



APR 17 2017

L-2017-053
10 CFR 50.4
10 CFR 50.36

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

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Annual Radiological Environmental
Operating Report for Calendar Year 2016

The enclosed report is being submitted pursuant to Technical Specification 6.9.1.8. The *Annual Radiological Environmental Operating Report* provides information summaries and analytical results of the Radiological Environmental Monitoring Program (REMP) for calendar year 2016.

Please contact us should there be any questions regarding this report.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael J. Snyder".

Michael J. Snyder
Licensing Manager
St. Lucie Plant

Enclosure: 2016 Annual Radiological Environmental Operating Report (97 pages)

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2016
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 DOH

Prepared by: *Thomas Bertoloni / JW Hunt*

Reviewed by: *[Signature]*

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ST. LUCIE PLANT – UNITS 1 & 2

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I. INTRODUCTION

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. Purpose

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 to 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. Program Description

The radiological environmental monitoring program (REMP) for the St. Lucie Plant (PSL) is conducted pursuant to the St. Lucie Units 1 and 2 Offsite Dose Calculation Manual (ODCM) Section 3/4.12.1, Monitoring Program.

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.
- 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.

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

Note: Ground Water Protection, NEI Initiative: The program and results are described in Attachment D

2. Analytical Responsibility:

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

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

C. Analytical Results

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 or missing data, if any, are noted and explained in Table 1A. Samples not meeting the specified "A PRIORI" LLD, if any, are noted and explained in Table 1B. Analysis data for all specified samples analyzed during the surveillance period is provided in Attachment B.

D. Land Use Census

A Land Use Census Survey out to a distance of a five mile 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 16 meteorological sectors. A summary of the Land Use Census for the surveillance year is provided in Table 2, Land Use Census Summary.

E. Interlaboratory Comparison Program

The interlaboratory comparison program consists of participating in the DOE Mixed Analyte Performance Evaluation Program (MAPEP).

This program provides similar testing (matrices, nuclides, and levels) as the former EPA Interlaboratory Comparison Program and is referred to as the Mixed Analyte Performance Evaluation Program (MAPEP).

The samples are analyzed using the methods applicable to the REMP (Gamma Spectroscopy, Gross Beta, and Tritium for Water).

From the MAPEP handbook:

Acceptance criteria were developed from a review of precision and accuracy data compiled by other performance evaluation programs (PEPs), the analytical methods literature, from several MAPEP pilot studies, and from what is considered reasonable, acceptable, and achievable for routine analyses among the more experienced laboratories.

The results for nuclides associated with the REMP are listed in ATTACHMENT C, RESULTS FROM THE INTERLABORATORY COMPARISON PROGRAM.

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III. DISCUSSION AND INTERPRETATION OF RESULTS

A. Reporting of Results

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 adverse trends attributed to effluents from the plant. The measured exposure rates are consistent with exposure rates that were observed during the pre-operational surveillance program.

The BRC has performed a comprehensive investigation to determine the cause of a potential decreasing Direct Exposure TLD trend at St. Lucie. Results indicate that TLDs may be experiencing age related degradation. The BRC will start to replace the TLD inventory in the first quarter of 2017. A site tracking action has been generated to track the issue to ensure closure.

Direct radiation monitoring results are summarized in Table 1 and are trended in Figure 1 below.

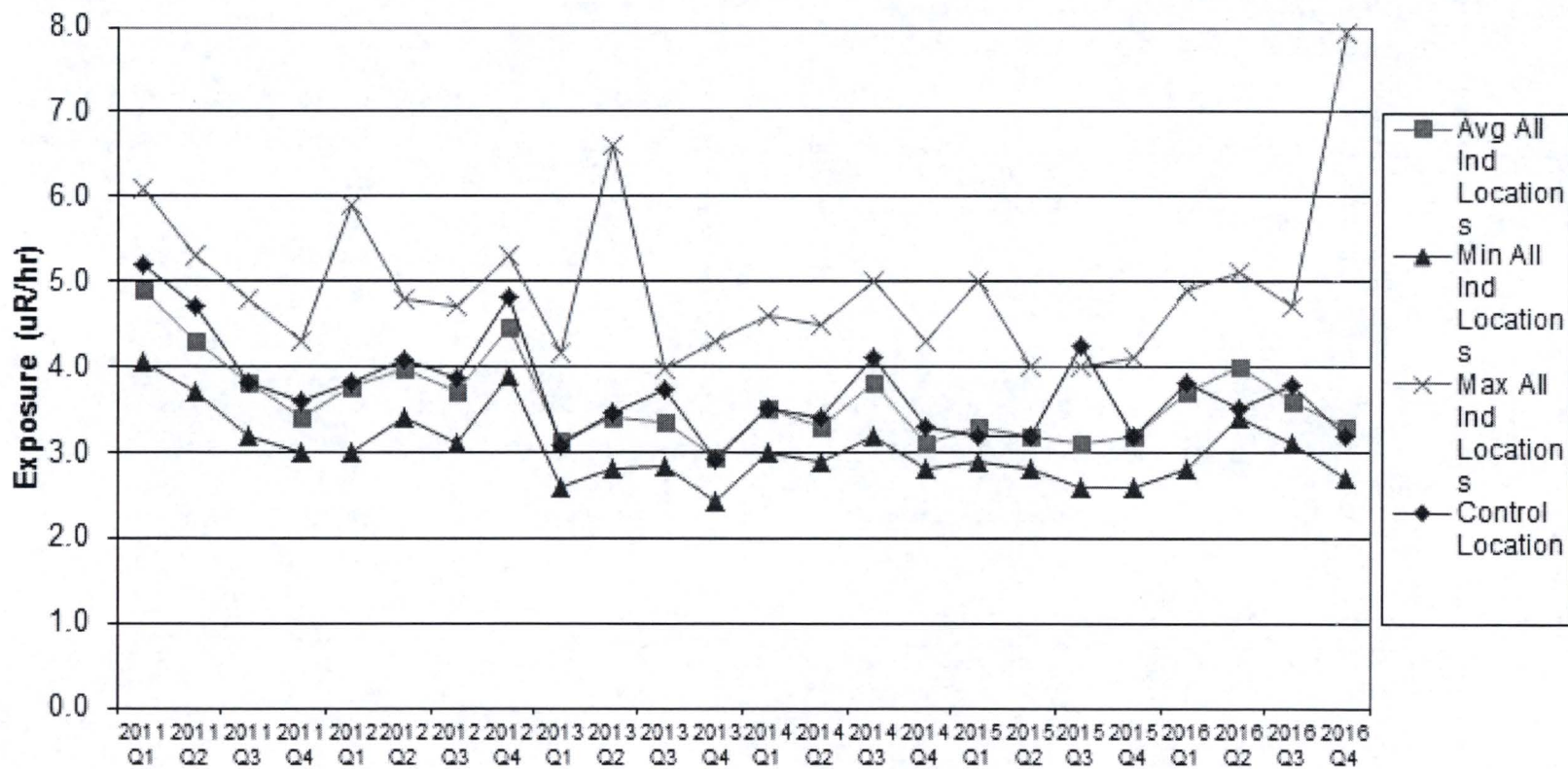
2. Air Particulates/Radioiodine:

For results attributed to plant effluents: 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 that were made during the pre-operational surveillance program.

Air particulate and radioiodine monitoring results are summarized in Table 1 and are trended in Figure 2 below.

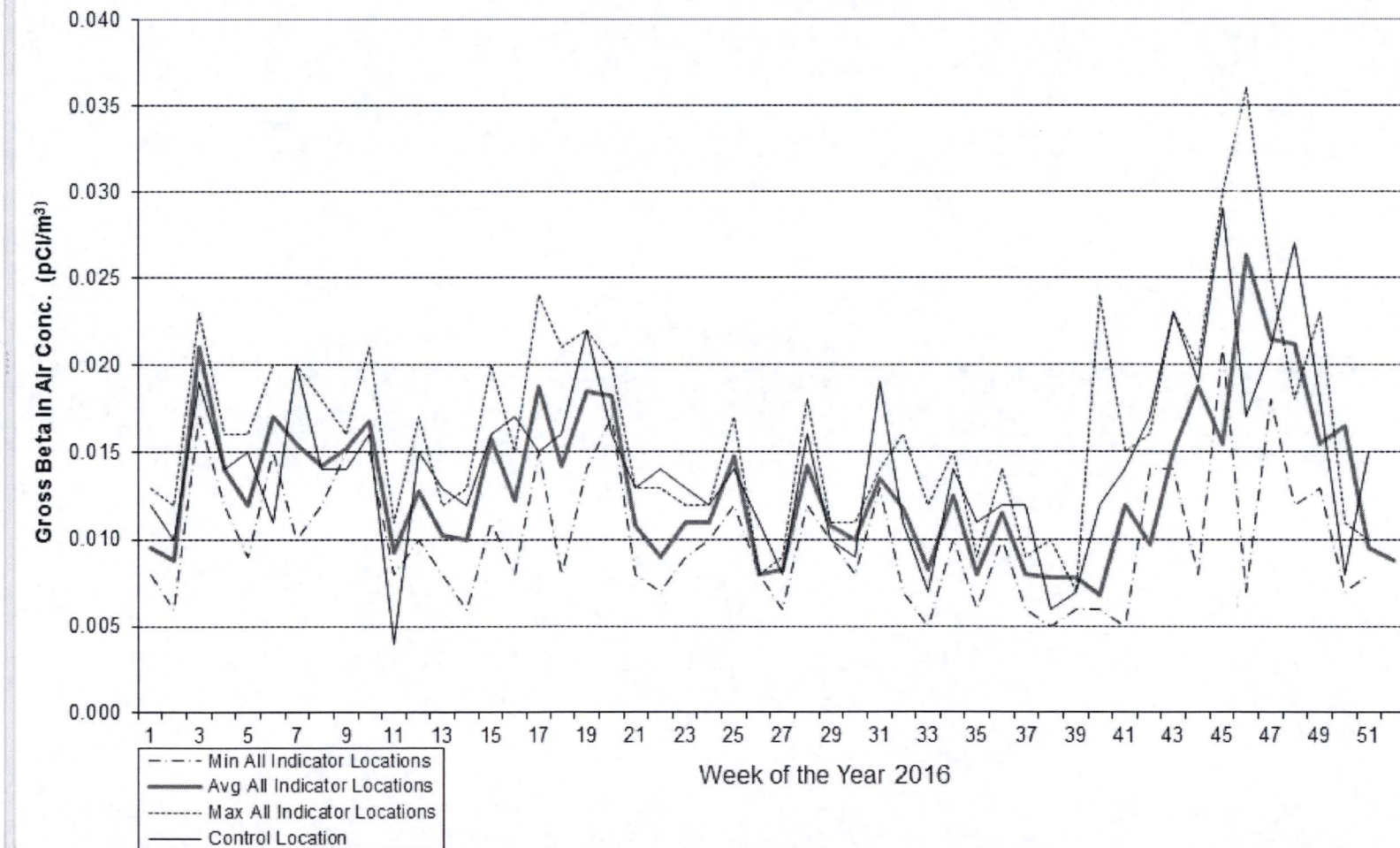
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Figure 1 - St. Lucie Direct Radiation Gamma Exposure (via TLD)



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Figure 2 - St. Lucie 2016 REMP Program
Gross Beta in Air, pCi/m³



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3. Waterborne, Surface Water:

The results for radioactivity measurements in surface water are consistent with past measurements and with measurements made during the pre-operational surveillance program. Tritium was reported as present in 2 of the 52 ODCM required samples for the indicator location and none of the 12 samples of the control location surface water samples collected. The highest value was 27.5% of the required lower limit of detection and 2.75% of the reporting level listed in ODCM Table 4.12-1. There were no indications of any other nuclides that could be attributed to plant effluents. Results are summarized in Table 1.

4. Waterborne, Sediment and Food Products:

The results for radioactivity measurements in waterborne sediment, fish, and crustacean samples are consistent with past measurements and with measurements made during the pre-operational surveillance program. For the Fish Ingestion Pathway, Cs-137 was not reported for the two samples at the indicator location as well as the 2 samples at the control location. There were no indications of any other nuclides that could be attributed to plant effluents. A deviation from the ODCM required REMP Program sample schedule was identified that a semi-annual crustacea sample for the second half of the year 2016 was not obtained. 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 pre-operational surveillance program. Cs-137 was reported as present in 1 of the 24 ODCM required samples for the two indicator locations. The highest value was 8.75% of the required lower limit of detection and 0.35% of the reporting level listed in ODCM Table 3.12-2. There were no indications of any other nuclides that could be attributed to plant effluents. Results for broad leaf vegetation samples are summarized in Table 1.

6. Land Use Census:

There were no additions or changes identified in the Land Use Census as compared to last year's report.

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.

The Land Use Census is summarized in Table 2.

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7. Interlaboratory Comparison Program:

The State of Florida laboratory participated in MAPEP 34 and 35. These satisfied the requirements as directed in the PSL Offsite Dose Calculation Manual (ODCM) for the Interlaboratory Comparison Program.

The results are listed in Attachment C.

C. Conclusions

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. Measured exposure rates are consistent with exposure rates that were observed during the pre-operational surveillance program.

- Results for air particulate/radioiodine samples are consistent with measurements that were made during the pre-operational surveillance program.
- The highest value for tritium in surface water was 27.5% of the required lower limit of detection and 2.75% of the reporting level listed in ODCM Table 4.12-1. There were no indications of any other nuclides that could be attributed to plant effluents.
- The highest value for Cs-137 in broad leaf vegetation was 8.75% of the required lower limit of detection and 0.35% of the reporting level listed in ODCM Table 4.12-1. There were no indications of any other nuclides that could be attributed to plant effluents.
- There were no indications in the waterborne sediment or food products of any other nuclides that could be attributed to plant effluents.

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.

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
 Name of Facility St. Lucie Units 1 & 2, Docket No(s). 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

PATHWAY: DIRECT RADIATION
 SAMPLES COLLECTED: TLD
 UNITS: micro-R/hr

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
Exposure ^d Rate, 108	---	3.65 (102/104) 2.65 - 7.93	WNW-5 5.1 mi., WNW	4.65 (4/4) 3.45 - 7.93	3.57 (4/4) 3.20 - 3.81

Number of Non-Routine Reported Measurements = 0

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
 Name of Facility St. Lucie Units 1 & 2, Docket No(s) 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

PATHWAY: AIRBORNE
 SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES
 UNITS: PICO - Ci/M³

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
¹³¹ I, 260	0.012	<MDA	---	---	<MDA
Gross Beta, 260	0.0064	0.0128 (258/260) 0.0050 - 0.0360	H-14 1 mi., SE	0.014 (52/52) 0.005 - 0.031	0.014 (52/52) 0.004 - 0.029
Composite Gamma Isotopic, 20					
⁷ Be	0.0006	0.1513 (14/16) 0.0984 - 0.1919	H-14 1 mi., SE	0.1782 (4/4) 0.1639 - 0.1919	0.1635 (4/4) 0.1544 - 0.1816
¹³⁴ Cs	0.0008	<MDA	<MDA	<MDA	<MDA
¹³⁷ Cs	0.0008	<MDA	<MDA	<MDA	<MDA
²¹⁰ Pb	---	0.0176 (8/16) 0.0126 - 0.0386	H-34 0.5 mi., N	0.0256 (2/4) 0.0126 - 0.0386	0.0143 (3/4) 0.0111 - 0.0181

Be-7 & Pb-210 are naturally occurring.

Number of Non-Routine Reported Measurements = 0

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
 Name of Facility St. Lucie Units 1 & 2, Docket No(s). 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

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

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c Distance & Direction	Mean (f) ^b Range	
Tritium, 64	172	466 (2/52) 109 - 823	H-15 <1 mi., ENE/E/ESE	466 (2/52) 109-823	<MDA (0/12)
Gamma Isotopic, 64					
⁴⁰ K	58	380 (52/52) 321 - 471	H-15 <1 mi., ENE/E/ESE	380 (52/52) 321-471	382 (12/12) 331 - 444
⁵⁴ Mn	3	<MDA	---	---	<MDA
⁵⁹ Fe	6	<MDA	---	---	<MDA
⁵⁸ Co	3	<MDA	---	---	<MDA
⁶⁰ Co	4	<MDA	---	---	<MDA
⁶⁵ Zn	7	<MDA	---	---	<MDA
⁹⁵ Zr-Nb	6-3	<MDA	---	---	<MDA
¹³¹ I	4	<MDA	---	---	<MDA
¹³⁴ Cs	4	<MDA	---	---	<MDA
¹³⁷ Cs	4	<MDA	---	---	<MDA
¹⁴⁰ Ba-La	9-3	<MDA	---	---	<MDA

K-40 is naturally occurring.

Number of Non-Routine Reported Measurements = 0

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
 Name of Facility St. Lucie Units 1 & 2, Docket No(s) 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

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

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
Gamma Isotopic, 4					
⁷ Be	56	30 (1/2)	H-15 <1 mi., ENE/E/ESE	30 (1/2)	<MDA
⁴⁰ K	100	681 (2/2) 340 - 1022	H-15 <1 mi., ENE/E/ESE	681 (2/2) 340 - 1022	155 (2/2) 131 - 178
⁵⁸ Co	6	<MDA	---	---	<MDA
⁶⁰ Co	7	<MDA	---	---	<MDA
¹³⁴ Cs	7	<MDA	---	---	<MDA
¹³⁷ Cs	7	<MDA	---	---	<MDA
²¹⁰ Pb	---	270 (2/2) 256 - 284	H-15 <1 mi., ENE/E/ESE	270 (2/2) 256 - 284	379 (1/2)
²²⁶ Ra	15	496 (2/2) 402 - 590	H-15 <1 mi., ENE/E/ESE	496 (2/2) 402 - 590	408 (2/2) 366 - 450
²³² Th	25	77 (2/2) 58 - 96	H-15 <1 mi., ENE/E/ESE	77 (2/2) 58 - 96	57 (1/2)
²³⁵ U	---	37 (1/2)	H-15	37 (1/2)	28 (1/2)
²³⁸ U	---	247 (2/2) 218 - 276	H-15 <1 mi., ENE/E/ESE	247 (2/2) 218 - 276	217.5 (2/2) 207 - 228

Be-7, K-40, Pb-210, Ra-226, Th-232, U-235 & U-238 are naturally occurring. Number of Non-Routine Reported Measurements = 0

TABLE 1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
 Name of Facility St. Lucie Units 1 & 2, Docket No(s). 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

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

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
Gamma Isotopic, 4					
⁴⁰ K	270	1376 (1/2)	H-15 <1 mi., NE/ENE/E	1376 (1/2)	1752 (2/2) 1633 -1871
⁵⁴ Mn	16	<MDA	---	---	<MDA
⁵⁹ Fe	28	<MDA	---	---	<MDA
⁵⁸ Co	15	<MDA	---	---	<MDA
⁶⁰ Co	16	<MDA	---	---	<MDA
⁶⁵ Zn	32	<MDA	---	---	<MDA
¹³⁴ Cs	16	<MDA	---	---	<MDA
¹³⁷ Cs	18	<MDA	---	---	<MDA
²²⁶ Ra	300	<MDA	---	---	<MDA
²²⁸ Ra	58	<MDA	---	---	<MDA

K-40, Ra-226 & Ra-228 are naturally occurring.

Number of Non-Routine Reported Measurements = 0

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 Name of Facility St. Lucie Units 1 & 2, Docket No(s). 50-335 & 50-389
 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

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

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
Gamma Isotopic, 4					
⁴⁰ K	270	1885 (2/2) 1370 - 2399	H-15 <1 mi., ENE/E/ESE	1885 (2/2) 1370 - 2399	2143 (2/2) 2030 - 2255
⁵⁴ Mn	16	<MDA	---	---	<MDA
⁵⁹ Fe	28	<MDA	---	---	<MDA
⁵⁸ Co	15	<MDA	---	---	<MDA
⁶⁰ Co	16	<MDA	---	---	<MDA
⁶⁵ Zn	32	<MDA	---	---	<MDA
¹³⁴ Cs	16	<MDA	---	---	<MDA
¹³⁷ Cs	18	<MDA	---	---	<MDA

K-40 is naturally occurring.

Number of Non-Routine Reported Measurements = 0

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 Location of Facility St. Lucie, Florida, Reporting Period January 1 - December 31, 2016
 (County, State)

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

Type and Total Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range
			Name ^c	Mean (f) ^b	
			Distance & Direction	Range	
Gamma Isotopic, 36					
⁷ Be	64	1234 (24/24) 593 - 2263	H-51 1 mi., N/NNW	1490 (12/12) 593 - 2263	998 (12/12) 393 - 2170
⁴⁰ K	120	4127 (24/24) 2874 - 5400	H-51 1 mi., N/NNW	4178 (12/12) 2876 - 5400	3587 (12/12) 2700 - 4324
⁵⁸ Co	6	<MDA	---	---	<MDA
⁶⁰ Co	8	<MDA	---	---	<MDA
¹³¹ I	8	<MDA	---	---	<MDA
¹³⁴ Cs	8	<MDA	---	---	<MDA
¹³⁷ Cs	8	7 (1/24)	H-52 1 mi., S/SSE	7 (1/12)	<MDA
²¹⁰ Pb	---	370 (7/24) 134 - 1151	H-51 1 mi., N/NNW	483 (4/12) 238 - 1151	290 (1/12)
²¹² Pb	---	25 (2/24) 20 - 29	H-52 1 mi., S/SSE	29 (1/12)	<MDA
²²⁶ Ra	189	<MDA	---	---	<MDA

Be-7, K-40, Pb-210, Pb-212, & Ra-226 are naturally occurring.

Number of Non-Routine Reported Measurements = 0

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(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 three elements in a TLD (thermoluminescent dosimeter).

MDA refers to minimum detectable activity.

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TABLE 1A

DEVIATIONS / MISSING DATA

There were several instances of missing data and air sampler partial run times as follows:

- A) Pathway: Airborne, Particulates and Radioiodines
- Location: H34, 0.5 miles N
- Dates: 1/12/16 – 1/19/16
- Deviation: Failure to Perform Continuous Monitoring
- Description of Problem: Air sampling pump was not operational upon discovery during routine weekly sampling; estimated sampling duration of 165 out of 170.1 hour sampling period.
- Corrective Action: Replaced pump; verified equipment as operable.
-
- B) Pathway: Airborne, Particulates and Radioiodines
- Location: H34, 0.5 miles N
- Dates: 3/22/16 - 3/29/16
- Deviation: Failure to Perform Continuous Monitoring
- Description of Problem: Air Sampler had intermittent power loss and run time upon discover during routine weekly sampling. Power was lost from 3/27/16 at 15:55 to 3/28/16 at 15:00 as a result of in-progress construction activities. Estimated run time for the week was 70.4 hrs out of 145.0 hrs.
- Corrective Action: Power was restored to H34: Verified equipment as operable.
-
- C) Pathway: Airborne, Particulates and Radioiodines
- Location: H14, 1 miles S
- Dates: 9/14/16 – 9/16/16
- Deviation: Failure to Perform Continuous Monitoring
- Description of Problem: It was discovered during routine weekly sampling that the brass coupling was separated and had

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come apart; result was little if any deposition on the particulate filter. The filter coupling must not have snapped together completely and separated soon after start of collection. Estimated run time was 0 hrs for the week due to the complete loss of data.

Corrective Action: The filter coupling was properly reconnected and immediately returned to service; verified equipment as operable. Worker was coached to reinforce the correct method for reconnecting the coupling to prevent reoccurrence.

D) Pathway: Airborne, Particulates and Radioiodines

Location: H30, 2 miles W

Dates: 10/6/16 – 10/26/16

Deviation: Failure to Perform Continuous Monitoring

Description of Problem: Power was lost at the air sample station on 10/6/16 as a result of Hurricane Matthew. Estimated run time for the week of 10/10/16 was 60 out of 145 hours. There was no power and no sample collected until power was restored on 10/26/16. The power meter can and overhead service at the location needed complete rebuilding by Power Distribution as a result of hurricane damage for return to service.

Corrective Action: Power meter and overhead service was repaired.

E) Pathway: Airborne, Particulates and Radioiodines

Location: H30, 2 miles W

Dates: 11/14/16 - 11/22/16

Deviation: Failure to Perform Continuous Monitoring

Description of Problem: Air sampling pump was not operational upon discovery during routine weekly sampling; estimated sampling duration of 108.5 out of 193.1 hour sampling period.

Corrective Action: Replaced pump; verified equipment as operable.

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- F) Pathway: Direct Radiation
- Location: TLD: Locations W-10 and SW-10
- Dates: 11/22/16 - 11/29/16
- Deviation: Failure to Perform Continuous Monitoring
- Description of Problem: Two of the total 26 Direct Exposure TLDs were missing upon discovery during routine quarterly sampling in Qtr 3 2016; data was unrecoverable. Both TLDs were removed and disposed of during routine servicing of the poles by the utility's contractor.
- Corrective Action: The BRC immediately deployed two new TLD/cricket cages on utility poles at both locations. The BRC is designing TLD/cricket cages to include larger, more easily seen placards to prevent inadvertent moving or disposing of TLDs. Completed communication with the utility contractor of the importance to not remove or touch the TLD/cricket cages.
- G) Pathway: Ingestion, Fish and Invertebrates, Crustacea
- Location: H-15, <1 mile ENE/E/ESE, Ocean side vicinity of public beaches east side of St. Lucie Plant
- Dates: Second Semi-Annual Sample
- Deviation: Failure to Perform Environmental Surveillance due to Storm Activity and Seasonal Unavailability.
- Description of Problem: A crustacean was unavailable and not collected in the second half of 2016. Staff personnel were not able to locate and collect crustacea during the period. Contributing to the problem was poor water quality from storm activity causing murky water.
- Corrective Action: The crustacea sample was collected in the first week of Jan 2017 for the first semi-annual sample of 2017. Completed a communication to more closely coordinate resources between BRC and FPL utility personnel to ensure timely collection of crustacea samples.

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TABLE 1B

ANALYSIS WITH LLDs ABOVE THE REQUIRED DETECTION CAPABILITIES
(LLDs) Listed in ODCM TABLE 4.12-1
1/1/2016 – 12/31/2016

The values specified in ODCM Table 4.12-1, Detection Capabilities, were achieved for all samples. REMP Program sampling deviations and missing data are listed in Table 1A.

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TABLE 2

LAND USE CENSUS
(Page 1 of 2)

The St. Lucie Annual Land Use Census Survey was performed during the months of June and July 2016 - No additions or changes were identified as compared to the 2015 St. Lucie Annual Land Use Census Survey. No locations were identified of potential milk-producing animals (cows or goats).

Sector	<u>Distance to Nearest (a, b)</u>		
	Residence	Garden (d)	Milk Animal (c)
N	O (e)	O	O
NNE	O	O	O
NE	O	O	O
ENE	O	O	O
E	O	O	O
ESE	O	O	O
SE	1.5/142 1.6/145	O	O
SSE	1.8/147 (g) 2.0/149	L (f)	L
S	3.3/190	L	L
SSW	2.2/212	4.4/207 4.7/199 5.1/195	L
SW	1.9/234	L	L
WSW	1.9/240	2.0/250	L
W	1.9/260	L	L
WNW	2.3/281	4.0/282 4.2/284	L
NW	3.4/304	L	L
NNW	2.7/344	L	L

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TABLE 2

LAND USE CENSUS
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NOTES

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

distance (miles) / bearing (degrees)

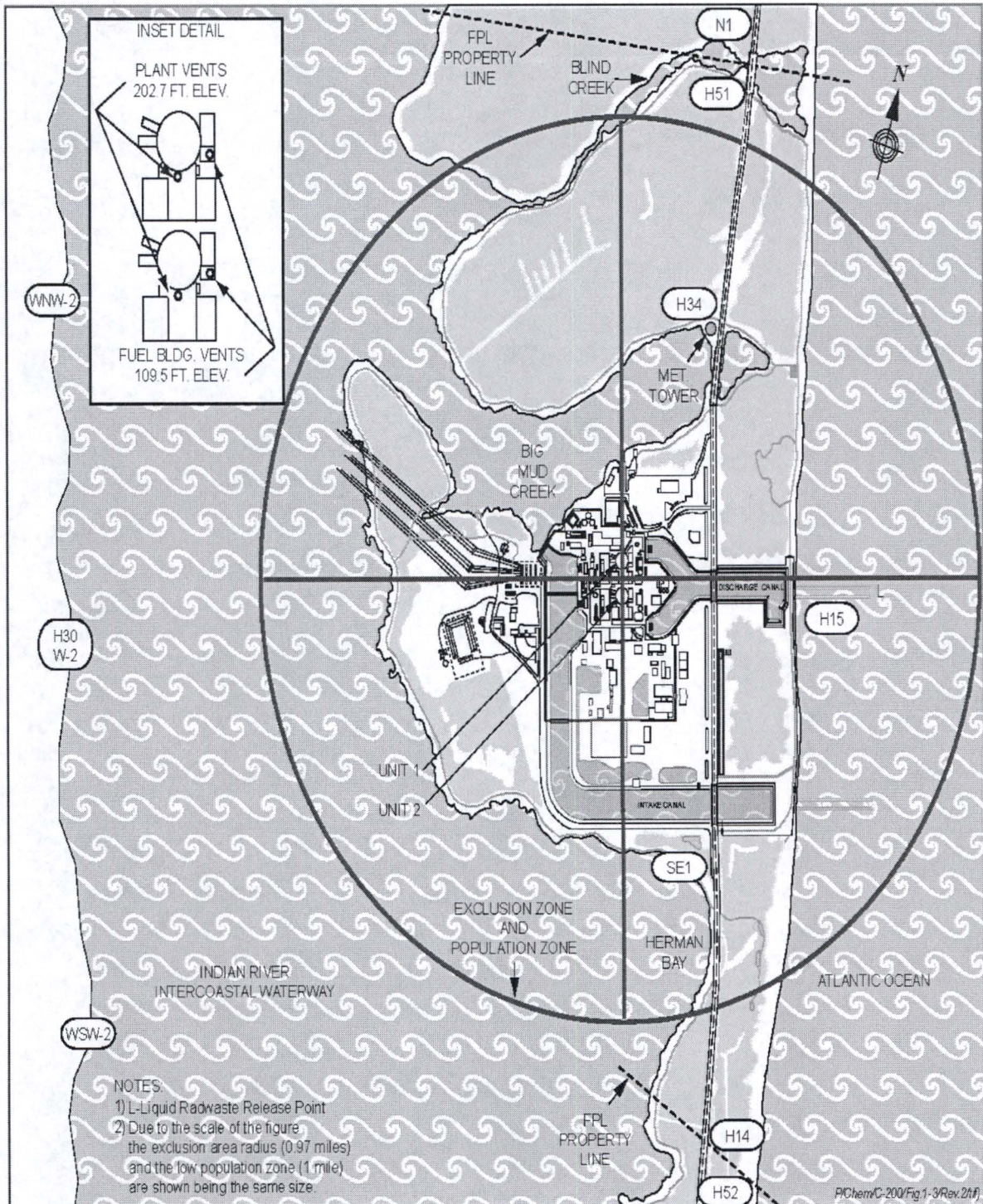
For example, a residence located in the southeast sector at a distance of 1.5 miles bearing 142 degrees is recorded as 1.5/142.
- c. Potential milk animal locations.
- d. Only gardens with an estimated total area of 500 square feet, or more, and producing green leafy vegetables are considered.
- e. "O" 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>	<u>Description</u>
SSE	1.8/147	Fire Station

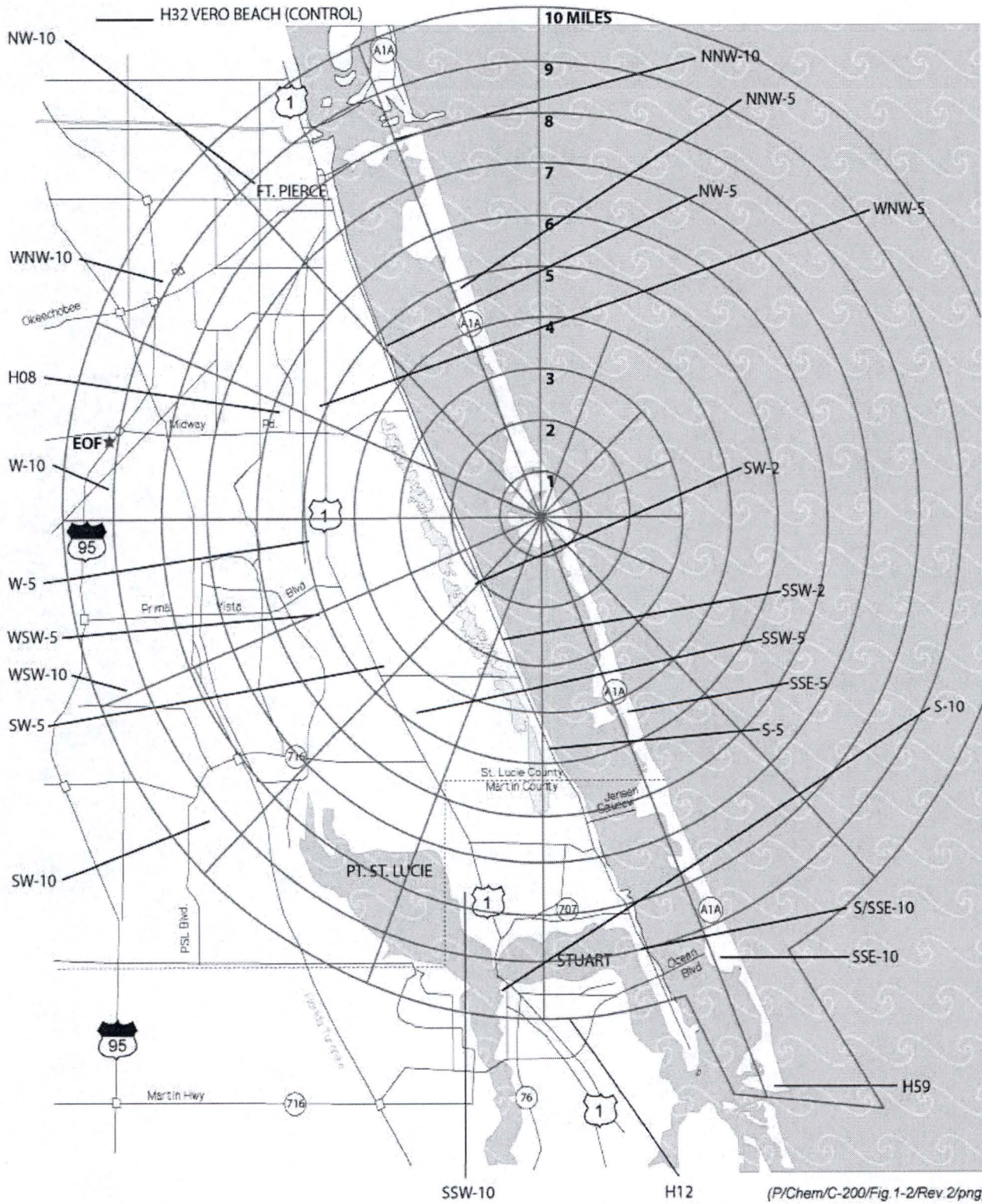
ATTACHMENT A

KEY TO SAMPLE LOCATIONS

SITE AREA MAP & ENVIRONMENTAL SAMPLE LOCATIONS



ENVIRONMENTAL SAMPLE LOCATIONS (10 MILES)



(P/Chem/C-200/Fig. 1-2/Rev. 2/png)

ATTACHMENT A

PAGE 1 OF 3

PATHWAY: DIRECT RADIATION

SAMPLES COLLECTED: TLD

SAMPLE COLLECTION FREQUENCY: QUARTERLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
N-1	N	1	A1A, North of Blind Creek
NNW-5	NNW	4.8	Frederick Douglas Beach Entrance
NNW-10	NNW	8.7	Coast Guard Station
NW-5	NW	5.4	Indian River Dr. at Rio Vista Dr.
NW-10	NW	9.6	FPL Facility, S.R. 68 and 33 RD St.
WNW-2	WNW	2.3	Cemetery South of 7107 Indian River Dr.
WNW-5	WNW	5.1	U.S. 1 at S.R. 712
WNW-10	WNW	10	S.R. 70, West of Interstate 95
W-2	W	2	Power Line - 77609 Indian River Drive
W-5	W	5.4	Oleander and Sager Street
W-10	W	10.3	Interstate 95 and S.R. 709
WSW-2	WSW	1.8	8503 Indian River Dr.
WSW-5	WSW	5.6	Prima Vista Blvd. at Yacht Club
WSW-10	WSW	10	Del Rio and Davis Street
SW-2	SW	2	9205 Indian River Drive
SW-5	SW	4.5	FPL Walton Service Center
SW-10	SW	10.2	Port St. Lucie Blvd. and Cairo Rd.
SSW-2	SSW	2.6	10307 Indian River Drive
SSW-5	SSW	6	U.S. 1 and Port St. Lucie Blvd.
SSW-10	SSW	8	Pine Valley and Westmoreland Rd.
S-5	S	5.2	13189 Indian River Drive
S-10	S	10.8	U.S. 1 and Palm City Ave
S/SSE-10	SSE	9.9	Indian River Dr. and Quail Run Lane
SSE-5	SSE	5.1	North of Entrance to Miramar
SSE-10	SSE	10.2	Elliot Museum
SE-1	SE	1	South of Cooling Canal
<u>Control:</u>			
H32	NNW	18.1	U. of Florida IFAS Entomology Lab Vero Beach

ATTACHMENT A
PAGE 2 OF 3

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

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
H08	WNW	6	FPL Substation, Weatherbee Rd.
H14	SE	1	On-Site, near south property line
H30	W	2	Power Line, 7609 Indian River Drive
H34	N	0.5	Onsite at Meteorological Tower

Control:

H12	S	12	FPL Substation, SR-76 Stuart
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PATHWAY: WATERBORNE
SAMPLES COLLECTED: SURFACE WATER (OCEAN)
SAMPLE COLLECTION FREQUENCY: H-15 WEEKLY, H-59 MONTHLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
H15	ENE/E/SSE	<1	Atlantic Ocean, public beaches east side A1A

Control:

H59	S/SSE	10-20	Near south end of Hutchinson Island
-----	-------	-------	-------------------------------------

ATTACHMENT A
PAGE 3 OF 3

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

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
H15	ENE/E/ESE	<1	Atlantic Ocean, public beaches east side A1A

Control:

H59	S/SSE	10-20	Near south end of Hutchinson Island
-----	-------	-------	-------------------------------------

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

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
H15	ENE/E/ESE	<1	Ocean Side, Vicinity of St. Lucie Plant

Control:

H59	S/SSE	10-20	Near south end of Hutchinson Island
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SAMPLES COLLECTED: BROAD LEAF VEGETATION - FOOD PRODUCTS
SAMPLE COLLECTION FREQUENCY: MONTHLY

<u>Location Name</u>	<u>Direction Sector</u>	<u>Approximate Distance (miles)</u>	<u>Description</u>
H51	N/NNW	1	Off-Site Near North Property Line
H52	S/SSE	1	Off-Site Near South Property Line

Control:

H59	S/SSE	10-20	Near south end of Hutchinson Island
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ATTACHMENT B

RADIOLOGICAL SURVEILLANCE OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE SITE

2016

First Quarter 2016

Second Quarter 2016

Third Quarter 2016

Fourth Quarter 2016



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

FIRST QUARTER 2016

BUREAU OF RADIATION CONTROL

2016
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ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

First Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Number of Sample Locations</u>	<u>Number of 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	1
4.a.2. Fish	Semiannually	2	1
4.b. Broadleaf Vegetation	Monthly	3	9

Total: 186

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 not 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.

The marine fauna listed in this report were collected in part, under Florida FWC SAL030.

1. DIRECT RADIATION - TLD's - (μ R/hour)

Sample Site	Deployment 09-Dec-15 Collection 15-Mar-16	Sample Site	Deployment 09-Dec-15 Collection 15-Mar-16
N-1	3.57 \pm 0.35	SW-2	3.52 \pm 0.20
NNW-5	3.49 \pm 0.16	SW-5	4.89 \pm 0.17
NNW-10	4.16 \pm 0.12	SW-10	3.64 \pm 0.18
NW-5	3.60 \pm 0.12	SSW-2	3.41 \pm 0.09
NW-10	4.71 \pm 0.50	SSW-5	4.07 \pm 0.10
WNW-2	3.50 \pm 0.26	SSW-10	4.13 \pm 0.15
WNW-5	3.45 \pm 0.28	S-5	4.32 \pm 0.18
WNW-10	3.72 \pm 0.32	S-10	3.69 \pm 0.18
W-2	3.55 \pm 0.21	S/SSE-10	3.43 \pm 0.34
W-5	3.89 \pm 0.37	SSE-5	3.40 \pm 0.33
W-10	2.82 \pm 0.11	SSE-10	3.59 \pm 0.20
WSW-2	3.70 \pm 0.09	SE-1	3.41 \pm 0.15
WSW-5	3.48 \pm 0.29	H-32	3.81 \pm 0.23
WSW-10	3.32 \pm 0.05		

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

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
05-Jan-16	<0.03	<0.03	<0.03	<0.03	<0.03
12-Jan-16	<0.04	<0.04	<0.04	<0.04	<0.04
19-Jan-16	<0.04	<0.04	<0.04	<0.04	<0.04
26-Jan-16	<0.03	<0.03	<0.03	<0.03	<0.03
03-Feb-16	<0.03	<0.03	<0.03	<0.03	<0.03
10-Feb-16	<0.03	<0.03	<0.03	<0.03	<0.03
16-Feb-16	<0.03	<0.03	<0.03	<0.03	<0.03
23-Feb-16	<0.03	<0.03	<0.03	<0.03	<0.03
01-Mar-16	<0.03	<0.03	<0.03	<0.03	<0.03
08-Mar-16	<0.03	<0.03	<0.03	<0.03	<0.03
15-Mar-16	<0.03	<0.03	<0.03	<0.03	<0.03
22-Mar-16	<0.04	<0.04	<0.04	<0.03	<0.04
28-Mar-16	<0.03	<0.03	<0.03	<0.03	<0.02(A)

(A) Apparent loss of power. Estimated run time 70.4 out of 145.0 hours.

2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m³)

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
05-Jan-16	0.008 ± 0.002	0.012 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.013 ± 0.002
12-Jan-16	0.006 ± 0.002	0.010 ± 0.002	0.012 ± 0.002	0.009 ± 0.002	0.008 ± 0.002
19-Jan-16	0.022 ± 0.002	0.019 ± 0.002	0.023 ± 0.002	0.017 ± 0.002	0.022 ± 0.002
26-Jan-16	0.012 ± 0.002	0.014 ± 0.002	0.016 ± 0.002	0.012 ± 0.002	0.016 ± 0.002
03-Feb-16	0.012 ± 0.002	0.015 ± 0.002	0.016 ± 0.002	0.009 ± 0.002	0.011 ± 0.002
10-Feb-16	0.017 ± 0.002	0.011 ± 0.002	0.020 ± 0.002	0.016 ± 0.002	0.015 ± 0.002
16-Feb-16	0.020 ± 0.003	0.020 ± 0.003	0.017 ± 0.002	0.015 ± 0.002	0.010 ± 0.002
23-Feb-16	0.013 ± 0.002	0.014 ± 0.002	0.018 ± 0.002	0.014 ± 0.002	0.012 ± 0.002
01-Mar-16	0.015 ± 0.002	0.014 ± 0.002	0.015 ± 0.002	0.015 ± 0.002	0.016 ± 0.002
08-Mar-16	0.021 ± 0.003	0.016 ± 0.002	0.016 ± 0.002	0.015 ± 0.002	0.015 ± 0.002
15-Mar-16	0.011 ± 0.002	0.004 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.009 ± 0.002
22-Mar-16	0.017 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.011 ± 0.002	0.013 ± 0.002
28-Mar-16	0.011 ± 0.002	0.013 ± 0.002	0.008 ± 0.002	0.010 ± 0.002	0.012 ± 0.004(A)
Average:	0.014 ± 0.001	0.014 ± 0.001	0.014 ± 0.001	0.012 ± 0.001	0.013 ± 0.001

(A) Apparent loss of power. Estimated run time 70.4 out of 145.0 hours.

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

<u>Sample Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H08	0.1614 ± 0.0046	<0.0073	<0.0004	<0.0004	0.0145 ± 0.0049
H12	0.1544 ± 0.0101	<0.0125	<0.0014	<0.0010	0.0181 ± 0.0032
H14	0.1788 ± 0.0124	<0.0272	<0.0012	<0.0015	<0.0325
H30	0.1665 ± 0.0107	<0.0174	<0.0015	<0.0010	0.0159 ± 0.0029
H34	0.1606 ± 0.0106	<0.0169	<0.0013	<0.0012	0.0126 ± 0.0031

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
H15	05-Jan-16	<151	397 ± 19	<2	<2	<4	<2	<4	<3	<2	<2	<2	<4
	12-Jan-16	<145	416 ± 24	<3	<3	<5	<3	<5	<4	<3	<2	<2	<10
	19-Jan-16	<155	345 ± 25	<2	<3	<7	<3	<8	<6	<4	<3	<4	<7
	26-Jan-16	<152	355 ± 25	<3	<3	<6	<4	<8	<5	<4	<3	<3	<9
	03-Feb-16	<149	321 ± 25	<3	<3	<7	<4	<7	<5	<4	<3	<4	<10
	10-Feb-16	<149	369 ± 26	<3	<3	<7	<4	<6	<5	<4	<3	<3	<7
	16-Feb-16	<145	333 ± 25	<3	<3	<6	<3	<8	<5	<3	<3	<3	<10
	23-Feb-16	109 ± 29	444 ± 29	<4	<3	<7	<4	<8	<5	<4	<3	<3	<7
	01-Mar-16	<154	351 ± 25	<3	<3	<7	<3	<7	<6	<3	<3	<3	<12
	08-Mar-16	<164	373 ± 26	<3	<3	<6	<4	<8	<5	<4	<3	<3	<8
	15-Mar-16	<140	420 ± 28	<3	<3	<8	<4	<8	<5	<4	<3	<4	<6
	22-Mar-16	<140	370 ± 27	<3	<3	<7	<3	<8	<6	<4	<3	<3	<11
	28-Mar-16	<140	379 ± 27	<3	<2	<7	<3	<8	<5	<4	<3	<3	<11
H59	05-Jan-16	<151	391 ± 22	<3	<2	<5	<3	<5	<4	<3	<2	<3	<7
	16-Feb-16	<145	345 ± 26	<3	<2	<7	<2	<7	<6	<4	<3	<3	<6
	16-Mar-16	<151	365 ± 26	<3	<3	<7	<4	<8	<5	<4	<3	<3	<6

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

(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)

<u>Sample Site</u>	<u>Collection 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-235</u>	<u>U-238</u>
H15	19-Feb-16	30 ± 10	340 ± 32	<6	<6	<6	<6	284 ± 51	402 ± 48	58 ± 6	<8	218 ± 17
H59	16-Feb-16	<83	131 ± 37	<10	<10	<9	<9	<740	366 ± 76	<51	<15	207 ± 40

4.a.1. CRUSTACEA - Mixed Crustacea - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection 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	This sample not yet collected.										
H59	16-Mar-16	1871 ± 189	<19	<24	<40	<27	<62	<23	<29	<512	<121

4.a.2. FISH - Catfish - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection 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	This sample not yet collected.										
H59	16-Mar-16	2030 ± 204	<24	<27	<53	<27	<54	<19	<30	<474	<103

4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>	<u>Pb-212</u>	<u>Ra-226</u>	<u>Ra-228</u>
H51	05-Jan-16	1411 ± 57	4140 ± 158	<9	<8	<8	251 ± 67	<17	<196	<32
	16-Feb-16	2230 ± 96	5231 ± 233	<16	<14	<16	<1121	20 ± 9	<317	<60
	16-Mar-16	1008 ± 71	3819 ± 203	<17	<14	<19	<1119	<31	<344	<65
H52	05-Jan-16	1031 ± 63	4235 ± 208	<12	<12	<14	<959	<28	<258	<63
	16-Feb-16	1487 ± 72	3870 ± 187	<12	<11	<14	<1106	<25	<287	<64
	16-Mar-16	800 ± 53	4583 ± 217	<16	<14	<17	<1087	29 ± 10	<304	<64
H59	05-Jan-16	601 ± 47	3300 ± 160	<10	<9	<13	<836	<23	<280	<52
	16-Feb-16	675 ± 54	4324 ± 196	<14	<11	<15	<867	<25	<243	<50
	16-Mar-16	393 ± 46	3579 ± 192	<17	<12	<18	<1087	<32	<295	<68

ST. LUCIE SITE

Supplemental Sampling

First Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Number of Sample Locations</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	9	9
2. Airborne			
2.a. Air Iodines	Weekly	3	39
2.b. Air Particulates	Weekly	3	39
3. Waterborne			
3.a. Surface Water	Monthly	2	6
3.b. Shoreline Sediment	Semiannually	4	3
3.c. Beach Sand	Semiannually	3	3
3.d. Ground Water	Quarterly	10	10
4. Ingestion			
4.a. Garden Crops	Annually	1	0
4.b. Citrus	Annually	1	1
4.c. Milk	Quarterly	1	0
			Total: 110

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 not 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 - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 09-Dec-15 Collection 15-Mar-16
H08	4.25 \pm 0.15
H09	3.89 \pm 0.27
H12	10.31 \pm 0.41
H14	4.14 \pm 0.20
H33	3.82 \pm 0.23
H34	3.81 \pm 0.17
H60	3.78 \pm 0.22
H61	4.83 \pm 0.14
H62	4.05 \pm 0.39

2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m^3)

Collection Date	H09	H32	H33
05-Jan-16	<0.03	<0.03	<0.03
12-Jan-16	<0.04	<0.04	<0.04
19-Jan-16	<0.04	<0.04	<0.03
26-Jan-16	<0.03	<0.03	<0.03
03-Feb-16	<0.03	<0.03	<0.03
10-Feb-16	<0.03	<0.03	<0.03
16-Feb-16	<0.03	<0.03	<0.03
23-Feb-16	<0.03	<0.03	<0.03
01-Mar-16	<0.03	<0.03	<0.03
08-Mar-16	<0.03	<0.03	<0.03
15-Mar-16	<0.03	<0.03	<0.03
22-Mar-16	<0.04	<0.04	<0.04
28-Mar-16	<0.03	<0.03	<0.03

2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m³)

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
05-Jan-16	0.011 ± 0.002	0.010 ± 0.002	0.007 ± 0.002
12-Jan-16	0.008 ± 0.002	0.009 ± 0.002	0.008 ± 0.002
19-Jan-16	0.021 ± 0.002	0.019 ± 0.002	0.017 ± 0.002
26-Jan-16	0.014 ± 0.002	0.015 ± 0.002	0.009 ± 0.002
03-Feb-16	0.011 ± 0.002	0.017 ± 0.002	0.012 ± 0.002
10-Feb-16	0.014 ± 0.002	0.015 ± 0.002	0.015 ± 0.002
16-Feb-16	0.013 ± 0.002	0.018 ± 0.002	0.012 ± 0.002
23-Feb-16	0.015 ± 0.002	0.015 ± 0.002	0.014 ± 0.002
01-Mar-16	0.019 ± 0.002	0.017 ± 0.002	0.012 ± 0.002
08-Mar-16	0.015 ± 0.002	0.017 ± 0.002	0.013 ± 0.002
15-Mar-16	0.010 ± 0.002	0.018 ± 0.002	0.016 ± 0.002
22-Mar-16	0.014 ± 0.002	0.012 ± 0.002	0.013 ± 0.002
28-Mar-16	0.007 ± 0.002	0.011 ± 0.002	0.014 ± 0.003
Average:	0.013 ± 0.001	0.015 ± 0.001	0.012 ± 0.001

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

<u>Sample Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H09	0.1541 ± 0.0116	<0.0265	<0.0015	<0.0012	<0.0486
H32	0.1726 ± 0.0108	<0.0156	<0.0015	<0.0011	0.0226 ± 0.0035
H33	0.1635 ± 0.0109	<0.0181	<0.0013	<0.0011	0.0158 ± 0.0034

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
H13	05-Jan-16	<151	333 ± 20	<2	<2	<5	<3	<6	<4	<3	<2	<3	<5
	16-Feb-16	<145	206 ± 19	<3	<3	<6	<3	<7	<5	<3	<3	<3	<6
	16-Mar-16	<140	255 ± 22	<3	<3	<6	<3	<8	<5	<4	<3	<3	<10
H36	05-Jan-16	<151	328 ± 25	<3	<3	<7	<3	<8	<5	<4	<3	<4	<11
	16-Feb-16	<145	375 ± 27	<3	<3	<6	<3	<7	<6	<4	<3	<4	<8
	16-Mar-16	<140	339 ± 26	<3	<3	<7	<3	<7	<5	<4	<3	<3	<6

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

(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 Site	Collection Date	<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-235</u>	<u>U-238</u>
H13	This sample not yet collected due to ongoing construction in the area.											
H16	19-Feb-16	<62	212 ± 26	<6	<6	<7	<7	289 ± 56	570 ± 60	71 ± 6	<10	276 ± 19
H19	19-Feb-16	<56	238 ± 27	<6	<6	<6	<7	367 ± 55	381 ± 51	70 ± 6	<9	207 ± 17
H36	19-Feb-16	1980 ± 74	5311 ± 192	<12	47 ± 3	<11	27 ± 3	4483 ± 308	1430 ± 121	422 ± 22	<21	4333 ± 119

3.c. BEACH SAND - (pCi/kg, dry weight)

Sample Site	Collection Date	<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-235</u>	<u>U-238</u>
H15	19-Feb-16	<72	147 ± 41	<10	<10	<9	<11	<971	429 ± 84	<51	<16	184 ± 46
H16	16-Feb-16	52 ± 24	182 ± 38	<10	<10	<9	<10	<755	467 ± 81	89 ± 12	<15	247 ± 35
H19	19-Feb-16	<117	123 ± 42	<11	<10	<10	<12	<999	802 ± 116	214 ± 18	<22	423 ± 40

3.d. GROUND WATER - (pCi/L)

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
H70	14-Jan-16	<145	<51	<4	<4	<8	<4	<7	<7	<5	<3	<4	<6
H71	14-Jan-16	685 ± 63	385 ± 27	<3	<3	<7	<3	<7	<6	<6	<3	<3	<5
H72	14-Jan-16	<155	339 ± 25	<4	<3	<7	<4	<8	<5	<5	<3	<3	<5
H73	14-Jan-16	<156	<60	<3	<3	<6	<3	<7	<5	<5	<3	<3	<5
H74	14-Jan-16	<156	298 ± 24	<4	<3	<7	<4	<7	<6	<5	<3	<3	<5
H75	14-Jan-16	<156	296 ± 23	<3	<3	<6	<4	<7	<5	<6	<3	<3	<6
H76	14-Jan-16	<145	<44	<3	<3	<6	<3	<8	<6	<5	<3	<3	<5
H77	14-Jan-16	<156	<37	<3	<3	<6	<3	<7	<6	<5	<3	<3	<4
H78	14-Jan-16	<156	44 ± 6	<2	<2	<4	<2	<4	<3	<3	<2	<2	<3
H79	14-Jan-16	<155	<53	<3	<3	<6	<3	<7	<6	<5	<3	<3	<5

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

(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.a. GARDEN CROP - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H41	This sample not yet collected.					

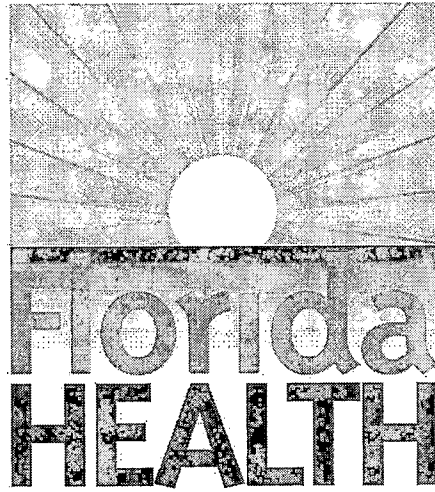
4.b. CITRUS - Oranges - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H23	19-Jan-16	<7671	1709 ± 96	<9	<9	<10

4.c. MILK - (pCi/L)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140</u> <u>La-140</u> (A)
H101	There was no sample available during the quarter.					

(A) - This tabulated LLD value is for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

SECOND QUARTER 2016

BUREAU OF RADIATION CONTROL

2016
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
ST. LUCIE PLANT - UNITS 1 & 2

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Second Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of 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	0
4. Ingestion			
4.a. Fish and Invertebrates			
4.a.1. Crustacea	Semiannually	2	1
4.a.2. Fish	Semiannually	2	1
4.b. Broadleaf Vegetation	Monthly	3	9
			Total: 184

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 not 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.

The marine fauna listed in this report were collected in part, under Florida FWC SAL030.

1. DIRECT RADIATION - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 15-Mar-16 Collection 07-Jun-16	Sample Site	Deployment 15-Mar-16 Collection 07-Jun-16
N-1	3.90 ± 0.19	SW-2	3.79 ± 0.31
NNW-5	3.85 ± 0.15	SW-5	4.52 ± 0.52
NNW-10	4.65 ± 0.32	SW-10	3.97 ± 0.21
NW-5	3.56 ± 0.38	SSW-2	3.81 ± 0.40
NW-10	5.09 ± 0.45	SSW-5	4.34 ± 0.43
WNW-2	3.72 ± 0.14	SSW-10	5.11 ± 0.24
WNW-5	3.75 ± 0.35	S-5	4.60 ± 0.37
WNW-10	3.62 ± 0.20	S-10	3.76 ± 0.25
W-2	3.46 ± 0.13	S/SSE-10	3.80 ± 0.54
W-5	4.29 ± 0.13	SSE-5	3.86 ± 0.13
W-10	3.63 ± 0.11	SSE-10	3.90 ± 0.10
WSW-2	3.85 ± 0.28	SE-1	3.72 ± 0.32
WSW-5	3.85 ± 0.10	H-32	3.48 ± 0.13
WSW-10	3.43 ± 0.19		

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

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
05-Apr-16	<0.03	<0.03	<0.03	<0.03	<0.03
12-Apr-16	<0.03	<0.03	<0.03	<0.03	<0.03
19-Apr-16	<0.03	<0.03	<0.03	<0.03	<0.03
26-Apr-16	<0.03	<0.03	<0.03	<0.03	<0.03
04-May-16	<0.02	<0.02	<0.02	<0.02	<0.02
10-May-16	<0.03	<0.03	<0.03	<0.03	<0.03
17-May-16	<0.02	<0.02	<0.02	<0.02	<0.02
24-May-16	<0.02	<0.02	<0.02	<0.02	<0.02
31-May-16	<0.02	<0.02	<0.02	<0.02	<0.02
07-Jun-16	<0.02	<0.02	<0.02	<0.02	<0.02
14-Jun-16	<0.02	<0.02	<0.02	<0.02	<0.02
21-Jun-16	<0.02	<0.02	<0.02	<0.02	<0.02
28-Jun-16	<0.02	<0.02	<0.02	<0.02	<0.02

2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m³)

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
05-Apr-16	0.013 ± 0.002	0.012 ± 0.002	0.009 ± 0.002	0.012 ± 0.002	0.006 ± 0.002
12-Apr-16	0.017 ± 0.002	0.016 ± 0.002	0.020 ± 0.002	0.015 ± 0.002	0.011 ± 0.002
19-Apr-16	0.015 ± 0.002	0.017 ± 0.002	0.013 ± 0.002	0.008 ± 0.002	0.013 ± 0.002
26-Apr-16	0.019 ± 0.002	0.015 ± 0.002	0.024 ± 0.003	0.017 ± 0.002	0.015 ± 0.002
04-May-16	0.021 ± 0.002	0.016 ± 0.002	0.014 ± 0.002	0.014 ± 0.002	0.008 ± 0.002
10-May-16	0.018 ± 0.003	0.022 ± 0.003	0.022 ± 0.003	0.014 ± 0.003	0.020 ± 0.003
17-May-16	0.020 ± 0.002	0.016 ± 0.002	0.018 ± 0.002	0.018 ± 0.002	0.017 ± 0.002
24-May-16	0.012 ± 0.002	0.013 ± 0.002	0.013 ± 0.002	0.010 ± 0.002	0.008 ± 0.002
31-May-16	0.008 ± 0.002	0.014 ± 0.002	0.007 ± 0.002	0.013 ± 0.002	0.008 ± 0.002
07-Jun-16	0.009 ± 0.002	0.013 ± 0.002	0.012 ± 0.002	0.011 ± 0.002	0.012 ± 0.002
14-Jun-16	0.010 ± 0.002	0.012 ± 0.002	0.012 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
21-Jun-16	0.016 ± 0.002	0.014 ± 0.002	0.017 ± 0.002	0.012 ± 0.002	0.014 ± 0.002
28-Jun-16	<0.008	0.006 ± 0.002	<0.008	<0.008	<0.008
Average:	<0.014	0.014 ± 0.001	<0.015	<0.013	<0.012

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

<u>Sample Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H08	<0.0311	<0.0091	<0.0013	<0.0007	0.0138 ± 0.0024
H12	0.1558 ± 0.0086	<0.0158	<0.0010	<0.0008	<0.0268
H14	<0.0368	<0.0101	<0.0015	<0.0012	0.0150 ± 0.0029
H30	0.1188 ± 0.0106	<0.0260	<0.0016	<0.0012	<0.0372
H34	0.1546 ± 0.0122	<0.0206	<0.0017	<0.0011	0.0386 ± 0.0139

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
H15	05-Apr-16	<157	352 ± 25	<3	<3	<7	<4	<7	<6	<4	<3	<3	<5
	12-Apr-16	<153	378 ± 26	<3	<3	<6	<3	<8	<6	<3	<3	<3	<10
	19-Apr-16	<152	380 ± 23	<3	<3	<5	<3	<6	<5	<3	<3	<3	<8
	26-Apr-16	<161	371 ± 26	<3	<3	<6	<3	<7	<6	<3	<3	<3	<11
	04-May-16	<163	372 ± 23	<2	<2	<5	<3	<6	<4	<3	<2	<3	<9
	10-May-16	<156	351 ± 27	<3	<3	<8	<3	<7	<6	<4	<3	<3	<6
	17-May-16	<156	390 ± 27	<3	<3	<6	<4	<7	<5	<4	<3	<4	<11
	24-May-16	<172	368 ± 26	<3	<3	<6	<4	<7	<5	<3	<3	<3	<11
	31-May-16	<172	334 ± 20	<2	<2	<5	<3	<5	<4	<3	<2	<2	<7
	08-Jun-16	<171	413 ± 28	<3	<3	<7	<4	<8	<5	<4	<3	<3	<11
	14-Jun-16	<150	365 ± 26	<3	<3	<6	<3	<8	<5	<3	<3	<3	<10
	21-Jun-16	<150	333 ± 25	<3	<3	<6	<3	<8	<5	<3	<3	<3	<11
	28-Jun-16	<159	369 ± 25	<3	<3	<6	<4	<7	<5	<3	<3	<3	<10
H59	19-Apr-16	<161	355 ± 26	<3	<4	<8	<3	<7	<6	<4	<3	<3	<5
	10-May-16	<156	385 ± 21	<3	<2	<5	<3	<5	<4	<3	<2	<3	<4
	08-Jun-16	<171	431 ± 28	<3	<3	<6	<4	<6	<6	<4	<3	<3	<6

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

(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)

<u>Sample Site</u>	<u>Collection 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>
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These samples were previously collected.

4.a.1. CRUSTACEA - Stone Crab - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection 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	17-May-16	1376 ± 124	<21	<18	<37	<16	<42	<20	<22	<369	<66

H59 This sample was previously collected.

4.a.2. FISH - Sheepshead - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection 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	24-May-16	1370 ± 173	<22	<22	<47	<26	<57	<23	<28	<428	<115

H59 This sample was previously collected.

4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>	<u>Pb-212</u>	<u>Ra-226</u>	<u>Ra-228</u>
H51	19-Apr-16	2263 ± 90	2876 ± 151	<12	<10	<13	<981	<21	<268	<50
	10-May-16	1838 ± 91	3783 ± 199	<20	<13	<16	1151 ± 406	<38	<328	<63
	08-Jun-16	1435 ± 59	3348 ± 141	<10	<9	<9	291 ± 64	<17	<199	<31
H52	19-Apr-16	1431 ± 76	4616 ± 222	<14	<14	<17	<1090	<25	<321	<65
	10-May-16	994 ± 65	2874 ± 164	<16	<12	<15	<1016	<26	<307	<71
	08-Jun-16	916 ± 58	3479 ± 176	<16	<11	<13	<966	<27	<286	<54
H59	19-Apr-16	653 ± 53	3521 ± 174	<13	<11	<15	<950	<24	<273	<59
	10-May-16	534 ± 54	3473 ± 184	<17	<12	<13	<1177	<28	<286	<60
	08-Jun-16	605 ± 52	3834 ± 196	<13	<12	<17	<1183	<20	<279	<64

ST. LUCIE SITE

Supplemental Sampling

Second Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	9	9
2. Airborne			
2.a. Air Iodines	Weekly	3	39
2.b. Air Particulates	Weekly	3	39
3. Waterborne			
3.a. Surface Water	Monthly	2	6
3.b. Shoreline Sediment	Semiannually	4	1
3.c. Beach Sand	Semiannually	3	0
3.d. Ground Water	Quarterly	10	10
4. Ingestion			
4.a. Garden Crop	Annually	1	1
4.b. Citrus	Annually	1	0
4.c. Milk	Quarterly	1	0
			Total: 105

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 not 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 - TLD's - (μ R/hour)

<u>Sample Site</u>	<u>Deployment 15-Mar-16 Collection 07-Jun-16</u>
H08	3.71 \pm 0.04
H09	3.55 \pm 0.37
H12	9.40 \pm 1.08
H14	3.65 \pm 0.16
H33	3.60 \pm 0.27
H34	3.32 \pm 0.06
H60	3.39 \pm 0.30
H61	4.58 \pm 0.17
H62	3.76 \pm 0.24

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

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
05-Apr-16	<0.03	<0.03	<0.03
12-Apr-16	<0.03	<0.03	<0.03
19-Apr-16	<0.03	<0.03	<0.03
26-Apr-16	<0.03	<0.03	<0.03
04-May-16	<0.02	<0.02	<0.02
10-May-16	<0.03	<0.03	<0.04
17-May-16	<0.02	<0.02	<0.03
24-May-16	<0.02	<0.02	<0.02
31-May-16	<0.02	<0.02	<0.02
07-Jun-16	<0.02	<0.02	<0.02
14-Jun-16	<0.02	<0.02	<0.02
21-Jun-16	<0.02	<0.02	<0.02
28-Jun-16	<0.02	<0.02	<0.02

2.b. AIR PARTICULATES - GROSS BETA - (pCi/m³)

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
05-Apr-16	0.011 ± 0.002	0.013 ± 0.002	0.014 ± 0.002
12-Apr-16	0.019 ± 0.002	0.021 ± 0.003	0.012 ± 0.002
19-Apr-16	0.017 ± 0.002	0.015 ± 0.002	0.013 ± 0.002
26-Apr-16	0.019 ± 0.002	0.020 ± 0.003	0.019 ± 0.003
04-May-16	0.016 ± 0.002	0.018 ± 0.002	0.014 ± 0.002
10-May-16	0.018 ± 0.003	0.019 ± 0.003	0.020 ± 0.003
17-May-16	0.019 ± 0.002	0.017 ± 0.002	0.019 ± 0.003
24-May-16	0.009 ± 0.002	0.012 ± 0.002	0.011 ± 0.002
31-May-16	0.015 ± 0.002	0.010 ± 0.002	0.011 ± 0.002
07-Jun-16	0.009 ± 0.002	0.012 ± 0.002	0.008 ± 0.002
14-Jun-16	0.012 ± 0.002	0.010 ± 0.002	0.006 ± 0.002
21-Jun-16	0.014 ± 0.002	0.015 ± 0.002	0.008 ± 0.002
28-Jun-16	0.009 ± 0.002	0.007 ± 0.002	0.004 ± 0.002
Average:	0.014 ± 0.001	0.015 ± 0.001	0.012 ± 0.001

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

<u>Sample Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H09	0.1557 ± 0.0115	<0.0243	<0.0013	<0.0013	<0.0464
H32	0.1307 ± 0.0127	<0.0342	<0.0016	<0.0014	<0.0376
H33	0.1574 ± 0.0107	<0.0229	<0.0014	<0.0013	0.0112 ± 0.0028

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	I-131	Cs-134	Cs-137	Ba-140
									Nb-95 (A)				La-140 (B)
H13	18-Apr-16	<161	298 ± 23	<3	<3	<7	<3	<7	<5	<5	<3	<3	<4
	10-May-16	<156	327 ± 24	<3	<3	<7	<3	<7	<4	<4	<3	<3	<6
	08-Jun-16	<171	306 ± 24	<3	<3	<7	<3	<7	<5	<4	<3	<3	<10
H36	18-Apr-16	<152	374 ± 27	<4	<4	<7	<4	<8	<6	<5	<3	<4	<6
	10-May-16	<156	410 ± 27	<3	<3	<7	<4	<6	<5	<4	<3	<3	<6
	08-Jun-16	<171	360 ± 21	<3	<2	<5	<3	<6	<4	<3	<2	<3	<7

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

(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 Site	Collection Date	Be-7	K-40	Co-58	Co-60	Cs-134	Cs-137	Pb-210	Ra-226	Th-232	Others
H13	18-Apr-16	<72	697 ± 45	<7	<6	<7	<8	512 ± 76	589 ± 56	88 ± 7	U238: 261 ± 20

3.c. BEACH SAND - (pCi/kg, dry weight)

Sample Site	Collection Date	Be-7	K-40	Co-58	Co-60	Cs-134	Cs-137	Pb-210	Ra-226	Th-232	Others
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These samples were previously collected.

3.d. GROUND WATER (pCi/L)

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H70	18-Apr-16	<152	<45	<3	<3	<7	<3	<8	<5	<4	<3	<3	<6
H71	18-Apr-16	575 ± 60	400 ± 27	<3	<4	<7	<4	<8	<5	<4	<4	<3	<6
H72	18-Apr-16	<152	310 ± 24	<3	<4	<7	<4	<8	<6	<5	<3	<4	<7
H73	18-Apr-16	<161	80 ± 13	<3	<4	<6	<3	<7	<6	<4	<3	<4	<7
H74	18-Apr-16	<161	348 ± 26	<3	<3	<7	<3	<8	<5	<4	<3	<4	<7
H75	18-Apr-16	<152	302 ± 24	<3	<3	<7	<3	<7	<5	<4	<3	<3	<6
H76	18-Apr-16	<152	<36	<3	<3	<7	<3	<7	<6	<4	<3	<3	<7
H77	18-Apr-16	<152	<42	<3	<3	<7	<4	<8	<6	<4	<3	<4	<8
H78	18-Apr-16	<152	28 ± 6	<2	<2	<4	<2	<4	<4	<3	<2	<2	<5
H79	18-Apr-16	<152	<37	<3	<3	<7	<3	<7	<6	<4	<3	<3	<6

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

(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.a. GARDEN CROP - Collard Greens - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H41	05-Apr-16	457 ± 28	4746 ± 162	<7	<6	20 ± 2

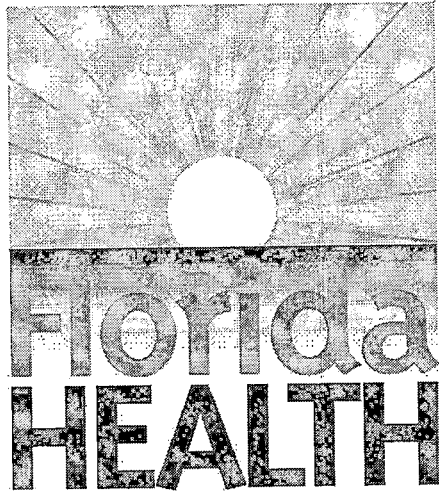
4.b. CITRUS - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H23	This sample was previously collected.					

4.c. MILK - (pCi/L)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140</u> <u>La-140</u> (A)
H101	There was no sample available during the quarter.					

(A) - This tabulated LLD value is for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity.



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

THIRD QUARTER 2016

BUREAU OF RADIATION CONTROL

2016
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
ST. LUCIE PLANT - UNITS 1 & 2

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Third Quarter, 2016

Sample Type	Collection Frequency	Locations Sampled	Number of Samples
1. Direct Radiation	Quarterly	27	25
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	0
4.a.2. Fish	Semiannually	2	1
4.b. Broadleaf Vegetation	Monthly	3	9
			Total: 183

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 not 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.

The marine fauna listed in this report were collected in part, under Florida FWC SAL030.

1. DIRECT RADIATION - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 07-Jun-16 Collection 07-Sep-16	Sample Site	Deployment 07-Jun-16 Collection 07-Sep-16
N-1	3.37 ± 0.35	SW-2	3.38 ± 0.39
NNW-5	3.36 ± 0.25	SW-5	3.93 ± 0.28
NNW-10	4.13 ± 0.34	SW-10	(B)
NW-5	3.30 ± 0.13	SSW-2	3.45 ± 0.23
NW-10	4.38 ± 0.21	SSW-5	3.99 ± 0.63
WNW-2	3.34 ± 0.12	SSW-10	4.74 ± 0.17
WNW-5	3.45 ± 0.36	S-5	4.36 ± 0.20
WNW-10	3.41 ± 0.33	S-10	3.45 ± 0.34
W-2	3.21 ± 0.05	S/SSE-10	3.44 ± 0.41
W-5	3.80 ± 0.23	SSE-5	3.31 ± 0.32
W-10	(A)	SSE-10	3.58 ± 0.27
WSW-2	3.53 ± 0.27	SE-1	3.38 ± 0.27
WSW-5	3.48 ± 0.08	H-32	3.78 ± 0.18
WSW-10	3.06 ± 0.42		

(A) TLD missing upon collection.

(B) TLD missing upon collection.

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

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
05-Jul-16	<0.02	<0.02	<0.02	<0.02	<0.02
13-Jul-16	<0.02	<0.02	<0.02	<0.02	<0.02
19-Jul-16	<0.02	<0.02	<0.02	<0.02	<0.02
26-Jul-16	<0.02	<0.02	<0.02	<0.02	<0.02
02-Aug-16	<0.02	<0.02	<0.02	<0.02	<0.02
10-Aug-16	<0.02	<0.02	<0.02	<0.02	<0.02
16-Aug-16	<0.02	<0.02	<0.02	<0.02	<0.02
23-Aug-16	<0.02	<0.02	<0.02	<0.02	<0.02
30-Aug-16	<0.02	<0.02	<0.02	<0.02	<0.02
07-Sep-16	<0.02	<0.02	<0.02	<0.02	<0.02
14-Sep-16	<0.02	<0.02	<0.02(A)	<0.02	<0.02
20-Sep-16	<0.02	<0.02	<0.02	<0.02	<0.02
26-Sep-16	<0.02	<0.03	<0.02	<0.02	<0.02

(A) Hose coupling came apart during sample period, unknown actual volume.

2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m³)

Collection Date	H08	H12	H14	H30	H34
05-Jul-16	0.009 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.006 ± 0.002	0.009 ± 0.002
13-Jul-16	0.014 ± 0.002	0.016 ± 0.002	0.013 ± 0.002	0.012 ± 0.002	0.018 ± 0.002
19-Jul-16	0.011 ± 0.002	0.010 ± 0.002	0.011 ± 0.002	0.011 ± 0.002	0.010 ± 0.002
26-Jul-16	0.011 ± 0.002	0.009 ± 0.002	0.011 ± 0.002	0.008 ± 0.002	0.010 ± 0.002
02-Aug-16	0.014 ± 0.002	0.019 ± 0.002	0.013 ± 0.002	0.014 ± 0.002	0.013 ± 0.002
10-Aug-16	0.007 ± 0.002	0.011 ± 0.002	0.016 ± 0.002	0.011 ± 0.002	0.013 ± 0.002
16-Aug-16	0.005 ± 0.002	0.007 ± 0.002	0.005 ± 0.002	0.011 ± 0.002	0.012 ± 0.002
23-Aug-16	0.013 ± 0.002	0.014 ± 0.002	0.015 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
30-Aug-16	0.006 ± 0.002	0.011 ± 0.002	0.009 ± 0.002	0.008 ± 0.002	0.009 ± 0.002
07-Sep-16	0.014 ± 0.002	0.012 ± 0.002	0.012 ± 0.002	0.010 ± 0.002	0.010 ± 0.002
14-Sep-16	0.006 ± 0.002	0.012 ± 0.002	<0.009 (A)	0.009 ± 0.002	0.008 ± 0.002
20-Sep-16	0.005 ± 0.002	0.006 ± 0.002	0.007 ± 0.002	0.010 ± 0.002	0.009 ± 0.002
26-Sep-16	0.006 ± 0.002	0.005 ± 0.002	0.009 ± 0.002	0.006 ± 0.002	<0.010
Average:	0.009 ± 0.001	0.011 ± 0.001	<0.011	0.010 ± 0.001	<0.012

(A) Hose coupling came apart during sample period, unknown actual volume.

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

Sample Site	Be-7	K-40	Cs-134	Cs-137	Pb-210
H08	0.1521 ± 0.0149	<0.0240	<0.0017	<0.0011	<0.0123
H12	0.1816 ± 0.0158	<0.0126	<0.0017	<0.0011	0.0111 ± 0.0029
H14	0.1919 ± 0.0190	<0.0260	<0.0016	<0.0012	<0.0382
H30	0.1086 ± 0.0136	<0.0194	<0.0015	<0.0011	<0.0126
H34	0.1626 ± 0.0178	<0.0204	<0.0016	<0.0014	<0.0380

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H15	05-Jul-16	<149	416 ± 28	<3	<3	<6	<4	<7	<5	<3	<3	<3	<12
	13-Jul-16	<149	386 ± 27	<3	<3	<7	<3	<6	<6	<5	<3	<3	<4
	19-Jul-16	<167	382 ± 26	<3	<3	<7	<3	<7	<6	<3	<3	<4	<10
	26-Jul-16	<167	384 ± 27	<3	<3	<7	<4	<7	<5	<4	<3	<3	<6
	02-Aug-16	<167	369 ± 26	<3	<3	<6	<3	<8	<6	<4	<3	<3	<4
	10-Aug-16	<156	400 ± 42	<6	<7	<18	<6	<14	<13	<23	<6	<6	<17
	15-Aug-16	<156	392 ± 27	<3	<4	<8	<3	<8	<7	<2	<3	<3	<7
	23-Aug-16	<158	394 ± 42	<6	<7	<13	<6	<14	<11	<11	<5	<6	<10
	30-Aug-16	<158	416 ± 43	<6	<7	<13	<6	<15	<11	<6	<5	<6	<16
	08-Sep-16	<158	328 ± 26	<3	<3	<7	<3	<6	<6	<5	<3	<3	<5
	14-Sep-16	<158	343 ± 26	<3	<3	<7	<3	<7	<4	<3	<3	<3	<12
	20-Sep-16	<150	382 ± 27	<3	<3	<6	<3	<7	<6	<4	<3	<4	<6
	26-Sep-16	<150	331 ± 37	<6	<6	<11	<6	<12	<9	<6	<6	<7	<14
H59	13-Jul-16	<149	369 ± 26	<3	<3	<6	<4	<7	<5	<5	<3	<3	<5
	15-Aug-16	<156	444 ± 45	<6	<6	<15	<6	<16	<12	<23	<5	<6	<17
	08-Sep-16	<158	342 ± 25	<3	<3	<6	<3	<8	<5	<5	<3	<3	<4

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

(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 Site	Collection Date	Be-7	K-40	Co-58	Co-60	Cs-134	Cs-137	Pb-210	Ra-226	Th-232	U-235	U-238
H15	15-Aug-16	<82	1022 ± 58	<8	<7	<7	<8	256 ± 58	590 ± 61	96 ± 8	37 ± 4	276 ± 22
H59	15-Aug-16	<74	178 ± 24	<6	<6	<7	<7	379 ± 64	450 ± 54	57 ± 6	28 ± 3	228 ± 11

4.a.1. CRUSTACEA - (pCi/kg, wet weight)

Sample Site	Collection Date	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226	Ra-228
H15	This sample not yet collected.										
H59	This sample not yet collected.										

4.a.2. FISH - Catfish - (pCi/kg, wet weight)

Sample Site	Collection Date	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	Ra-226	Ra-228
H15	This sample not yet collected.										
H59	08-Sep-16	2255 ± 127	<16	<17	<35	<15	<35	<17	<16	<322	<66

4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137	Pb-210	Pb-212	Ra-226	Ra-228
H51	13-Jul-16	812 ± 58	5049 ± 225	<19	<14	<14	<1016	<20	<310	<65
	15-Aug-16	887 ± 42	4320 ± 158	<9	<7	<9	238 ± 62	<15	<171	<32
	08-Sep-16	1799 ± 93	3592 ± 189	<21	<12	<18	<1166	<31	<345	<59
H52	13-Jul-16	688 ± 39	2960 ± 125	<12	<7	7 ± 2	<252	<15	<180	<35
	15-Aug-16	740 ± 39	5196 ± 187	<10	<9	<10	<260	<16	<181	<35
	08-Sep-16	653 ± 54	5220 ± 223	<18	<10	<13	<943	<28	<313	<61
H59	13-Jul-16	1273 ± 74	4125 ± 197	<21	<12	<14	<1100	<22	<294	<59
	15-Aug-16	1741 ± 83	3784 ± 185	<15	<10	<13	<1043	<23	<289	<58
	08-Sep-16	1086 ± 61	3552 ± 168	<15	<10	<11	<842	<22	<236	<50

ST. LUCIE SITE
 Supplemental Sampling
 Third Quarter, 2016

Sample Type	Collection Frequency	Locations Sampled	Number of Samples
1. Direct Radiation	Quarterly	9	9
2. Airborne			
2.a. Air Iodines	Weekly	3	39
2.b. Air Particulates	Weekly	3	39
3. Waterborne			
3.a. Surface Water	Monthly	2	6
3.b. Shoreline Sediment	Semiannually	4	4
3.c. Beach Sand	Semiannually	3	3
3.d. Ground Water	Quarterly	10	10
4. Ingestion			
4.a. Garden Crops	Annually	1	0
4.b. Citrus	Annually	1	0
4.c. Milk	Quarterly	1	0
			Total: 110

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 not 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 - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 07-Jun-16 Collection 07-Sep-16
H08	3.88 ± 0.23
H09	3.90 ± 0.15
H12	10.00 ± 0.70
H14	4.09 ± 0.25
H33	3.97 ± 0.24
H34	3.51 ± 0.39
H60	3.77 ± 0.20
H61	4.79 ± 0.53
H62	4.01 ± 0.26

2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m^3)

Collection Date	H09	H32	H33
05-Jul-16	<0.02	<0.02	<0.02
13-Jul-16	<0.02	<0.02	<0.02
19-Jul-16	<0.02	<0.01	<0.02
26-Jul-16	<0.02	<0.02	<0.02
02-Aug-16	<0.02	<0.02	<0.02
10-Aug-16	<0.02	<0.02	<0.02
16-Aug-16	<0.02	<0.02	<0.02
23-Aug-16	<0.02	<0.02	<0.02
30-Aug-16	<0.02	<0.02	<0.02
07-Sep-16	<0.02	<0.02	<0.02
14-Sep-16	<0.02	<0.02	<0.02
20-Sep-16	<0.02	<0.02	<0.02
26-Sep-16	<0.02	<0.02	<0.02

2.b. AIR PARTICULATES - GROSS BETA - (pCi/m³)

Collection Date	H09	H32	H33
05-Jul-16	0.014 ± 0.002	0.008 ± 0.002	0.006 ± 0.002
13-Jul-16	0.012 ± 0.002	0.013 ± 0.002	0.016 ± 0.002
19-Jul-16	0.011 ± 0.002	<0.029(A)	0.009 ± 0.002
26-Jul-16	0.010 ± 0.002	0.011 ± 0.002	0.011 ± 0.002
02-Aug-16	0.014 ± 0.002	0.018 ± 0.002	0.016 ± 0.002
10-Aug-16	0.013 ± 0.002	0.014 ± 0.002	0.012 ± 0.002
16-Aug-16	0.008 ± 0.002	0.008 ± 0.002	0.010 ± 0.002
23-Aug-16	0.012 ± 0.002	0.013 ± 0.002	0.014 ± 0.002
30-Aug-16	0.012 ± 0.002	0.010 ± 0.002	0.005 ± 0.002
07-Sep-16	0.008 ± 0.002	0.009 ± 0.002	0.008 ± 0.002
14-Sep-16	0.007 ± 0.002	0.010 ± 0.002	<0.010
20-Sep-16	0.007 ± 0.002	0.008 ± 0.002	<0.010
26-Sep-16	0.008 ± 0.002	0.009 ± 0.002	<0.009
Average:	0.010 ± 0.001	<0.012	<0.010

(A) Pump off upon arrival; failed and was replaced. Estimated run time 47.7 out of 139 hours.

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

Sample Site	Be-7	K-40	Cs-134	Cs-137	Pb-210
H09	0.1495 ± 0.0182	<0.0338	<0.0016	<0.0013	<0.0421
H32	0.1721 ± 0.0187	<0.0318	<0.0019	<0.0013	<0.0369
H33	0.1431 ± 0.0144	<0.0221	<0.0015	<0.0012	0.0077 ± 0.0026

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H13	13-Jul-16	<148	273 ± 22	<3	<3	<7	<4	<8	<5	<5	<3	<3	<5
	15-Aug-16	<156	324 ± 39	<7	<6	<17	<7	<13	<12	<21	<6	<6	<14
	08-Sep-16	<158	348 ± 40	<6	<6	<9	<6	<13	<10	<9	<5	<7	<10
H36	13-Jul-16	<149	369 ± 26	<3	<3	<8	<3	<8	<6	<5	<3	<3	<4
	15-Aug-16	8886 ± 158	391 ± 27	<3	<4	<8	<3	<8	<6	<13	<3	<3	<8
	08-Sep-16	<158	378 ± 41	<6	<7	<12	<7	<14	<11	<9	<6	<6	<10

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

(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 Site	Collection Date	Be-7	K-40	Co-58	Co-60	Cs-134	Cs-137	Pb-210	Ra-226	Th-232	U-235	U-238
H13	16-Aug-16	248 ± 40	948 ± 80	<12	<12	<12	<13	826 ± 350	974 ± 114	86 ± 14	61 ± 7	471 ± 62
H16	16-Aug-16	<102	308 ± 49	<12	<10	<10	<10	669 ± 271	285 ± 70	41 ± 10	18 ± 4	208 ± 46
H19	15-Aug-16	<87	1294 ± 67	<8	<8	<8	<8	429 ± 75	754 ± 75	131 ± 9	47 ± 5	387 ± 24
H36	16-Aug-16	438 ± 68	5120 ± 239	<21	44 ± 5	<18	39 ± 7	4911 ± 1216	1099 ± 519	411 ± 26	<29	1160 ± 75

3.c. BEACH SAND - (pCi/kg, dry weight)

Sample Site	Collection Date	Be-7	K-40	Co-58	Co-60	Cs-134	Cs-137	Pb-210	Ra-226	Th-232	U-235	U-238
H15	15-Aug-16	<111	498 ± 61	<13	<13	<11	<12	<1005	798 ± 104	119 ± 15	50 ± 6	290 ± 57
H16	16-Aug-16	58 ± 15	171 ± 26	<7	<6	<6	<7	182 ± 51	496 ± 55	64 ± 7	31 ± 3	129 ± 17
H19	15-Aug-16	108 ± 33	260 ± 50	<13	<11	<9	<10	<872	541 ± 85	<69	34 ± 5	206 ± 46

3.d. GROUND WATER (pCi/L)

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H70	28-Jul-16	146 ± 54	<58	<3	<3	<7	<3	<7	<5	<4	<3	<3	<12
H71	28-Jul-16	416 ± 60	457 ± 46	<7	<7	<15	<7	<14	<10	<7	<6	<7	<16
H72	28-Jul-16	<167	299 ± 42	<6	<5	<13	<8	<17	<12	<7	<6	<7	<18
H73	28-Jul-16	<167	74 ± 14	<3	<3	<7	<4	<8	<6	<4	<4	<3	<9
H74	28-Jul-16	<167	351 ± 43	<6	<7	<13	<6	<13	<11	<9	<5	<6	<11
H75	28-Jul-16	<167	273 ± 23	<4	<3	<6	<4	<7	<5	<5	<3	<3	<5
H76	28-Jul-16	<167	<45	<3	<3	<6	<3	<7	<5	<5	<3	<4	<6
H77	28-Jul-16	<167	<76	<6	<5	<10	<6	<12	<8	<8	<5	<6	<9
H78	28-Jul-16	<167	43 ± 10	<3	<4	<7	<3	<7	<6	<5	<3	<4	<5
H79	28-Jul-16	<167	<44	<3	<3	<6	<3	<8	<5	<5	<3	<3	<5

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

(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.a. GARDEN CROPS - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137
H41	This sample was previously collected.					

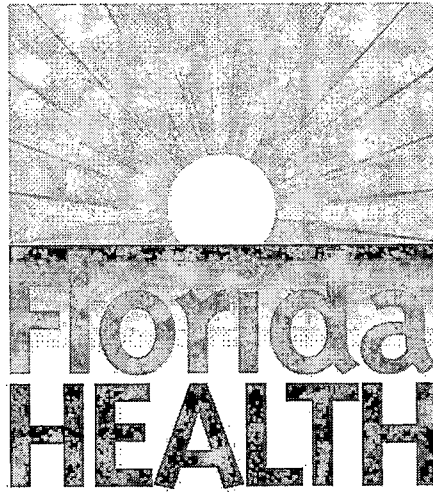
4.b. CITRUS - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137
H23	This sample was previously collected.					

4.c. MILK - (pCi/L)

Sample Site	Collection Date	K-40	I-131	Cs-134	Cs-137	Ba-140 La-140 (A)
H101	There was no sample available during the quarter.					

(A) - This tabulated LLD value is for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE SITE

FOURTH QUARTER 2016

BUREAU OF RADIATION CONTROL

**2016
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
ST. LUCIE PLANT - UNITS 1 & 2**

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Fourth Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	27	27
2. Airborne			
2.a. Air Iodines	Weekly	5	63
2.b. Air Particulates	Weekly	5	63
3. Waterborne			
3.a. Surface Water	Weekly	1	13
	Monthly	1	3
3.b. Shoreline Sediment	Semiannually	2	0
4. Ingestion			
4.a. Fish and Invertebrates			
4.a.1. Crustacea	Semiannually	2	1
4.a.2. Fish	Semiannually	2	1
4.b. Broadleaf Vegetation	Monthly	3	9
			Total: 180

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 not 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.

The marine fauna listed in this report were collected in part, under Florida FWC SAL030.

1. DIRECT RADIATION - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 07-Sep-16 Collection 08-Dec-16	Sample Site	Deployment 07-Sep-16 Collection 08-Dec-16
N-1	3.02 ± 0.12	SW-2	2.91 ± 0.15
NNW-5	2.89 ± 0.19	SW-5	3.42 ± 0.04
NNW-10	3.68 ± 0.22	SW-10	3.04 ± 0.05
NW-5	2.85 ± 0.29	SSW-2	2.94 ± 0.27
NW-10	3.99 ± 0.33	SSW-5	3.46 ± 0.27
WNW-2	2.92 ± 0.13	SSW-10	4.27 ± 0.20
WNW-5	$7.93 \pm 6.51(\text{A})$	S-5	3.57 ± 0.12
WNW-10	2.85 ± 0.29	S-10	2.91 ± 0.35
W-2	2.81 ± 0.11	S/SSE-10	2.82 ± 0.02
W-5	3.35 ± 0.15	SSE-5	2.86 ± 0.33
W-10	2.65 ± 0.16	SSE-10	3.00 ± 0.15
WSW-2	2.99 ± 0.10	SE-1	2.89 ± 0.17
WSW-5	2.96 ± 0.18	H-32	3.20 ± 0.15
WSW-10	2.68 ± 0.20		

(A) Based upon these values, this TLD was removed from service pending further analysis.

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

<u>Collection Date</u>	<u>H08</u>	<u>H12</u>	<u>H14</u>	<u>H30</u>	<u>H34</u>
04-Oct-16	<0.03	<0.03	<0.03	<0.03	<0.03
10-Oct-16	<0.02	<0.02	<0.02	<0.01(A)	<0.02
18-Oct-16	<0.03	<0.03	<0.03	(B)	<0.03
24-Oct-16	<0.02	<0.02	<0.02	(C)	<0.02
01-Nov-16	<0.01	<0.01	<0.01	<0.02	<0.01
09-Nov-16	<0.01	<0.01	<0.01	<0.01	<0.01
14-Nov-16	<0.04	<0.04	<0.04	<0.04	<0.04
22-Nov-16	<0.01	<0.01	<0.01	<0.03(D)	<0.01
30-Nov-16	<0.02	<0.02	<0.02	<0.02	<0.02
08-Dec-16	<0.01	<0.01	<0.01	<0.01	<0.01
14-Dec-16	<0.02	<0.02	<0.02	<0.02	<0.02
22-Dec-16	<0.01	<0.01	<0.01	<0.01	<0.01
29-Dec-16	<0.02	<0.02	<0.02	<0.02	<0.02

(A) No power. Estimated run time 60 out of 145 hours.

(B) No power for sampling period, no sample collected.

(C) No power for sampling period, no sample collected.

(D) Vacuum pump failed and was replaced. Estimated run time 108.5 out of 193.1 hours.

2.b.1. AIR PARTICULATES - GROSS BETA - (pCi/m³)

Collection Date	H08	H12	H14	H30	H34
04-Oct-16	<0.007	<0.007	<0.006	<0.007	<0.007
10-Oct-16	0.009 ± 0.002	0.012 ± 0.002	0.009 ± 0.002	<0.024(A)	0.006 ± 0.002
18-Oct-16	0.009 ± 0.002	0.014 ± 0.002	0.015 ± 0.002	(B)	0.005 ± 0.002
24-Oct-16	0.015 ± 0.003	0.017 ± 0.003	0.014 ± 0.003	(C)	0.016 ± 0.003
01-Nov-16	0.017 ± 0.002	0.023 ± 0.002	0.023 ± 0.002	0.014 ± 0.003	0.021 ± 0.002
09-Nov-16	0.020 ± 0.002	0.019 ± 0.002	0.020 ± 0.002	0.014 ± 0.002	0.008 ± 0.002
14-Nov-16	0.030 ± 0.004	0.029 ± 0.004	0.027 ± 0.003	0.027 ± 0.003	0.021 ± 0.003
22-Nov-16	0.012 ± 0.002	0.017 ± 0.002	0.031 ± 0.003	0.036 ± 0.004(D)	0.007 ± 0.002
30-Nov-16	0.020 ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.018 ± 0.002	0.025 ± 0.002
08-Dec-16	0.018 ± 0.002	0.027 ± 0.003	0.012 ± 0.002	0.015 ± 0.002	0.017 ± 0.002
14-Dec-16	0.017 ± 0.003	0.018 ± 0.003	0.013 ± 0.002	0.013 ± 0.003	0.023 ± 0.003
22-Dec-16	0.011 ± 0.002	0.008 ± 0.002	0.007 ± 0.002	0.010 ± 0.002	0.010 ± 0.002
29-Dec-16	0.008 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.008 ± 0.002	0.009 ± 0.002
Average:	<0.015	<0.017	<0.016	<0.017	<0.013

(A) No power. Estimated run time 60 out of 145 hours.

(B) No power for sampling period, no sample collected.

(C) No power for sampling period, no sample collected.

(D) Vacuum pump failed and was replaced. Estimated run time 108.5 out of 193.1 hours.

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

Sample Site	Be-7	K-40	Cs-134	Cs-137	Pb-210
H08	0.1446 ± 0.0097	<0.0189	<0.0012	<0.0010	0.0153 ± 0.0037
H12	0.1623 ± 0.0103	<0.0156	<0.0012	<0.0010	0.0138 ± 0.0037
H14	0.1639 ± 0.0123	<0.0234	<0.0015	<0.0011	<0.0380
H30	0.0984 ± 0.0096	<0.0207	<0.0017	<0.0010	0.0150 ± 0.0046
H34	0.1547 ± 0.0122	<0.0216	<0.0015	<0.0011	<0.0350

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H15	04-Oct-16	<161	467 ± 45	<7	<6	<12	<5	<13	<12	<10	<6	<6	<10
	10-Oct-16	<161	380 ± 27	<3	<3	<7	<3	<8	<6	<4	<3	<3	<4
	18-Oct-16	<155	335 ± 42	<6	<6	<12	<7	<15	<9	<7	<6	<7	<10
	24-Oct-16	823 ± 38	392 ± 27	<3	<3	<7	<3	<7	<5	<5	<3	<4	<5
	01-Nov-16	<158	350 ± 25	<3	<3	<6	<3	<7	<5	<3	<3	<3	<9
	09-Nov-16	<158	429 ± 28	<3	<3	<6	<4	<7	<5	<3	<3	<3	<10
	14-Nov-16	<154	398 ± 43	<6	<6	<13	<6	<16	<10	<12	<5	<7	<11
	22-Nov-16	<163	413 ± 43	<7	<6	<16	<7	<15	<11	<19	<5	<7	<14
	30-Nov-16	<163	471 ± 46	<6	<7	<14	<6	<15	<11	<9	<5	<7	<9
	07-Dec-16	<162	370 ± 26	<3	<3	<7	<3	<7	<5	<6	<3	<4	<5
	14-Dec-16	<162	414 ± 28	<3	<3	<7	<3	<7	<6	<3	<3	<4	<11
	22-Dec-16	<170	366 ± 26	<3	<3	<7	<4	<7	<5	<3	<3	<3	<10
29-Dec-16	<170	417 ± 28	<3	<3	<7	<3	<7	<5	<3	<3	<3	<11	
H59	18-Oct-16	<156	331 ± 25	<3	<3	<6	<3	<7	<6	<5	<3	<3	<5
	09-Nov-16	<164	429 ± 44	<6	<6	<15	<7	<15	<12	<17	<6	<6	<14
	07-Dec-16	<162	391 ± 42	<5	<7	<13	<7	<14	<11	<10	<6	<7	<9

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

(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 Site	Collection Date	<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	This sample was previously collected.										
H59	This sample was previously collected.										

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

Sample Site	Collection Date	<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	This sample not collected.										
H59	22-Dec-16	1633 ± 193	<27	<24	<45	<30	<56	<23	<26	<459	<122

4.a.2. FISH - Mixed Species - (pCi/kg, wet weight)

Sample Site	Collection Date	<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	08-Dec-16	2399 ± 169	<19	<16	<41	<23	<44	<19	<22	<420	<82
H59	This sample was previously collected.										

4.b. BROADLEAF VEGETATION - Brazilian Pepper - (pCi/kg, wet weight)

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137	Pb-210	Pb-212	Ra-226	Ra-228
H51	18-Oct-16	2160 ± 100	4960 ± 236	<20	<15	<21	<1270	15 ± 6	<355	<71
	09-Nov-16	1440 ± 87	5400 ± 243	<38	<13	<17	<1080	<28	<322	<67
	07-Dec-16	593 ± 51	3620 ± 182	<18	<10	<15	<1277	<27	<284	<63
H52	18-Oct-16	1460 ± 55	3260 ± 130	<10	<7	<10	204 ± 56	<16	<185	<31
	09-Nov-16	684 ± 37	3660 ± 136	<19	<7	<7	134 ± 42	<13	<149	<28
	07-Dec-16	863 ± 48	4964 ± 187	<14	<9	<10	321 ± 73	<19	<201	<41
H59	18-Oct-16	2170 ± 73	3710 ± 147	<11	<8	<9	290 ± 58	<18	<206	<34
	09-Nov-16	1480 ± 86	2700 ± 162	<39	<14	<15	<1180	<29	<331	<57
	07-Dec-16	769 ± 61	3138 ± 171	<21	<13	<17	<1084	<23	<292	<61

ST. LUCIE SITE
 Supplemental Sampling
 Fourth Quarter, 2016

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	9	9
2. Airborne			
2.a. Air Iodines	Weekly	3	34
2.b. Air Particulates	Weekly	3	34
3. Waterborne			
3.a. Surface Water	Monthly	2	6
3.b. Shoreline Sediment	Semiannually	4	0
3.c. Beach Sand	Semiannually	3	0
3.d. Ground Water	Quarterly	10	10
4. Ingestion			
4.a. Garden Crops	Annually	1	0
4.b. Citrus	Annually	1	0
4.c. Milk	Quarterly	1	0
			Total: 93

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 not 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 - TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 07-Sep-16
	Collection 08-Dec-16
H08	3.59 ± 0.27
H09	3.33 ± 0.16
H12	7.87 ± 0.35
H14	3.45 ± 0.17
H33	3.40 ± 0.08
H34	3.02 ± 0.20
H60	3.07 ± 0.07
H61	4.07 ± 0.09
H62	3.54 ± 0.18

2.a. IODINE-131 IN WEEKLY AIR CARTRIDGES - (pCi/m^3)

Collection Date	H09	H32	H33
04-Oct-16	<0.03	<0.03	<0.03
10-Oct-16	<0.02	<0.02	<0.02
18-Oct-16	<0.03	<0.03	<0.03
24-Oct-16	<0.02	<0.02	<0.02
01-Nov-16	<0.01	<0.01	<0.02(A)
09-Nov-16	<0.01	<0.01	(B)
14-Nov-16	<0.04	<0.04	(C)
22-Nov-16	<0.01	<0.01	(D)
30-Nov-16	<0.02	<0.02	(E)
08-Dec-16	<0.01	<0.01	(F)
14-Dec-16	<0.02	<0.02	<0.02
22-Dec-16	<0.01	<0.01	<0.01
29-Dec-16	<0.02	<0.02	<0.02

(A) No power. Estimated run time 122.8 out 194 hours.

(B) thru (F) No power for sampling period, no sample collected.

2.b. AIR PARTICULATES - GROSS BETA - (pCi/m³)

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
04-Oct-16	<0.007	<0.006	<0.006
10-Oct-16	0.008 ± 0.002	0.009 ± 0.002	0.009 ± 0.002
18-Oct-16	0.011 ± 0.002	0.009 ± 0.002	0.014 ± 0.002
24-Oct-16	0.018 ± 0.003	0.014 ± 0.002	0.018 ± 0.003
01-Nov-16	0.015 ± 0.002	0.019 ± 0.002	0.009 ± 0.003(A)
09-Nov-16	0.018 ± 0.002	0.019 ± 0.002	(B)
14-Nov-16	0.032 ± 0.004	0.022 ± 0.003	(C)
22-Nov-16	0.011 ± 0.002	0.015 ± 0.002	(D)
30-Nov-16	0.024 ± 0.002	0.024 ± 0.002	(E)
08-Dec-16	0.015 ± 0.002	0.021 ± 0.003	(F)
14-Dec-16	0.017 ± 0.003	0.017 ± 0.002	0.013 ± 0.003
22-Dec-16	0.012 ± 0.002	0.007 ± 0.002	0.011 ± 0.002
29-Dec-16	0.012 ± 0.002	0.009 ± 0.002	0.007 ± 0.002
Average:	<0.015	<0.015	<0.011

(A) No power. Estimated run time 122.8 out 194 hours.

(B) thru (F) No power for sampling period, no sample collected.

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

<u>Sample Site</u>	<u>Be-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H09	0.1289 ± 0.0111	<0.0194	<0.0014	<0.0011	<0.0426
H32	0.1379 ± 0.0112	<0.0234	<0.0013	<0.0011	<0.0380
H33	0.1161 ± 0.0102	<0.0191	<0.0015	<0.0014	0.0151 ± 0.0046

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

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H13	18-Oct-16	<156	318 ± 24	<3	<3	<7	<4	<8	<5	<4	<3	<3	<6
	09-Nov-16	<155	298 ± 24	<3	<3	<6	<3	<7	<4	<3	<3	<3	<10
	07-Dec-16	<162	301 ± 24	<3	<3	<6	<3	<8	<6	<4	<3	<3	<6
H36	18-Oct-16	<155	330 ± 40	<6	<7	<12	<7	<13	<11	<6	<5	<6	<12
	09-Nov-16	<155	356 ± 26	<3	<3	<6	<4	<7	<5	<3	<3	<3	<10
	07-Dec-16	<162	388 ± 27	<3	<3	<7	<3	<8	<5	<4	<3	<3	<8

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

(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 Site	Collection Date	<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>
H13	This sample was previously collected.									
H16	This sample was previously collected.									
H19	This sample was previously collected.									
H36	This sample was previously collected.									

3.c. BEACH SAND - (pCi/kg, dry weight)

Sample Site	Collection Date	<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>
H15	This sample was previously collected.									
H16	This sample was previously collected.									
H19	This sample was previously collected.									

3.d. GROUND WATER (pCi/L)

Sample Site	Collection Date	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95 Nb-95 (A)	I-131	Cs-134	Cs-137	Ba-140 La-140 (B)
H70	20-Oct-16	<158	367 ± 46	<7	<7	<14	<6	<15	<12	<12	<6	<6	<10
H71	20-Oct-16	423 ± 59	<82	<6	<6	<10	<7	<14	<9	<9	<5	<6	<10
H72	20-Oct-16	<161	415 ± 42	<7	<6	<11	<6	<14	<12	<11	<6	<7	<10
H73	20-Oct-16	<158	73 ± 12	<3	<3	<6	<4	<7	<6	<5	<3	<3	<4
H74	20-Oct-16	<158	265 ± 23	<4	<3	<6	<4	<7	<6	<6	<3	<3	<5
H75	20-Oct-16	<161	355 ± 40	<6	<5	<13	<8	<16	<10	<11	<6	<7	<9
H76	20-Oct-16	<157	<81	<4	<6	<12	<5	<12	<9	<11	<5	<6	<11
H77	20-Oct-16	<158	<34	<3	<3	<7	<3	<6	<6	<6	<3	<3	<5
H78	20-Oct-16	<161	68 ± 24	<5	<7	<13	<6	<14	<9	<11	<6	<5	<11
H79	20-Oct-16	<158	<37	<3	<3	<6	<3	<7	<6	<6	<3	<3	<5

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

(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.a. GARDEN CROPS - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H41	This sample was previously collected.					

4.b. CITRUS - (pCi/kg, wet weight)

<u>Sample Site</u>	<u>Collection Date</u>	<u>Be-7</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>
H23	This sample was previously collected.					

4.c. MILK - (pCi/L)

<u>Sample Site</u>	<u>Collection Date</u>	<u>K-40</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140</u> <u>La-140</u> (A)
H101	There was no sample available during the quarter.					

(A) - This tabulated LLD value is for Ba-140, either based on direct measurement of Ba-140 or based on ingrowth of La-140, whichever method yields the greater sensitivity

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ATTACHMENT C

RESULTS FROM THE 2016
INTERLABORATORY COMPARISON PROGRAM
CONDUCTED BY
DEPARTMENT OF ENERGY

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DOE-MAPEP 34 RESULTS

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
Matrix: RdF Air Filter (Bq/filter)				
MN54	4.828	4.53	A	3.17 – 5.89
CO57	2.736	2.94	A	2.06 – 3.82
CO60	4.118	4.02	A	2.81 - 5.23
ZN65	4.062	3.57	A	2.50 – 4.64
CS134	0.007	0	A	False Positive Test (within acceptance range)
CS137	2.396	2.30	A	1.61 - 2.99
Matrix: GrF Air Filter (Bq/filter)				
Gross Beta	0.90	0.79	A	0.40 – 1.19
Matrix: MaS Soil (Bq/kg)				
K40	618.83	607	A	425 – 789
MN54	1195	1160	A	812 – 1508
CO57	1003.17	992	A	694 - 1290
CO60	1186.67	1190	A	883 – 1547
ZN65	739	692	A	484 - 900
CS134	1020.09	1030	A	721 – 1339
CS137	1.562	0	N (*1)	False Positive Test (within acceptance range)
Matrix: MaW Water (Bq/L)				
H3	0.686	0	A	False Positive Test (within acceptance range)
MN54	11.967	11.1	A	7.8 - 14.4
CO57	-1.44	0	A	False Positive Test (within acceptance range)
CO60	12.644	11.8	A	8.3 - 15.3
ZN65	15.522	13.6	A	9.5 – 17.7
CS134	16.110	16.1	A	11.3 – 20.9
CS137	23.056	21.2	A	14.8 – 27.6
SR90	8.77	8.74	A	6.12 - 11.36
Matrix: RdV Vegetation (Bq/sample)				
MN54	-0.032	0	A	False Positive Test (within acceptance range)
CO57	10.58	11.8	A	8.3 - 15.3
CO60	0.031	0	A	False Positive Test (within acceptance range)

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ZN65	8.832	9.6	A	6.7 - 12.5
CS134	9.258	10.62	A	7.43 – 13.81
CS137	5.518	5.62	A	3.93 – 7.31

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

In MAPEP 32, the results for gamma on air filters, water, and vegetation matrices for those nuclides associated with nuclear power plant operation and using analytical methods used in the REMP are acceptable.

There was one relevant data flag for MAPEP 34 for the soil matrix:

*1) The Cs-137 result for the soil matrix for the MAPEP #34 Interlaboratory Crosscheck Program showed a "Not Acceptable" result for reporting a "false positive" on Cs-137 in soil. While the 661 keV peak was identified in 3 of 6 long counts, it was not identified in the normal 2-hour counts which are typical counting times for the power plant samples. Based on this information and BRC reporting protocols, the BRC would not have reported the false positive Cs-137 in normal sample analyses.

A Site Condition Report was generated to document the failure of the required Co-60 isotopic soil matrix analysis. The unknown result is the only failure this year for the two sets of interlaboratory crosscheck analyses. All other MAPEP ODCM required REMP Program unknowns reported by the BRC in 2016 were acceptable.

MAPEP Series #35 had no Interlaboratory crosscheck failures related to the normal nuclear site required isotopes including Cs-137 in soil. Also, a second Cs-137 in soil unknown was analyzed satisfactorily from the ERA MRAD-25 PT Program:

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
CS137 in Soil	6710	6700	A	5130 – 8620

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DOE-MAPEP 35 RESULTS

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
Matrix: RdF Air Filter (Bq/filter)				
MN54	2.953	2.75	A	1.93 – 3.58
CO57	2.396	2.48	A	1.74 – 3.22
CO60	3.276	3.26	A	2.28 – 4.24
ZN65	-0.029	0	A	False Positive Test (within acceptance range)
CS134	1.963	2.04	A	1.43 – 2.65
CS137	1.85	1.78	A	1.25 – 2.31
Matrix: GrF Air Filter (Bq/filter) - (No MAPEP Gross Beta, Unknown from ERA MRAD-25 PT Program)				
Gross Beta	77.24	60.3	A	38.1 – 87.9
Matrix: MaS Soil (Bq/kg)				
K40	581.25	588	A	412 - 779
MN54	0.718	0	A	False Positive Test (within acceptance range)
CO57	1215	1190	A	833 - 1547
CO60	872	851	A	596 - 1106
ZN65	766.25	695	A	487 - 904
CS134	-0.073	0	A	False Positive Test (within acceptance range)
CS137	1135	1067	A	747 - 1387
Matrix: MaW Water (Bq/L)				
H3	354.5	334	A	234 - 434
MN54	15.025	14.8	A	10.4 - 19.2
CO57	25.163	27.3	A	19.1 - 35.5
CO60	0.208	0	A	False Positive Test (within acceptance range)
ZN65	18.600	17.4	A	12.2 – 22.6
CS134	21.953	23.9	A	16.7 – 31.1
CS137	0.041	0	A	False Positive Test (within acceptance range)

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Matrix: RdV Vegetation (Bq/sample)

MN54	7.338	7.27	A	5.09 – 9.45
CO57	7.233	6.81	A	4.77 – 8.85
CO60	4.820	4.86	A	3.40 – 6.32
ZN65	5.535	5.40	A	3.78 – 7.02
CS134	-0.045	0	A	False Positive Test (within acceptance range)
CS137	5.675	5.54	A	3.88 – 7.20

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

In MAPEP 34, the results for gamma on air filters, water, soil, and vegetation matrices for those nuclides associated with nuclear power plant operation and using analytical methods used in the REMP are acceptable. There are no relevant data flags.

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ATTACHMENT D

Industry Initiative

Ground Water Protection Program

Tritium in Ground Water Monitoring

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A. Description of Program:

Quarterly sampling & analysis for Tritium & principle gamma emitters is performed by the State of Florida Department of Health (DOH) and Bureau of Radiation Control (BRC), pursuant to an Agreement between FPL and DOH, as part of the ODCM REMP sampling program.

The wells identified for radiological environmental sampling in support of the industry initiative are listed below, and in Appendix B-2 of the ODCM. The ten wells are on the 'outside' perimeter of the protected area. Two locations where the Plant ID ends with "S" are shallower wells adjacent, within a few feet, of a deeper well at the same location.

State ID	St. Lucie Plant ID	Location Description
H70	GIS-MW-ES	West of A1A; between the discharge canal and Gate "B"
H71	GIS-MW-EI	West of A1A; between the discharge canal and Gate "B"
H72	GIS-MW-SI	South of Intake canal and the adjacent access road
H73	GIS-MW-SWS	S/W corner of Intake canal and the adjacent access road
H74	GIS-MW-SWI	S/W corner of Intake canal and the adjacent access road
H75	GIS-MW-WI	West of plant site and intake canal; South of switchyard
H76	H76	North of Simulator; South of Big Mud Creek
H77	H77	East of Barge Slip; By LU bldg
H78	H78	South of North Warehouse
H79	H79	West of A1A and East of Parking Lot

B. St. Lucie 2016 Tritium Results ⁽¹⁾ Summary, pCi/L

Well number	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
H70	<145	<152	146	<158
H71	685	575	416	423
H72	<155	<152	<167	<161
H73	<156	<161	<167	<158
H74	<156	<161	<167	<158
H75	<156	<152	<167	<161
H76	<145	<152	<167	<157
H77	<156	<152	<167	<158
H78	<156	<152	<167	<161
H79	<155	<152	<167	<158

Notes

1. Samples analyzed for H3 and principle gamma emitters; tritium is the only fission product identified. Naturally occurring K-40 is occasionally identified.
2. Laboratory H3 MDA is about 150 pCi/liter

Map depicting the well locations follows.

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RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS
IN SUPPORT OF THE INDUSTRY INITIATIVE

