85E+00
argon-41	Ci	2.11E+02	2.61E+00	1.19E+00	2.95E-01
xenon-133m	Ci	6.20E+02	6.18E+01	2.24E+01	1.72E+01
xenon-131m	Ci	7.97E+02	. E	3.49E+01	4.54E+00
unidentified	Ci	. E	2.39E+02	. E	. E
Total for Period	Ci	3.48E+04	6.08E+03	2.25E+03	1.44E+03

Iodines

iodine-131	Ci	8.99E-03	2.24E-03	. E	. E
iodine-133	Ci	1.82E-03	5.42E-04	. E	. E
iodine-135	Ci	<6.32E-01	<9.43E-01	. E	. E
Total for Period	Ci	1.08E-02	2.78E-03	. E	. E

3. Particulates

strontium-89	Ci	9.61E-06	3.85E-06	. E	. E
strontium-90	Ci	8.35E-07	<1.96E-06	. E	. E
cesium-134	Ci	3.81E-06	<4.15E-03	. E	. E
cesium-137	Ci	6.14E-06	<2.19E-05	. E	. E
barium-lanthanum-140	Ci	<4.04E-05	<7.88E-05	. E	. E
cobalt-58	Ci	1.43E-06	1.30E-05	. E	. E
cerium-141	Ci		1.94E-09	. E	. E
Total excluding gross alpha	Ci	2.18E-05	1.69E-05	. E	. E
gross alpha	Ci	7.40E-08	1.62E-08	. E	. E
	Ci	. E	. E	. E	. E
unidentified	Ci	. E	. E	. E	. E

TABLE II-3  
Doses to Individuals from Continuous Gaseous Effluent Releases

FIRST QUARTER

Beta Air Dose =  $2.40\text{E-}01$  mrad/yr (4.50 miles, E)  
Gamma Air Dose =  $1.19\text{E-}01$  mrad/yr (4.50 miles, E)

Pathway	Whole Body Dose			Organ Dose			
	Distance (Mi.) and Direction	Age Group	Dose(mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ	Dose(mrem/yr)
Plume Immersion	4.50 @ E	each	$7.36\text{E-}02$	4.50 @ E	each	skin	$1.87\text{E-}01$
Ground Contamination	4.50 @ E	each	$1.05\text{E-}05$	4.50 @ E	each	skin	$1.25\text{E-}05$
Inhalation	4.50 @ E	teen	$7.11\text{E-}05$	4.50 @ E	child	thyroid	$8.53\text{E-}04$
Vegetable Consumption	4.50 @ E	child	$1.79\text{E-}04$	4.50 @ E	child	thyroid	$1.34\text{E-}02$
Cow Milk Consumption	4.50 @ E	infant	$4.46\text{E-}04$	4.50 @ E	infant	thyroid	$2.70\text{E-}01$
Goat Milk Consumption	4.50 @ E	infant	$6.08\text{E-}04$	4.50 @ E	infant	thyroid	$3.25\text{E-}01$
Meat Consumption	4.50 @ E	adult	$1.38\text{E-}05$	4.50 @ E	child	thyroid	$1.42\text{E-}03$
Total			$7.49\text{E-}01$				$7.98\text{E-}01$

SECOND QUARTER

Beta Air Dose =  $3.98\text{E-}02$  mrad/yr (4.50 miles, E)  
Gamma Air Dose =  $1.49\text{E-}02$  mrad/yr (4.50 miles, E)

Pathway	Whole Body Dose			Organ Dose			
	Distance (Mi.) and Direction	Age Group	Dose(mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ	Dose(mrem/yr)
Plume Immersion	4.50 @ E	each	$8.89\text{E-}03$	4.50 @ E	each	skin	$2.44\text{E-}02$
Ground Contamination	4.50 @ E	each	$1.51\text{E-}06$	4.50 @ E	each	skin	$1.84\text{E-}06$
Inhalation	4.50 @ E	teen	$3.09\text{E-}05$	4.50 @ E	child	thyroid	$2.41\text{E-}04$
Vegetable Consumption	4.50 @ E	child	$6.64\text{E-}05$	4.50 @ E	child	thyroid	$4.12\text{E-}03$
Cow Milk Consumption	4.50 @ E	infant	$1.46\text{E-}04$	4.50 @ E	infant	thyroid	$8.25\text{E-}02$
Goat Milk Consumption	4.50 @ E	infant	$2.04\text{E-}04$	4.50 @ E	infant	thyroid	$9.91\text{E-}02$
Meat Consumption	4.50 @ E	adult	$5.48\text{E-}06$	4.50 @ E	child	thyroid	$4.34\text{E-}04$
Total			$9.34\text{E-}03$				$2.11\text{E-}01$



TABLE II-4  
Doses to Individuals from Batch Gaseous Effluent Releases

FIRST QUARTER

Beta Air Dose =  $1.55\text{E}-02$  mrad/yr (4.50 miles, E)  
Gamma Air Dose =  $5.42\text{E}-03$  mrad/yr (4.50 miles, E)

Pathway	Whole Body Dose			Organ Dose		
	Distance (Mi.) and Direction	Age Group	Dose(mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ Dose(mrem/yr)
Plume Immersion	4.50 @ E	each	3.12E-03	4.50 @ E	each	skin 9.31E-03
Ground Contamination	4.50 @ E	each	0.00E+00	4.50 @ E	each	each 0.00E+00
Inhalation	4.50 @ E	teen	1.60E-05	4.50 @ E	teen	each* 1.60E-05
Vegetable Consumption	4.50 @ E	child	3.10E-05	4.50 @ E	child	each* 3.10E-05
Cow Milk Consumption	4.50 @ E	infant	1.84E-05	4.50 @ E	infant	each* 1.84E-05
Goat Milk Consumption	4.50 @ E	infant	3.76E-05	4.50 @ E	infant	each* 3.76E-05
Meat Consumption	4.50 @ E	adult	3.76E-05	4.50 @ E	adult	each* 2.52E-06
Total			3.32E-03			9.42E-03

SECOND QUARTER

Beta Air Dose =  $9.60\text{E}-03$  mrad/yr (4.50 miles, E)  
Gamma Air Dose =  $3.59\text{E}-03$  mrad/yr (4.50 miles, E)

Pathway	Whole Body Dose			Organ Dose		
	Distance (Mi.) and Direction	Age Group	Dose(mrem/yr)	Distance (Mi.) and Direction	Age Group	Organ Dose(mrem/yr)
Plume Immersion	4.50 @ E	each	2.14E-03	4.50 @ E	each	skin 5.96E-03
Ground Contamination	4.50 @ E	each	0.00E+00	4.50 @ E	each	each 0.00E+00
Inhalation	4.50 @ E	teen	1.49E-06	4.50 @ E	teen	each* 1.49E-06
Vegetable Consumption	4.50 @ E	child	2.87E-06	4.50 @ E	child	each* 2.87E-06
Cow Milk Consumption	4.50 @ E	infant	1.71E-06	4.50 @ E	infant	each* 1.71E-06
Goat Milk Consumption	4.50 @ E	infant	3.48E-06	4.50 @ E	infant	each* 3.48E-06
Meat Consumption	4.50 @ E	adult	2.33E-07	4.50 @ E	adult	each* 2.33E-07
Total			2.15E-03			5.97E-03

\*except bone

TABLE II-5

Doses to the Population from Continuous Gaseous Effluent Releases

FIRST QUARTER

<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ Dose</u>	
		<u>Organ</u>	<u>Dose (Man-Rem)</u>
Plume Immersion	1.43E-00	skin	4.53E+00
Ground Contamination	8.54E-05	skin	1.02E-04
Inhalation	2.19E-03	thyroid	1.99E-02
Vegetable Consumption	1.30E-03	thyroid	1.20E-01
Milk Consumption	5.10E-04	thyroid	1.05E-01
Meat Consumption	2.60E-04	thyroid	9.10E-03
Total	1.43E+00		4.78E+00

SECOND QUARTER

<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ Dose</u>	
		<u>Organ</u>	<u>Dose (Man-Rem)</u>
Plume Immersion	1.13E-01	skin	3.78E-01
Ground Contamination	1.06E-05	skin	1.27E-05
Inhalation	5.52E-04	thyroid	3.32E-03
Vegetable Consumption	3.40E-04	thyroid	3.00E-02
Milk Consumption	9.51E-05	thyroid	1.82E-02
Meat Consumption	6.38E-05	thyroid	2.07E-03
Total	1.14E-01		3.83E+00

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TABLE II-6

Doses to the Population from Batch Gaseous Effluent Releases

FIRST QUARTER

<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ Dose</u>	
		<u>Organ</u>	<u>Dose (Man-Rem)</u>
Plume Immersion	5.43E-02	skin	1.93E-01
Ground Contamination	0.00E+00	each	0.00E+00
Inhalation	3.82E-04	each*	3.82E-04
Vegetable Consumption	1.62E-04	each*	1.62E-04
Milk Consumption	5.75E-05	each*	5.75E-05
Meat Consumption	3.98E-05	each*	3.98E-05
Total	5.49E-02		1.94E-01

SECOND QUARTER

<u>Pathway</u>	<u>Whole Body Dose (Man-Rem)</u>	<u>Organ Dose</u>	
		<u>Organ</u>	<u>Dose (Man-Rem)</u>
Plume Immersion	2.68E-02	skin	9.17E-02
Ground Contamination	0.00E+00	each	0.00E+00
Inhalation	2.73E-05	each*	2.72E-05
Vegetable Consumption	1.43E-05	each*	1.43E-05
Milk Consumption	3.05E-06	each*	3.05E-06
Meat Consumption	2.97E-06	each*	2.97E-06
Total	2.69E-02		9.17E-02

\*except bone

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### III RELEASES OF AND DOSES FROM LIQUID EFFLUENTS

There are two sources of liquid effluents released to the discharge canal: 1) the Laundry and Hot Shower Sump and 2) the Evaporator Condensate Storage Tanks. Both are batch type releases made through the plant liquid release monitor, RML-2. There is one source of liquid effluents released to the Chemical/Industrial Waste Water Ponds: the turbine building sump. This is a continuous mode type release and the measurements and calculations will be described in Supplement I to this report.

#### 1. Regulatory Limits

The Technical Specification limits for liquid effluent releases are as follows:

##### Specification 2.4.1

- A. The instantaneous concentration of radioactive materials released in liquid waste effluents from all reactors at the site shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted areas.
- B. The cumulative release of radioactive materials in liquid waste effluents excluding tritium and dissolved gases, shall not exceed 10 Ci/reactor/calendar quarter.
- C. The cumulative release of radioactive materials in liquid waste effluents excluding tritium and dissolved gases, shall not exceed 20 Ci/reactor in any 12 consecutive months.
- D. During release of radioactive wastes, the effluent control monitor shall be set to alarm and to initiate the automatic closure of each waste isolation valve prior to exceeding the limits specified in 2.4.1.A above.
- E. The operability of each automatic isolation valve in the liquid radwaste discharge lines shall be demonstrated quarterly.
- F. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when the projected cumulative release could exceed 1.25 Ci/reactor/calendar quarter, excluding tritium and dissolved gases.
- G. The maximum radioactivity to be contained in any liquid radwaste tank that can be discharged directly to the environs shall not exceed 10 Ci, excluding tritium and dissolved gases.
- H. If the cumulative release of radioactive materials in liquid effluents, excluding tritium and dissolved gases, exceeds 2.5 Ci/reactor/calendar quarter, the licensee shall make an investigation to identify the causes for such releases, define and initiate a program of action to reduce such releases to the design objective levels listed in Section 2.4, and a report of these actions shall be made to the USNRC in accordance with Section 5.6.2.C(1).

## 2. Maximum Permissible Concentrations

The maximum permissible concentration values used in determining allowable liquid radwaste release concentrations are taken from 10 CFR Part 20, Appendix B, Table II, Column 2. Release rate and dilution ratio for each batch are determined by a mixed nuclide MPC calculation performed before the release of the batch. To facilitate the measurements and calculations, the nuclides of Column 2 which can be produced in a fission reactor have been grouped according to MPC value and type of radiation as shown in Figure III-1.

The concentration of each of the 23 gamma emitting nuclides specifically noted in Figure III-1 is measured individually because of interest in that nuclide. For any of the 23 nuclides not detected in the gamma scan, the MDA Limit is computed from the measured data for that sample.

Only two pure beta emitters, Sr-89 and Sr-90, have MPC values less than  $9 \times 10^{-6}$   $\mu\text{Ci/ml}$ . Individual measurements are made on proportional composite liquid radwaste samples to determine the Sr-89 and Sr-90 concentration or MDA value to be applied to individual batch release calculations.

Although the MPC limit for tritium is greater than  $9 \times 10^{-6}$   $\mu\text{Ci/ml}$ , a separate measurement is made for tritium. A distillation and liquid scintillation counting technique is used to measure tritium concentration.

The measured and calculated concentration values for each batch are used to calculate the dilution ratio, release rate, and dilution rate prior to release of each batch. Both the concentration and release data are stored on a computer disc file. The disc file data is used to assure that quarterly and annual release limits are not exceeded. Bases used for the data of Table III-1 are as follows:

- A. Fission and activation products - The total release values (not including tritium, gases, alpha) are comprised of the sum of the individual radionuclide activities in each batch released to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent. Percent of applicable limit is determined from a mixed nuclide MPC calculation. The average concentration for each nuclide summed over all batches is divided by the corresponding individual MPC value. The sum over all nuclides of the  $\text{Ci/MPCi}$  ratios times 100 is the percent of applicable limit for effluent releases during the quarter.
- B. Tritium - The measured tritium concentration in a composite sample is used to calculate the total release and average diluted concentration during each period. Average diluted concentration divided by the MPC limit,  $3 \times 10^{-3}$   $\mu\text{Ci/ml}$ , is converted to percent to give the percent of applicable limit.

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- C. Dissolved and entrained gases - Concentrations of dissolved and entrained gases in liquid effluents are measured monthly by Ge(Li) spectroscopy on a one liter sample from a representative liquid radwaste batch. Dissolved and entrained gases for which measured or MDA concentrations are determined include noble gases with half lives greater than 8 hours: Xe-135, Xe-133m, Xe-133, and Kr-85. Iodine radionuclides in any form are determined during the isotopic analysis for each batch, therefore a separate analysis for possible gaseous forms is not performed because it would not provide additional information.

A conservative release limit, the maximum sensitivity limit of  $4 \times 10^{-5}$   $\mu\text{Ci/ml}$  of each dissolved and entrained radionuclide as specified in Table Note 5, Table 2.4-1, Environmental Technical Specifications, has been applied in determining the percent of applicable limit.

### 3. Measurements and Approximations of Total Radioactivity

Details of the analytical procedures for liquid radwaste analysis are as follows:

	<u>Measurement</u>	<u>Frequency</u>	<u>Method</u>
1.	Gamma Isotopic	Each Batch	Ge(Li) spectrometry with on-line computer
2.	Gross Beta	Each Batch	Liquid scintillation
3.	Sr-89	Monthly Composite	Chemical separation and gas flow proportional counting
4.	Sr-90	Monthly Composite	Chemical separation and gas flow proportional counting
5.	Tritium	Monthly Composite	Distillation and liquid scintillation counting
6.	Alpha	Monthly Composite	Gas flow proportional counting
7.	Dissolved Gases	One Batch/Month	Ge(Li) spectrometry with on-line computer

Estimated errors are based on errors in counting equipment calibration, counting statistics, non-steady release flow rate, chemical yield factors, sampling and mixing losses, and volume determinations.

- A. Fission and Activation Products Total Release as calculated for each batch.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

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B. Total Tritium Release as calculated from a monthly composite.

Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>40%</u>

C. Dissolved and Entrained Gases Total Release as calculated from one batch per month.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

D. Total Gross Alpha Radioactivity Release as calculated from a monthly composite.

Statistical Error at MDA	60%
Waste Volume	10%
Counting Equipment Calibration	10%
Sampling and Mixing	20%
	<u>100%</u>

#### 4. Batch and Unplanned Releases

The batch liquid effluent releases may be summarized as follows:

	First Quarter	Second Quarter
Number of Batch Releases	6.40E+01	1.04E+02
Total Time for all Releases (minutes)	1.75E+04	2.71E+04
Maximum Time for any one Release (minutes)	7.95E+02	8.05E+02
Average Time for all Releases (minutes)	2.74E+02	2.61E+02
Minimum time for any one Release (minutes)	1.20E+02	1.50E+01
Average dilution flow of Units 1, 2 and 3 during all Releases (liters/minute)	3.36E+06	2.40E+06
Number of Unplanned Releases	0.00E+00	0.00E+00
Total Unplanned Activity Releases (Curie)	0.00E+00	0.00E+00

The summation of liquid effluent releases is in Table III-1 and the summation of nuclides in liquid effluent releases is in Table III-2. These releases are based on the dilution of the radioactive liquid effluent by the condenser cooling and nuclear services water of Unit 3.

The doses to individuals from liquid effluent releases are in Table III-3 and the doses to the population from liquid effluent releases are in Table III-4. These doses are based on the dilution of the radioactive liquid effluents by the condenser cooling water of Units 1, 2 and 3.

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Figure III-1

## METHODS OF MEETING 10 CFR 20, APPENDIX B, TABLE II, COLUMN 2 MPC LIMITS

MPC RANGE ( $\mu\text{Ci/ml}$ )	GAMMA-RAY EMITTERS	BETA EMITTERS	ALPHA EMITTERS
$<9 \times 10^{-6}$	<u>I-131, I-132, I-133</u>	Sr-89, Sr-90	
	<u>I-135, Cs-134</u>	(Separation and Gas Flow Counting)	
	(Ge(Li) Gamma-Ray Spectroscopy)		All (Gas Flow Counting Sensitivity $\sim 10^{-7} \mu\text{Ci/ml}$ as Pu-239)
$\geq 9 \times 10^{-6}$	<u>Ba-La-140, Na-24, Cu-64</u>	<u>Tritium</u>	
	<u>Co-60, Fe-59, Zn-65</u>	(Distillation and Liquid Scintillation Counting $\sim 10^{-5} \mu\text{Ci/ml}$ )	
	<u>Ag-110m, Mn-54, Co-58</u>		
	<u>Zr-Nb-95, Cs-Ba-137</u>		
	<u>As-76, F-18, Cr-51</u>	<u>All others</u>	
	<u>Np-239, Ce-141</u>	(Liquid Scintillation Counting $\sim 10^{-5} \mu\text{Ci/ml}$ as Cs-137)	
	<u>Mo-Tc-99, Ce-Pr-144</u>		
	(Ge(Li) Gamma-Ray Spectroscopy)		

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TABLE III-1  
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1979  
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

Unit	Quarter 1	Quarter 2	Est.Total Error, %
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A. Fission and Activation Products

1. Total Release (not including tritium, gases, alpha)	Ci	8.95E-02	2.12E-01	1.00E+02
2. Average diluted concentration during period	$\mu$ Ci/ml	2.14E-09	6.56E-09	
3. Percent of applicable limit	%	3.43E-01	8.80E-02	

B. Tritium

1. Total Release	Ci	8.15E+01	4.08E+01	4.00E+01
2. Average diluted concentration during period	$\mu$ Ci/ml	1.95E-06	1.27E-06	
3. Percent of applicable limit	%	6.48E-02	4.24E-02	

C. Dissolved and entrained gases

1. Total release	Ci	9.92E-01	2.20E+00	1.00E+02
2. Average diluted concentration during period	$\mu$ Ci/ml	2.37E-08	6.86E-08	
3. Percent of applicable limit	%	2.37E-01	6.86E-01	

D. Gross alpha radioactivity

1. Total release	Ci	1.29E-05	2.20E-06	1.00E+02
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E. Volume of waste released prior to dilution)**	liters	1.72E+07	2.27E+06	1.00E+01
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F. Volume of dilution water used during period	liters	4.19E+10	3.21E+10	1.00E+01
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\*\*For Batch Mode: Volume of Waste Released for Continuous Mode (1st quarter) = 2.13E-07 liters  
(2nd quarter) = 1.24E-07 liters

TABLE III-2  
EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1979

LIQUID EFFLUENTS

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
strontium-89	Ci	4.87E-03	3.84E-04	5.73E-05	9.49E-05
strontium-90	Ci	2.54E-03	1.65E-04	<1.21E-04	1.43E-05
cesium-134	Ci	2.43E-05	. E	7.12E-03	3.45E-02
cesium-137	Ci	1.98E-06	4.16E-05	1.03E-02	5.11E-02
iodine-131	Ci	9.30E-06	. E	4.24E-02	6.02E-03
cobalt-58	Ci	9.20E-06	9.71E-05	1.64E-02	7.47E-02
cobalt-60	Ci	. E	. E	2.66E-03	1.87E-02
iron-59	Ci	. E	. E	4.40E-04	1.93E-03
zinc-65	Ci	. E	. E	<2.83E-04	2.06E-05
manganese-54	Ci	. E	. E	5.21E-04	2.87E-03
chromium-51	Ci	. E	. E	3.20E-04	1.47E-02
zirconium-niobium-95	Ci	. E	. E	2.38E-04	4.76E-03
molybdenum-99	Ci	. E	. E	2.91E-05	2.89E-04
technetium-99m	Ci	. E	. E	9.91E-05	1.76E-04
barium-lanthanum-140	Ci	. E	. E	1.84E-04	1.29E-04
cerium-141	Ci	. E	. E	1.79E-04	1.15E-04
arsenic-76	Ci	. E	. E	4.85E-05	<1.35E-03
sodium-24	Ci	. E	. E	4.13E-06	7.35E-06
iodine-135	Ci	. E	. E	8.84E-05	1.72E-05
iodine-132	Ci	. E	. E	<1.32E-04	2.70E-06
iodine-133	Ci	. E	. E	6.32E-04	6.32E-05
copper-64	Ci	. E	. E	<1.65E-02	3.94E-04
cerium-139	Ci	. E	2.31E-05	. E	. E
cerium-144	Ci	. E	. E	4.86E-05	3.32E-03
unidentified	Ci	. E	. E	. E	. E
Total for period (above)	Ci	. E	. E	. E	. E
xenon-133	Ci	. E	. E	. E	. E
xenon-135	Ci	. E	. E	. E	. E

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TABLE III-3

## Doses to Individuals from Liquid Effluent Releases

FIRST QUARTER - CONTINUOUS RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		<u>Dose(mrem/yr)</u>
	<u>Age Group</u>	<u>Dose(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	
Fish	adult	6.83E-05	teen	bone	2.73E-04
Invertebrates	teen	1.45E-04	teen	bone	6.20E-04
Shoreline Use	teen	8.63E-06	teen	skin	1.01E-05
Total		2.22E-04			9.03E-04

SECOND QUARTER - CONTINUOUS RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		<u>Dose(mrem/yr)</u>
	<u>Age Group</u>	<u>Dose(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	
Fish	teen	1.44E-03	teen	bone	6.24E-03
Invertebrates	teen	3.41E-03	teen	bone	1.48E-02
Shoreline Use	teen	5.57E-06	teen	skin	6.50E-06
Total		4.86E-03			2.10E-02

FIRST QUARTER - BATCH RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		<u>Dose(mrem/yr)</u>
	<u>Age Group</u>	<u>Dose(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	
Fish	adult	4.00E-03	adult	thyroid	3.65E-02
Invertebrates	adult	1.48E-03	adult	thyroid	4.31E-02
Shoreline Use	teen	2.14E-03	teen	skin	2.50E-03
Total		7.62E-03			8.21E-02

SECOND QUARTER - BATCH RELEASES

<u>Pathway</u>	<u>Whole Body Dose</u>		<u>Organ Dose</u>		<u>Dose(mrem/yr)</u>
	<u>Age Group</u>	<u>Dose(mrem/yr)</u>	<u>Age Group</u>	<u>Organ</u>	
Fish	adult	2.42E-02	adult	GI-LLI	2.24E-01
Invertebrates	adult	9.07E-03	adult	GI-LLI	5.66E-02
Shoreline Use	teen	1.64E-02	teen	skin	1.92E-02
Total		4.97E-02			3.00E-01

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TABLE III-4  
Doses to the Population from Liquid Effluent Releases

FIRST QUARTER - CONTINUOUS RELEASES

Pathway	Whole Body Dose	Organ Dose	
	(Man-Rem)	Organ	Dose (Man-Rem)
Sport Fish	1.16E-02	bone	4.56E-02
Commercial Fish	1.19E-05	bone	4.69E-05
Sport Invertebrate	6.78E-03	bone	2.90E-02
Commercial Invertebrate	4.89E-05	bone	2.09E-04
Shoreline Use	3.87E-05	skin	4.51E-05
Swimming	2.82E-07	thyroid	2.82E-07
Boating	2.82E-07	thyroid	2.82E-07
Total	1.85E-02		7.49E-02

SECOND QUARTER - CONTINUOUS RELEASES

Pathway	Whole Body Dose	Organ Dose	
	(Man-Rem)	Organ	Dose (Man-Rem)
Sport Fish	2.41E-01	bone	1.04E+00
Commercial Fish	2.48E-04	bone	1.07E-03
Sport Invertebrate	1.59E-01	bone	6.93E-01
Commercial Invertebrate	1.15E-03	bone	4.98E-03
Shoreline Use	2.50E-05	skin	2.91E-05
Swimming	2.45E-07	thyroid	2.45E-07
Boating	2.45E-07	thyroid	2.45E-07
Total	4.01E-01		1.74E+00

FIRST QUARTER - BATCH RELEASES

Pathway	Whole Body Dose	Organ Dose	
	(Man-Rem)	Organ	Dose (Man-Rem)
Sport Fish	5.78E-01	thyroid	3.84E+00
Commercial Fish	5.92E-04	thyroid	3.08E-03
Sport Invertebrate	6.27E-02	thyroid	1.27E+00
Commercial Invertebrate	4.40E-04	thyroid	7.07E-03
Shoreline Use	9.59E-03	skin	1.12E-02
Swimming	7.43E-05	thyroid	7.43E-05
Boating	7.43E-05	thyroid	7.43E-05
Total	6.51E-01		5.13E+00

SECOND QUARTER - BATCH RELEASES

Pathway	Whole Body Dose	Organ Dose	
	(Man-Rem)	Organ	Dose (Man-Rem)
Sport Fish	3.49E+00	GI-LLI	2.92E+01
Commercial Fish	3.58E-03	GI-LLI	2.85E-02
Sport Invertebrate	3.94E-01	GI-LLI	2.22E+00
Commercial Invertebrate	2.79E-03	GI-LLI	1.56E-02
Shoreline Use	7.34E-02	skin	8.59E-02
Swimming	3.75E-04	thyroid	3.75E-04
Boating	3.75E-04	thyroid	3.75E-04
Total	3.96E+00		3.16E+01

#### IV. SOLID WASTE SHIPMENTS

Solid waste shipments from the plant may include irradiated fuel, solidified liquid waste and compressed solid waste.

##### 1. Regulatory Limits

The Technical Specifications for solid waste shipment are as follows:

##### Specification 2.4.3

- A. The total curie quantity and principle radionuclide composition shall be determined by measurement or estimates for all radioactive solid waste shipped offsite.
- B. Reports of the radioactive solid waste shipments, volumes, principle radionuclides, and total curie quantity, shall be submitted in accordance with Section 5.6.1.

The summation of solid waste and irradiated fuel shipments is in Table IV-1.

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TABLE IV-1

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1979  
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

## A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Non irradiated fuel)

1. Type of waste	Unit	First 6-month period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup> Ci	3.62E+02 1.13E+03	3.70E+01
b. Dry compressible waste, contaminated equip, etc.	m <sup>3</sup> Ci	2.66E+02 1.08E+01	6.50E+01
c. Irradiated components, control rods, etc.	m <sup>3</sup> Ci	. E . E	. E
d. Other (describe)	m <sup>3</sup> Ci	. E . E	. E

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

a.	Co-58, Cs-134, Cs-137 - each	g/g	2.50E+01
	Co-60, Mn-54, I-131, Zr-Nb-95 - each	g/g	5.00E+00
	Cr-51, Sb-124, Ba-140, La-140, Fe-59 - each	g/g	1.00E+00
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
b.		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
c.		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E
		g/g	. E

## 3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
61	Chem-Nuclear Transport Truck-Exclusive Use Vehicle	Chem-Nuclear System, Inc. Barnwell, So. Carolina

## B. IRRADIATED FUEL SHIPMENTS (Disposition)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
None	NR	NR

## V METEOROLOGICAL DATA

The meteorological data at 33 feet (10 meters) is summarized in Tables V-1 (for the First Quarter), V-2 (for the Second Quarter), V-3 (concurrent with batch gaseous effluent releases - First Quarter), and V-4 (concurrent with batch gaseous effluent releases - Second Quarter).

The classification of atmosphere stability is as follows:

Stability Classification	Pasquill Categories	Temperature change with height (°C/100m)
Extremely unstable	A	<-1.9
Moderately unstable	B	>-1.9 to <-1.7
Slightly unstable	C	>-1.7 to <-1.5
Neutral	D	>-1.5 to <-0.5
Slightly stable	E	>-0.5 to < 1.5
Moderately stable	F	> 1.5 to < 4.0
Extremely stable	G	> 4.0

The data recovery rate for the first quarter was 97.9% and for the second quarter it was 92.9%. For the first six months of 1979, the data recovery rate was 95.4%.

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TABLE V-1

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	1	4	4	1	0	10
NNE	0	5	11	2	0	0	18
NE	1	5	35	14	0	0	55
ENE	0	8	12	0	0	0	20
E	1	11	20	5	0	0	37
ESE	1	5	12	5	0	0	23
SE	0	3	10	5	0	0	18
SSE	0	10	10	7	1	0	28
S	0	5	11	2	6	0	24
SSW	2	6	16	3	1	0	28
SW	1	8	11	1	0	0	21
WSW	2	16	19	1	0	0	38
W	2	22	40	14	0	0	78
WNW	2	13	31	12	0	0	58
NW	0	4	2	3	0	0	9
NNW	0	1	2	1	0	0	4
TOTAL	12	123	246	79	9	0	469

PERIODS OF CALM (HOURS) - 0

TABLE V-1

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND	WIND SPEED (MPH)						TOTAL
DIR	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	1	0	0	0	1
NNE	0	1	0	0	0	0	1
NE	0	3	10	1	0	0	14
ENE	0	2	2	0	0	0	4
E	0	1	4	0	0	0	5
ESE	0	2	2	0	0	0	4
S	0	0	2	0	0	0	2
SSE	0	0	0	2	0	0	2
S	0	0	0	0	0	0	0
SSW	0	1	2	0	0	0	3
SW	0	1	0	0	0	0	1
WSW	1	1	0	0	0	0	2
W	1	3	3	1	0	0	5
WNW	0	0	12	1	3	0	16
NW	0	0	1	0	0	0	1
NNW	0	0	1	1	0	0	2
TOTAL	2	15	40	5	3	0	56

PERIODS OF CALM (HOURS) - 0

2036 001



TABLE V-1

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	2	0	0	1	3
NNE	0	0	0	0	0	0	0
NE	0	1	3	0	0	0	4
ENE	0	1	1	0	0	0	2
E	0	3	1	0	0	0	4
ESE	0	0	2	0	0	0	2
SE	0	0	2	0	0	0	2
SSE	0	0	0	0	0	0	0
S	0	1	0	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	1	0	0	0	0	1
W	0	4	2	0	0	0	6
WNW	0	0	3	0	1	0	4
NW	1	0	2	0	0	0	3
NNW	0	0	0	0	0	0	0
TOTAL	1	11	18	0	1	1	32

PERIODS OF CALM (HOURS) - 0

2036 002

TABLE V-1

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	5	6	5	2	3	21
NNE	0	4	10	0	0	0	14
NE	1	10	35	5	0	0	51
ENE	2	8	25	0	0	0	35
E	1	5	7	0	0	0	13
ESE	2	3	4	0	0	0	9
SE	0	5	11	0	0	0	16
SSE	0	2	4	3	0	0	9
S	0	2	1	2	1	1	7
SSW	2	6	1	2	5	0	16
SW	2	14	0	0	1	0	17
WSW	0	13	4	4	1	0	22
W	1	9	9	12	7	4	42
WNW	0	13	21	3	24	12	63
NW	0	6	12	13	8	0	39
NNW	0	1	19	12	0	0	32
TOTAL	11	111	169	60	49	20	426

PERIODS OF CALM (HOURS) - 0

2036 003



TABLE V-1

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECCRD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	13	5	0	0	0	18
NNE	0	13	9	0	0	0	22
NE	1	10	29	5	0	0	45
ENE	1	16	34	0	0	0	51
E	1	24	20	0	0	0	45
ESE	1	19	21	0	0	0	41
SE	4	22	22	3	0	0	51
SSE	1	9	10	2	0	0	22
S	7	5	4	11	2	4	33
SSW	0	6	9	8	0	0	23
SW	1	10	7	4	1	1	24
WSW	5	15	6	3	0	0	29
W	7	15	11	5	4	3	45
WNW	8	24	22	21	5	2	82
NW	8	18	20	15	1	0	62
NNW	4	33	25	3	0	0	65
TOTAL	49	252	254	80	13	10	658

PERIODS OF CALM (HOURS) - 0

2036 004

TABLE V-1

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	4	0	0	0	0	4
NNE	0	7	3	0	0	0	10
NE	0	8	4	0	0	0	12
ENE	5	27	13	0	0	0	45
E	2	19	1	0	0	0	22
ESE	0	15	0	0	0	0	15
SE	5	11	0	0	0	0	16
SSE	5	7	0	0	0	0	12
S	5	8	4	0	0	0	17
SSW	5	7	6	1	0	0	19
SW	4	5	1	0	0	0	10
WSW	5	4	2	0	0	0	11
W	3	4	1	1	0	0	14
WNW	1	7	1	2	0	0	11
NW	7	5	3	0	0	0	16
NNW	9	19	5	0	0	0	33
TOTAL	61	158	44	4	0	0	267

PERIODS OF CALM (HOURS) - 4

2036 005

TABLE V-1

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	1	10	4	0	0	0	15
NE	4	5	2	0	0	0	11
ENE	12	23	10	0	0	0	45
E	7	17	0	0	0	0	24
ESE	8	5	0	0	0	0	13
SE	7	6	0	0	0	0	13
SSE	4	3	0	0	0	0	7
S	7	1	0	0	0	0	8
SSW	5	1	3	0	0	0	9
SW	4	2	4	0	0	0	10
WSW	3	1	0	0	0	0	4
W	1	1	0	0	0	0	2
WNW	1	0	0	0	0	0	1
NW	5	1	0	0	0	0	6
NNW	5	1	0	0	0	0	6
TOTAL	74	77	23	0	0	0	174

PERIODS OF CALM (HOURS) - 19

2036 006

TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	4	2	4	0	0	10
NE	0	9	26	11	1	0	47
ENE	1	17	33	17	1	0	69
E	1	5	17	1	0	0	24
ESE	1	5	8	6	0	0	20
SE	1	3	6	3	0	0	13
SSE	2	3	12	0	0	0	17
S	0	1	4	2	0	0	7
SSW	0	4	11	9	2	0	26
SW	1	12	29	14	0	0	56
WSW	0	32	50	5	0	0	87
W	1	21	100	2	0	0	124
WNW	0	14	59	12	0	0	85
NW	0	0	6	0	0	0	6
NNW	0	1	0	0	0	0	1
TOTAL	8	131	363	86	4	0	592

PERIODS OF CALM (HOURS) - 0

TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	1	0	3	0	0	4
NE	0	0	5	1	0	0	6
ENE	0	1	6	2	0	0	9
E	0	2	2	0	0	0	4
ESE	0	1	3	0	0	0	4
SE	0	2	3	2	0	0	7
SSE	0	0	2	0	0	0	2
S	0	2	1	0	0	0	3
SSW	0	3	4	1	0	0	8
SW	0	11	3	0	0	0	14
WSW	0	5	1	0	0	0	6
W	0	2	2	0	0	0	4
WNW	0	3	16	2	0	0	21
NW	0	1	6	1	0	0	8
NNW	0	0	0	0	0	0	0
TOTAL	0	34	54	12	0	0	100

PERIODS OF CALM (HOURS) - 0

2036 008



TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	1	0	0	1
NE	0	0	4	3	0	0	7
ENE	0	4	3	1	0	0	8
E	0	1	0	1	0	0	2
ESE	0	1	1	0	0	0	2
SE	0	1	0	0	0	0	1
SSE	1	1	0	0	0	0	2
S	0	3	1	0	0	0	4
SSW	0	0	1	0	0	0	1
SW	0	1	1	0	0	0	2
WSW	1	1	2	0	0	0	4
W	0	4	1	0	0	0	5
WNW	0	3	1	2	0	0	6
NW	0	0	1	0	0	0	1
NNW	0	0	1	0	0	0	1
TOTAL	2	20	17	8	0	0	47

PERIODS OF CALM (HOURS) - 0



TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	2	19	2	0	0	23
NE	0	12	42	4	0	0	58
ENE	0	15	25	6	0	0	46
E	2	10	28	1	0	0	41
ESE	1	0	25	1	0	0	37
SE	0	7	10	0	0	0	17
SSE	2	10	10	1	0	0	23
S	0	3	1	0	0	0	4
SSW	1	10	4	9	0	0	24
SW	1	13	16	8	0	0	38
WSW	3	7	7	5	0	0	22
W	4	15	12	0	0	0	31
WNW	0	13	20	2	0	0	35
NW	3	9	8	1	0	0	21
NNW	1	2	4	0	0	0	7
TOTAL	18	138	231	40	0	0	427

PERIODS OF CALM (HOURS) - 0

TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	20	11	1	0	0	32
NE	0	18	13	0	0	0	31
ENE	4	63	11	0	0	0	78
E	7	50	12	0	0	0	69
ESE	4	35	21	1	0	0	61
SE	6	36	10	0	0	0	52
SSE	3	13	5	2	0	0	23
S	6	2	3	2	1	0	14
SSW	4	5	7	5	1	0	22
SW	4	4	13	1	0	0	22
WSW	5	9	22	0	0	0	36
W	5	23	30	0	0	0	58
WNW	5	22	23	0	0	0	50
NW	4	12	10	0	0	0	26
NNW	0	6	1	0	0	0	7
TOTAL	57	318	192	12	2	0	581

PERIODS OF CALM (HOURS) - 0

TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	1	8	6	0	0	0	15
NE	1	2	0	0	0	0	3
ENE	2	14	2	0	0	0	18
E	9	30	0	0	0	0	39
ESE	7	30	0	0	0	0	37
SE	8	11	0	0	0	0	19
SSE	4	4	0	0	0	0	8
S	3	0	1	0	0	0	4
SSW	1	3	0	0	0	0	4
SW	2	0	0	0	0	0	2
WSW	7	1	0	0	0	0	8
W	6	0	0	0	0	0	6
WNW	4	2	0	0	0	0	6
NW	4	2	0	0	0	0	6
NNW	3	6	1	0	0	0	10
TOTAL	62	113	10	0	0	0	185

PERIODS OF CALM (HOURS) - 0

2036 012

TABLE V-2

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	2	4	0	0	0	6
NE	4	4	0	0	0	0	8
ENE	6	8	0	0	0	0	14
E	2	10	0	0	0	0	12
ESE	6	6	0	0	0	0	12
SE	3	7	0	0	0	1	11
SSE	4	0	0	0	0	0	4
S	2	1	0	0	0	0	3
SSW	3	1	0	0	0	0	4
SW	2	1	0	0	0	0	3
WSW	3	0	0	0	0	0	3
W	2	0	0	0	0	0	2
WNW	4	0	0	0	0	0	4
NW	8	0	0	0	0	0	8
NNW	2	0	0	0	0	0	2
TOTAL	51	40	4	0	0	1	96

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	1	1	0	0	0	2
NNE	0	1	5	1	0	0	7
NE	0	1	12	1	0	0	14
ENE	0	3	2	0	0	0	5
E	0	4	0	0	0	0	4
ESE	1	1	1	1	0	0	4
SE	0	2	2	5	0	0	9
SSE	0	2	2	0	0	0	4
S	0	0	1	1	2	0	4
SSW	0	6	1	1	1	0	9
SW	1	5	1	0	0	0	7
WSW	0	8	3	1	0	0	12
W	0	5	12	3	0	0	20
WNW	1	4	5	0	0	0	10
NW	0	1	0	2	0	0	3
NNW	0	1	1	0	0	0	2
TOTAL	3	45	49	16	3	0	116

PERIODS OF CALM (HOURS) - 0



TABLE V-3

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	2	0	0	0	2
ENE	0	0	0	0	0	0	0
E	0	0	1	0	0	0	1
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	1	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	1	0	0	0	0	0	1
W	1	1	0	0	0	0	2
WNW	0	0	0	0	2	0	2
NW	0	0	0	0	0	0	0
NNW	0	0	1	0	0	0	1
TOTAL	2	1	5	0	2	0	10

PERIODS OF CALM (HOURS) - 0



TABLE V-3

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND	WIND SPEED (MPH)						TOTAL
DIR	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	1	0	0	0	2
ENE	0	1	1	0	0	0	2
E	0	1	0	0	0	0	1
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	2	0	0	0	0	2
WNW	0	0	0	0	0	0	0
NW	1	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	1	5	2	0	0	0	8

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	2	0	0	0	2
NE	1	2	4	3	0	0	10
ENE	1	2	3	0	0	0	6
E	0	0	1	0	0	0	1
ESE	2	0	0	0	0	0	2
SE	0	2	1	0	0	0	3
SSE	0	0	0	3	0	0	3
S	0	0	0	2	0	0	2
SSW	2	0	0	0	0	0	2
SW	1	3	0	0	0	0	4
WSW	0	3	1	0	0	0	4
W	1	0	0	2	6	0	9
WNW	0	3	2	1	4	0	10
NW	0	0	3	1	2	0	6
NNW	0	0	0	0	0	0	0
TOTAL	8	15	17	12	12	0	64

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - E

ELEVATION - 35 FT.

WIND	WIND SPEED (MPH)						TOTAL
DIR	1-3	4-7	8-12	13-18	19-24	24+	
N	0	3	2	0	0	0	5
NNE	0	3	4	0	0	0	7
NE	0	0	9	5	0	0	14
ENE	1	2	7	0	0	0	10
E	0	4	1	0	0	0	5
ESE	0	1	3	0	0	0	4
SE	0	2	7	0	0	0	9
SSE	0	1	1	1	0	0	3
S	1	0	0	1	2	3	7
SSW	0	1	2	1	0	0	4
SW	0	2	0	0	0	0	2
WSW	1	6	1	1	0	0	9
W	4	5	2	0	0	0	11
WNW	4	6	2	3	1	0	16
NW	2	4	4	3	0	0	13
NNW	1	6	9	1	0	0	17
TOTAL	14	46	54	16	3	3	136

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	2	0	0	0	3
ENE	1	3	0	0	0	0	4
E	0	3	0	0	0	0	3
ESE	0	2	0	0	0	0	2
SE	1	4	0	0	0	0	5
SSE	0	2	0	0	0	0	2
S	0	0	0	0	0	0	0
SSW	1	1	0	0	0	0	2
SW	1	0	0	0	0	0	1
WSW	0	0	0	0	0	0	0
W	1	0	0	0	0	0	1
WNW	0	1	0	0	0	0	1
NW	4	0	0	0	0	0	4
NNW	1	3	0	0	0	0	4
TOTAL	12	20	2	0	0	0	32

PERIODS OF CALM (HOURS) - 0

TABLE V-3

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - JANUARY 1, 1979 THROUGH MARCH 31, 1979 BATCH RELEASES

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND	WIND SPEED (MPH)						
DIR	1-3	4-7	8-12	13-18	19-24	24+	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	2	1	0	0	0	0	3
ENE	5	3	2	0	0	0	10
E	1	0	0	0	0	0	1
ESE	1	1	0	0	0	0	2
SE	0	1	0	0	0	0	1
SEE	0	0	0	0	0	0	0
S	2	0	0	0	0	0	2
SSW	0	0	0	0	0	0	0
SW	0	1	0	0	0	0	1
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	1	0	0	0	0	0	1
TOTAL	12	7	2	0	0	0	21

PERIODS OF CALM (HOURS) - 2



TABLE V-4

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - A

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	2	2	4	0	0	8
NE	0	8	21	10	1	0	40
ENE	1	17	29	14	1	0	62
E	1	5	14	1	0	0	21
ESE	1	5	8	5	0	0	19
SE	1	3	3	1	0	0	8
SSE	2	3	7	0	0	0	12
S	0	1	3	1	0	0	5
SSW	0	4	8	6	0	0	18
SW	1	11	24	13	0	0	49
WSW	0	30	44	5	0	0	79
W	1	20	94	2	0	0	117
WNW	0	14	59	12	0	0	85
NW	0	0	6	0	0	0	6
NNW	0	1	0	0	0	0	1
TOTAL	8	124	322	74	2	0	530

PERIODS OF CALM (HOURS) - 0



TABLE V-4

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - B

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	1	0	3	0	0	4
NE	0	0	4	0	0	0	4
ENE	0	1	6	1	0	0	8
E	0	2	2	0	0	0	4
ESE	0	1	2	0	0	0	3
SE	0	2	2	2	0	0	6
SSE	0	0	2	0	0	0	2
S	0	2	1	0	0	0	3
SSW	0	2	3	1	0	0	6
SW	0	11	2	0	0	0	13
WSW	0	5	1	0	0	0	6
W	0	2	2	0	0	0	4
WNW	0	3	16	2	0	0	21
NW	0	1	6	1	0	0	8
NNW	0	0	0	0	0	0	0
TOTAL	0	33	49	10	0	0	92

PERIODS OF CALM (HOURS) - 0

TABLE V-4

## FLORIDA POWER CORPORATION

HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - C

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	4	2	0	0	6
ENE	0	4	3	0	0	0	7
E	0	1	0	1	0	0	2
ESE	0	0	1	0	0	0	1
SE	0	1	0	0	0	0	1
SSE	1	1	0	0	0	0	2
S	0	3	1	0	0	0	4
SSW	0	0	1	0	0	0	1
SW	0	1	1	0	0	0	2
WSW	0	1	1	0	0	0	2
W	0	4	1	0	0	0	5
WNW	0	3	1	2	0	0	6
NW	0	0	1	0	0	0	1
NNW	0	0	1	0	0	0	1
TOTAL	1	19	16	5	0	0	41

PERIODS OF CALM (HOURS) - 0

TABLE V-4

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - D

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	1	13	0	0	0	14
NE	0	11	35	2	0	0	48
ENE	0	15	19	2	0	0	36
E	2	8	28	1	0	0	39
ESE	1	9	25	1	0	0	36
SE	0	6	9	0	0	0	15
SSE	2	9	7	1	0	0	19
S	0	3	1	0	0	0	4
SSW	1	10	4	7	0	0	22
SW	1	11	14	5	0	0	31
WSW	3	6	7	5	0	0	21
W	4	15	11	0	0	0	30
WNW	0	12	19	2	0	0	33
NW	3	8	8	1	0	0	20
NNW	1	1	4	0	0	0	6
TOTAL	18	125	204	27	0	0	374

PERIODS OF CALM (HOURS) - 0

2036 024

TABLE V-4

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - E

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	19	11	1	0	0	31
NE	0	18	13	0	0	0	31
ENE	4	63	10	0	0	0	77
E	7	46	12	0	0	0	65
ESE	4	29	18	1	0	0	52
SE	6	30	9	0	0	0	45
SSE	2	13	2	2	0	0	19
S	6	2	2	1	0	0	11
SSW	3	5	3	0	1	0	12
SW	3	4	12	1	0	0	20
WSW	4	9	21	0	0	0	34
W	4	23	30	0	0	0	57
WNW	5	22	20	0	0	0	47
NW	4	12	9	0	0	0	25
NNW	0	6	1	0	0	0	7
TOTAL	52	301	173	6	1	0	533

PERIODS OF CALM (HOURS) - 0

TABLE V-4

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - F

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	1	8	6	0	0	0	15
NE	1	2	0	0	0	0	3
ENE	2	14	2	0	0	0	18
E	9	25	0	0	0	0	34
ESE	7	22	0	0	0	0	29
SE	8	8	0	0	0	0	16
SSE	3	4	0	0	0	0	7
S	3	0	0	0	0	0	3
SSW	1	3	0	0	0	0	4
SW	2	0	0	0	0	0	2
WSW	7	0	0	0	0	0	7
W	3	0	0	0	0	0	3
WNW	4	2	0	0	0	0	6
NW	4	1	0	0	0	0	5
NNW	3	6	1	0	0	0	10
TOTAL	58	95	9	0	0	0	162

PERIODS OF CALM (HOURS) - 0



TABLE V-4

## FLORIDA POWER CORPORATION

## HOURS AT EACH WIND SPEED AND DIRECTION

PERIOD OF RECORD - APRIL 1, 1979 THROUGH JUNE 30, 1979 BATCH RELEASES

STABILITY CLASS - G

ELEVATION - 33 FT.

WIND DIR	WIND SPEED (MPH)						TOTAL
	1-3	4-7	8-12	13-18	19-24	24+	
N	0	0	0	0	0	0	0
NNE	0	2	2	0	0	0	4
NE	4	2	0	0	0	0	6
ENE	6	8	0	0	0	0	14
E	2	8	0	0	0	0	10
ESE	6	3	0	0	0	0	9
SE	3	6	0	0	0	0	9
SSE	3	0	0	0	0	0	3
S	2	1	0	0	0	0	3
SSW	3	0	0	0	0	0	3
SW	2	1	0	0	0	0	3
WSW	3	0	0	0	0	0	3
W	1	0	0	0	0	0	1
WNW	3	0	0	0	0	0	3
NW	6	0	0	0	0	0	6
NNW	0	0	0	0	0	0	0
TOTAL	44	31	2	0	0	0	77

PERIODS OF CALM (HOURS) - 0