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April 20, 1994

L-94-100 10 CFR 50.36

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

Re: St. Lucie Units 1 and 2 Docket Nos. 50-335 and 50-389 1993 Annual Radiological Environmental Operating Report

This letter transmits the subject report in accordance with Technical Specification 6.9.1.8 for St. Lucie Units 1 and 2.

Should there be any questions on this information, please contact us.

Very truly yours,

D. A. Sager

Vice President St. Lucie Plant

DAS/CDW/kw

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC Senior Resident Inspector, USNRC, St. Lucie Plant

Attachment

DAS/PSL #1104-94

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# 1993

# ANNUAL RADIOLOGICAL ENVIRONMENTAL **OPERATING REPORT**

ST. LUCIE PLANT

UNITS 1 & 2

LICENSE NOS. DPR-67, NPF-16 DOCKET NOS: 50-335, 50-389

Data Submitted By: \_\_\_\_\_ Florida DHRS

Report Prepared: <u>Peter G Boliz</u> 6 APR 94 Report Reviewed: <u>JJ Vanch 4/11/94</u>



1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2 .

# TABLE OF CONTENTS

	DESCRIPTION	PAGE	
	Introduction	1	
	Radiological Environmental Monitoring Program	1	
	Discussion and Interpretation of Results	3	
	Environmental Radiological Monitoring Program Annual Summary	TABLE 1	
	Deviations/Missing Data	TABLE 1A	
)	Analyses with LLDs Above Table 4.12-1 Detection Capabilities	TABLE 1B	
1	Land Use Census	TABLE 2	
	Key to Sample Locations	ATTACHMENT	A
	Radiological Surveillance of Florida Power and Light Company's St. Lucie Site	ATTACHMENT	в
	First Quarter, 1993 Second Quarter, 1993 Third Quarter, 1993 Fourth Quarter, 1993		
	Results from the Interlaboratory Comparison Program, 1993	ATTACHMENT	С
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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### I. INTRODUCTION

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This report is submitted pursuant to Specification 6.9.1.8 of St. Lucie Unit 1 and St. Lucie Unit 2 Technical Specifications. The Annual Radiological Environmental Operating Report provides information, summaries and analytical results pertaining to the Radiological Environmental Monitoring Program for the calendar year indicated. This report covers surveillance activities meeting the requirements of Unit 1 and Unit 2 Technical Specifications.

#### II. RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

#### A. <u>Purpose</u>

The purpose of the radiological environmental monitoring program is to provide representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of members of the public resulting from station operation. The radiological environmental monitoring program also supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways.

#### B. <u>Program Description</u>

The Radiological Environmental Monitoring Program for the St. Lucie Plant is conducted pursuant to the St. Lucie Unit 1 and St. Lucie Unit 2 Offsite Dose Calculation Manual Control 3/4.12.1.

- 1. Sample Locations, Types and Frequencies:
  - a. Direct radiation gamma exposure rate is monitored continuously at 27 locations by thermoluminescent dosimeters (TLDs). TLDs are collected and analyzed quarterly.
  - b. Airborne radioiodine and particulate samplers are operated continuously at five locations. Samples are collected and analyzed weekly. Analyses include Iodine-131, gross beta, and gamma isotopic measurements.

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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

- c. Surface water samples are collected from two locations. Samples are collected and analyzed weekly and monthly respectively. Analyses include gamma isotopic and tritium measurements.
- d. Shoreline sediment samples are collected from two locations coinciding with the locations for surface water samples. Samples are collected and analyzed semi-annually. Sediment samples are analyzed by gamma isotopic measurements.
- e. Fish and invertebrate samples are collected from two locations. Samples are collected and analyzed semi-annually. Fish and invertebrate samples are analyzed by gamma isotopic measurements.
- f. Broad leaf vegetation samples are collected from three locations. Samples are collected and analyzed monthly. Broad leaf vegetation samples are analyzed by gamma isotopic measurements.

Attachment A provides specific information pertaining to sample locations, types and frequencies.

2. Analytical Responsibility:

Radiological environmental monitoring for the St. Lucie Plant is conducted by the State of Florida, Department of Health and Rehabilitative Services (HRS). Samples are collected and analyzed by HRS personnel. Samples are analyzed at the HRS Environmental Radiation Control Laboratory in Orlando, Florida.

# C. <u>Analytical Results</u>

Table 1, Environmental Radiological Monitoring Program Annual Summary provides a summary for all specified samples collected during the referenced surveillance period. Deviations from the sample schedule, missing data and/or samples not meeting the specified "A PRIORI" LLD, if any, are noted and explained in Tables 1A and 1B respectively. Analysis data for all specified samples analyzed during the surveillance period is provided in Attachment B.

# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### D. Land Use Census

A land use census out to a distance of 5 miles radius from the St. Lucie Plant is conducted annually to determine the location of the nearest milk animal, residence, and garden producing broad leaf vegetation in each of the sixteen meteorological sectors. A summary of the land use census for the surveillance year is provided in <u>Table 2</u>, <u>Land Use Census</u> <u>Summary</u>.

No locations yielding a calculated dose or dose commitment greater than the values currently being calculated were identified by the land use census.

No locations yielding a calculated dose or dose commitment (via the same exposure pathway) 20% greater than locations currently being sampled in the radiological environmental monitoring program were identified by the land use census.

#### E. Interlaboratory Comparison\_Program

The State of Florida HRS Environmental Radiation Control Laboratory participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by the Environmental Protection Agency. Results from the Interlaboratory Comparison Program are provided in Attachment C.

#### III. DISCUSSION AND INTERPRETATION OF RESULTS

# A. <u>Reporting of Results</u>

The Annual Radiological Environmental Operating Report contains the summaries, interpretations and information required by the St. Lucie Plant, Units 1 & 2 Technical Specifications. Table 1 provides a summary of the measurements made for the nuclides required by Technical Specifications, Table 4.12-1, for all samples specified by Table 3.12-1. In addition, summaries are provided for other nuclides identified in the specified samples, including those not related to station operation. These include nuclides such as K-40, Th-232, Ra-226, Ra-228, and Be-7 which are common in the Florida environment.

# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### B. <u>Interpretation of Results</u>

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1. Direct Radiation:

The results for direct radiation monitoring are consistent with past measurements for the specified locations. The exposure rate data shows no indication of any trends attributed to effluents from the plant. The measured exposure rates are consistent with exposure rates that were observed during the preoperational surveillance program. Direct radiation monitoring results are summarized in Table 1.

2. Air Particulates/Radioiodine:

The results for radioactive air particulate and radioiodine monitoring are consistent with past measurements and indicate no trends attributed to plant effluents. All samples for radioiodine yielded no detectable I-131. Gamma isotopic measurements yielded no indication of any nuclides attributed to station The results for air particulate/radioiodine operation. samples are consistent with measurements which were made during the preoperational surveillance program. Air particulate and radioiodine monitoring results are summarized in Table 1.

3. Surface Water:

The results for radioactivity measurements in surface water samples are consistent with past measurements. Tritium was reported as present in three of the weekly surface water samples collected from Site H-15. Subsequent samples indicate there has been no increase nor adverse trend for tritium in surface water samples at H-15. The highest measured tritium at site H-15 was less than 2% of the reporting level specified by the Off-Site Dose Calcuation Manual, Table 3.12-2. No other nuclides attributed to station operation were detected. Results for surface water samples are summarized in Table 1.

### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

# 4. Waterborne Sediment and Food Products:

The results for radioactivity measurements in waterborne sediment, fish and crustacea samples are consistent with past measurements and with measurements made during the preoperational surveillance program. There were no indications of any nuclides attributed to plant effluents. Results for the waterborne sediment, fish and crustacea samples are summarized in Table 1.

#### 5. Broad Leaf Vegetation:

The results for radioactivity measurements in broad leaf vegetation are consistent with past measurements and with measurements made during the preoperational surveillance program. There were no indications of any nuclides attributed to plant effluents. Results for the broad leaf vegetation samples are summarized in Table 1.

#### C. <u>Conclusions</u>

The data obtained through the St. Lucie Plant Radiological Environmental Monitoring Program verifies that the levels of radiation and concentrations of radioactive materials in environmental samples, representing the highest potential exposure pathways to members of the public, are not being increased. The measurements verify that the dose or dose commitment to members of the public, due to operation of St. Lucie Units 1 & 2, during the surveillance year, are well within "as low as reasonably achievable (ALARA)" criteria established by 10 CFR 50, Appendix I.







Location	ENVIRONME Name of Facilit of Facility <u>St</u>	NTAL RADIOLOGICAL y <u>St. Lucie Units</u> Lucie, Florida, County, State)	MONITORING PROGRAM <u>1 &amp; 2</u> , Docket No(s Reporting Period <u>.</u>	ANNUAL SUMMARY 3). <u>50-335 &amp; 50-3</u> January 1 - Decemb	<u>889</u> Der 31, 1993
PATHWAY: DIRE SAMPLES COLLEC UNITS: MICRO	CT RADIATION TED: TLD - R/hr	-	, 4		-
Type and	Lower Limit	All Indicator	Location wit Annual	h Highest Mean	
Total Number	of	Locations	Name <sup>c</sup>	Mean (f) <sup>b</sup>	Control Locations
of Analyses Performed	Detection <sup>a</sup> (LLD)	Mean (f) Range	Distance & Direction	Range	Mean (f)° Range
Exposure Rate, 103 <sup>d</sup>	,	5.4 (99/99) 4.2 - 6.9	NW-10 10 mi., NW	6.5 (4/4) 6.0 - 6.9	6.1 (4/4) 5.5 - 6.3

Number of Nonroutine Reported Measurements = 0

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# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

# PATHWAY: AIRBORNE SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES UNITS: PICO - Ci/M<sup>3</sup>

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location wi Annual <u>Name<sup>c</sup></u> Distance & Direction	th Highest Mean <u>Mean (f)</u> b Con Range	trol Locations Mean (f) <sup>b</sup> Range
<sup>131</sup> I, 257 -	0.024	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
Gross Beta, 256	0.0025	0.013 (198/205) 0.003 - 0.056	H-08 6 mi., WNW	0.015 (50/52) 0.003 - 0.056	0.013 (49/51) 0.005 - 0.032
Composite Gamma Isotopic, 20					
<sup>7</sup> Be	0.0052	0.1197 (16/16) 0.0852 - 0.1482	H-14 1 mi., SE	0.1264 (4/4) 0.1160 - 0.1482	0.1152 (4/4) 0.1075 - 0.1240
40K	0.012	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	0.00069	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	0.00066	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0

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# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

# PATHWAY: WATERBORNE SAMPLES COLLECTED: SURFACE WATER UNITS: PICO - Ci/LITER

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with H: Annual Mean <u>Name</u> ° Distance & Direction	ighest n <u>Mean (f)<sup>b</sup></u> Range	Control Locations Mean (f) <sup>b</sup> Range
Tritium, 64 Gamma	230	197 (3/52) 91 - 408	H-15 <1 mi., ENE/E/ESE	197 (3/52) 91 - 408	<mda< td=""></mda<>
Isotopic, 64					
<sup>40</sup> K	60	323 (52/52) 251 - 404	H-15 <1 mi., ENE/E/ESE	323 (52/52) 251 - 404	318 (12/12) 153 - 368
<sup>54</sup> Mn	4	<mda< td=""><td></td><td><b></b> <i>s</i></td><td><mda< td=""></mda<></td></mda<>		<b></b> <i>s</i>	<mda< td=""></mda<>
<sup>59</sup> Fe	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>58</sup> Co	4	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>60</sup> Co	4	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>65</sup> Zn	8	<mda< td=""><td></td><td>- <b></b></td><td><mda< td=""></mda<></td></mda<>		- <b></b>	<mda< td=""></mda<>
<sup>95</sup> Zr-Nb	7	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>131</sup> I	5 .	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	5	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	5	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>140</sup> Ba-La	11	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0

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# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

PATHWAY: WATERBORNE SAMPLES COLLECTED: SHORELINE SEDIMENT UNITS: PICO - Ci/Kg, DRY

Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with 1 Annual Mea <u>Name</u> Distance & Direction	Highest an <u>Mean (f)<sup>b</sup></u> Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 4			-	-	
40K	140	308 (2/2) 283 - 334	H-15 <1 mi. ENE/E/ESE	308 (2/2) 283 - 334	163 (2/2) 94 - 232
<sup>226</sup> Ra	49	200 (2/2) 189 - 212	H-15 <1 mi. ENE/E/ESE	200 (2/2) 189 - 212	302 (2/2) 184 - 420
<sup>232</sup> Th	52	73 (4/4) 64 - 82	H-15 <1 mi. ENE/E/ESE	73 (2/2) 64 - 82	98 (2/2) 54- 142
58Co	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>60</sup> Co	12	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	14	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	12	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0

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# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

#### PATHWAY: INGESTION SAMPLES COLLECTED: CRUSTACEA UNITS: PICO - Ci/Kg, WET

Type and Total Number	Lower Limit	All Indicator Locations	Location with Highest Annual Mean Name <sup>c</sup> Mean (f) <sup>b</sup>		Control Locations
of Analyses Performed	Detection <sup>a</sup> (LLD)	Mean (f) Range	Distance & Direction	Range	Mean (f)" Range
Gamma Isotopic, 4		•	· · ·		
40K	130	2393 (2/2) 1636 - 3150	H-15 <1 mi., ENE/E/ESE	2393 (2/2) 1636 - 3150	1472 (2/2) 1378 - 1567
<sup>228</sup> Ra		172 (1/2)	H-15 <1 mi., ENE/E/ESE	172 (1/2)	<mda< td=""></mda<>
<sup>54</sup> Mn	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>59</sup> Fe	16	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
58Co	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>60</sup> Co	19	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>65</sup> Zn	17	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0



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# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

ATHWAY: INGESTION AMPLES COLLECTED: FISH INITS: PICO - Ci/Kg, WET						
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Location with H Annual Mea <u>Name<sup>c</sup></u> Distance & Direction	lighest n <u>Mean (f)<sup>b</sup></u> Range	Control Locations Mean (f) <sup>b</sup> Range	
Gamma Isotopic, 4						
<sup>40</sup> K	130	2122 (2/2) 1753 - 2491	H-15 <1 mi., ENE/E/ESE	2122 (2/2) 1753 - 2491	2204 (2/2) 2159 - 2250	
<sup>54</sup> Mn	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>	
<sup>59</sup> Fe	16	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>	
<sup>58</sup> Co	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>	
60Co	10	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>	
<sup>65</sup> Zn	17	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>	
<sup>134</sup> Cs	9	<mda< td=""><td>,</td><td></td><td><mda< td=""></mda<></td></mda<>	,		<mda< td=""></mda<>	
<sup>137</sup> Cs	9	<mda< td=""><td></td><td></td><td>- <mda< td=""></mda<></td></mda<>			- <mda< td=""></mda<>	

Number of Nonroutine Reported Measurements = 0







# ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1993</u> (County, State)

PATHWAY: INGESTION SAMPLES COLLECTED: BROAD LEAF VEGETATION UNITS: PICO - Ci/Kg, WET

Type and	Lower Limit	All Indicator	Location with Highest		
Total Number of of Analyses Detect: Performed (LLD	of Detection <sup>a</sup> (LLD)	Locations Mean (f) Range	Name <sup>c</sup> Distance & Direction	Mean (f) <sup>b</sup> Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 36		•			
<sup>7</sup> Be	71	930 (24/24) 468 - 2903	H-51 1 mi., N/NNW	1022 (12/12) 468 - 2903	851 (12/12) 508 - 1438
⁴⁰K	100	3222 (24/24) 2038 - 4490	H-51 1 mi., N/NNW	3326 (12/12) 2038 - 4490	3291 (12/12) 1297 - 4460
<sup>131</sup> I	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0



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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### TABLE 1

Page 8 of 8

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u> Docket No.(s) <u>50-335 and 50-389</u> Location of Facility <u>St. Lucie, Florida</u> (County, State) Reporting Period <u>January 1 - December 31, 1993</u>

#### NOTES

a. The LLD is an "a priori" lower limit of detection which establishes the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a real signal.

LLDs in this column are at time of measurement. The MDAs reported in Attachment B for the individual samples have been corrected to the time of sample collection.

- b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f).
- c. Specific identifying information for each sample location is provided in Attachment A.
- d. Results are typically based upon the average net response of two TLDs. (Thermoluminescent dosimeters).

MDA refers to minimum detectable activity.

#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### TABLE 1A

Page 1 of 3

#### DEVIATIONS/MISSING DATA

A) Pathway: Airborne Particulates

Location: H-14, 1 mile SE

Date: 01/05/93 to 01/12/93

Deviation: Failure to provide continuous air sampling.

Description The particulate filter was missing when collection of Problem: was attempted; suspected tampering.

Corrective Replacement of filter. Action:

B) Pathway: Airborne Particulates and Iodines

Location: H-14, 1 mile SE

Date: 01/26/93 to 02/02/93

Deviation: Failure to provide continuous air sampling.

Description Equipment upgrade took longer than expected; of Problem: sample duration of 147 hours out of the 166 hour sampling period.

Corrective Ensure available supply of spare parts. Action:

C) Pathway: Airborne Particulates and Iodines

Location: H-14, 1 mile SE

Date: 03/09/93 to 03/16/93

Deviation: Failure to provide continuous air sampling.

Description Severe storm induced power failure, sample of Problem: duration of 141 hours out of the 172 hour sampling period.

**Corrective** Reestablished power upon discovery of outage. Action:

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#### 1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

## TABLE 1A

Page 2 of 3

# DEVIATIONS/MISSING DATA

D) Pathway: Direct Exposure - TLDs

Location: SW-10, 1 miles SW

Date: 06/15/93 to 09/21/93

Deviation: Failure to provide continuous monitoring.

Description TLDs missing upong attempted collection, road of Problem: construction in progress.

**Corrective** Replaced TLDs in a location out of the way of Action: construction

E) Pathway: Airborne Particulates and Iodines

Location: H-08, 6 miles WNW

Date: 08/11/93 to 08/16/93

Deviation: Failure to provide continuous air sampling.

Description. Air pump failure, sample duration of 57 hours of Problem: out of the 116 hour sampling period.

Corrective Replaced air pump. Action:

F) Pathway: Direct Exposure - TLDs

Locations: WNW-2, WNW-5, SW-2, S-5 (Bearing - Range, Miles)

Date: 09/21/93 to 12/07/93

Deviation: Failure to provide continuous monitoring.

Description These dosimeters were missing when collection of Problem: was attempted.

Corrective Replaced dosimeters. Action:



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### 1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

## TABLE 1A

Page 3 of 3

# DEVIATIONS/MISSING DATA

G) Pathway: Airborne - Particulates & Iodines

Location: H-14, 1 miles SE

Date: 10/25/93 to 11/09/93

Deviation: Failure to provide continuous air sampling.

Description Extended power failure. of Problem:

**Corrective** Restarted air sampling equipment upon power Action: restoration.

H) Pathway: Airborne Particulates

Location: H-12, 12 miles S

Date: 11/30/93 to 12/06/93

Deviation: Failure to provide continuous air sampling.

Description Particulate filter was missing when collection of Problem: was attempted; suspected tampering.

Corrective Replacement of filter. Action:

# 1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### TABLE 1B

# ANALYSES WITH LLDS ABOVE TABLE 4.12-1 DETECTION CAPABILITIES 1/1/93 - 12/31/93

A) Airborne Particulates: Gross Beta analysis failed to achieve required LLD of 0.010 pCi/m<sup>3</sup>.

Affected Sampling Location: H-08, 6 miles WNW of plant

Affected Sample Collected During: August 11 to 16, 1993

- Cause: Failure in air sampling pump caused an insufficient sample size to achieve required LLD.
- B) Airborne Particulates: Gross Beta analysis failed to achieve required LLD of 0.010 pCi/M<sup>3</sup>.

Affected Sampling Location: H-14, 1 miles SE of plant

Affected Sample Collected During: October 21 to 25, 1993

Cause: Power failure to air sampling pump caused an insufficient sample size to achieve required LLD.

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# 1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

# TABLE\_2

# LAND USE CENSUS

# Distance to Nearest (a, b)

Sector	5/93 Milk (c) Animal	5/93 Residence	5/93 Garden (d)
	0 (0)	0	0
IN	0 (e)	0	0
NNE	0	0	* <b>U</b>
NE	0	0	0
ENE	0	1 <b>O</b>	О "
Е	0	0	0
ESE	0	0	O
SE	· · O · ·	1.5/141 (g)	, <b>O</b>
SSE	L (f)	3.5/152 (g)	L ·
S	Li	3.2/191	3.8/185
SSW	L	2.2/213	3.9/199
SW	Ľ	1.9/236	1.9/234
WSW	4.1/257	1.9/245 (h)	1.9/253
W	4.5/263	1.9/260	2.1/275
WNW	L	2.3/281	2.6/290
NW	L	3.5/304	3.7/306
, NNM	L	L (g)	L



HP3:1/RADENVOP.PSL

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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### TABLE\_2

#### LAND USE CENSUS

#### NOTES

- a. All categories surveyed out to 5 miles radius from the St. Lucie Plant.
- b. The following format is used to denote the location:

distance (miles)/bearing (degrees)

For example, a residence located in the southeast sector at a distance of 1.5 miles bearing 141 degrees is recorded as 1.5/141.

- c. Potential milk animal locations. All locations specified have been verified to be <u>not</u> producing milk for human consumption.
- d. Gardens with an estimated growing area of 500 square feet or more.
- e. O denotes that the sector area is predominantly an ocean area.
- f. L denotes that the sector area is predominantly a land area unoccupied by the category type.
- g. Non-residential occupied buildings in these sectors include the following:

SSE - Fire Station, 1.8/149
SSE - Country Club, 3.4/153
NNW - Lifeguard station at beach, 4.6/342
SE - Lifeguard station at beach, 1.1/132

h. Several residences in this sector are located approximately 1.9 miles from the St. Lucie Plant.





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1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

ATTACHMENT\_A

KEY TO SAMPLE LOCATIONS



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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

# ATTACHMENT A

Page 1 of 4

PATHWAY: DIRECT RADIATION SAMPLES COLLECTED: TLD SAMPLE COLLECTION FREQUENCY: QUARTERLY

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		Approximate	
Location	Direction	Distance	
Name	Sector	<u>(miles)</u>	Description
NT 1	NT	1	NAN North of Plind Crock
	IN NTNTUT	с Т	Air, North of Billio Creek
	ININW NINIW	5	South of Pete Stone Creek
NINW-10	ININW	9	Coast Guard Station
NW-5	NW NW	6	Indian River Dr., at Rio Vista DI.
NW-10	NW	TO	S.R. 68 at S.K. 607 Genetering Gruth of E10E Indian Dimon Dr.
WNW-2	WNW	<u>న</u>	Cemetery South of /10/ Indian River Dr.
WNW-5	WNW	5	$\begin{array}{c} \text{U.S. 1 at S.R. 712} \\ \text{O.B. 70} \\ \text{Wask of Burnella} \end{array}$
NW-10	WNW	. 10	S.R. 70, West of Turnpike
U-2	W	2	7609 Indian River Drive
-5	W	5	Oleander and Sager Street
W-10	W	9	Interstate 95 at S.R. 709
WSW-2	WSW ,	2	8503 Indian River Dr.
WSW-5	WSW	5	Prima Vista at Yacht Club
WSW-10	WSW	10	Del Rio at Davis Street
SW-2	SW	2	9207 Indian River Drive
SW-5	SW	5	U.S. 1 at Village Green Dr.
SW-10	SW	10	Port St. Lucie Blvd. at Cairo Rd.
SSW-2	SSW	3	10307 Indian River Drive
SSW-5	SSW	6	U.S. 1 at Port St. Lucie Blvd.
SSW-10	SSW	<b>8</b>	Pine Valley at Westmoreland Rd.
S-5	S	5	13179 Indian River Drive
S-10	S	10	U.S. 1 at S.R. 714
S/SSE-10	SSE	10	Indian River Dr. at Quail Run Lane
SSE-5	SSE	5	Entrance to Nettles Island
SSE-10	SSE	10	Elliot Museum
SE-1	SE	1	South of Cooling Canal
<u>Control</u> :			x

H-32

NNW

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University of Florida IFAS Vero Beach



# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

ATTACHMENT A .

# Page 2 of 4

#### PATHWAY: AIRBORNE SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES SAMPLE COLLECTION FREQUENCY: WEEKLY

Location <u>Name</u>	Direction Sector	Approximate Distance (miles)	Description
H-08 H-14 H-30 H-34	WNW SE W N	6 1 2 0.5	FPL Substation, Weatherby Rd. On-Site, Near South Property Line Power Line, 7609 Indian River Drive On-Site at Meteorology Tower
<u>Control</u> :			
12	S	12	FPL Substation, SR-76 Stuart



1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### ATTACHMENT A

Page 3 of 4

PATHWAY: WATERBORNE SAMPLES COLLECTED: SURFACE WATER (OCEAN) SAMPLE COLLECTION FREQUENCY: H-15 WEEKLY, H-59 MONTHLY

Location <u>Name</u>	Direction _ <u>Sector</u>	Approximate Distance (miles)		Desc	<u>cription</u>		
H-15	ENE/E/SSE	<1	Atlantic Side A1A	Ocean,	Public	Beaches	East

#### Control:

H-59 S/SSE 10-20 South End, Hutchinson Island

AMPLES COLLECTED: SHORELINE SEDIMENT SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

Location <u>Name</u>	Direction Sector	Approximate Distance (miles)	De	scriptio	on		
H-15	ENE/E/ESE	<1	Atlantic Side A1A	Ocean,	Public	Beaches	East

Control:

S/SSE H-59

10-20 South End, Hutchinson Island



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1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

#### ATTACHMENT A

Page 4 of 4

PATHWAY: INGESTION SAMPLES COLLECTED: CRUSTACEA AND FISH SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

Location <u>Name</u>	Direction Sector	Approximate Distance (miles)	Description	
H-15	ENE/E/ESE	<1	Ocean Side, Vicinity of St. Lu	cie Plant

# <u>Control</u>:

H-59 S/SSE 10-20 South End, Hutchinson Island

CAMPLES COLLECTED: BROAD LEAF VEGETATION SAMPLE COLLECTION FREQUENCY: MONTHLY

Location Name	Direction Sector	Approximate Distance (miles)	Description
H-51 H-52	N/NNW S/SSE	1 1	Off-site Near North Property Line Off-Site Near South Property Line
<u>Control</u> :		,	
H-59	S/SSE	10-20	South End, Hutchinson Island

1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

ATTACHMENT\_B

1993

# ANNUAL

RADIOLOGICAL ENVIRONMENTAL

OPERATING REPORT

ST. LUCIE PLANT

**UNITS 1 & 2** 

First Quarter, 1993 Second Quarter, 1993 Third Quarter, 1993 Fourth Quarter, 1993



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RADIOLOGICAL SURVEILLANCE OF FLORIDA POWER AND LIGHT COMPANY'S

ST. LUCIE SITE

First Quarter, 1993

Office of Radiation Control

Florida Department of Health and Rehabilitative Services

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#### ST. LUCIE SITE

# Technical Specifications Sampling

#### First Quarter, 1993

	Sample Type	Collection Frequency	Locations <u>Sampled</u>	Number of <u>Samples</u>
1.	Direct Radiation	Quarterly	27	54
2.	Airborne 2.a Air Iodines 2.b Air Particulates	Weekly Weekly	5 ' 5	65 68*
3.	Waterborne 3.a Surface Water 3.b Shoreline Sediment	Weekly Monthly Semiannually	1 1 2	13 3 3*
4.	Ingestion 4.a Fish and Invertebrates 4.a.1 Crustacea 4.a.2 Fish	Semiannually Semiannually	2 2	2 2
	4.b Food Products 4.b.1 Broadleaf Vegetation	Monthly	3	9

Total: 219

#### \* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are <u>not</u> significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.



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DIRECT RADIATION - TLDs - (micro-R/hour)

Sample	Deployment	12-09-92
<u>Site</u>	<u>Collection</u>	03-23-93
N-1	5.'3 ± 0.3	
NNW-5	$5.6 \pm 0.3$	1
NNW-10	$6.1 \pm 0.3$	
NW-5	5.6 ± 0.3	
NW-10	$6.9 \pm 0.4$	
WNW-2	5.5 ± 0.3	
WNW-5	$5.7 \pm 0.3$	
WNW-10	6.0 ± 0.3	•
W-2	$5.9 \pm 0.3$	
₩ <b>-</b> 5	$5.9 \pm 0.3$	
W-10	$5.3 \pm 0.3$	
WSW-2	$5.5 \pm 0.3$	
WSW-5	$5.4 \pm 0.3$	
WSW-10	$4.8 \pm 0.3$	
SW-2	$5.5 \pm 0.3$	
SW-5	$5.0 \pm 0.3$	
SW-10	$5.6 \pm 0.3$	
SSW-2	$5.4 \pm 0.3$	
SSW-5	$5.4 \pm 0.3$	
SSW-10	$5.5 \pm 0.3$	
S-5	$5.4 \pm 0.3$	
S-10	$5.4 \pm 0.3$	
S/SSE-10	5.3 ± 0.3	
SSE-5	$5.9 \pm 0.3$	
SSE-10 (A	$3.5.6 \pm 0.3$	
SE-1	5.4 ± 0.3	
H-30	63+03	•

Each result is the average net response of two dosimeters.

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(A) - The dosimeters for site SSE-10 were moved to a different utility pole on 12-14-92, because the pole on which they were previously mounted was being removed.

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<u>2.a</u>

IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

	•······		Sample Site		
Collection Date	<u></u>	<u>H12</u>	<u></u> H14	<u>H30</u>	<u> </u>
			·		
01-05-93	<0.02	<0.02	<0.01	<0.02	<0.01
01-12-93	<0.02	<0.02	<0.02	<0.02	<0.02
01-20-93	<0.01	<0.01	<0.01	<0.01	<0.01
01-26-93	<0.03	<0.03	<0.03	<0.03	<0.03
			,		
02-02-93	<0.02	<0.02	<0.02(A)	<0.02	<0.02
02-10-93	<0.02	<0.02	<0.02	<0.01	<0.02
02-16-93	<0.02	<0.02	<0.02	<0.02	<0.02
02-23-93	<0.02	<0.02	<0.03	<0.02	<0.02
03-02-93	<0.02	<0.02	<0.02	<0.02	<0.02
03-09-93	<0.02	<0.02	<0.02	<0.02	<0.02
03-16-93	<0.02	<0.02	<0.02(B)	<0.02	<0.02
03-22-93	<0.03	<0.03	<0.03	<0.02	<0.03
03-30-93	<0.01	<0.01	<0.01	<0.02	<0.01

(A) - The equipment was shut off at the beginning of this sample to be upgraded. The equipment could not be restarted right away because additional parts were needed. The equipment is estimated to have run for 147 hours out of the 166 total hours for this sampling interval.

(B) - There was a power outage during this sample due to a severe storm. The equipment is estimated to have run for 141 hours out of the 172 total hours for this sampling interval.

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AIR PARTICULATES

SS BETA -  $(pCi/m^3)$ 

Collection	Sample Site							
Date	H08	<u>H12</u>	<u>H14</u>	H30	H34			
01-05-93	0.005 ± 0.002	$0.005 \pm 0.002$	0.005 ± 0.001	<0.005	$0.007 \pm 0.002$			
01-12-93	$0.003 \pm 0.002$	$0.005 \pm 0.002$	(A)	$0.006 \pm 0.002$	$0.003 \pm 0.002$			
01-20-93	$0.014 \pm 0.002$	$0.015 \pm 0.002$	$0.010 \pm 0.002$	$0.015 \pm 0.002$	$0.014 \pm 0.002$			
01-26-93	$0.010 \pm 0.002$	$0.008 \pm 0.002$	$0.005 \pm 0.002$	$0.017 \pm 0.003$	$0.009 \pm 0.002$			
02-02-93	$0.016 \pm 0.002$	$0.019 \pm 0.002$	$(B*0.015 \pm 0.002)$	$0.017 \pm 0.002$	$0.018 \pm 0.002$			
02-10-93	$0.015 \pm 0.002$	$0.015 \pm 0.002$	*0.007 ± 0.002	$0.014 \pm 0.002$	$0.010 \pm 0.002$			
02-16-93	$0.012 \pm 0.002$	$0.013 \pm 0.002$	*0.016 ± 0.002	$0.013 \pm 0.002$	$0.014 \pm 0.002$			
02-23-93	$0.017 \pm 0.002$	$0.018 \pm 0.002$	$*0.013 \pm 0.002$	$0.019 \pm 0.002$	$0.015 \pm 0.002$			
03-02-93	$0.015 \pm 0.002$	$0.015 \pm 0.002$	$0.014 \pm 0.002$	$0.013 \pm 0.002$	$0.016 \pm 0.002$			
03-09-93	$0.019 \pm 0.002$	$0.018 \pm 0.002$	$0.023 \pm 0.003$	$0.022 \pm 0.002$	$0.018 \pm 0.002$			
03-16-93	$0.018 \pm 0.002$	$0.017 \pm 0.002$	$(C0.017 \pm 0.002)$	$0.017 \pm 0.002$	$0.010 \pm 0.002$			
03-22-93	<0.005	<0.005	$0.003 \pm 0.002$	<0.004	<0.006			
03-30-93	0.013 ± 0.002	$0.011 \pm 0.002$	0.016 ± 0.002	$0.014 \pm 0.002$	$0.013 \pm 0.002$			
Means:	$0.013 \pm 0.001$	$0.013 \pm 0.001$	$0.012 \pm 0.001$	$0.015 \pm 0.001$	$0.012 \pm 0.001$			

\* - NRC split samples.

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(A) - The particulate filter was missing when collection was attempted. Tampering by unauthorized persons is suspected to be the cause.

- (B) The equipment was shut off at the beginning of this sample to be upgraded. The equipment could not be restarted right away because additional parts were needed. The equipment is estimated to have run for 147 hours out of the 166 total hours for this sampling interval.
- (C) There was a power outage during this sample due to a severe storm. The equipment is estimated to have run for 141 hours out of the 172 total hours for this sampling interval.

b	AIR PARTICULATES	-	GAMMA	SCANS	OF	OUARTERLY	COMPOSITES	-	(pCi/m <sup>3</sup>	\$
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First Quarter, 1993

<u>Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>
H08	$0.1231 \pm 0.0113$	<0.0186	<0.0011	<0.0010
H12	$0.1172 \pm 0.0103$	<0.0172	<0.0011	<0.0010
H14	0.1160 ± 0.0116	<0.0178	<0.0012	<0.0009
H30	0.1097 ± 0.0114	<0.0217	<0.0009	<0.0011
H34	$0.1082 \pm 0.0114$	<0.0180	<0.0009	<0.0011

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Sample	Collection	<b>11</b> 0	VE 4.0	Nm Ed	<b>Fo FO</b>	00.50	· 0 6 0	7- 65	Zr-95	T 101	00.124	0127	Ba-140
<u>sice</u>	Date	<u>n=3</u>	<u>K=40</u>	<u>M1-54</u>	<u>re-59</u>	58	<u>CO-60</u>	<u>20-65</u>	(A)	<u>1-131</u>	<u>CS-134</u>	<u>CS-137</u>	(B)
H15	01-06-93	<138	330 ± 41	<4	<8	<4	<5	<8	<6	<4	<4	<4	<8
	01-12-93	<138	$289 \pm 35$	<4	<8	<3	<5	<8	<5	<4	<3	<4	<8 ,
	01-20-93	<138	$291 \pm 44$	<3	<9	<3	<5	<8	<6	<5	<3	<3	<5
	01-26-93	<138	317 ± 18	<2	<4	<2	<2	<4	<3	<2	<2	<2	<3
	02-02-93	<135	331 ± 39	<4	<9	<4	<4	<7	<7	<4	<4	<4	<10
	02-10-93	93 ± 43	$298 \pm 35$	<3	<7	<4	<4	<7	<6	<5	<4	<5	<3
	02-15-93	<134	$309 \pm 40$	<3	<6	<4	<5	<8	<7	<7	<4	<4	<5
	02-23-93	<134	$320 \pm 40$	<4	<8	<3	<4	<8	<8	<4	<5	<4	<8
	03-03-93	<138	319 ± 38	<3	<8	<4	<5	<8	<6	<5	<4	<4	<6
	03-10-93	<138	313 ± 39	<4	<7	<2	<5	<9	<7	<6	<4	<4	<6
	03-16-93	<154	260 ± 39	<3	<9	<5	<5	<6	<5	<5	<4	<4	<6
	03-24-93	<137	335 ± 29	<3	<5	<2	<3	<5	<5	<3	<3	<3	<5
	03-31-93	<137	337 ± 27	<3	<7	<3	<3	<7	<5	<3	<3	<3	<6
							-						
H59	01-13-93	<138	153 ± 28	<3	<7	<4	<5	<9	<6	<4	<4	<5	<7
,	02-03-93	<147	256 ± 34	<4	<9	<4	<5	<9	<6	<4	<5	<5	<4
ı	03-10-93	<138	. 347 ± 36	<4	<8	<3	<4	<8	<7	<6	·<4	<3	<5
	•					м	•				-		

- (A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.
- (B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

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<u>3.b</u>			SEDIM	ENT -	(pCi	/kq, di	ry weig	(ht)			
Sample 	Collectio Date	n Be-7	K-40	<u>C</u> (	<u>0-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-13</u>	<u>7Ra</u>	-226	Th-232
H15*	02-15-93	<60	283 ± 4	46 ·	<6	<8	<8	<9	189	± 12	64 ± 16
Н59	02-16-93	<69	94 ± 4	45 ·	<8	<9	<9	<9	420	± 15	142 ± 21
* -	- NRC spli	t sample.	*								
<u>4.a.1</u>	CRUSTACE	A - (H15:	Speckle	ed_Cral	b) (H	59: Blu	ue Crab	<u>) - (</u>	<u>pCi/kq,</u>	wet weig	aht)
Sample ( 	Collection	K-40	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	Ra-228•
H15	03-09-93	1636 ± 508	<87	<182	<80	<108	<164	<88	<103	ND	ND
H59	02-23-93	1378 ± 199	<20	<41	<19	<21	<39	<23	<22	ND	ND
1							¥**.		-	,	
<u>4.a.2</u>	FI	<u>SH - (H15</u>	Group	er) (1	H59: B	luefis	<u>h) –</u>	(pCi/kg	, wet w	veight)	
Sample ( 	Collection Date	K-40	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	Ra-228
H15 <sup>.</sup>	02-16-02		-0	107							
	02-10-93	$2491 \pm 165$	. <9	<27	<11	<15	<25	<10	<12	ND	ND

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ND - Non-detectable.

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Sample <u>Site</u>	Collection Date	Be-7	<u> </u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H51	01-13-93	944 ± 68	2179 ± 131	<9	<8	<12
	02-03-93	2903 ± 96	4990 ± 179	<9	<13	<10
	03-10-93	606 ± 48	2662 ± 128	<7	<8	<9 <i>*</i>
H52	01-13-93	863 ± 53	2770 ± 128	<7	<9	<9
	02-03-93	940 ± 52	2498 ± 109	<7	<9	<7
	03-10-93	615 ± 53	3035 ± 135	<8	' <8	<10
			đ			
H59	01-13-93	928 ± 55	1988 ± 110	<8	<10	<7
•	02-03-93	1438 ± 74	3573 ± 160	<10	<10	<11
	03-10-93	508 ± 54	3431 ± 157	<8	<11	<9

4.b.1 BROADLEAF VEGETATION - Mangrove - (pCi/kg, wet weight)

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RADIOLOGICAL SURVEILLANCE OF FLORIDA POWER AND LIGHT COMPANY'S ST. LUCIE SITE

Second Quarter, 1993

Office of Radiation Control

Florida Department of Health and Rehabilitative Services

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ST. LUCIE SITE

# Technical Specifications Sampling

# Second Quarter, 1993

	Sample Type	Collection Frequency	Locations <u>Sampled</u>	Number of <u>Samples</u>
1.	Direct Radiation	Quarterly	27	54
2.	Airborne 2.a Air Iodines 2.b Air Particulates	Weekly Weekly	5 5	65 69*
3.	Waterborne 3.a Surface Water 3.b Shoreline Sediment	Weekly Monthly Somiannually	1	13 3
4.	Ingestion 4.a Fish and Invertebrates 4.a.1 Crustacea 4.a.2 Fish	Semiannually Semiannually	0	0 0
	4.b Food Products 4.b.1 Broadleaf Vegetation	Monthly	3	9
				<b>Total:</b> 213

- \* Includes NRC split samples.
- NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

Measurement results that are <u>not</u> significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.



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DIRECT RADIATION - TLDS - (micro-R/hour)

Each result is the average net response of two dosimeters.

Sample Site	Deployment <u>Collection</u>	03-23-93 06-15-93
N-1	5.8 ± 0.3	
NNW-5 NNW-10	$5.2 \pm 0.3$ $5.3 \pm 0.3$	
NW-5 (A) NW-10	$5.3 \pm 0.3$ $6.6 \pm 0.3$	
WNW-2 WNW-5 WNW-10	$5.3 \pm 0.3$ $5.4 \pm 0.3$ $6.1 \pm 0.3$	
₩-2 ₩-5 ₩-10	$5.8 \pm 0.3$ $6.1 \pm 0.3$ $5.5 \pm 0.3$	
WSW-2 WSW-5 WSW-10	$5.6 \pm 0.3$ $5.4 \pm 0.3$ $4.9 \pm 0.3$	
SW-2 SW-5 SW-10	$5.4 \pm 0.3$ $5.3 \pm 0.3$ $5.3 \pm 0.3$	
SSW-2 SSW-5 SSW-10	$5.3 \pm 0.3$ $5.5 \pm 0.3$ $5.6 \pm 0.3$	
S-5 S-10	5.3 ± 0.3 5.5 ± 0.3	
S/SSE-10 (A)	5.2 ± 0.3	
SSE-5 SSE-10	5.8 ± 0.3 5.5 ± 0.3	
SE-1	5.2 ± 0.3	
H-32	6.2 ± 0.3	

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(A) - The results for sites NW-5 and S/SSE-10 are each based on a single dosimeter due to anomalous responses from the other dosimeters at those sites. × 

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IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

	,		Sample Sit	e	
Collection Date	<u>H08</u>	<u>H12</u>	<u> </u>	<u> </u>	<u>H34</u>
					,
04-06-93 .	<0.02	<0.02	<0.02	<0.02	<0.02
04-12-93	<0.02	<0.02	<0.02	<0.02	<0.02
04-21-93	<0.02	<0.02	<0.02	<0.02	<0.02
04-27-93	<0.02	<0.02	<0.02	<0.02	<0.02
05-04-93	<0.02	<0.02	<0.02	<0.02	<0.02
05-11-93	<0.02	<0.02	<0.02	<0.02	. <0.02
05-18-93	<0.02	<0.02	<0.02	<0.02	<0.02
05-24-93	<0.03	<0.03	<0.03	<0.04	<0.03
06-01-93	<0.01	<0.01	<0.01	<0.01	<0.01
06-07-93	<0.02	<0.02	<0.02	<0.02	<0.02
06-14-93	<0.02	<0.02	<0.02	<0.02	<0.02
.06-21-93	<0.02	<0.02	<0.02	`<0.02	<0.02
06-29-93	<0.02	<0.02	<0.02	<0.02	<0.02

<u>2.a</u>

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<u>2.b</u>



Collection			Sample Site		•
Date	H08	H12	H14	H30	H34
04-06-93	(A0.014 ± 0.002	$0.009 \pm 0.002$	(A0.007 ± 0.002	$0.017 \pm 0.002$	$(A0.008 \pm 0.002)$
04-12-93	$0.023 \pm 0.003$	$0.017 \pm 0.002$	$0.014 \pm 0.002$	$0.020 \pm 0.003$	$0.012 \pm 0.002$
04-21-93	0.016 ± 0.002	$0.014 \pm 0.002$	$0.014 \pm 0.002$	$0.013 \pm 0.002$	0.011 + 0.001
04-27-93	$0.020 \pm 0.003$	0.015 ± 0.003	$0.013 \pm 0.002$	$0.019 \pm 0.003$	$0.016 \pm 0.003$
05-04-93	0.014 ± 0.002	0.026 ± 0.003	*0.017 ± 0.002	$0.015 \pm 0.003$	$0.015 \pm 0.002$
05-11-93	$0.012 \pm 0.002$	$0.007 \pm 0.002$	<b>*0.010</b> ± 0.002	$0.010 \pm 0.002$	$0.014 \pm 0.002$
05-18-93	$0.013 \pm 0.002$	$0.013 \pm 0.002$	$*0.013 \pm 0.002$	$0.012 \pm 0.002$	$0.017 \pm 0.002$
05-24-93	$0.014 \pm 0.002$	$0.013 \pm 0.002$	*0.014 ± 0.002	$0.014 \pm 0.002$	$0.012 \pm 0.002$
06-01-93	$0.007 \pm 0.002$	0.008 ± 0.002	$0.008 \pm 0.002$	$0.007 \pm 0.002$	0.010 + 0.002
06-07-93	$0.008 \pm 0.002$	$0.007 \pm 0.002$	$0.009 \pm 0.002$	$0.011 \pm 0.002$	$0.005 \pm 0.002$
06-14-93	$0.015 \pm 0.002$	$0.012 \pm 0.002$	$0.011 \pm 0.002$	$0.012 \pm 0.002$	0.011 + 0.002
06-21-93	$0.010 \pm 0.002$	$0.007 \pm 0.002$	$0.010 \pm 0.002$	$0.013 \pm 0.002$	$0.006 \pm 0.002$
06-29-93	$0.010 \pm 0.002$	$0.009 \pm 0.002$	$0.011 \pm 0.002$	$0.012 \pm 0.002$	$0.014 \pm 0.002$
Means:	0.014 ± 0.001	0.012 ± °0.001	0.012 ± 0.001	0.013 ± 0.001	0.012 ± 0.001

\* - NRC split samples.

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(A) - These particulate filters had "water spots" where they apparently had been struck by wind-driven rain.

AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

Second Quarter, 1993

<u>Site</u>	Be-7	<u> </u>	<u>Cs-134</u>	<u>Cs-137</u>	
H08	$0.1289 \pm 0.0124$	<0.0195	<0.0012	<0.0008	
H12	$0.1240 \pm 0.0125$	<0.0162	<0.0011	<0.0011	
H14	0.1206 ± 0.0130	<0.0170	<0.0010	<0.0010	
H30	$0.1142 \pm 0.0107$	<0.0201	<0.0009	<0.0008	
H34	0.1346 ± 0.0127	<0.0216	<0.0011	<0.0010	

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Sample Site	Collection Date	H-3	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95 Nb-95	T-131	Cs-134	Cs-137	Ba-140 La-140
<u></u>			• • • • • • • • • • • • • • • • • • • •			<u> </u>	<u> </u>	<u></u>	(A)	<u></u>	<u></u>	00_10/	(B)
H15	04-07-93	<136	309 ± 37	<4	<8	<3	<5	<9	<5	<7	<4	<3	<6
	04-12-93	<136	$312 \pm 38$	<3	<9	<4	<5	<8	<7	<4	<3	<4	<7
	04-22-93	<137	345 ± 40	<4	<8	<4	<5	<9	<7	<5	<4	<5	<5
	04-28-93	<136	307 ± 32	<3	<6 、	<3	<4	<7	<6	<3	<4	<4	<8
	05-04-93	<136	361 ± 39	<4	<7	<4	<5	<9	<7	<5	<5	<5	<6
	05-11-93	<136	339 ± 27	<2	<6	<3	<3	<6	<4	<3	<3	<3	<7
	05-19-93	<136	321 ± 28	<2	<7	<3	<4	<5	<4	<5	<3	<2	<3
	05-25-93	<136	355 ± 34	<3	<7	<3	<4	<7	<5	<3	<4	<4	<9
	06-02-93	<143	325 ± 39	<4	<9	<4	<5	<9	<7	<4	<4	<4	<6
	06-08-93	<143	297 ± 34	<4	<9	<4	<4	<9	<6	<4	<5	<4	<7
	06-14-93	<143	$284 \pm 35$	<4	<9	<4	<4	<9	<6	<5	<4	<4	<5
	06-22-93	<145	373 ± 28	<3	<6	<3	<3	<6	<5	<3	<3	<3	<5
	06-30-93	<142	$356 \pm 42$	<4	<11	<4	<5	<10	<8	<5	<4	<5	<8

05-05-93 <136  $359 \pm 41$ <5 <8 <9 <4 `<6 06-08-93  $336 \pm 40$ <10 <143 <4 <8 <4 <4

 $356 \pm 38$ 

<4

<8

(A) - These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

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(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

<u>3.a</u>

H59

04-06-93

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<u>4.b.1</u>	BROADLEAF	VEGETATION	 Mangrove	 (pCi/kq, wet weight)	
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Sample <u>Site</u>	Collection <u>Date</u>	<u>Be-7</u>	<u> </u>	<u>1-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H51	04-07-93	737 ± 61	2896 ± 139	<10	<8	<8
	05-04-93	468 ± 54	2119 ± 115	<8	<8	<10
	06-08-93	819 ± 69	. 3747 ± 180	<13	<13	<13
H52	04-07-93	773 ± 58	2457 ± 135	<9	<9	<11
4	05-04-93	511 ± 59	3106 ± 151	<10	<11	<9
	06-08-93	611 ± 51	3531 ± 134	<7	<9	<9
a						
H59	04-06-93	695 ± 52	2807 ± 142	<10	<10	<11
	05-05-93	651 ± 56	3646 ± 158	<9	<10	<11
	06-08-93	844 ± 56	3238 ± 138	<8	<9	<9
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# RADIOLOGICAL SURVEILLANCE OF FLORIDA POWER AND LIGHT COMPANY'S ST. LUCIE SITE

Third Quarter, 1993

Office of Radiation Control

Florida Department of Health and Rehabilitative Services

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## ST. LUCIE SITE

Technical Specifications Sampling

### Third Quarter, 1993

<u> </u>	Sample Type	Collection Frequency	Locations <u>Sampled</u>	Number of <u>Samples</u>
1.	Direct Radiation	Quarterly	27	52
2.	Airborne 2.a Air Iodines 2.b Air Particulates	Weekly Weekly	5 5	65 69*
3.	Waterborne 3.a Surface Water 3.b Shoreline Sediment	Weekly Monthly Semiannually	1 1 2	13 3 / 3*
4.	Ingestion 4.a Fish and Invertebrates 4.a.1 Crustacea 4.a.2 Fish	Semiannually Semiannually	" 2 2	2 2
	4.b Food Products 4.b.1 Broadleaf Vegetation	Monthly	•	9

Total: 218

\* - Includes NRC split samples.

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NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

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Measurement results that are <u>not</u> significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

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DIRECT RADIATION - TLDs - (micro-R/hour)

Each result is the average net response of two dosimeters.

Sample	Deployment	06-15-93
<u></u>	COTTECCION	
N-1	5.2 ± 0.3	
NNW-5	5.5 ± 0.3	
NNW-10	$5.9 \pm 0.3$	
NW-5	5.5 ± 0.3	± ●
NW-10	$6.7 \pm 0.4$	
WNW-2	$5.5 \pm 0.3$	
	$5.6 \pm 0.3$	
WWW-10	5.9 ± 0.3	
W-2	$5.7 \pm 0.3$	
W-5	$5.7 \pm 0.3$	
W-10	$5.2 \pm 0.3$	
WSW-2	5.3 ± 0.3	
WSW-5	$5.4 \pm 0.3$	
WSW-10	$4.7 \pm 0.2$	
SW-2	5.4 ± 0.3	
SW-5∗	$5.0 \pm 0.3$	
SW-10	(A)	*
SSW-2	5.3 ± 0.3	
SSW-5	$5.4 \pm 0.3$	
SSW-10	$5.5 \pm 0.3$	
S-5	5.4 ± 0.3	
S-10	$5.3 \pm 0.3$	
S/SSE-10	5.3 ± 0.3	
SSE-5	5.8 ± 0.3	
SSE-10	$5.3 \pm 0.3$	
SE-1	$5.2 \pm 0.3$	
H-32	$6.2 \pm 0.3$	



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(A) - The dosimeters for site SW-10 were missing when collection was attempted. Road construction was in progress in this area.



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IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

	Sample Site									
Collection Date	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>					
07-06-93	<0.02	<0.02	<0.02	<0.02	<0.02					
07-12-93	<0.02	<0.02	<0.02	<0.02	<0.02					
07-21-93	<0.01	<0.01	<0.01	<0.01	<0.01					
07-27-93	<0.02	<0.02	<0.02	<0.02	<0.02					
		1								
08-03-93	<0.02	<0.02	<0.02	<0.02	<0.02					
08-11-93	<0.02	<0.02	<0.02	<0.02	<0.02					
08-16-93	<0.05(A)	<0.02	<0.02	<0.02	<0.02					
08-25-93	<0.01	<0.01	<0.01	<0.01	<0.01					
				ولا ا	-					
09-01-93	<0.05	<0.04	<0.04	<0.04	<0.04					
09-07-93	<0.02	<0.02	<0.02	<0.02	<0.02					
09-14-93	<0.02	<0.02	<0.02	<0.02	<0.02					
09-20-93	<0.02	<0.02	<0.03	<0.02	<0.03					
09-29-93	<0.01	<0.01	<0.01	<0.01	<0.01					

 (A) - This sample had a low collected volume due to failure of the air pump. The equipment is estimated to have run for 57 hours out of the 116 total hours for this sampling interval.

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	Sample Site									
Collection Date	HOS	H12	H14	H30	H3/					
		<b>*1</b> 2, 2,			1154					
07-06-93	$0.021 \pm 0.002$	$0.024 \pm 0.002$	$0.014 \pm 0.002$	$0.018 \pm 0.002$	$0.015 \pm 0.002$					
07-12-93	$0.023 \pm 0.003$	$0.017 \pm 0.002$	$0.016 \pm 0.002$	$0.014 \pm 0.002$	$0.019 \pm 0.002$					
07-21-93	$0.020 \pm 0.002$	$0.019 \pm 0.002$	$0.022 \pm 0.002$	$0.033 \pm 0.002$	$0.022 \pm 0.002$					
07-27-93	$0.013 \pm 0.002$	$0.004 \pm 0.002$	0.010 ± 0.002	$0.012 \pm 0.002$	$0.011 \pm 0.002$					
08-03-93	0.015 ± 0.002	$0.018 \pm 0.002$	*0.016 ± 0.003	$0.017 \pm 0.002$	$0.013 \pm 0.002$					
08-11-93	$0.023 \pm 0.002$	$0.022 \pm 0.002$	$*0.021 \pm 0.002$	$0.018 \pm 0.002$	$0.022 \pm 0.002$					
08-16-93	<0.015(A)	$0.009 \pm 0.002$	*0.009 ± 0.002	$0.011 \pm 0.002$	$0.010 \pm 0.002$					
08-25-93	$0.017 \pm 0.002$	$0.017 \pm 0.002$	*0.016 ± 0.002	$0.015 \pm 0.002$	$0.017 \pm 0.002$					
09-01-93	0.011 ± 0.002	$0.015 \pm 0.002$	0.012 ± 0.002	$0.024 \pm 0.003$	$0.008 \pm 0.002$					
09-07-93	$0.009 \pm 0.002$	$0.009 \pm 0.002$	$0.006 \pm 0.002$	$0.008 \pm 0.002$	$0.009 \pm 0.002$					
09-14-93	$0.011 \pm 0.002$	$0.011 \pm 0.002$	$0.009 \pm 0.002$	$0.013 \pm 0.002$	$0.009 \pm 0.002$					
09-20-93	$0.008 \pm 0.002$	$0.008 \pm 0.002$	$0.011 \pm 0.002$	$0.012 \pm 0.002$	$0.009 \pm 0.002$					
09-29-93	$0.015 \pm 0.002$	$0.012 \pm 0.002$	$0.014 \pm 0.002$	$0.015 \pm 0.002$	$0.011 \pm 0.002$					
Means:	0.016 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.016 ± 0.001	0.013 ± 0.001					

\* - NRC split samples.

 (A) - This sample had a low collected volume due to failure of the air pump. The equipment is estimated to have run for 57 hours out of the 116 total hours for this sampling interval. The required sensitivity of <0.010 pCi/m<sup>3</sup> could not be achieved due to the small volume.

<u>2.b</u>	AIR PAR	TICULATES - GAMMA S	CANS OF QUARTERI	LY COMPOSITES	- (pCi/m <sup>3</sup> )					
	Sample	. Thir	Third Quarter, 1993							
	Site	Be-7	K-40	<u>Cs-134</u>	<u>Cs-137</u>					
	H08	$0.1171 \pm 0.0121$	<0.0213	<0.0011	<0.0008					
	H12	$0.1075 \pm 0.0117$	<0.0215	<0.0010	<0.0011					
	H14	0.1206 ± 0.0105	<0.0203	<0.0013	<0.0007					
-	H30	$0.0852 \pm 0.0100$	<0.0204	<0.0012	<0.0010					
	H34	$0.1175 \pm 0.0115$	<0.0192	<0.0008	<0.0010					

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<u>3.a</u>





Sample	Collection								Zr-95				Ba-140
<u>Site</u>	<u> </u>	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Nb-95</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	La-140
									(A)				(B)
H15	07-07-93	<137	343 ± 38	<4	<9	<4	<3	<9	<7	<4	<4	<4	<11
	07-12-93	<137	327 ± 43	<4	<11	<5	<4	<10	<7	<4	<4	<4	<5
	07-21-93	<137	$354 \pm 38$	<5	<8	<4	<4	<8	<7	<4	<4	<4	<9
	07-27-93	<137	392 ± 39	<4	<9	<4	<4	<7	<7	<3	<4	<4	<10
	08-03-93	<131	350 ± 41	<4	<9	<4	<5	<8	<6	<4	<4	<4	<10
	08-11-93	<135	$395 \pm 40$	<5	<7	<4	<5	<10	<7	<4	<4	<4	<9
	08-16-93	<137	$324 \pm 44$	<5 <sup>-</sup>	<8	<4	<5	<8	<7	<5	<4	<5	<7
	08-26-93	<131	333 ± 32	<3	<7	<3	<4	<9	<5	<3	<4	<3	<8
	08-31-93	<130	311 ± 37	<3	<9	<4	<5	<7	<6	<4	<4	<4	<10
	09-07-93	<135	255 ± 37	<3	<9	<4	<5	<7	<7	<4	<4	<4	<8
	09-15-93	<134	$345 \pm 28$	<3	<6	<3	<4	<6	<4	<3	<4	<3	<7
	09-22-93	<134	251 ± 37	<3	<9	<3	<4	<8	<7	<4	<4	<5	<9
ų	09-29-93	408 ± 48	329 ± 41	<4	<10	<4	<4	<10	<5	<4	<4	<4	<9
								-	_		_		_
H59	07-07-93	<137	347 ± 38	<3	<8	<4	<6	<7	<7	<4	<5	<4	<9
	08-04-93	<131	364 ± 39	<4	<8	<3	<4	<8	<7	<4	_ <4	<4	<8
	09-01-93	<137	368 ± 38	<4	<9	<4	<4	<10	<7	<6	<4	<4	<5

(A) - These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

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<u>3.b</u>	·		_SEDIMEN	IT -	(pCi/	<u>kg, dr</u>	<u>y weig</u> l	nt)			
Sample <u>Site</u>	Collection Date	<u>Be-7</u>	K-40	<u>Co-</u>	<u>-58 C</u>	<u>0-60</u>	<u>Cs-134</u>	<u>Cs-13</u>	7 <u>Ra-</u>	-226	Th-232
H15*	08-12-93	<67	334 ± 50	) <6	5	<9	<8	<9	212	± 12	82 ± 14
H59	08-12-93	<63	232 ± 54	<	5	<7	<9	<8	184	± 11	54 ± 14
*	- NRC split	sample.		ų							
<u>4.a.1</u>		CRUSI	ACEA -	Blue	Crab	<b>- (</b> p	<u>Ci/kg,</u>	wet we:	ight)		
Sample Site	Collection Date	K-40	<u> Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
H15	08-12-93	3150 ± 606	5 <103	<191	<83	<104	<217	<97	<107	ND	ND
H59	08-12-93	1567 ± 190	<21	<41	<19	<26	<57	<23	<28	ND	172 ± 38
2				-							
<u>4.a.2</u>	FIS	H - (H15:	Shark)	(H59:	Yell	owtail	)(	(pCi/kq	<u>, wet we</u>	eight)	
Sample Site	Collection Date	K-40	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>2n-65</u>	<u>Cs-134</u>	<u>Cs-137</u>		<u>Ra-228</u>
H15	08-12-93	1753 ± 235	5 <17	<34	<18	<26	<46	<24	<26	ND	ND
H59	09-08-93	2159 ± 237	<17	<46	<23	<32	<54	<23	<26	ND	ND

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ND - Non-detectable.

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## 4.b.1 BROADLEAF VEGETATION - Mangrove - (pCi/kg, wet weight)

Sample <u>Site</u>	Collection <u>Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>1-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
	1					
H51	07-07-93	747 ± 55	3841 ± 147	<8	<10	<7
	08-04-93	945 ± 73	4231 ± 184	<9	<12	<12
	09-01-93	934 ± 68	2038 ± 141	<b>&lt;9</b> ,	<11	<12
	ŧ					
H52	07-07-93	629 ± 61	3671 ± 155	<10	<11	<11
	08-04-93	548 ± 60	4075 ± 172	<8	, <b>&lt;10</b>	<10
	09-01-93	1164 ± 86	2435 ± 157	<12	<14	<12
	φ					
H59	07-07-93	520 ± 57	4460 ± 185	<10	<15	<11
	08-04-93	924 ± 68	4239 ± 172	<10	<11	<12
	09-01-93	868 ± 69	1297 ± 116	<11	<12	<12

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RADIOLOGICAL SURVEILLANCE OF FLORIDA POWER AND LIGHT COMPANY'S ST. LUCIE SITE

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Fourth Quarter, 1993

Office of Radiation Control

Florida Department of Health and Rehabilitative Services

### ST. LUCIE SITE

## Technical Specifications Sampling

## Fourth Quarter, 1993

	Sample Type	Collection Frequency	Locations <u>Sampled</u>	Number of <u>Samples</u>
1.	Direct Radiation	Quarterly	27	23 *
2.	Airborne 2.a Air Iodines 2.b Air Particulates	Weekly Weekly	5 5	62 67*
3.	Waterborne 3.a Surface Water 3.b Shoreline Sediment	Weekly Monthly Semiannually	1 1 0	13 3 0
4.	Ingestion 4.a Fish and Invertebrates 4.a.1 Crustacea 4.a.2 Fish	Semiannually Semiannually	0 0	0 0
	4.b Food Products 4.b.1 Broadleaf Vegetation	Monthly	3	9

### Total: 177

\* - Includes NRC split samples.

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term.

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Measurement results that are <u>not</u> significantly above background are reported as "non-detectable" (ND) or as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.



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DIRECT RADIATION - TLDs - (micro-R/hour)

Sample	e I	Deploym	ent	09-21	L-93	(2)	Sample	Dej	ployme	nt	09-21-93
<u> </u>	<u>`</u>	JULLECC	1011	12-07	-93	$(\mathbf{A})$	SILE	<u> </u>	TTECCT	on	12-07-93
N-1		4.87	±	0.15			SW-2	(C)			
							SW-5	(D,E)	4.37	<u>+</u>	0.16
NNW-5		4.78	±	0.16			SW-10		4.63	±	0.15
NNW-10		4.86	±	0.16							
					μ		SSW-2		4.62	±	0.16
NW-5	(B)	4.78	+	0.14	•		SSW-5		4.84	+	0.16
NW-10	(-/	5.97	+	0 17			SSW-10		5 16		0 16
		5.57		0.17			221-10		3.10	÷	0.10
WNW-2	(C,D)	)					S-5	(C)			
WNW-5	$\dot{c}$						S-10	<b>v</b> = 7	5.01	+	0.16
WNW-10	(-/	5.36	±	0.16						-	00110
			11				S/SSE-10		4.26	<u>+</u>	0.15
W-2		5.03	±	0.18			.,				•
W-5		4.97	±	0.14			SSE-5		4.87	+	0.15
W-10		4.60	+	0.14			SSE-10		4.78	+	0.15
	a a		-	•••					4.70		0.10
WSW-2		4.90	±	0.15			SE-1		4.52	±	0.16
WSW-5		4.88	±	0.17							
WSW-10		4.18	±	0.14			H-32		5.53	±	0.18

- (A) All of the above results were obtained using Panasonic UD-814 environmental dosimeters and a Panasonic UD-706A TLD reader. Previous results in recent years were obtained using Victoreen CaF<sub>2</sub>:Mn TLD bulbs and a Harshaw 2000 TLD reader, which are now obsolete. All subsequent results will be obtained using the Panasonic equipment, until it needs to be replaced with newer equipment.
- (B) Sand was found in the bottom section of the plastic cage used to hold this dosimeter. This TLD may have fallen from its mounting and been replaced by someone.
- (C) These dosimeters were missing when collection was attempted.
- (D) The new dosimeters for the next collection were deployed at a slightly different location in an effort to reduce loss of samples thought to be due to tampering.
- (E) These dosimeters were found lying on the ground when they were collected.

<u>2.a</u>

IODINE-131 IN WEEKLY AIR FILTERS - (pCi/m<sup>3</sup>)

	Sample_Site								
Date	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u> </u>	<u>H34</u>				
10-07-93	<0.01	<0.02	<0.01	<0.01	<0.01				
10-12-93	<0.02	<0.02	<0.03	<0.02	<0.03				
10-21-93	<0.01	<0.01	<0.01	<0.01	<0.01				
10-25-93	<0.03	<0.03	<0.05(A)	<0.03	<0.02				
				-					
11-02-93	<0.02	<0.02	(B)	<0.02	° <0.02				
11-09-93	<0.01	<0.01	(B)	<0.01	<0.01				
11-18-93	<0.02	<0.02	(C)	<0.02	<0.01				
11-23-93	<0.03	<0.03	<0.04	<0.03	<0.04				
11-30-93	<0.02	<0.02	<0.02	<0.02(D)	<0.02				
12-06-93	<0.02	<0.02	<0.02	<0.02(D)	<0.02				
12-14-93	<0.01	<0.01	<0.01	<0.01	<0.01				
12-21-93	<0.01	<0.01	<0.01	<0.01	<0.01				
12-29-93	<0.02	<0.02	<0.02	<0.02	<0.02				

- (A) Electrical power was out at the end of this sample. The equipment is estimated to have run for 54 hours out of the 135 total hours for this sampling interval.
- (B) Electrical power was out during this entire sampling interval. There were no samples for analysis.
- (C) Electrical power was out at the start of this sample. There was no I-131 filter because the HRS air pump failed to start when power was restored.

(D) - Accurate measurement of the air volume was not available due to failure of the gas meter. The volumes for these samples are estimated based on flow rate measurements.

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AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Collection			Sample Site				
Date	<u>H08</u>	<u>H12</u>	H14	H30	- <u>H34</u>		
10-07-93	$0.010 \pm 0.002$	0.011 ± 0.002	$0.009 \pm 0.002$	$0.008 \pm 0.002$	$0.011 \pm 0.002$		
10-12-93	$0.008 \pm 0.002$	<0.007	<0.008	$0.007 \pm 0.002$	$0.008 \pm 0.002$		
10-21-93	$0.008 \pm 0.002$	$0.009 \pm 0.002$	$0.008 \pm 0.002$	$0.007 \pm 0.002$	$0.012 \pm 0.002$		
10-25-93	$0.010 \pm 0.003$	(A0.008 ± 0.003	<0.014(B)	$0.013 \pm 0.003$	(A0.014 ± 0.003		
11-02-93	$0.008 \pm 0.002$	$0.005 \pm 0.002$	(C)	0.011 ± 0.002	0.009 ± 0.002		
11-09-93	$0.016 \pm 0.002$	$0.015 \pm 0.002$	(C)	$0.018 \pm 0.002$	$0.017 \pm 0.002$		
11-18-93	$0.010 \pm 0.002$	$0.010 \pm 0.002$	$(D0.008 \pm 0.001)$	$0.012 \pm 0.002$	$0.012 \pm 0.002$		
11-23-93	$0.012 \pm 0.002$	$0.011 \pm 0.002$	*0.006 ± 0.002	$0.009 \pm 0.002$	$0.009 \pm 0.003$		
11-30-93	$0.009 \pm 0.002$	$0.008 \pm 0.002$	*0.009 ± 0.002	(E0.013 ± 0.002	$0.012 \pm 0.002$		
12-06-93	$0.019 \pm 0.002$	(F)	*0.010 ± 0.002	(E0.014 ± 0.002	$0.013 \pm 0.002$		
12-14-93	$0.056 \pm 0.003$	$0.032 \pm 0.003$	*0.019 ± 0.002	$0.036 \pm 0.003$	$0.021 \pm 0.002$		
12-21-93	$0.013 \pm 0.002$	$0.013 \pm 0.002$	$0.014 \pm 0.002$	$0.015 \pm 0.002$	$0.014 \pm 0.002$		
12-29-93	0.018 ± 0.002	$0.014 \pm 0.002$	0.016 ± 0.002	$0.016 \pm 0.002$	$0.020 \pm 0.002$		
Means:	.0.015 ± 0.001	0.012 ± 0.001	0.011 ± 0.001	0.014 ± 0.001	0.013 ± 0.001		

\* - NRC split samples.

- (A) This filter was found with a small hole near the center. We believe this was due to inadvertent mishandling upon deployment of the filter.
- (B) Electrical power was out at the end of this sample. The equipment is estimated to have run for 54 hours out of the 135 total hours for this sampling interval.
- (C) Electrical power was out during this entire sampling interval. There were no samples for analysis.
- (D) Electrical power was out at the start of this sample. The HRS air pump failed to start when power was restored. A separate sampling unit which was intended to provide a duplicate particulate filter for NRC was, instead, used for this sample. The equipment is estimated to have run for 214 hours out of the 242 total hours for this sampling interval.
- (E) Accurate measurement of the air volume was not available due to failure of the gas meter. The air volumes for these samples are estimated based on flow rate measurements.
- (F) This filter was missing when collection was attempted. We believe this was due to someone tampering with the equipment.



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# 2.b AIR PARTICULATES - GAMMA SCANS OF QUARTERLY COMPOSITES - (pCi/m<sup>3</sup>)

Fourth Quarter, 1993

Sample <u>Site</u>	Be-7	K-40	<u>Cs-134</u>	<u>Cs-137</u>
H08	0.1205 ± 0.0111	<0.0256	<0.0009	<0.0010
H12	$0.1121 \pm 0.0123$	<0.0177	<0.0011	<0.0011
H14	0.1482 ± 0.0142	<0.0278	<0.0014	<0.0011
H30	0.1078 ± 0.0107	<0.0194	<0.0014	<0.0008
H34	0.1428 ± 0.0111	<0.0143	<0.0012	<0.0008

- 5 -



SURFACE WATER - (pCi/l)

Sample <u>Site</u>	Collection Date	H-3	<u>K-40</u>	<u>Mn-54</u>	<u>Fe-59</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 Nb-95	I-131	Cs-134	Cs-137	Ba-140 La-140
	-					z			(A)			<u> </u>	(B)
H15	10-06-93	<126	321 ± 42	: <3	<10	<4	<4	<8	<6	<6	<5	<4	<5
	10-12-93	<126	283 ± 37	<4	<b>&lt;</b> 8 <sup>*</sup>	<4	<3	<9	<6	<4	<5	<4	<8
	10-20-93	<131	404 ± 39	<4	<8	<4	<5	<9	<7	<5	<4	<4	<5
	10-26-93	<130	355 ± 37	<4	<8	<3	<3	<9	<7	<4	<4	<4	<11
	11-02-93	<127	337 ± 38	<4	<7	<4	<4	<9	<7	<4	<4	<5	<9
	11-09-93	91 ± 40	338 ± 42	<4	<10	<4	<5	<10	<5	<9	<5	<4	<6
	11-19-93	<129	$295 \pm 34$	<4	<10	<4	<5	<8	<8	<6	<4	<4	<8
	11-23-93	<137	288 ± 39	** <5	<9	<3	<5	<9	<7	<6	<4	<4	<5
	11-30-93	<143	289 ± 34	<3	<4	<3	<4	<5	<7	<4	<5	<5	<10
	12-08-93	<135	$363 \pm 44$	<4	<7	<4	<5	<8	<5	<4	<4	<4	<8
	12-13-93	<140	$283 \pm 42$	<3	<11	<4	<5	<9	<7	<5	<4	<4	<6
	12-21-93	<140	$312 \pm 37$	<4	<6	<3	<6	<7	<7	<4	<4	<4	<6
	12-29-93	<141	294 ± 18	<2	<4	<2	<2	<4	<3	<3	<2	<2	<3
										-			
H59	10-12-93	<126	317 ± 38	<4	<9	<4	<5	<10	<7	<5	<4	<4	<6
	11-08-93	<127	$294 \pm 38$	<5	<12	<4	<5	<9	<7	<8	<4	<4	<5
	12-01-93	<135	328 ± 37	′ <3	<8	<3	<5	<10	<7	<5	<4	- <4	<7

- (A) These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.
- (B) These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

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# 4.b.1 BROADLEAF VEGETATION - Mangrove - (pCi/kg, wet weight)

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ı	Sample <u>Site</u>	Collection Date	<u>Be-7</u>	<u> </u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
	H51	10-12-93	1158 ± 62	2639 ± 126	<8	<9	<8
		11-08-93	1249 ± 89	4347 ± 201	<15	<13	<12
		12-01-93	755 ± 58	4219 ± 170	<9	<10	<9
	H52	10-12-93	2202 ± 88	2436 ± 132	<11	<11	<11
)		11-08-93	492 ± 61	3754 ± 174	<13	<13	<12
		12-01-93	711 ± 63	3566 ± 154	<10	<13	<9
	H59	10-12-93	945 ± 60	3519 ± 154	<10	<12	<11
		11-08-93	1327 ± 80	3251 ± 177	<15	<16	<15
		12-01-93	567 ± 59	4040 ± 160	<9	<11	<11

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## 1993 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT, UNITS 1 & 2

### ATTACHMENT C

## RESULTS FROM THE INTERLABORATORY

### COMPARISON PROGRAM 1993

FLORIDA DEPT. OF HRS - EPA INTERLABORATORY CROSS-CHECK PROGRAM DATA

N.D.K. Action Units Normal. Mean of Media Nuclide Collection EPA Range Analyses Level Mon Day Yr Known 9 WATER Alpha. 01 29 93 34 pCi/L 0.656 145.67 21.49 1 93 44 pCi/L 0.236 45.67 0.58 WATER Beta 01 29 -0.35 15 pCi/L 0.000 14.00 WATER CO-60 06 11 93 106.67 WATER Zn-65 06 11 93 103 pCi/L 0.118 0.64 11 119 pCi/L 0.049 103.33 -2.26 WATER Ru-106 06 93 WATER Ba-133 99 pCi/L 06 11 93 0.059 95.33 -0.64 11 0.00 WATER Cs-134 06 93 5 pCi/L 0.000 5.00 5 pCi/L 11 -0.12WATER Cs-137 06 93 0.118 4.67 WATER H-3 06 04 93 9844 pCi/L 0.072 9756.67 -0.15 WATER I-131 02 05 93 WATER Sr-89 01 15 93 100 pCi/L 98.67 -0.23 0.177 15 pCi/L 0.236 12.00 -1.04 WATER Sr-90 01 15 93 10 pCi/L0.118 7.67 -0.81

#### January through June, 1993

#### NOTES:

- Normalized range. As defined in "Environmental Range Normal.: Radioactivity Laboratory Intercomparison Studies Program Fiscal Year 1981 - 1982", Environmental Monitoring Systems Laboratory, U. S. Environmental Protection Agency, P. O. Box 93478, Las Vegas, Nevada, 89193-3478. EPA-600/4-81-004, February, 1981.
- N.D.K.: Normalized deviation of the mean from the known value, as defined in EPA-600/4-81-004.

NDP: No data provided. No data was provided to EPA for inclusion in their report.

NA: Not available. Report containing this data has not yet been received from EPA, Las Vegas.

#### ACTION LEVEL:

(1)Cause: The cause of the result exceeding the action level is not known. It should be noted, however, that two-thirds of the participating laboratories in this cross-check exceeded the control limit. Corrective Action: None at this time.





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## FLORIDA DEPT. OF HRS - EPA INTERLABORATORY CROSS-CHECK PROGRAM DATA

July through December, 1993

Media	Nuclide	Coll	lecti	lon	EPA	Units	Normal.	Mean of	N.D.K.	Action
		Mon	Day	Yr	Known		Range	Analyses		Level
FILTER	Alpha	80	27	93	19	pCi/F	0.000	21.00	0.69	
FILTER	Beta	80	27	93	47	pCi/F	0.000	50.00	1.04	
FILTER	Cs-137	08	27	93	9	pCi/F	0.000	10.00	0.35	
FILTER	Sr-90	80	27	93	19	pCi/F	0.354	13.67	-1.85	
MILK	I-131	09	24	93	120	pCi/L	0.148	117.00	-0.43	
MILK	Cs-137	09	24	93	49	pCi/L	0.236	49.67	0.23	
MILK	K	09	24	93	1679	mg/L	0.359	1591.33	-1.81	
MILK	Sr-89	09	24	93	30	pČi/L	0.354	16.67	-4.62	1
MILK	Sr-90	09	24	93	25	pCi/L	0.118	15.33	-3.35	2
WATER	Alpha	07	23	93	15	pCi/L	0.000	15.00	0.00	
WATER	Alpha	10	29	93	20	pCi/L	0.000	22.00	0.69	
WATER	Beta	07	23	93	43	pCi/L	0.341	47.00	1.00	
WATER	Beta	10	29	93	15	pCi/L	0.236	21.00	2.08	
WATER	Co-60 '	11	12	93	30	pCi/L	0.118	29.33	-0.23	
WATER	Zn-65	11	12	93	150	pCi/L	0.158	156.67	0.77	
WATER	Ru-106	11	12	93	201	pCi/L	0.148	186.00	-1.30	
WATER	Ba-133	11	12	93	79	pCi/L	0.148	76.00	-0.65	
WATER	Cs-134	11	12	93	59	pCi/L	0.236	54.00	-1.73	
WATER	Cs-137	11	12	93	40	pCi/L	0.118	42.67	0.92	
WATER	H-3	11	05	93	7398	pCi/L	0.079	7452.33	0.13	
WATER	I-131	10	08	93	117	pCi/L	0.049	112.67	-0.63	
WATER	Sr-89	07	16	93	34	pCi/L	0.118	30.33	-1.27	
WATER	Sr-90	07	16	93	25	pCi/L	0.000	22.00	-1.04	







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NOTES:

- Normal.: Normalized range. As defined in "Environmental Range Radioactivity Laboratory Intercomparison Studies Program Fiscal Year 1981 - 1982", Environmental Monitoring Systems Laboratory, U. S. Environmental Protection Agency, P. O. Box 93478, Las Vegas, Nevada, 89193-3478. EPA-600/4-81-004, February, 1981.
- N.D.K.: Normalized deviation of the mean from the known value, as defined in EPA-600/4-81-004.
- NDP: No data provided. No data was provided to EPA for inclusion in their report.
- NA: Not available. Report containing this data has not yet been received from EPA, Las Vegas.

ACTION LEVEL:

- (1) Cause: Erroneously over estimated chemical recovery of strontium carrier. Corrective Action: Try to improve purity of isolated strontium carrier.
- (2) Cause: Erroneously over estimated chemical recovery of strontium carrier. Corrective Action: Try to improve purity of isolated strontium carrier.

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**OPERATING REPORT** 

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ST. LUCIE PLANT

**UNITS 1 & 2** 

LICENSE NOS. DPR-67, NPF-16

DOCKET NOS. 50-335, 50-389

Data Submitted by: Florida DOH
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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

# TABLE OF CONTENTS

DESCRIPTION	PAGE
Introduction	1
Radiological Environmental Monitoring Program	1
Discussion and Interpretation of Results	3
Environmental Radiological Monitoring Program Annual Summary	TABLE 1
Deviations / Missing Data	TABLE 1A
Analyses with LLDs Above Required Detection Capabilities	TABLE 1B
Land Use Census	TABLE 2
Key to Sample Locations	ATTACHMENT A
Radiological Surveillance of Florida Power and Light Company's St. Lucie Site	ATTACHMENT B
First Quarter, 1998	
Second Quarter, 1998	
<sup>°</sup> Third Quarter, 1998	
Fourth Quarter, 1998	
Results from the Interlaboratory Comparison Program, 1998	ATTACHMENT C

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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

#### I. INTRODUCTION

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This report is submitted pursuant to Specification 6.9.1.8 of St. Lucie Unit 1 & St. Lucie Unit 2 Technical Specifications. The Annual Radiological Environmental Operating Report provides information, summaries and analytical results pertaining to the Radiological Environmental Monitoring Program for the calendar year indicated. This report covers surveillance activities meeting the requirements of Unit 1 and Unit 2 Technical Specifications.

#### II. RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

#### A. <u>Purpose</u>

The purpose of the Radiological Environmental Monitoring Program is to provide representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of members of the public resulting from station operation. The Radiological Environmental Monitoring Program also supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways.

#### B. <u>Program Description</u>

The Radiological Environmental Monitoring Program (REMP) for the St. Lucie Plant is conducted pursuant to the St. Lucie Unit 1 and St. Lucie Unit 2 Offsite Dose Calculation Manual (ODCM) Control 3/4.12.1.

- 1. Sample Locations, Types and Frequencies:
  - a. Direct radiation gamma exposure rate is monitored continuously at 27 locations by thermoluminescent dosimeters (TLDs). TLDs are collected and analyzed quarterly.
  - b. Airborne radioiodine and particulate samplers are operated continuously at five locations. Samples are collected and analyzed weekly. Analyses include lodine-131, gross beta, and gamma isotopic measurements.
  - c. Surface water samples are collected from two locations. Samples are collected and analyzed weekly and monthly, respectively. Analyses include gamma isotopic and tritium measurements.



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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

- d. Shoreline sediment samples are collected from two locations coinciding with the locations for surface water samples. Samples are collected and analyzed semi-annually. Sediment samples are analyzed by gamma isotopic measurements.
- e. Fish and invertebrate samples are collected from two locations. Samples are collected and analyzed semi-annually. Fish and invertebrate samples are analyzed by gamma isotopic measurements.
- f. Broad leaf vegetation samples are collected from three locations. Samples are collected and analyzed monthly. Broad leaf vegetation samples are analyzed by gamma isotopic measurements.

Attachment A provides specific information pertaining to sample locations, types and frequencies.

2. Analytical Responsibility:

Radiological environmental monitoring for the St. Lucie Plant is conducted by the State of Florida, Department of Health (DOH). Samples are collected and analyzed by DOH personnel.

Samples are analyzed at the DOH Environmental Radiation Control Laboratory in Orlando, Florida.

C. Analytical Results

<u>Table 1, Environmental Radiological Monitoring Program Annual Summary</u> provides a summary for all specified samples collected during the referenced surveillance period. Deviations from the sample schedule, missing data and/or samples not meeting the specified "A PRIORI" LLD, if any, are noted and explained in Tables 1A and 1B, respectively. Analysis data for all specified samples analyzed during the surveillance period is provided in Attachment B.





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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

#### D. Land Use Census

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A land use census out to a distance of five miles radius from the St. Lucie Plant is conducted annually to determine the location of the nearest milk animal, residence, and garden producing broad leaf vegetation in each of the sixteen meteorological sectors. A summary of the land use census for the surveillance year is provided in <u>Table 2</u>, <u>Land</u> <u>Use Census Summary</u>.

No locations yielding a calculated dose or dose commitment greater than the values currently being calculated were identified by the land use census.

No locations yielding a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than locations currently being sampled in the radiological environmental monitoring program were identified by the land use census.

#### E. Interlaboratory Comparison Program

The intercomparison program for 1998 consisted of samples provided through the EPA Safe Drinking Water Program and Department of Energy QAP Program.

The EPA program consisted of one round of Water samples. The results are listed in ATTACHMENT C, RESULTS FROM THE INTERLABORATORY COMPARISON PROGRAM.

The DOE-QAP consisted of two rounds of Air Filter, Water, Soil, and Vegetation matices. The samples were analyzed using the methods applicable to the REMP (gamma spectroscopy, Gross Beta, and Tritium for water). The results for nuclides associated with the REMP are listed in ATTACHMENT C, RESULTS FROM THE INTERLABORATORY COMPARISON PROGRAM.

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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

- III. DISCUSSION AND INTERPRETATION OF RESULTS
  - A. <u>Reporting of Results</u>

The Annual Radiological Environmental Operating Report contains the summaries, interpretations, and information required by St. Lucie Plant, ODCM. Table 1 provides a summary of the measurements made for the nuclides required by ODCM, Table 4.12-1, for all samples specified by Table 3.12-1. In addition, summaries are provided for other nuclides identified in the specified samples, including those not related to station operation. These include nuclides such as K-40, Th-232, Ra-226, and Be-7 which are common in the Florida environment.

- B. Interpretation of Results
  - 1. Direct Radiation:

The results of direct radiation monitoring are consistent with past measurements for the specified locations. The exposure rate data shows no indication of any trends attributed to effluents from the plant. The measured exposure rates are consistent with exposure rates that were observed during the preoperational surveillance program. Direct radiation monitoring results are summarized in Table 1.

2. Air Particulates/Radioiodine:

The results for radioactive air particulate and radioiodine monitoring are consistent with past measurements and indicate no trends attributed to plant effluents. All samples for radioiodine yielded no detectable I-131. Gamma isotopic measurements yielded no indication of any nuclides attributed to station operation. The results for air particulate/radioiodine samples are consistent with measurements which were made during the preoperational surveillance program. Air particulate and radioiodine monitoring results are summarized in Table 1.

3. Surface Water:

The results of radioactivity measurements in surface water samples are consistent with past measurements. No nuclides attributed to station operation were detected. Results for surface water samples are summarized in Table 1.





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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT – UNITS 1 & 2

#### 4. Waterborne Sediment and Food Products:

The results for radioactivity measurements in waterborne sediment, fish and crustacea samples are consistent with past measurements and with measurements made during the preoperational surveillance program. Although Cs-137 was detected in one sample from the control location, there were no indications of any nuclides attributed to plant effluents. Results for the waterborne sediment, fish, and crustacea samples are summarized in Table 1.

#### 5. Broad Leaf Vegetation

The results of radioactivity measurements in broad leaf vegetation are consistent with past measurements and with measurements made during the preoperational surveillance program. During this year, a transition was made from sampling Mangroves to Brazillian Pepper. Mangrove is a protected species. B. Pepper is quite abundant. One indicator location sample and one control location sample indicated Cs-137. The highest level is less than one percent of the reporting level listed in the ODCM. There were no indications of any other nuclides attributed to plant effluents. Results for the broad leaf vegetation samples are summarized in Table 1.

#### C. <u>Conclusions</u>

The data obtained through the St. Lucie Plant Radiological Environmental Monitoring Program verifies that the levels of radiation and concentrations of radioactive materials in environmental samples, representing the highest potential exposure pathways to members of the public, are not being increased. The measurements verify that the dose or dose commitment to members of the public, due to operation of St. Lucie Units 1 and 2, during the surveillance year, are well within "as low as reasonably achievable (ALARA)" criteria established by 10 CFR 50, Appendix I.





#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

PATHWAY: DIRECT RADI SAMPLES COLLECTED: UNITS: micro-R/hr	IATION TLD		Location with Hiol	nest Annual Mean	r
		•	Name <sup>c</sup>	Mean (f) <sup>⊳</sup>	
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	- All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Exposure Rate, 107 <sup>d</sup>	•••	4.8 (103/103) 3.7 - 6.6	NW-10 10 mi., NW	6.1 (4/4) 5.8 - 6.6	5.1 (4/4) 4.8 - 5.3

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Number of Nonroutine Reported Measurements = 0

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#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: AIRBORNE SAMPLES COLLECTED: RADIOIODINE AND PARTICULÂTES UNITS: PICO - CI/M<sup>3</sup>

			Location with Hig	phest Annual Mean	
_			Name <sup>c</sup>	Mean (f) <sup>b</sup>	
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
<sup>131</sup> I, 259	0.024	<mda< th=""><th></th><th></th><th><mda< th=""></mda<></th></mda<>			<mda< th=""></mda<>
Gross Beta, 259	0.0025	0.01 (206/207) 0.004 - 0.026	H-34 0.5 mi., N	0.013 (52/52) 0.006 - 0.024	0.014 (52/52) 0.005 - 0.025
Composite Gamma Isotopic, 20					
<sup>7</sup> Be	0.0052	0.1243 (16/16) 0.0872 - 0.1601	H-14 1 mi., SE	0.1350 (4/4) 0.1145 - 0.1601	0.1257 (4/4) 0.0979 - 0.1642
<sup>134</sup> Cs	0.00069	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	0.00066	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>210</sup> Pb	,	0.0140 (16/16) 0.0096 - 0.0181	H-08 6 mi., WNW	0.0154 (4/4) 0.0137 - 0.0166	0.0129 (4/4) 0.0104 - 0.0160

Number of Nonroutine Reported Measurements = 0





#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: WATERBORNE SAMPLES COLLECTED: SURFACE WATER UNITS: PICO - CI/LITER

			Location with Highest Annual Mean		
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Tritium, 64	230	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
Gamma Isotopic, 64	-				
⁴⁰K	60	331 (52/52) 252 - 381	H-15 <1 mi., ENE/E/ESE	331 (52/52) 252 - 381	330 (12/12) 243 - 381
<sup>54</sup> Mn	4	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>59</sup> Fe	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>58</sup> Co	4	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>60</sup> Co	4	<mda< td=""><td>·</td><td></td><td><mda< td=""></mda<></td></mda<>	·		<mda< td=""></mda<>
<sup>65</sup> Zn	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>95</sup> Zr-Nb	7	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>131</sup> ]	5	- <mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	5	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	5	<mda< td=""><td> <sup>~</sup></td><td></td><td><mda< td=""></mda<></td></mda<>	<sup>~</sup>		<mda< td=""></mda<>
<sup>140</sup> Ba-La	11	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0

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#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: WATERBORNE SAMPLES COLLECTED: SHORELINE SEDIMENT UNITS: PICO - CI/Kg, DRY

			Location with Highes		
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	_
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 4					
⁴⁰K	140	262 (2/2) 236 - 287	H-15 <1 mi, ENE/E/ESE	262 (2/2) 236 - 287	257 (2/2) 230 - 284
<sup>210</sup> Pb		589 (1/2)	H-15 <1 mi, ENE/E/ESE	589 (1/2)	<mda< td=""></mda<>
<sup>226</sup> Ra	49	251 (2/2) 200 - 302	H-15 <1 mi., ENE/E/ESE	251 (2/2) 200 - 302	238 (2/2) 198 - 277
<sup>÷ 232</sup> Th		128 (1/2)	• H-15 <1 mi., ENE/E/ESE	128 (1/2)	82 (1/2)
<sup>238</sup> U		262 (1/2)	- H-15 <1 mi., ENE/E/ESE	262 (1/2)	378 (1/2)
<sup>58</sup> Co	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>60</sup> Co	12	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	14	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	12	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0





Page 5 of 8

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#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: INGESTION SAMPLES COLLECTED: CRUSTACEA UNITS: PICO - Ci/Kg, WET

		Location with Highest Annual Mean			
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	_
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 4		-			
⁴⁰K	130	2156 (2/2) 2042 - 2270	H-15 <1 mi., ENE/E/ESE	2156 (2/2) 2042 - 2270	1698 (2/2) 1594 - 1802
<sup>228</sup> Ra		<mda< td=""><td></td><td></td><td>200 (1/2)</td></mda<>			200 (1/2)
<sup>54</sup> Mn	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>59</sup> Fe	16	<mda< td=""><td></td><td>÷ <b>ــ</b>ـ</td><td><mda< td=""></mda<></td></mda<>		÷ <b>ــ</b> ـ	<mda< td=""></mda<>
<sup>58</sup> Co	9	<mda< td=""><td>3 ••••</td><td></td><td><mda< td=""></mda<></td></mda<>	3 ••••		<mda< td=""></mda<>
<sup>60</sup> Co	19	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>65</sup> Zn	17	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>

Number of Nonroutine Reported Measurements = 0



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#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: INGESTION SAMPLES COLLECTED: FISH UNITS: PICO - Ci/Kg, WET

1			Location with Highest Annual Mean		
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	- ·
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 4					
⁴⁰K	130	2112 (2/2) 1727 - 2497	H-15 <1 mi., ENE/E/ESE	2112 (2/2) 1727 - 2497	2010 (2/2) 1382 - 2637
<sup>54</sup> Mn	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>59</sup> Fe	16	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>58</sup> Co	9	<mda< td=""><td></td><td>_<b></b></td><td><mda< td=""></mda<></td></mda<>		_ <b></b>	<mda< td=""></mda<>
<sup>60</sup> Co	10	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>65</sup> Zn	17	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	9	<mda< td=""><td>•</td><td></td><td>75 (1/2)</td></mda<>	•		75 (1/2)

Number of Nonroutine Reported Measurements = 0

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#### ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### PATHWAY: INGESTION SAMPLES COLLECTED: BROAD LEAF VEGETATION UNITS: PICO - Ci/Kg, WET

			Location with Highest Annual Mean		•
			Name <sup>c</sup>	Mean (f) <sup>b</sup>	_
Type and Total Number of Analyses Performed	Lower Limit of Detection <sup>a</sup> (LLD)	All Indicator Locations Mean (f) Range	Distance & Direction	Range	Control Locations Mean (f) <sup>b</sup> Range
Gamma Isotopic, 54					
<sup>7</sup> Be	71	828 (36/36) 239 - 2891	H-51 1 mi., N/NNW	876 (18/18) 328 - 2891	627 (18/18) 313 - 1136
⁴⁰K	100	3480 (36/36) 1917 - 5932	H-52 1 mi., S/SSE	3524 (18/18) 2068 - 5932	3353 (18/18) 1246 - 4819
<sup>210</sup> Pb		470 (2/36) 429 - 510	H-52 1 mi., S/SSE	510 (1/18)	668 <b>(1/18)</b> -
<sup>212</sup> Pb		<mda< td=""><td></td><td></td><td>82 (1/18)</td></mda<>			82 (1/18)
<sup>131</sup>	9	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>134</sup> Cs	8	<mda< td=""><td></td><td></td><td><mda< td=""></mda<></td></mda<>			<mda< td=""></mda<>
<sup>137</sup> Cs	8	11 (1/36)	H-52	11 (1/18)	11 (1/18)
			1 mi., S/SSE		

Number of Nonroutine Reported Measurements = 0

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ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY Name of Facility <u>St. Lucie Units 1 & 2</u>, Docket No(s). <u>50-335 & 50-389</u> Location of Facility <u>St. Lucie, Florida</u>, Reporting Period <u>January 1 - December 31, 1998</u> (County, State)

#### NOTES

a. The LLD is an "a priori" lower limit of detection which establishes the smallest concentration of radioactive material in a sample that will yield a net count above system background that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a real signal.

LLDs in this column are at time of measurement. The MDAs reported in Attachment B for the individual samples have been corrected to the time of sample collection.

- b. Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f).
- c. Specific identifying information for each sample location is provided in Attachment A.
- d. Results were based upon the average net response of two TLDs. (Thermoluminescent dosimeters).

MDA refers to minimum detectable activity.

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## 1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

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# TABLE 1A

# **DEVIATIONS / MISSING DATA**

4)	Pathway:	Airborne; Radioiodine 131 & Particulates
	Location:	H-30, 2 miles W
	Dates:	01/14/98 to 1/20/98
	Deviation:	Failure to provide continuous monitoring.
	Description of Problem:	Air sampling hose found disconnected at end of sample period Evaluation of sampling filter material concluded virtually no sample collected
	Corrective Action:	Repaired sampling equipment, verified sampling equipment as operable.
3)	Pathway:	Direct Exposure
	Locations:	SSW-5, 5 miles SSW
	Dates:	03/10/98 to 06/08/98
	Deviation:	Failure to provide continuous monitoring.
4	Description of Problem:	TLD's missing when collection was attempted; utility pole serving as mount had been replaced
	Corrective Action:	New TLD's deployed.

#### 1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

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# TABLE 1B

# ANALYSIS WITH LLDs ABOVE TABLE 4.12-1 DETECTION CAPABILITIES 1/1/98 – 12/31/98

The values specified in ODCM Table 4.12-1, Detection Capabilities, were achieved for all samples.

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# ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

# TABLE 2

# LAND USE CENSUS

# Distance to Nearest (a, b)

Sector	7/98 Milk (c) Animal	7/98 Residence	7/98 Garden (d)
N	O (e)	0	· 0
NNE	0		0
NE	0	0	0
ENE	0	0	0
E	0	O	0
ESE	0	0	Ο
SE	0	1.5/141 (g)	0
SSE	∟ (f)	3.3/153 (g).	L
S	L 。	3.2/191	L
SSW	L Č	2.2/213	Ĺ
SW	L	1.9/236	L
WSW	L	🖞 1.9/245 (h)	L
W	L	1.9/260	L
WNW	L	2.3/281	L
NW	L	3.5/304	L
NNW	L	L (g)	L

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#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### TABLE 2

#### LAND USE CENSUS

#### NOTES

- a. All categories surveyed out to 5 miles radius from the St. Lucie Plant.
- b. The following format is used to denote the location:

distance (miles)/bearing (degrees)

For example, a residence located in the southeast sector at a distance of 1.5 miles bearing 141 degrees is recorded as 1.5/141.

- c. Potential milk animal locations. All locations specified have been verified to be not producing milk for human consumption.
- d. Gardens with an estimated growing area of 500 square feet or more.
- e. O denotes that the sector area is predominantly an ocean area.
- f. L denotes that the sector area is predominantly a land area unoccupied by the category type.
- g. Non-residential occupied buildings in these sectors include the following:

<u>Sector</u>	<u>Distance</u>	Description
SSE	1.8/149	Fire Station
NNW	2.8/348	A new community is being developed, At the current time, there are no houses available for occupancy.
SE	1.1/132	Lifeguard station at beach

h. Several residences in this sector are located approximately 1.9 miles from the St. Lucie Plant.

1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

64

# ATTACHMENT A

# KEY TO SAMPLE LOCATIONS

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1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### SITE AREA MAP & ENVIRONMENTAL SAMPLE LOCATIONS

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1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

# ENVIRONMENTAL SAMPLE LOCATIONS (10 MILES)

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### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

### ATTACHMENT A

#### PAGE 1 OF 4

#### PATHWAY: DIRECT RADIATION SAMPLES COLLECTED: TLD SAMPLE COLLECTION FREQUENCY: QUARTERLY

1.6

Location <u>Name</u>	Direction <u>Sector</u>	Approximate Distance <u>(miles)</u>	Description
N-1	N	1	A1A, North of Blind Creek
NNW-5	NNW	5	South of Pete Stone Creek
NNW-10	NNW	9	Coast Guard Station
NW-5	NW	6	Indian River Dr., at Rio Vista Dr.
NW-10	NW	10	S.R. 68 at S.R. 607
WNW-2	WNW	3	Cemetery South of 7107 Indian River Dr.
WNW-5	WNW	5	U.S. 1 at S.R. 712
WNW-10	WNW	10	S.R. 70, West of Turnpike
W-2	W	2	7609 Indian River Drive
W-5	W	5	Oleander and Sager Street
W-10	W	. 9	Interstate 95 at S.R. 709
WSW-2	WSW	2	8503 Indian River Dr.
WSW-5	WSW	5	Prima Vista at Yacht Club
WSW-10	WSW	10	Del Rio at Davis Street
SW-2	SW	2	9207 Indian River Drive
SW-5	SW	5	U.S. 1 at Village Green Dr.
SW-10	SW	10	Port St. Lucie Blvd. at Cairo Rd.
SSW-2	SSW	3	10307 Indian River Drive
SSW-5	SSW	6	U.S. 1 at Port St. Lucie Blvd.
SSW-10	SSW	8	Pine Valley at Westmoreland Rd.
S-5	S	5	13179 Indian River Drive
S-10	S	10	U.S. 1 at S.R. 714
S/SSE-10	SSE	10	Indian River Dr. at Quail Run Lane
SSE-5	SSE	5	Entrance to Nettles Island
SSE-10	SSE	<u></u> 10	Elliot Museum
SE-1	SE	1	South of Cooling Canal
Control;			
H-32	NNW 👘 📖	19	University of Florida IFAS Vero Beach

### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

### ATTACHMENT A

#### PAGE 2 OF 4

#### PATHWAY: AIRBORNE SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES SAMPLE COLLECTION FREQUENCY: WEEKLY

Location <u>Name</u>	Direction <u>Sector</u>	Approximate Distance <u>(miles</u> )	Description
H-08	WNW	6	FPL Substation, Weatherby Rd.
H-14	SE	1	On-Site, Near South Property Line
H-30	W	2	Power Line, 7609 Indian River Drive
H-34	Ν	0.5	On-Site at Meteorology Tower
<u>Control</u> :		10	
H-12	5	12	FPL Substation, SR-76 Stuart

### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### ATTACHMENT A

#### PAGE 3 OF 4

#### PATHWAY: WATERBORNE SAMPLES COLLECTED: SURFACE WATER (OCEAN) SAMPLE COLLECTION FREQUENCY: H-15 WEEKLY, H-59 MONTHLY

6

Location <u>Name</u>	Direction <u>Sector</u>	Approximate Distance <u>(miles)</u>	Description
H-51 °	ENE/E/SSE	<1	Atlantic Ocean, Public Beaches East Side A1A
Control:			
H-59	S/SSE	10-20	South End, Hutchinson Island

#### SAMPLES COLLECTED: SHORELINE SEDIMENT SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

Location <u>Name</u> ,	Direction <u>Sector</u>	Approximate Distance <u>(miles)</u>	Description
H-15	ENE/E/ESE	<1	Atlantic Ocean, Public Beaches East Side A1A
<u>Control</u> :			
H-59	S/SSE	10-20	South End, Hutchinson Island



#### ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

#### ATTACHMENT A

#### PAGE 4 OF 4

#### PATHWAY: INGESTION SAMPLES COLLECTED: CRUSTACEA AND FISH SAMPLE COLLECTION FREQUENCY: SEMI-ANNUALLY

Location <u>Name</u>	Direction Sector	Approximate Distance * _ <u>(miles)</u>	Description
H-15	ENE/E/ESE	<1	Ocean Side, Vicinity of St. Lucie Plant
Control:	÷		
H-59	S/SSE	10-20	South End, Hutchinson Island

# SAMPLES COLLECTED: BROAD LEAF VEGETATION SAMPLE COLLECTION FREQUENCY: MONTHLY

Location <u>Name</u>	Direction <u>Sector</u>	Approximate Distance _(miles)	Description
H-51	N/NNW	1	Off-site Near North Property Line
H-52	S/SSE	1	Off-site Near South Property Line
Control:	-		•
H-59	S/SSE	10-20	South End, Hutchinson Island

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#### 1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

### ATTACHMENT B

### RADIOLOGICAL SURVEILLANCE OF

#### FLORIDA POWER AND LIGHT COMPANY'S

ST. LUCIE SITE

1998

First Quarter, 1998

Second Quarter, 1998

Third Quarter, 1998

Fourth Quarter, 1998

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### RADIOLOGICAL SURVEILLANCE

OF

### FLORIDA POWER AND LIGHT COMPANY

### ST. LUCIE PLANT

FIRST QUARTER 1998

BUREAU OF RADIATION CONTROL

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### ST. LUCIE SITE

### **Technical Specifications Sampling**

### First Quarter, 1998

Sample Type	Collection Frequency	Locations Sampled	Number of <u>Samples</u>
1. Direct Radiation	Quarterly	27	27
2. Airborne		8	
2.a. Air Iodines	Weekly	5	64
2.b. Air Particulates	Weekly	5	64
<ul><li>3. Waterborne</li><li>3.a. Surface Water</li></ul>	Weekly Monthly	. 1, 1	13 3
3.b. Shoreline Sediment	Semiannually	2	2
<ul><li>4. Ingestion</li><li>4.a. Fish and Invertebrates</li></ul>	, .		
4.a.1. Crustacea	Semiannually	2	2
4.a.2. Fish	Semiannually	2	2
4.b. Broad Leaf Vegetation	Monthly	3 _	15

Total: 192

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term. Measurement results that are <u>not</u> significantly above background are reported as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

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### 1. DIRECT RADIATION - TLDs - (µR/hour)

Sample Site	Deployment 05-Dec-97 Collection 10-Mar-98	Sample Site	Deployment 05-Dec-97 Collection 10-Mar-98
N-1	$5.5 \pm 0.4$ (A)	SW-2	$4.4 \pm 0.3$
NNW-5	$5.0 \pm 0.4$	SW-5	$5.8 \pm 0.4$
NNW-10	$5.0 \pm 0.4$	SW-10	$5.0 \pm 0.4$ (A)
NW-5	$4.9 \pm 0.4$	SSW-2	$4.6 \pm 0.4$
NW-10	$6.6 \pm 0.5$	SSW-5	$4.8 \pm 0.4$
		SSW-10	$5.3 \pm 0.4$
WNW-2	$4.9 \pm 0.4$		
WNW-5	$4.6 \pm 0.4$	S-5	$4.6 \pm 0.3$
WNW-10	$4.8 \pm 0.4$	S-10	$4.9 \pm 0.4$
		S/SSE-10	$4.7 \pm 0.4$
W-2	$5.1 \pm 0.4$		
W-5	$5.3 \pm 0.4$	SSE-5	$4.6 \pm 0.3$
W-10	$4.9 \pm 0.4$	SSE-10	$5.1 \pm 0.4$
•			
WSW-2	$4.7 \pm 0.4$	SE-1	<sup>•</sup> 4.7 ± 0.3
WSW-5	$4.4 \pm 0.3$		
WSW-10	$4.5 \pm 0.3$	H-32	$5.3 \pm 0.4$

(A) The dosimeters for sites N-1 and SW-10 were found on the ground when collection was attempted. TLD cages were remounted on utility poles and new dosimeters were deployed.



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### 2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m3)

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Date	<u>H08</u>	H12	<u>H14</u>	H30	H34
08-Jan-98	<0.01	<0.01	<0.01	<0.01	<0.01
14-Jan-98	<0.01	<0.01	<0.01	<0.01	<0.01
20-Jan-98	<0.02	<0.02	<0.02	(A)	<0.02
26-Jan-98	<0.02	<0.02	<0.02	<0.02	<0.02
02-Feb-98	<0.01	<0.01	<0.01	<0.01	<0.01
09-Feb-98	<0.02	` <0.02	<0.02	<0.02	<0.02
17-Feb-98	<0.01	<0.01	<0.01	<0.01	<0.01
23-Feb-98	, <0.02 .	<0.02	).02 <0.02 <0.0		<0.02
02-Mar-98	<0.03	<0.03	<0.03	<0.02	<0.02
09-Mar-98	<0.02	<0.02	<0.02	<0.02	<0.02
16-Mar-98	<0.02	<0.02	<0.02	<0.02	<0.02
23-Mar-98	<0.02	<0.02	<0.02	<0.02	<0.02
30-Mar-98	<0.02	<0.01	<0.02	<0.01	<0.01

(A) - The sample for this time period was lost due to a disconnected air hose.

### 2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

Sample Site									
Collection Date	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	H34				
08-Jan-98	$0.005 \pm 0.001$	$0.005 \pm 0.001$	$0.006 \pm 0.001$	$0.006 \pm 0.001$	$0.009 \pm 0.001$				
14-Jan-98	$0.014 \pm 0.002$	$0.020 \pm 0.003$	$0.017 \pm 0.003$	$0.019 \pm 0.003$	$0.012 \pm 0.002$				
20-Jan-98	$0.013 \pm 0.002$	$0.017 \pm 0.003$	$0.009 \pm 0.002$	(A)	$0.014 \pm 0.002$				
26-Jan-98	$0.013 \pm 0.002$	$0.015 \pm 0.003$	$0.012 \pm 0.002$	$0.007 \pm 0.002$	$0.013 \pm 0.002$				
02-Feb-98	$0.021 \pm 0.002$	$0.016 \pm 0.002$	$0.015 \pm 0.002$	$0.009 \pm 0.002$	$0.015 \pm 0.002$				
09-Feb-98	$0.012 \pm 0.002$	$0.013 \pm 0.002$	$0.011 \pm 0.002$	$0.011 \pm 0.002$	$0.011 \pm 0.002$				
17-Feb-98	$0.012 \pm 0.002$	$0.018 \pm 0.002$	$0.011 \pm 0.002$	$0.012 \pm 0.002$	$0.010 \pm 0.002$				
23-Feb-98	$0.013 \pm 0.002$	$0.013 \pm 0.002$	$0.012 \pm 0.002$	$0.016 \pm 0.002$	$0.014 \pm 0.002$				
02-Mar-98	$0.016 \pm 0.002$	$0.017 \pm 0.002$	$0.015 \pm 0.002$	0.017 ± 0.002	$0.013 \pm 0.002$				
09-Mar-98	$0.019 \pm 0.002$	$0.018 \pm 0.002$	$0.017 \pm 0.002$	$0.014 \pm 0.002$	$0.017 \pm 0.002$				
16-Mar-98	$0.018 \pm 0.002$	$0.016 \pm 0.002$	$0.017 \pm 0.002$	$0.018 \pm 0.002$	$0.017 \pm 0.002$				
23-Mar-98	$0.011 \pm 0.002$	$0.012 \pm 0.002$	$0.014 \pm 0.002$	$0.007 \pm 0.002$	$0.009 \pm 0.002$				
30-Mar-98	$0.015 \pm 0.002$	$0.013 \pm 0.002$	$0.015 \pm 0.002$	$0.011 \pm 0.002$	$0.013 \pm 0.002$				
Mean:	$0.014 \pm 0.001$	$0.015 \pm 0.001$	$0.013 \pm 0.001$	$0.012 \pm 0.001$	$0.013 \pm 0.001$				

(A) - The sample for this time period was lost due to a disconnected air hose.

# 2.b.2. AIR PARTICULATES GAMMA ANALYSIS OF QUARTERLY COMPOSITES (pCi/m³)

# First Quarter, 1998

Sample Site	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H08	$0.1253 \pm 0.0099$	<0.0183	<0.0007	<0.0009	$0.0159 \pm 0.0026$
H12	$0.1242 \pm 0.0095$	<0.0192	<0.0010	<0.0007	$0.0116 \pm 0.0027$
H14	$0.1341 \pm 0.0095$	<0.0152	<0.0006	<0.0008	$0.0096 \pm 0.0028$
H30	$0.1235 \pm 0.0110$	<0.0174	8000.0>	<0.0009	$0.0142 \pm 0.0028$
H34 "	0.1323 ± 0.0093	<0.0178	<0.0009	<0.0006	$0.0171 \pm 0.0032$

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#### 3.a. SURFACE WATER - (pCi/L)

Sample <u>Site</u>	Collection 	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 <u>Nb-95</u> (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 ~ <u>La-140</u> (B)
H15	08-Jan-98	<145	339 ± 33	<4	<3	<7	<5	<10	<7	<6	<4	<3	<3
	14-Jan-98	<145	$323 \pm 37$	<3	<3	<7	<4	<6	<7	<7	<3	<4	<4
	20-Jan-98	<145	333 ± 27	<3	<2	<6	<4	<5	<5	<3	<4	<3	<7
	26-Jan-98	<145	357 ± 26	<3	<3	<5	<4	<7	<5	° <3	<3	<3	<8
	02-Feb-98	<164	$314 \pm 35$	<4	<4	<7	<4	<5	<7	<7	<4	<4	<4
	09-Feb-98	<163	317±38	<4	$\triangleleft$	<9	<5	<7	<6	<7	<4	<4	<6
	17-Feb-98	<163	353 ± 16	<2	<2	<3	<2 .	<3	<3	<2	<2	<2	<3
	23-Feb-98	<163	361 ± 28	<3	<3	<4	<3.	<5	<6	<3	<3	<3	<5
	02-Mar-98	<154	$350 \pm 33$	<4	<3	<8	<4	<8	<8	<5	<5	<4	<5
	09-Mar-98	<153	$339 \pm 34$	<4	<4	<7	<4	<8	<7	<4	<4	<4	<6
	16-Mar-98	<153	$296 \pm 33$	<4	<3	<7	<5	<8	<7 *	<5	<4	<4	<9
	23-Mar-98	<153	$359 \pm 25$	<3	<2	<5	<3	<5	<4	<3	<3	<3	<7
	30-Mar-98	<153	$334 \pm 29$	<3	<3	<5	<4	<7	<5	<3	<3	<3	<7
H59	09-Jan-98	<145	$243 \pm 29$	<4	<4	<6	<5	<9	<6	<7	<4	<4	<7
	02-Feb-98	<164	$349 \pm 34$	<4	<4	<10	<3	<8	<7	<8	<4	<3	<6
	02-Mar-98	<154	$359 \pm 38$	<3	<3	<5	<4	<8	<7	<5	<4	<4	<4

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(A) - These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

### 3.b. SHORELINE SEDIMENT - (pCi/kg, dry weight)

Sample <u>Site</u>	Collection <u>Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>	<u>Ra-226</u>	<u>Th-232</u>	<u>U-238</u> `
H15	05-Feb-98	<67	$236 \pm 42$	<7	<8	<7	<6	<616	$200 \pm 10$	<44	$262 \pm 123$
H59	05-Feb-98	<87	$284 \pm 47$	<8	<7	<7	<8	<652	$198 \pm 9$	$82 \pm 10$	378 ± 126

# <u>4.a.1. CRUSTACEA - Blue Crab - (pCi/kg, wet weight)</u>

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Sample <u>Site</u>	Collection <u>Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
H15	16-Feb-98	$2270 \pm 319$	<31	<33	<54	<38	<79	<3'1	<32	<492	<145
H59	29-Jan-98	$1802 \pm 198$	<21	<18	<34	<29	<41	<24	<19	<422	$200 \pm 27$

### 4.a.2. FISH - (H15: Sheepshead) (H59: Jack) - (pCi/kg, wet weight)

Sample <u>Site</u>	Collection 	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>
H15	18-Feb-98	$1727 \pm 189$	<17	<19	<40	<29	<35	<u>.</u> <20	<18	<347	<81
H59	10-Mar-98	·2637 ± 252	<24	<26	<42	<34	<51	<26	75 ± 16	- <351	<103

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# 4.b. BROAD LEAF VEGETATION - Mangrove<sup>1</sup>, Brazilian Pepper<sup>2</sup> - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	Cs-137	Pb-210	Ra-226
H51	09-Jan-981	$402 \pm 48$	$2201 \pm 116$	<13	<11	<10	<654	<219
	05-Feb-98'	795 ± 52	$2604 \pm 107$	<12	<8	<7	$429 \pm 118$	<156
	05-Feb-98 <sup>2</sup>	$1534 \pm 78$	$3830 \pm 131$	<14	<10	<9	<586	<216
	02-Mar-981	$697 \pm 52$	$1917 \pm 104$	<12	<10	<10	<544	<230
	02-Mar-98 <sup>2</sup>	$848 \pm 75$	$3693 \pm 154$	<12	<13	<12	<807	<275
H52	09-Jan-981	$239 \pm 49$	$2154 \pm 119$	<13	-<11	<9	<593	<253
	05-Feb-981	$706 \pm 48$	$3454 \pm 114$	<13	<10	<8	<536	<167
	05-Feb-98 <sup>2</sup>	$952 \pm 57$	2954 ± 120	<14	<9	$11 \pm 4$	$510 \pm 249$	<221
	02-Mar-981	526 ± 57	$2068 \pm 118$	. <10	<9	<11	<665	<225
	02-Mar-98 <sup>2</sup>	897 ± 75	$4299 \pm 171$	<13	· <14	<11	<752	<281
H59	09-Jan-98'	$323 \pm 20$	1248 ± 39	<6 -	<4	<5	<248	<93
	05-Feb-981	$514 \pm 55$	2686 ± 113	<14	<8	<9	$668 \pm 141$	<160
	05-Feb-98 <sup>2</sup>	366 ± 65	$3956 \pm 142$	<15	<11	<14	<592	<198
	02-Mar-981	$357 \pm 22$	2848 ± 55	<5	<4	, <4	<245	<90
	02-Mar-98 <sup>2</sup>	$805 \pm 69$	$4412 \pm 165$	<13	<12	<12	<756	<249

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### RADIOLOGICAL SURVEILLANCE

OF

### FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

**SECOND QUARTER 1998** 

BUREAU OF RADIATION CONTROL

#### ST. LUCIE SITE

#### **Technical Specifications Sampling**

#### Second Quarter, 1998

1. Direct Radiation       Quarterly       27         2. Airborne       2.a. Air Iodines       Weekly       5         2.b. Air Particulates       Weekly       5         3. Waterborne       3. Waterborne       3. Waterborne	Sampled Samples
<ul> <li>2. Airborne</li> <li>2.a. Air Iodines Weekly 5</li> <li>2.b. Air Particulates Weekly 5</li> <li>3. Waterborne</li> </ul>	26
2.a. Air IodinesWeekly52.b. Air ParticulatesWeekly53. Weterborne3	•
2.b. Air Particulates Weekly 5	. 65
2 Waterhormo	65
3.a. Surface Water Weekly 1	13
Monthly 1	3
3.b. Shoreline Sediment Semiannually 0	. 0
4. Ingestion	
4.a. Fish and Invertebrates	
4.a.1. Crustacea Semiannually 0	0
4.a.2. FishSemiannually04.b. Food Products0	· <b>O</b>
Broadleaf Vegetation Monthly 3	18

Total: 190

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standard-deviation error term. Measurement results that are <u>not</u> significantly above background are reported as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

### 1. DIRECT RADIATION - TLDs - (µR/hour)

Sample Site	Deployment 10-Mar-98 Collection 08-Jun-98	Sample Site	Deployment 10-Mar-98 Collection 08-Jun-98
N-1	$4.6 \pm 0.3$ .	SW-2	$4.4 \pm 0.3$
		SW-5	$5.7 \pm 0.4$
NNW-5	$4.5 \pm 0.3$	SW-10	$4.4 \pm 0.3$
NNW-10	4.7 ± 0.4 •		
۷	` <b>,</b>	SSW-2	$4.5 \pm 0.3$
NW-5	$4.7 \pm 0.3$	SSW-5	(A) <sup>*</sup>
NW-10	$6.0 \pm 0.4$	SSW-10	$5.0 \pm 0.4$
			•
WNW-2	$4.7 \pm 0.3$	S-5	$4.5 \pm 0.3$
WNW-5	$4.5 \pm 0.3$	S-10	$4.8 \pm 0.4$
WNW-10	$4.6 \pm 0.3$		
		S/SSE-10	$4.5 \pm 0.3$
W-2	$4.9 \pm 0.4$	ą	
• W-5	$4.8 \pm 0.4$	SSE-5	$4.2 \pm 0.3$
W-10	$4.8 \pm 0.4$	SSE-10	$4.4 \pm 0.3$
WSW-2	$4.7 \pm 0.3$	SE-1	$4.2 \pm 0.3$
WSW-5	$4.6 \pm 0.3$		
WSW-10	$4.1 \pm 0.3$	H-32	$5.1 \pm 0.4$

(A) The dosimeter for site SSW-5 was missing when collection was attempted. Work had been completed recently on the pole. A new cage was mounted and a new dosimeter was deployed.

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### 2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m<sup>3</sup>)

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Collection Date	<u>H08</u>	<u>H12</u>	H14	<u>H30</u>	H34
07-Apr-98	<0.02	<0.02	<0.01	<0.02	<0.01
13-Apr-98	<0.02	<0.02	<0.03	<0.02	< 0.02
20-Apr-98	<0.02	<0.02	<0.02	<sup>^</sup> <0.02	<0.02
27-Apr-98	<0.03	<0.03	<0.03	<0.03	<0.03
05-May-98	<0.02	<0.02	<0.02	<0.02	< 0.02
11-May-98	<0.02	· <0.02	<0.03	<0.02	<0.03
18-May-98	<0.02	<0.02	<0.02	<0.02	<0.02
26-May-98	<0.01	<0.01	<0.01	<0.01	<0.01
	•		•	,	
02-Jun-98	< 0.02	<0.02	<0.02	<0.02	<0.02
08-Jun-98	<0.03	<0.03	<0.03	<0.03	<0.03
15-Jun-98	<0.02	。<0.02	<0.02	<0.02	<0.02
22-Jun-98	<0.01	<0.01	<0.01	<0.01	<0.01
30-Jun-98	<0.01	<0.01	<0.01	<0.01	<0.01



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### 2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

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<u> </u>	Sample Site       Collection     H08     H12     H14     H30     H34													
Collection Date	<u>H08</u>	<u>H12</u>	<u>H14</u>	H30	H34									
07-Apr-98	$0.007 \pm 0.002$	$0.008 \pm 0.002$	$0.011 \pm 0.002$	$0.009 \pm 0.002$	$0.009 \pm 0.002$									
13-Apr-98	$0.014 \pm 0.002$	$0.022 \pm 0.003$	$0.021 \pm 0.003$	$0.024 \pm 0.003$	$0.014 \pm 0.003$									
20-Apr-98	$0.018 \pm 0.002$	$0.019 \pm 0.002$	0.018 ± 0.002	$0.015 \pm 0.002$	$0.019 \pm 0.002$									
27-Apr-98	$0.019 \pm 0.002$	$0.019 \pm 0.002$	$0.012\pm0.002$	$0.020\pm0.002$	$0.019 \pm 0.002$									
05-May-98	$0.016 \pm 0.002$	$0.017 \pm 0.002$	$0.014 \pm 0.002$	$0.016 \pm 0.002$	$0.016 \pm 0.002$									
11 <b>-</b> May-98	$0.016\pm0.002$	$0.016 \pm 0.002$	$0.013 \pm 0.002$	$0.015 \pm 0.002$	$0.014 \pm 0.002$									
18-May-98	$0.013 \pm 0.002$	$0.013 \pm 0.002$	$0.012\pm0.002$	$0.014 \pm 0.002$	$0.013 \pm 0.002$									
26-May-98	$0.022 \pm 0.002$	$0.023 \pm 0.002$	$0.026 \pm 0.002$	$0.021 \pm 0.002$	$0.023 \pm 0.002$									
02-Jun-98	$0.010 \pm 0.002$	$0.009 \pm 0.002$	$0.011 \pm 0.002$	$0.010 \pm 0.002$	$0.010 \pm 0.002$									
08-Jun-98	$0.010 \pm 0.002$	$0.010\pm0.002$	$0.011 \pm 0.002$	$0.010\pm0.002$	$0.011 \pm 0.002$									
15-Jun-98	$0.013 \pm 0.002$	$0.017 \pm 0.002$	$0.018 \pm 0.002$	$0.011 \pm 0.002$	$0.020 \pm 0.002$									
22-Jun-98	$0.014 \pm 0.002$	$0.012 \pm 0.002$	$0.017\pm0.002$	$0.015 \pm 0.002$	$0.016 \pm 0.002$									
30-Jun-98	$0.014 \pm 0.002$	$0.011 \pm 0.002$	$0.015 \pm 0.002$	$0.012 \pm 0.002$	$0.013 \pm 0.002$									
Mean:	$0.014 \pm 0.001$	$0.015 \pm 0.001$	$0.015 \pm 0.001$	$0.015 \pm 0.001$	$0.015 \pm 0.001$									

### 2.b.2. AIR PARTICULATES GAMMA ANALYSIS OF QUARTERLY COMPOSITES (pCi/m<sup>3</sup>)

	:	Second Quar	<u>ter, 1998</u>		
Sample Site	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H08	$0.1551 \pm 0.0107$	<0.0160	<0.0009	<0.0009	$0.0166 \pm 0.0035$
H12	$0.1642 \pm 0.0098$	<0.0176	<0.0010	<0.0007	$0.0135 \pm 0.0032$
H14	$0.1601 \pm 0.0110$	<0.0157	<0.0009	<0.0010	$0.0157 \pm 0.0036$
H30	$0.1478 \pm 0.0108$	<0.0170	<0.0009	<0.0010	$0.0181 \pm 0.0035$
H34	$0.1436 \pm 0.0123$	<0.0155	<0.0007	<0.0008	$0.0171 \pm 0.0025$





#### 3.a. SURFACE WATER - (pCi/L)

Sample <u>Site</u>	Collection 	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 <u>Nb-95</u> (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 <u>La-140</u> (B)
H15	08-Apr-98	<150	$365 \pm 35$	<4	<3	<7	<4	<8	<7	<6	<4	<4	<6
-	13-Apr-98	<150	$337 \pm 31$	<2	<4	<7	<4	<7	<6	<4	<4	<3	<8
	20-Apr-98	<150	$347 \pm 29$	$\triangleleft$	<3	<6	.<3	<7	<6	<3	<3	<3	<8
	27-Apr-98	<150	$351 \pm 17$	<2	<1	<3	<2	<4	<3	<2	<2	<2	<4
	05-May-98	<146	$290 \pm 29$	<4	<3	<7	<4	<8	<7	<4	<5	-<5	<11
	11-May-98	<146	$330 \pm 15$	<1	<1	<3	<2	<3	<2	<2 ,	· <2	<2	<3
	18-May-98	<146	$252 \pm 34$	<3	<3	<7	<5	<9	<5	<5	<4	<4	<5
-	26-May-98	<146	$345 \pm 21$	<2	<2	<5	<3	<5	<4	<2	<3	<2	<6
	02-Jun-98	<151	$296 \pm 35$	<4	<4	<7	<5	<8	<6	<4	<4	<4	<8
	08-Jun-98	<151	$339 \pm 30$	<3	<4	<7	<4	<8	<7	<4	<3	<4	· <8
	15-Jun-98	<151	$326 \pm 32$	ຸ <3	\$	<7	<4	<9	<6	<3	<4	<4.	<8
	22-Jun-98	<151	$360 \pm 37$	<4	<3	<7	<4	<7	<6	<5	<4	<4	<5
	30-Jun-98	<149	322 ± 35	<4	<4	<8 <sup>.</sup>	<4	<9	<7	- <4	<4	<4	<9
H59	07-Apr-98	<150	$346 \pm 30$	<4	<4	<8	<4	<7	<6	<5	<4	<4	<5
-	05-May-98	<146	$299 \pm 33$	<5	<4	<7	<4	<8	<6	<4	<4	<4	<7
	09-Jun-98	<151	$309 \pm 38$	<4	<4	<8	<5	<8	<8	<5	<4	<4	<6

(A) - These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

			1	4						SL	QR98-2	
<u>3.b. SHOR</u>	ELINE SEDIM	<u> IENT - (pCi/k</u>	g, dry weight)							÷	į	
Sample <u>Site</u>	Collection Date	<u>Be-7</u>	<u>K-40</u> <u>Co-</u>	<u>-58 C</u>	<u>o-60</u>	<u>Cs-134</u>	<u>Cs-13</u>	<u>7 Pb-2</u>	<u>10 Ra-</u>	<u> 226 Th-2</u>	<u>32 U-238</u>	
	These s	amples were	previously colle	ected.								
4.a.1. CRUSTACEA - (pCi/kg, wet weight)												
Sample <u>Site</u>	Collection <u>Date</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>	
	These sa	mples were pr	eviously collec	ted.						•		
4.a.2. FISH - (pCi/kg, wet weight)												
Sample <u>Site</u>	Collection <u>Date</u>	- <u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>	
	. These sa	mples were pr	eviously collec	ted.						-		

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# 4.b. BROADLEAF VEGETATION - Mangrove<sup>1</sup>, Brazilian Pepper<sup>2</sup> - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	<u>K-40</u>	I-131	<u>_Cs-134</u>	_Cs-137_	Pb-210	Ra-226
H51	08-Apr-981	328 ± 56	2557 ± 130	<9	<11	<8	<633	<214
	08-Apr-98 <sup>2</sup>	$749 \pm 69$	3673 ± 148	<10	<12	<13	<704	<218
	05-May-981	$734 \pm 53$	$2051 \pm 91$	<6	-<8	<7	<486	<146
	05-May-98 <sup>2</sup>	2891 ± 85	$4889 \pm 150$	<9	<10	<10	<772	<222
	09-Jun-98 <sup>1</sup>	$351 \pm 40$	2273 ± 96	<7	<8	<7	<436	<169
	09-Jun-98 <sup>2</sup>	697 ± 56	$3042 \pm 118$	<8	<8	<9	<545	<189
						•		
H52	08-Apr-981	$429 \pm 55$	$2085 \pm 115$	<10	<9	<9	<652	<204
	08-Apr-98 <sup>2</sup>	721 ± 61	$3093 \pm 126$	<10	<8	<11	<581	<193
	05-May-981	811 ± 52	$2689 \pm 109$	<8	<8	<6	<562	<177
	6 05-May-98 <sup>2</sup>	$1458 \pm 71$	. 3013 ± 118	<9	<7	<8	<622	<210 .
	09-Jun-981	$454 \pm 36$	$4285 \pm 133$	<8	<10	<7 .	<537	<172
	09-Jun-98 <sup>2</sup>	$726 \pm 53$	5932 ± 175	<11	<12	<11	<663	<220
H59	07-Apr-981	$440 \pm 55$	$1478 \pm 99$	<12	<10	<11	<597	<214
	07-Apr-98 <sup>2</sup>	687 ± 59	$3853 \pm 156$	<12	<10	<14	<663	<230
	05-May-981	622 ± 47	2769 ± 106	<8	<8	<7	<463	<161
	05-May-98 <sup>2</sup>	1093 ± 59	$2841 \pm 114$	<8	<8	<10	<577	<199
	09-Jun-981	$313 \pm 41$	$2419 \pm 105$	<8	<8	<8	<460	<173
	09-Jun-98 <sup>2</sup>	508 ± 22	$4230 \pm 67$	<4	<5	$11 \pm 2$	<260	<92
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7 of 12



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### RADIOLOGICAL SURVEILLANCE

OF

### FLORIDA POWER AND LIGHT COMPANY

### ST. LUCIE PLANT

THIRD QUARTER 1998

### BUREAU OF RADIATION CONTROL

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#### ST. LUCIE SITE

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#### **Technical Specifications Sampling**

#### Third Quarter, 1998

Sample Type	Collection Frequency	Locations Sampled	Number of <u>Samples</u>
1. Direct Radiation	Quarterly	27	27
2. Airborne	,	*	
2.a. Air Iodines	Weekly	5	65
2.b. Air Particulates	Weekly -	5	65
3. Waterborne			
3.a. Surface Water	Weekly	1	13
	Monthly	1	3
3.b. Shoreline Sediment	Semiannually	2	2
4. Ingestion			
4.a. Fish and Invertebrates			
4.a.1. Crustacea	Semiannually	2	2
4.a.2. Fish 4.b. Food Products	Semiannually	2	2
Broadleaf Vegetation	Monthly	3	9

Total: 188

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standarddeviation error term. Measurement results that are <u>not</u> significantly above background are reported as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

### 1. DIRECT RADIATION - TLDs - (µR/hour)

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Sample Site	Deployment 08-Jun-98 Collection 22-Sep-98	Sample Site	Deployment 08-Jun-98 Collection 22-Sep-98
N-1	$5.1 \pm 0.4$	SW-2	$4.6 \pm 0.3$
		SW-5	$5.7 \pm 0.4$
NNW-5	$4.8 \pm 0.4$	SW-10	$4.7 \pm 0.3$
NNW-10	$5.0 \pm 0.4$	-	
		SSW-2	$4.6 \pm 0.3$
NW-5	$4.9 \pm 0.4$	SSW-5	$5.0 \pm 0.4$
NW-10	$6.1 \pm 0.4$	SSW-10	$5.3 \pm 0.4$
WNW-2	$5.0 \pm 0.4$	S-5	$4.8 \pm 0.4$
WNW-5	$4.9 \pm 0.4$	S-10	$5.0 \pm 0.4$
WNW-10	$5.0 \pm 0.4$		
		S/SSE-10	$4.5 \pm 0.3$
W-2	$5.3 \pm 0.4$		
W-5	$5.6 \pm 0.4$	SSE-5	$4.6 \pm 0.3$
W-10	$5.1 \pm 0.4$	SSE-10	$4.9 \pm 0.4$
WSW-2	$4.8 \pm 0.4$	SE-1	$4.8 \pm 0.4$
WSW-5	$4.8\pm0.4$		
WSW-10	$4.3 \pm 0.3$	H-32	$5.3 \pm 0.4$

## 2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m<sup>3</sup>)

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Collection Date	H08	H12	H14	H30	H34
06-Jul-98	<0.03	<0.03	<0.03	<0.03	<0.03
14-Jul-98	<0.01	`<0.01,	<0.01	<0.01	<0.01
20-Jul-98	<0.02	<0.02	<0.02	<0.02	<0.02
28-Jul-98	<0.01	<0.01	<0.01	<0.01	< 0.01
06-Aug-98	<0.01	<0.01	<0.01	<0.01	<0.01
12-Aug-98	<0.02	<0.02	<0.01	<0.02	<0.01
19-Aug-98	<0.02	<0.01	<0.01	<0.02	<0.01
27-Aug-98	< 0.03	<0.03	<0.04	<0.03	<0.04
31-Aug-98	<0.02	<0.02	<0.02	<0.02	<0.02
09-Sep-98	<0.01	<0.01	<0.01	<0.01	<0.01
14-Sep-98	<0.02 .	<0.02	<0.02	<0.02	<0.02
22-Sep-98	<0.02	<0.02	<0.02	<0.02	<0.02
30-Sep-98	<0.01	<0.01	<0.01	<0.01	<0.01

3 of 12

### SL QR98-3

### 2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

	Sample Site											
Collection Date	H08	H12 .	H14	H30	H34							
06-Jul-98	$0.019 \pm 0.003$	$0.015 \pm 0.002$	$0.015 \pm 0.003$	$0.017 \pm 0.003$	0.016 ± 0.003							
14-Jul-98	$0.013 \pm 0.002$	$0.014 \pm 0.002$	$0.013 \pm 0.002$	$0.005 \pm 0.002$	$0.013 \pm 0.002$							
20-Jul-98	$0.011 \pm 0.002$	$0.007 \pm 0.002$	$0.007 \pm 0.002$	$0.009 \pm 0.002$	$0.006 \pm 0.002$							
28-Jul-98	$0.017 \pm 0.002$	$0.021 \pm 0.002$	0.018 ± 0.002`	$0.019 \pm 0.002$	$0.022 \pm 0.002$							
		, ,			·							
06-Aug-98	$0.013 \pm 0.002$	$0.015 \pm 0.002$	$0.013 \pm 0.002$	$0.012 \pm 0.002$	$0.011 \pm 0.002$							
12-Aug-98	$0.007 \pm 0.002$	$0.009 \pm 0.002$	$0.006 \pm 0.002$	$0.008 \pm 0.002$	$0.007 \pm 0.002$							
19-Aug-98	$0.014 \pm 0.002$	$0.010\pm0.002$	$0.010 \pm 0.002$	$0.012 \pm 0.002$	$0.011 \pm 0.002$							
27-Aug-98	$0.009 \pm 0.002$	$0.011 \pm 0.002$	$0.011 \pm 0.002$	$0.010 \pm 0.002$	$0.010\pm0.002$							
31-Aug-98	$0.011 \pm 0.003$	$0.011 \pm 0.003$ $0.018 \pm 0.003$		0.016 ± 0.003	$0.024 \pm 0.003$							
09-Sep-98	$0.012 \pm 0.002$	$0.013 \pm 0.002$	$0.014 \pm 0.002$	$0.014 \pm 0.002$	$0.012 \pm 0.002$							
14-Sep-98	$0.014 \pm 0.003$	$0.018 \pm 0.003$	$0.019 \pm 0.003$	$0.012 \pm 0.003$	$0.014 \pm 0.003$							
22-Sep-98	$0.006 \pm 0.002$	$0.006 \pm 0.002$	$0.007 \pm 0.002$	$0.004 \pm 0.001$	$0.007 \pm 0.002$							
30-Sep-98	$0.011 \pm 0.002$	$0.011 \pm 0.002$	$0.014 \pm 0.002$	$0.012 \pm 0.002$	$0.014\pm0.002$							
Mean:	$0.012 \pm 0.001$	$0.013 \pm 0.001$	$0.012 \pm 0.001$	$0.012 \pm 0.001$	$0.013 \pm 0.001$							

### 2.b.2. AIR PARTICULATES GAMMA ANALYSIS OF QUARTERLY COMPOSITES (pCi/m<sup>3</sup>)

Sample Site	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u> ·	• <u>Cs-137</u>	<u>Pb-210</u>
H08	$0.0926 \pm 0.0107$	<0.0179	<sup>*</sup> <0.0007	<0.0007	$0.0137 \pm 0.0026$
H12 .	$0.0979 \pm 0.0100$	<0.0156	<0.0009	<0.0007	$0.0104 \pm 0.0028$
H14	$0.1145 \pm 0.0095$	<0.0122	<0.0009	<0.0008	$0.0138 \pm 0.0030$
H30	$0.0908 \pm 0.0078$	<0.0176	<0.0010	<0.0007	$0.0103 \pm 0.0034$
H34	$0.0872 \pm 0.0090$	<0.0174	<0.0009	<0.0009	$0.0121 \pm 0.0032$



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### 3.a. SURFACE WATER - (pCi/L)

Sample	Collection		•				-		Zr-95				Ba-140
<u>Site</u>	_Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Nb-95</u> (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>La-140</u> (B)
H15	06-Jul-98	<152	$347 \pm 15$	<2	<2	<4	<2 ·	<4	<3	<3	<2	<2	<2
	14-Jul-98	<152	$^{-}$ 319 ± 26	\$	$\triangleleft$	<7	<4	<7	<5	<3	<3	\$	<8
-	20-Jul-98	<152	$366 \pm 37$	<3	<4	<8	<4	<7	<6	<5	<4	<4	<5
	28-Jul-98	<152	$323 \pm 32$	<3	<3	<6	<3	<7	<6	<4	<4	<3	<6
	05-Aug-98	<142	$347 \pm 34$	<3	<3	<7.	<4	<b>&lt;</b> 8	<6	<4	<5	<4	<8
•	12-Aug-98	<144	375 ± 32	<3	<4	<b><i< b="">0</i<></b>	<4	<7	<7	<7	<5	<b>&lt;</b> 4	<7
	19-Aug-98	<144	$306 \pm 34$	<4	<4	<7	<4	<8	<6	<4	• <4	<4	<7
	26-Aug-98	<144	$306 \pm 33$	<4	\$	<6	- <5	<9	<7	<4	<4	<4	<6
	31-Aug-98	<144	$334 \pm 35$	<3	<3	<9	<4	<8	<7	<4	<5	<3	<10
	10-Sep-98	<144	$273 \pm 34$	<4	<sup>°</sup> <4	<6		<9	<6	<4	<5	<4	<11
	14-Sep-98	<144	$317 \pm 31$	<4	. <4	<7	<4	<10	<4	<5	<4	<4 <sup>•</sup>	<4
•	22-Sep-98	<144	$330 \pm 29$	<3	<3	<6	<4	<7	<5	<3	<3	<3	<10
	30-Sep-98	<143 `	$325 \pm 36$	<4	<4	<7	<4	<8	<6	<5	<4	<4	<5
H59	01-Jul-98	<152	357 ± 37	<3	<4	<b>.</b>	<4 ·	<7	<7	<5	<4	<4	<5
	06-Aug-98	<142	$289 \pm 33$	<4	<4	<7	<4	<9	<6	· <5	<4	<5	<6
•	10-Sep-98	<144	297 ± 36	<3	<3	<6	<5	<7	<7	<5	<5	<3	<5

(A)- These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.



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# 3.b. SHORELINE SEDIMENT - (pCi/kg, dry weight)

Sample <u>Site</u>	Collection <u>Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>Co-</u>	<u>58 (</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-2</u>	<u>10</u>	<u>Ra-226</u>	<u>Th-2:</u>	<u>32 U-2</u>	238
H15	06-Aug-98	<77	$287 \pm 49$	<	7	<7	<10	• <9	589 ± 1	236 3	$302 \pm 11$	128 ±	12 <4(	08
H59	06-Aug-98.	<69	$230 \pm 36$	<8	3	<7	<9	<7	<68	2 2	$277 \pm 10$	<50	) ⊲37	77
	*						-	ø						
<u>4.a.1. CRUS</u>	<u>STACEA - (pCi</u>	/kg, wet w	veight)	•	•									
Sample <u>Site</u>	Collection Date	<u>_K-4</u>	1 <u>0 N</u>	<u>In-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-13</u>	<u>37 Ra</u>	<u>a-226</u>	<u>Ra-228</u>	
H15	20-Aug-98	2042 <del>±</del>	= 407	<26	<42	<104	<49	<89	<46	<49	) <	<697	<187	
H59	13-Aug-98	1594 <del>±</del>	= 178	<15	<18	<37	<27	<41	<21	<20	) <	393	. <87	
<u>4.a.2. FISH</u>	- (pCi/kg, wet v	veight)												
Sample <u>Site</u>	Collection	K-4	10 M	[n-54	Co-58	Fe-59	<sup>•</sup> Co-60	Zn-65	Cs-134	Cs-1?	37 R <i>:</i>	a-226	Ra-228	
H15	25-Aug-98	2497 ±	= 200	<16	<18	<41	<21	<43	<20	<23	<u> </u>	- <u></u> -307	<86	
H59	27-Aug-98	1832 ±	186	<17	<16	<32	<20	`<42	<19	<21	. <	343	<80	
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# 4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	К-40	I-131	Cs-134	Cs-137	Pb-210	Pb-212	Ra-226
H51	01-Jul-98	$497 \pm 55$	$3882 \pm 148$	<10	<12	<12	<637	<198	<243
	06-Aug-98	$633 \pm 60$	4671 ± 157	<10	<10	<13	<663	<178	<219
	10-Sep-98	989 ± 70	5105 ± 176	<10	<11	<11	<687	<161	<259
			•						
H52	01-Jul-98	604 ± 56	$3580 \pm 137$	<9	<11	<12	<611	<653	<220
	06-Aug-98	798 ± 57	$4879 \pm 148$	<9	<11	· <9	<614	<165	<210
	10-Sep-98	$1114 \pm 79$	$4756 \pm 168$	<12	<12	<12	. <743	<171	<263
H59	01-Jul-98	$516 \pm 70$	$4238 \pm 169$	<10	<13	<15	<674	<201	<251
	06-Aug-98	$533 \pm 48$	$3568 \pm 141$	<b>خ</b> 9	. <11	<15	<617	<175	<221
	10-Sep-98	$1040 \pm 68$	4493 ± 157	<11	<12	<9	<695	82 ± 20	<233
		4 17 16			•	•	•		



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### RADIOLOGICAL SURVEILLANCE

OF

### FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

FOURTH QUARTER 1998

BUREAU OF RADIATION CONTROL

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#### ST. LUCIE SITE

#### **Technical Specifications Sampling**

### Fourth Quarter, 1998

Sample Type	Collection Frequency	Locations Sampled	Number of <u>Samples</u>
1. Direct Radiation	Quarterly	27	27
2. Airborne			f
2.a. Air Iodines	Weekly	5	<b>`</b> 65
2.b. Air Particulates	Weekly	5	65
3. Waterborne		•	-
3.a. Surface Water	Weekly	1	13
	Monthly	1	3
3.b. Shoreline Sediment	Semiannually	0	0
4. Ingestion			
4.a. Fish and Invertebrates			
4.a.1. Crustacea	Semiannually	0	0
4.a.2. Fish	Semiannually	0	0
4.b. Food Products		1	
Broadleaf Vegetation	Monthly	3	9

Total: 182

NOTE: Measurement results having magnitudes that are significantly above the background of the measurement system are reported as net values plus or minus a one-standarddeviation error term. Measurement results that are <u>not</u> significantly above background are reported as less than a Lower Limit of Detection (<LLD), which is an estimated upper limit (with at least 95% confidence) for the true activity in the sample.

1.	DIRECT	RADIA	TION -	TLDs -	$(\mu R/hour)$
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Sample Site	Deployment 22-Sep-98 Collection 08-Dec-98	Sample Site	Deployment 22-Sep-98 Collection 08-Dec-98
N-1	$4.6 \pm 0.4$	SW-2	$4.1 \pm 0.3$
		SW-5	$5.3 \pm 0.4$
· NNW-5	$4.5 \pm 0.3$	. SW-10	$4.4 \pm 0.3$
NNW-10	$4.7 \pm 0.4$		
	v	SSW-2	$4.4 \pm 0.3$
NW-5	$4.5 \pm 0.3$	SSW-5	$4.5 \pm 0.3$
NW-10	$5.8 \pm 0.4$	SSW-10	$4.4 \pm 0.3$
WNW-2	4.4 ± 0.3	S-5	$4.3 \pm 0.3$
WNW-5	$4.4 \pm 0.3$	S-10	$4.6 \pm 0.3$
WNW-10	$4.6 \pm 0.3$ ·		•
	A	S/SSE-10	$4.3 \pm 0.3$
W-2	$4.8 \pm 0.4$		
W-5	$4.9 \pm 0.4$	SSE-5 (A)	$3.7 \pm 0.3$
W-10	$4.6 \pm 0.3$	SSE-10	$4.7 \pm 0.4$
WSW-2	$4.6 \pm 0.3$	SE-1	$4.2 \pm 0.3$
WSW-5	$4.2 \pm 0.3$		
<b>WSW-10</b>	$3.9 \pm 0.3$	H-32	$4.8 \pm 0.4$

(A) – This site was relocated at the start of the quarter.

2 of 12

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# SL QR98-4

### 2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m3)

Collection Date	<u>H08</u>	H12	<u>H14</u>	<u>H30</u>	H34
07-Oct-98	<0.02	<0.02	<0.02	<0.04	<0.02
14-Oct-98	<0.02	<0.02	<0.01	<0.01	<0.02
19-Oct-98	<0.03	<0.03	<0.03	<0.03	<0.02
<sup>.</sup> 26-Oct-98	<0.01	<0.01	<0.01	<0.01	<0.01
02-Nov-98	<0.02	<0.02	<0.02	<0.02	<0.02
10-Nov-98	<0.02	<0.02	<0.02	·<0.02	<0.02
17-Nov-98	<0.02	<0.02	<0.02	. <0.02	<0.02
24-Nov-98	<0.03	<0.03	<0.03	<0.03	<0.03
30-Nov-98	<0.03	<0.03	<0.03	<0.03	<0.03
08-Dec-98	<0.02 .	<0.02	<0.02	<0.02	<0.02
16-Dec-98	<0.02	<0.02	<0.02	<0.02	<0.02
22-Dec-98	<0.02	<0.02	<0.02	. <0.02	<0.02
30-Dec-98	<0.01	<0.01	<0.01	<0.01	<0.01

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### 2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m<sup>3</sup>)

			Sample Site	-	
Collection Date	<u>H08</u>	<u></u>	H14	H30	H34
07-Oct-98 °	$0.007 \pm 0.002$	$0.009 \pm 0.002$	$0.009 \pm 0.002$	<0.009	$0.009 \pm 0.002$
14-Oct-98	$0.005 \pm 0.002$	$0.012 \pm 0.002$	$0.006 \pm 0.002$	$0.005 \pm 0.001$	$0.008 \pm 0.002$
19-Oct-98	$0.012 \pm 0.003$	$0.015 \pm 0.003$	$0.012 \pm 0.003$	$0.013 \pm 0.003$	$0.011 \pm 0.003$
26-Oct-98	$0.010 \pm 0.002$	$0.008 \pm 0.002$	$0.011 \pm 0.002$	$0.012 \pm 0.002$	$0.007 \pm 0.002$
02-Nov-98	$0.021 \pm 0.002$	$0.025 \pm 0.003$	$0.016 \pm 0.002$	$0.021 \pm 0.002$	$0.024 \pm 0.002$
10-Nov-98	$0.018 \pm 0.002$	$0.018 \pm 0.002$	$0.022 \pm 0.002$	$0.014 \pm 0.002$	$0.019 \pm 0.002$
17-Nov-98	$0.012 \pm 0.002$	$0.011 \pm 0.002$	$0.010\pm0.002$	$0.011 \pm 0.002$	$0.007 \pm 0.002$
24-Nov-98	$0.006 \pm 0.002$	$0.005 \pm 0.002$	$0.008 \pm 0.002$	$0.005 \pm 0.002$	$0.006 \pm 0.002$
30-Nov-98	$0.011 \pm 0.002$	$0.013 \pm 0.002$	$0.015 \pm 0.002$	$0.014 \pm 0.002$	$0.015 \pm 0.002$
08-Dec-98	$0.007 \pm 0.002$	$0.008 \pm 0.002$	$0.010 \pm 0.002$	$0.004 \pm 0.002$	$0.013 \pm 0.002$
16-Dec-98	$0.009 \pm 0.002$	$0.014 \pm 0.002$	0.013 ± 0.002	$0.005 \pm 0.002$	$0.011 \pm 0.002$
22-Dec-98	$0.013 \pm 0.002$	$0.017 \pm 0.003$	$0.011 \pm 0.002$	$0.013 \pm 0.002$	$0.017 \pm 0.002$
30-Dec-98	$0.004 \pm 0.001$ ,	$0.007 \pm 0.002$	$0.008 \pm 0.002$	$0.004 \pm 0.001$	$0.006 \pm 0.001$
Mean:	$0.010 \pm 0.001$	$0.012 \pm 0.001$	$0.012 \pm 0.001$	<0.010	0.012 ± 0.001

# 2.b.2. AIR PARTICULATES GAMMA ANALYSIS OF QUARTERLY COMPOSITES (pCi/m³)

æ	Fourth Quarter, 1998												
Sample Site	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>								
H08	$0.1075 \pm 0.0097$	<0.0161	<0.0009	<0.0007	$0.0155 \pm 0.0029$								
H12	$0.1165 \pm 0.0106$	<0.0189	<0.0008	<0.0009	$0.0160 \pm 0.0035$								
H14	$0.1312 \pm 0.0108$	<0.0205	<0.0009	<0.0007	$0.0106 \pm 0.0029$								
H30	$0.1114 \pm 0.0084$	<0.0189	<0.0007	<0.0009	0.0135 ± 0.0026								
H34	$0.1322 \pm 0.0068$	<0.0128	<0.0006	<0.0005	$0.0098 \pm 0.0022$								

4 of 12



### 3.a. SURFACE WATER - (pCi/L)

Sample	Collection 	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 <u>Nb-95</u> (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 <u>La-140</u> (B)
H15	07-Óct-98	<146	$367 \pm 38$	<3 ·	<3	<6	<5	<8	<6	<6	<4	<4	<5
	15-Oct-98	<145	$292 \pm 32$	<4	<4	<6	`<4	<7	<6	<4	<4	<4	<8
•	19-Oct-98	<142	$\frac{1}{349 \pm 36}$	<4	<4	<7	<b></b> . 4	<9	<6	<4	<4	<5	<7
	26-Oct-98	<145	$312 \pm 32$	<3	<3	<6	<3	<7	<5	. <3	\$	<4	<9
	02-Nov-98	<148	$345 \pm 34$	· <3	<4	<6	<4	<u> </u>	<7	<4	<3	<4	<6
	10-Nov-98	<148	$330 \pm 32$	<3	<3	<i>.</i> <5	<4	<6	<5	<4	<4	Ä	<7
	17-Nov-98	<147	$381 \pm 34$	<3	<4	<6	<4	<9	<6	<5	<3	<4	<4
	24-Nov-98	<146	$284 \pm 33$	\$	<4	<7	<5	<9	<7	<6	<4	<4	<4
	30-Nov-98	<146	321 ± 35	<4	<4	<9	<4	<8	<6	<4	<4	<4	<7
	09-Dec-98	<148	290 ±•36	<4	<4	· <7	<3	<8.	<7	<4	<4	<4	<6
	16-Dec-98 -	<145	333 ± 34	$\triangleleft$	<4	<8	<4	<10	<7	<7 -	<4	<4	<4
	22-Dec-98	<145	$344 \pm 36$	<4	<4	<5	<5	<8>	<7	<3	<4	<4	<8 <sup>*</sup>
	31-Dec-98	<145	$337 \pm 17$	<2	<2	<3	` · <2	<4	<3	<3	<2.	<2	. <2
H59	01-Oct-98	<146	$373 \pm 34$	$\triangleleft$	<4	<8	<4	<7	<sup>:</sup> <7	<6	<4 <sup>^</sup>	<3	<5
•	02-Nov-98	<148	$359 \pm 36$	<3	⊲.	<7	<5	<9	<6	<5	<4	<4	<7
	01-Dec-98	<148	381 ± 37	<4	\$	<7	<3	<10	· <7	<5	<4	<4	<8

(A)- These tabulated LLD values for Zr/Nb-95 are the higher of the individual parent or daughter LLDs.

(B) - These tabulated LLD values are for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity for a given sample.

							•			SL	QR98-4	1
3.b. SHORELINE SEDIMENT - (pCi/kg, dry weight)												
Sample <u>Site</u>	Collection <u>Date</u>	<u>Bc-7</u>	<u>K-40</u>	<u>Co-58</u>	<u>Co-60</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>7 Pb-2</u>	<u>10 Ra-</u>	<u>226 Th-23</u>	<u>12 U-238</u>	
	These s	samples wer	e previousl	y collected	1.							
•	•								-			
<u>4.a.1. CRU</u>	<u>STACEA - (pC</u>	i/kg, wet we	eight)		-							
Sample <u>Site</u>	Collection	<u> </u>	<u>) M</u>	<u>ín-54 Co</u>	<u>-58 Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>	
	These sa	mples were	previously	collected.								
<u>4.a.2. FISH</u>	- (pCi/kg, wet	weight)					•			и		
Sample <u>Site</u>	Collection <u>Date</u>	<u> </u>	<u>) M</u>	<u>In-54 Co</u>	<u>-58 Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ra-226</u>	<u>Ra-228</u>	
	These sa	mples were	previously	collected.								
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### 4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	. <u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Pb-210	<u>Pb-212</u>	<u>Ra-226</u>
H51	01-Oct-98	936 ± 69	$3103 \pm 144$	<12	<10	<12	<642	<198	<232
	02-Nov-98	1339 ± 76	$4369 \pm 156$	.<9	<10	<11	<885	<34	<249
	01-Dec-98	$472\pm62$	4561 ± 168	<11	<12	<11	<688	<30	<244
				٣		•			-
H52	01-Oct-98	$927 \pm 62$	$3381 \pm 143$	<11	<10	<10 .	<676	<194	<245
-	02-Nov-98	830 ± 70	$4448 \pm 159$	<9	<12	<13	<724	<32	<249
	01-Dec-98	1073 ± 67	$2834 \pm 120$	<10	<9	<10	<696	<22	<212
		- 2			vy 🔺				
H59	`01-Oct-98	$781 \pm 65$	$3389 \pm 146$	<11	<14	<10 *	<706	<180	<230
	02-Nov-98	$1136 \pm 75$	$3746 \pm 154$	<10	<11	$23 \pm 6$	<732	<35	<245
	01-Dec-98	621 ± 67	$4819 \pm 168$	<13	<11	<13	<626	<38	<245

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1998 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT ST. LUCIE PLANT - UNITS 1 & 2

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ATTACHMENT C

### **RESULTS FROM THE INTERLABORATORY**

COMPARISON PROGRAM 1998

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#### FLORIDA DEPT.' OF HEALTH - EPA INTERLABORATORY CROSS-CHECK PROGRAM DATA

Media	Nuclide	Coll	lect	ion	EPA	Units	Normal.	Mean of	N.D.K.	Action
		Mon	Day	Yr	Known		Range	Analyses		Level
WATER	Alpha	01	30	98	30.5	pCi/L	0.241	9.77	-4.73	1
WATER	Beta	01	30	98	3.9	pCi/L	0.071	7.30	1.18	
WATER	H-3	03	13	98	2155	pCi/L	0.144	2066.33	-0.44	
WATER	I-131	02	06	98	104.9	pCi/L	0.146	103.97	-0.15	
WATER	Sr-89	01	16	98	8	pCi/L	0.000	6.00	-0.69	
WATER	Sr-90	01	16	98	32	pCi/L	0.118	27.33	-1.62	
WATER	Co-60	06	05	98	12	pCi/L	0.118	12.33	0.12	
WATER	Zn-65	06.	05	98	104	pCi/L	0.295	112.00	1.39	
WATER	Cs-134	06	05	98	31	pCi/L	0.000	29.00	-0.69	
WATER	Cs-137	06	05	98	35	pCi/L	0.118	37.67	0.92	
WATER	Ba-133	06	05	98	40	pCi/L	0.354	37.00	-1.04	

#### January through June, 1998

#### NOTES:

- Normal.: Normalized range. As defined in "Environmental Radioactivity Laboratory Intercomparison Studies Program Fiscal Year 1981 - 1982", Environmental Monitoring Systems Laboratory, U. S. Environmental Protection Agency, P. O. Box 93478, Las Vegas, Nevada, 89193-3478. EPA-600/4-81-004, February, 1981.
- N.D.K.: Normalized deviation of the mean from the known value, as defined in EPA-600/4-81-004.
- NDP: No data provided. No data was provided to EPA for inclusion in their report.

#### ACTION LEVEL:

(1) Cause: No cause for the low result can be found. However, the graph of % responding labs vs. nornamlized deviaton of the mean from the known value given on page 9 of EPA's report for this cross-check (copy attached) shows most laboratories reported a value lower than the known value. Furthermore, the second graph on page 9, % responding labs vs. normalized deviation of the mean from the grand average, shows that the laboratories agree fairly well with each other. Action: None at this time.



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DOE-QAP 49 RESULTS

No. Test	Radionuclide	Reported Value	Reported Error	EML Value	EML Error	Reported EML	Evaluation					
Matrix: Al Air Filter Bq/filter												
1 1 1 1	GROSS BETA MN54 CO60 SB125 CS137	2.080 5.250 8.630 7.300 3.830	0.070 0.050 0.050 0.200 0.100	2.160 4.920 9.160 8.890 22.470	0.070 0.400 0.580 0.550 1.030	0.963 1.067 0.942 0.821 1.061	A A W A					
Matrix	: WA Water Bq/I											
1 1 1 1	H3 MN54 CO60 NI63 CS137	84.080 36.400 51.300 95.230 52.700	3.100 0.500 0.400 0.670 0.600	76.200 32.400 49.400 95.700 50.000	2.900 1.400 1.200 0.900 1.700	1.103 1.123 1.038 0.995 1.054	A A A A					
Matrix	: VE Vegetation E	Bq/kg										
1 1 1	K40 CO60 CS137	499.000 20.200 402.000	9.000 0.500 2.000	460.000 20.000 390.000	20.000 1.000 20.000	1.085 1.010 1.031	A A A					
Matrix	SO Soil Bq/kg											
1 1	K40 CS137	332.00 945.000	6.000 2.000	314.000 954.000	13.000 38.000	1.057 0.991	AA					

Evaluation : A = Acceptable, W = Acceptable with Warning, N = Not Acceptable

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DOE-QAP 48 RESULTS

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No. Test	Radionuclide	Reported Value	Reported Error	EML Value	EML Error	Reported EML	Evaluation
Matrix: AI Air Filter Bq/filter							
1 1 1 1 1	GROSS BETA MN54 CO57 CO60 SB125 CS124	2.300 5.950 10.180 8.960 11.100	0.040 0.080 0.040 0.070 0.300	1.960 5.44 11.110 9.090 12.160	0.300 0.485 0.846 0.732 1.151	1.173 1.094 0.916 0.986 0.913 0.866	A A A A A
י 1 1	CS134 CS137 CE144	12.700 7.700	0.100 0.100 0.100	11.860 8.210	0.957 0.796	1.071 0.938	A A
Matrix: WA Water Bq/I							
1 1 1	H3 MN54 CO60 CS137	240.100 63.500 15.000 51.500	4.800 0.600 0.300 0.600	218.300 57.000 13.600 46.000	6.505 1.900 1.200 1.700	1.100 1.114 1.103 1.120	A A A A
Matrix: VE Vegetation Bq/kg							
1 1 1	.K40 CO60 CS137	757.000 11.100 186.000	10.000 0.500 1.000	707.500 10.575 181.500	24.987 0.206 7.141	1.070 1.050 1.025	A A A
Matrix: SO Soil Bq/kg							
1 1	K40 CS137	313.000 325.000	6.000 1.000	313.500 329.500	10.150 9.260	0.998 0.986	A A

Evaluation : A = Acceptable, W = Acceptable with Warning, N = Not Acceptable

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