Duke Energy®

Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: ITS 5.7.1.1(b)

April 25, 2013
3F0413-08

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – 2012 Annual Radiological Environmental Operating Report

Dear Sir:

Florida Power Corporation hereby submits the 2012 Annual Radiological Environmental Operating Report for Crystal River Unit 3 (CR-3) in accordance with the CR-3 Improved Technical Specifications, Section 5.7.1.1(b) and Section 6.6 of the Offsite Dose Calculation Manual (ODCM). The data provided in the attached report is consistent with the objectives outlined in the ODCM, and includes all radiological environmental samples taken during the report period from January 1, 2012 through December 31, 2012.

No new regulatory commitments are made in this letter.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Licensing Supervisor at (352) 563-4796.

Sincerely,

Blair P. Wunderly
Plant Manager
Crystal River Nuclear Plant

BPW/ff

Attachment: 2012 Annual Radiological Environmental Operating Report

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

IE25
NRR

Crystal River Nuclear Plant
15760 W. Power Line Street
Crystal River, FL 34428

FLORIDA POWER CORPORATION

DOCKET NUMBER 50 - 302 / LICENSE NUMBER DPR - 72

ATTACHMENT

2012 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

2012

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

Prepared By: Rudy Pinner 04/17/2013
Sr. Nuclear Plant Chemistry Specialist

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INTRODUCTION

This report is submitted as required by Technical Specification 5.7.1.1(b) to the Crystal River Facility Operating License No. DPR-72, and Section 6.6 of the Offsite Dose Calculation Manual.

The following information is required to be included in this report:

- Data Summaries
- Interpretations
- Unachievable LLDs
- An analysis of trends
- An assessment of any observed impact of plant operation on the environment

  NOTE: If harmful effects or evidence of irreversible damage are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to correct it.

- Summarized and tabulated results of all radiological environmental samples taken during the report period, in the format of Radiological Assessment Branch Technical Position, Revision 1, November, 1979.

  NOTE: If some results are not available for inclusion, the report shall note and explain the reason for the missing results. The missing results shall be submitted as soon as possible in a supplementary report.

- A summary description of the Radiological Environmental Monitoring Program.
- A map of all sampling locations keyed to a table giving distances and directions from the reactor.
- Land-use census results.
- Interlaboratory Comparison Program results.
- A discussion of airborne sample station availability.
- Results of any unplanned release or spill of radioactive material that could have the potential to contaminate the groundwater as reported to maintain compliance with the groundwater protection initiative (NEI 07-07).

I. SUMMARY DESCRIPTION OF THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

The analytical results of the Crystal River Unit 3 (CR-3) operational Radiological Environmental Monitoring Program (REMP) for 2012 are contained in this report. The operational program began on January 1, 1977 just prior to initial criticality, which was achieved on January 14, 1977.

Sampling of the facility environs is performed by the State of Florida Department of Health, Bureau of Radiation Control. The State also performs the required analyses, participates in the Interlaboratory Comparison Program, and performs the annual land-use census. Prior to 1990, the program was split between the Department of Health and the University of Florida. The transition to the State performing all of the program's sampling and analyses in 1990 is evident in several of the trend graphs, most notably oysters and carnivorous fish, and is due to the State using less sensitive measurement techniques for several of the pathways which were formerly evaluated by the University of Florida.

Sample station locations are given in Table I-1 and Figures I-2, I-3, I-4, and I-5. Sample frequency and analysis type may be determined from Table I-2. Figure I-1 illustrates the relevant exposure pathways. Regarding waterborne pathways, the groundwater area of the Crystal River site is too saline to be used as a source of drinking water, hence there is no credible drinking water uptake pathway. Additionally, the Florida aquifer groundwater flows in a west-southwest direction across the site toward the Gulf of Mexico and since the locale of the site is along the coast, there is no downstream public impact regarding groundwater.

Except for air sample gross beta results and direct radiation measurements, most of the analytical results are below the lower limit of detection (LLD) of the sample. Sample LLDs are generally much lower than the required "a priori" LLD. When measurable results are reported, the values are also usually less than the required "a priori" LLD.

In 2011 there were positively measured results of iodine and cesium airborne concentrations during the period of March 22 through April 12th for almost all sampling stations including the control station. These measurements are a direct result of the earthquake and tsunami event at the Dai-Ichi, Fukushima following the March 11, 2011 Tohoku event in Japan. These measurements are not related to Crystal River Unit 3 activities. The Japanese event also affected broad leaf vegetation sample media throughout the year as long-lived radionuclides (Cs-137) were released at Fukushima multiple times. The vegetation measurements in 2012 are still affected by the Fukushima event due to the long-lived radionuclides deposited.

The results of the 2012 REMP have been compared to previous years' results. This comparison, in part illustrated by the trend graphs of Section IV, shows no evidence of consistent long-term increasing trends in any of the sample media. However, radioactive material is routinely quantified in sediment samples which are taken in the discharge canal near the liquid release discharge point. In general, these results verify the effectiveness of in-plant measures for controlling radioactive releases.

Trend graphs illustrate the mean measured concentration of a particular radionuclide for the year. When measurable results are not obtained, the highest sample LLD is plotted. LLD and measured values are plotted on the same line to best illustrate any trend. As shown on each graph's legend, any measured value is noted by a text box, unless all values trended are measured values for that particular parameter.

Statistical summary pages are provided for each medium or pathway. Measured values are reported in terms of a mean and range. In addition, the number of measured values versus samples obtained is reported. For example, in the following entry;

15 (249/256)
(4 - 35)

the "All Indicator Locations" column would be interpreted as indicating a mean measured value of 15, with measured values ranging from 4 to 35. (249/256) means that out of 256 samples, 249 were measured values.

TABLE I-1

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

SAMPLE STATION LOCATIONS

SAMPLE MEDIA	STATION ID	DIRECTION	APPROX. DISTANCE (Miles)
TLD – on-site	C60	N	0.88
	C61	NNE	0.92
	C62	NE	1.17
	C63	ENE	0.87
	C64	E	0.80
	C65	ESE	0.33
	C66	SE	0.36
	C67	SSE	0.33
	C68	S	0.27
	C69	SSW	0.31
	C41	SW	0.43
	C70	WSW	0.74
	C71	WNW	0.58
	C72	NW	0.30
	C73	NNW	0.74
	C27	W	0.41
TLD – off-site	C18	N	5.3
	C03	NNE	4.89
	C04	NE	5.95
	C74	ENE	5.13
	C75	E	3.99
	C76	ESE	5.61
	C08	SE	5.66
	C77	SSE	3.39
	C09	S	3.23
	C78	WSW	4.59
	C14G	W	2.53
	C01	NW	4.8
	C79	NNW	4.97
	C47-Control	ESE	78
	C07*	ESE	7.67
	C40*	E	3.48
	C46*	N	0.37

*TLDs not required by ODCM. Deployed at air sample locations.

TABLE I-1 (CONT'D)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

SAMPLE STATION LOCATIONS

SAMPLE MEDIA	STATION ID	DIRECTION	DISTANCE (Miles)
AIR	C07	ESE	7.7
	C18	N	5.3
	C40	E	3.5
	C41	SW	0.4
	C46	N	0.4
	C47-Control	ESE	78
SEAWATER	C14H	NW	0.1
	C14G	W	2.5
	C13-Control	WSW	4.6
GROUND WATER	C40-Control	E	3.6
SITE GROUND WATER	CR3-2	E	0.1
	CR3-4	SSE	0.086
	CR3-5	SSW	0.051
	CR3-6S	W	0.038
	CR3-6D	W	0.038
	CR3-7	WNW	0.060
	CR3-8	WNW	0.073
	CR3-9	NW	0.1
	CR3-10	NNE	0.1
DRINKING WATER	C07-Control	ESE	7.4
	C10-Control	ESE	6.0
	C18-Control	N	5.3
SHORELINE SEDIMENT	C09-Control	S	3.2
	C14H	NW	0.1
	C14M	W	1.2
	C14G	W	2.5
FISH & OYSTERS	C29	W	2.5
	C30-Control	WSW	3.4
BROAD LEAF VEGETATION	C48A	N	0.4
	C48B	ENE	0.9
	C47-Control	ESE	78
WATERMELON	C04	NE	13
CITRUS	C19	ENE	9.6

TABLE I-2

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

SAMPLING AND ANALYSIS PROGRAM

SAMPLE MEDIA	# OF STATIONS	FREQUENCY	ANALYSIS		LLD[1]
TLD	33*	Quarterly	γ Dose		---
Air Iodine	6	Weekly	I-131		0.07[g] pCi/m^3
Air Particulate	6	Weekly	Gross ß		0.01
		Quarterly	γ Spec :	Cs-134	0.05[e]
				Cs-137	0.06[e]
Seawater	3	Monthly	Tritium		2000[b] pCi/L
		Monthly	γ Spec :	Mn-54	15
				Fe-59	30
				Co-58	15
				Co-60	15
				Zn-65	30
				Zr-Nb-95	15[c]
				I-131	1[f]
				Cs-134	15
				Cs-137	18
				Ba-La-140	15[c]
Ground Water	1	Semiannual	Tritium		2000[b] pCi/L
		Semiannual	γ Spec :	[2]	[2]
Site Ground Water[6]	9	Quarterly	Tritium		2000[b] pCi/L
		Quarterly	γ Spec :	[2]	[2]
Drinking Water	3	Quarterly	Tritium		2000[b] pCi/L
		Quarterly	γ Spec :	[2]	[2]
Shoreline Sediment	4	Semiannual	γ Spec :	Cs-134	150 pCi/kg
				Cs-137	180

*Includes 3 stations which are not required by the ODCM
[1]The maximum "a priori" LLD
[2]Same as Seawater γ Spec
[6]Additional 2 stations reported that are not required by the ODCM
[b]LLD for drinking water. If no drinking water pathway exists, a value of 3000 pCi/L may be used
[c]The specified LLD is for an equilibrium mixture of parent and daughter nuclides which contain 15 pCi/L of the parent nuclide
[e]LLDs apply only to quarterly composite gamma spectral analysis, not to analyses of single particulate filters
[f]LLD for drinking water. If no drinking water pathway exists, the LLD of the gamma isotopic analysis may be used
[g]LLD for I-131 applies to a single weekly filter

TABLE I-2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

SAMPLING AND ANALYSIS PROGRAM

SAMPLE MEDIA	# OF STATIONS	FREQUENCY	ANALYSIS		LLD[1]
Carnivorous Fish and Oysters	2	Quarterly	γ Spec :	Mn-54	130 pCi/kg
				Fe-59	260
				Co-58	130
				Co-60	130
				Zn-65	260
				Cs-134	130
				Cs-137	150
Broad Leaf Vegetation	3	Monthly[3]	γ Spec :	I-131	60 pCi/kg
				Cs-134	60
				Cs-137	80
Watermelon	1	Annual[4]	γ Spec :	[5]	[5]
Citrus	1	Annual[4]	γ Spec :	[5]	[5]

[1]The maximum "a priori" LLD
[3]When available
[4]During harvest
[5]Same as broad leaf vegetation

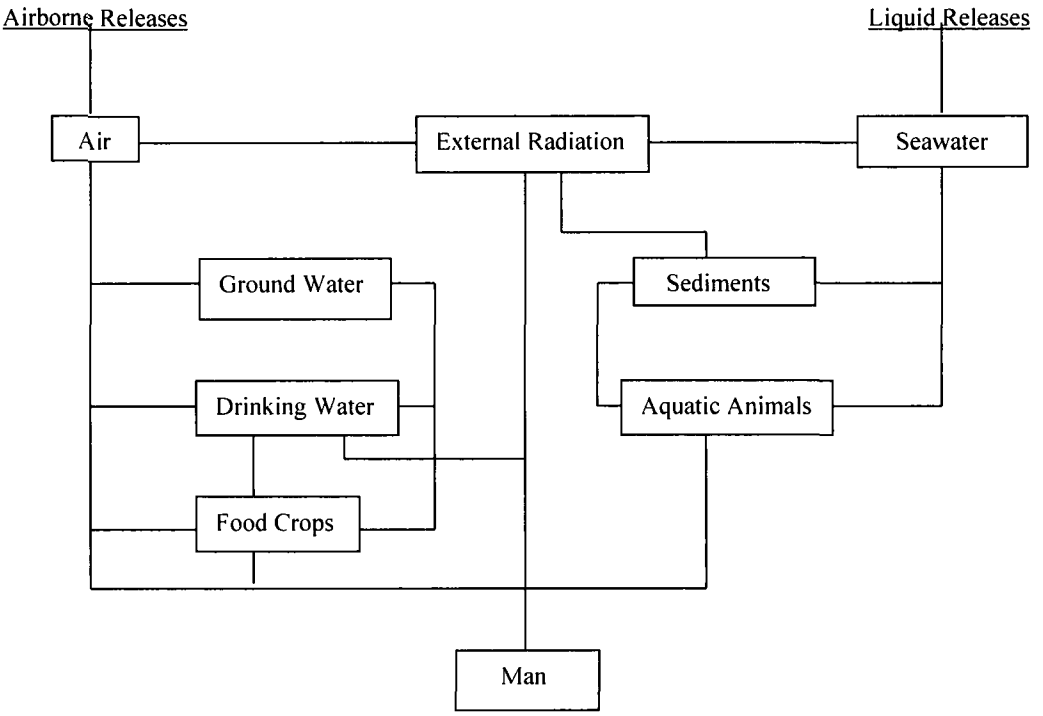


FIGURE I-1: Environmental Media and Exposure Pathways

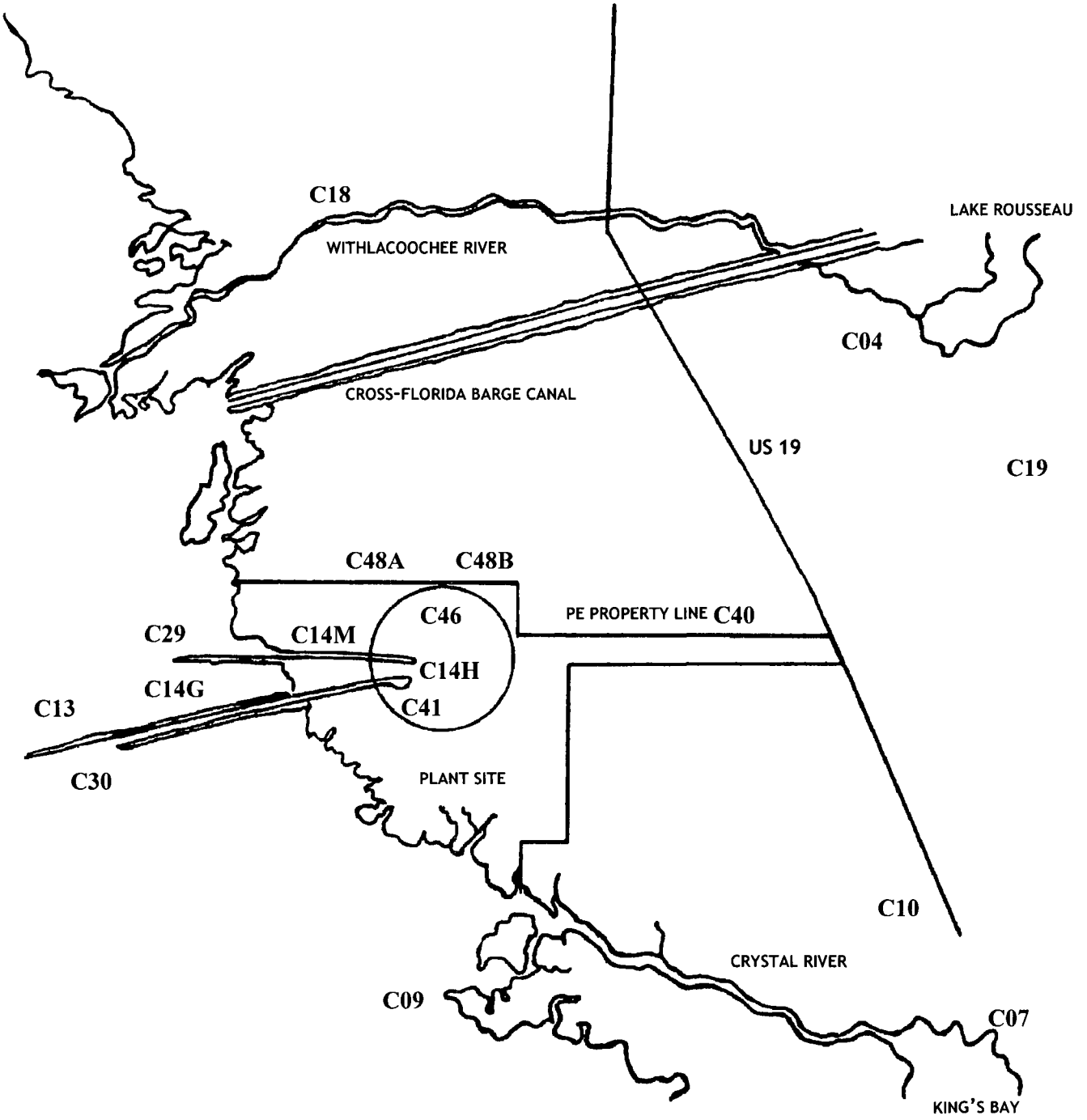


FIGURE I-2: Environmental Monitoring Sample Stations (non-TLDs)

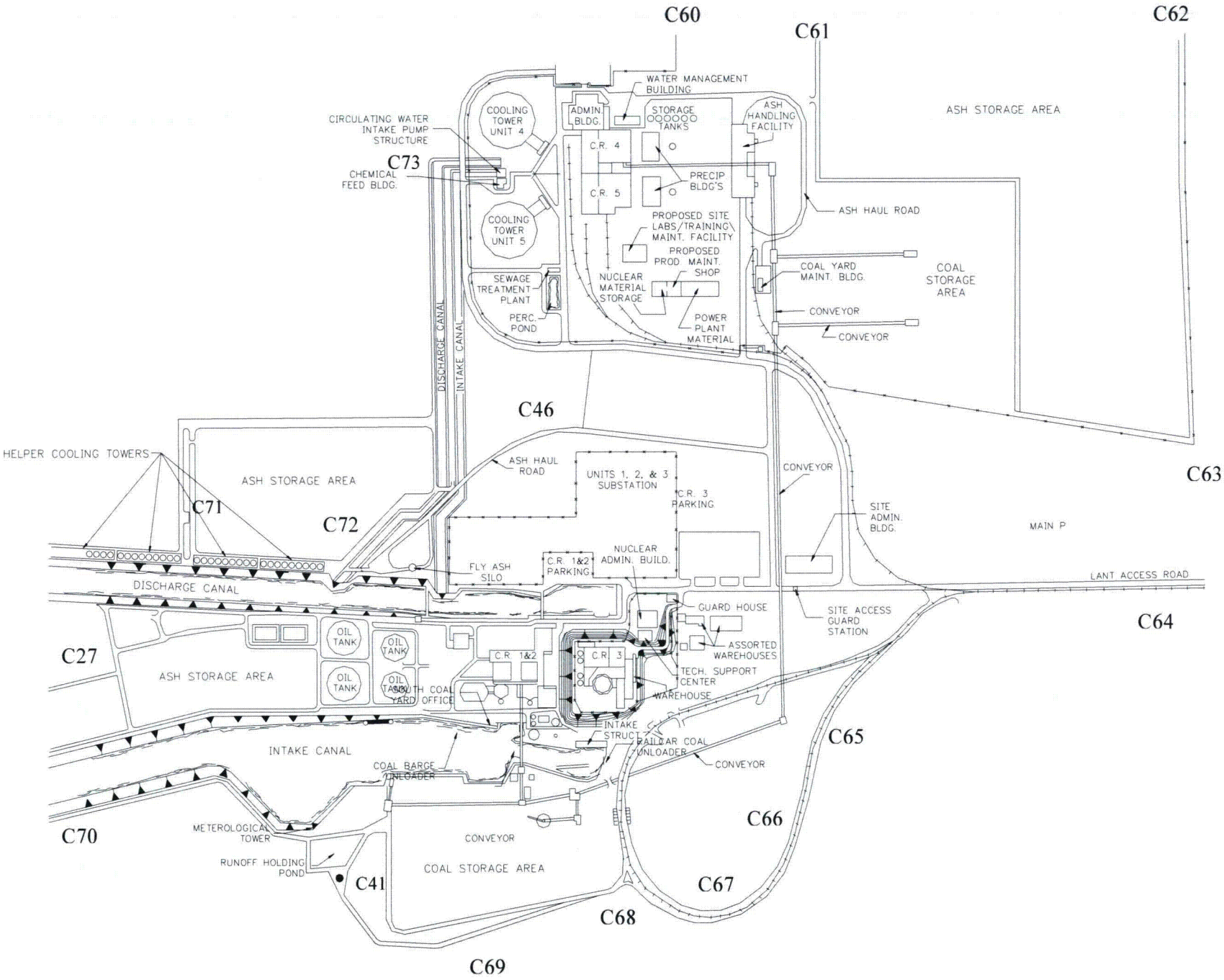


FIGURE I-3: Environmental Monitoring TLD Locations (on site)

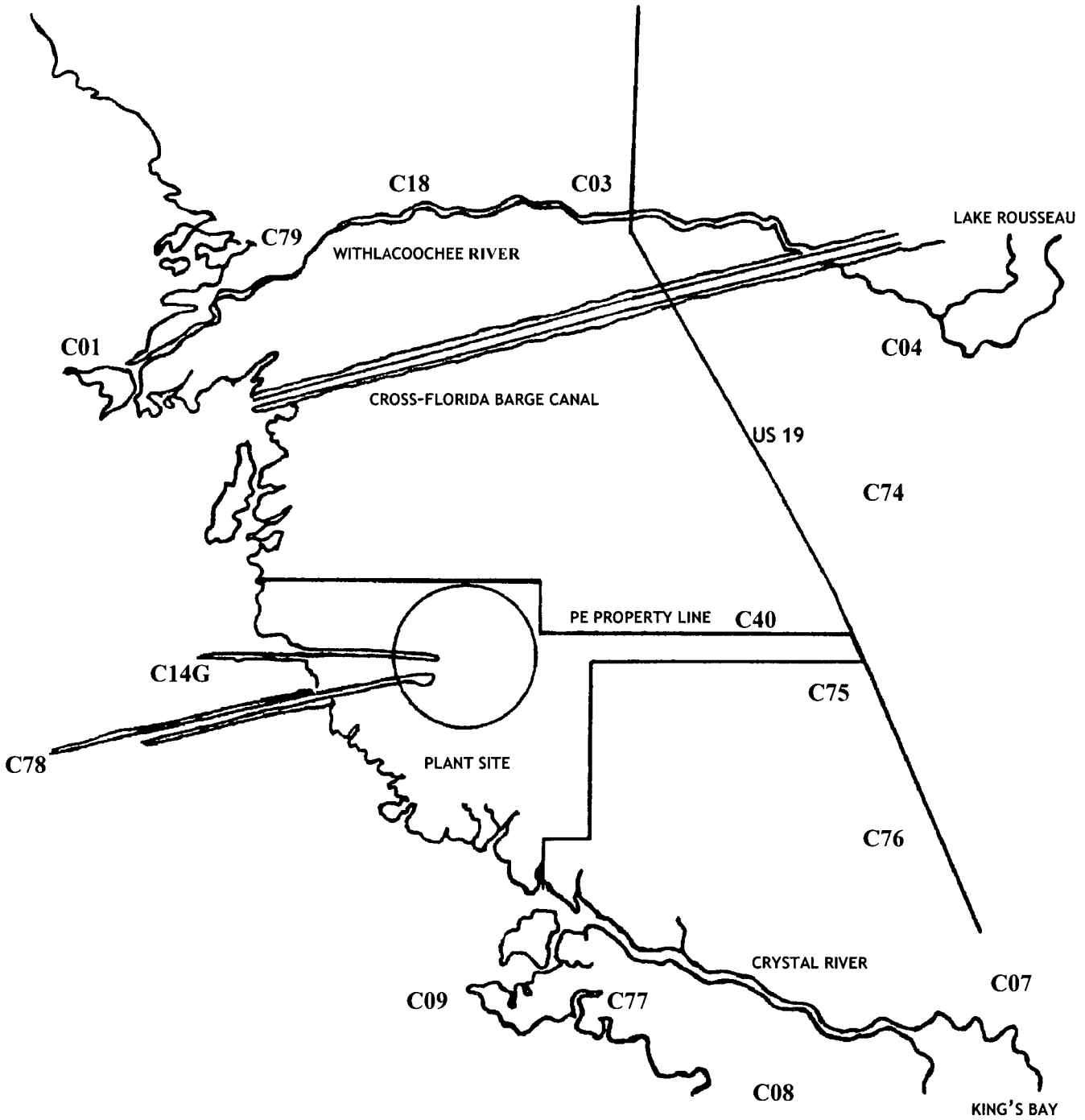
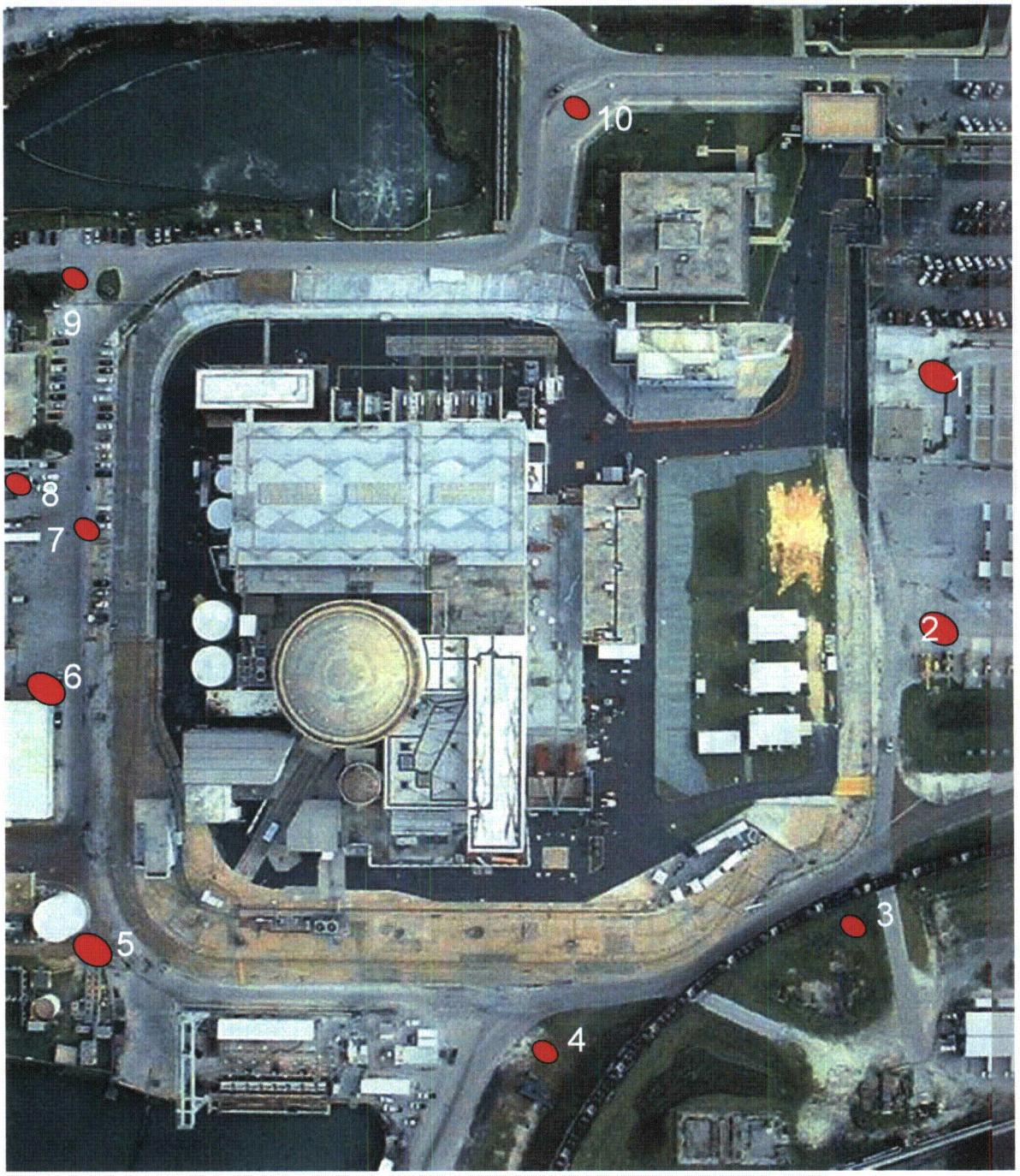


FIGURE I-4: Environmental Monitoring TLD Locations (off site)

Figure I-5: CR3 Groundwater Monitoring Well Locations
Deep Wells Are Also Installed at #'s 1, 3, 6



Wells # 1 & 3 are not routinely
sampled by the REMP

II. LAND-USE CENSUS

A land-use census was conducted during June through August. The purpose of this census is to identify the nearest residences, vegetable gardens, and potential milk-producing animals within a five mile radius of the nuclear plant. The distance in miles and bearing in degrees for each receptor type in each of the sixteen sectors is summarized below.

SECTOR	NEAREST RESIDENCE	NEAREST GARDEN (A)	NEAREST MILK ANIMAL
N	4.5 @ 2°	*	*
NNE	4.6 @ 15°	*	*
NE	3.8 @ 54°	*	*
ENE	3.4 @ 60°	4.4 @ 63°	*
E	2.4 @ 92°	*	*
ESE	4.2 @ 102°	4.7 @ 103°	*
SE	4.9 @ 133°	*	*
SSE	3.5 @ 149°	*	*
S	*	*	*
SSW	*	*	*
SW	*	*	*
WSW	*	*	*
W	*	*	*
WNW	*	*	*
NW	4.8 @ 321°	*	*
NNW	4.6 @ 339°	*	*

(A) - Only gardens with an estimated total area of 500 square feet, or more, and producing green leafy vegetables are considered.

* No suitable sites were located within 5 miles.

III. FLORIDA DEPARTMENT OF HEALTH - INTERLABORATORY COMPARISON PROGRAM DATA

The EPA crosscheck program ceased operation at the end of 1998. To meet the requirements for a crosscheck program, the Florida Department of Health participates in the Department of Energy's Mixed-Analyte Performance Evaluation Program (MAPEP). The following units are used for each of the four media:

Air Filters: Bq/sample
Soil: Bq/Kg
Vegetation: Bq/sample
Water: Bq/L

Analytical performance is based on historical analytical capabilities for individual analyte/matrix pairs.
Acceptable performance is designated by an "A".
Acceptable with warning is designated by a "W".
Performance which is not acceptable is designated by an "N".

Results for April 2012:

Media	Nuclide	Result	% Bias	Acceptance Range	Flag
Air	Cs-134	2.12	-10.9	1.67 – 3.09	A
Air	Cs-137	1.93	7.8	1.25 – 2.33	A
Air	Mn-54	3.66	13.0	2.27 – 4.21	A
Air	Zn-65	3.43	14.7	2.09 – 3.89	A
Air	Co-60	2.18	-0.1	1.527 – 2.837	A
Soil	K-40	1558.35	4.5	1044 – 1938	A
Soil	Mn-54	602.87	8.0	391 – 725	A
Soil	Cs-134	847.22	2.3	580 – 1076	A
Soil	Zn-65	712.63	11.0	449 – 835	A
Soil	Co-57	1201.03	1.9	825 – 1533	A
Vegetation	Co-57	10.40	-13.1	6.96 – 12.92	A
Vegetation	Co-60	5.24	-13.4	4.24 – 7.87	A
Vegetation	Cs-134	7.91	-6.2	5.90 – 10.96	A
Vegetation	Zn-65	8.14	-8.5	6.23 – 11.57	A
Water	H-3	446.30	2.1	306 – 568	A
Water	Mn-54	33.49	5.3	22.3 – 41.3	A
Water	Cs-137	40.37	1.2	27.9 – 51.9	A
Water	Co-57	30.56	-7.1	23.0 – 30.84	A
Water	Co-60	24.19	2.0	16.60 – 30.84	A

FLORIDA DEPARTMENT OF HEALTH - INTERLABORATORY COMPARISON PROGRAM DATA, cont'd

Results for August 2012:

Media	Nuclide	Result	% Bias	Acceptance Range	Flag
Air	Cs-134	2.49	-9.1	1.92 – 3.56	A
Air	Mn-54	2.56	8.5	1.65 – 3.07	A
Air	Co-57	1.81	-5.2	1.34 – 2.48	A
Air	Co-60	1.70	-1.6	1.21 – 2.246	A
Soil	Mn-54	960.09	4.4	644 – 1196	A
Soil	Co-60	550.54	1.8	372 – 690	A
Soil	Co-57	1317.05	0.1	921 – 1711	A
Soil	Zn-65	657.47	8.5	424 – 788	A
Soil	Cs-134	940.11	0.1	657 – 1221	A
Soil	Cs-137	1158.87	0.8	805 – 1495	A
Vegetation	Mn-54	2.99	-8.6	2.29 – 4.25	A
Vegetation	Co-57	5.28	-6.7	3.96 – 7.36	A
Vegetation	Co-60	4.63	-9.6	3.58 – 6.66	A
Vegetation	Cs-134	6.27	-3.7	4.56 – 8.46	A
Vegetation	Cs-137	3.96	-9.6	3.07 – 5.69	A
Water	H-3	371.05	11.1	234 – 4.34	A
Water	Co-57	28.33	-3.3	20.5 – 38.1	A
Water	Cs-137	17.16	2.8	11.7 – 21.7	A
Water	Cs-134	23.18	-0.1	16.2 – 30.2	A
Water	Zn-65	28.79	11.2	18.1 – 33.7	A
Water	Mn-54	19.01	6.8	12.5 – 23.1	A

IV-A. AIRBORNE PATHWAY

Air samples are taken at five locations in the vicinity of the plant. The control location is 78 miles ESE of the plant, at the Department of Health, State Bureau of Radiation Control in Orlando.

Table IV-A.1 provides a statistical summary of the analytical results for 312 gross beta samples and 312 iodine samples.

Tables IV-A.2 and IV-A.3 provide the results for each weekly air sample.

In 2012, three hundred twelve particulate samples were analyzed for gross beta activity, all of which had measurable activity. The average indicator concentration was 18 pCi/1000 m^3 with a range of 6 to 44 pCi/1000 m^3. The average indicator concentration since 1996 was in the range of 14 to 20 pCi/1000 m^3. The control location concentration for 2012 averaged 17 pCi/1000 m^3, with a range of 9 to 36 pCi/1000 m^3.

In 2012, three hundred twelve samples were analyzed for iodine activity, with none having measurable activity. The highest iodine LLD was 0.04 pCi/m^3. There were no anomalies with the iodine samples for the year.

Quarterly composite data are summarized in Table IV-A.4. In 2012, measurable quantities of cesium were not identified in any particulate filter sample. The highest cesium LLD was 1.7 pCi/1000 m^3 for cesium 134.

The 2012 airborne sample data is comparable with previous year's sample data with exception of samples collected in 2011 during the March and April time frame where airborne particulate and iodine samples were affected by the Fukushima earthquake and tsunami event that occurred on March 11, 2011. Those sample data were thoroughly discussed in the 2011 Annual Radiological Environmental Operating Report submitted for Crystal River Unit 3.

There were no instances of non-collected airborne samples for the year 2012, but there were several instances of air sampler partial run times as follows:

1. In July station C-07 was down for 18.4* hours due to a failed vacuum pump.
2. In August station C-07 was down for 66.7 hours due to a power outage as a result of a failed lightening arrestor.
3. In September station C-18 was down for 41.2 hours due to a failed vacuum pump.
4. In December station C-18 was down for 25.7* hours due to an unknown power outage.

The remaining 4 sample stations were in service 100% of the time, with exception of filter changes and air pump/gas meter replacements. The percentages of down times for the 2 stations are as follows:

C07	0.97%
C18	0.76%

The air sample station's down times are documented in the plant Corrective Action Program (CAP) under Condition Reports (CRs) 557809 and 561970.

*These run times are below the threshold reporting criteria of 30 hours of continuous lost run time during a sample period.

TABLE IV-A.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	LOCATION WITH HIGHEST MEAN MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIRBORNE IODINE	γ Spec 312						
(pCi/m^3)	I-131	0.04	<LLD	--	<LLD	<LLD	0
AIRBORNE PARTICULATES	Gross ß 312	6.0	18 (260/260) (6–44)	C18 5.3 @ 0°	19 (52/52) (8–38)	17 (52/52) (6–36)	0
(pCi/1000m^3 for Gross ß, pCi/1000m^3 for γ Spec)	γ Spec 24						
	Cs-134	1.7	<LLD	--	--	<LLD	0
	Cs-137	1.5	<LLD	--	--	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-A.2

PROGRESS ENERGY FLORIDA, INC. - CR3 – 2012

pCi/m^3 IODINE - 131 IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
03-Jan-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
10-Jan-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
17-Jan-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
24-Jan-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
31-Jan-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
07-Feb-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
14-Feb-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
21-Feb-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
28-Feb-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
06-Mar-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
13-Mar-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
20-Mar-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
26-Mar-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/m^3 IODINE - 131 IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
02-Apr-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
10-Apr-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
17-Apr-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24-Apr-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
01-May-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
08-May-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
15-May-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
22-May-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
29-May-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
05-Jun-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
11-Jun-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
19-Jun-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
26-Jun-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/m^3 IODINE - 131 IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
03-Jul-12	<0.02(A)	<0.02	<0.02	<0.02	<0.02	<0.02
11-Jul-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
17-Jul-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24-Jul-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30-Jul-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
07-Aug-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
14-Aug-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
21-Aug-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
27-Aug-12	<0.02(B)	<0.04	<0.04	<0.04	<0.04	<0.03
04-Sep-12	<0.02	<0.03(C)	<0.02	<0.02	<0.02	<0.02
11-Sep-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
18-Sep-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
26-Sep-12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

(A) Pump failed and was replaced. Estimated run time 151.3 out of 169.7 hours.
(B) No power to sample hut. Estimated run time 83.7 out of 150.4 hours.
(C) Pump failed and was replaced. Estimated run time 149.6 out of 190.8 hours.

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/m^3 IODINE - 131 IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
02-Oct-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
10-Oct-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
17-Oct-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
23-Oct-12	<0.03	<0.02	<0.03	<0.03	<0.03	<0.03
31-Oct-12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
06-Nov-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
13-Nov-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
19-Nov-12	<0.03	<0.02	<0.03	<0.03	<0.03	<0.02
27-Nov-12	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
04-Dec-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
11-Dec-12	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
19-Dec-12	<0.03	<0.03(A)	<0.03	<0.03	<0.03	<0.03
26-Dec-12	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

(A) Estimated run time 165.6 out of 191.3 hours. Unknown reason for lower run time.

TABLE IV-A.3

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/1000m^3 GROSS ß IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
03-Jan-12	25	32	32	27	27	26
10-Jan-12	23	35	26	16	23	22
17-Jan-12	19	27	25	26	25	20
24-Jan-12	19	24	27	21	25	15
31-Jan-12	15	19	19	15	12	15
07-Feb-12	14	20	17	14	14	14
14-Feb-12	22	23	18	16	27	23
21-Feb-12	9	13	13	12	14	11
28-Feb-12	14	19	19	14	18	16
06-Mar-12	13	15	10	13	12	14
13-Mar-12	14	17	11	15	13	14
20-Mar-12	8	18	6	9	11	11
26-Mar-12	21	19	17	20	16	19
Average:	17	22	18	17	18	17

TABLE IV-A.3 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/1000m^3 GROSS ß IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
02-Apr-12	20	25	21	20	18	17
10-Apr-12	17	17	17	15	17	18
17-Apr-12	24	30	27	25	29	24
24-Apr-12	14	15	18	19	18	15
01-May-12	19	23	17	22	17	17
08-May-12	15	16	15	16	15	13
15-May-12	21	25	21	23	18	20
22-May-12	21	14	19	17	18	13
29-May-12	13	27	24	18	17	13
05-Jun-12	18	21	18	17	16	17
11-Jun-12	13	13	12	16	11	12
19-Jun-12	13	15	14	11	11	12
26-Jun-12	8	8	8	8	8	12
Average:	17	19	18	17	16	16

TABLE IV-A.3 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/1000m^3 GROSS ß IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
03-Jul-12	17(A)	14	19	14	18	22
11-Jul-12	14	15	16	16	13	12
17-Jul-12	9	6	11	6	7	9
24-Jul-12	9	11	6	8	11	11
30-Jul-12	10	9	9	9	11	16
07-Aug-12	14	16	12	13	10	13
14-Aug-12	18	16	16	12	16	10
21-Aug-12	10	9	10	7	9	9
27-Aug-12	11(B)	10	8	14	8	11
04-Sep-12	18	23(C)	7	18	16	17
11-Sep-12	18	15	18	18	16	14
18-Sep-12	9	8	12	13	8	12
26-Sep-12	22	21	18	14	17	19
Average:	14	13	12	12	12	13

(A) Pump failed and was replaced. Estimated run time 151.3 out of 169.7 hours.
(B) No power to sample hut. Estimated run time 83.7 out of 150.4 hours.
(C) Pump failed and was replaced. Estimated run time 149.6 out of 190.8 hours.

TABLE IV-A.3 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/1000m^3 GROSS ß IN AIR

	SAMPLE SITE					
Collection Date	C07	C18	C40	C41	C46	C47
02-Oct-12	11	11	12	17	8	7
10-Oct-12	10	9	9	11	7	6
17-Oct-12	29	31	34	29	25	32
23-Oct-12	28	23	26	25	22	23
31-Oct-12	24	24	28	25	19	24
06-Nov-12	39	36	36	36	34	36
13-Nov-12	31	35	32	29	26	29
19-Nov-12	16	19	16	17	18	18
27-Nov-12	33	38	28	32	33	28
04-Dec-12	44	25	24	28	22	26
11-Dec-12	11	18	15	11	11	9
19-Dec-12	12	15(A)	16	13	14	10
26-Dec-12	16	25	19	22	18	18
Average:	23	24	23	23	20	20

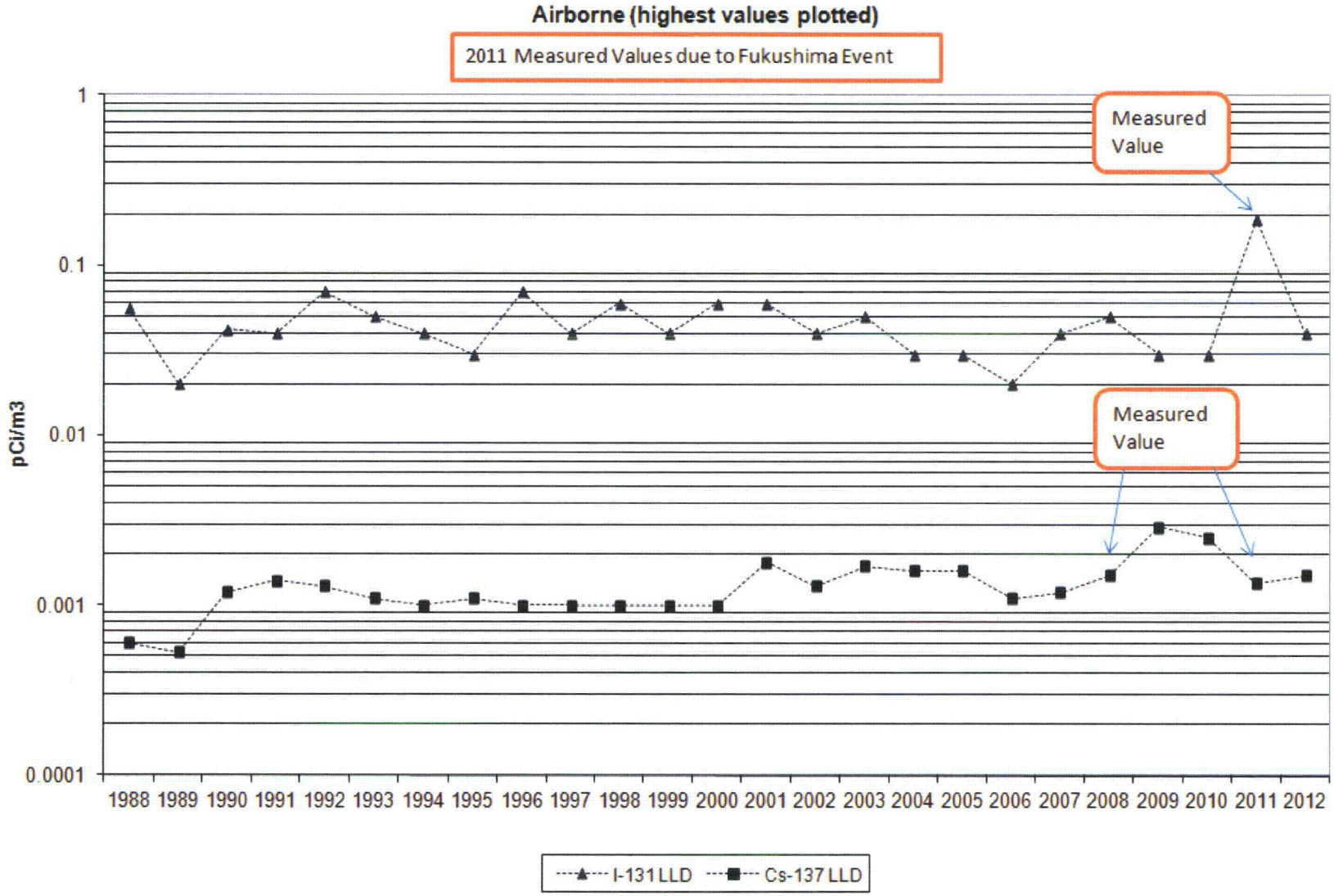
(A) Estimated run time 165.6 out of 191.3 hours. Unknown reason for lower run time.

TABLE IV-A.4

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/1000m^3 γ EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES

STATION	NUCLIDE	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
C07	Be-7	182	148	104	129
	K-40	<9.0	<28	<18	<15
	Cs-134	<1.1	<1.3	<1.5	<1.1
	Cs-137	<1.0	<1.2	<1.3	<1.0
C18	Be-7	150	149	110	114
	K-40	<15	<25	<15	<18
	Cs-134	<1.0	<1.1	<1.3	<1.2
	Cs-137	<0.7	<1.2	<1.0	<1.0
C40	Be-7	196	128	93	120
	K-40	<26	<16	<19	<17
	Cs-134	<1.5	<1.6	<1.3	<1.3
	Cs-137	<0.8	<1.5	<1.1	<1.3
C41	Be-7	181	152	109	121
	K-40	<31	<19	<19	<14
	Cs-134	<1.3	<1.7	<1.1	<1.2
	CS-137	<1.2	<1.4	<0.9	<1.1
C46	Be-7	172	161	119	105
	K-40	<17	<23	<19	<12
	Cs-134	<1.7	<1.6	<0.9	<1.3
	Cs-137	<1.5	<1.3	<0.9	<1.0
C47	Be-7	177	150	142	117
	K-40	<17	<20	<15	<15
	Cs-134	<1.7	<1.7	<0.7	<1.4
	Cs-137	<1.5	<1.3	<0.9	<1.0


Airborne (highest values plotted)
2011 Measured Values due to Fukushima Event
Measured Value
Measured Value
pCi/m3
1
0.1
0.01
0.001
0.0001
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
I-131 LLD
Cs-137 LLD

IV-B. DIRECT RADIATION

Direct radiation measurements (using TLDs) were taken at seventeen locations (stations C60 through C73 and station C27) within one mile of the plant, at fifteen locations ranging from 2.8 to 6.3 miles from the plant, and at one control location 78 miles from the site. One-hundred and thirty-two TLDs were collected during 2012.

Table IV-B provides a statistical summary of the analytical results for 132 TLDs sampled throughout the year.

Table IV-B.1 provides the results of the individual TLD measurements.

The highest on-site dose was 72 mrem/yr at station C71 (WNW at 3600 feet). Station C71 was relocated in 1992 due to construction of the helper cooling towers on the former site. The new location has a higher background radiation level due to being closer to the storage pond for Units 4 & 5 fly ash, which produces a higher external radiation component than normal levels of natural background. The second highest on-site dose was 56 mrem/yr at station C65 (ESE at 1584 feet).

The highest off-site dose was 51 mrem/yr at station C40 (east at 3.5 miles). The control station (C47) average dose was 51 mrem/yr. The average for all stations (except control) was 41 mrem/yr for 2012, 46 mrem/yr for 2011, and 49 mrem/yr for 2010. Direct radiation results are similar to previous years and show no change of significance.

There were no missing or unanalyzed TLDs during this evaluation period.

TABLE IV-B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DIRECT RADIATION (mrem/yr)	γ DOSE, 132	15	41 (128/128) (29 - 72)	C71 0.6 @ 296°	65 (4/4) (60 - 72)	51 (4/4) (43 - 57)	0

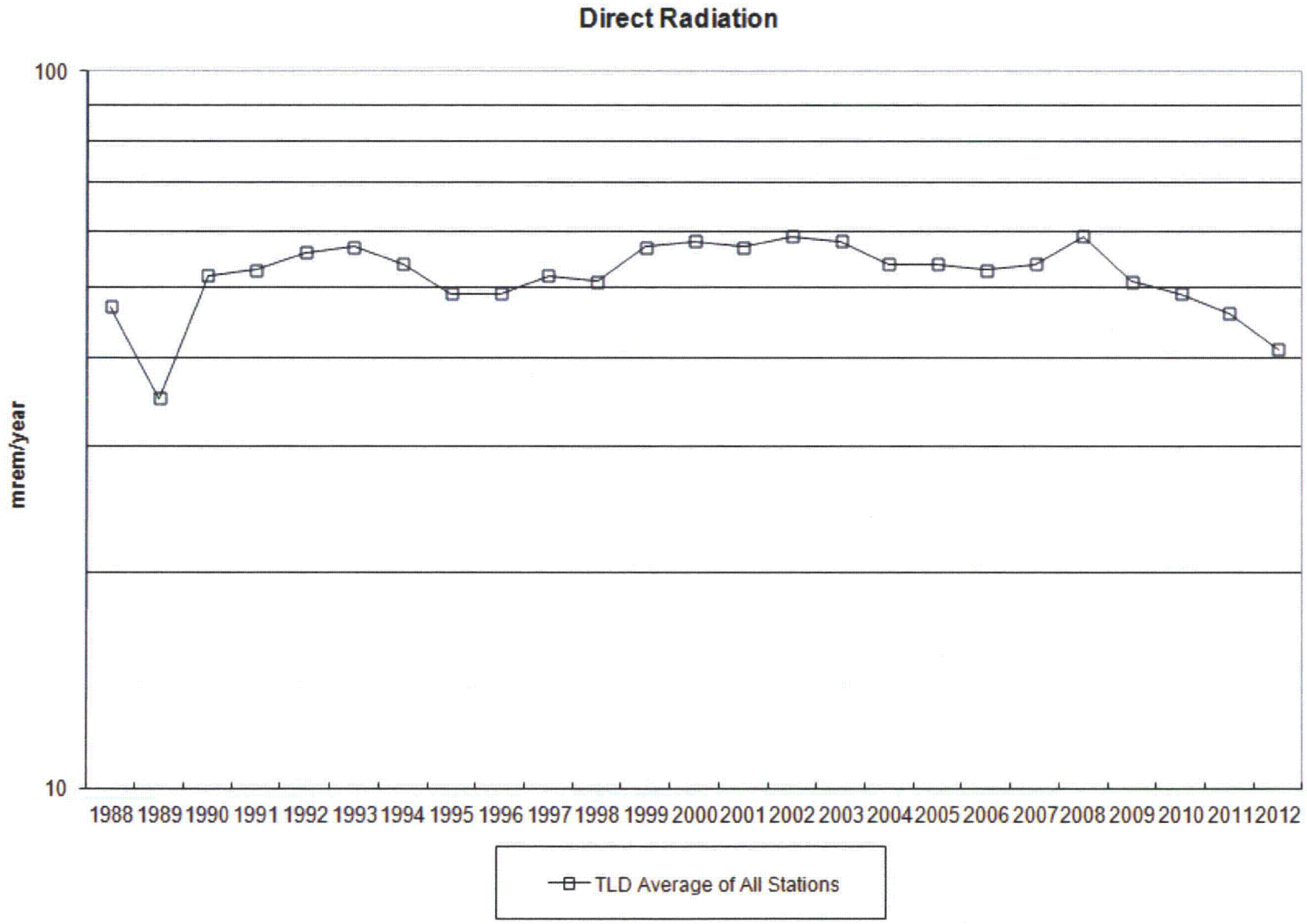
TABLE IV-B.1

PROGRESS ENERGY FLORIDA, INC. - CR-3 - 2012

mrem/yr γ Dose

TLD STATION	Quarter	1	2	3	4
CO1		47	39	32	31
CO3		35	39	34	32
CO4		32	39	31	31
CO7*		31	37	32	31
CO8		29	36	31	30
C09		31	39	32	30
C14G		39	45	40	37
C18		37	42	34	35
C27		45	53	46	42
C40*		46	51	44	43
C41		43	50	42	40
C46*		41	48	41	40
C47 (CONTROL)		50	57	53	43
C60		40	47	39	37
C61		41	49	44	40
C62		49	53	47	46
C63		43	50	42	40
C64		40	47	40	38
C65		47	56	48	46
C66		42	48	43	42
C67		46	51	43	44
C68		41	48	42	41
C69		44	51	43	43
C70		46	51	44	44
C71		66	72	61	60
C72		42	49	43	44
C73		40	45	39	38
C74		30	36	31	30
C75		40	46	38	35
C76		36	42	36	34
C77		37	42	37	36
C78		32	37	31	30
C79		36	42	35	35

*TLDs not required by the ODCM.


Direct Radiation
100
10
mrem/year
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
TLD Average of All Stations

IV-C. WATERBORNE PATHWAY

To evaluate the waterborne pathway, samples are taken of seawater, ground water, drinking water, and shoreline sediment.

1. Monthly seawater grab samples are taken at two locations in the discharge canal (C14G and C14H) and at one control location (C13) near the mouth of the intake canal.
   In 2012, of twenty-four indicator samples, six had measurable tritium at an average concentration of 125 pCi/L, with a range of 118 to 152 pCi/L. The sample with the highest concentration of tritium was obtained in December at station C14H near the beginning of the discharge canal. The seawater tritium activity is consistent with the concentration of tritium in the liquid waste stream and the release times of waste tanks. CR-3 was in Refuel 16 outage at the time of sampling with reduced dilution due to no circulating water pumps running. Plant raw water pumps were providing the dilution flow. In 2012 three control station samples had measurable tritium concentrations at an average of 107 pCi/l.

   In 2011, five of twenty four indicator samples contained measurable tritium with an average concentration of 190 pCi/L. The 2011 control station samples had measurable tritium concentrations at an average of168 pCi/L.

   Gamma spectral analysis was performed on thirty-six samples, none of which showed measurable amounts of the gamma emitters of interest.

   Table IV-C.1 provides a statistical summary of the seawater tritium and gamma spectroscopy results.

   Table IV-C.1.a provides the results of the monthly samples.

2. Semiannual ground water samples are taken at one location, station C40, located approximately 3.5 miles east of CR-3. Gamma spectral and tritium analyses are performed on both samples.
   In 2012, all results were less than the detection limits. Since plant startup, all results, except for the results of one 1985 tritium analysis, have been less than LLD. The required sensitivity for measuring tritium in ground water is 2000 pCi/L. Analysis of ground water in the vicinity of CR-3 is done at a sensitivity of approximately 150 pCi/L for tritium and less than 10 pCi/L for select gamma emitters. Additionally, Potassium-40, a natural product, was detected in the first sample collected in 2012. In the second sample collected, K-40 was <LLD.

   Table IV-C.2 provides a statistical summary of the groundwater tritium and gamma spectroscopy results.

   Table IV-C.2.a provides the results of the semi-annual samples.

3. Quarterly site ground water samples are taken at nine locations surrounding the perimeter of the CR-3 protected area. Periodically five of these ground water wells have shown indications of very low levels of tritium on the west-southwest side of the plant. It is believed that this tritium is the result of a leak in the Station Drain Tank (SDT-1) to the settling pond discharge line that occurred in 1998. This discharge line has recently been leak tested and it is leak free. There are no other know leaking plant components.
   In 2012 the wells that have shown measurable amounts of tritium range from 72 to 619 pCi/L. These wells have been sampled additionally on a monthly basis to develop trend data. This increased sampling information is shown as supplemental data. Along with these wells, two other wells that are not presently part of the REMP have been sampled that are on either side of the plant settling ponds (percolation ponds). In 2012 these two wells are showing measurable amounts of tritium in the range of 95 to 182 pCi/L, which are a result of plant discharges from the SDT-1. These discharges are being minimized through operational focus. The positively measured tritium values are below the reporting criteria of the ODCM and the NEI 07-07 Ground Water Protection Initiative Guidelines. There have been no measurable amounts of gamma emitting radionuclides in any of these wells. There have been no measurable amounts of hard-to-detect (HTD) radionuclides in any of these wells with exception of trace levels of gross alpha, which is expected, given the naturally occurring limestone strata that surrounds the Florida aquifer. It should be noted that site ground water flows in a west-southwest direction toward the Gulf of Mexico. This flow was re-verified in 2006 with a new ground water flow study performed by a certified hydro-geologist as part of the NEI Ground Water Protection Initiative. In 2012 another groundwater flow study was performed to evaluate groundwater flow post installation of CR Units 4 & 5 clean air scrubber system. This scrubber system utilizes significant groundwater from the Florida aquifer. The flow study confirmed that the groundwater flow, and direction of flow, has not been altered due to the installation and operation of the clean air scrubber system.

Additionally, the groundwater at the CR3 site is too saline for use as a potable water source, hence there is no drinking water uptake pathway at the Crystal River site.

Table IV-C.3. provides a statistical summary of the groundwater tritium and gamma spectroscopy results.

Table IV-C.3.a.1 provides the results of the quarterly samples.

Table IV-C.3.a.2 provides the results of the monthly supplemental samples.

4. Monthly non-REMP required well samples were collected as discussed in item #3 above. Two wells were sampled. These two wells are located on the north side and the south side of the site percolation ponds. The information is discussed above. Both of these wells showed no measurable amounts of any other radionuclides of interest. The tritium concentration in these wells, discussed in item #3 above, have decreased significantly due to a focused reduction in the number of discharges from the station drain tank (SDT-1) to the site settling ponds (percolation ponds).

   Table IV-C.4 provides a statistical summary of the groundwater tritium and gamma spectroscopy results.

   Table IV-C.4.a. provides the results of the monthly supplemental non-REMP required samples.

5. Quarterly drinking water samples are drawn from three locations: the Crystal River City Hall (C07), the Days Inn Motel (C10), and the Yankeetown City Well (C18). All samples were collected and analyzed for gamma emitters and tritium.
   In 2012, none of the samples yielded measurable activities of tritium or the required gamma emitters. The measurement sensitivity for drinking water samples are the same as those for ground water samples. Note that one sample collected at station C07 yielded a statistically positive-measured tritium concentration of 77 pCi/L, which is well below the LLD of 150 pCi/L. This sample set (all three stations) was split with an independent lab to run tritium analyses. The independent lab tritium results of all three samples indicated <LLD of 150 pCi/L. It is felt that the one sample measurement of 77 pCi/L is an outlier and is of no consequence.

   Since the beginning of sampling, the drinking water samples have not had any other positive-measured radionuclides of interest detected.

   Table IV-C.5 provides a statistical summary of the drinking water tritium and gamma spectroscopy results.

   Table IV-C.5.a provides the results of the quarterly samples.

6. Semiannual shoreline sediment samples are taken at three indicator locations in the discharge canal (C14H, C14M, C14G) and one control location (C09) at Fort Island Gulf Beach. The plant discharge canal is the primary liquid effluent release pathway from CR-3.

   In 2012, of the six indicator samples, three had measurable amounts of cesium-137 with an average concentration of 28 pCi/kg and a range of 19 to 35 pCi/kg and three had measurable amounts of cobalt-60 with a concentration range of 14 to 24 pCi/kg.

   In 2011 two samples had measurable amounts of cesium-137 with an average of 26 pCi/kg and a range of 14 to 37 pCi/kg. Also there were three samples with measurable amounts of cobalt-60 with a concentration range of 11 to 65 pCi/kg.

   In 2010 the average cesium-137 concentration at the indicator locations was 19 pCi/kg.

   In 2009, the average cesium-137 concentration at the indicator locations was 24 pCi/kg.

   In 2008, the average cesium-137 concentration at the indicator locations was 25 pCi/kg.

   The average cobalt-60 concentration at the indicator locations ranged from 30 to 389 pCi/kg from 1998 through 2007.
   The 2012 results are similar to previous years' results. None of the samples taken at Fort Island Gulf Beach, the control location station C09, indicated measurable amounts of cobalt or cesium.

Table IV-C.6 provides a statistical summary of the shoreline sediment gamma spectroscopy results.

Table IV-C.6.a provides the results of the semi-annual samples.

7. Additional samples taken in 2012 but not required by the ODCM:

   Annual sediment samples were collected at four locations in the site settling ponds. Cs-137 was detected in two of the four samples in concentrations ranging from 10 to 16 pCi/kg. There were no measurable amounts of Co-60 or Cs-134 in any of the samples.

   Annual surface water samples were collected at two locations in the site settling ponds. The tritium concentration was < LLD of 152 pCi/L in three of four samples. One sample in the northeast quadrant has a measurable amount of tritium at a concentration of 233 pCi/L. All of the samples showed no measurable amounts of any other radionuclides of interest. Note that two of the four surface water samples were collected in January of 2013 due to the settling ponds being drained for maintenance in December of 2012.

   Table IV-C.7 provides the results of the settling pond samples.

8. There were no unmonitored spills or releases of radioactive material in 2012 that could have the potential to contaminate the ground water per the guidelines of the Nuclear Energy Institute Ground Water Protection Initiative – Final Guidance Document 07-07. As such, there were no communiqués issued to state, local, or regulatory agencies.

TABLE IV-C.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEAWATER (pCi/L)	Tritium, 36	148	125(6/24) (118-152)	C14H 0.1 @ 0°	152 (4/12) (<LLD-152)	107(3/12) (92-132)	0
	γ Spec, 36						
	Mn-54	5	<LLD	--	--	<LLD	0
	Fe-59	12	<LLD	--	--	<LLD	0
	Co-58	6	<LLD	--	--	<LLD	0
	Co-60	7	<LLD	--	--	<LLD	0
	Zn-65	12	<LLD	--	--	<LLD	0
	Zr-Nb-95	10	<LLD	--	--	<LLD	0
	I-131	8	<LLD	--	--	<LLD	0
	Cs-134	6	<LLD	--	--	<LLD	0
	Cs-137	5	<LLD	--	--	<LLD	0
	Ba-La-140	15	<LLD	--	--	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-C.1.a
PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012
pCi/L γ EMITTERS AND TRITIUM IN SEAWATER

STATION	MONTH	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C13	JAN	<147	331±32	<4	<3	<7	<5	<7	<6	<5	<5	<5	<9
	FEB	<147	359±31	<4	<3	<8	<6	<9	<9	<5	<5	<5	<8
	MAR	<148	341±38	<4	<4	<10	<7	<11	<7	<4	<5	<5	<15
	APR	<140	167±18	<3	<4	<8	<4	<8	<7	<5	<4	<4	<7
	MAY	98±44	361±33	<4	<3	<6	<4	<7	<7	<5	<5	<5	<6
	JUN	<146	251±13	<2	<2	<5	<2	<5	<4	<2	<2	<2	<8
	JUL	92±43	367±34	<3	<4	<7	<5	<6	<7	<5	<4	<4	<10
	AUG	<139	199±95	<3	<3	<6	<4	<7	<5	<3	<3	<3	<11
	SEP	<141	361±24	<3	<3	<7	<3	<8	<6	<4	<4	<4	<7
	OCT	132±45	186±21	<3	<3	<6	<3	<6	<6	<3	<3	<3	<9
	NOV	<137	314±33	<4	<4	<8	<4	<7	<7	<6	<5	<5	<5
	DEC	<128	296±30	<4	<4	<6	<4	<9	<6	<5	<4	<4	<5
C14G	JAN	<147	270±31	<4	<4	<6	<4	<7	<7	<6	<5	<4	<8
	FEB	<147	222±16	<3	<4	<7	<3	<10	<6	<4	<4	<4	<6
	MAR	<148	223±16	<3	<3	<7	<4	<7	<6	<3	<4	<3	<10
	APR	<140	382±34	<3	<4	<7	<4	<8	<7	<6	<4	<4	<7
	MAY	93±44	233±77	<3	<3	<8	<4	<8	<6	<4	<4	<4	<6
	JUN	<146	345±36	<4	<4	<8	<6	<9	<7	<4	<4	<5	<14
	JUL	<132	195±48	<5	<6	<12	<7	<12	<9	<6	<6	<5	<11
	AUG	<139	301±33	<3	<4	<8	<4	<9	<6	<4	<4	<4	<12
	SEP	<145	294±32	<4	<3	<8	<4	<8	<5	<4	<3	<3	<7
	OCT	<135	296±33	<3	<3	<9	<4	<8	<7	<5	<5	<4	<9
	NOV	<137	295±31	<4	<2	<8	<5	<9	<7	<7	<4	<4	<5
	DEC	133±43	310±34	<3	<3	<7	<4	<8	<5	<5	<4	<3	<8

TABLE IV-C.1a (CONT'D)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN SEAWATER

STATION	MONTH	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C14H	JAN	<147	308±17	<2	<2	<3	<2	<4	<3	<2	<2	<2	<3
	FEB	124±48	362±33	<4	<3	<6	<4	<8	<6	<5	<4	<4	<7
	MAR	<148	348±34	<3	<4	<6	<6	<8	<6	<5	<5	<4	<12
	APR	<140	292±30	<4	<3	<8	<4	<8	<6	<4	<4	<3	<6
	MAY	118±45	380±30	<3	<4	<8	<5	<8	<8	<6	<5	<3	<6
	JUN	<146	327±29	<4	<4	<7	<4	<8	<7	<4	<4	<4	<12
	JUL	129±44	158±19	<4	<4	<8	<5	<7	<6	<5	<4	<3	<7
	AUG	<139	161±35	<5	<4	<7	<5	<10	<10	<5	<6	<5	<15
	SEP	<141	207±26	<3	<4	<8	<4	<9	<6	<4	<4	<4	<7
	OCT	<138	263±27	<3	<3	<7	<4	<7	<5	<4	<3	<4	<4
	NOV	<137	298±30	<4	<3	<8	<4	<8	<6	<8	<5	<4	<6
	DEC	152±43	329±37	<4	<3	<7	<5	<8	<6	<5	<6	<4	<9

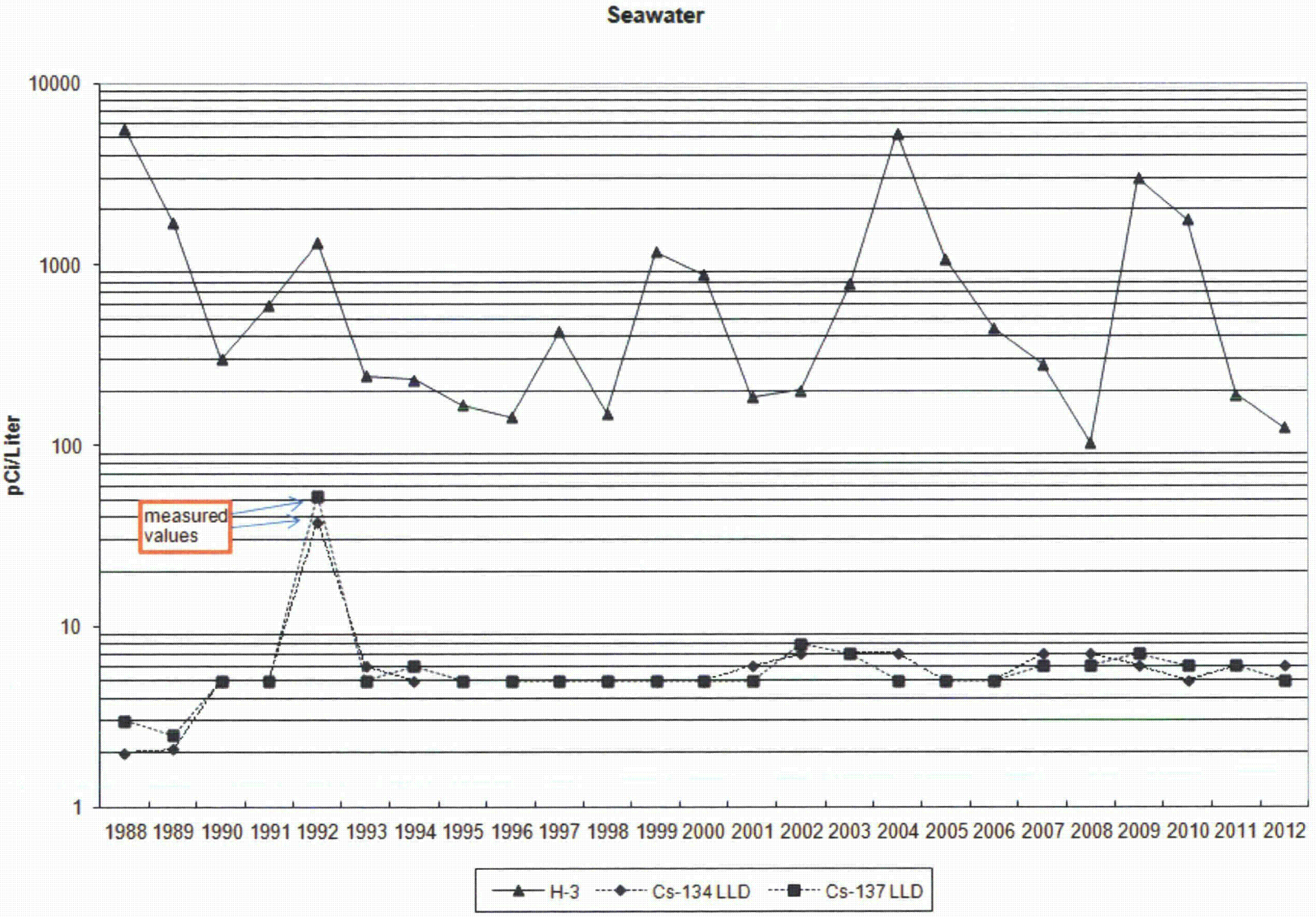

Seawater
10000
1000
100
10
1
pCi/Liter
measured values
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
H-3
Cs-134 LLD
Cs-137 LLD

TABLE IV-C.2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROUND WATER[2] (pCi/L)	Tritium, 2	150	<LLD	--	--	<LLD	0
	γ Spec, 2						
	Mn-54	4	<LLD	--	--	<LLD	0
	Fe-59	7	<LLD	--	--	<LLD	0
	Co-58	4	<LLD	--	--	<LLD	0
	Co-60	4	<LLD	--	--	<LLD	0
	Zn-65	14	<LLD	--	--	<LLD	0
	Zr-Nb-95	7	<LLD	--	--	<LLD	0
	I-131	5	<LLD	--	--	<LLD	0
	Cs-134	5	<LLD	--	--	<LLD	0
	Cs-137	5	<LLD	--	--	<LLD	0
	Ba-La-140	9	<LLD	--	--	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.
[2]There is no drinking water uptake pathway at the Crystal River site.

TABLE IV-C.2.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN GROUND WATER

STATION	NUCLIDE	FIRST HALF	SECOND HALF
C40	H-3	<150	<139
	Mn-54	<4	<4
	Fe-59	<7	<7
	Co-58	<3	<4
	Co-60	<4	<4
	Zn-65	<7	<14
	Zr-Nb-95	<7	<7
	I-131	<5	<5
	Cs-134	<5	<4
	Cs-137	<5	<4
	Ba-La-140	<9	<9
	K-40	66±19	<39

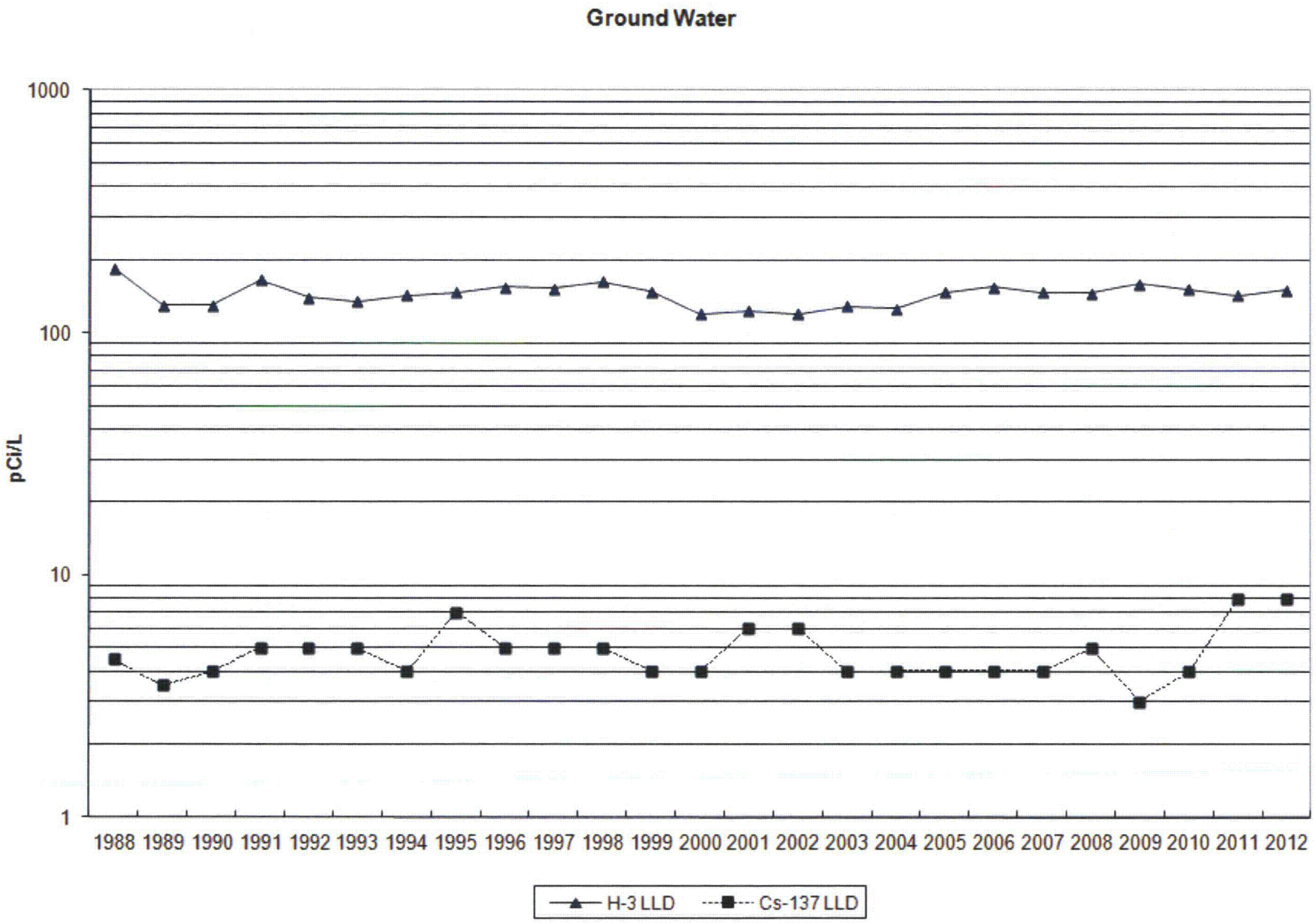

Ground Water
1000
100
10
1
pCi/L
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
H-3 LLD
Cs-137 LLD

TABLE IV-C.3

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL (NUMBER)[2] OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CR3 SITE GROUND WATER	Tritium 76	150	228 (47/76) (77-619)	CR3-5 0.051 mi.@225°	517(12/12) (363-619)	CR3-2 <LLD	0
(pCi/L)	γ Spec 76						
	Mn-54	5	<LLD	--	--	<LLD	0
	Fe-59	12	<LLD	--	--	<LLD	0
	Co-58	5	<LLD	--	--	<LLD	0
	Co-60	6	<LLD	--	--	<LLD	0
	Zn-65	18	<LLD	--	--	<LLD	0
	Zr-Nb-95	11	<LLD	--	--	<LLD	0
	I-131	9	<LLD	--	--	<LLD	0
	Cs-134	8	<LLD	--	--	<LLD	0
	Cs-137	6	<LLD	--	--	<LLD	0
	Ba-La-140	15	<LLD	--	--	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.
[2]Includes extra samples collected for data trending.

TABLE IV-C.3.a.1

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-2	01-04	<147	<85	<5	<5	<10	<4	<8	<10	<9	<6	<5	<5
	04-03	<140	83±16	<4	<4	<8	<3	<9	<8	<8	<4	<5	<8
	07-05	<132	<48	<5	<5	<9	<4	<19	<8	<8	<5	<5	<8
	10-01	<135	<61	<4	<3	<7	<5	<10	<7	<7	<4	<5	<6
C3-4	01-04	<147	<52	<4	<4	<9	<4	<13	<8	<6	<4	<4	<7
	04-03	75±26	55±18	<3	<3	<8	<3	<8	<7	<8	<5	<5	<6
	07-05	<132	<61	<3	<4	<7	<4	<6	<6	<6	<4	<4	<7
	10-01	<138	62±11	<2	<2	<5	<3	<5	<4	<4	<3	<3	<4
C3-5	01-04	548±58	<83	<5	<5	<10	<3	<8	<8	<8	<5	<4	<8
	04-03	619±58	87±13	<2	<2	<5	<3	<5	<4	<4	<3	<3	<4
	07-05	468±55	<67	<4	<4	<8	<4	<9	<6	<4	<5	<4	<11
	10-01	363±51	82±21	<3	<4	<8	<5	<7	<7	<6	<4	<4	<7

TABLE IV-C.3.a.1(cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-6S	01-04	<147	<53	<4	<4	<7	<4	<14	<7	<5	<4	<5	<9
	04-03	146±46	<45	<4	<4	<7	<4	<13	<5	<5	<4	<4	<6
	07-05	102±43	<88	<5	<5	<12	<5	<12	<9	<8	<8	<5	<9
	10-01	91±44	<75	<4	<4	<8	<4	<10	<5	<6	<5	<4	<7
C3-6D	01-04	<147	140±15	<4	<4	<8	<4	<12	<7	<6	<4	<4	<7
	04-03	98±26	251±19	<3	<2	<5	<3	<6	<5	<4	<3	<3	<4
	07-05	<144	259±26	<4	<4	<6	<5	<6	<7	<6	<4	<4	<6
	10-01	<135	<28	<4	<4	<7	<4	<11	<6	<5	<4	<4	<6
C3-7	01-04	177±49	<47	<3	<3	<7	<3	<8	<6	<7	<3	<3	<5
	04-03	139±46	32±8	<4	<4	<9	<4	<11	<7	<5	<4	<4	<7
	07-05	130±27	<40	<3	<4	<7	<3	<9	<6	<5	<4	<3	<5
	10-01	192±46	19±5	<2	<2	<5	<2	<7	<4	<3	<2	<2	<4

TABLE IV-C.3.a.1(cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-8	01-04	<147	<83	<5	<5	<10	<7	<12	<11	<9	<6	<5	<10
	04-03	132±46	128±22	<4	<4	<6	<5	<8	<7	<5	<4	<4	<7
	07-05	169±45	<62	<4	<4	<10	<3	<8	<7	<6	<4	<4	<8
	10-02	158±46	<52	<5	<4	<8	<4	<15	<7	<5	<4	<5	<8
C3-9	01-04	<147	<52	<4	<5	<7	<4	<16	<7	<5	<4	<5	<10
	04-03	103±26	31±7	<4	<4	<7	<4	<13	<6	<5	<4	<4	<7
	07-05	92±43	32±5	<3	<3	<5	<3	<9	<4	<3	<3	<3	<8
	10-02	<150	29±7	<1	<1	<2	<1	<2	<1	<3	<1	<1	<2
C3-10	01-04	<147	<53	<4	<5	<8	<5	<14	<7	<7	<5	<4	<7
	04-03	78±26	<39	<4	<3	<8	<4	<9	<6	<6	<4	<3	<6
	07-05	112±43	<54	<4	<5	<9	<5	<18	<8	<8	<5	<5	<8
	10-02	<138	<47	<4	<4	<7	<4	<14	<7	<5	<4	<4	<7

TABLE IV-C.3.a.2

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER (SUPPLEMENTAL DATA)

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-5	02-01	521±58	<62	<5	<5	<11	<6	<12	<8	<5	<4	<6	<12
	03-07	580±59	<65	<4	<4	<7	<5	<8	<7	<4	<5	<4	<13
	05-08	568±56	<20	<4	<4	<7	<4	<14	<6	<4	<4	<4	<13
	06-06	482±56	<34	<3	<3	<5	<3	<10	<4	<3	<3	<3	<8
	08-06	531±55	<51	<4	<4	<8	<4	<14	<6	<5	<4	<4	<9
	09-05	551±56	<76	<3	<4	<9	<5	<6	<6	<7	<5	<4	<6
	11-07	442±53	<44	<2	<2	<6	<2	<5	<5	<5	<2	<3	<4
	12-04	532±53	132±22	<4	<4	<8	<3	<9	<7	<5	<6	<4	<10
C3-6S	02-01	<150	<49	<4	<5	<8	<4	<15	<7	<5	<4	<4	<10
	03-07	<148	<84	<4	<4	<11	<6	<11	<9	<5	<6	<6	<15
	05-08	115±45	120±18	<4	<4	<7	<5	<8	<6	<4	<5	<5	<13
	06-06	<146	25±7	<5	<4	<7	<4	<14	<7	<4	<4	<4	<13
	08-06	<139	97±20	<3	<3	<7	<3	<6	<6	<4	<4	<3	<7
	09-05	<141	<51	<4	<4	<8	<4	<14	<7	<4	<4	<4	<13
	11-07	115±45	<37	<2	<2	<5	<3	<5	<4	<4	<3	<3	<4
	12-04	77±25	<75	<4	<4	<8	<4	<9	<7	<6	<6	<5	<10

TABLE IV-C.3.a.2(cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER (SUPPLEMENTAL DATA)

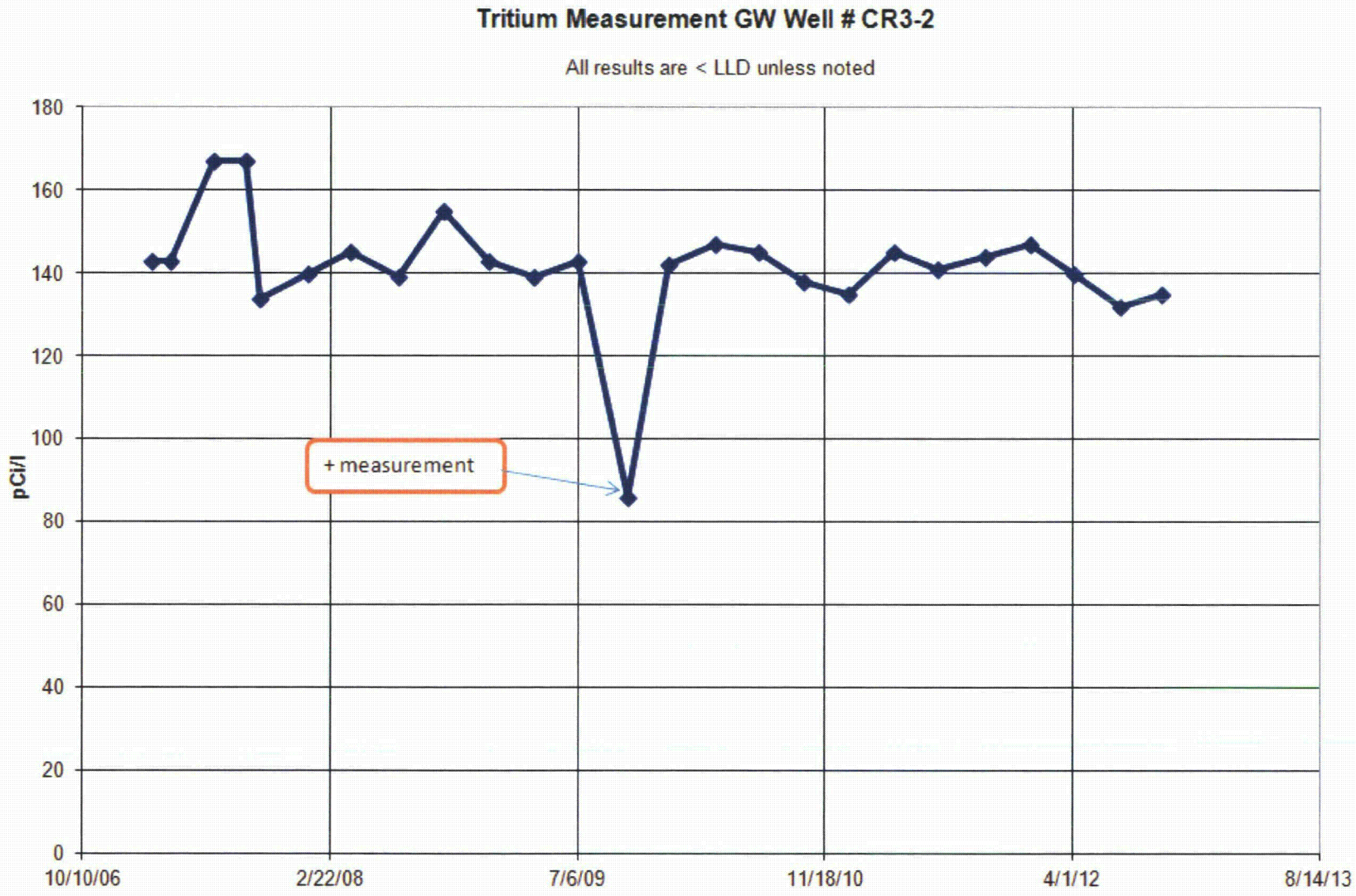
STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-7	02-01	139±49	125±16	<3	<4	<8	<3	<7	<6	<5	<4	<4	<9
	03-07	140±49	<79	<5	<5	<9	<6	<10	<8	<6	<6	<6	<12
	05-08	162±46	114±18	<4	<3	<6	<3	<6	<6	<5	<4	<4	<15
	06-06	138±48	99±15	<3	<3	<5	<3	<6	<4	<6	<4	<3	<4
	08-06	96±45	<71	<4	<4	<7	<4	<8	<7	<5	<5	<4	<7
	09-05	219±49	<45	<4	<4	<6	<4	<11	<6	<4	<4	<3	<8
	11-07	238±48	<35	<3	<3	<5	<3	<6	<4	<4	<2	<3	<4
	12-04	169±44	<40	<3	<3	<6	<3	<5	<5	<4	<3	<3	<8
C3-8	02-01	<150	<57	<4	<4	<9	<5	<9	<6	<5	<4	<4	<9
	03-07	<148	111±14	<3	<3	<6	<3	<6	<6	<5	<4	<4	<12
	05-08	152±46	<19	<4	<4	<8	<4	<17	<6	<4	<4	<4	<14
	06-06	103±47	41±7	<4	<4	<7	<4	<15	<6	<4	<4	<4	<10
	08-06	110±45	16±5	<4	<4	<7	<3	<14	<6	<4	<4	<4	<7
	09-05	113±45	<56	<4	<5	<9	<4	<17	<7	<6	<5	<5	<10
	11-07	153±46	<39	<3	<3	<6	<3	<6	<5	<5	<2	<3	<5
	12-04	113±42	<53	<5	<5	<9	<5	<18	<8	<6	<5	<5	<9

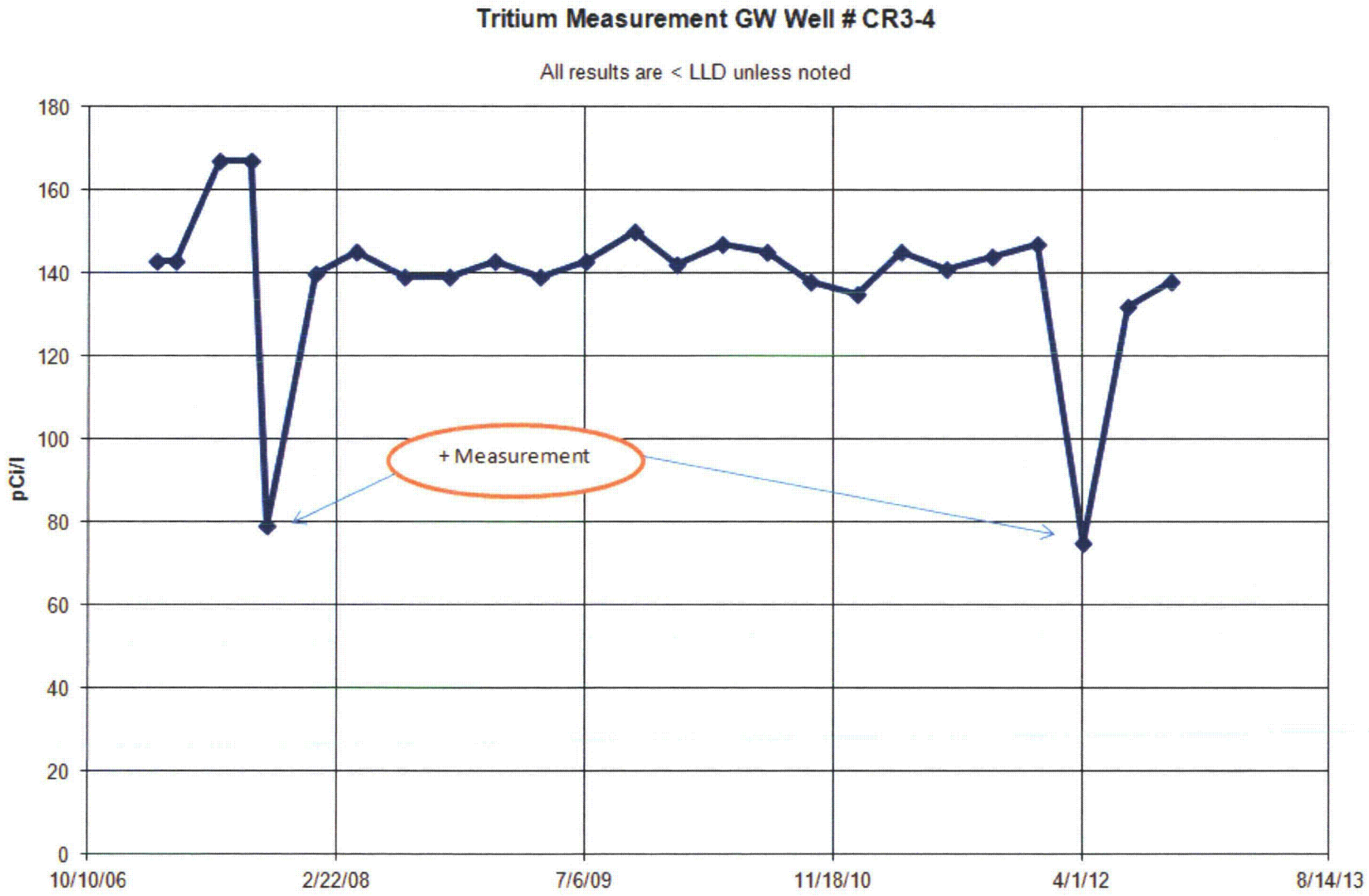
TABLE IV-C.3.a.2(cont'd)

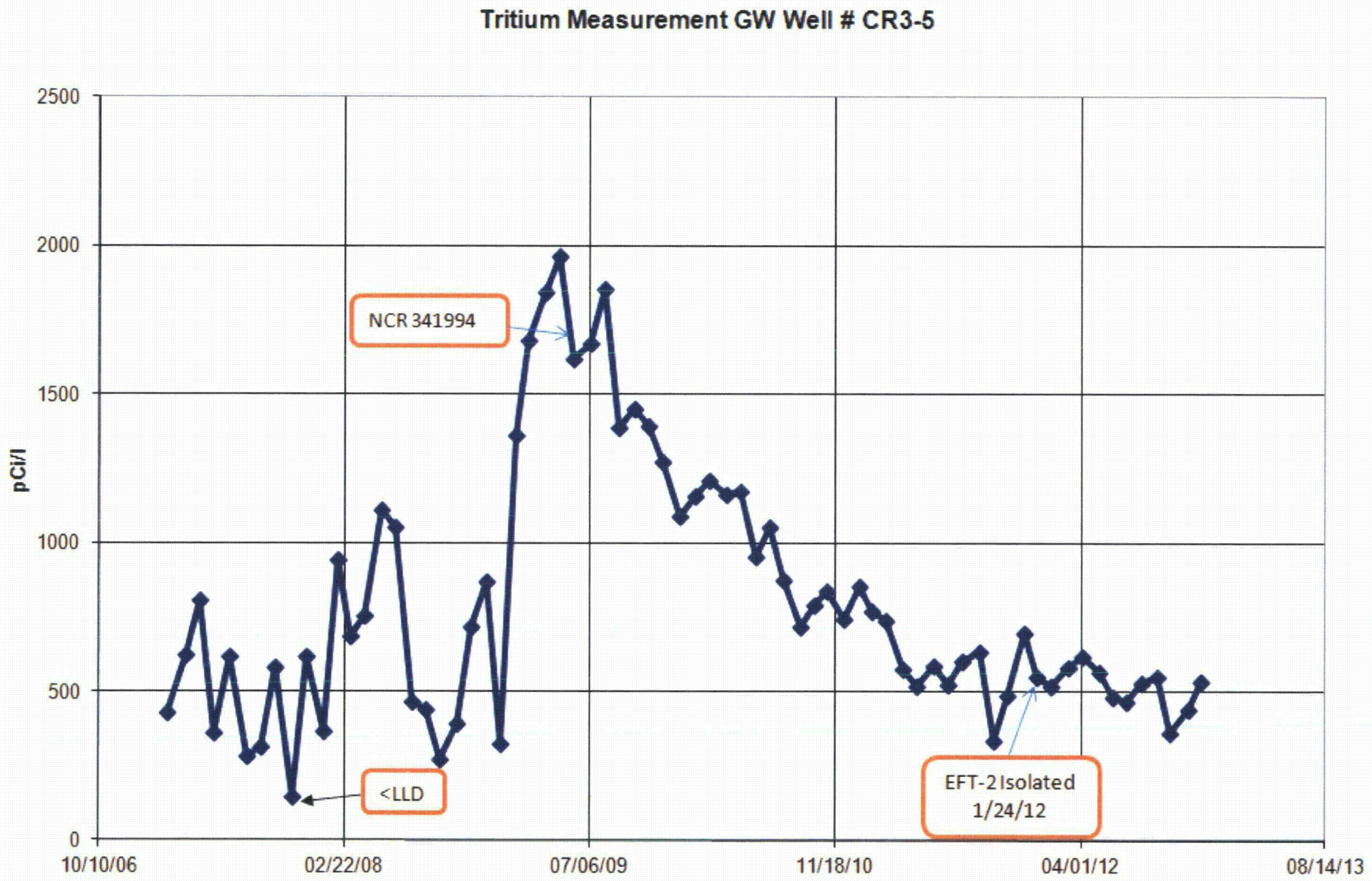
PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

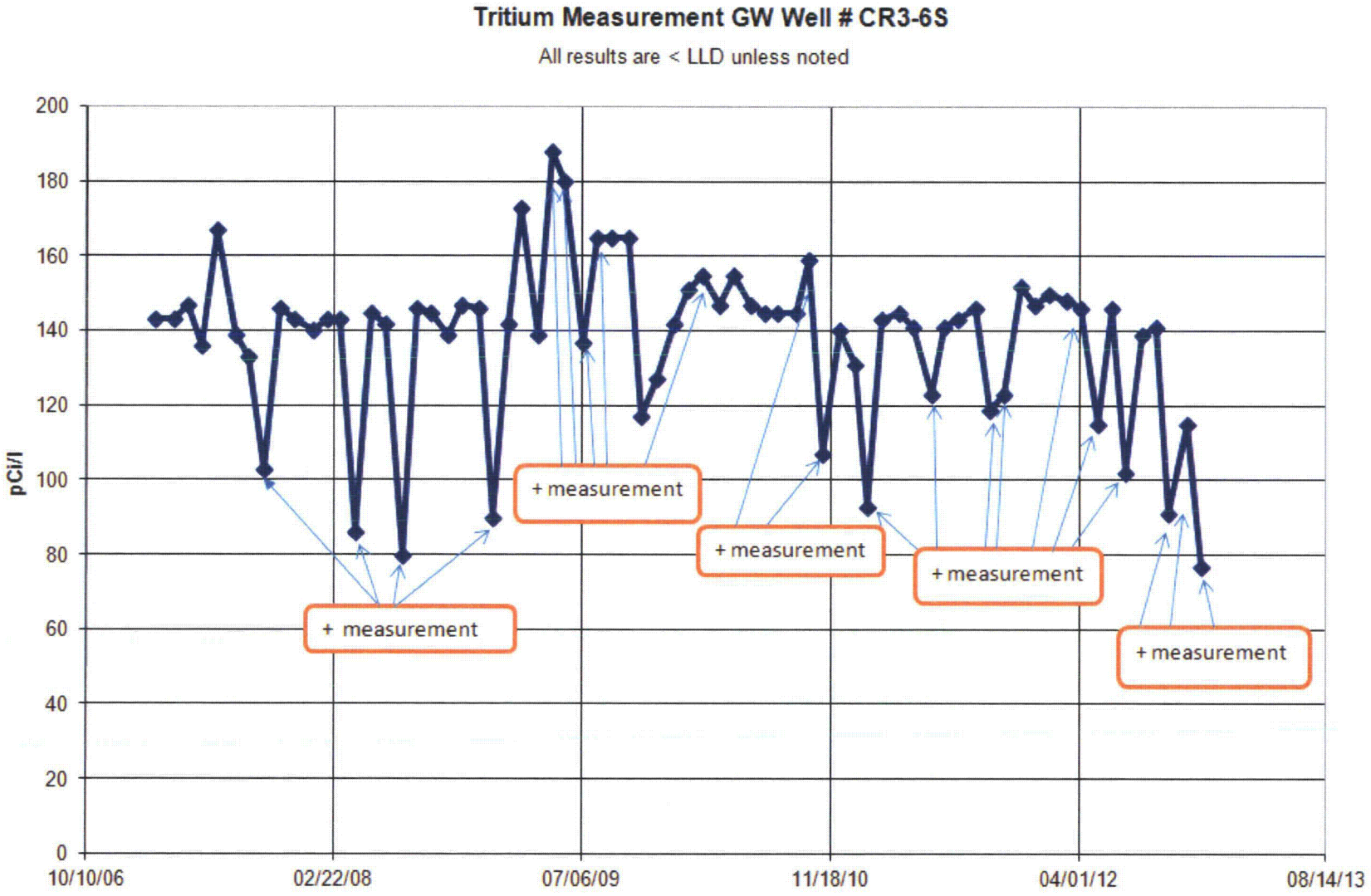
pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER (SUPPLEMENTAL DATA)

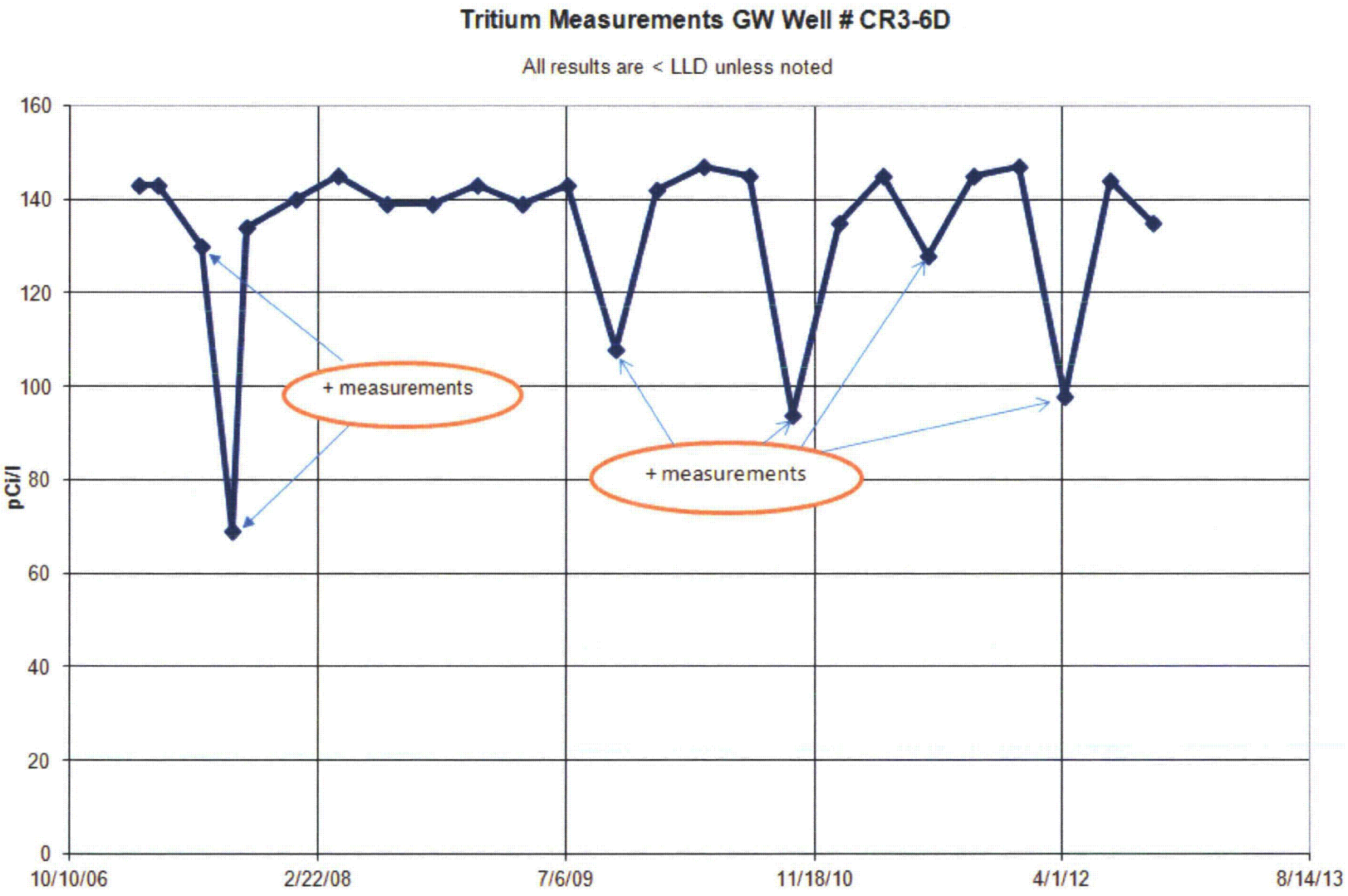
STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C3-9	02-01	<150	44±10	<4	<5	<9	<4	<16	<8	<6	<5	<5	<11
	03-07	<148	<49	<4	<4	<7	<4	<14	<7	<4	<4	<4	<14
	05-08	<138	36±8	<4	<4	<7	<4	<16	<6	<4	<4	<4	<15
	06-06	<146	152±18	<3	<3	<5	<3	<6	<5	<4	<3	<3	<9
	08-06	<139	<73	<4	<4	<8	<4	<7	<7	<5	<4	<4	<7
	09-05	<141	19±6	<3	<3	<7	<4	<10	<6	<6	<4	<4	<5
	11-07	98±44	<36	<3	<2	<5	<2	<5	<4	<5	<3	<2	<4
	12-04	79±25	<19	<3	<3	<6	<3	<6	<5	<4	<3	<3	<6

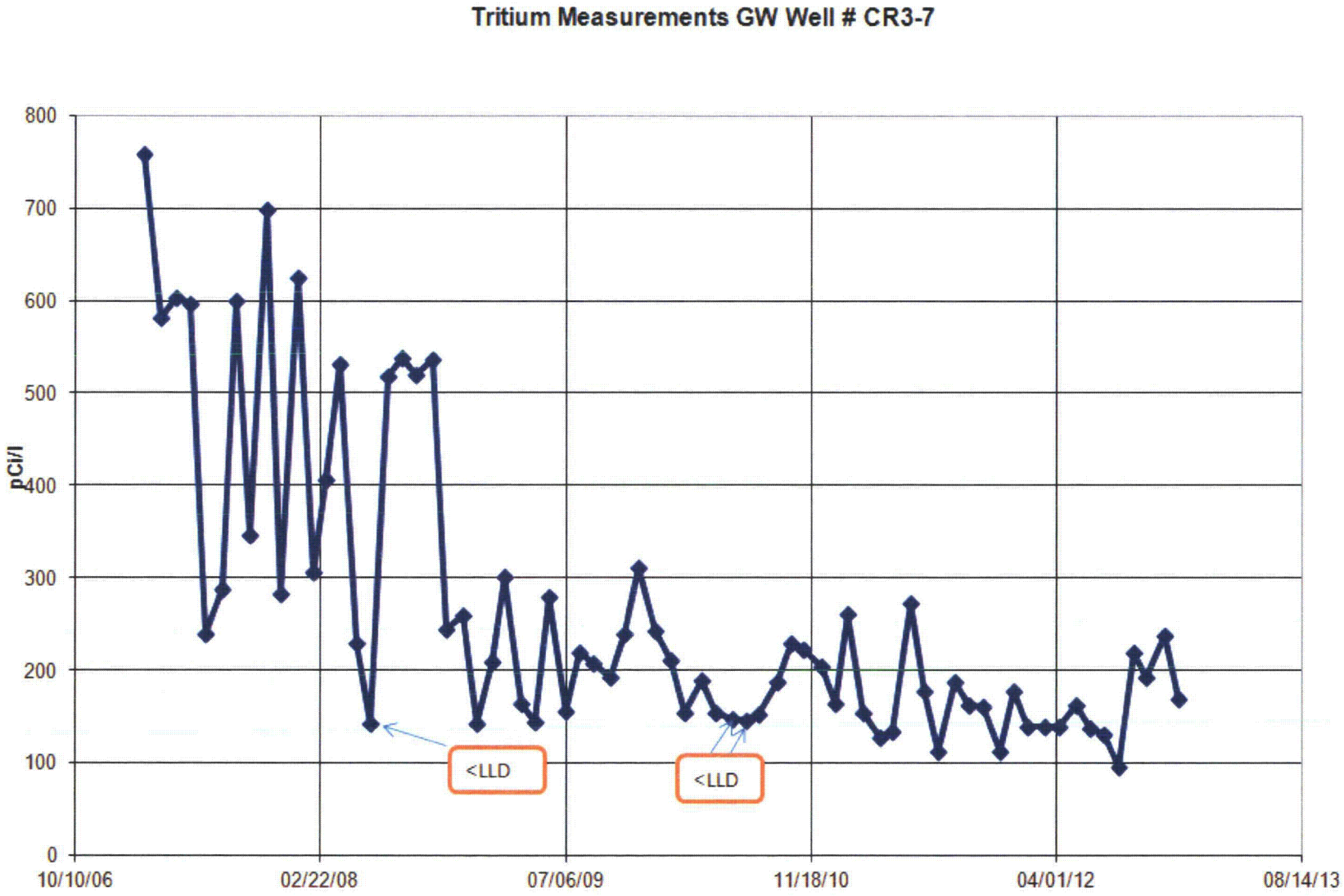

Tritium Measurement GW Well # CR3-2
All results are < LLD unless noted
pCi/l
180
160
140
120
100
80
60
40
20
0
+ measurement
10/10/06
2/22/08
7/6/09
11/18/10
4/1/12
8/14/13


Tritium Measurement GW Well # CR3-4
All results are < LLD unless noted
pCi/l
180
160
140
120
100
80
60
40
20
0
10/10/06
2/22/08
7/6/09
11/18/10
4/1/12
8/14/13
+ Measurement

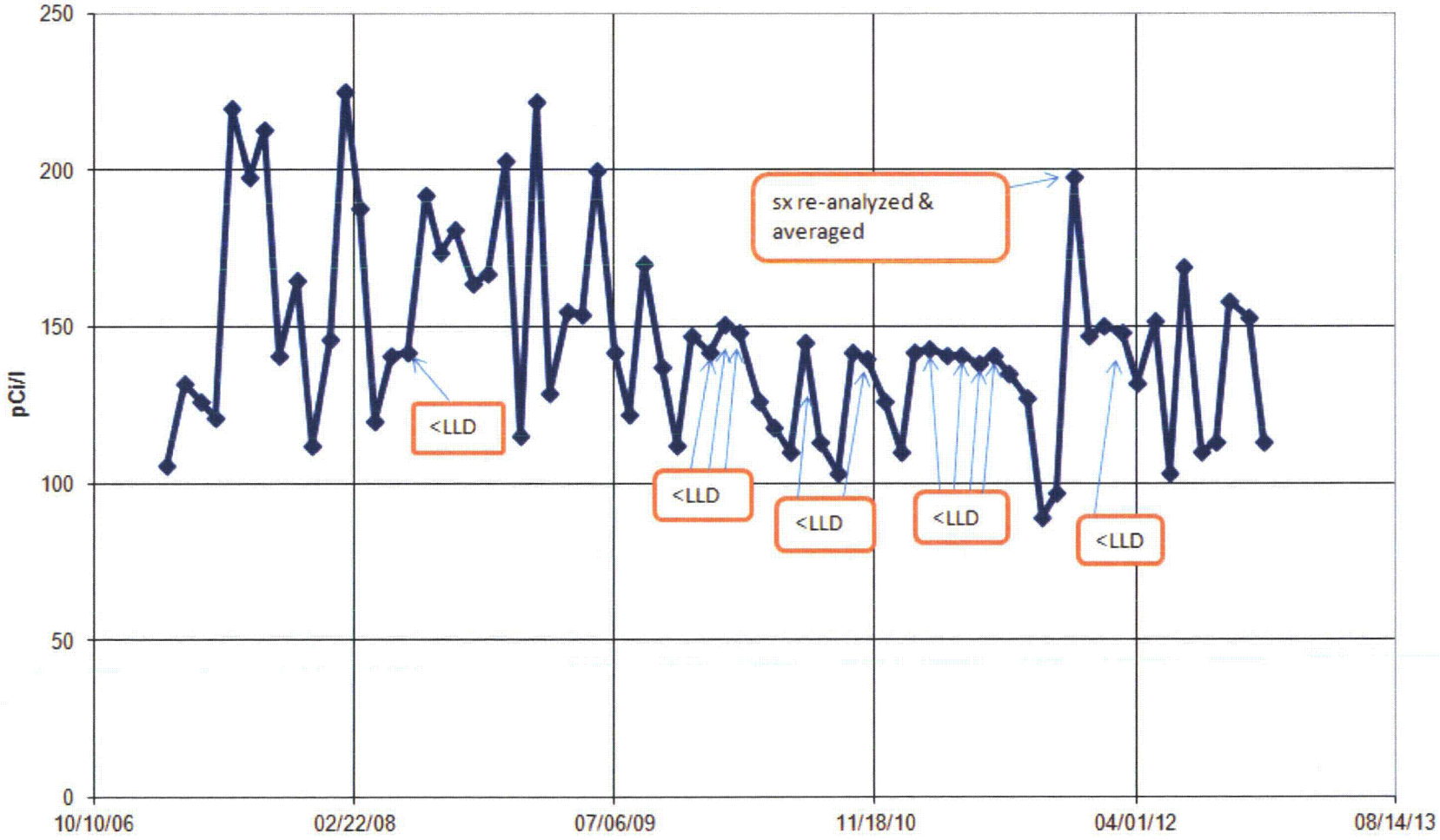

Tritium Measurement GW Well # CR3-5
pCi/l
2500
2000
1500
1000
500
0
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13
NCR 341994
<LLD
EFT-2 Isolated
1/24/12

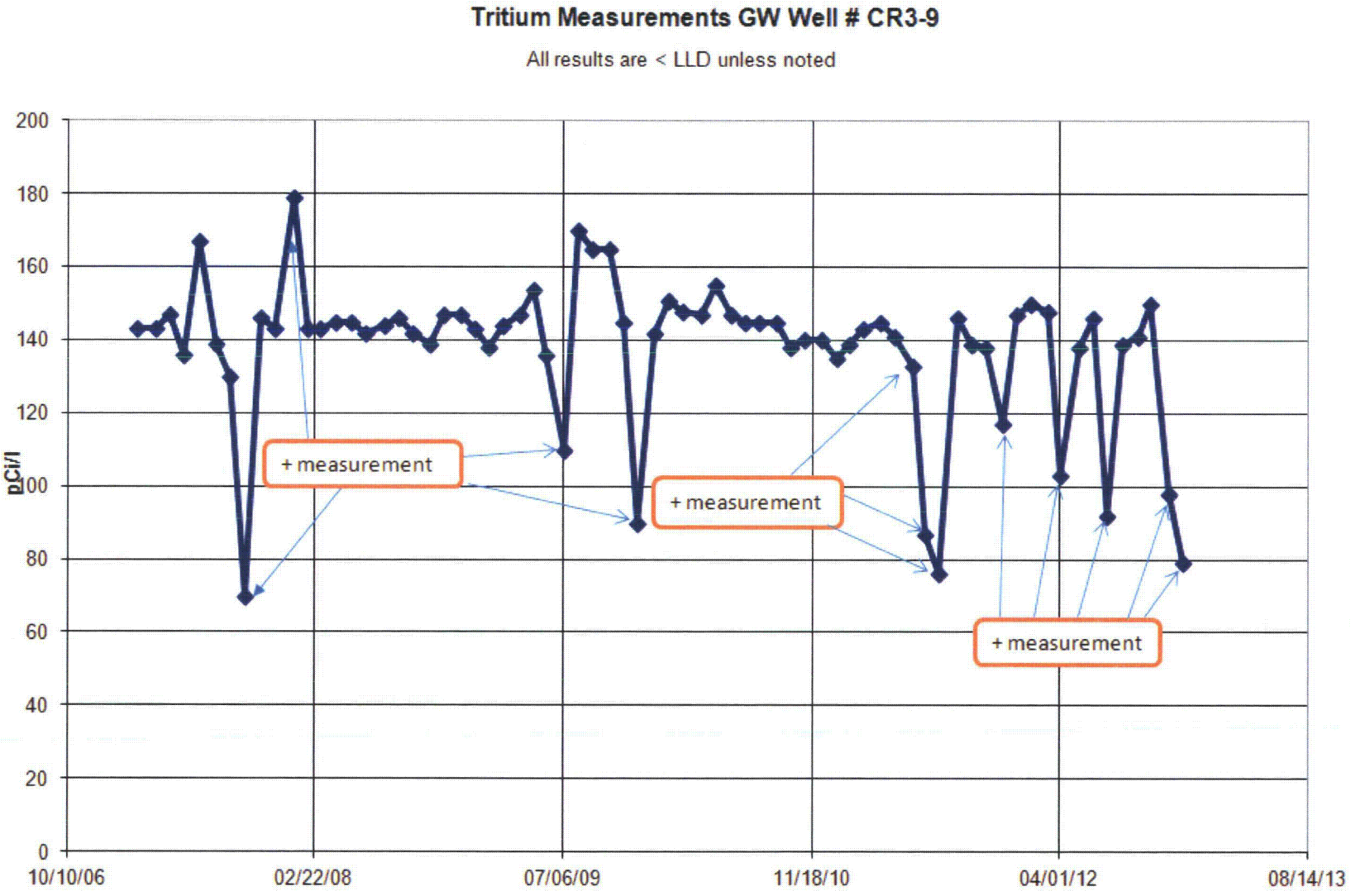

Tritium Measurement GW Well # CR3-6S
All results are < LLD unless noted
pCi/l
200
180
160
140
120
100
80
60
40
20
0
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13
+ measurement
+ measurement
+ measurement
+ measurement
+ measurement


Tritium Measurements GW Well # CR3-6D
All results are < LLD unless noted
pCi/l
160
140
120
100
80
60
40
20
0
10/10/06
2/22/08
7/6/09
11/18/10
4/1/12
8/14/13
+ measurements
+ measurements


Tritium Measurements GW Well # CR3-7
800
700
600
500
400
300
200
100
0
pCi/l
<LLD
<LLD
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13

Tritium Measurements GW Well # CR3-8




Tritium Measurements GW Well # CR3-9
All results are < LLD unless noted
pCi/l
200
180
160
140
120
100
80
60
40
20
0
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13
+ measurement
+ measurement
+ measurement

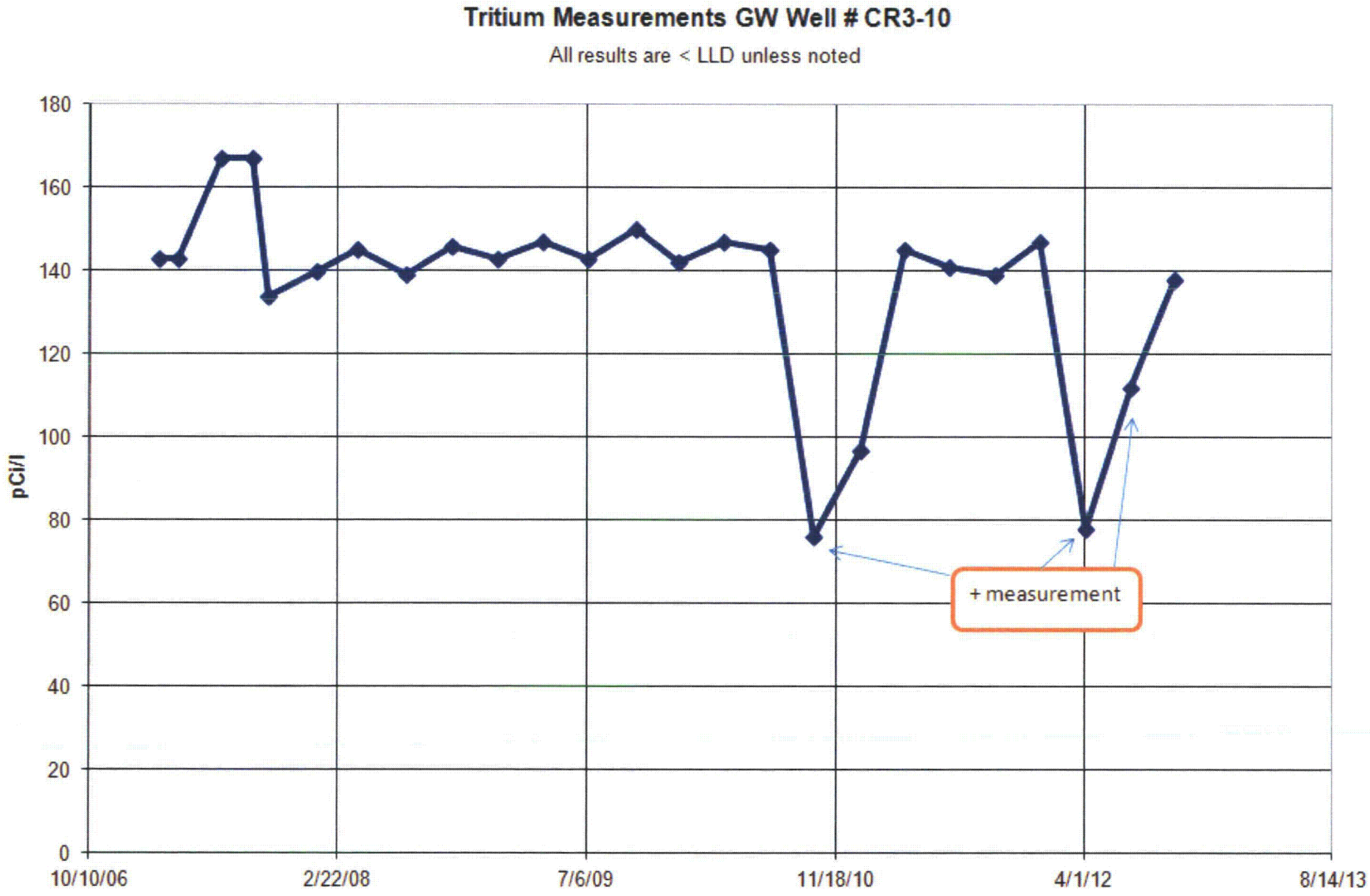

Tritium Measurements GW Well # CR3-10
All results are < LLD unless noted
pCi/l
180
160
140
120
100
80
60
40
20
0
10/10/06
2/22/08
7/6/09
11/18/10
4/1/12
8/14/13
+ measurement

TABLE IV-C.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
*CR3 SITE GROUND WATER (pCi/L) *	Tritium 24	150	125 (9/24) (95-182)	MWC-IF2 0.30 mi.@266°	125 (7/12) (<LLD-182)	CR3-2 <LLD	0
	γ Spec 24						
	Mn-54	4	<LLD	-	-	<LLD	0
	Fe-59	9	<LLD	-	-	<LLD	0
	Co-58	5	<LLD	-	-	<LLD	0
	Co-60	6	<LLD	-	-	<LLD	0
	Zn-65	16	<LLD	-	-	<LLD	0
	Zr-Nb-95	8	<LLD	-	-	<LLD	0
	I-131	8	<LLD	-	-	<LLD	0
	Cs-134	6	<LLD	-	-	<LLD	0
	Cs-137	6	<LLD	-	-	<LLD	0
	Ba-La-140	14	<LLD	-	-	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.
*Non-REMP required samples

TABLE IV-C.4.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER (SUPPLEMENTAL DATA)

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
MWC-27*	01-04	<147	<20	<2	<2	<3	<2	<6	<3	<2	<2	<2	<4
	02-01	<150	<36	<3	<3	<6	<3	<12	<5	<4	<4	<4	<7
	03-07	<148	<46	<4	<4	<7	<4	<16	<6	<4	<4	<5	<14
	04-03	<140	68±22	<3	<3	<7	<5	<9	<7	<8	<4	<3	<6
	05-08	142±46	62±16	<4	<4	<8	<4	<10	<7	<6	<6	<5	<13
	06-06	<146	<85	<5	<4	<9	<6	<9	<8	<5	<6	<5	<13
	07-05	<144	62±9	<4	<4	<7	<3	<12	<7	<6	<4	<4	<7
	08-06	<139	<32	<3	<3	<5	<3	<10	<5	<4	<3	<3	<7
	09-05	<141	<48	<4	<4	<8	<4	<16	<6	<5	<4	<5	<9
	10-02	<135	<21	<4	<4	<8	<4	<14	<6	<5	<4	<4	<6
	11-07	<137	79±19	<4	<4	<8	<5	<8	<7	<8	<4	<4	<6
	12-04	108±42	15±4	<2	<2	<4	<2	<4	<3	<2	<2	<2	<4

*= These wells are not officially included in the REMP and are located on either side of the site percolation ponds.

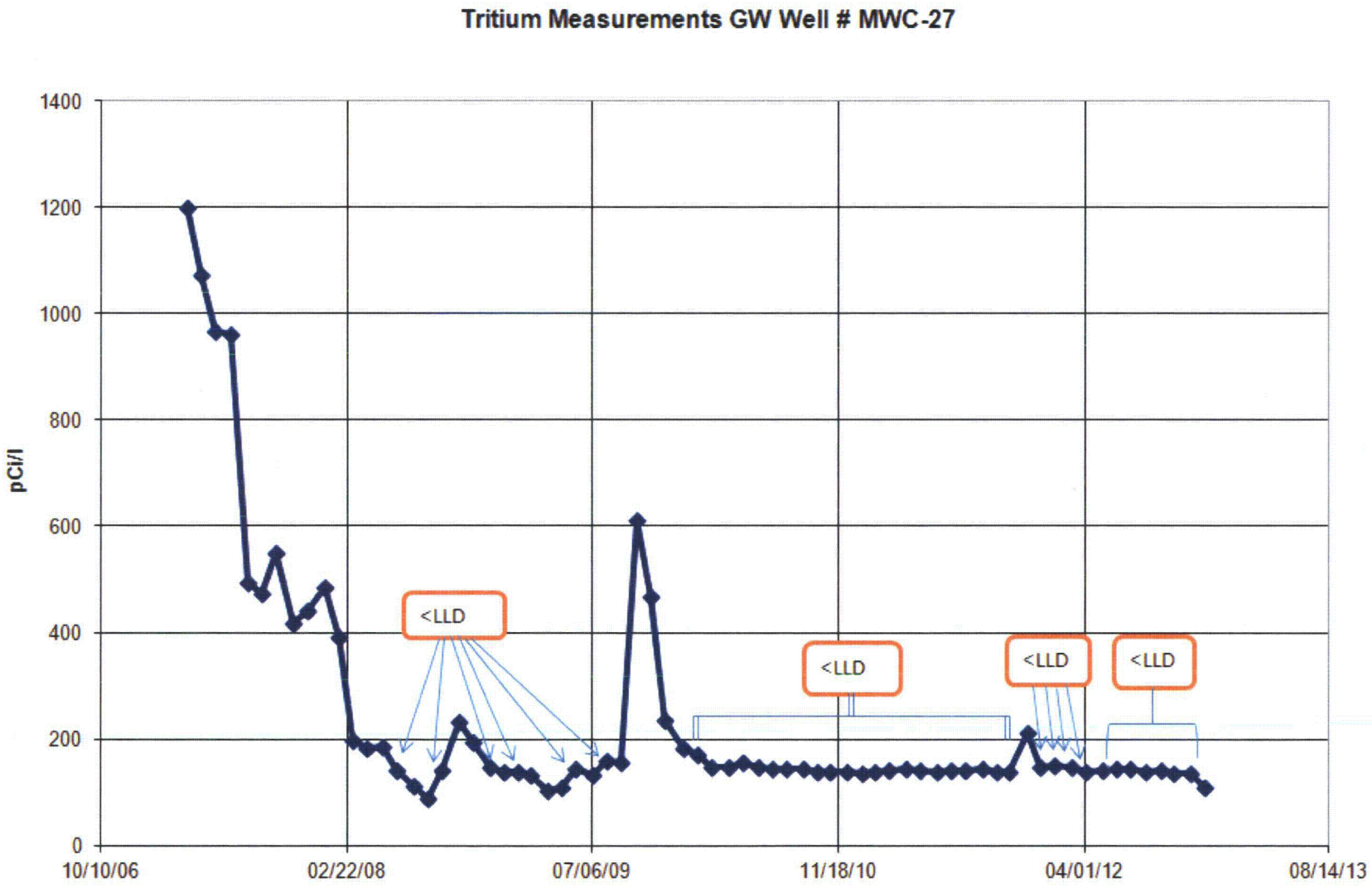
TABLE IV-C.4.a(cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN CR3 SITE GROUND WATER (SUPPLEMENTAL DATA)

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
MWC-IF2*	01-04	<147	<76	<5	<5	<9	<5	<10	<8	<8	<5	<6	<6
	02-01	103±48	<44	<4	<4	<8	<4	<14	<6	<5	<4	<4	<9
	03-07	109±48	104±16	<3	<3	<6	<4	<8	<5	<5	<4	<4	<14
	04-03	97±45	<55	<4	<4	<9	<4	<14	<7	<5	<5	<5	<8
	05-08	115±45	<64	<3	<3	<7	<4	<7	<6	<5	<4	<4	<14
	06-06	<146	105±17	<4	<4	<8	<5	<9	<7	<4	<5	<5	<14
	07-05	<144	<67	<4	<3	<9	<3	<6	<8	<6	<5	<4	<5
	08-06	<139	113±19	<3	<4	<6	<3	<7	<6	<5	<4	<4	<8
	09-05	<141	<28	<2	<2	<4	<2	<8	<4	<3	<2	<2	<7
	10-02	182±46	<46	<4	<4	<6	<4	<12	<6	<4	<4	<4	<7
	11-07	95±44	<38	<2	<2	<6	<3	<6	<4	<4	<2	<2	<3
	12-04	174±44	<38	<3	<3	<6	<3	<6	<5	<3	<3	<3	<7

*= These wells are not officially included in the REMP and are located on either side of the site percolation ponds.


Tritium Measurements GW Well # MWC-27
pCi/l
1400
1200
1000
800
600
400
200
0
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13
<LLD
<LLD
<LLD
<LLD

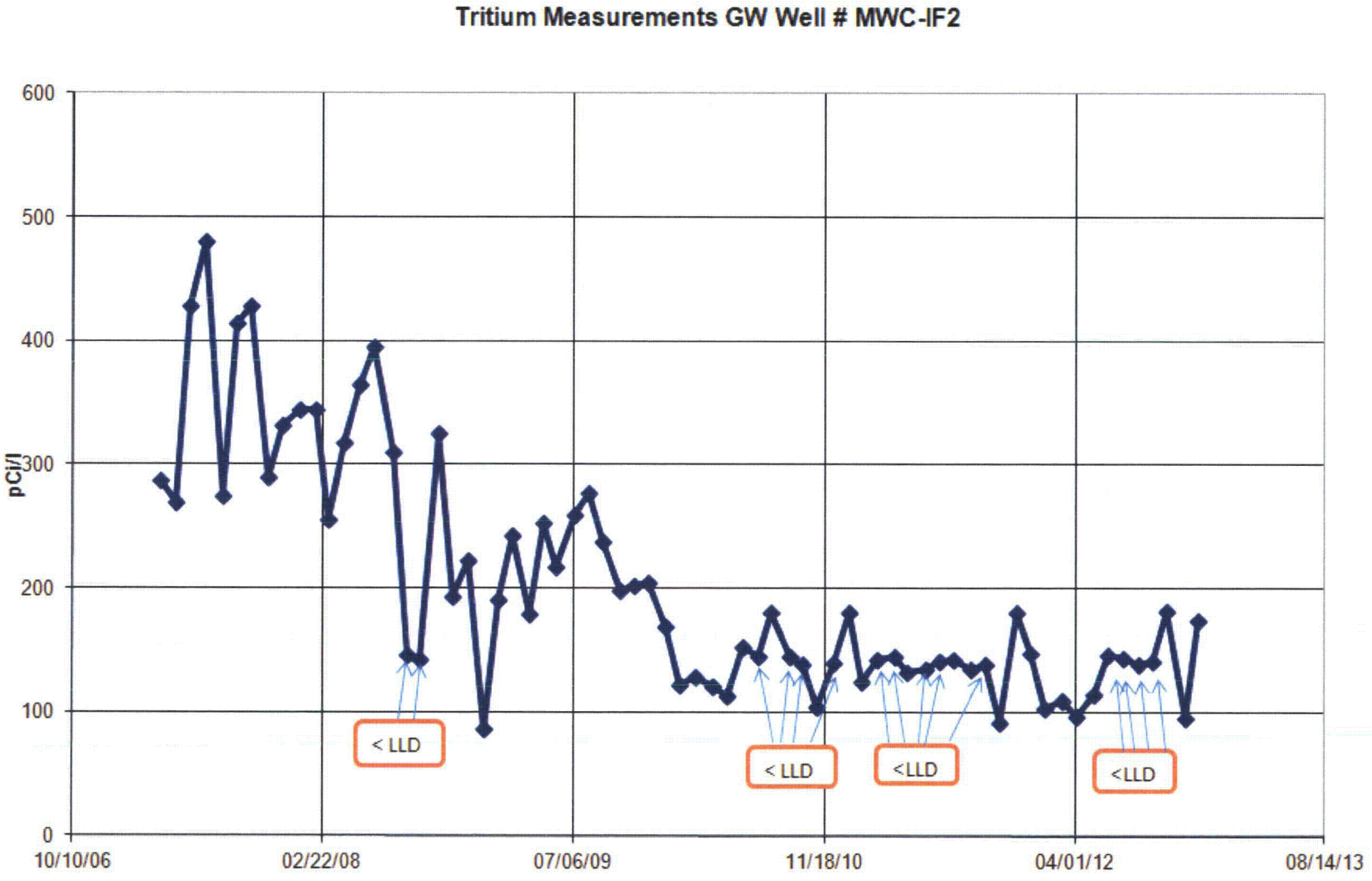

Tritium Measurements GW Well # MWC-IF2
600
500
400
300
200
100
0
pCi/l
10/10/06
02/22/08
07/06/09
11/18/10
04/01/12
08/14/13
< LLD
< LLD
<LLD
<LLD

TABLE IV-C.5

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	LOCATION WITH HIGHEST MEAN MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER	Tritium 12	150	<LLD	-	-	<LLD	0
(pCi/L)	γ Spec 12						
	Mn-54	5	<LLD	-	-	<LLD	0
	Fe-59	11	<LLD	-	-	<LLD	0
	Co-58	5	<LLD	-	-	<LLD	0
	Co-60	7	<LLD	-	-	<LLD	0
	Zn-65	12	<LLD	-	-	<LLD	0
	Zr-Nb-95	11	<LLD	-	-	<LLD	0
	I-131	8	<LLD	-	-	<LLD	0
	Cs-134	8	<LLD	-	-	<LLD	0
	Cs-137	7	<LLD	-	-	<LLD	0
	Ba-La-140	11	<LLD	-	-	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-C.5.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN DRINKING WATER

STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
C07	01-10	<146	<39	<3	<3	<6	<3	<9	<6	<3	<3	<3	<11
	04-02	<140	<23	<2	<2	<4	<2	<5	<3	<2	<2	<2	<4
	07-03	<132	<39	<3	<4	<7	<3	<8	<6	<4	<4	<4	<6
	10-01	*77±32	<34	<3	<3	<5	<3	<6	<5	<4	<3	<3	<5
C10	01-10	<146	<23	<2	<2	<4	<2	<5	<3	<2	<2	<2	<6
	04-02	<146	<96	<5	<5	<11	<5	<11	<10	<8	<7	<6	<10
	07-03	<143	<71	<4	<4	<8	<4	<9	<7	<6	<5	<4	<10
	10-01	*<138	<59	<4	<3	<8	<3	<8	<7	<5	<4	<3	<8
C18	01-10	<146	<61	<4	<3	<6	<4	<7	<6	<5	<4	<5	<7
	04-02	<146	<89	<5	<4	<8	<7	<12	<11	<6	<7	<7	<8
	07-03	<143	<93	<5	<5	<10	<5	<11	<7	<6	<8	<6	<8
	10-01	*<138	<46	<4	<3	<6	<3	<8	<6	<5	<3	<4	<5

*This sample was split with an independent lab. The independent lab's result was <LLD of 150 pCi/l.

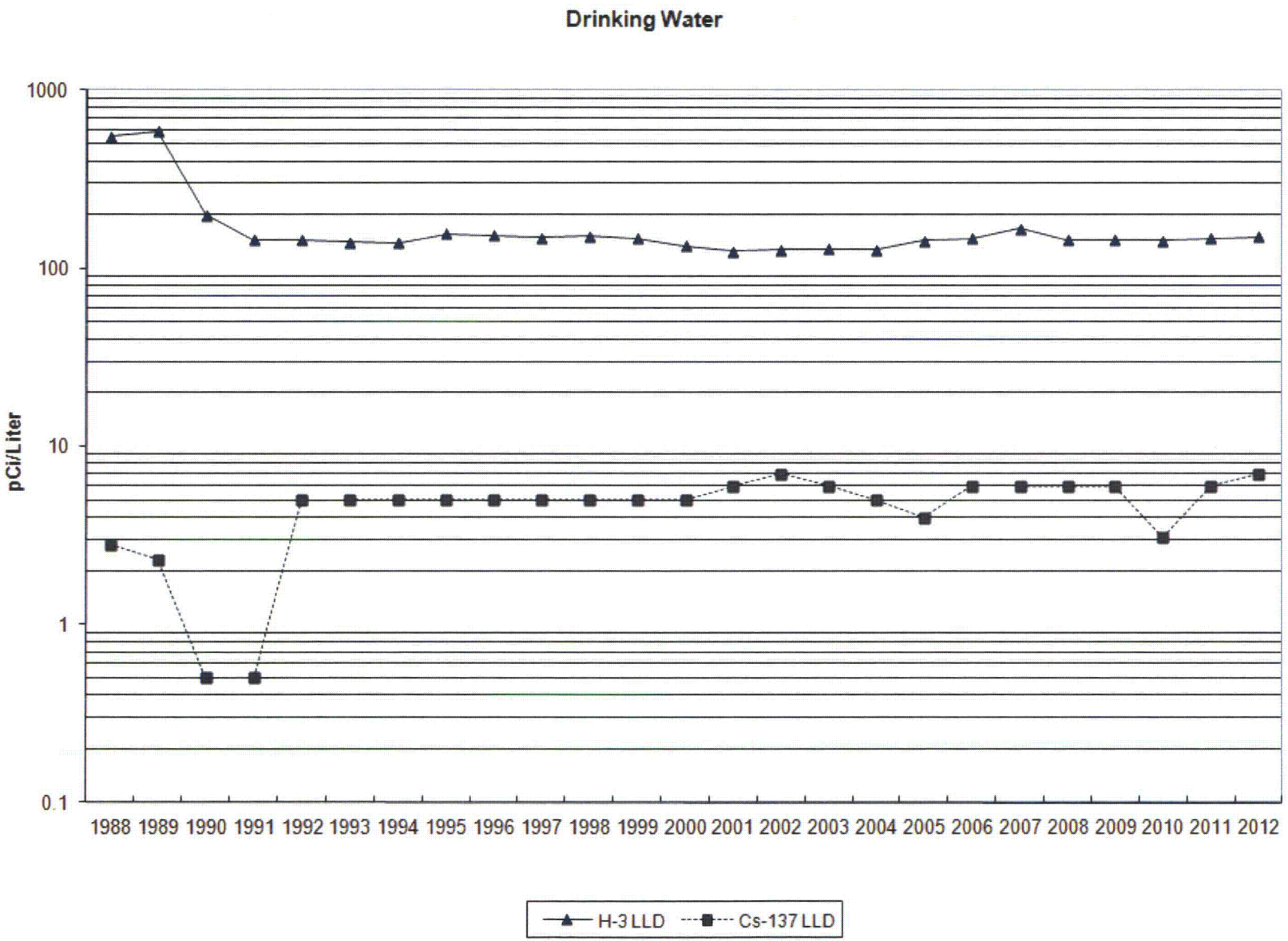

Drinking Water
1000
100
10
1
0.1
pCi/Liter
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
H-3 LLD
Cs-137 LLD

TABLE IV-C.6

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SHORELINE SEDIMENT	γ Spec 8						
(pCi/kg)	Cs-134	20	<LLD	—	—	<LLD	0
	Cs-137	20	28 (3/6) (19-35)	C14G 2.5 @ 270°	35 (1/2) (<LLD-35)	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-C.6.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg γ EMITTERS IN SHORELINE SEDIMENT

STATION	PERIOD	Co-58	Co-60	Cs-134	Cs-137	K-40	Ra-226
C09	First Half	<9	<9	<14	<10	488±59	941±163
	Second Half	<9	<9	<10	<8	213±26	217±50
C14H	First Half	<18	<17	<20	<20	862±58	1473±202
	Second Half	<6	<9	<14	<11	<216	601±134
C14M	First Half	<14	24±2	<16	31±3	1290±72	1278±153
	Second Half	<15	14±2	<15	19±3	637±50	<200
C14G	First Half	<10	17±3	<20	35±5	469±62	1473±202
	Second Half	<12	<11	<12	<12	335±61	2063±217

C09 is the control station at Ft. Island Beach. C14H, C14M, & C14G are discharge canal stations.

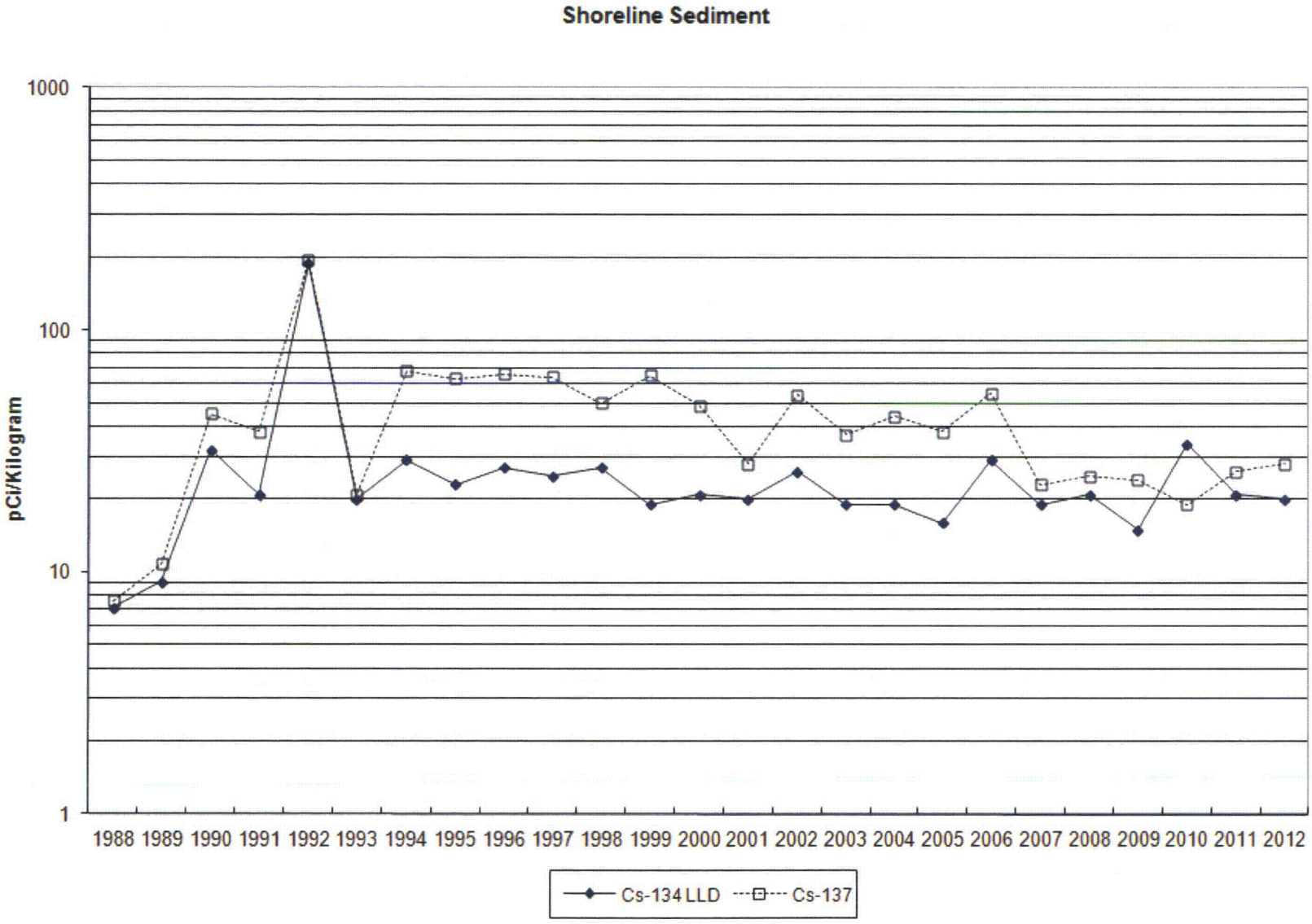

Shoreline Sediment
1000
100
10
1
pCi/Kilogram
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
Cs-134 LLD
Cs-137

TABLE IV-C.7 SUPPLEMENTAL DATA

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/L γ EMITTERS AND TRITIUM IN SITE SETTLING PONDS SURFACE WATER

STATION	MONTH	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-Nb-95	I-131	Cs-134	Cs-137	Ba-La-140
31NE	DEC	233±48	N/A	<2	<2	<4	<2	<5	<4	<3	<2	<2	<8
31NE	JAN*	<152	N/A	<4	<3	<8	<4	<7	<7	<5	<5	<5	<10
32NE	DEC	<138	N/A	<3	<3	<7	<4	<8	<5	<4	<3	<4	<3
32NE	JAN*	<152	N/A	<3	<4	<7	<3	<10	<5	<4	<3	<3	<3

*Samples actually collected in 2013 due to maintenance being performed on ponds causing them to be not in use in late December 2012.

pCi/kg γ EMITTERS IN SITE SETTLING PONDS SEDIMENT

STATION	MONTH	Co-58	Co-60	Cs-134	Cs-137	K-40	Ra-226
31NE	DEC	<10	<9	<12	<14	768±68	1413±149
31NW	DEC	<12	<12	<11	16±3	1488±77	2365±222
32NE	DEC	<8	<7	<10	<9	<132	1120±137
32NW	DEC	<8	<8	<7	10±2	252±29	462±108

IV-D. INGESTION PATHWAY

To evaluate the ingestion pathway, samples are taken of fish, oysters, broad leaf vegetation, citrus, and watermelon.

1. Quarterly carnivorous fish samples were taken at two locations: C29 at the end of the discharge canal, and C30, the control location, near the mouth of the intake canal.
   In 2012, none of the required radionuclides were found in measurable quantities. The highest cesium-137 LLD for station C29 was 32 pCi/kg. Naturally occurring potassium-40 was quantified in all eight samples at an average concentration of 2659 pCi/kg.

   In 2011, none of the radionuclides of interest were identified in measurable quantities.

   In 2010, none of the radionuclides of interest were identified in measurable quantities.

   In 2009, none of the radionuclides of interest were identified in measurable quantities.

   Table IV-D.1 provides a statistical summary of the carnivorous fish gamma spectroscopy results.

   Table IV-D.1.a provides the results of the quarterly samples.

2. Quarterly oyster samples were taken at the same locations as fish samples, C29 and C30.
   In 2012, of the isotopes required to be evaluated, one sample from station C29 indicated measurable amounts of cesium-137 at a concentration of 22 pCi/L. This value was statistically positive, but is in the range of the analytical LLD. Additionally, silver-110m was not quantified in any sample.

   In 2011, silver-110m was quantified in two samples at C29 with an average concentration of 19 pCi/kg and a range of 14 to 23 pCi/kg. There were no other radionuclides of interest identified in any oyster samples in 2011.

   In 2010, silver-110m was not quantified in any oyster samples collected. There were no other radionuclides of interest identified in any oyster samples in 2010.

   In 2009, silver-110m was quantified in one sample at location C29 near the end of the discharge canal, at a concentration of 20 pCi/kg. There were no other radionuclides of interest identified in any oyster samples in 2009.

   Table IV-D.2 provides a statistical summary of the oyster gamma spectroscopy results.

   Table IV-D.2.a provides the results of the quarterly samples.

3. Monthly broad leaf vegetation samples were taken at two indicator locations, C48A and C48B, and one control location, C47.

   In 2012, thirteen of twenty four indicator samples had measurable amounts of cesium-137 with an average concentration of 86 pCi/kg and a range of 18 to 172 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of cesium-137. In eight of twelve control station samples there were measurable amounts of cesium-137 at an average concentration of 57 pCi/kg and a range of 16 to 201 pCi/kg. The cesium-137 values are similar in concentration as compared to samples collected in 2011 which experienced radionuclide deposition as a result of the Fukushima earthquake event and are not a result of the operation of CR3.

   In 2011, eighteen of twenty four indicator samples had measurable amounts of cesium-137 with an average concentration of 76 pCi/kg and a range of 6 to 233 pCi/kg. Two of twenty four indicator samples also had measurable amounts of iodine-131 with an average of 232 pCi/kg and a range of 195-269 pCi/kg. The control station also had measurable amounts of iodine-131 and cesium-137. In seven of twenty one control station samples, there was measurable I-131 at an average concentration of 324 pCi/kg and a range of 13-1397 pCi/kg. In seventeen of twenty one control station samples there was measurable cesium-137 at an average concentration of 61 pCi/kg and a range of 7 to 182 pCi/kg. Nine extra control samples were collected at the Orlando station location.

These positive-measured radionuclides were a result of the Fukushima earthquake and tsunami event that occurred in 2011 and were not from the operation of CR3.

In 2010, five of twenty-four indicator samples had measurable amounts of cesium-137 with an average concentration of 66 pCi/kg and a range of 9 to 153 pCi/kg. This is higher than the levels found in 2009, but lower than in 2007 and 2008. It is believed the 2007 and 2008 spike was due to possible collection of wire grass mixed into the sample, which has a greater uptake rate of cesium as compared to other broad-leafed media. Additionally in 2010, eight of twelve control station samples had measurable amounts of cesium-137 with an average concentration of 21 pCi/kg and a range of 9 to 31 pCi/kg. During 2009 due to construction activities at the Crystal River Unit 4 & 5 site, the area where broad leaf vegetation was being collected at station C48A was removed. A new location in the same north sector was located near the air sample station C46. During 2010, also due to construction activities at the Crystal River Units 4 & 5 site, the area where broadleaf vegetation was being collected at station C48B became inaccessible. A new location in the ENE sector was located near the transmission power line corridor right of way, just NE of the mariculture center. This sector has the same D/Q value as the N and NNE sectors and is allowed by the ODCM.

Table IV-D.3 provides a statistical summary of the broad leaf vegetation gamma spectroscopy results.

Table IV-D.3.a provides the results of the monthly samples.

4. In 2012 one watermelon sample was collected at station C04. This sample had no measurable quantities of radionuclides of interest. Citrus samples were taken at station C19. There were no measurable quantities of radionuclides of interest in the citrus samples.

   In 2011 two watermelon samples were collected at station C04. One sample had a measurable amount of cesium-137 at a concentration of 14 pCi/kg. All other radionuclides of interest were < LLD. Citrus samples were taken at station C19. There were no measurable quantities of radionuclides of interest in the citrus samples.

   In 2010 watermelon samples were collected at station C04. None of the required radionuclides were found in measurable quantities. Citrus samples were taken at station C19. None of the required radionuclides were found in measurable quantities in the citrus samples with exception of Cs-137 at a concentration of 71 pCi/kg.

   In 2008 and again in 2009, there were no watermelon samples available at station C04. In these 2 years, due to crop rotation, there were no locally grown watermelons found in any areas nearby the facility and no local commercial harvest performed.

   Table IV-D.4 provides a statistical summary of the watermelon and citrus gamma spectroscopy results.

   Table IV-D.4.a provides the results of the semi-annual samples.

TABLE IV-D.1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	LOCATION WITH HIGHEST MEAN MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
CARNIVOROUS FISH	γ Spec 8						
(pCi/kg)	Mn-54	27	<LLD	-	-	<LLD	0
	Fe-59	60	<LLD	-	-	<LLD	0
	Co-58	27	<LLD	-	-	<LLD	0
	Co-60	38	<LLD	-	-	<LLD	0
	Zn-65	77	<LLD	-	-	<LLD	0
	Cs-134	39	<LLD	-	-	<LLD	0
	Cs-137	32	<LLD	-	-	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-D.1.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg γ EMITTERS IN CARNIVOROUS FISH

STATION	QUARTER	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	K-40
C29	1	<27	<27	<56	<28	<62	<33	<27	2349±167
	2	<25	<25	<60	<38	<77	<39	<32	2382±243
	3	<17	<21	<40	<25	<47	<22	<19	3066±251
	4	<20	<19	<41	<22	<51	<25	<19	2354±200
C30	1	<20	<20	<46	<20	<44	<28	<23	3012±226
	2	<19	<16	<41	<27	<50	<26	<23	2333±217
	3	<21	<20	<35	<23	<47	<23	<25	2866±221
	4	<22	<20	<53	<24	<35	<24	<22	2913±213

Carnivorous Fish

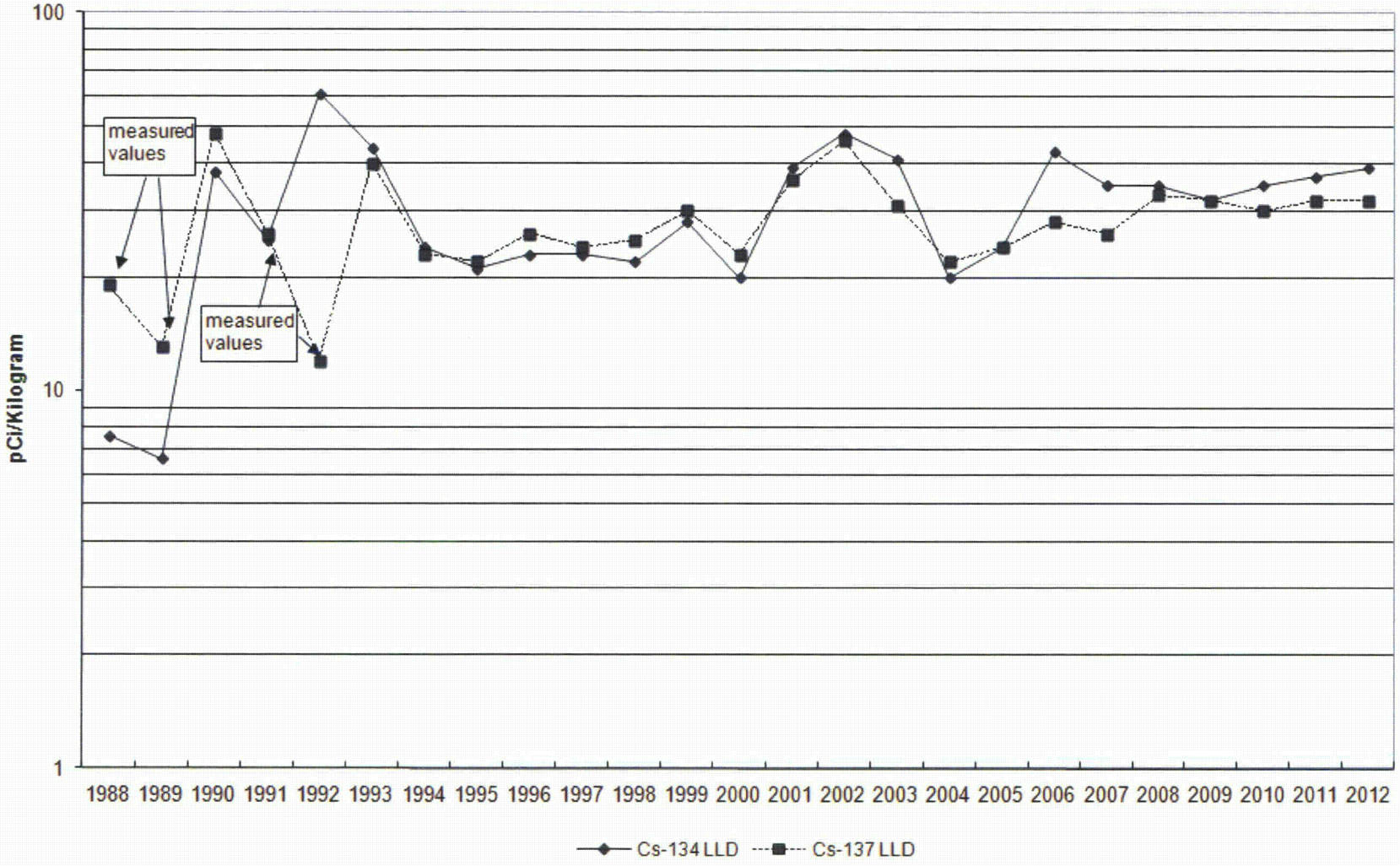


TABLE IV-D.2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	LOCATION WITH HIGHEST MEAN MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
OYSTERS (pCi/kg)	γ Spec 8						
	Mn-54	28	<LLD	-	-	<LLD	0
	Fe-59	64	<LLD	-	-	<LLD	0
	Co-58	32	<LLD	-	-	<LLD	0
	Co-60	35	<LLD	-	-	<LLD	0
	Zn-65	69	<LLD	-	-	<LLD	0
	Cs-134	30	<LLD	-	-	<LLD	0
	Cs-137	32	22(1/8) (LLD – 22)	C29 20@270°	22(1/8) (LLD – 22)	<LLD	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-D.2.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg γ EMITTERS IN OYSTERS

STATION	QUARTER	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	K-40
C29	1	<14	<17	<45	<21	<43	<24	<19	1086±156
	2	<18	<21	<36	<24	<39	<20	22±5	1698±141
	3	<26	<27	<58	<25	<56	<29	<26	488±83
	4	<23	<18	<46	<21	<41	<24	<22	782±1123
C30	1	<19	<19	<46	<17	<48	<20	<22	1236±145
	2	<28	<26	<62	<25	<50	<30	<26	892±111
	3	<31	<32	<64	<35	<69	<27	<32	756±205
	4	<21	<20	<44	<26	<37	<22	<21	919±153

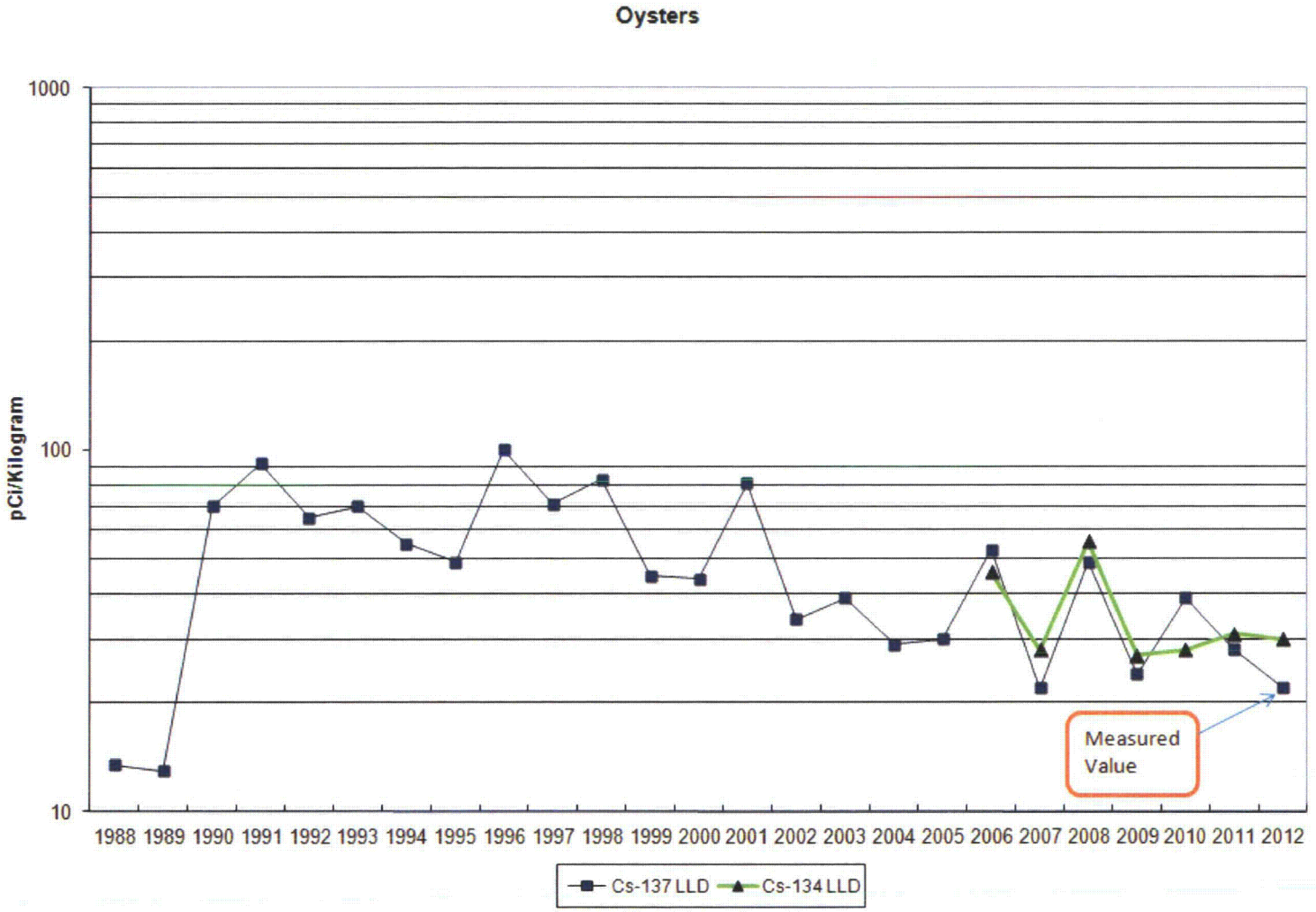

Oysters
1000
100
10
pCi/Kilogram
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
Measured Value
Cs-137 LLD
Cs-134 LLD

TABLE IV-D.3

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
BROAD LEAF VEGETATION (pCi/kg)	γ Spec 36						
	I-131	30	<LLD	_	_	<LLD	0
	Cs-134	21	<LLD	_	_	<LLD	0
	Cs-137[2]	23	86 (13/24) (18-172)	C48B 0.9 @ 73°	92(12/12) (27-172)	57 (8/12) (16-201)	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

[2]The elevated Cs-137 values are not associated with the operation of CR3 and are a direct result of the Fukushima earthquake and tsunami event that occurred in 2011.

TABLE IV-D.3.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg OF γ EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C47	JAN	<26	<18	30±7	3552±195
	FEB	<30	<16	84±9	3083±191
	MAR	<11	<13	33±8	3963±178
	APR	<18	<13	<13	4111±167
	MAY	<12	<13	201±10	2901±119
	JUN	<11	<15	<15	4350±157
	JUL	<22	<15	25±6	3407±185
	AUG	<17	<11	<13	2772±201
	SEP	<11	<11	16±2	2707±184
	OCT	<17	<10	<11	2328±167
	NOV	<23	<13	24±5	3086±138
	DEC	<19	<14	40±6	4276±156
C48A	JAN	<19	<21	<20	2023±159
	FEB	<12	<11	<10	1941±169
	MAR	<12	<12	<10	2195±118
	APR	<17	<17	18±8	4605±232
	MAY	<10	<10	<12	2749±211
	JUN	<13	<21	<18	4237±198
	JUL	<16	<11	<10	2338±112
	AUG	<10	<13	<13	2187±141
	SEP	<16	<20	<17	4002±220
	OCT	<24	<11	<12	2307±125
	NOV	<14	<7	<7	2487±182
	DEC	<10	<10	<11	1881±104

TABLE IV-D.3.a (CONT'D)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg OF γ EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C48B	JAN	<16	<17	107±10	2435±150
	FEB	<17	<16	94±9	3006±167
	MAR	<10	<10	174±6	2047±182
	APR	<20	<18	105±12	3504±191
	MAY	<16	<16	172±14	3439±183
	JUN	<15	<14	97±11	3529±186
	JUL	<25	<13	85±7	3617±150
	AUG	<15	<15	38±8	3837±188
	SEP	<15	<21	27±6	3571±200
	OCT	<20	<11	102±5	2898±203
	NOV	<21	<11	53±7	4328±159
	DEC	<7	<7	45±3	3435±214

The elevated Cs-137 values are a direct result of the Fukushima earthquake and tsunami event that occurred in 2011 and are not associated with CR-3 operation.

Broad Leaf Vegetation

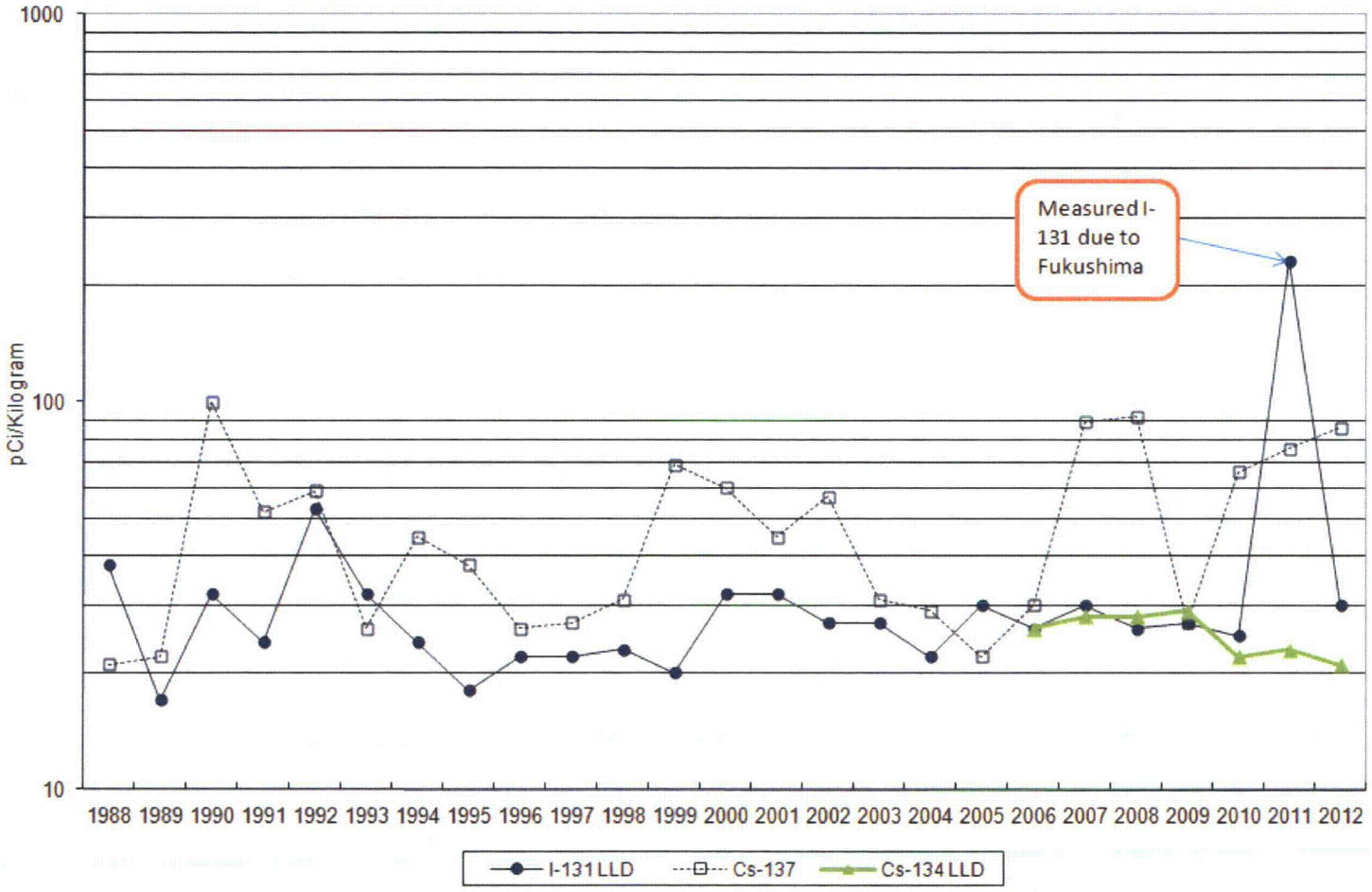


TABLE IV-D.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**

CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2012**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)[1]	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	LOCATION WITH HIGHEST MEAN MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
WATERMELON (pCi/kg)	γ Spec 1						
	I-131	5	< LLD	_	_	None	0
	Cs-134	6	< LLD	_	_	None	0
	Cs-137	6	< LLD	_	_	None	0
CITRUS (pCi/kg)	γ Spec 1						
	I-131	9	<LLD	_	_	None	0
	Cs-134	10	<LLD	_	_	None	0
	Cs-137	10	<LLD	_	_	None	0

[1]The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-D.4.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2012

pCi/kg OF γ EMITTERS IN WATERMELON AND CITRUS

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C04 – Watermelon	June	<5	<6	<6	1106±60
C19 – Citrus	January	<9	<10	<10	1415±93