



March 23, 2020

L-2020-049
10 CFR 50.4
10 CFR 50.36

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

Re: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Annual Radiological Environmental
Operating Report for Calendar Year 2019

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 2019.

Please contact me at 772-467-7435 with any questions regarding this submittal.

Sincerely,

A handwritten signature in black ink that reads 'Wyatt Godes'.

Wyatt Godes
Licensing Manager
St. Lucie Plant

WG/rcs

Enclosure: 2019 Annual Radiological Environmental Operating Report (117 pages)

cc: USNRC Senior Resident Inspector, St. Lucie Units 1 and 2

2019
ANNUAL
RADIOLOGICAL ENVIRONMENTAL
OPERATING REPORT

ST. LUCIE PLANT
UNITS 1 & 2
LICENSE NOS. DPR-67, NPF-16
DOCKET NOS. 50-335, 50-389

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1. 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.

2. 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.

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

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 the Deviations/Missing Data section. Samples not meeting the specified "A PRIOR" LLD, if any, are noted and explained in Analyses with LLDs Above Required Detection Capabilities. Analysis data for all specified samples analyzed during the surveillance period is provided in Section 4.

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 Section 4.

E. Interlaboratory Comparison Program

The interlaboratory comparison program consists of participating in the DOE Mixed Analyte Performance Evaluation Program (MAPEP) and the Environmental Resources Associates (ERA) proficiency Testing, consisting of the MRaD and RadChem study.

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

The results for nuclides associated with the REMP are listed in Section 10.

3. 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. The following tables provide 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.

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.

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 3 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 7.0% of the required lower limit of detection and 0.7% 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.

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.

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 in 0 of the 24 ODCM required samples and was not present in any of the 12 Control locations. There were no indications of any other nuclides that could be attributed to plant effluents.

6. Land Use Census:

There were no 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.

7. Interlaboratory Comparison Program:

The State of Florida laboratory participated in MAPEP Series 41, and the ERA RadChem-117. These satisfied the requirements as directed in the PSL Offsite Dose Calculation Manual (ODCM) for the Interlaboratory Comparison Program.

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 7.0% of the required lower limit of detection and 0.7% of the reporting level listed in ODCM Table 3.12-1. There were no indications of any other nuclides that could be attributed to plant effluents.
- There were no indications of any nuclides that could be attributed to plant effluents in the broad leaf vegetation samples.
- There were no indications of any nuclides in the waterborne, sediment, or food products 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.

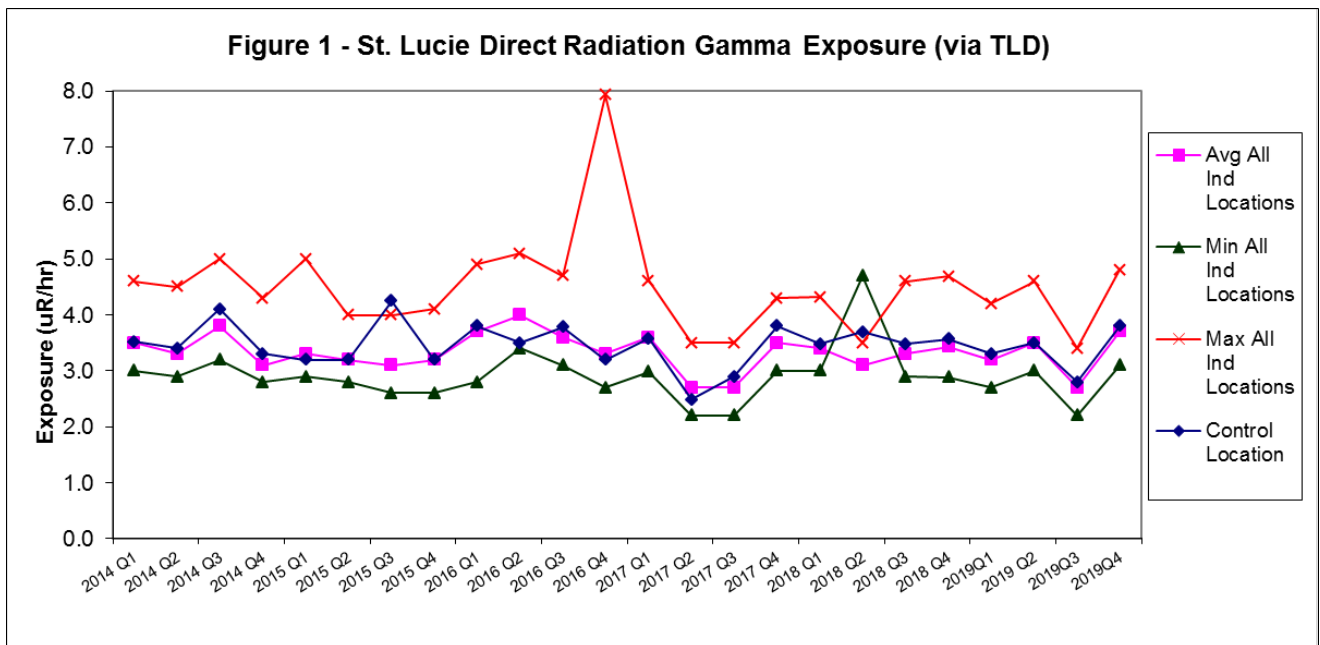
4. Environmental Radiological Monitoring Program Annual Summary

I. Direct Radiation

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

Type of Analyses	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 Distance & Direction	Mean (f) ^b Range	
Exposure ^d	108		3.28 (104/104)	NW-10	4.25 (4/4)	3.46 (4/4)
			2.24-4.81	9.6 mi., NW	3.39-4.81	2.92-3.92

Number of Non-Routine Reported Measurements = 0



II. Air Particulates/Radioiodine:

PATHWAY: AIRBORNE

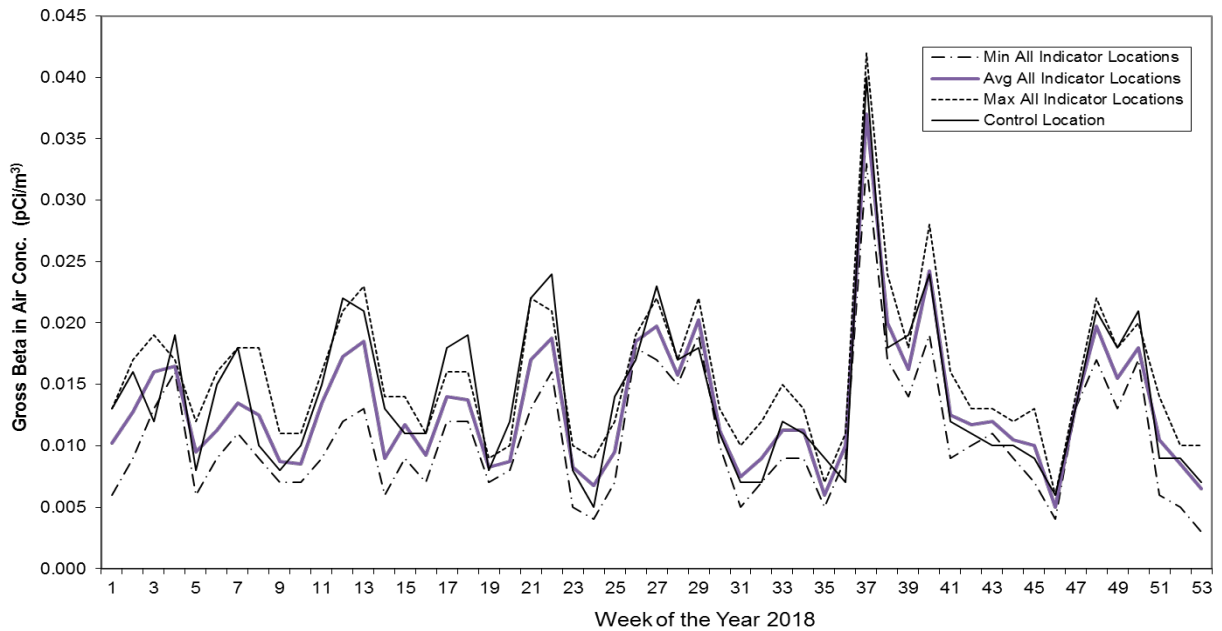
SAMPLES COLLECTED: RADIOIODINE AND PARTICULATES

UNITS: pico- Ci/M₃

Type of Analyses	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 Distance & Direction	Mean (f) ^b Range	
¹³¹ I	265	0.012	<MDA (212/212)			<MDA
Gross Beta	265	0.0064	0.0128(210/212) 0.0030-0.0420	H14 1mi., SE	0.014(52/53) 0.004-0.039	0.014 (53/53) 0.005-0.040
Composite Gamma	20					
⁷ Be		0.0006	0.1253 (16/16) 0.0884-0.1740	H14 1 mi., SE	0.1381 (4/4) 0.104-0.174	0.1265 (4/4) 0.0824-0.1516
¹³⁴ Cs		0.0008	<MDA		<MDA	<MDA
¹³⁷ Cs		0.0008	<MDA		<MDA	<MDA
²¹⁰ Pb			0.0163 (4/16) 0.012-0.0282	H34 0.5 mi., N	0.0282 (1/4)	0.0147 (3/4) 0.0080-0.0275

Be-7 & Pb-210 are naturally occurring
Number of Non-Routine Reported Measurements =0

Figure 2 - St. Lucie 2019 REMP Program
Gross Beta in Air, pCi/m³



III. Waterborne, Surface Water:

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

Type of Analyses	Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		
				Name Distance & Direction	Mean (f) ^b Range	Control Locations Mean (f) ^b Range
Tritium	64	172	194(3/53) 166-211	H15 <1mi., NE/ENE/E	194(3/53) 166-211	<MDA
Gamma Isotopic	64					
⁴⁰ K		58	362(53/53) 294-444	H15 <1mi., NE/ENE/E	362(53/53) 294-444	349(11/11) 308-404
⁵⁴ Mn		3	<MDA		<MDA	<MDA
⁵⁹ Fe		6	<MDA		<MDA	<MDA
⁵⁸ Co		3	<MDA		<MDA	<MDA
⁶⁰ Co		4	<MDA		<MDA	<MDA
⁶⁵ Zn		7	<MDA		<MDA	<MDA
⁹⁵ Zr-Nb		6-3	<MDA		<MDA	<MDA
¹³¹ I		4	<MDA		<MDA	<MDA
¹³⁴ Cs		4	<MDA		<MDA	<MDA
¹³⁷ Cs		4	<MDA		<MDA	<MDA
¹⁴⁰ Ba-La		9-3	<MDA		<MDA	<MDA

IV. Waterborne, Sediment and Food Products

PATHWAY: WATERBORNE

SAMPLES COLLECTED: SHORELINE SEDIMENT

UNITS: PICO-Ci/Kg DRY

Type of Analyses	Number of Analyses Performed	Lower Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		
				Name Distance & Direction	Mean (f) ^b Range	Control Locations Mean (f) ^b Range
Gamma Isotopic	4					
⁷ Be		56	<MDA			<MDA
⁴⁰ K		100	706(2/2) 322-1090	H15 <1mi, ENE/E/ESE	706(2/2) 322-1090	177(2/2) 145-208
⁵⁸ Co		6	<MDA			
⁶⁰ Co		7	<MDA			
¹³⁴ Cs		7	<MDA			
¹³⁷ Cs		7	<MDA			
²¹⁰ Pb			425(2/2) 264-585	H15 <1mi, ENE/E/ESE	425(2/2) 264-585	215(2/2) 130-300
²²⁶ Ra		15	631(2/2) 420-842	H15 <1mi, ENE/E/ESE	631(2/2) 420-842	354(1/2)
²³² Th		25	168(2/2) 63-272	H15 <1mi, ENE/E/ESE	168(2/2) 63-272	45.5(2/2) 41-50
²³⁵ U			40(2/2) 26-53	H15 <1mi, ENE/E/ESE	40(2/2) 26-53	32.5(2/2) 22-43
²³⁸ U			336(2/2) 226-446	H15 <1mi, ENE/E/ESE	336(2/2) 226-446	170(2/2) 137-203

Be-7, K-40, Pb-210, Ra-226, Th-232, U-235 & U-238 are naturally occurring.

Number of Non-Routine Reported Measurements =0

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

Type of Analyses	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 Distance & Direction	Mean (f) ^b Range	
Gamma Isotopic	2					
⁴⁰ K		270	1110(1/1)	H-15 <1mi, ENE/E/ESE	1110(1/1)	1520 (1/1)
⁵⁴ Mn		16	<MDA			
⁵⁸ Co		15	<MDA			
⁶⁰ Co		16	<MDA			
¹³⁴ Cs		16	<MDA			
¹³⁷ Cs		18	<MDA			
²²⁶ Ra		300	<MDA			
²²⁸ Ra		58	<MDA			275(1/1)
⁵⁹ Fe		28	<MDA			
⁶⁵ Zn		32	<MDA			

K-40, Ra-226, & Ra-228 are naturally occurring.
 Number of Non-Routine Reported Measurements =0

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

Type of Analyses	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 Distance & Direction	Mean (f) ^b Range	
Gamma Isotopic	5					
⁴⁰ K		270	2638(2/2) 2530-2746	H15 <1mi., ENE/E/ESE	2638(2/2) 2530-2746	2572(3/3) 2270-3080
⁵⁴ Mn		16	<MDA			
⁵⁸ Co		15	<MDA			
⁶⁰ Co		16	<MDA			
¹³⁴ Cs		16	<MDA			
¹³⁷ Cs		18	<MDA			
²²⁶ Ra		300	<MDA			
²²⁸ Ra		58	<MDA			
⁵⁹ Fe		28	<MDA			
⁶⁵ Zn		32	<MDA			

K-40 are naturally occurring.
 Number of Non-Routine Reported Measurements =0

V. Broad Leaf Vegetation

PATHWAY: INGESTION
 SAMPLES COLLECTED: BROADLEAF VEGETATION
 UNITS: PICO-Ci/Kg WET

Type of Analyses	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 Distance & Direction	Mean (f) ^b Range	
Gamma Isotopic	36					
⁷ Be		64	1122(24/24) 488-2662	H52 1mi., S/SSE	1211(12/12) 784-2662	1142(12/12) 536-1710
⁴⁰ K		120	4393(24/24) 2361-5885	H51 1mi., N/NNW	4770(12/12) 3880-5885	2704(12/12) 1920-3623
⁵⁸ Co		6	<MDA			
⁶⁰ Co		8	<MDA			
¹³¹ I		8	<MDA			
¹³⁴ Cs		8	<MDA			
¹³⁷ Cs		8	<MDA			
²¹⁰ Pb			554(7/24) 116-1160	H52 1mi., S/SSE	561(4/12) 187-1160	373(6/12) 174-962
²¹² Pb			33(8/24) 14-49	H51 1mi., N/NNW	36(5/12) 29-47	19(7/12) 12-25
²²⁶ Ra		189	163(1/12)	H52 1mi., S/SSE	163(1/12)	130(1/12)

Be-7, K-40, Pb-210, Pb-212, & Ra-226 are naturally occurring.
 Number of Non-Routine Reported Measurements=0

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 the Quarterly reports 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.

VI. Land Use Census

The St. Lucie Annual Land Use Census Survey was performed during the month of June 2019. There was one change identified as compared to the 2018 St. Lucie Annual Land Use Census Survey. No locations were identified of potential milk-producing animals (cows or goats).

Distance to Nearest (a, b)

Sector	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	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	L	L
NW	3.4/304	L	L
NNW	2.7/344	L	L

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

VII. Interlaboratory Comparison Program:

DOE-MAPEP 41 RESULTS
RAD-119 RESULTS

Matrix: RdF Air Filter (Bq/filter)

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
Mn-54	1.448	1.37	A	0.96-1.78
Co-57	1.128	1.16	A	0.81-1.51
Co-60	0.898	0.815	A	0.571-1.060
Zn-65	1.142	1.06	A	0.74-1.38
Cs-134	0.3		A	False Positive
Cs-137	1.642	1.58	A	1.11-2.05
Gross Alpha	0.68	0.528	A	0.158-0.898
Gross Beta	1.13	0.937	A	0.469-1.406

Matrix:MaS Soil (Bq/kg)

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
K-40	525.33	555	A	389-722
Mn-54	721.33	745	A	522-969
Co-57	0.14		A	False Positive
Zn-65	1.8		A	False Positive
Cs-134	0.29		A	False Positive
Cs-137	1137.78	1164	A	815-1513

Matrix:MaW Water (Bq/L)

Radionuclide	Result	Ref. Value	Flag (Evaluation)	Acceptance Range
H-3	23978	23400	A	20500-25700
Mn-54	21.15	20.6	A	14.4-26.8
Co-57	15.613	15.6	A	10.9-20.3
Zn-65	21.95	20.3	A	14.2-26.4
Cs-134	0.47		A	False Positive
Cs-137	19.275	18.4	A	12.9-23.9
Gross Alpha	0.914	1.06	A	0.32-1.80
Gross Beta	3.3	3.32	A	1.66-4.98

5. 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: H30, 2miles West
Dates: 08/27/19-09/05/19
Deviation: Failure to perform continuous monitoring
Description of Problem: The pump failed during the sampling week. Estimated run time for the week was 208.78 hours out of 218.40 (10 hours down time).
Corrective Action: Replaced the pump.

B. Ingestion, Fish and Invertebrates, Crustacea

Location: H15 <1mi, ENE/E/ESE
Dates: Second Semi-Annual Sample
Deviation: Failure to perform environmental surveillance due to seasonal unavailability.
Description of Problem: A crustacean was unavailable and not collected in the second half of 2019. Staff personnel were not able to locate and collect Crustacea during the period.
Corrective Action: Crustacea was collected in June 2019. Completed a communication to more closely coordinate resources between BRC and FPL utility personnel to ensure timely collection of Crustacea samples.

C. Ingestion, Fish and Invertebrates, Crustacea

Location: H59 10-20mi, S/SSE
Dates: Second Semi-Annual Sample

Deviation: Failure to perform environmental surveillance due to seasonal unavailability.

Description of Problem: A crustacean was unavailable and not collected in the second half of 2019. Staff personnel were not able to locate and collect Crustacea during the period.

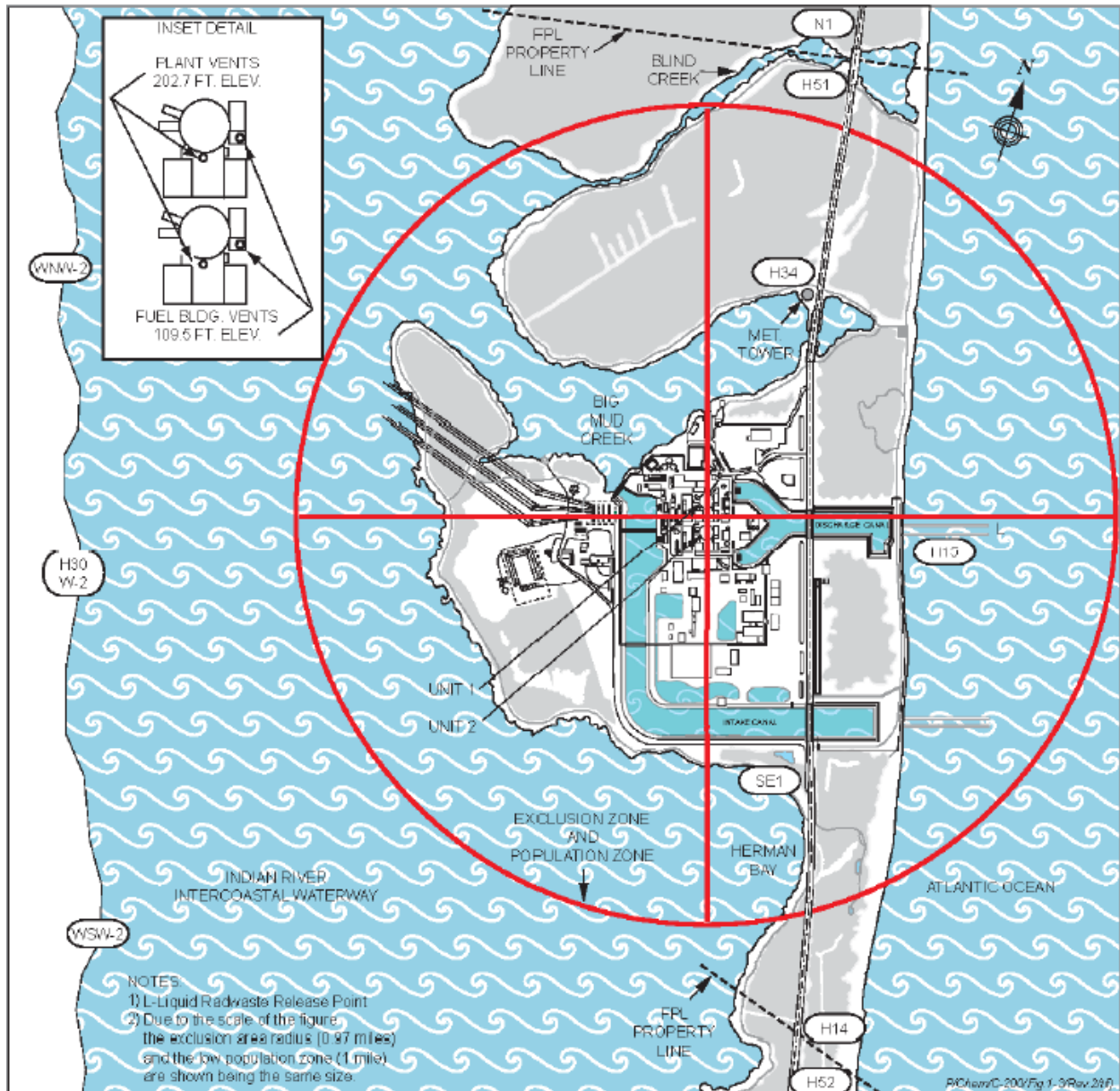
Corrective Action: Crustacea was collected in June 2019. Completed a communication to more closely coordinate resources between BRC and FPL utility personnel to ensure timely collection of Crustacea samples

6. Analyses with LLDs Above Required Detection Capabilities

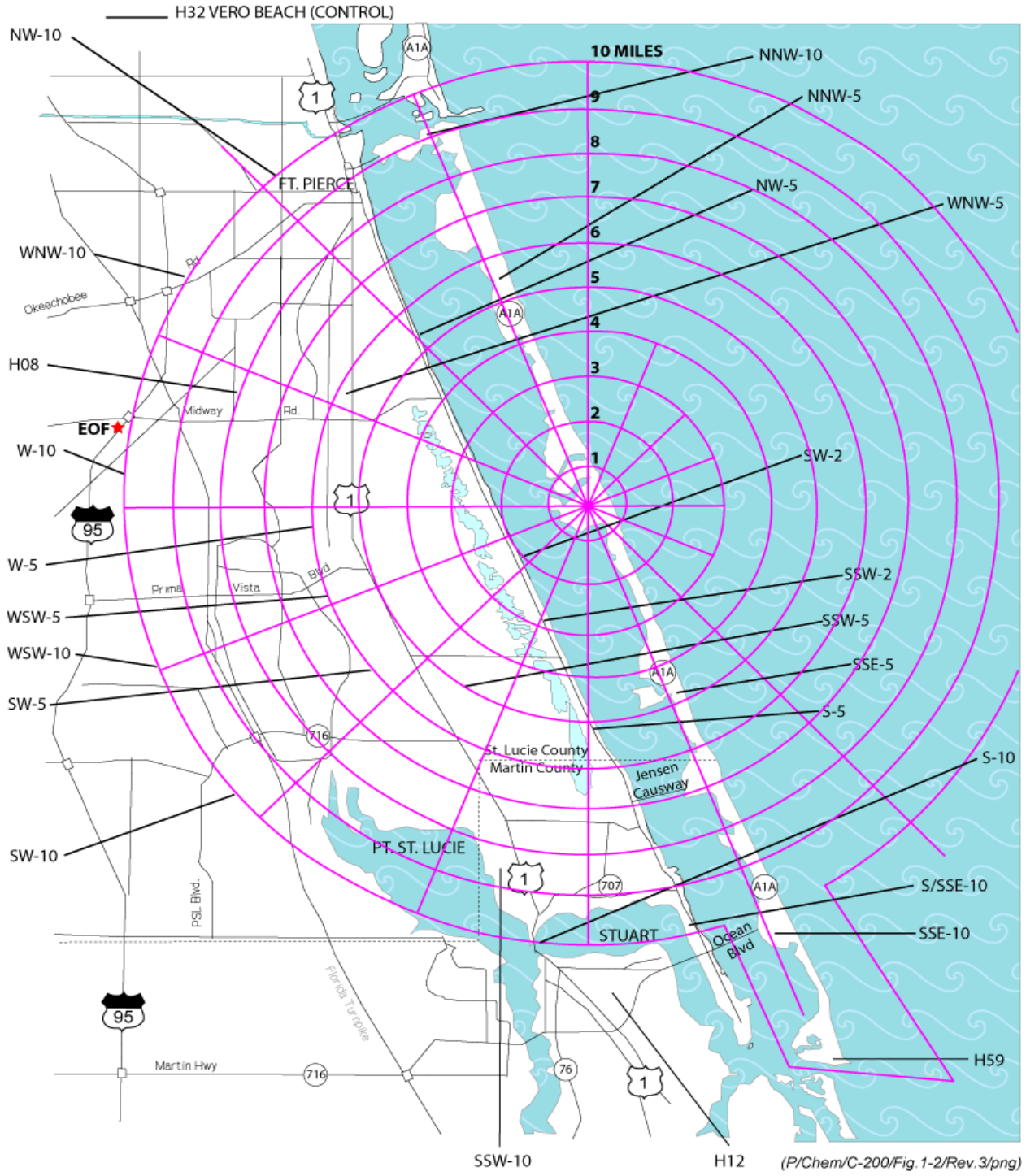
The values specified in the ODCM 4.12-1 Detection Capabilities, were achieved for all samples.

7. Key to Sample Locations

Site Area Map & Environmental Sample Locations



Environmental Sample Locations (10 Miles)



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
Control:			
H32	NNW	18.1	U. of Florida IFAS Entomology Lab Vero Beach

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
<u>Control:</u>			
H12	S	12	FPL Substation, SR-76 Stuart

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
<u>Control:</u>			
H59	S/SSE	10-20	Near south end of Hutchinson Island

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
<u>Control:</u>			
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
<u>Control:</u>			
H59	S/SSE	10-20	Near south end of Hutchinson Island

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
<u>Control:</u>			
H59	S/SSE	10-20	Near south end of Hutchinson Island

8. Ground Water Protection, Industry Initiative:

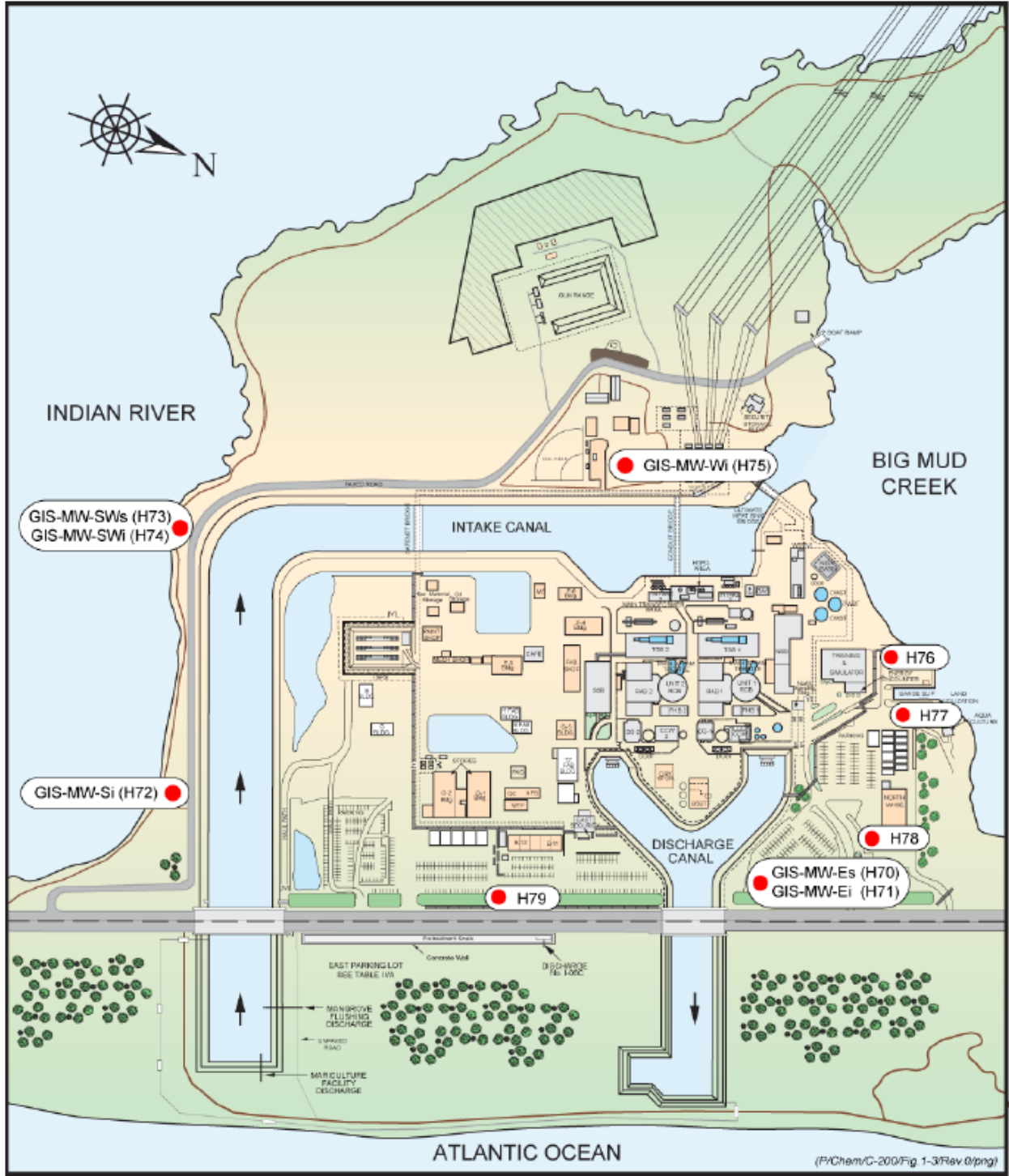
A. Description of Program:

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.

Samples analyzed for H3 and principle gamma emitters; tritium is the only fission product identified. Naturally occurring K-40 is occasionally identified.

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 2019 Tritium Results Summary, pCi/L

Well number	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
H70	<161	<158	<143	142
H71	560	374	441	332
H72	<161	<158	<137	<144
H73	<161	<146	<143	<144
H74	<161	<158	<147	<153
H75	<161	<146	<147	<153
H76	<161	<159	<147	<144
H77	<159	<158	<147	<144
H78	<159	<158	<147	<144
H79	<159	<158	<147	<153

Attachment A:

9. **Radiological Surveillance of Florida Power and Light Company's St. Lucie Site**



RADIOLOGICAL SURVEILLANCE

OF

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

FIRST QUARTER 2019

BUREAU OF RADIATION CONTROL

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

First Quarter, 2019

Sample Type	Collection Frequency	Number of Sample Locations	Number of Samples
1. Direct Radiation	Quarterly	27	54
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: 212

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 - DUAL DEPLOYED TLD's - ($\mu\text{R/hr}$)

Sample Site	Deployment 05-Dec-18 Collection 21-Mar-19		Sample Site	Deployment 05-Dec-18 Collection 21-Mar-19	
	Old	New		Old	New
N-1	3.19 ± 0.17	3.09 ± 0.04	SW-2	3.19 ± 0.14	3.09 ± 0.26
NNW-5	3.12 ± 0.17	3.13 ± 0.26	SW-5	3.80 ± 0.03	3.64 ± 0.16
NNW-10	3.69 ± 0.21	3.79 ± 0.25	SW-10	3.30 ± 0.20	3.33 ± 0.29
NW-5	3.03 ± 0.43	2.85 ± 0.13	SSW-2	3.12 ± 0.07	3.25 ± 0.07
NW-10	4.06 ± 0.34	4.21 ± 0.19	SSW-5	3.75 ± 0.07	3.66 ± 0.05
WNW-2	3.04 ± 0.15	3.13 ± 0.25	SSW-10	2.87 ± 0.06	3.09 ± 0.35
WNW-5	3.09 ± 0.14	3.31 ± 0.21	S-5	3.44 ± 0.46	3.39 ± 0.43
WNW-10	3.27 ± 0.35	3.18 ± 0.14	S-10	3.25 ± 0.20	3.03 ± 0.05
W-2	2.92 ± 0.19	2.98 ± 0.09	S/SSE-10	3.19 ± 0.17	3.13 ± 0.19
W-5	3.43 ± 0.27	3.54 ± 0.22	SSE-5	3.23 ± 0.22	3.01 ± 0.15
W-10	2.88 ± 0.05	2.74 ± 0.18	SSE-10	3.30 ± 0.39	3.21 ± 0.33
WSW-2	3.09 ± 0.41	3.21 ± 0.08	SE-1	3.30 ± 0.14	3.11 ± 0.21
WSW-5	3.08 ± 0.03	3.25 ± 0.29	H-32	3.29 ± 0.32	3.47 ± 0.24
WSW-10	2.73 ± 0.37	2.95 ± 0.22			

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

Collection Date	H08	H12	H14	H30	H34
02-Jan-19	<0.02	<0.02	<0.02	<0.02	<0.02
08-Jan-19	<0.02	<0.02	<0.02	<0.02	<0.02
14-Jan-19	<0.03	<0.03	<0.03	<0.03	<0.03
22-Jan-19	<0.02	<0.02	<0.02	<0.02	<0.02
28-Jan-19	<0.03	<0.03	<0.03	<0.03	<0.03
05-Feb-19	<0.02	<0.02	<0.02	<0.02	<0.02
12-Feb-19	<0.02	<0.02	<0.02	<0.02	<0.02
19-Feb-19	<0.02	<0.02	<0.02	<0.02	<0.02
25-Feb-19	<0.02	<0.02	<0.02	<0.02	<0.02
04-Mar-19	<0.02	<0.02	<0.02	<0.01	<0.01
12-Mar-19	<0.02	<0.02	<0.02	<0.02	<0.02
18-Mar-19	<0.02	<0.02	<0.02	<0.02	<0.02
25-Mar-19	<0.03	<0.03	<0.03	<0.03	<0.03

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

Collection Date	H08	H12	H14	H30	H34
02-Jan-19	0.012 ± 0.002	0.013 ± 0.002	0.013 ± 0.002	0.006 ± 0.002	0.010 ± 0.002
08-Jan-19	0.015 ± 0.002	0.016 ± 0.002	0.017 ± 0.002	0.009 ± 0.002	0.010 ± 0.002
14-Jan-19	0.016 ± 0.002	0.012 ± 0.002	0.016 ± 0.002	0.013 ± 0.002	0.019 ± 0.003
22-Jan-19	0.017 ± 0.002	0.019 ± 0.002	0.017 ± 0.002	0.016 ± 0.002	0.016 ± 0.002
28-Jan-19	0.012 ± 0.002	0.008 ± 0.002	0.012 ± 0.002	0.006 ± 0.002	0.008 ± 0.002
05-Feb-19	0.016 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.009 ± 0.001	0.010 ± 0.002
12-Feb-19	0.018 ± 0.002	0.018 ± 0.002	0.013 ± 0.002	0.012 ± 0.002	0.011 ± 0.002
19-Feb-19	0.011 ± 0.002	0.010 ± 0.002	0.018 ± 0.002	0.009 ± 0.002	0.012 ± 0.002
25-Feb-19	0.007 ± 0.002	0.008 ± 0.002	0.011 ± 0.002	0.009 ± 0.002	0.008 ± 0.002
04-Mar-19	0.008 ± 0.002	0.010 ± 0.002	0.007 ± 0.002	0.011 ± 0.002	0.008 ± 0.002
12-Mar-19	0.014 ± 0.002	0.015 ± 0.002	0.016 ± 0.002	0.009 ± 0.002	0.015 ± 0.002
18-Mar-19	0.018 ± 0.002	0.022 ± 0.003	0.021 ± 0.002	0.012 ± 0.002	0.018 ± 0.002
25-Mar-19	0.016 ± 0.002	0.021 ± 0.002	0.022 ± 0.002	0.013 ± 0.002	0.023 ± 0.002
Average:	0.014 ± 0.001	0.014 ± 0.001	0.015 ± 0.001	0.010 ± 0.001	0.013 ± 0.001

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	0.1414 ± 0.0088	<0.0132	<0.0012	<0.0011	<0.0155
H12	0.1516 ± 0.0091	<0.0100	<0.0014	<0.0010	0.0080 ± 0.0033
H14	0.1542 ± 0.0097	<0.0186	<0.0014	<0.0008	<0.0359
H30	0.1165 ± 0.0082	<0.0179	<0.0013	<0.0010	<0.0108
H34	0.1431 ± 0.0093	<0.0182	<0.0012	<0.0010	0.0282 ± 0.0107

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 Nb-95 (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 La-140 (B)
H15	02-Jan-19	<145	408 ± 28	<3	<3	<7	<4	<9	<6	<4	<3	<4	<7
	08-Jan-19	<145	368 ± 26	<3	<3	<6	<3	<7	<5	<4	<3	<3	<12
	14-Jan-19	<142	349 ± 25	<3	<3	<7	<3	<8	<6	<4	<3	<3	<6
	22-Jan-19	<145	415 ± 40	<5	<6	<12	<6	<15	<9	<7	<6	<7	<10
	28-Jan-19	<145	382 ± 27	<3	<3	<6	<3	<7	<6	<4	<3	<3	<8
	05-Feb-19	<142	383 ± 27	<3	<3	<7	<4	<8	<5	<3	<3	<3	<11
	12-Feb-19	<142	341 ± 26	<3	<3	<7	<4	<8	<6	<4	<3	<3	<7
	19-Feb-19	<141	346 ± 26	<3	<3	<6	<4	<8	<5	<4	<3	<4	<12
	25-Feb-19	<141	317 ± 24	<4	<3	<6	<4	<8	<6	<6	<3	<3	<4
	04-Mar-19	<141	361 ± 26	<3	<3	<7	<3	<8	<5	<4	<4	<3	<13
	12-Mar-19	<141	345 ± 25	<3	<4	<7	<4	<7	<6	<4	<3	<4	<7
	18-Mar-19	<141	315 ± 24	<3	<3	<7	<3	<7	<6	<4	<3	<4	<7
	25-Mar-19	<141	347 ± 25	<3	<3	<7	<4	<8	<6	<4	<3	<3	<7
H59	08-Jan-19	<145	325 ± 42	<6	<6	<12	<6	<13	<9	<7	<5	<7	<9
	12-Feb-19	<142	374 ± 26	<3	<4	<7	<3	<7	<6	<4	<3	<4	<7
	18-Mar-19	<141	328 ± 24	<4	<3	<7	<4	<7	<6	<4	<3	<4	<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	U-235	U-238
H15	19-Feb-19	<63	322 ± 28	<6	<6	<6	<7	264 ± 56	420 ± 52	63 ± 6	26 ± 3	226 ± 16
H59	19-Feb-19	<39	145 ± 22	<6	<6	<7	<7	130 ± 45	354 ± 42	41 ± 5	22 ± 3	137 ± 13

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 - Mixed Species - (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	16-Jan-19	2746 ± 202	<21	<24	<49	<24	<55	<15	<21	<352	<73
H59	This sample not yet 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	08-Jan-19	796 ± 38	4979 ± 174	<9	<8	<8	<317	<16	<176	<32
	12-Feb-19	791 ± 45	5885 ± 210	<11	<10	<12	<431	32 ± 4	<229	<45
	18-Mar-19	488 ± 46	5211 ± 221	<11	<12	<13	<928	37 ± 7	<254	<64
H52	08-Jan-19	1174 ± 53	4639 ± 175	<10	<9	<11	187 ± 77	<18	<209	<35
	12-Feb-19	2662 ± 103	2361 ± 139	<13	<11	<13	<1053	49 ± 11	163 ± 74	<57
	18-Mar-19	885 ± 57	4075 ± 194	<13	<12	<14	<1210	<23	<284	<63
H59	08-Jan-19	1386 ± 71	3623 ± 178	<13	<11	<13	<1020	12 ± 6	<272	<49
	12-Feb-19	1456 ± 60	2451 ± 117	<10	<9	<7	<401	25 ± 3	<208	<35
	18-Mar-19	995 ± 46	2343 ± 106	<8	<7	<10	303 ± 91	14 ± 3	<184	<31

ST. LUCIE SITE

Supplemental Sampling

First Quarter, 2019

Sample Type	Collection Frequency	Number of Sample Locations	Number of Samples
1. Direct Radiation	Quarterly	9	18
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	1
4.b. Citrus	Annually	1	1
			Total: 121

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 - DUAL DEPLOYED TLD's - ($\mu\text{R/hr}$)

Sample Site	Deployment 05-Dec-18 Collection 21-Mar-19	
	Old	New
H08	3.67 ± 0.49	3.69 ± 0.06
H09	3.42 ± 0.29	3.62 ± 0.14
H12	7.77 ± 0.84	7.64 ± 0.08
H14	3.68 ± 0.23	3.79 ± 0.18
H33	3.59 ± 0.40	3.48 ± 0.20
H34	3.25 ± 0.57	3.34 ± 0.44
H60	3.36 ± 0.33	3.42 ± 0.14
H61	3.60 ± 0.05	3.81 ± 0.41
H62	4.35 ± 0.16	4.55 ± 0.06

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

Collection Date	H09	H32	H33
02-Jan-19	<0.02	<0.02	<0.02
08-Jan-19	<0.02	<0.02	<0.02
14-Jan-19	<0.03	<0.03	<0.03
22-Jan-19	<0.02	<0.02	<0.02
28-Jan-19	<0.03	<0.03	<0.03
05-Feb-19	<0.02	<0.02	<0.02
12-Feb-19	<0.02	<0.02	<0.02
19-Feb-19	<0.02	<0.02	<0.02
25-Feb-19	<0.02	<0.02	<0.02
04-Mar-19	<0.02	<0.02	<0.02
12-Mar-19	<0.02	<0.02	<0.02
18-Mar-19	<0.02	<0.02	<0.02
25-Mar-19	<0.03	<0.03	<0.03

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

Collection Date	H09	H32	H33
02-Jan-19	0.009 ± 0.002	0.014 ± 0.002	0.010 ± 0.002
08-Jan-19	0.016 ± 0.002	0.017 ± 0.002	0.015 ± 0.002
14-Jan-19	0.017 ± 0.003	0.019 ± 0.003	0.012 ± 0.002
22-Jan-19	0.019 ± 0.002	0.021 ± 0.002	0.023 ± 0.002
28-Jan-19	0.009 ± 0.002	0.009 ± 0.002	0.010 ± 0.002
05-Feb-19	0.013 ± 0.002	0.017 ± 0.002	0.009 ± 0.002
12-Feb-19	0.015 ± 0.002	0.022 ± 0.002	0.008 ± 0.002
19-Feb-19	0.014 ± 0.002	0.016 ± 0.002	0.013 ± 0.002
25-Feb-19	0.007 ± 0.002	0.011 ± 0.002	0.007 ± 0.002
04-Mar-19	0.011 ± 0.002	0.006 ± 0.002	0.008 ± 0.002
12-Mar-19	0.017 ± 0.002	0.017 ± 0.002	0.012 ± 0.002
18-Mar-19	0.023 ± 0.003	0.026 ± 0.003	0.016 ± 0.002
25-Mar-19	0.017 ± 0.002	0.025 ± 0.002	0.017 ± 0.002
Average:	0.014 ± 0.001	0.017 ± 0.001	0.012 ± 0.001

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

Sample Site	Be-7	K-40	Cs-134	Cs-137	Pb-210
H09	0.1436 ± 0.0097	<0.0220	<0.0012	<0.0011	<0.0322
H32	0.1513 ± 0.0100	<0.0211	<0.0011	<0.0009	<0.0336
H33	0.1476 ± 0.0089	<0.0163	<0.0014	<0.0012	0.0066 ± 0.0033

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Zr-95 Nb-95 (A)</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140 La-140 (B)</u>
H13	08-Jan-19	<145	361 ± 26	<3	<3	<6	<3	<8	<6	<4	<3	<4	<7
	12-Feb-19	<142	324 ± 25	<3	<4	<6	<3	<7	<6	<4	<3	<4	<9
	18-Mar-19	<141	316 ± 24	<3	<3	<7	<4	<6	<6	<4	<3	<3	<7
H36	08-Jan-19	<145	343 ± 25	<4	<3	<6	<3	<6	<6	<4	<3	<3	<6
	12-Feb-19	<142	361 ± 27	<3	<3	<7	<3	<7	<6	<4	<3	<3	<7
	18-Mar-19	<141	342 ± 26	<3	<3	<7	<3	<7	<6	<4	<3	<4	<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.

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	19-Feb-19	84 ± 27	466 ± 47	<10	<9	<8	<10	<892	485 ± 77	100 ± 11	31 ± 5	276 ± 45
H16	19-Feb-19	<60	286 ± 27	<6	<6	<7	<6	301 ± 71	398 ± 47	76 ± 6	25 ± 3	212 ± 15
H19	19-Feb-19	<58	138 ± 20	<6	<5	<6	<6	251 ± 52	333 ± 41	<35	21 ± 3	163 ± 14
H36	19-Feb-19	1038 ± 62	6184 ± 224	<12	220 ± 7	<16	47 ± 4	6756 ± 433	1376 ± 132	382 ± 20	87 ± 8	2976 ± 86

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	19-Feb-19	<83	261 ± 40	<10	<8	<7	<8	<658	487 ± 74	74 ± 10	31 ± 5	299 ± 44
H16	19-Feb-19	<94	219 ± 37	<9	<7	<8	<8	<744	478 ± 68	116 ± 12	30 ± 4	300 ± 28
H19	19-Feb-19	<110	256 ± 43	<9	<11	<9	<11	<817	580 ± 79	181 ± 13	37 ± 5	409 ± 34

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Zr-95 Nb-95 (A)</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140 La-140 (B)</u>
H70	11-Jan-19	171 ± 27	57 ± 12	<3	<3	<7	<3	<7	<6	<5	<3	<4	<5
H71	11-Jan-19	588 ± 54	497 ± 45	<6	<7	<13	<6	<13	<11	<9	<6	<6	<9
H72	11-Jan-19	<141	388 ± 27	<4	<4	<7	<4	<9	<6	<5	<4	<4	<5
H73	11-Jan-19	<141	93 ± 14	<3	<4	<7	<4	<8	<6	<5	<3	<3	<6
H74	11-Jan-19	<141	368 ± 40	<6	<6	<12	<7	<14	<11	<9	<5	<6	<11
H75	11-Jan-19	<141	264 ± 23	<3	<3	<7	<3	<8	<5	<6	<3	<4	<5
H76	11-Jan-19	<141	<83	<5	<6	<12	<6	<10	<11	<9	<5	<7	<9
H77	11-Jan-19	<142	<87	<5	<5	<12	<6	<13	<11	<9	<6	<6	<11
H78	11-Jan-19	<142	36 ± 10	<3	<3	<8	<3	<7	<6	<5	<4	<4	<5
H79	11-Jan-19	<145	125 ± 24	<5	<6	<9	<5	<14	<9	<8	<6	<7	<11

(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.

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

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137
H41	18-Mar-19	266 ± 25	5060 ± 180	<9	<8	12 ± 2

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

Sample Site	Collection Date	Be-7	K-40	I-131	Cs-134	Cs-137
H23	08-Jan-19	<57	1718 ± 96	<7	<7	<9



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

SECOND QUARTER 2019

BUREAU OF RADIATION CONTROL

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Second Quarter, 2019

Sample Type	Collection Frequency	Number of Sample Locations	Number of Samples
1. Direct Radiation	Quarterly	27	54
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	2
4.a.2. Fish	Semiannually	2	1
4.b. Broadleaf Vegetation	Monthly	3	9

Total: 212

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 - DUAL DEPLOYED TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment 21-Mar-19 Collection 17-Jun-19		Sample Site	Deployment 21-Mar-19 Collection 17-Jun-19	
	Old	New		Old	New
N-1	3.22 ± 0.19	3.48 ± 0.53	SW-2	2.96 ± 0.12	3.80 ± 0.22
NNW-5	3.20 ± 0.16	3.44 ± 0.29	SW-5	3.46 ± 0.12	4.07 ± 0.58
NNW-10	3.68 ± 0.30	4.11 ± 0.26	SW-10	3.10 ± 0.33	3.32 ± 0.18
NW-5	3.03 ± 0.26	3.29 ± 0.21	SSW-2	2.90 ± 0.16	3.24 ± 0.10
NW-10	4.17 ± 0.10	4.57 ± 0.36	SSW-5	3.35 ± 0.25	3.90 ± 0.25
WNW-2	2.96 ± 0.12	3.19 ± 0.25	SSW-10	2.73 ± 0.23	3.19 ± 0.15
WNW-5	3.11 ± 0.14	3.43 ± 0.11	S-5	3.12 ± 0.15	3.43 ± 0.37
WNW-10	2.91 ± 0.07	3.26 ± 0.04	S-10	3.13 ± 0.17	3.37 ± 0.05
W-2	2.84 ± 0.04	3.15 ± 0.50	S/SSE-10	3.36 ± 0.56	3.95 ± 0.06
W-5	3.23 ± 0.23	3.59 ± 0.12	SSE-5	2.78 ± 0.24	3.29 ± 0.45
W-10	2.76 ± 0.50	3.01 ± 0.17	SSE-10	2.88 ± 0.19	3.50 ± 0.22
WSW-2	3.07 ± 0.09	3.46 ± 0.59	SE-1	2.87 ± 0.14	3.22 ± 0.15
WSW-5	2.96 ± 0.07	3.31 ± 0.16	H-32	3.27 ± 0.23	3.53 ± 0.31
WSW-10	2.85 ± 0.10	3.06 ± 0.10			

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>
01-Apr-19	<0.02	<0.02	<0.02	<0.02	<0.02
09-Apr-19	<0.02	<0.02	<0.02	<0.02	<0.02
16-Apr-19	<0.03	<0.03	<0.03	<0.03	<0.03
23-Apr-19	<0.02	<0.02	<0.02	<0.02	<0.02
30-Apr-19	<0.02	<0.02	<0.02	<0.02	<0.02
08-May-19	<0.01	<0.01	<0.01	<0.01	<0.01
14-May-19	<0.02	<0.02	<0.02	<0.02	<0.02
22-May-19	<0.01	<0.01	<0.01	<0.01	<0.01
28-May-19	<0.03	<0.03	<0.03	<0.03	<0.03
04-Jun-19	<0.02	<0.02	<0.02	<0.02	<0.02
10-Jun-19	<0.02	<0.02	<0.01	<0.02	<0.02
17-Jun-19	<0.03	<0.03	<0.03	<0.03	<0.03
24-Jun-19	<0.02	<0.02	<0.02	<0.03	<0.02

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

Collection Date	H08	H12	H14	H30	H34
01-Apr-19	0.007 ± 0.002	0.013 ± 0.002	0.014 ± 0.002	0.006 ± 0.002	0.009 ± 0.002
09-Apr-19	0.012 ± 0.002	0.011 ± 0.002	0.014 ± 0.002	0.009 ± 0.002	0.012 ± 0.002
16-Apr-19	0.009 ± 0.002	0.011 ± 0.002	0.010 ± 0.002	0.007 ± 0.002	0.011 ± 0.002
23-Apr-19	0.015 ± 0.002	0.018 ± 0.002	0.016 ± 0.002	0.012 ± 0.002	0.013 ± 0.002
30-Apr-19	0.012 ± 0.002	0.019 ± 0.002	0.013 ± 0.002	0.014 ± 0.002	0.016 ± 0.002
08-May-19	0.008 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.009 ± 0.002
14-May-19	0.008 ± 0.002	0.012 ± 0.002	0.010 ± 0.002	0.008 ± 0.002	0.009 ± 0.002
22-May-19	0.016 ± 0.002	0.022 ± 0.002	0.022 ± 0.002	0.013 ± 0.002	0.017 ± 0.002
28-May-19	0.021 ± 0.003	0.024 ± 0.003	0.018 ± 0.002	0.016 ± 0.002	0.020 ± 0.002
04-Jun-19	0.010 ± 0.002	0.008 ± 0.002	0.009 ± 0.002	0.005 ± 0.002	0.009 ± 0.002
10-Jun-19	0.008 ± 0.002	0.005 ± 0.002	0.004 ± 0.001	0.006 ± 0.002	0.009 ± 0.002
17-Jun-19	0.012 ± 0.002	0.014 ± 0.002	0.009 ± 0.002	0.010 ± 0.002	0.007 ± 0.002
24-Jun-19	0.018 ± 0.002	0.017 ± 0.002	0.019 ± 0.002	0.019 ± 0.002	0.018 ± 0.002
Average:	0.012 ± 0.001	0.014 ± 0.001	0.013 ± 0.001	0.010 ± 0.001	0.012 ± 0.001

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	0.1480 ± 0.0092	<0.0135	<0.0012	<0.0009	0.0120 ± 0.0030
H12	0.1310 ± 0.0087	<0.0138	<0.0012	<0.0010	0.0085 ± 0.0029
H14	0.1740 ± 0.0120	<0.0255	<0.0013	<0.0013	<0.0410
H30	0.1020 ± 0.0077	<0.0156	<0.0012	<0.0010	<0.0151
H34	0.1170 ± 0.0092	<0.0256	<0.0009	<0.0010	<0.0308

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 <u>Nb-95</u> (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 <u>La-140</u> (B)
H15	01-Apr-19	<141	313 ± 24	<3	<3	<6	<3	<8	<5	<4	<3	<4	<11
	09-Apr-19	<140	403 ± 44	<6	<5	<13	<7	<13	<11	<6	<6	<6	<13
	16-Apr-19	<143	366 ± 26	<3	<3	<6	<4	<7	<6	<4	<3	<3	<8
	23-Apr-19	<143	402 ± 27	<3	<3	<6	<4	<7	<6	<3	<3	<4	<12
	30-Apr-19	<142	342 ± 26	<3	<3	<7	<3	<7	<5	<4	<3	<3	<12
	08-May-19	211 ± 27	407 ± 27	<3	<3	<7	<3	<7	<5	<3	<3	<3	<6
	14-May-19	<141	368 ± 27	<3	<3	<7	<4	<8	<6	<3	<3	<3	<12
	22-May-19	<142	339 ± 26	<3	<3	<6	<3	<8	<5	<4	<3	<3	<9
	28-May-19	<142	386 ± 27	<3	<4	<7	<4	<7	<6	<11	<3	<3	<7
	04-Jun-19	<141	336 ± 43	<6	<6	<12	<7	<14	<10	<9	<5	<7	<8
	10-Jun-19	<149	344 ± 26	<3	<3	<7	<3	<7	<6	<4	<3	<3	<11
	18-Jun-19	<134	444 ± 29	<3	<3	<7	<4	<8	<6	<4	<3	<3	<7
	24-Jun-19	<133	365 ± 26	<4	<3	<6	<4	<8	<5	<4	<3	<3	<6
H59	09-Apr-19	<140	404 ± 28	<3	<3	<6	<4	<7	<5	<4	<3	<3	<6
	08-May-19	<134	390 ± 47	<6	<6	<13	<7	<14	<10	<6	<5	<6	<12
	13-Jun-19	<135	373 ± 46	<6	<7	<12	<7	<15	<10	<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
These samples were previously collected.										

4.a.1. CRUSTACEA - Mixed Crab - (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	04-Jun-19	1110 ± 113	<18	<14	<41	<16	<34	<19	<21	<403	<80
H59	12-Jun-19	1520 ± 126	<21	<19	<36	<20	<40	<21	<24	275 ± 92	<99

4.a.2. FISH - Mixed Species - (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 was previously collected.										
H59	11-Apr-19	2366 ± 153	<22	<20	<41	<22	<47	<22	<22	<440	<85

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	09-Apr-19	954 ± 60	4727 ± 211	<12	<12	<16	<902	36 ± 8	<267	<58
	08-May-19	919 ± 66	4940 ± 238	<17	<14	<17	<1070	29 ± 9	<364	<64
	13-Jun-19	1210 ± 52	4580 ± 167	<13	<8	<5	116 ± 69	<16	<121	<35
H52	09-Apr-19	871 ± 41	4626 ± 165	<8	<7	<8	<193	<17	<182	<37
	08-May-19	1030 ± 49	4010 ± 158	<10	<9	<10	<377	20 ± 4	<210	<39
	13-Jun-19	784 ± 59	3740 ± 187	<18	<13	<15	<915	<23	<280	<55
H59	09-Apr-19	1201 ± 49	1920 ± 90	<8	<7	<9	229 ± 66	22 ± 3	<178	<27
	08-May-19	1710 ± 63	2260 ± 106	<10	<7	<9	354 ± 84	19 ± 4	<206	<29
	13-Jun-19	791 ± 37	2240 ± 94	<9	<6	<8	<260	<13	<146	<26

ST. LUCIE SITE

Supplemental Sampling

Second Quarter, 2019

Sample Type	Collection Frequency	Number of Sample Locations	Number of Samples
1. Direct Radiation	Quarterly	9	18
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	0
3.c. Beach Sand	Semiannually	3	0
3.d. Ground Water	Quarterly	10	10
4. Ingestion			
4.a. Garden Crop	Annually	1	0
4.b. Citrus	Annually	1	0

Total: 112

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 - DUAL DEPLOYED TLD's - ($\mu\text{R}/\text{hour}$)

Sample Site	Deployment	
	21-Mar-19 Collection	17-Jun-19
	Old	New
H08	3.35 ± 0.12	3.96 ± 0.37
H09	3.38 ± 0.07	3.96 ± 0.24
H12	7.10 ± 0.34	7.91 ± 0.51
H14	3.47 ± 0.14	3.90 ± 0.38
H33	3.35 ± 0.30	3.68 ± 0.15
H34	3.05 ± 0.12	3.51 ± 0.33
H60	3.24 ± 0.15	3.53 ± 0.37
H61	4.04 ± 0.19	4.72 ± 0.44
H62	3.36 ± 0.48	4.02 ± 0.30

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

Collection Date	H09	H32	H33
01-Apr-19	<0.02	<0.03	<0.03
09-Apr-19	<0.02	<0.02	<0.02
16-Apr-19	<0.03	<0.02	<0.03
23-Apr-19	<0.02	<0.02	<0.02
30-Apr-19	<0.02	<0.02	<0.02
08-May-19	<0.01	<0.01	<0.01
14-May-19	<0.02	<0.02	<0.02
22-May-19	<0.01	<0.01	<0.01
28-May-19	<0.03	<0.02	<0.02
04-Jun-19	<0.02	<0.02	<0.02
10-Jun-19	<0.02	<0.02	<0.02(A)
17-Jun-19	<0.03	<0.03	<0.01
24-Jun-19	<0.02	<0.02	<0.03

(A) No power. Estimated run time 130 out of 144 hours.

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

Collection Date	H09	H32	H33
01-Apr-19	0.013 ± 0.002	0.013 ± 0.002	0.013 ± 0.002
09-Apr-19	0.011 ± 0.002	0.015 ± 0.002	0.011 ± 0.002
16-Apr-19	0.012 ± 0.002	0.012 ± 0.002	0.013 ± 0.002
23-Apr-19	0.017 ± 0.002	0.014 ± 0.002	0.015 ± 0.002
30-Apr-19	0.017 ± 0.002	0.018 ± 0.002	0.017 ± 0.002
08-May-19	0.011 ± 0.002	0.008 ± 0.001	0.009 ± 0.002
14-May-19	0.010 ± 0.002	0.012 ± 0.002	0.009 ± 0.002
22-May-19	0.020 ± 0.002	0.020 ± 0.002	0.018 ± 0.002
28-May-19	0.025 ± 0.003	0.026 ± 0.003	0.022 ± 0.002
04-Jun-19	0.012 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
10-Jun-19	0.011 ± 0.002	0.005 ± 0.002	0.008 ± 0.002(A)
17-Jun-19	0.011 ± 0.002	0.011 ± 0.002	0.008 ± 0.002
24-Jun-19	0.022 ± 0.002	0.016 ± 0.002	0.016 ± 0.002
Average:	0.015 ± 0.001	0.014 ± 0.001	0.013 ± 0.001

(A) No power. Estimated run time 130 out of 144 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	0.1630 ± 0.0115	<0.0260	<0.0014	<0.0010	<0.0411
H32	0.1420 ± 0.0097	<0.0246	<0.0010	<0.0008	<0.0310
H33	0.1460 ± 0.0095	<0.0143	<0.0012	<0.0011	<0.0144

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	09-Apr-19	<140	307 ± 24	<3	<4	<7	<4	<7	<5	<4	<3	<4	<7
	08-May-19	<134	392 ± 46	<6	<6	<11	<6	<10	<9	<6	<5	<6	<12
	13-Jun-19	<135	295 ± 24	<3	<3	<7	<4	<8	<6	<6	<3	<4	<5
H36	09-Apr-19	<140	402 ± 28	<3	<3	<7	<4	<7	<6	<4	<3	<3	<7
	08-May-19	394 ± 49	332 ± 45	<6	<7	<11	<7	<10	<9	<7	<5	<6	<13
	13-Jun-19	<135	326 ± 44	<6	<6	<13	<6	<16	<10	<9	<5	<7	<12

(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
These samples were previously collected.											

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
These samples were previously collected.											

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 Nb-95 (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 La-140 (B)
H70	11-Apr-19	<140	<92	<6	<6	<12	<6	<13	<9	<8	<5	<7	<9
H71	11-Apr-19	578 ± 54	378 ± 27	<4	<3	<7	<3	<8	<6	<5	<3	<4	<5
H72	11-Apr-19	<140	250 ± 40	<6	<7	<15	<6	<14	<11	<9	<6	<6	<12
H73	11-Apr-19	<140	96 ± 13	<3	<3	<6	<4	<7	<6	<5	<4	<4	<6
H74	11-Apr-19	<140	272 ± 39	<6	<6	<11	<7	<13	<10	<8	<5	<6	<11
H75	11-Apr-19	<140	278 ± 23	<4	<4	<7	<4	<7	<6	<5	<4	<3	<5
H76	11-Apr-19	<140	<44	<3	<4	<7	<3	<8	<6	<6	<3	<3	<6
H77	11-Apr-19	<142	<92	<6	<7	<10	<6	<14	<10	<9	<5	<6	<10
H78	11-Apr-19	<140	<113	<6	<5	<12	<5	<13	<12	<9	<6	<6	<10
H79	11-Apr-19	<140	<108	<6	<5	<12	<7	<12	<10	<8	<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.

4.a. GARDEN CROP - (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.					



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

THIRD QUARTER 2019

BUREAU OF RADIATION CONTROL

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Third Quarter, 2019

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	27	54
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	2
4.b. Broadleaf Vegetation	Monthly	3	9
			Total: 213

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 17-Jun-19 Collection 05-Sep-19		Sample Site	Deployment 17-Jun-19 Collection 05-Sep-19	
	Old	New		Old	New
N-1	2.89 ± 0.41	2.59 ± 0.40	SW-2	3.10 ± 0.37	2.64 ± 0.03
NNW-5	2.98 ± 0.11	2.41 ± 0.33	SW-5	3.64 ± 0.12	3.17 ± 0.21
NNW-10	3.62 ± 0.45	3.18 ± 0.26	SW-10	3.02 ± 0.37	2.61 ± 0.21
NW-5	2.79 ± 0.20	2.57 ± 0.10	SSW-2	3.01 ± 0.08	2.58 ± 0.47
NW-10	3.87 ± 0.28	3.39 ± 0.09	SSW-5	3.35 ± 0.07	3.01 ± 0.18
WNW-2	2.94 ± 0.12	2.66 ± 0.15	SSW-10	2.77 ± 0.12	2.47 ± 0.08
WNW-5	3.13 ± 0.25	2.89 ± 0.31	S-5	3.02 ± 0.35	2.64 ± 0.22
WNW-10	2.92 ± 0.54	2.63 ± 0.28	S-10	2.89 ± 0.20	2.59 ± 0.10
W-2	2.98 ± 0.20	2.70 ± 0.16	S/SSE-10	3.33 ± 0.23	2.99 ± 0.32
W-5	3.34 ± 0.12	2.93 ± 0.16	SSE-5	2.84 ± 0.09	2.56 ± 0.15
W-10	2.64 ± 0.14	2.24 ± 0.10	SSE-10	2.92 ± 0.17	2.69 ± 0.25
WSW-2	3.08 ± 0.52	2.76 ± 0.03	SE-1	2.87 ± 0.16	2.50 ± 0.17
WSW-5	3.13 ± 0.26	2.74 ± 0.28	H-32	3.24 ± 0.52	2.92 ± 0.14
WSW-10	2.80 ± 0.13	2.38 ± 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>
02-Jul-19	<0.01	<0.01	<0.01	<0.01	<0.01
09-Jul-19	<0.02	<0.02	<0.02	<0.02	<0.02
16-Jul-19	<0.02	<0.02	<0.02	<0.02	<0.02
23-Jul-19	<0.02	<0.02	<0.02	<0.02	<0.02
30-Jul-19	<0.02	<0.02	<0.02	<0.02	<0.02
06-Aug-19	<0.02	<0.02	<0.02	<0.02	<0.02
13-Aug-19	<0.06	<0.06	<0.06	<0.06	<0.06
21-Aug-19	<0.03	<0.03	<0.03	<0.03	<0.03
27-Aug-19	<0.04	<0.04	<0.04	<0.04	<0.04
05-Sep-19	<0.01	<0.01	<0.01	<0.01	<0.01
10-Sep-19	<0.02	<0.02	<0.02	<0.02	<0.02
17-Sep-19	<0.02	<0.02	<0.02	<0.02	<0.02
24-Sep-19	<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>
02-Jul-19	0.022 ± 0.002	0.023 ± 0.002	0.017 ± 0.002	0.021 ± 0.002	0.019 ± 0.002
09-Jul-19	0.016 ± 0.002	0.017 ± 0.002	0.017 ± 0.002	0.015 ± 0.002	0.015 ± 0.002
16-Jul-19	0.021 ± 0.002	0.018 ± 0.002	0.022 ± 0.002	0.019 ± 0.002	0.019 ± 0.002
23-Jul-19	0.010 ± 0.002	0.011 ± 0.002	0.010 ± 0.002	0.013 ± 0.002	0.012 ± 0.002
30-Jul-19	0.005 ± 0.002	0.007 ± 0.002	0.007 ± 0.002	0.010 ± 0.002	0.008 ± 0.002
06-Aug-19	0.008 ± 0.002	0.007 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.012 ± 0.002
13-Aug-19	0.011 ± 0.002	0.012 ± 0.002	0.015 ± 0.002	0.010 ± 0.002	0.009 ± 0.002
21-Aug-19	0.011 ± 0.002	0.011 ± 0.002	0.012 ± 0.002	0.013 ± 0.002	0.009 ± 0.002
27-Aug-19	<0.007	<0.007	<0.007	0.005 ± 0.002	0.007 ± 0.002
05-Sep-19	0.011 ± 0.002	0.007 ± 0.001	0.009 ± 0.001	0.011 ± 0.002	0.009 ± 0.001
10-Sep-19	0.033 ± 0.003	0.040 ± 0.004	0.039 ± 0.004	0.042 ± 0.004	0.034 ± 0.003
17-Sep-19	0.018 ± 0.002	0.018 ± 0.002	0.024 ± 0.002	0.021 ± 0.002	0.017 ± 0.002
24-Sep-19	0.014 ± 0.002	0.019 ± 0.002	0.017 ± 0.002	0.016 ± 0.002	0.018 ± 0.002
02-Jul-19	0.022 ± 0.002	0.023 ± 0.002	0.017 ± 0.002	0.021 ± 0.002	0.019 ± 0.002

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	0.0977 ± 0.0081	<0.0171	<0.0009	<0.0006	<0.0284
H12	0.0824 ± 0.0087	<0.0024	<0.0011	<0.0009	<0.0310
H14	0.1040 ± 0.0081	<0.0138	<0.0013	<0.0007	0.0130 ± 0.0028
H30	0.1020 ± 0.0087	<0.0213	<0.0011	<0.0008	<0.0291
H34	0.0884 ± 0.0072	<0.0107	<0.0012	<0.0010	<0.0143

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 Nb-95 (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 La-140 (B)
H15	02-Jul-19	<137	379 ± 27	<3	<3	<7	<3	<7	<5	<4	<3	<3	<6
	09-Jul-19	<137	327 ± 25	<3	<3	<6	<4	<7	<5	<4	<3	<4	<12
	16-Jul-19	<138	371 ± 26	<4	<4	<7	<3	<7	<5	<3	<3	<3	<10
	23-Jul-19	<138	402 ± 27	<3	<4	<7	<3	<8	<5	<4	<3	<4	<7
	*30-Jul-19	<138	425 ± 42	<6	<5	<10	<6	<11	<10	<7	<5	<5	<21
	*06-Aug-19	<138	367 ± 40	<6	<7	<11	<8	<15	<10	<6	<5	<6	<21
	13-Aug-19	<138	397 ± 42	<7	<7	<12	<6	<14	<11	<10	<5	<7	<10
	21-Aug-19	<143	302 ± 24	<3	<3	<7	<4	<7	<6	<7	<3	<4	<6
	27-Aug-19	<143	340 ± 26	<4	<3	<6	<4	<7	<5	<3	<3	<4	<10
	05-Sep-19	<142	365 ± 26	<3	<3	<7	<3	<7	<6	<5	<3	<3	<5
	10-Sep-19	<142	412 ± 28	<4	<4	<7	<3	<7	<6	<4	<3	<3	<10
	17-Sep-19	166 ± 23	383 ± 27	<3	<3	<6	<3	<8	<6	<4	<3	<3	<8
	24-Sep-19	<134	339 ± 26	<3	<3	<6	<4	<8	<6	<3	<3	<3	<13
H59	15-Jul-19	<139	365 ± 44	<6	<6	<11	<6	<12	<9	<7	<5	<6	<8
	13-Aug-19	<138	308 ± 34	<6	<7	<13	<7	<12	<11	<12	<6	<6	<10
	17-Sep-19	<142	340 ± 41	<6	<6	<10	<7	<14	<9	<6	<5	<6	<14

(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.

* Analysis of these two samples did not meet the required 15 pCi/L limit of detection for Ba-140/La-140 due to an oversight of lab

processes. Additional processes and training have been put in place to fix this oversight.

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	15-Aug-19	<111	1090 ± 57	<10	<8	<9	<9	585 ± 103	842 ± 82	272 ± 14	53 ± 5	446 ± 24
H59	15-Aug-19	<87	208 ± 24	<7	<6	<7	<7	300 ± 62	<129	50 ± 6	43 ± 12	203 ± 16

4.a.1. 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	This sample not yet collected.										

4.a.2. FISH - Mixed Species - (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	22-Aug-19	2530 ± 229	<20	<20	<53	<24	<63	<19	<25	<498	<110
H59	23-Aug-19	3080 ± 246	<23	<26	<59	<29	<58	<22	<27	<551	<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	15-Jul-19	670 ± 61	4270 ± 210	<13	<12	<17	<1010	<26	<285	<61
	13-Aug-19	2090 ± 109	5070 ± 247	<62	<17	<18	<1230	<31	<359	<69
	17-Sep-19	1240 ± 70	4910 ± 219	<14	<12	<16	<962	<26	<282	<62
H52	15-Jul-19	1010 ± 57	3960 ± 181	<12	<9	<13	687 ± 294	<16	<234	<51
	13-Aug-19	1120 ± 65	5090 ± 198	<44	<11	<13	<462	<22	<256	<46
	17-Sep-19	1440 ± 66	4470 ± 188	<11	<9	<12	<836	<21	<231	<45
H59	15-Jul-19	884 ± 38	2440 ± 101	<7	<6	<8	174 ± 55	<13	<145	<23
	13-Aug-19	1260 ± 62	3420 ± 144	<33	<9	<10	<406	<19	<202	<35
	17-Sep-19	1030 ± 42	3070 ± 117	<8	<6	<8	213 ± 56	<13	<156	<26

ST. LUCIE SITE

Supplemental Sampling

Third Quarter, 2019

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	9	18
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
			Total: 119

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 17-Jun-19 Collection 05-Sep-19	
	Old	New
H08	3.37 ± 0.23	3.04 ± 0.21
H09	3.36 ± 0.14	3.13 ± 0.12
H12	7.18 ± 0.57	6.52 ± 0.23
H14	3.45 ± 0.15	3.06 ± 0.07
H33	3.15 ± 0.08	2.84 ± 0.07
H34	5.13 ± 0.13	2.92 ± 0.48
H60	3.14 ± 0.19	2.82 ± 0.08
H61	4.16 ± 0.30	3.74 ± 0.13
H62	3.53 ± 0.53	3.02 ± 0.37

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

Collection Date	H09	H32	H33
02-Jul-19	<0.01	<0.01	<0.01
09-Jul-19	<0.02	<0.02	<0.02
16-Jul-19	<0.02	<0.02	<0.02
23-Jul-19	<0.02	<0.02	<0.02
30-Jul-19	<0.02	<0.02	<0.02
06-Aug-19	<0.02	<0.02	<0.02
13-Aug-19	<0.06	<0.06	<0.06
21-Aug-19	<0.03	<0.03	<0.03
27-Aug-19	<0.04	<0.04	<0.04
05-Sep-19	<0.01	<0.01	<0.01
10-Sep-19	<0.02	<0.02	<0.02
17-Sep-19	<0.02	<0.02	<0.02
24-Sep-19	<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>
02-Jul-19	<0.004	0.021 ± 0.002	0.012 ± 0.002
09-Jul-19	0.014 ± 0.002	0.014 ± 0.002	0.013 ± 0.002
16-Jul-19	0.019 ± 0.002	0.024 ± 0.002	0.016 ± 0.002
23-Jul-19	0.010 ± 0.002	0.010 ± 0.002	0.013 ± 0.002
30-Jul-19	0.008 ± 0.002	0.008 ± 0.002	0.005 ± 0.002
06-Aug-19	0.010 ± 0.002	0.006 ± 0.002	0.007 ± 0.002
13-Aug-19	0.010 ± 0.002	0.008 ± 0.002	0.011 ± 0.002
21-Aug-19	0.011 ± 0.002	0.011 ± 0.002	0.009 ± 0.002
27-Aug-19	0.007 ± 0.002	0.006 ± 0.002	<0.007
05-Sep-19	0.009 ± 0.001	0.008 ± 0.001	0.011 ± 0.002
10-Sep-19	0.031 ± 0.003	0.039 ± 0.004	0.031 ± 0.003
17-Sep-19	0.022 ± 0.002	0.024 ± 0.002	0.018 ± 0.002
24-Sep-19	0.017 ± 0.002	0.016 ± 0.002	0.014 ± 0.002

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

<u>Sample Site</u>	<u>B-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H09	0.0923 ± 0.0075	<0.0133	<0.0012	<0.0009	<0.0145
H32	0.1080 ± 0.0081	<0.0140	<0.0013	<0.0009	0.0200 ± 0.0034
H33	0.0897 ± 0.0081	<0.0226	<0.0012	<0.0009	<0.0293

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

<u>Sample Site</u>	<u>Collection Date</u>	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Zr-95 Nb-95 (A)</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140 La-140 (B)</u>
H13	15-Jul-19	<139	331 ± 25	<3	<3	<6	<4	<7	<5	<3	<3	<3	<8
	13-Aug-19	<138	326 ± 35	<6	<6	<13	<7	<12	<11	<11	<5	<6	<11
	17-Sep-19	<142	356 ± 26	<3	<3	<6	<3	<8	<6	<4	<3	<3	<6
H36	15-Jul-19	<139	357 ± 26	<3	<4	<7	<3	<8	<5	<4	<3	<3	<7
	13-Aug-19	<138	460 ± 41	<7	<7	<13	<6	<13	<11	<11	<5	<6	<12
	17-Sep-19	1324 ± 33	386 ± 27	<4	<3	<8	<3	<8	<6	<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>	<u>U-235</u>	<u>U-238</u>
H13	15-Aug-19	107 ± 31	456 ± 51	<10	<10	<9	<10	<684	417 ± 62	72 ± 11	26 ± 4	171 ± 46
H16	15-Aug-19	<112	785 ± 63	<11	<9	<8	<10	<756	614 ± 83	100 ± 11	39 ± 5	288 ± 53
H19	15-Aug-19	< 123	834 ± 69	<13	<10	<10	<12	<1030	844 ± 88	182 ± 14	53 ± 5	294 ± 26
H36	15-Aug-19	278 ± 30	2840 ± 110	<12	<8	<10	17 ± 3	3030 ± 210	926 ± 89	207 ± 12	58 ± 6	586 ± 27

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	15-Aug-19	60 ± 15	138 ± 20	<8	<6	<7	<7	299 ± 66	484 ± 51	72 ± 6	31 ± 3	239 ± 16
H16	15-Aug-19	197 ± 34	219 ± 34	<12	<7	<9	<10	526 ± 287	585 ± 78	96 ± 11	37 ± 5	233 ± 32
H19	15-Aug-19	134 ± 20	116 ± 20	<7	<5	<7	<7	312 ± 57	471 ± 56	88 ± 7	30 ± 3	210 ± 16

3.d. GROUND WATER (pCi/L)

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Zr-95 Nb-95 (A)</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140 La-140 (B)</u>
H70	25-Jul-19	<135	45 ± 11	<4	<4	<7	<4	<9	<7	<4	<4	<4	<10
H71	*25-Jul-19	442 ± 50	401 ± 42	<7	<5	<14	<7	<15	<11	<7	<5	<6	<20
H72	*25-Jul-19	<135	342 ± 38	<6	<7	<13	<6	<14	<10	<7	<6	<7	<27
H73	25-Jul-19	<135	114 ± 15	<4	<3	<7	<4	<7	<6	<4	<4	<4	<13
H74	*25-Jul-19	<135	327 ± 36	<6	<7	<13	<7	<16	<9	<6	<6	<7	<20
H75	25-Jul-19	<135	305 ± 24	<4	<3	<7	<4	<8	<6	<4	<4	<3	<11
H76	25-Jul-19	<135	<37	<4	<4	<7	<3	<9	<7	<4	<4	<4	<13
H77	25-Jul-19	<135	<99	<6	<5	<11	<6	<13	<10	<6	<5	<6	<14
H78	25-Jul-19	<138	41 ± 11	<4	<4	<7	<4	<9	<6	<4	<4	<4	<9
H79	25-Jul-19	<138	64 ± 20	<6	<6	<10	<6	<13	<11	<6	<5	<6	<15

(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.

* Analysis of these three samples did not meet the required 15 pCi/L limit of detection for Ba-140/La-140 due to an oversight of lab processes. Additional processes and training have been put in place to fix this oversight.

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.					



RADIOLOGICAL SURVEILLANCE
OF
FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT

FOURTH QUARTER 2019

BUREAU OF RADIATION CONTROL

ST. LUCIE SITE

Offsite Dose Calculation Manual Sampling

Fourth Quarter, 2019

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	27	54
2. Airborne			
2.a. Air Iodines	Weekly	5	70
2.b. Air Particulates	Weekly	5	70
3. Waterborne			
3.a. Surface Water	Weekly	1	14
	Monthly	1	3
3.b. Shoreline Sediment	Semiannually	2	0
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: 221

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 05-Sep-19 Collection 17-Dec-19		Sample Site	Deployment 05-Sep-19 Collection 17-Dec-19	
	Old	New		Old	New
N-1	3.45 ± 0.43	3.52 ± 0.47	SW-2	3.49 ± 0.08	3.48 ± 0.29
NNW-5	3.48 ± 0.06	3.46 ± 0.19	SW-5	4.12 ± 0.30	4.13 ± 0.20
NNW-10	4.19 ± 0.11	4.41 ± 0.22	SW-10	3.64 ± 0.43	3.53 ± 0.02
NW-5	3.42 ± 0.40	3.62 ± 0.11	SSW-2	3.40 ± 0.21	3.54 ± 0.21
NW-10	4.67 ± 0.30	4.81 ± 0.25	SSW-5	4.03 ± 0.26	4.19 ± 0.18
WNW-2	3.44 ± 0.28	3.73 ± 0.09	SSW-10	3.36 ± 0.18	3.28 ± 0.28
WNW-5	3.91 ± 0.21	4.01 ± 0.41	S-5	3.60 ± 0.46	3.65 ± 0.25
WNW-10	3.53 ± 0.15	3.48 ± 0.38	S-10	3.58 ± 0.06	3.56 ± 0.15
W-2	3.48 ± 0.33	3.42 ± 0.22	S/SSE-10	4.01 ± 0.23	3.92 ± 0.36
W-5	4.00 ± 0.32	3.97 ± 0.17	SSE-5	3.48 ± 0.18	3.43 ± 0.14
W-10	3.21 ± 0.16	3.13 ± 0.49	SSE-10	3.74 ± 0.18	3.58 ± 0.44
WSW-2	3.61 ± 0.13	3.62 ± 0.62	SE-1	3.35 ± 0.19	3.46 ± 0.03
WSW-5	3.55 ± 0.13	3.63 ± 0.18	H-32	3.79 ± 0.32	3.92 ± 0.47
WSW-10	3.34 ± 0.34	3.29 ± 0.26			

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>
01-Oct-19	<0.02	<0.02	<0.02	<0.02	<0.02
08-Oct-19	<0.02	<0.02	<0.02	<0.02	<0.02
15-Oct-19	<0.02	<0.02	<0.02	<0.02	<0.02
22-Oct-19	<0.03	<0.03	<0.03	<0.03	<0.03
29-Oct-19	<0.02	<0.02	<0.02	<0.02	<0.02
05-Nov-19	<0.02	<0.02	<0.02	<0.02	<0.02
12-Nov-19	<0.02	<0.02	<0.02	<0.02	<0.02
20-Nov-19	<0.01	<0.01	<0.01	<0.01	<0.01
26-Nov-19	<0.02	<0.02	<0.02	<0.02	<0.02
03-Dec-19	<0.02	<0.02	<0.02	<0.02	<0.02
10-Dec-19	<0.02	<0.02	<0.02	<0.02	<0.02
17-Dec-19	<0.02	<0.02	<0.02	<0.02	<0.02
23-Dec-19	<0.02	<0.02	<0.02	<0.02	<0.02
30-Dec-19	<0.02	<0.03	<0.03	<0.03	<0.03

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

Collection Date	H08	H12	H14	H30	H34
01-Oct-19	0.025 ± 0.003	0.024 ± 0.002	0.025 ± 0.003	0.028 ± 0.003	0.019 ± 0.002
08-Oct-19	0.012 ± 0.002	0.012 ± 0.002	0.013 ± 0.002	0.016 ± 0.002	0.009 ± 0.002
15-Oct-19	0.010 ± 0.002	0.011 ± 0.002	0.012 ± 0.002	0.013 ± 0.002	0.012 ± 0.002
22-Oct-19	0.011 ± 0.002	0.010 ± 0.002	0.013 ± 0.002	0.013 ± 0.002	0.011 ± 0.002
29-Oct-19	0.012 ± 0.002	0.010 ± 0.002	0.010 ± 0.002	0.011 ± 0.002	0.009 ± 0.002
05-Nov-19	0.013 ± 0.002	0.009 ± 0.002	0.007 ± 0.002	0.009 ± 0.002	0.011 ± 0.002
12-Nov-19	0.006 ± 0.002	0.006 ± 0.002	0.004 ± 0.002	0.004 ± 0.002	0.006 ± 0.002
20-Nov-19	0.013 ± 0.002	0.013 ± 0.002	0.014 ± 0.002	0.013 ± 0.002	0.013 ± 0.002
26-Nov-19	0.022 ± 0.003	0.021 ± 0.003	0.020 ± 0.003	0.020 ± 0.003	0.017 ± 0.002
03-Dec-19	0.018 ± 0.002	0.018 ± 0.002	0.013 ± 0.002	0.016 ± 0.002	0.015 ± 0.002
10-Dec-19	0.017 ± 0.002	0.021 ± 0.002	0.018 ± 0.002	0.017 ± 0.002	0.020 ± 0.002
17-Dec-19	0.006 ± 0.002	0.009 ± 0.002	0.014 ± 0.002	0.010 ± 0.002	0.012 ± 0.002
23-Dec-19	0.010 ± 0.002	0.009 ± 0.002	0.005 ± 0.002	0.010 ± 0.002	0.009 ± 0.002
30-Dec-19	0.007 ± 0.002	0.007 ± 0.002	0.010 ± 0.002	0.003 ± 0.002	0.006 ± 0.002
Average:	0.013 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.013 ± 0.001	0.012 ± 0.001

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	0.1400 ± 0.0089	<0.0117	<0.0009	<0.0009	0.0121 ± 0.0025
H12	0.1410 ± 0.0096	<0.0201	<0.0011	<0.0008	0.0275 ± 0.0085
H14	0.1200 ± 0.0094	<0.0177	<0.0009	<0.0008	<0.0298
H30	0.1370 ± 0.0090	<0.0139	<0.0011	<0.0011	<0.0142
H34	0.1190 ± 0.0090	<0.0192	<0.0009	<0.0007	<0.0262

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	01-Oct-19	<144	367 ± 26	<3	<3	<7	<4	<8	<5	<4	<3	<4	<11
	08-Oct-19	<143	360 ± 26	<3	<3	<6	<3	<7	<5	<4	<3	<3	<6
	15-Oct-19	<141	370 ± 26	<3	<3	<7	<4	<8	<6	<4	<3	<4	<11
	22-Oct-19	<143	345 ± 26	<3	<3	<6	<4	<8	<5	<3	<3	<3	<11
	29-Oct-19	<140	354 ± 26	<3	<3	<6	<3	<7	<6	<3	<3	<4	<12
	05-Nov-19	<142	353 ± 26	<3	<3	<7	<3	<8	<5	<4	<3	<3	<11
	12-Nov-19	205 ± 27	294 ± 23	<3	<3	<7	<4	<7	<5	<3	<3	<3	<11
	20-Nov-19	<140	334 ± 25	<3	<3	<6	<3	<7	<5	<3	<3	<3	<13
	26-Nov-19	<140	317 ± 25	<3	<3	<7	<3	<6	<5	<3	<3	<3	<11
	03-Dec-19	<138	337 ± 25	<3	<3	<6	<3	<7	<6	<3	<3	<3	<13
	10-Dec-19	<137	320 ± 25	<3	<3	<6	<3	<7	<5	<3	<4	<4	<12
	17-Dec-19	<137	362 ± 26	<3	<4	<7	<3	<8	<6	<7	<3	<4	<5
	23-Dec-19	<137	363 ± 26	<3	<4	<7	<3	<7	<4	<4	<3	<4	<5
	30-Dec-19	<137	389 ± 27	<3	<3	<7	<4	<8	<6	<4	<3	<4	<6
H59	10-Oct-19	<143	317 ± 24	<3	<3	<7	<4	<8	<6	<5	<3	<3	<4
	14-Nov-19	<140	335 ± 25	<3	<3	<7	<3	<7	<6	<4	<3	<3	<5
	20-Dec-19	<137	347 ± 27	<3	<3	<7	<3	<8	<5	<6	<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.

* Analysis of these two samples did not meet the required 15 pCi/L limit of detection for Ba-140/La-140 due to an oversight of lab

processes. Additional processes and training have been put in place to fix this oversight.

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	This sample was previously collected.											
H59	This sample was previously collected.											

4.a.1. 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 collected.										
H59	This sample not collected.										

4.a.2. FISH - Mixed Species - (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 was previously collected.										
H59	04-Dec-19	2270 ± 162	<19	<18	<32	<19	<44	<23	<22	<428	<74

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

Sample Site	Collection Date	<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	10-Oct-19	992 ± 62	3880 ± 185	<13	<13	<15	746 ± 354	<23	<281	<67
	14-Nov-19	822 ± 54	4700 ± 203	<11	<11	<13	771 ± 351	47 ± 8	<268	<55
	20-Dec-19	1420 ± 78	4090 ± 199	<20	<12	<16	<1130	<23	<275	<60
H52	10-Oct-19	871 ± 54	3290 ± 162	<12	<12	<12	1160 ± 349	<23	<261	<57
	14-Nov-19	1000 ± 44	3510 ± 135	<7	<7	<7	209 ± 79	14 ± 3	<175	<30
	20-Dec-19	1680 ± 83	4410 ± 202	<19	<13	<14	<1150	<23	<285	<52
H59	10-Oct-19	536 ± 42	2460 ± 131	<10	<8	<13	<728	25 ± 6	130 ± 42	<46
	14-Nov-19	1090 ± 46	3290 ± 130	<7	<7	<8	<460	17 ± 3	<171	<32
	20-Dec-19	1370 ± 75	2930 ± 157	<19	<11	<14	962 ± 364	<23	<275	<59

ST. LUCIE SITE

Supplemental Sampling

Fourth Quarter, 2019

<u>Sample Type</u>	<u>Collection Frequency</u>	<u>Locations Sampled</u>	<u>Number of Samples</u>
1. Direct Radiation	Quarterly	9	18
2. Airborne			
2.a. Air Iodines	Weekly	3	42
2.b. Air Particulates	Weekly	3	42
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
			Total: 118

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 05-Sep-19 Collection 17-Dec-19	
	Old	New
H08	4.08 ± 0.24	4.13 ± 0.28
H09	4.26 ± 0.19	4.19 ± 0.12
H12	8.24 ± 0.22	8.05 ± 0.25
H14	4.13 ± 0.58	4.10 ± 0.35
H33	3.83 ± 0.21	3.96 ± 0.17
H34	3.77 ± 0.41	3.81 ± 0.32
H60	3.79 ± 0.12	4.06 ± 0.27
H61	4.80 ± 0.09	4.90 ± 0.27
H62	4.27 ± 0.36	4.22 ± 0.21

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

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
01-Oct-19	<0.02	<0.02	<0.02
08-Oct-19	<0.02	<0.02	<0.02
15-Oct-19	<0.02	<0.02	<0.02
22-Oct-19	<0.03	<0.03	<0.03
29-Oct-19	<0.02	<0.02	<0.03
05-Nov-19	<0.02	<0.02	<0.02
12-Nov-19	<0.02	<0.02	<0.02
20-Nov-19	<0.01	<0.01	<0.01
26-Nov-19	<0.02	<0.02	<0.02
03-Dec-19	<0.02	<0.02	<0.02
10-Dec-19	<0.02	<0.02	<0.02
17-Dec-19	<0.02	<0.02	<0.03
23-Dec-19	<0.02	<0.02	<0.02
30-Dec-19	<0.02	<0.03	<0.02

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

<u>Collection Date</u>	<u>H09</u>	<u>H32</u>	<u>H33</u>
01-Oct-19	0.025 ± 0.002	0.029 ± 0.003	0.020 ± 0.002
08-Oct-19	0.014 ± 0.002	0.015 ± 0.002	0.010 ± 0.002
15-Oct-19	0.011 ± 0.002	0.011 ± 0.002	0.010 ± 0.002
22-Oct-19	0.010 ± 0.002	0.012 ± 0.002	0.012 ± 0.002
29-Oct-19	0.012 ± 0.002	0.012 ± 0.002	0.010 ± 0.002
05-Nov-19	0.015 ± 0.002	0.012 ± 0.002	0.008 ± 0.002
12-Nov-19	0.006 ± 0.002	0.007 ± 0.002	<0.008
20-Nov-19	0.011 ± 0.002	0.013 ± 0.002	0.011 ± 0.002
26-Nov-19	0.025 ± 0.003	0.023 ± 0.003	0.019 ± 0.002
03-Dec-19	0.016 ± 0.002	0.021 ± 0.002	0.018 ± 0.002
10-Dec-19	0.019 ± 0.002	0.016 ± 0.002	0.020 ± 0.002
17-Dec-19	0.012 ± 0.002	0.011 ± 0.002	0.007 ± 0.003
23-Dec-19	0.007 ± 0.002	0.010 ± 0.002	0.008 ± 0.002
30-Dec-19	0.006 ± 0.002	0.009 ± 0.002	0.005 ± 0.002
Average:	0.014 ± 0.001	0.014 ± 0.001	<0.012

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

<u>Sample Site</u>	<u>B-7</u>	<u>K-40</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Pb-210</u>
H09	0.1070 ± 0.0087	<0.0211	<0.0009	<0.0009	<0.0310
H32	0.0989 ± 0.0077	<0.0199	<0.0010	<0.0008	<0.0274
H33	0.1290 ± 0.0089	<0.0131	<0.0011	<0.0010	<0.0152

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

Sample Site	Collection Date	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	Zr-95 Nb-95 (A)	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	Ba-140 La-140 (B)
H13	10-Oct-19	<143	307 ± 36	<7	<6	<10	<6	<14	<11	<8	<5	<7	<9
	14-Nov-19	<142	302 ± 24	<3	<3	<7	<3	<7	<5	<4	<3	<3	<11
	20-Dec-19	<137	272 ± 23	<3	<3	<7	<4	<8	<5	<5	<3	<3	<4
H36	10-Oct-19	214 ± 48	407 ± 27	<3	<3	<7	<4	<8	<6	<5	<3	<3	<4
	14-Nov-19	<142	327 ± 25	<3	<3	<7	<3	<6	<5	<4	<3	<3	<9
	20-Dec-19	<137	342 ± 26	<3	<3	<7	<3	<8	<7	<6	<3	<4	<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.

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>
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)

<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	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	<u>H-3</u>	<u>K-40</u>	<u>Mn-54</u>	<u>Co-58</u>	<u>Fe-59</u>	<u>Co-60</u>	<u>Zn-65</u>	<u>Zr-95 Nb-95 (A)</u>	<u>I-131</u>	<u>Cs-134</u>	<u>Cs-137</u>	<u>Ba-140 La-140 (B)</u>
H70	18-Oct-19	<141	<85	<6	<5	<10	<7	<14	<10	<7	<5	<7	<11
H71	18-Oct-19	296 ± 49	359 ± 26	<3	<4	<7	<4	<7	<6	<5	<4	<4	<6
H72	18-Oct-19	<141	394 ± 42	<6	<7	<13	<7	<15	<10	<8	<6	<7	<9
H73	18-Oct-19	<141	94 ± 14	<4	<3	<7	<3	<8	<6	<5	<4	<4	<6
H74	18-Oct-19	<141	282 ± 35	<5	<6	<13	<7	<13	<11	<9	<5	<7	<11
H75	18-Oct-19	<141	318 ± 25	<4	<3	<8	<3	<7	<6	<5	<3	<4	<5
H76	18-Oct-19	<141	<43	<3	<3	<8	<4	<9	<6	<5	<4	<4	<6
H77	18-Oct-19	<143	<97	<6	<6	<13	<6	<12	<11	<8	<6	<6	<10
H78	18-Oct-19	<141	<106	<7	<6	<11	<6	<12	<9	<8	<5	<7	<11
H79	18-Oct-19	<143	<101	<6	<6	<10	<7	<12	<10	<8	<5	<6	<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.

* Analysis of these three samples did not meet the required 15 pCi/L limit of detection for Ba-140/La-140 due to an oversight of lab processes. Additional processes and training have been put in place to fix this oversight.

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.					

Attachment B:

10. Results from the Interlaboratory Comparison Program 2019

Mission:

To protect, promote & improve the health of all people in Florida through integrated state, county & community efforts.



Ron DeSantis
Governor

Vision: To be the Healthiest State in the Nation

Date June 13, 2019

Kaitlyn Toebe
St. Lucie Nuclear Power Plant
6501 S. Ocean Blvd.
Jensen Beach, FL 34957

Subject: Mixed-Analyte Performance Evaluation Program (MAPEP)

Our results from the DOE Mixed-Analyte Performance Evaluation Program (MAPEP) are enclosed. The results are from the MAPEP Series 40 for February 2019 and satisfy paragraph 6.8.4 of the technical specification for the St. Lucie and Turkey Point Plants. Please note that not all of the MAPEP Series 40 data pertains to samples analyzed for nuclear utilities, it is completed for other programs as well

We had no issues on any of the nuclides we are required to report in the ODCM.

With this study, MAPEP has resumed providing an Alpha/Beta filter, which we passed. As per utility request, we also did a second Tritium study from ERA (ERA RAD 117), which we also passed. The reports are included with this letter.

If you have any further questions, please contact me.

Thank You,

A handwritten signature in black ink, appearing to read "Allen Moody".

Allen Moody
Chemist Administrator
Bureau of Radiation Control
407-297-2096

Enclosures:

MAPEP 40 Final Report

ERA RAD117 Final Report





MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP Series 40

(FDOH01) Florida Dept. of Health, Mobile Environmental Radiological Lab
 PO Box 680069
 Orlando, FL 32868-0069

MAPEP-19-GrF40: Gross alpha/beta air filter

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.61	0.528	A		15.5	0.158 - 0.898	0.05	A
Gross beta	0.96	0.948	A		1.3	0.474 - 1.422	0.03	A

Radiological Reference Date: February 1, 2019

MAPEP-19-MaS40: Radiological and inorganic combined soil standard

Inorganic						Units: (mg/kg)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Antimony	NR	21.7				15.2 - 28.2		
Arsenic	NR	87.2				61.0 - 113.4		
Barium	NR	307				215 - 399		
Beryllium	NR	61.5				43.1 - 80.0		
Cadmium	NR	11.1				7.8 - 14.4		
Chromium	NR	48.6				34.0 - 63.2		
Cobalt	NR	74.9				52.4 - 97.4		
Copper	NR	258				181 - 335		
Lead	NR	52.2				36.5 - 67.9		
Mercury	NR	1.71				1.20 - 2.22		
Nickel	NR	193				135 - 251		
Selenium	NR	16.5				11.6 - 21.5		
Silver	NR	10.65				7.46 - 13.85		
Technetium-99	NR	0.000646				4.52E-4 - 8.40E-4		
Thallium	NR	75.7				53.0 - 98.4		
Uranium-235	NR	0.0456				0.0319 - 0.0593		
Uranium-238	NR	16.5				11.6 - 21.5		
Uranium-Total	NR	16.6				11.6 - 21.6		
Vanadium	NR	279				195 - 363		
Zinc	NR	171				120 - 222		

Radiological						Units: (Bq/kg)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	54.40	49.9	A		9.0	34.9 - 64.9	4.77	A
Cesium-134	0.29		A			False Positive Test	5.91	
Cesium-137	1137.78	1164	A		-2.3	815 - 1513	18.63	N



A Waters Company

RAD-117 2009 TNI Evaluation Final Complete Report

Allen Moody
Chemist Administrator
State of Florida DOH
P.O. Box 680069
Orlando, FL 32868-0069
407-297-2096

EPA ID:
ERA Customer Number:
Report Issued:
Study Dates:

FL01115
S746301
05/28/19
04/08/19 - 05/23/19

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
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RAD NaturalSM (cat# 811, lot# R117-751)

2965	Radium-226	pCi/L	6.87	7.15	5.39 - 8.48	Acceptable	EPA 903.1 SC 1980	4/30/2019	0.0592	6.81	0.956	
2970	Radium-228	pCi/L	4.32	2.94	1.54 - 4.35	Acceptable	EPA Ra-05	4/29/2019	2.31	2.95	0.595	
3055	Uranium (Nat)	pCi/L	49.8	55.9	45.6 - 61.5	Acceptable	D6239	5/6/2019	-0.878	52.6	3.20	
3055	Uranium (Nat) mass	µg/L		81.5	66.5 - 89.7	Not Reported				77.6	7.38	

RAD NaturalSM (cat# 811, lot# R117-751)

2965	Radium-226	pCi/L	6.768	7.15	5.39 - 8.48	Acceptable	GA Ra-226/228 1.2 2004	5/1/2019	-0.0474	6.81	0.956	
2970	Radium-228	pCi/L	3.49	2.94	1.54 - 4.35	Acceptable	GA Ra-226/228 1.2 2004	5/1/2019	0.912	2.95	0.595	
3055	Uranium (Nat)	pCi/L		55.9	45.6 - 61.5	Not Reported				52.6	3.20	
3055	Uranium (Nat) mass	µg/L		81.5	66.5 - 89.7	Not Reported				77.6	7.38	

RAD TritiumSM (cat# 812, lot# R117-752)

3030	Tritium	pCi/L	20941	21400	18700 - 23500	Acceptable	EPA 906.0 1980	4/22/2019	-0.586	21400	833	
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RAD Strontium-89/90 (cat# 807, lot# R117-757)

2995	Strontium-89	pCi/L	28.98	33.3	24.5 - 40.1	Acceptable	Other	5/7/2019	-0.618	32.3	5.41	
3005	Strontium-90	pCi/L	25.21	26.3	19.0 - 30.7	Acceptable	Other	5/7/2019	-0.996	27.2	1.98	

RAD Strontium-89/90 (cat# 807, lot# R117-757)

2995	Strontium-89	pCi/L	32.76	33.3	24.5 - 40.1	Acceptable	EPA 905.0 1980	5/15/2019	0.0811	32.3	5.41	
3005	Strontium-90	pCi/L	29.09	26.3	19.0 - 30.7	Acceptable	EPA 905.0 1980	5/15/2019	0.965	27.2	1.98	



All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01

16341 Table Mountain Pkwy • Golden, CO 80403 • 800.372.0122 • 303.431.8454 • fax 303.421.0159 • www.eraqc.com

Study # : RAD-117



Mission:

To protect, promote & improve the health of all people in Florida through integrated state, county & community efforts.



Ron DeSantis
Governor

Scott A. Rivkees, MD
State Surgeon General

Vision: To be the Healthiest State in the Nation

December 17, 2019

Kaitlyn Toebe
St. Lucie Nuclear Power Plant
6501 S. Ocean Blvd.
Jensen Beach, FL 34957

Subject: Mixed-Analyte Performance Evaluation Program (MAPEP)

Our results from the DOE Mixed-Analyte Performance Evaluation Program (MAPEP) are enclosed. The results are from the MAPEP Series 41 for August 2019 and satisfy paragraph 6.8.4 of the technical specification for the St. Lucie and Turkey Point Plants. Please note that not all of the MAPEP Series 41 data pertains to samples analyzed for nuclear utilities, it is completed for other programs as well

We had no issues on any of the nuclides we are required to report in the ODCM.

As per utility request, we also did a second Tritium study from ERA (ERA RAD 119), which we also passed. The reports are included with this letter.

If you have any further questions, please contact me.

Thank You,

Allen Moody
Chemist Administrator
Bureau of Radiation Control
407-297-2096





**Mixed Analyte
Performance Evaluation Program**

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP Series 41
(FDHE01) Florida Dept of Health Environmental Laboratory
PO Box 680069
Orlando, FL 32868-0069

MAPEP-19-GrF41: Gross alpha/beta air filter
Radiological Units: (Bq/sample)

Analyte	Result	Ref Value	Flag Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.68	0.528	A	28.8	0.158 - 0.898	0.06	A
Gross beta	1.13	0.937	A	20.6	0.469 - 1.406	0.06	A

Radiological Reference Date: August 1, 2019

MAPEP-19-GrW41: Gross alpha/beta water
Radiological Units: (Bq/L)

Analyte	Result	Ref Value	Flag Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Gross alpha	0.914	1.06	A	-13.8	0.32 - 1.80	0.259	W
Gross beta	3.30	3.32	A	-0.6	1.66 - 4.98	0.247	A

Radiological Reference Date: August 1, 2019

MAPEP-19-MaS41: Radiological and inorganic combined soil standard
Inorganic Units: (mg/kg)

Analyte	Result	Ref Value	Flag Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Antimony	NR	119			83 - 155		
Arsenic	NR	35.1			24.6 - 45.6		
Barium	NR	292			204 - 380		
Beryllium	NR	10.6			7.4 - 13.8		
Cadmium	NR	18.0			12.6 - 23.4		
Chromium	NR	60.4			42.3 - 78.5		
Cobalt	NR	51.9			36.3 - 67.5		
Copper	NR	94.9			66.4 - 123.4		
Lead	NR	85.1			59.6 - 110.6		
Mercury	NR	1.01			0.71 - 1.31		
Nickel	NR	106.9			74.8 - 139.0		
Selenium	NR	3.53			2.47 - 4.59		
Silver	NR				False Positive Test		
Technetium-99	NR	0.00094			0.00066 - 0.00122		
Thallium	NR	21.6			15.1 - 28.1		
Uranium-235	NR	0.0679			0.0475 - 0.0883		
Uranium-238	NR	9.4			6.6 - 12.2		
Uranium-Total	NR	9.4			6.6 - 12.2		
Vanadium	NR	176			123 - 229		

Inorganic						Units: (mg/kg)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Zinc	NR	374				262 - 486		

Radiological						Units: (Bq/kg)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	60.13	74.7	A		-19.5	52.3 - 97.1	1.53	A
Cesium-134	999.60	1020	A		-2.0	714 - 1326	13.02	N
Cesium-137	762.50	789	A		-3.4	552 - 1026	14.24	N
Cobalt-57	0.14		A			False Positive Test	2.36	
Cobalt-60	715.67	760	A		-5.8	532 - 988	10.73	N
Iron-55	NR					False Positive Test		
Manganese-54	721.33	745	A		-3.2	522 - 969	13.12	N
Nickel-63	NR	629				440 - 818		
Plutonium-238	50.26	52.1	A		-3.5	36.5 - 67.7	3.68	A
Plutonium-239/240	62.30	61.4	A		1.5	43.0 - 79.8	4.86	A
Potassium-40	525.33	555	A		-5.3	389 - 722	17.02	A
Strontium-90	368.66	572	N		-35.5	400 - 744	15.56	A
Technetium-99	NR	593				415 - 771		
Uranium-234	98.999	116	A		-14.7	81 - 151	9.516	A
Uranium-238	121.03	117	A		3.4	82 - 152	9.91	A
Zinc-65	1.80		A			False Positive Test	8.50	

Radiological Reference Date: August 1, 2019

MAPEP-19-MaW41: Radiological and inorganic combined water standard

Inorganic						Units: (mg/L)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Antimony	NR	11.5				8.1 - 15.0		
Arsenic	NR	2.53				1.77 - 3.29		
Barium	NR	1.32				0.92 - 1.72		
Beryllium	NR	4.55				3.19 - 5.92		
Cadmium	NR	0.433				0.303 - 0.563		
Chromium	NR	0.00061				Sensitivity Evaluation		
Cobalt	NR	14.4				10.1 - 18.7		
Copper	NR	16.1				11.3 - 20.9		
Lead	NR	0.547				0.383 - 0.711		
Mercury	NR	0.0921				0.0645 - 0.1197		
Nickel	NR	18.6				13.0 - 24.2		
Selenium	NR	0.535				0.375 - 0.696		
Technetium-99	NR					False Positive Test		
Thallium	NR					False Positive Test		
Uranium-235	NR	0.000604				4.23E-4 - 7.85E-4		
Uranium-238	NR	0.085				0.060 - 0.111		
Uranium-Total	NR	0.085				0.060 - 0.111		
Vanadium	NR	3.02				2.11 - 3.93		
Zinc	NR	5.38				3.77 - 6.99		

Inorganic						Units: (mg/L)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag

Radiological						Units: (Bq/L)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	0.609	0.522	A		16.7	0.365 - 0.679	1.821	N
Cesium-134	0.047		A			False Positive Test	0.428	
Cesium-137	19.275	18.4	A		4.8	12.9 - 23.9	0.614	A
Cobalt-57	15.613	15.6	A		0.1	10.9 - 20.3	0.360	A
Cobalt-60	8.786	8.8	A		-0.2	6.2 - 11.4	0.273	A
Hydrogen-3	189.51	175	A		8.3	123 - 228	3.02	N
Iron-55	NR	15.7				11.0 - 20.4		
Manganese-54	21.150	20.6	A		2.7	14.4 - 26.8	0.623	A
Nickel-63	NR	9.7				6.8 - 12.6		
Plutonium-238	0.0093	0.0063	A			Sensitivity Evaluation	0.0024	
Plutonium-239/240	0.6043	0.727	A		-16.9	0.509 - 0.945	0.0328	A
Potassium-40	1.092		A			False Positive Test	1.113	
Radium-226	0.305	0.307	A		-0.7	0.215 - 0.399	0.120	N
Strontium-90	9.549	10.6	A		-9.9	7.4 - 13.8	0.558	A
Technetium-99	NR					False Positive Test		
Uranium-234	1.053	1.07	A		-1.6	0.75 - 1.39	0.152	A
Uranium-238	0.974	1.05	A		-7.2	0.74 - 1.37	0.147	W
Zinc-65	21.950	20.3	A		8.1	14.2 - 26.4	0.773	A

Radiological Reference Date: August 1, 2019

MAPEP-19-RdF41: Radiological air filter

Inorganic						Units: (ug/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Uranium-235	NR	0.0565				0.0396 - 0.0735		
Uranium-238	NR	7.7				5.4 - 10.0		
Uranium-Total	NR	7.8				5.5 - 10.1		

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	0.047		A			False Positive Test	0.264	
Cesium-134	0.030		A			False Positive Test	0.098	
Cesium-137	1.642	1.58	A		3.9	1.11 - 2.05	0.072	A
Cobalt-57	1.128	1.16	A		-2.8	0.81 - 1.51	0.033	A
Cobalt-60	0.898	0.815	A		10.2	0.571 - 1.060	0.054	A
Manganese-54	1.448	1.37	A		5.7	0.96 - 1.78	0.059	A
Plutonium-238	0.077	0.0761	A		1.2	0.0533 - 0.0989	0.005	A
Plutonium-239/240	0.045	0.0468	A		-3.8	0.0328 - 0.0608	0.004	A
Strontium-90	0.556	0.498	A		11.6	0.349 - 0.647	0.043	A
Uranium-234	0.087	0.093	A		-6.5	0.065 - 0.121	0.006	A
Uranium-238	0.095	0.096	A		-1.0	0.067 - 0.125	0.006	A

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Zinc-65	1.142	1.06	A		7.7	0.74 - 1.38	0.088	A

Radiological Reference Date: August 1, 2019

MAPEP-19-RdV41: Radiological vegetation						Units: (ug/sample)		
Inorganic								
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Uranium-235	NR	0.0391				0.0274 - 0.0508		
Uranium-238	NR	5.38				3.77 - 6.99		
Uranium-Total	NR	5.42				3.79 - 7.05		

Radiological						Units: (Bq/sample)		
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	0.133	0.090	N		47.8	0.063 - 0.117	0.349	N
Cesium-134	0.054		A			False Positive Test	0.085	
Cesium-137	3.578	3.28	A		9.1	2.30 - 4.26	0.196	A
Cobalt-57	5.588	4.57	W		22.3	3.20 - 5.94	0.154	A
Cobalt-60	5.555	5.30	A		4.8	3.71 - 6.89	0.152	A
Manganese-54	5.010	4.49	A		11.6	3.14 - 5.84	0.188	A
Plutonium-238	0.08456	0.081	A		4.4	0.057 - 0.105	0.00514	A
Plutonium-239/240	0.00072		A			False Positive Test	0.0006	
Strontium-90	1.015	1.00	A		1.5	0.70 - 1.30	0.064	A
Uranium-234	0.0611	0.0647	A		-5.6	0.0453 - 0.0841	0.0037	A
Uranium-238	0.0605	0.0670	A		-9.7	0.0469 - 0.0871	0.0037	A
Zinc-65	3.360	2.85	A		17.9	2.00 - 3.71	0.138	A

Radiological Reference Date: August 1, 2019

MAPEP-19-XaW41: Alkaline Radiological water standard						Units: (Bq/L)		
Radiological								
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Iodine-129	2.132	1.78	A		19.8	1.25 - 2.31	0.234	A

Radiological Reference Date: August 1, 2019

MAPEP-19-XrM41: Special Radiological Matrix						Units: (ug/sample)		
Mass								
Analyte	Result	Ref Value	Flag	Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Uranium-235	NR	0.0276						
Uranium-238	NR	9.0						
Uranium-Total	NR	9.1						

Radiological Units: (Bq/sample)

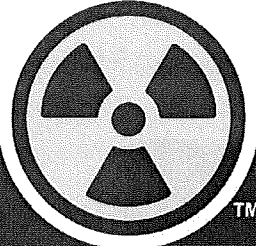
Analyte	Result	Ref Value	Flag Notes	Bias (%)	Acceptance Range	Unc Value	Unc Flag
Americium-241	0.06	0.086		-30.2		0.18	
Cadmium-109	0.36					0.25	
Cesium-134	0.30	0.391		-23.3		0.01	
Curium-244	NR	0.0731					
Plutonium-238	0.064	0.067		-4.5		0.005	
Plutonium-239/240	0.088	0.087		1.1		0.006	
Potassium-40	-0.26					0.56	
Radium-226	0.23	0.474		-51.5		0.02	
Radium-228	0.11					0.18	
Ruthenium-106	NR	0.290					
Strontium-90	0.123	0.493		-75.1		0.030	
Technetium-99	NR	0.832					
Uranium-234	0.03567	0.040		-10.8		0.0046	
Uranium-238	0.1023	0.112		-8.7		0.0080	

Radiological Reference Date: August 1, 2019



A Waters Company

Allen Moody
State of Florida DOH
P.O. Box 680069
Orlando, FL 32868-0069
USA

RAD-119  ***Final Report***

RadChem™ Proficiency Testing

RadChem™ Study

Reference Date: 10/04/19

Open Date: 10/04/19

Close Date: 11/18/19

Report Issued Date: 11/20/19



November 20, 2019

Allen Moody
State of Florida DOH
P.O. Box 680069
Orlando, FL 32868-0069

Enclosed is your final report for ERA's RadCheM™ Proficiency Testing (PT) study, RAD-119. Your final report includes an evaluation of all results submitted by your laboratory to ERA.

Data Evaluation Protocols: All of the analytes in ERA's RAD-119 study have been evaluated by comparing your results to the acceptance limits and evaluation criteria contained in the current TNI FoPT tables.

Corrective Action Help: As part of your accreditation(s), you may be required to identify the root cause of any "Not Acceptable" results, implement the necessary corrective actions, and then satisfy your PT requirements by participating in a Supplemental (Quik™Response) or future ERA PT study. If you need help, ERA's technical staff is available to help your laboratory resolve any technical issues that may be impairing your PT performance and possibly affecting your routine data quality. Our laboratory and technical staff have many years of collective experience in performing the full range of environmental analyses. As part of our technical support, ERA offers QC samples that can be useful in helping you work through your technical issues.

At the request of the TNI Accreditation Council, we have included a Laboratory Exception Report that includes a list of all analytes reported with less than qualifiers when the assigned value was greater than "0." In addition, because we have received many requests from laboratories, this report also includes a list of all analytes with "Not Acceptable" evaluations.

Some states have elected not to convert to the 2009 TNI Standards at this time. If you have released your results to a state that has retained the 2003 NELAC Evaluation Criteria, your final report will include a section that evaluates the results according to the 2003 Standard in addition to the 2009 TNI Standards.

Thank you for your participation in ERA's RadCheM™ Proficiency Testing study, RAD-119. If you have any questions, please contact our Proficiency Testing Department at 1-800-372-0122.

Sincerely,

Matthew Seebeck
Quality Officer

attachments



Report Recipient	Contact/Phone Number	Reporting Type	Evaluation Type
EPA Region 4	John Thomason / 706-355-8771	All Analytes	2009 TNI



RAD-119 Definitions & Study Discussion

Study Dates: 10/04/19 - 11/18/19

Report Issued: 11/20/19

RAD Study Definitions

The Reported Value is the value that the laboratory reported to ERA.

The ERA Assigned Values are compliant with the most current TNI Fields of Proficiency Testing (FoPT) tables. The assigned values are directly traceable to the commercially prepared starting materials used to manufacture the PT standards.

The Acceptance Limits are established per the criteria contained in the most current TNI FoPT tables.

The Performance Evaluation:

- Acceptable = Reported Value falls within the Acceptance Limits.
- Not Acceptable = Reported Value falls outside the Acceptance Limits.
- No Evaluation = Reported Value cannot be evaluated.
- Not Reported = No Value reported.

The Method Description is the method the laboratory reported to ERA.

RAD Study Discussion

ERA's RAD-119 RadCheM™ Proficiency Testing (PT) study has been reviewed by ERA senior management and certified compliant with the requirements of the 2009 TNI PT Standard and the criteria contained in the most current TNI Fields of Proficiency Testing (FoPT) tables.

ERA's RAD-119 RadCheM™ PT study standards were examined for any anomalies. A full review of all homogeneity, stability and accuracy verification data was completed. All analytical verification data for all analytes met the acceptance criteria contained in the 2009 TNI PT Standard and the criteria contained in the most current TNI FoPT tables.

The data submitted by participating laboratories was also examined for study anomalies. There were no anomalies observed during the statistical review of the data.

ERA's RAD-119 RadCheM™ study reports shall not be reproduced except in their entirety and not without the permission of the participating laboratories. The report must not be used by the participating laboratories to claim product endorsement by any agency of the U. S. government.

The data contained herein are confidential and intended for your use only.

If you have any questions or concerns regarding your assessment in ERA's RadCheM™ Proficiency Testing program, please contact our Proficiency Testing Department at 1-800-372-0122.





A Waters Company

RAD-119 Laboratory Exception Report

Allen Moody
Chemist Administrator
State of Florida DOH
P.O. Box 680069
Orlando, FL 32868-0069
407-297-2096

EPA ID:
ERA Customer Number:
Report Issued:
Study Dates:

FL01115
S746301
11/20/19
10/04/19 - 11/18/19

2009 TNI Evaluation Checks

There are no values reported with < where the assigned value was greater than 0.

2009 TNI Not Acceptable Evaluations

There were no Not Acceptable evaluations for this study.



All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01

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Study # : RAD-119



Final Report Results For Laboratory State of Florida DOH





2009 TNI Evaluation Report

Study: **RAD-119**

ERA Customer Number: **S746301**

Laboratory Name: **State of Florida DOH**

RAD Results





A Waters Company

RAD-119 2009 TNI Evaluation Final Complete Report

Allen Moody
Chemist Administrator
State of Florida DOH
P.O. Box 680069
Orlando, FL 32868-0069
407-297-2096

EPA ID:
ERA Customer Number:
Report Issued:
Study Dates:

FL01115
S746301
11/20/19
10/04/19 - 11/18/19

TNI Analyte Code	Analyte	Units	Reported Value	Assigned Value	Acceptance Limits	Performance Evaluation	Method Description	Analysis Date	Z Score	Study Mean	Study Standard Deviation	Analyst Name
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RAD NaturalSM (cat# 811, lot# R119-751)

2965	Radium-226	pCi/L	13.53	13.2	9.85 - 15.2	Acceptable	EPA 903.1 SC 1980	11/7/2019	0.798	12.2	1.62	
2970	Radium-228	pCi/L	4.54	5.28	3.18 - 7.03	Acceptable	EPA Ra-05	10/28/2019	-1.72	5.43	0.520	
3055	Uranium (Nat)	pCi/L	29.2	28.0	22.6 - 31.1	Acceptable	ASTM D6239	10/14/2019	1.30	27.1	1.63	
3055	Uranium (Nat) mass	µg/L		40.9	33.0 - 45.5	Not Reported				36.5	1.64	

RAD NaturalSM (cat# 811, lot# R119-751)

2965	Radium-226	pCi/L	12.047	13.2	9.85 - 15.2	Acceptable	GA Ra-226/228 1.2 2004	11/7/2019	-0.119	12.2	1.62	
2970	Radium-228	pCi/L	5.333	5.28	3.18 - 7.03	Acceptable	GA Ra-226/228 1.2 2004	11/7/2019	-0.195	5.43	0.520	
3055	Uranium (Nat)	pCi/L		28.0	22.6 - 31.1	Not Reported				27.1	1.63	
3055	Uranium (Nat) mass	µg/L		40.9	33.0 - 45.5	Not Reported				36.5	1.64	

RAD TritiumSM (cat# 812, lot# R119-752)

3030	Tritium	pCi/L	23978	23400	20500 - 25700	Acceptable	EPA 906.0 1980	10/15/2019	0.976	22800	1160	
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RAD Iodine-131 (cat# 810, lot# R119-750)

2875	Iodine-131	pCi/L	25.56	23.9	19.8 - 28.4	Acceptable	EPA 901.1 1980	10/17/2019	1.02	23.6	1.97	
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All analytes are included in ERA's A2LA accreditation. Lab Code: 1539-01

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Study # : RAD-119



CERTIFICATE OF EXCELLENCE

In recognition of the quality of your laboratory in proficiency testing for

RAD-119

State of Florida DOH

is issued this certificate of achievement by ERA. This laboratory has been recognized as a Laboratory of Excellence for achieving 100% acceptable data in this study which included 43 participating laboratories. This achievement is a demonstration of the superior quality of the laboratory in evaluation of the standards listed below.

Iodine-131

NaturalS™

TritiuM™



Matthew Seebeck
Quality Officer