



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

Ref: ITS 5.7.1.1(b)

May 13, 2009  
3F0509-02

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

Subject: Crystal River Unit 3 – 2008 Annual Radiological Environmental Operating Report

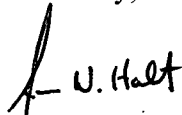
Dear Sir:

Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., hereby submits the 2008 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, 2008 through December 31, 2008.

This letter establishes no new regulatory commitments.

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

Sincerely,

  
James W. Holt  
Plant General Manager

JWH/ ff

Attachment

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

Progress Energy Florida, Inc.  
Crystal River Nuclear Plant  
15760 W. Powerline Street  
Crystal River, FL 34428

ITS  
NRR

**PROGRESS ENERGY FLORIDA, INC.**

**CRYSTAL RIVER UNIT 3**

**DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72**

**ATTACHMENT**

**2008 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING  
REPORT**

**PROGRESS ENERGY FLORIDA, INC.**  
**CRYSTAL RIVER UNIT 3**  
**ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT**  
**2008**

Prepared By:           Rudy Pinner           4/23/2009  
Sr. Science and Lab Services 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 2008 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, -3, and -4. Sample frequency and analysis type may be determined from Table I-2. Figure I-1 illustrates the relevant exposure pathways.

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.

The results of the 2008 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, the following entry

15 (249/256)  
(4 - 35)

in 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 - 2008

SAMPLE STATION LOCATIONS

SAMPLE MEDIA	STATION ID	DIRECTION	APPROX. DISTANCE (Miles)
TLD	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
	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 - 2008

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
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	NNE	0.9
	C47-Control	ESE	78
WATERMELON	C04	NE	13
CITRUS	C19	ENE	9.6



TABLE I-2

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

SAMPLING AND ANALYSIS PROGRAM

SAMPLE MEDIA	# OF STATIONS	FREQUENCY	ANALYSIS	LLD <sup>1</sup>
TLD	33*	Quarterly	γ Dose	---
Air Iodine	6	Weekly	I-131	0.07 pCi/m <sup>3</sup>
Air Particulate	6	Weekly	Gross β	0.01
		Quarterly	γ Spec : Cs-134	0.05
			Cs-137	0.06
Seawater	3	Monthly	Tritium	3000 pCi/L
		Monthly	γ Spec : Mn-54	15
			Fe-59	30
			Co-58	15
			Co-60	15
			Zn-65	30
			Zr-Nb-95	15
			I-131	1
			Cs-134	15
			Cs-137	18
			Ba-La-140	15
Ground Water	1	Semiannual	Tritium	2000 pCi/L
		Semiannual	γ Spec : <sup>2</sup>	<sup>2</sup>
Site Ground Water <sup>6</sup>	9	Quarterly	Tritium	3000 pCi/L
		Quarterly	γ Spec : <sup>2</sup>	<sup>2</sup>
Drinking Water	3	Quarterly	Tritium	2000 pCi/L
		Quarterly	γ Spec : <sup>2</sup>	<sup>2</sup>
Shoreline Sediment	4	Semiannual	γ Spec : Cs-134	150 pCi/kg
			Cs-137	180

\*Includes 3 stations which are not required by the ODCM

<sup>1</sup>The maximum "a priori" LLD

<sup>2</sup>Same as Seawater γ Spec

<sup>3</sup>When available

<sup>4</sup>During harvest

<sup>5</sup>Same as broad leaf vegetation

<sup>6</sup>Additional 2 stations reported that are not required by the ODCM

TABLE I-2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

SAMPLING AND ANALYSIS PROGRAM

SAMPLE MEDIA	# OF STATIONS	FREQUENCY	ANALYSIS	LLD <sup>1</sup>	
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 <sup>3</sup>	γ Spec :	I-131	60 pCi/kg
				Cs-134	60
				Cs-137	80
Watermelon	1	Annual <sup>4</sup>	γ Spec :	<sup>5</sup>	5
Citrus	1	Annual <sup>4</sup>	γ Spec :	<sup>5</sup>	5

<sup>1</sup>The maximum "a priori" LLD

<sup>2</sup>Same as Seawater γ Spec

<sup>3</sup>When available

<sup>4</sup>During harvest

<sup>5</sup>Same as broad leaf vegetation

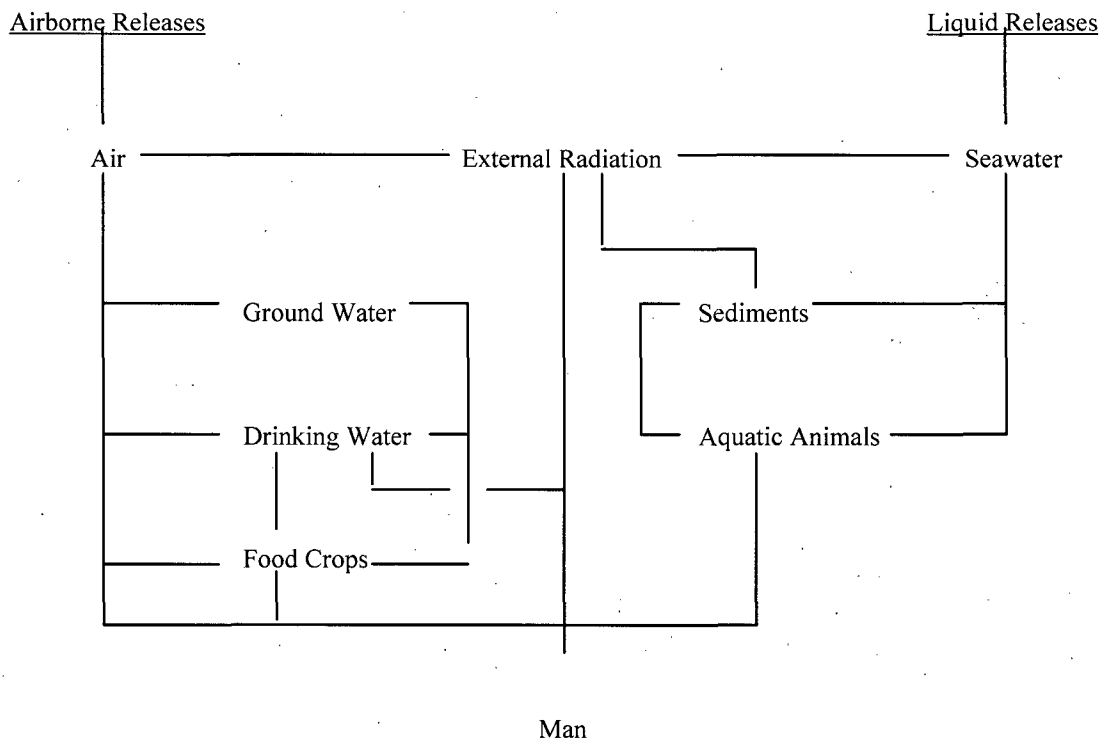


FIGURE I-1: Environmental Media and Exposure Pathways

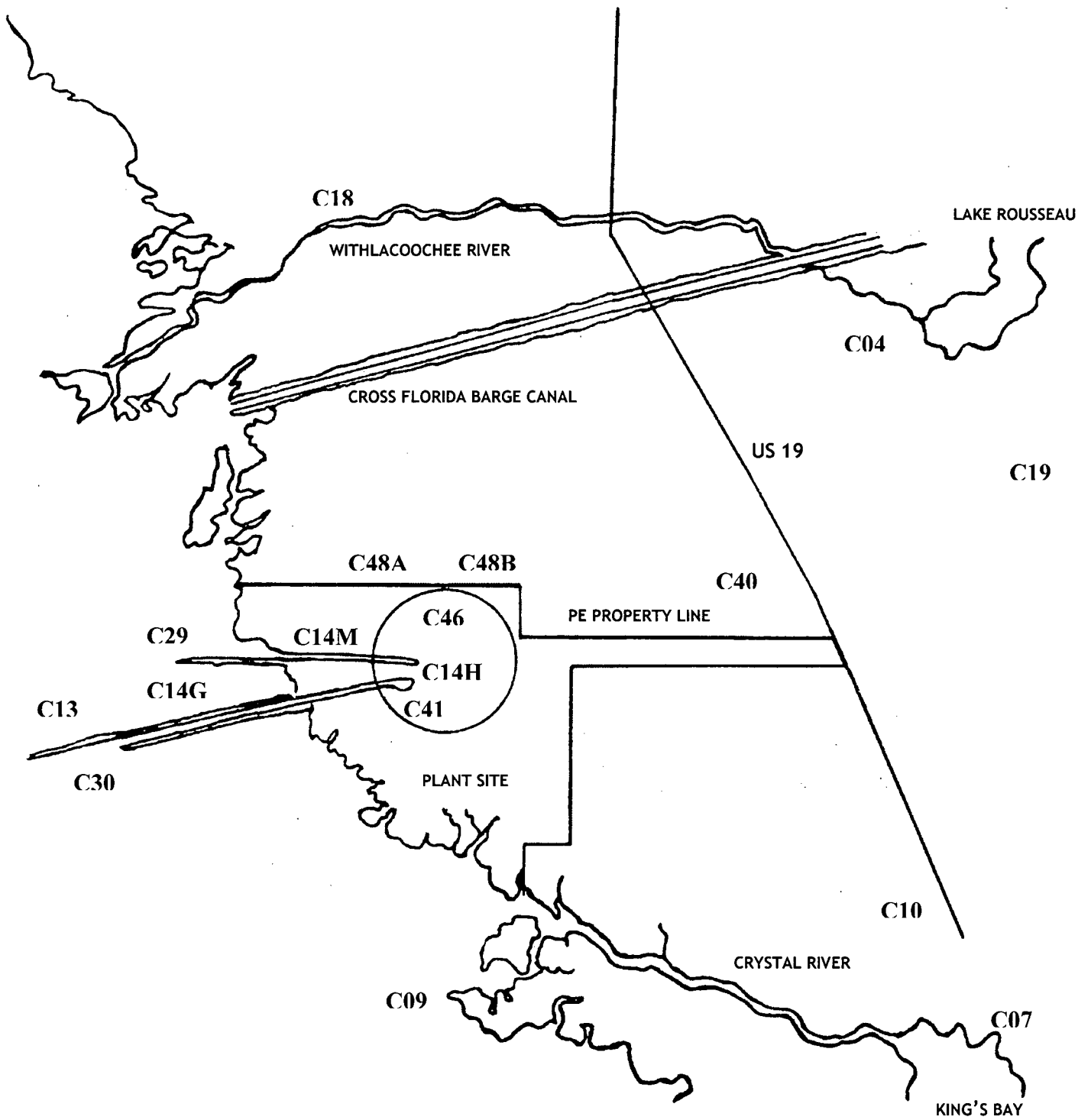


FIGURE I-2: Environmental Monitoring Sample Stations (non-TLDs)

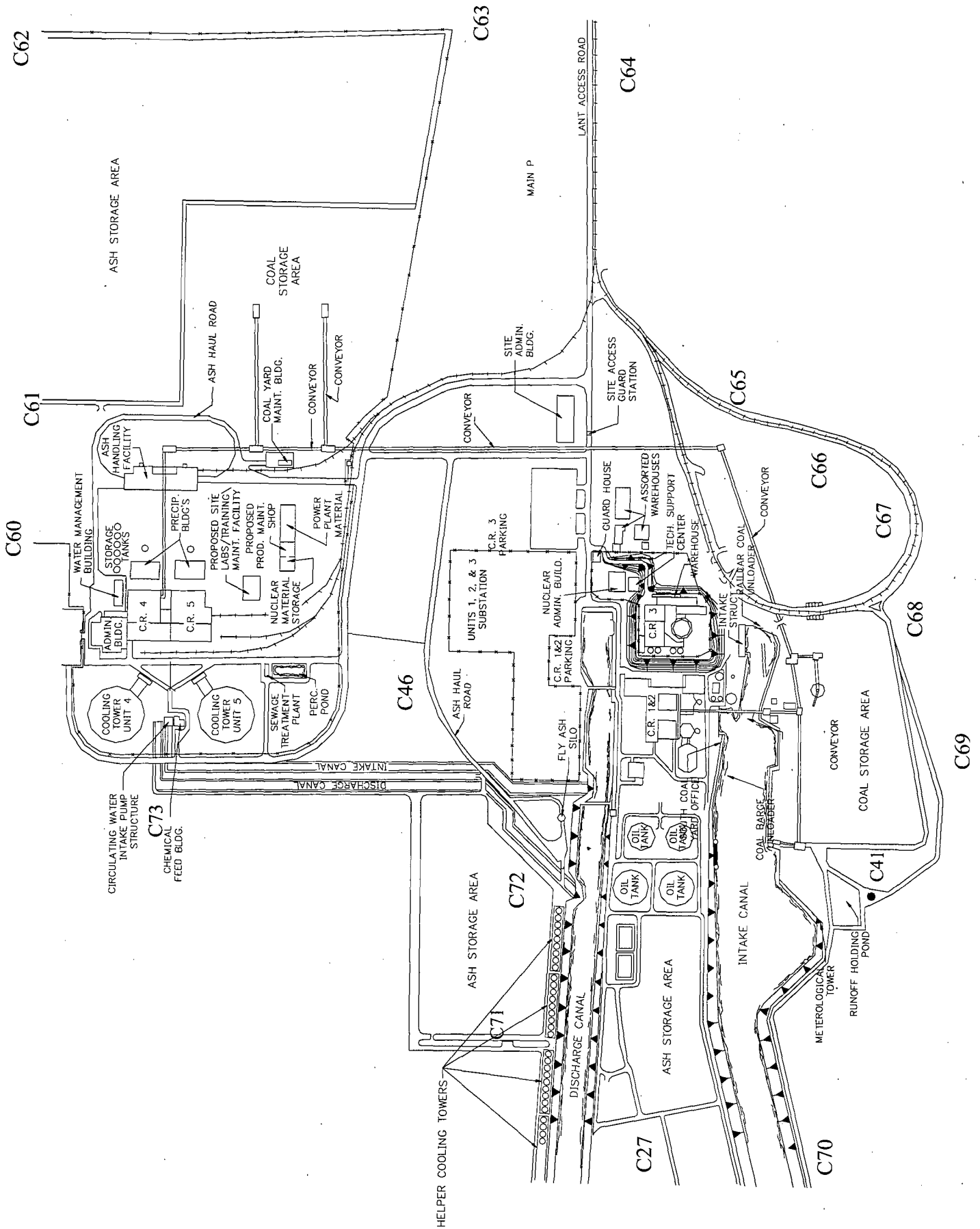


FIGURE I-3: Environmental Monitoring TLD Locations (on site)

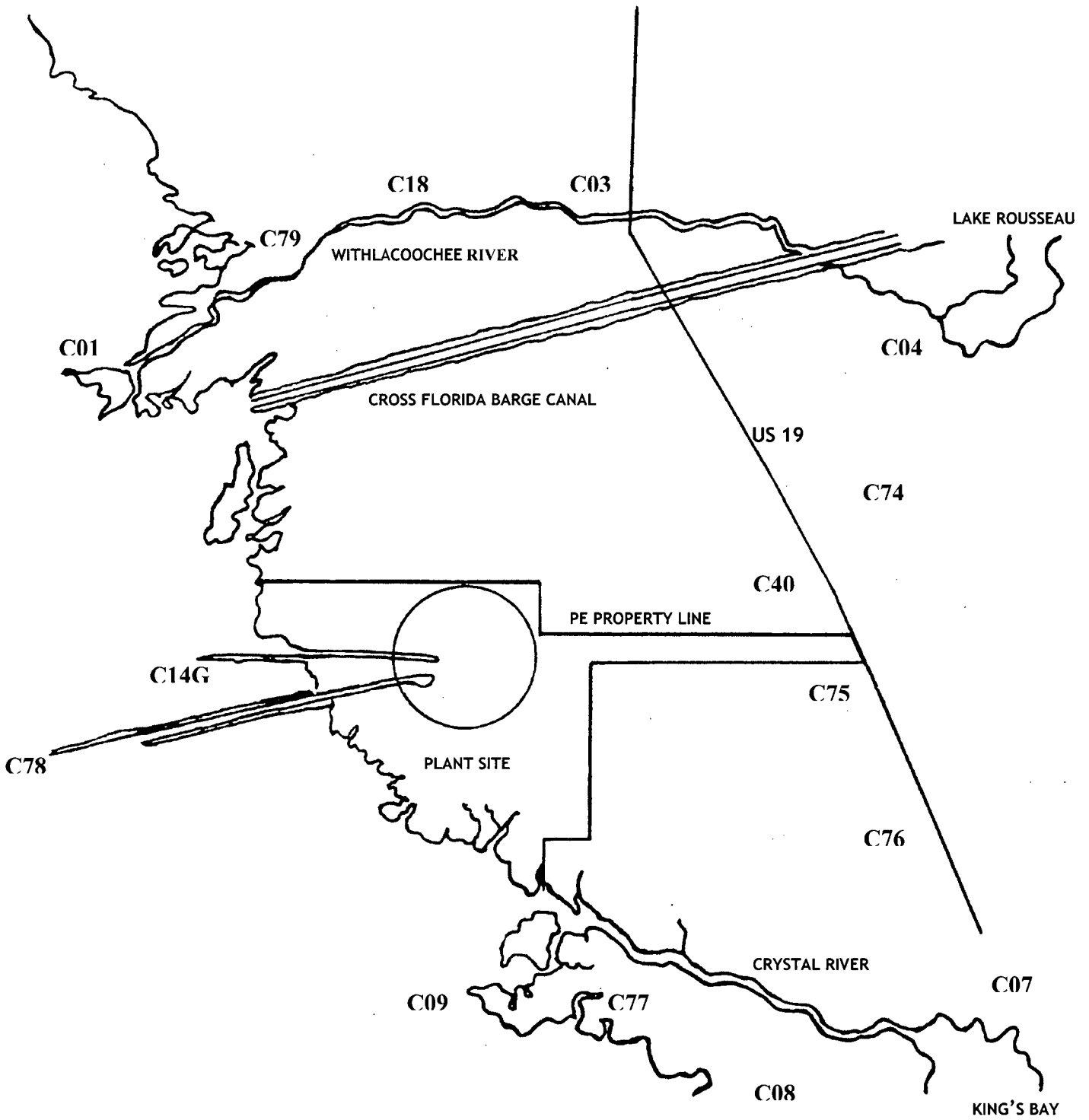
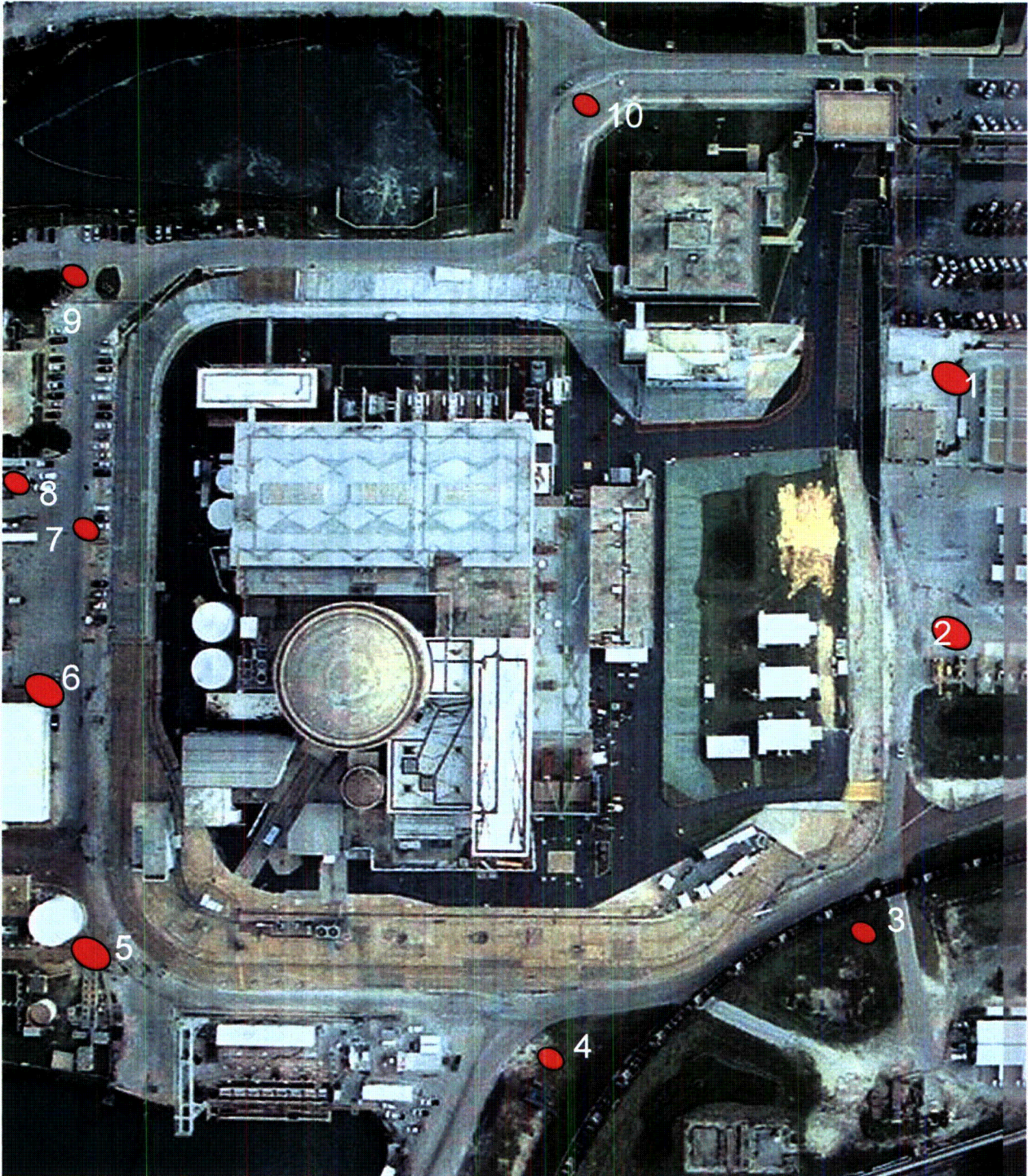


FIGURE I-4: Environmental Monitoring TLD Locations (off site)

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	4.46 @ 2°	*	*
NNE	3.95 @ 15°	*	*
NE	3.84 @ 54°	*	*
ENE	3.43 @ 60°	*	*
E	2.40 @ 92°	*	*
ESE	4.24 @ 102°	5.0 @ 103°	*
SE	4.90 @ 133°	*	*
SSE	3.53 @ 149°	*	*
S	*	*	*
SSW	*	*	*
SW	*	*	*
WSW	*	*	*
W	*	*	*
WNW	*	*	*
NW	4.77 @ 323°	*	*
NW	4.90 @ 321°	*	*
NNW	4.60 @ 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 February 2008:

Media	Nuclide	Result	% Bias	Acceptance Range	Flag
Air	Co-57	3.58	0.8	2.49 – 4.62	A
Air	Co-60	1.28	-2.3	0.92 – 1.70	A
Air	Cs-134	2.34	-7.1	1.76 – 3.28	A
Air	Cs-137	2.59	-4.1	1.89 – 3.51	A
Air	Zn-65	2.32	13.7	1.43 – 2.65	A
Air	Gross Beta	0.33	15.4	0.143 – 0.429	A
Soil	Mn-54	617.70	8.4	399 – 741	A
Soil	Co-57	461.2	9.5	295 – 547	A
Soil	Cs-134	881.67	3.2	598 – 1110	A
Soil	Cs-137	580.0	6.4	382 – 709	A
Soil	U-238	158.37	7.0	104 – 192	A
Vegetation	Co-57	6.34	-8.0	4.82 – 8.96	
Vegetation	Co-60	2.36	-14.8	1.94 – 3.60	A
Vegetation	Cs-134	5.51	-12.3	4.40 – 8.16	A
Vegetation	Cs-137	2.99	-12.3	2.39 – 4.43	A
Vegetation	Mn-54	4.22	-11.0	3.32 – 6.16	A
Water	H-3	506.83	7.4	330 – 614	A
Water	Mn-54	12.78	5.6	8.5 – 15.7	A
Water	Co-60	8.48	1.0	5.88 – 10.92	A
Water	Co-57	22.23	-2.5	16.0 – 29.6	A
Water	Am-241	1.2	-2.4	0.86 – 1.60	A
Water	Zn-65	17.69	8.5	11.4 – 21.2	A

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

Results for August 2008:

Media	Nuclide	Result	% Bias	Acceptance Range	Flag
Air	Mn-54	2.91	10.2	1.85 – 3.43	A
Air	Co-57	1.64	9.3	1.05 – 1.95	A
Air	Cs-134	2.72	3.4	1.84 – 3.42	A
Air	U-238	0.32	17.6	0.19 – 0.354	A
Air	Zn-65	1.08	0.94	0.66 – 1.22	A
Air	Gross Beta	0.551	5.0	0.263 - 0.788	A
Soil	Mn-54	440.04	6.0	291 – 540	A
Soil	Co-60	152.46	5.1	102 – 189	A
Soil	Cs-134	589.18	1.4	407 – 755	A
Soil	U-238	296.14	-2.3	212 – 394	A
Soil	Zn-65	348.64	4.7	233 – 433	A
Vegetation	Mn-54	5.45	-6.0	4.1 – 7.5	A
Vegetation	Co-60	4.35	-7.4	3.3 – 6.1	A
Vegetation	Cs-134	5.11	-7.1	3.9 – 7.2	A
Vegetation	Co-57	6.98	-1.7	5.0 – 9.2	A
Vegetation	Zn-65	6.54	-5.2	4.8 – 9.0	A
Water	H-3	358.97	5.3	239 – 443	A
Water	Mn-54	14.18	3.5	9.6 – 17.8	A
Water	Co-60	11.81	1.8	8.1 – 15.1	A
Water	Cs-134	19.37	-0.7	13.7 – 25.4	A
Water	Cs-137	24.06	1.9	16.5 – 30.7	A
Water	Zn-65	18.37	7.4	12.0 – 22.2	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 310 gross beta samples and 310 iodine samples.

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

Three hundred ten particulate samples were analyzed for gross beta activity, all of which had measurable activity except 8 samples. The average indicator concentration was 14 pCi/1000 m<sup>3</sup> with a range of 3 to 29 pCi/1000 m<sup>3</sup>. The average indicator concentration since 1996 was in the range of 14 to 19 pCi/1000 m<sup>3</sup>. The control location concentration for 2008 averaged 14 pCi/1000 m<sup>3</sup>, with a range of 3 to 24 pCi/1000 m<sup>3</sup>.

Three hundred ten samples were analyzed for iodine activity, with none having measurable activity. The highest iodine LLD was 0.05 pCi/m<sup>3</sup>. This LLD value was influenced by a partial sample run due to a power outage at the sample station.

Quarterly composite data are summarized in Table IV-A.4. Measurable quantities of cesium were not identified in any particulate filter sample. The highest cesium LLD was 2.1 pCi/1000 m<sup>3</sup> for cesium 134.

There were two non-collected samples for the year 2008 located at air sample station C46 due to the sampler was non-operational for two weeks and a partial week due to a loss of power to the station because of a circuit breaker panel failure. This breaker panel had to be totally rebuilt and had failed due to its age. There was one instance of air sample station C07 being down for 29.5 hours due to a power outage. There was one instance of air sample station C18 being down for 31.3 hours due to a power outage. There was one instance of air sample station C41 being down for 97 hours due to a power outage and again down for 77 hours due to an air sample pump failure. The remaining sample stations were in service 100% of the time, with exception of filter changes and air pump/gas meter replacements. The percentage of down times for the 4 stations are as follows:

C07	0.34%
C18	0.36%
C41	1.99%
C46	4.37%

The air sample station's down times are documented in the plant CAP under NCRs 279458, 285409, and 306319.

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, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	ALL INDICATOR LOCATIONS MEAN RANGE	LOCATION WITH HIGHEST MEAN NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIRBORNE IODINE (pCi/m <sup>3</sup> )	γ Spec 310 I-131	0.05	<LLD	--	--	<LLD	0
AIRBORNE PARTICULATES (pCi/1000m <sup>3</sup> for Gross β, pCi/1000m <sup>3</sup> for γ Spec)	Gross β 310 γ Spec 24 Cs-134 Cs-137	9.0	14 (302/310) (3-29)	C18 5.2 @ 0°	19 (52/52) (4-29)	14 (51/52) (3-24)	0
		2.1	<LLD	--	--	<LLD	0
		1.5	<LLD	--	--	<LLD	0

<sup>1</sup>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 - 2008

pCi/m<sup>3</sup> IODINE - 131 IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
08-Jan-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
15-Jan-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22-Jan-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
29-Jan-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
06-Feb-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
12-Feb-08	<0.03(A)	<0.02	<0.02	<0.02	<0.02	<0.02
19-Feb-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25-Feb-08	<0.03	<0.03(B)	<0.02	<0.02	<0.02	<0.03
04-Mar-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
11-Mar-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
18-Mar-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
25-Mar-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

(A) Power outage. Estimated run time 117.8 out of 147.3 hours.

(B) Power outage. Estimated run time 115.0 out of 146.3 hours.

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/m<sup>3</sup> IODINE - 131 IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
02-Apr-08	<0.02	<0.02	<0.02	<0.01	<0.01	<0.01
08-Apr-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
16-Apr-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22-Apr-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02
28-Apr-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
05-May-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
13-May-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20-May-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02
27-May-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
03-Jun-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10-Jun-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
17-Jun-08	<0.01	<0.01	<0.01	<0.01	(A)	<0.01
24-Jun-08	<0.02	<0.02	<0.02	<0.02	(A)	<0.02

(A) Power off due to failed breaker panel in sample building. Air sampler was off for 382 hours.

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/m<sup>3</sup> IODINE - 131 IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
01-Jul-08	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
07-Jul-08	<0.03	<0.03	<0.02	<0.03	<0.02	<0.03
15-Jul-08	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
22-Jul-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
29-Jul-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
05-Aug-08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
13-Aug-08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19-Aug-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
26-Aug-08	<0.02	<0.02	<0.03	<0.05(A)	<0.02	<0.02
02-Sep-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
09-Sep-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
15-Sep-08	<0.03	<0.03	<0.03	<0.03	<0.04	<0.03
23-Sep-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30-Sep-08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

(A) Experienced a low flow period. Estimated run time 71.8 out of 168.8 hours.

TABLE IV-A.2 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/m<sup>3</sup> IODINE - 131 IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
07-Oct-08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.02
13-Oct-08	<0.03	<0.03	<0.02	<0.03	<0.03	<0.03
21-Oct-08	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01
28-Oct-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
04-Nov-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
10-Nov-08	<0.03	<0.03	<0.03	<0.02(A)	<0.03	<0.03
18-Nov-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
24-Nov-08	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01
02-Dec-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
09-Dec-08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
16-Dec-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
22-Dec-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30-Dec-08	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

(A) Vacuum pump failed and was replaced. Estimated run time 64 out of 141.5 hours.



TABLE IV-A.3

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/1000m<sup>3</sup> GROSS B IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
08-Jan-08	14	19	19	10	21	18
15-Jan-08	9	10	14	13	8	9
22-Jan-08	13	11	14	12	14	9
29-Jan-08	8	5	16	20	16	21
06-Feb-08	6	4	23	18	14	16
12-Feb-08	8(A)	10	20	6	17	23
19-Feb-08	6	13	9	<6	12	12
25-Feb-08	11	20(B)	17	5	18	12
04-Mar-08	16	7	13	6	21	16
11-Mar-08	16	8	5	17	13	10
18-Mar-08	19	11	18	12	5	18
25-Mar-08	11	22	20	16	18	11
Average:	11	12	16	11	15	15

(A) Power outage. Estimated run time 117.8 out of 147.3 hours.

(B) Power outage. Estimated run time 115.0 out of 146.3 hours.

**TABLE IV-A.3 (Cont'd)**  
**PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008**  
**pCi/1000m<sup>3</sup> GROSS B IN AIR**

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
02-Apr-08	18	15	8	14	17	13
08-Apr-08	10	9	8	7	5	11
16-Apr-08	15	9	16	11	10	15
22-Apr-08	10	26	23	21	29	24
28-Apr-08	17	22	4	6	10	9
05-May-08	27	15	29	15	13	21
13-May-08	16	11	19	15	24	6
20-May-08	15	13	4	12	19	5
27-May-08	17	12	11	19	18	<6
03-Jun-08	18	13	15	12	15	15
10-Jun-08	10	7	8	10	6	9
17-Jun-08	11	9	6	15	(A)	15
24-Jun-08	12	16	9	9	(A)	10
Average:	15	14	12	13	15	12

(A) Power off due to failed breaker panel in sample building. Air sampler was off for 382 hours.

**TABLE IV-A.3 (Cont'd)**  
**PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008**  
**pCi/1000m<sup>3</sup> GROSS B IN AIR**

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
01-Jul-08	17	19	20	17	19	12
07-Jul-08	13	15	6	11	15	6
15-Jul-08	14	19	15	23	16	14
22-Jul-08	8	17	9	16	14	11
29-Jul-08	12	13	3	12	14	9
05-Aug-08	11	15	4	10	14	8
13-Aug-08	17	18	8	23	22	18
19-Aug-08	<7	13	11	<9	<8	16
26-Aug-08	4	10	<7	6(A)	<6	5
02-Sep-08	16	16	<6	13	5	12
09-Sep-08	12	8	17	19	10	21
15-Sep-08	9	14	5	13	6	11
23-Sep-08	11	3	<6	13	5	5
30-Sep-08	8	29	20	12	28	5
Average:	11	15	9	14	12	11

(A) Experienced a low flow period. Estimated run time 71.8 out of 168.8 hours.

TABLE IV-A.3 (Cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/1000m<sup>3</sup> GROSS B IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
07-Oct-08	28	29	8	27	25	21
13-Oct-08	6	12	5	7	3	3
21-Oct-08	28	27	26	26	24	16
28-Oct-08	17	20	19	24	13	19
04-Nov-08	17	15	17	14	19	12
10-Nov-08	10	7	10	4(A)	13	15
18-Nov-08	12	18	5	10	7	14
24-Nov-08	18	12	14	20	22	24
02-Dec-08	8	26	28	28	15	19
09-Dec-08	16	21	25	22	22	22
16-Dec-08	10	18	11	12	15	11
22-Dec-08	10	16	12	13	15	14
30-Dec-08	11	22	18	20	18	15
Average:	15	19	15	18	16	16

(A) Vacuum pump failed and was replaced. Estimated run time 64 out of 141.5 hours.

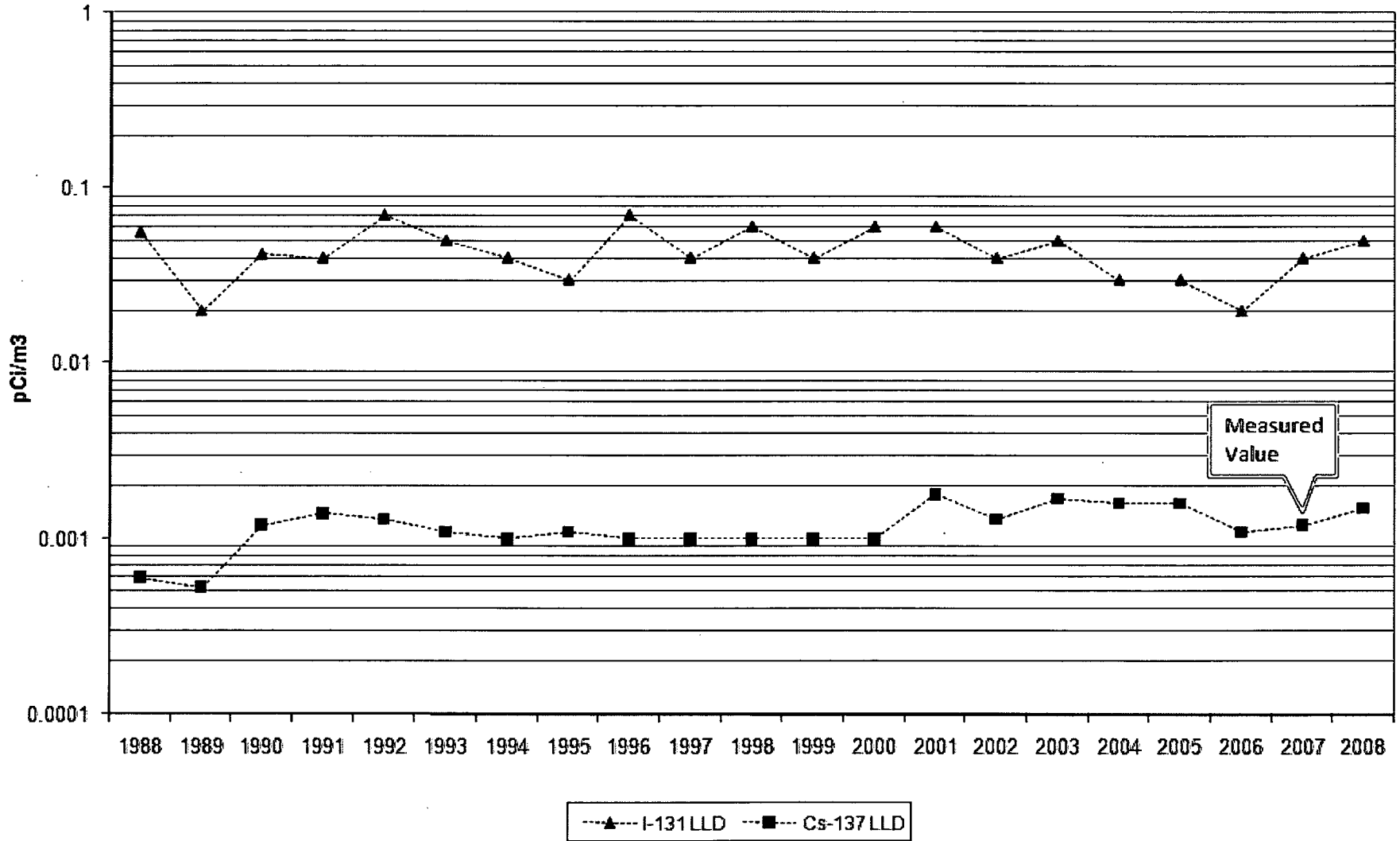
TABLE IV-A.4

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/1000m<sup>3</sup> γ EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES

STATION	NUCLIDE	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
C07	Be-7	162	186	117	145
	K-40	<23	<21	<22	<22
	Cs-134	<1.2	<1.7	<1.6	<1.8
	Cs-137	<1.1	<1.5	<1.2	<1.2
C18	Be-7	122	146	127	155
	K-40	<19	<17	<18	<20
	Cs-134	<1.4	<1.3	<1.4	<1.9
	Cs-137	<1.0	<1.0	<0.8	<1.4
C40	Be-7	162	134	82	116
	K-40	<26	<23	<17	<18
	Cs-134	<1.2	<1.1	<1.3	<2.1
	Cs-137	<1.0	<1.0	<1.2	<1.7
C41	Be-7	155	183	171	153
	K-40	<29	<18	<16	<23
	Cs-134	<1.7	<1.2	<1.2	<2.0
	CS-137	<1.0	<1.0	<0.6	<1.6
C46	Be-7	144	156	109	165
	K-40	<22	<7	<20	<20
	Cs-134	<2.0	<0.4	<1.1	<1.3
	Cs-137	<1.2	<0.3	<0.7	<1.0
C47	Be-7	183	145	84	162
	K-40	<24	<14	<17	<19
	Cs-134	<1.4	<1.0	<0.9	<1.6
	Cs-137	<1.0	<0.9	<0.9	<1.1

Airborne (highest values plotted)



#### 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 2008.

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 115 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 72 mrem/yr at station C65 (ESE at 1740 feet).

The highest off-site dose was 63 mrem/yr at station C40 (east at 3.5 miles). The control station (C47) dose was 60 mrem/yr. The average for all stations (except control) was 59 mrem/yr for 2008, 54 mrem/yr for 2007, and 53 mrem/yr for 2006. Direct radiation results are very slightly elevated, but 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, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD)	<u>ALL INDICATOR LOCATIONS</u> MEAN RANGE	<u>LOCATION WITH HIGHEST MEAN</u> NAME DISTANCE & BEARING	MEAN RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DIRECT RADIATION (mrem/yr)	γ DOSE, 132	15	59 (128/128) (44 - 115)	C71 0.6 @ 296°	115 (4/4) (113 - 116)	60 (4/4) (57 - 64)	0



TABLE IV-B.1

PROGRESS ENERGY FLORIDA, INC. - CR-3 - 2008

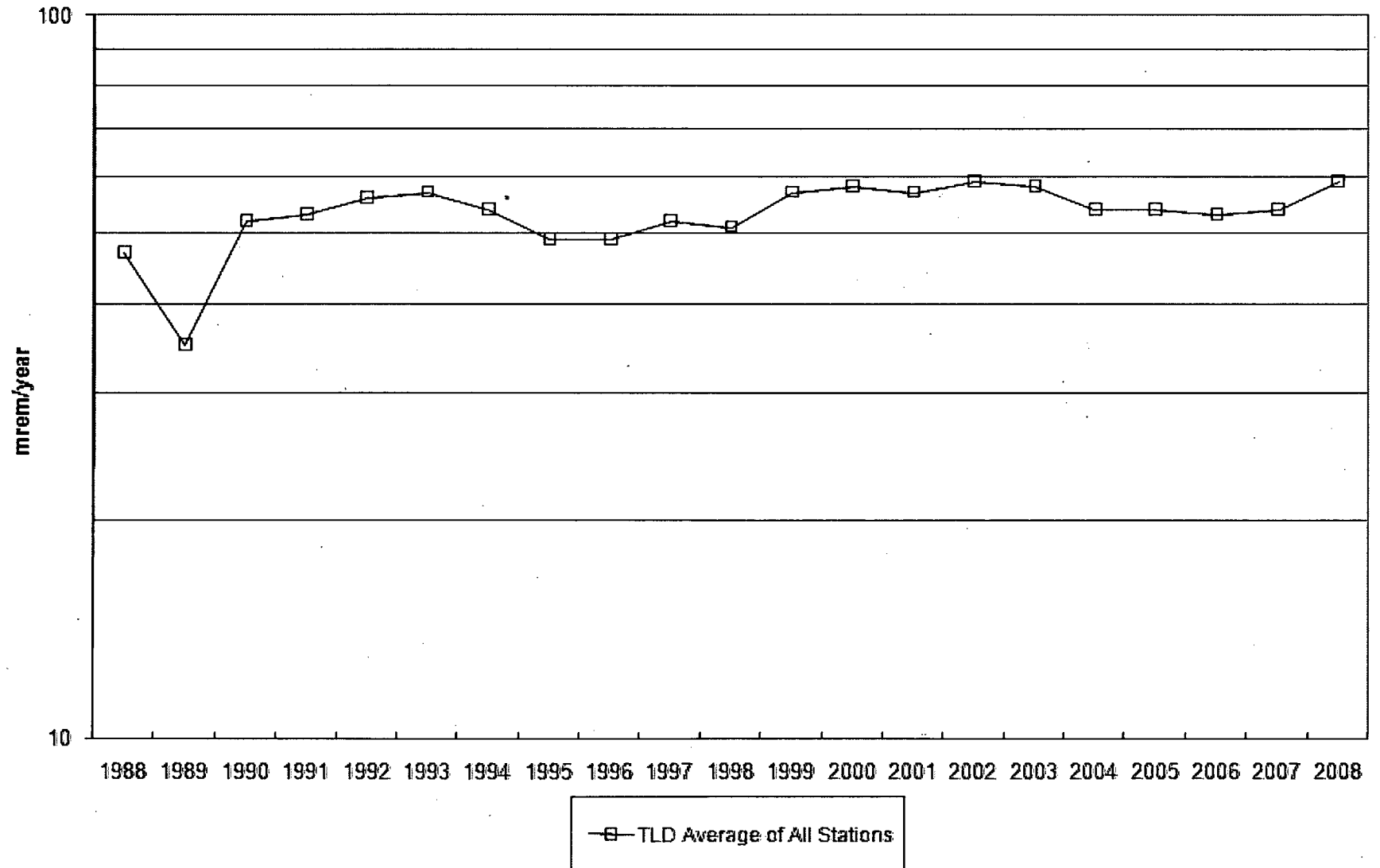
mrem/yr  $\gamma$  Dose

TLD STATION	Quarter	1	2	3	4
CO1		45	47	43	42
CO3		45	48	43	42
CO4		46	45	43	43
CO7*		44	47	42	42
CO8		44	48	44	44
C09		47	49	44	49
C14G		59	60	50	55
C18		51	54	52	50
C27		69	75	68	64
C40*		65	69	60	60
C41		61	60	59	56
C46*		58	58	55	57
C47 (CONTROL)		62	59	64	57
C60		62	58	58	58
C61		67	66	66	63
C62		66	66	65	63
C63		68	69	64	61
C64		58	59	59	56
C65		73	71	71	72
C66		60	61	61	62
C67		60	60	61	60
C68		63	61	66	66
C69		69	68	66	67
C70		68	69	66	63
C71		113	116	113	116
C72		68	64	63	63
C73		61	57	58	59
C74		46	44	45	46
C75		58	55	57	58
C76		56	50	50	48
C77		49	54	52	53
C78		51	49	47	49
C79		56	51	52	51

\*TLDs not required by the ODCM.

Quarterly values are multiplied by 4 to obtain an equivalent yearly dose.

### Direct Radiation



#### 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. Of twenty-four indicator samples, six had measurable tritium at an average concentration of 103 pCi/L, as compared to thirteen measurable samples containing tritium with an average of 282 pCi/L in 2007. The sample with the highest concentration of tritium, 150 pCi/L, was obtained in October at station C14G near the mouth 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. Two control station samples contained tritium at an average concentration of 91 pCi/L. The 2007 control station results averaged 194 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. 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.

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. Presently 5 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 many years ago. This discharge line has recently been leak tested and is leak free. There are no other known leaking plant components. The five wells that have shown measurable amounts of tritium range from 80 to 1110 pCi/L. These wells have been sampled additionally on a monthly basis to develop trend data. This 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). These two wells are showing measurable amounts of tritium in the range of 111 to 395 pCi/L, which are a result of plant discharges from the SDT-1. These discharges are being minimized through operational focus. The tritium values are below the reporting criteria of the ODCM or the NEI 07-07 Ground Water Protection Initiative Guidelines. There have been no measurable amounts of gamma emitting radionuclides in any of these wells. 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 hydro-geologist as part of the NEI Ground Water Protection Initiative. Additionally, the ground water at the CR-3 site is too saline for use as a potable water source.

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

Table IV-C.2.b.1 provides the results of the quarterly samples.

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

#### IV-C. WATERBORNE PATHWAY Cont'd

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

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

Table IV-C.2.c.1 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. 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.

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

Table IV-C.3.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. Of the six indicator samples, two had measurable amounts of cesium-137 and there were no measurable amounts of cobalt-60. The average cobalt-60 concentration in 2007 was 41 pCi/L. The average cobalt-60 concentration at the indicator locations ranged from 30 to 389 pCi/L from 1998 through 2007. In 2008 the average cesium-137 concentration at the indicator locations was 25 pCi/L. The average cesium-137 concentration in 2007 was 23 pCi/L. These 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.4 provides a statistical summary of the shoreline sediment gamma spectroscopy results.

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

7. There were no unmonitored spills or releases of radioactive material in 2008 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, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	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)	<u>Tritium, 36</u>	147	103 (6/24) (71-150)	C14G 2.5 @ 270°	102 (5/12) (71-150)	91 (2/12) (83-99)	0
	<u>γ Spec, 36</u>						
	Mn-54	6	<LLD	--	--	<LLD	0
	Fe-59	13	<LLD	--	--	<LLD	0
	Co-58	6	<LLD	--	--	<LLD	0
	Co-60	7	<LLD	--	--	<LLD	0
	Zn-65	13	<LLD	--	--	<LLD	0
	Zr-Nb-95	11	<LLD	--	--	<LLD	0
	I-131	8	<LLD	--	--	<LLD	0
	Cs-134	7	<LLD	--	--	<LLD	0
	Cs-137	6	<LLD	--	--	<LLD	0
	Ba-La-140	13	<LLD	--	--	<LLD	0

<sup>1</sup>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 - 2008**  
**pCi/L  $\gamma$  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	99±26	256±51	<6	<6	<11	<5	<10	<9	<6	<6	<5	<12
	FEB	<140	120±40	<6	<5	<12	<5	<9	<9	<8	<6	<5	<9
	MAR	<143	242±43	<4	<4	<8	<5	<9	<8	<4	<5	<3	<8
	APR	<145	84±28	<2	<2	<4	<2	<4	<4	<3	<2	<2	<3
	MAY	83±26	335±38	<4	<3	<7	<4	<8	<4	<4	<4	<3	<9
	JUN	<142	287±32	<2	<2	<5	<3	<6	<4	<3	<3	<2	<5
	JUL	<139	319±52	<5	<5	<11	<8	<13	<11	<6	<7	<6	<11
	AUG	<146	248±46	<5	<5	<13	<7	<12	<8	<6	<6	<5	<5
	SEP	<147	226±58	<5	<5	<13	<6	<12	<8	<6	<6	<5	<11
	OCT	<139	237±46	<5	<5	<10	<5	<12	<9	<6	<6	<6	<9
	NOV	<147	264±34	<2	<2	<5	<2	<5	<4	<2	<3	<3	<6
	DEC	<147	257±41	<5	<5	<7	<5	<10	<7	<5	<5	<4	<7
C14G	JAN	71±25	279±43	<6	<5	<12	<6	<12	<9	<5	<6	<6	<5
	FEB	140	203±26	<3	<3	<8	<3	<7	<5	<5	<4	<4	<5
	MAR	127±27	276±31	<2	<2	<4	<2	<5	<3	<2	<3	<2	<4
	APR	84±25	308±51	<5	<6	<11	<6	<13	<10	<8	<6	<6	<9
	MAY	140	316±48	<5	<5	<11	<5	<10	<9	<6	<6	<5	<10
	JUN	142	414±37	<4	<4	<8	<5	<9	<6	<4	<5	<4	<9
	JUL	139	298±43	<4	<5	<11	<5	<9	<9	<5	<5	<5	<6
	AUG	78±27	320±48	<5	<4	<11	<4	<10	<10	<6	<6	<5	<13
	SEP	147	217±48	<5	<5	<11	<5	<13	<11	<6	<5	<5	<8
	OCT	150±46	197±56	<6	<5	<11	<6	<7	<7	<7	<6	<6	<11
	NOV	147	302±14	<1	<1	<3	<2	<3	<3	<2	<2	<2	<4
	DEC	147	360±33	<4	<4	<6	<5	<9	<6	<4	<3	<3	<7

**TABLE IV-C.1a (CONT'D)**  
**PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008**  
**pCi/L  $\gamma$  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	<140	415±35	<3	<4	<8	<4	<8	<6	<4	<5	<4	<3
	FEB	<143	382±30	<4	<4	<9	<5	<8	<7	<8	<3	<4	<4
	MAR	<143	333±31	<3	<4	<7	<5	<9	<7	<6	<4	<4	<3
	APR	<145	221±30	<3	<4	<8	<4	<7	<8	<5	<4	<4	<3
	MAY	<140	316±33	<3	<3	<6	<3	<7	<6	<5	<4	<4	<3
	JUN	<142	283±34	<4	<4	<6	<3	<8	<6	<4	<4	<4	<4
	JUL	<139	291±28	<4	<3	<7	<4	<8	<4	<4	<4	<4	<4
	AUG	<146	306±31	<4	<3	<8	<4	<6	<6	<4	<4	<3	<4
	SEP	<147	316±28	<3	<3	<5	<3	<5	<6	<4	<4	<4	<3
	OCT	110±27	299±30	<3	<4	<7	<5	<7	<6	<5	<4	<4	<3
	NOV	<147	300±40	<4	<4	<8	<4	<8	<6	<5	<4	<4	<4
	DEC	<147	190±59	<5	<6	<11	<5	<12	<9	<5	<6	<6	<5

### Seawater

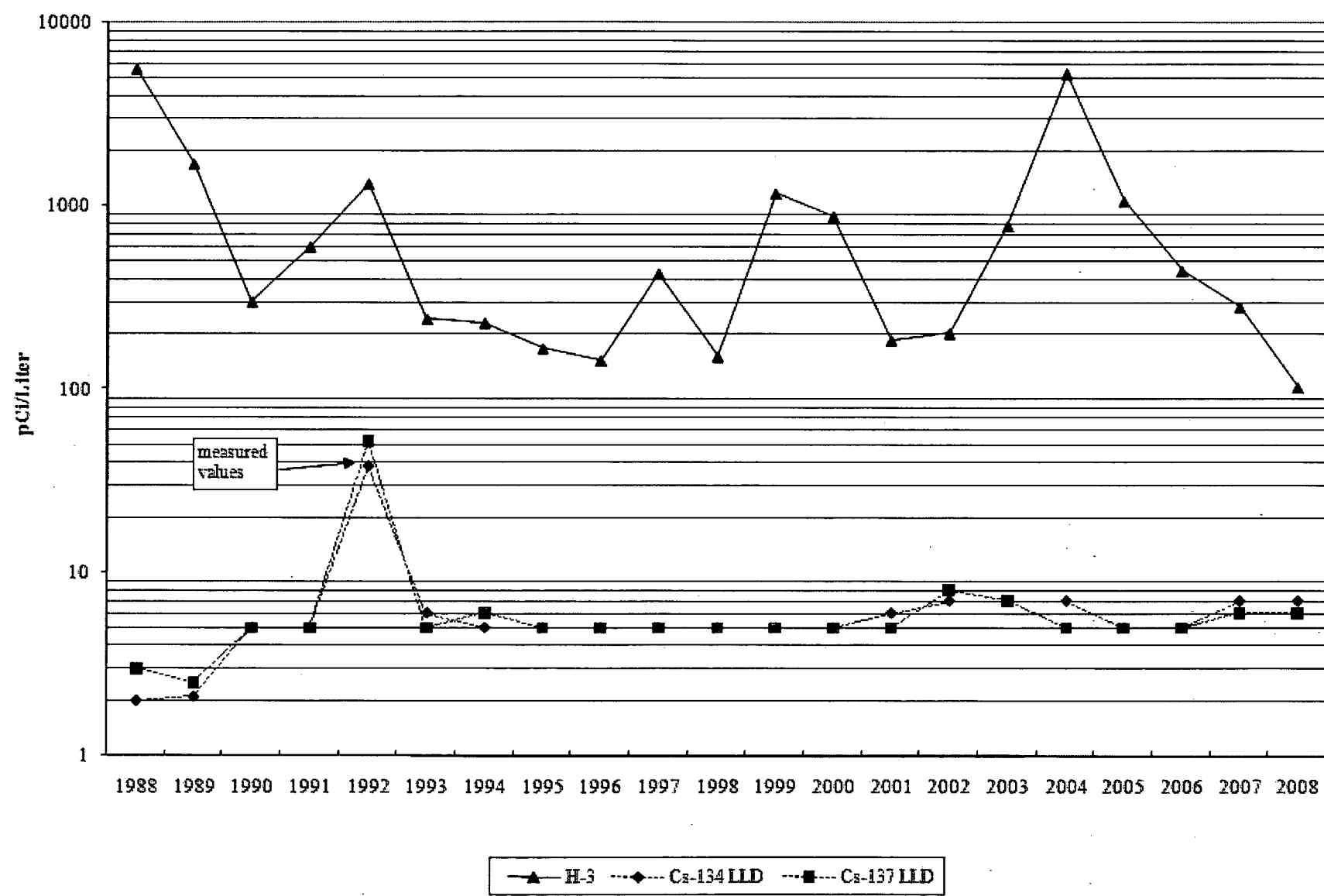




TABLE IV-C.2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	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 (pCi/L)	<u>Tritium, 2</u>	146	None	--	--	<LLD	0
	<u>γ Spec, 2</u>						
	Mn-54	6	None	--	--	<LLD	0
	Fe-59	11	None	--	--	<LLD	0
	Co-58	6	None	--	--	<LLD	0
	Co-60	6	None	--	--	<LLD	0
	Zn-65	9	None	--	--	<LLD	0
	Zr-Nb-95	9	None	--	--	<LLD	0
	I-131	6	None	--	--	<LLD	0
	Cs-134	7	None	--	--	<LLD	0
	Cs-137	5	None	--	--	<LLD	0
	Ba-La-140	12	None	--	--	<LLD	0

<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-C.2.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  EMITTERS AND TRITIUM IN GROUND WATER

STATION	NUCLIDE	FIRST HALF	SECOND HALF
C40	H-3	<144	<146
	Mn-54	<4	<6
	Fe-59	<8	<11
	Co-58	<4	<6
	Co-60	<4	<6
	Zn-65	<9	<9
	Zr-Nb-95	<6	<9
	I-131	<4	<6
	Cs-134	<5	<7
	Cs-137	<4	<5
	Ba-La-140	<8	<12
	K-40	<53	<76

### Ground Water

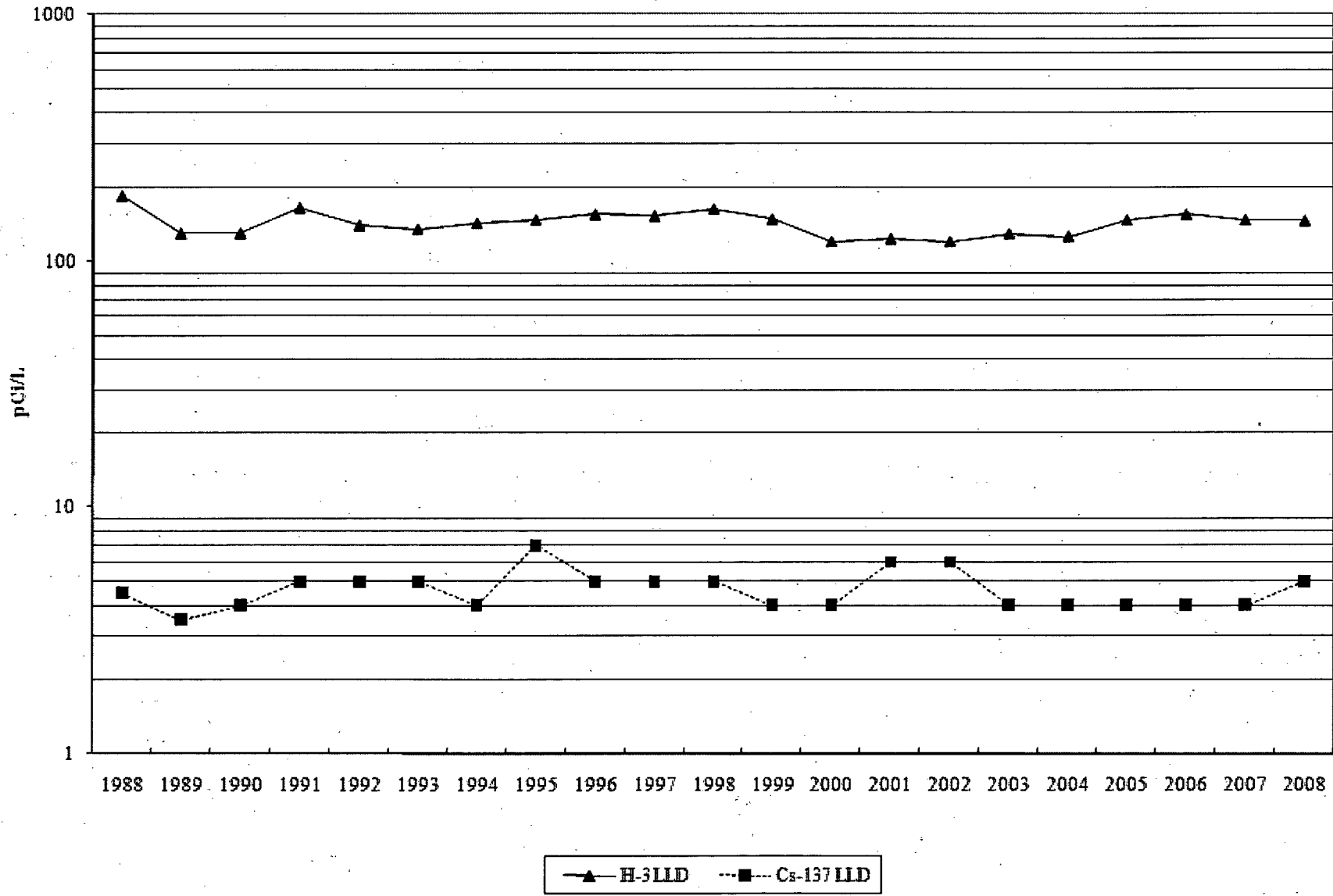


TABLE IV-C.2.b

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL (NUMBER) <sup>2</sup> OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
CR3 SITE GROUND WATER (pCi/L)	Tritium 76	147	406(37/76) (80-1110)	C3-5 0.051 mi.@225°	673(12/12) (314-808)	<LLD	0
	γ Spec 76						
	Mn-54	7	None	-	-	<LLD	0
	Fe-59	14	None	-	-	<LLD	0
	Co-58	8	None	-	-	<LLD	0
	Co-60	7	None	-	-	<LLD	0
	Zn-65	16	None	-	-	<LLD	0
	Zr-Nb-95	12	None	-	-	<LLD	0
	I-131	10	None	-	-	<LLD	0
	Cs-134	9	None	-	-	<LLD	0
	Cs-137	7	None	-	-	<LLD	0
	Ba-La-140	15	None	-	-	<LLD	0

<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

<sup>2</sup>Includes extra samples collected for data trending.

TABLE IV-C.2.b.1

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	01-08	<140	<97	<4	<5	<11	<6	<11	<11	<6	<6	<7	<10
	04-02	<145	<90	<5	<5	<8	<7	<13	<8	<9	<6	<6	<8
	07-07	<139	<67	<3	<5	<8	<5	<9	<6	<5	<5	<4	<8
	10-07	<155	<65	<5	<4	<9	<4	<10	<7	<6	<4	<5	<10
C3-4	01-08	<140	52±10	<2	<2	<4	<2	<5	<3	<3	<3	<2	<4
	04-02	<145	<93	<5	<6	<14	<6	<9	<9	<8	<6	<5	<5
	07-07	<139	<61	<4	<4	<8	<4	<8	<6	<5	<4	<4	<10
	10-07	<139	<88	<5	<5	<14	<5	<12	<9	<7	<7	<6	<11
C3-5	01-08	365±51	<58	<2	<3	<6	<3	<6	<5	<3	<4	<3	<7
	04-02	753±60	<54	<3	<4	<7	<4	<7	<6	<6	<4	<4	<6
	07-07	467±53	79±17	<2	<2	<5	<2	<5	<4	<3	<3	<3	<4
	10-07	392±52	96±16	<4	<3	<7	<3	<6	<5	<4	<4	<4	<13

TABLE IV-C.2.b.1(cont'd)

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	01-08	<140	<60	<7	<7	<12	<7	<17	<11	<8	<7	<7	<13
	04-02	86±26	26±9	<1	<1	<3	<1	<3	<2	<3	<2	<1	<2
	07-07	80±26	<61	<4	<4	<7	<4	<6	<6	<6	<3	<4	<7
	10-07	<139	<57	<3	<3	<7	<4	<9	<6	<5	<5	<4	<8
C3-6D	01-08	<140	<73	<4	<4	<8	<4	<10	<7	<6	<6	<5	<10
	04-02	<145	35± 11	<1	<2	<3	<2	<3	<3	<2	<2	<2	<3
	07-07	<139	223± 18	<2	<2	<4	<2	<5	<4	<2	<3	<2	<6
	10-07	<139	<81	<4	<4	<8	<5	<7	<7	<4	<4	<4	<15
C3-7	01-08	625±57	<92	<6	<6	<11	<7	<11	<8	<6	<7	<6	<10
	04-02	532±56	<34	<2	<2	<4	<2	<4	<3	<3	<2	<2	<3
	07-07	518±57	<54	<5	<4	<9	<5	<13	<11	<5	<7	<4	<8
	10-07	536±55	<58	<3	<3	<8	<4	<6	<6	<7	<4	<4	<4

TABLE IV-C.2.b.1(cont'd)

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	01-08	146±46	<82	<5	<5	<9	<7	<13	<10	<6	<7	<6	<11
	04-02	120±47	<105	<4	<4	<12	<5	<10	<10	<9	<6	<5	<9
	07-07	192±47	34±15	<4	<4	<7	<4	<8	<7	<5	<5	<4	<7
	10-07	164±47	<75	<6	<5	<12	<5	<12	<7	<5	<6	<5	<11
C3-9	01-08	179±27	<93	<5	<5	<13	<6	<11	<10	<6	<7	<6	<12
	04-02	<145	<68	<4	<3	<5	<3	<7	<7	<6	<4	<4	<5
	07-07	<145	77±20	<4	<4	<8	<3	<8	<7	<6	<5	<4	<5
	10-07	<142	<80	<5	<6	<9	<6	<9	<8	<5	<6	<6	<9
C3-10	01-08	<140	<82	<6	<4	<12	<6	<11	<10	<8	<5	<6	<8
	04-02	<145	<61	<3	<4	<8	<4	<8	<7	<6	<3	<5	<6
	07-07	<139	<72	<5	<5	<10	<5	<11	<9	<6	<5	<6	<15
	10-07	<146	<81	<5	<5	<12	<6	<12	<8	<6	<6	<5	<14

TABLE IV-C.2.b.2

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	02-06	946±37	<58	<4	<3	<9	<4	<6	<6	<6	<4	<4	<5
	03-04	689±59	<42	<2	<2	<4	<2	<5	<4	<2	<2	<2	<5
	05-05	1110±65	58±21	<4	<3	<7	<4	<7	<5	<4	<3	<4	<7
	06-03	1055±65	<62	<4	<4	<7	<5	<8	<6	<4	<5	<4	<8
	08-05	440±55	<58	<3	<3	<7	<4	<8	<7	<4	<5	<5	<7
	09-02	271±29	82±18	<4	<4	<6	<4	<7	<6	<4	<4	<5	<6
	11-04	719±61	<110	<5	<7	<11	<7	<13	<12	<7	<7	<7	<15
	12-02	868±63	<108	<6	<6	<12	<5	<12	<12	<7	<8	<6	<13
C3-6S	02-06	<143	<70	<3	<3	<8	<5	<9	<8	<5	<5	<5	<6
	03-04	<143	<43	<3	<2	<5	<3	<6	<4	<3	<3	<3	<5
	05-05	<145	<85	<5	<5	<11	<5	<11	<10	<6	<8	<6	<14
	06-03	<142	<92	<6	<6	<13	<5	<12	<8	<6	<7	<6	<13
	08-05	<146	<75	<6	<5	<10	<5	<11	<9	<5	<5	<5	<13
	09-02	<142	<56	<4	<4	<7	<4	<6	<6	<5	<4	<3	<6
	11-04	<147	<81	<6	<4	<12	<5	<14	<9	<6	<8	<6	<14
	12-02	<146	<67	<3	<4	<9	<4	<9	<6	<4	<5	<4	<14



TABLE IV-C.2.b.2(cont'd)

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	02-06	306±51	<34	<2	<2	<4	<2	<4	<3	<3	<2	<2	<3
	03-04	406±53	<94	<5	<4	<9	<5	<13	<11	<5	<7	<4	<8
	05-05	229±48	<27	<2	<2	<3	<1	<3	<3	<2	<2	<2	<3
	06-03	<142	<61	<3	<4	<7	<4	<8	<7	<4	<5	<4	<8
	08-05	538±57	<92	<6	<5	<10	<5	<11	<11	<7	<6	<5	<9
	09-02	520±55	<87	<5	<5	<12	<7	<11	<10	<5	<6	<5	<11
	11-04	244±51	<90	<6	<4	<9	<6	<11	<8	<7	<6	<4	<13
	12-02	260±51	<16	<1	<1	<3	<2	<3	<3	<2	<2	<2	<3
C3-8	02-06	225±49	<89	<4	<6	<11	<5	<12	<9	<8	<6	<5	<9
	03-04	188±48	<69	<4	<3	<8	<4	<7	<7	<5	<5	<4	<9
	05-05	141±46	<26	<2	<3	<5	<2	<5	<4	<3	<3	<2	<5
	06-03	<142	<108	<7	<6	<14	<7	<15	<11	<7	<8	<7	<12
	08-05	174±49	<71	<4	<4	<7	<3	<9	<6	<5	<5	<4	<8
	09-02	181±48	<81	<4	<6	<11	<6	<11	<9	<5	<5	<5	<10
	11-04	167±49	<71	<4	<4	<8	<5	<10	<7	<6	<5	<5	<10
	12-02	203±50	<62	<4	<5	<9	<4	<11	<8	<5	<4	<4	<10

TABLE IV-C.2.b.2(cont'd)

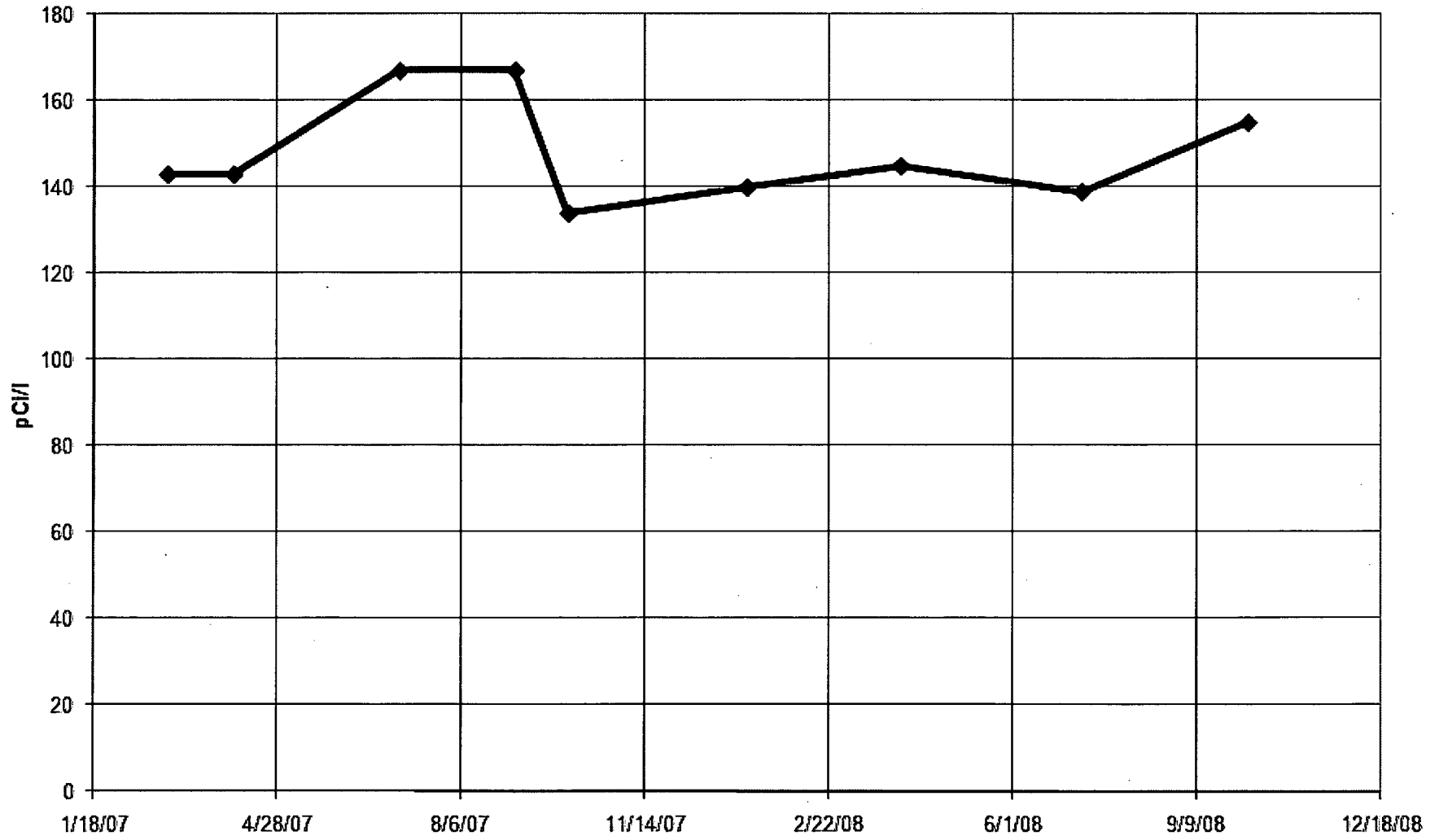
PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	02-06	<143	91±34	<5	<4	<10	<6	<11	<8	<6	<7	<4	<9
	03-04	<143	<66	<4	<4	<8	<4	<9	<6	<5	<4	<4	<6
	05-05	<145	<93	<5	<6	<11	<6	<10	<9	<7	<7	<5	<12
	06-03	<142	90±39	<7	<6	<12	<4	<11	<10	<6	<7	<6	<12
	08-05	<146	55±9	<1	<2	<3	<2	<3	<3	<2	<2	<2	<3
	09-02	<142	<41	<2	<2	<5	<2	<5	<4	<2	<3	<2	<5
	11-04	<147	<90	<7	<5	<12	<5	<13	<8	<6	<6	<5	<9
	12-02	<147	<45	<3	<2	<5	<3	<5	<4	<3	<3	<3	<5

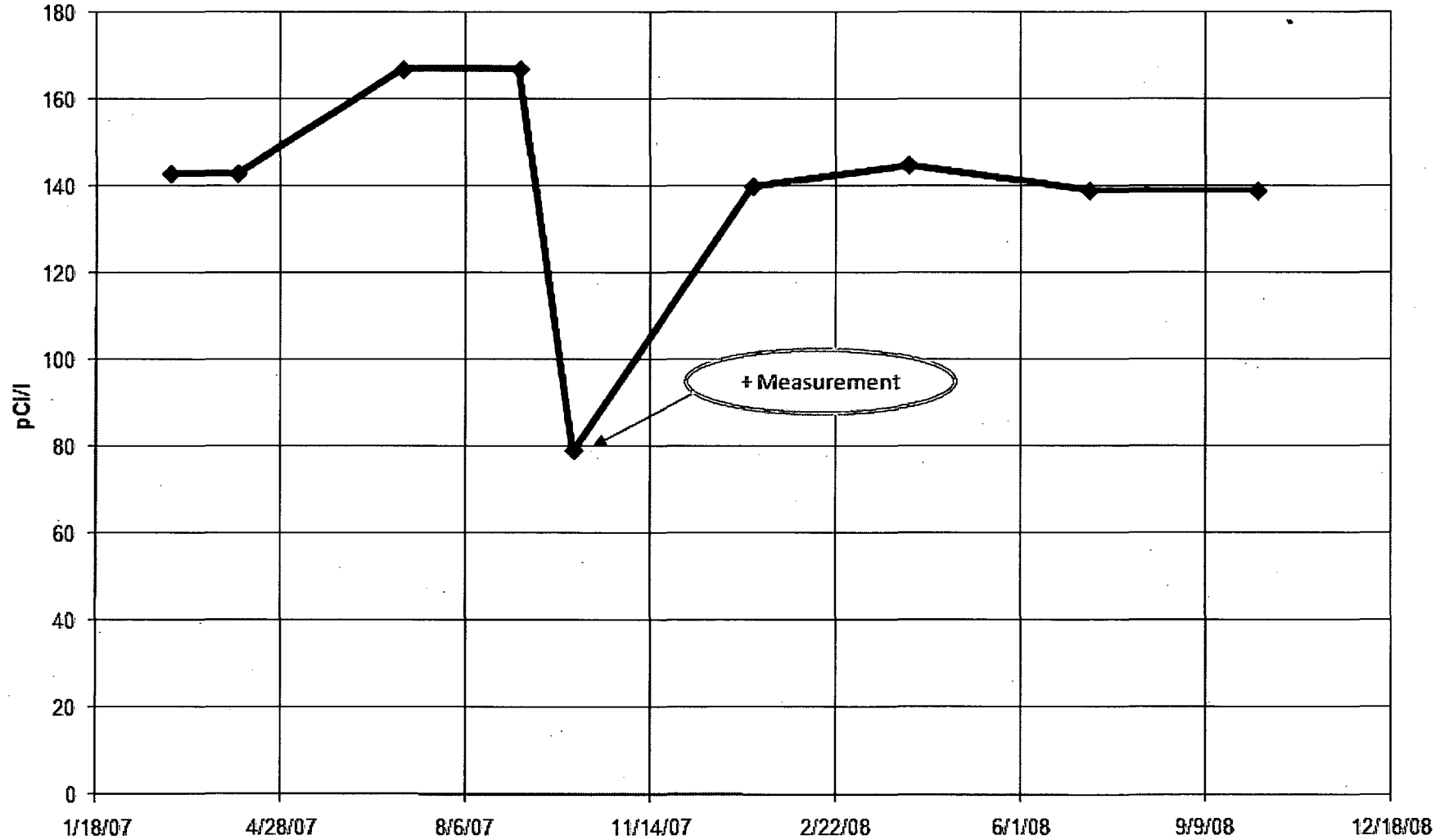
### Tritium Measurement GW Well # CR3-2

All results are < LLD

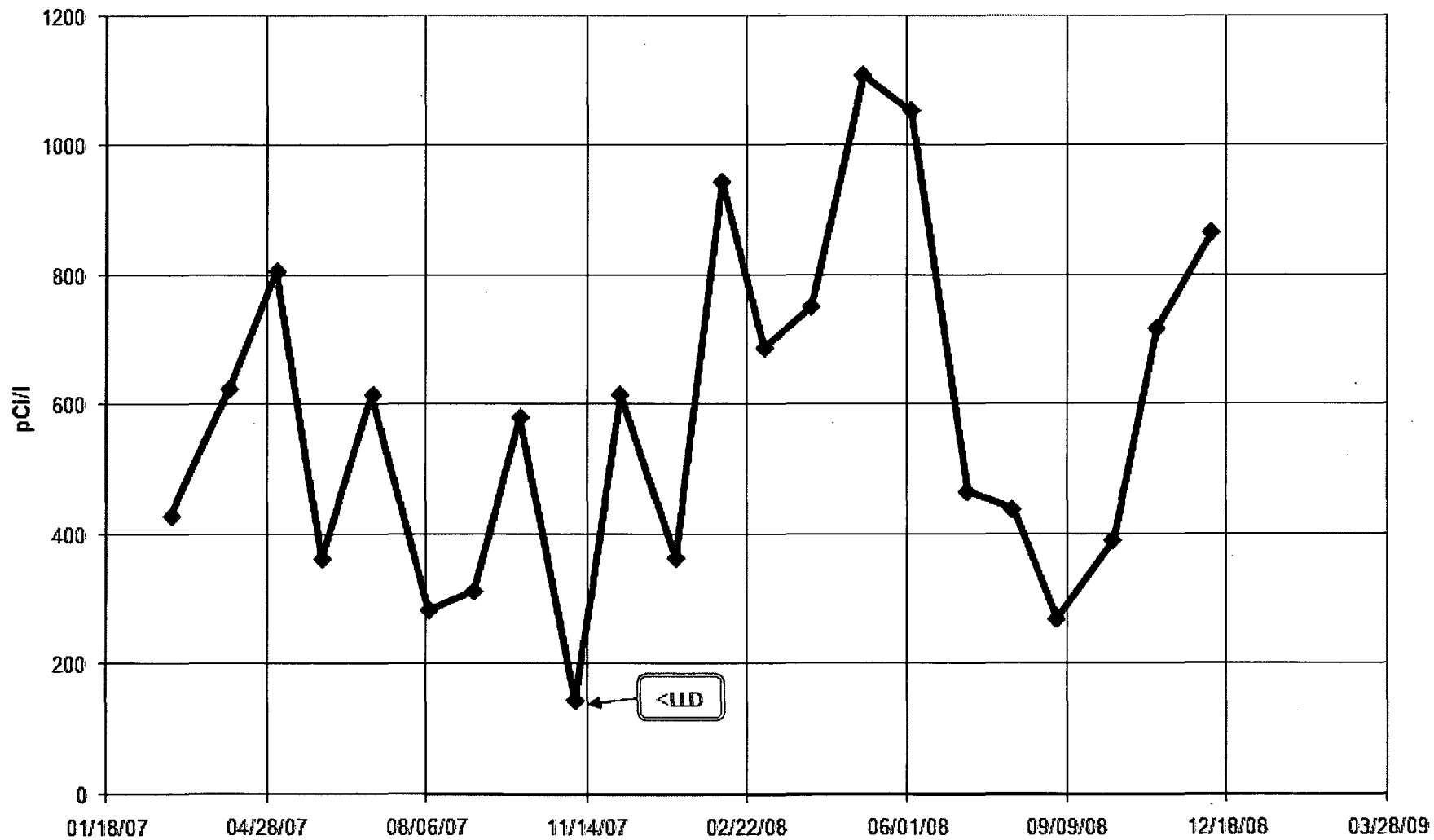


### Tritium Measurement GW Well # CR3-4

All results are < LLD unless noted

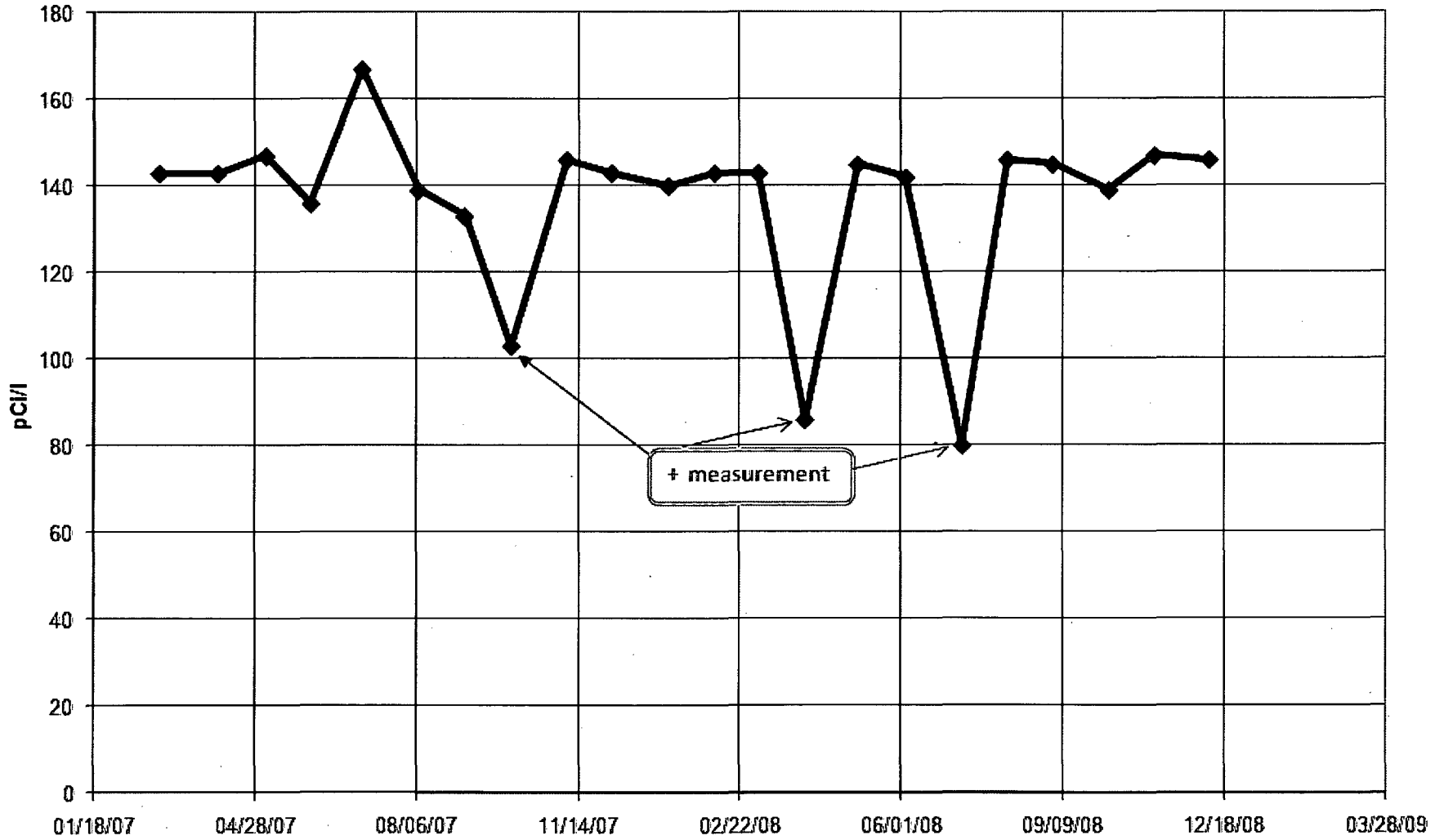


### Tritium Measurement GW Well # CR3-5



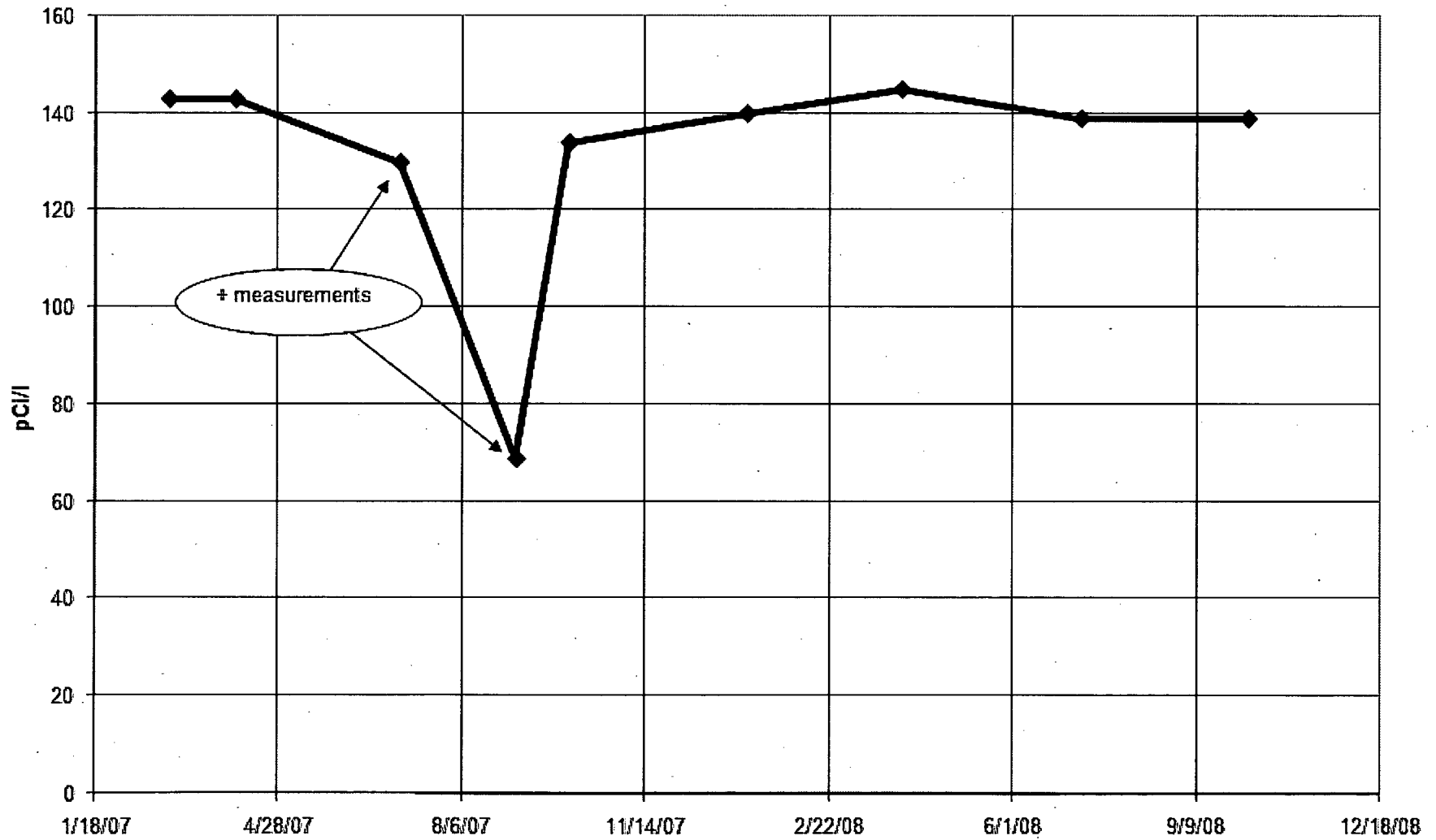
### Tritium Measurement GW Well # CR3-6S

All results are < LLD unless noted

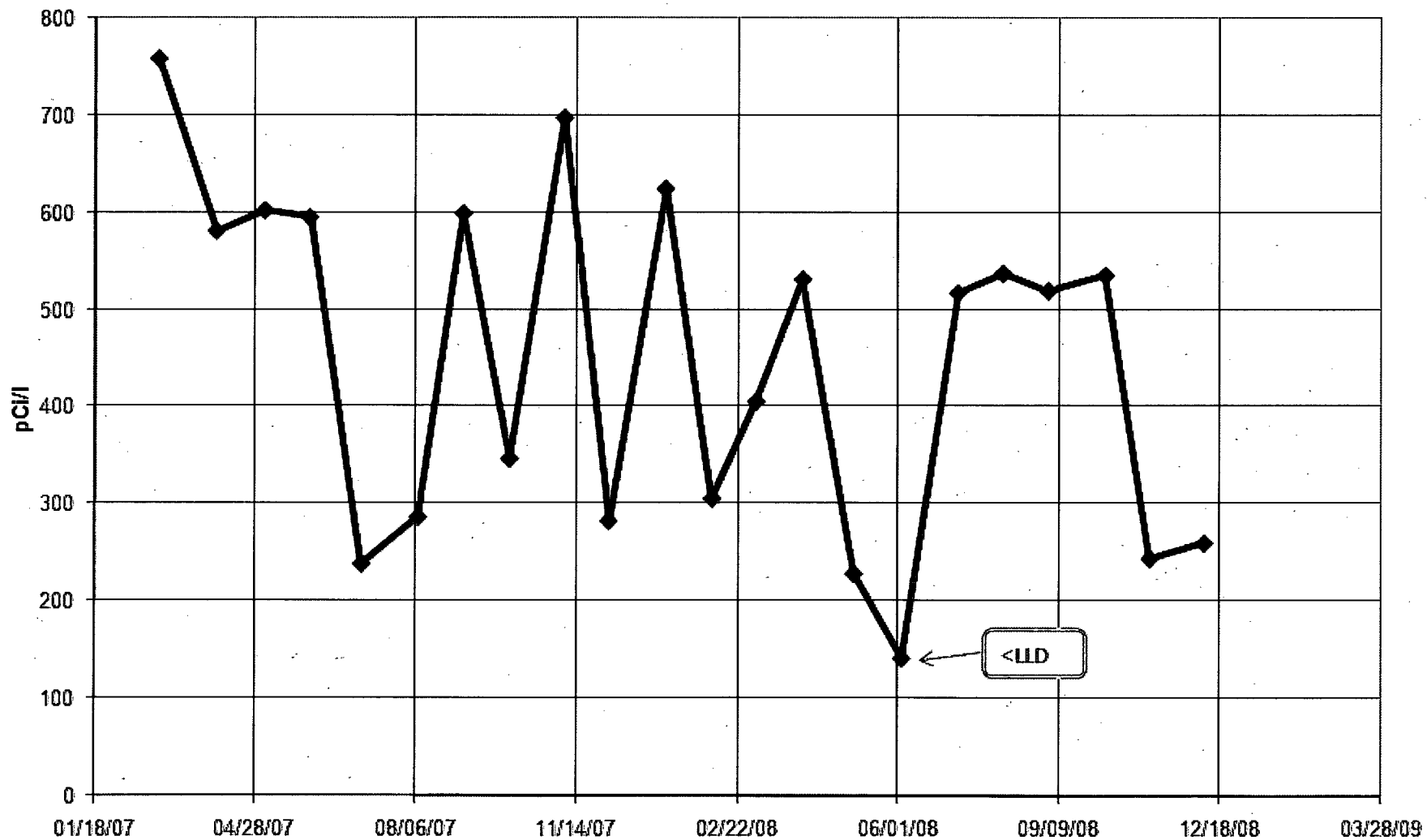


### Tritium Measurements GW Well # CR3-6D

All results are < LLD unless noted

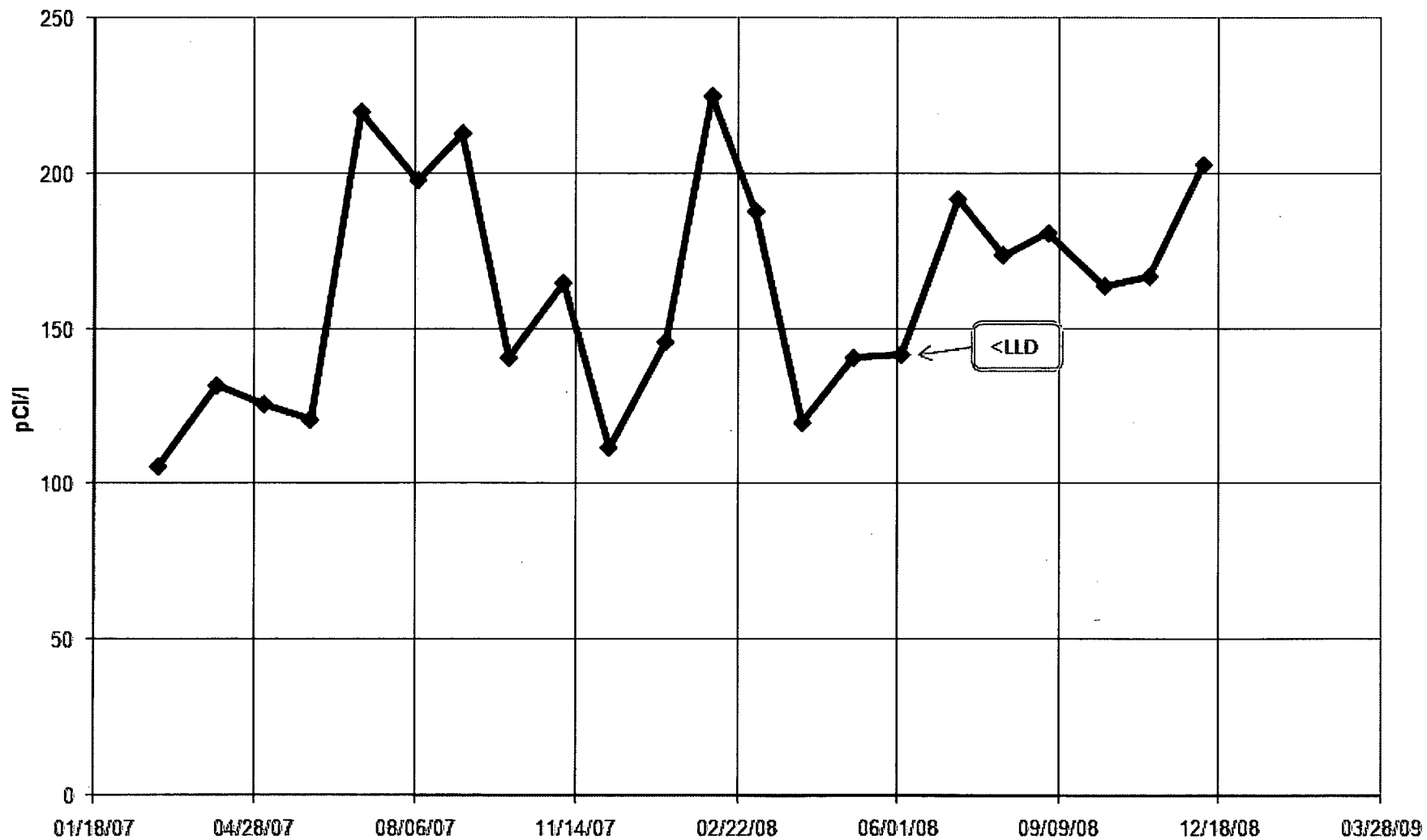


### Tritium Measurements GW Well # CR3-7



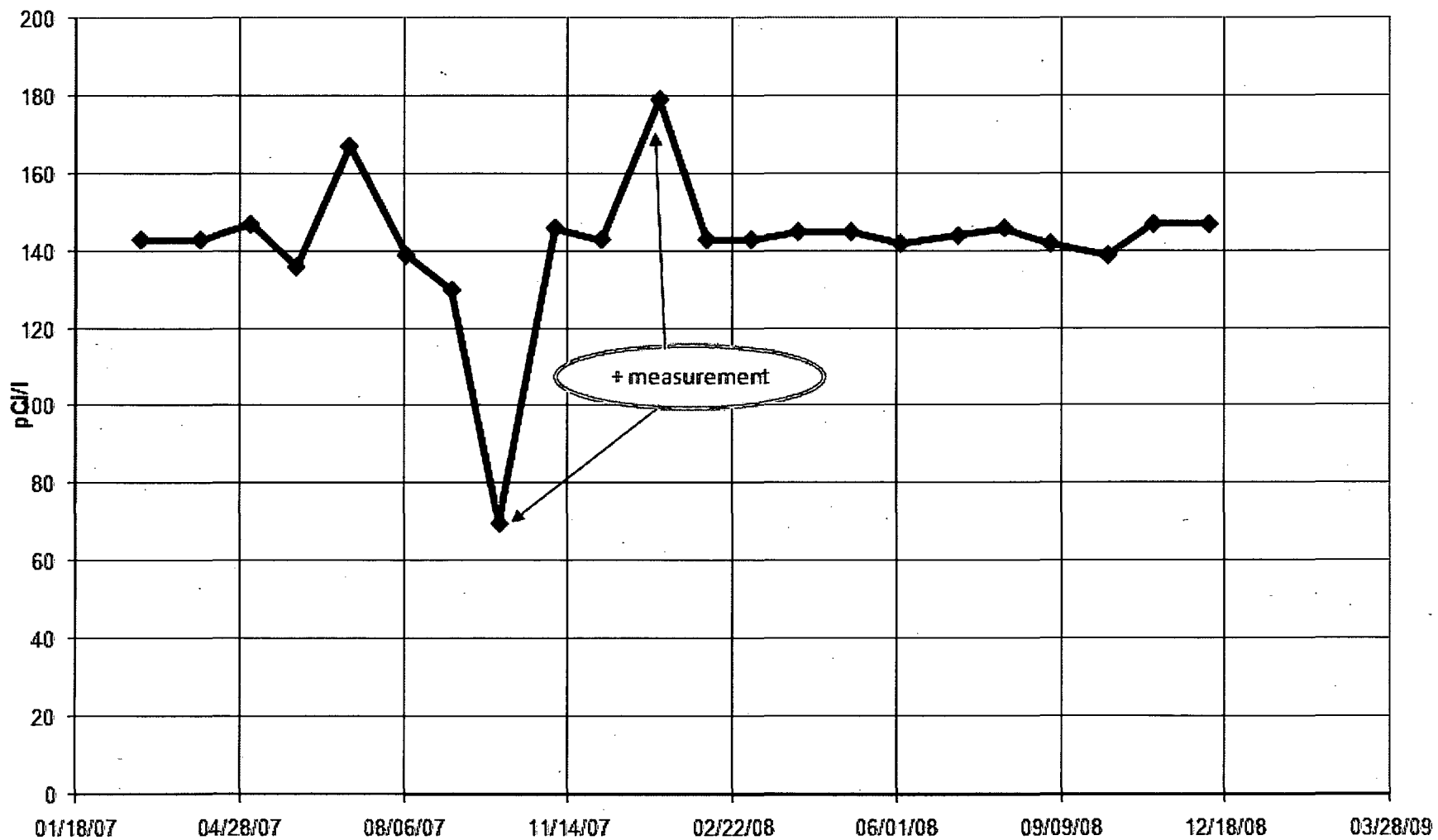


### Tritium Measurements GW Well # CR3-8



### Tritium Measurements GW Well # CR3-9

All results are < LLD unless noted



### Tritium Measurements GW Well # CR3-10

All results are < LLD

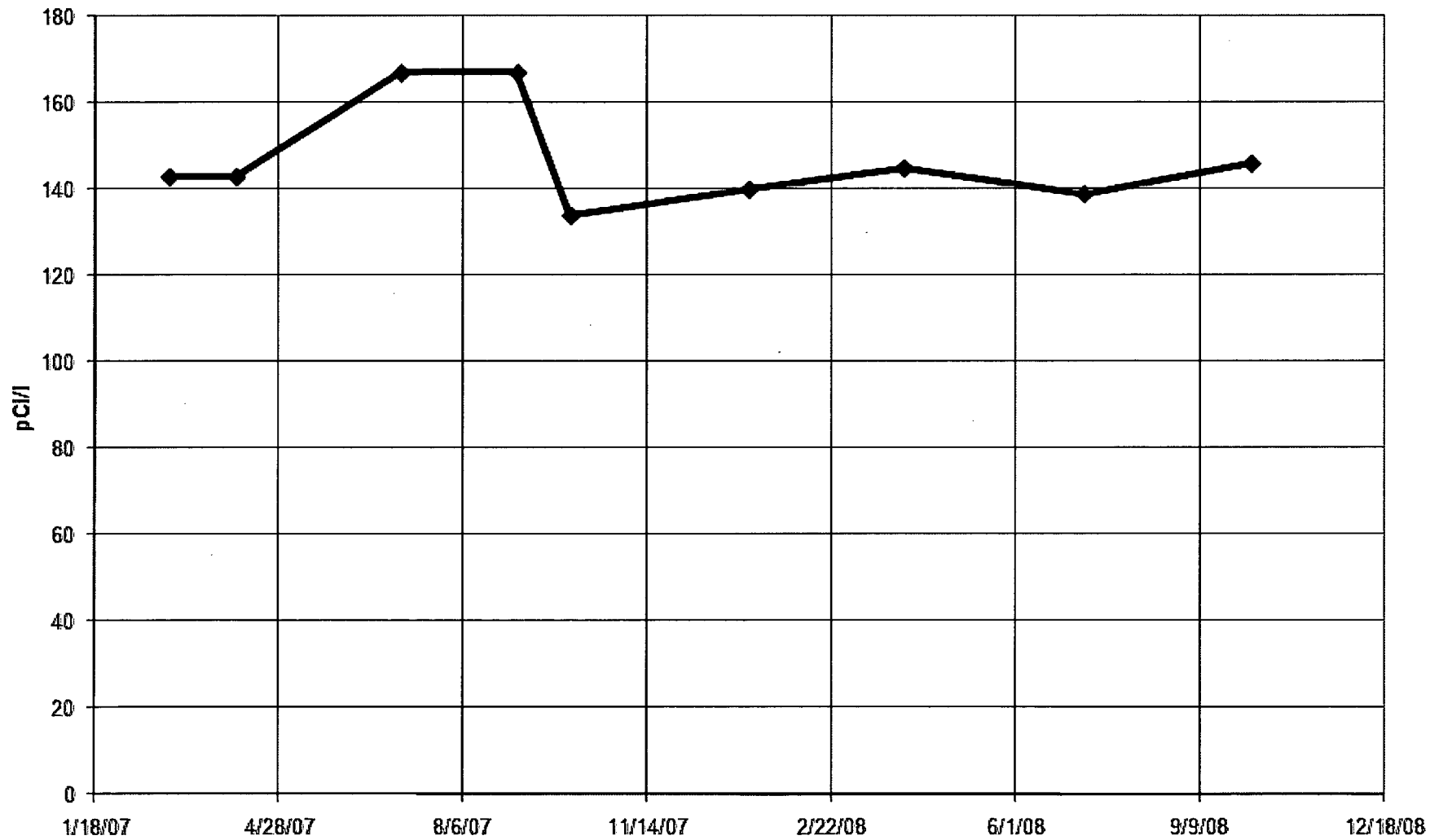


TABLE IV-C.2.c

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
*CR3 SITE GROUND WATER (pCi/L) *	Tritium 24 γ Spec 24	147	272(19/24) (89-486)	M27 0.42 mi.@285°	233(9/12) (89-486)	<LLD	0
	Mn-54	6	None	-	-	<LLD	0
	Fe-59	14	None	-	-	<LLD	0
	Co-58	8	None	-	-	<LLD	0
	Co-60	8	None	-	-	<LLD	0
	Zn-65	16	None	-	-	<LLD	0
	Zr-Nb-95	11	None	-	-	<LLD	0
	I-131	10	None	-	-	<LLD	0
	Cs-134	9	None	-	-	<LLD	0
	Cs-137	6	None	-	-	<LLD	0
	Ba-La-140	13	None	-	-	<LLD	0

<sup>1</sup>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.2.c.1

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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*	01-08	486±54	<55	<3	<4	<7	<4	<7	<6	<5	<5	<4	<6
	02-06	392±53	<65	<4	<4	<9	<5	<9	<7	<6	<4	<4	<4
	03-04	197±48	<89	<6	<6	<14	<7	<11	<10	<7	<6	<6	<10
	04-02	182±48	<89	<5	<5	<12	<6	<11	<11	<10	<5	<6	<8
	05-05	186±47	<67	<3	<4	<9	<4	<8	<7	<5	<5	<4	<6
	06-03	<142	<87	<5	<6	<8	<5	<9	<10	<6	<6	<4	<13
	07-07	138±27	<40	<2	<2	<5	<2	<5	<4	<3	<3	<3	<4
	08-05	89±27	<47	<4	<4	<8	<4	<7	<8	<6	<4	<4	<7
	09-02	<142	<70	<4	<5	<8	<5	<7	<7	<6	<5	<5	<7
	10-07	233±48	<68	<4	<3	<7	<4	<7	<7	<5	<4	<4	<8
	11-04	195±50	<73	<5	<4	<8	<4	<8	<8	<5	<5	<5	<10
	12-02	<147	<64	<4	<4	<7	<5	<9	<7	<5	<5	<5	<7

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

TABLE IV-C.2.c.1(cont'd)

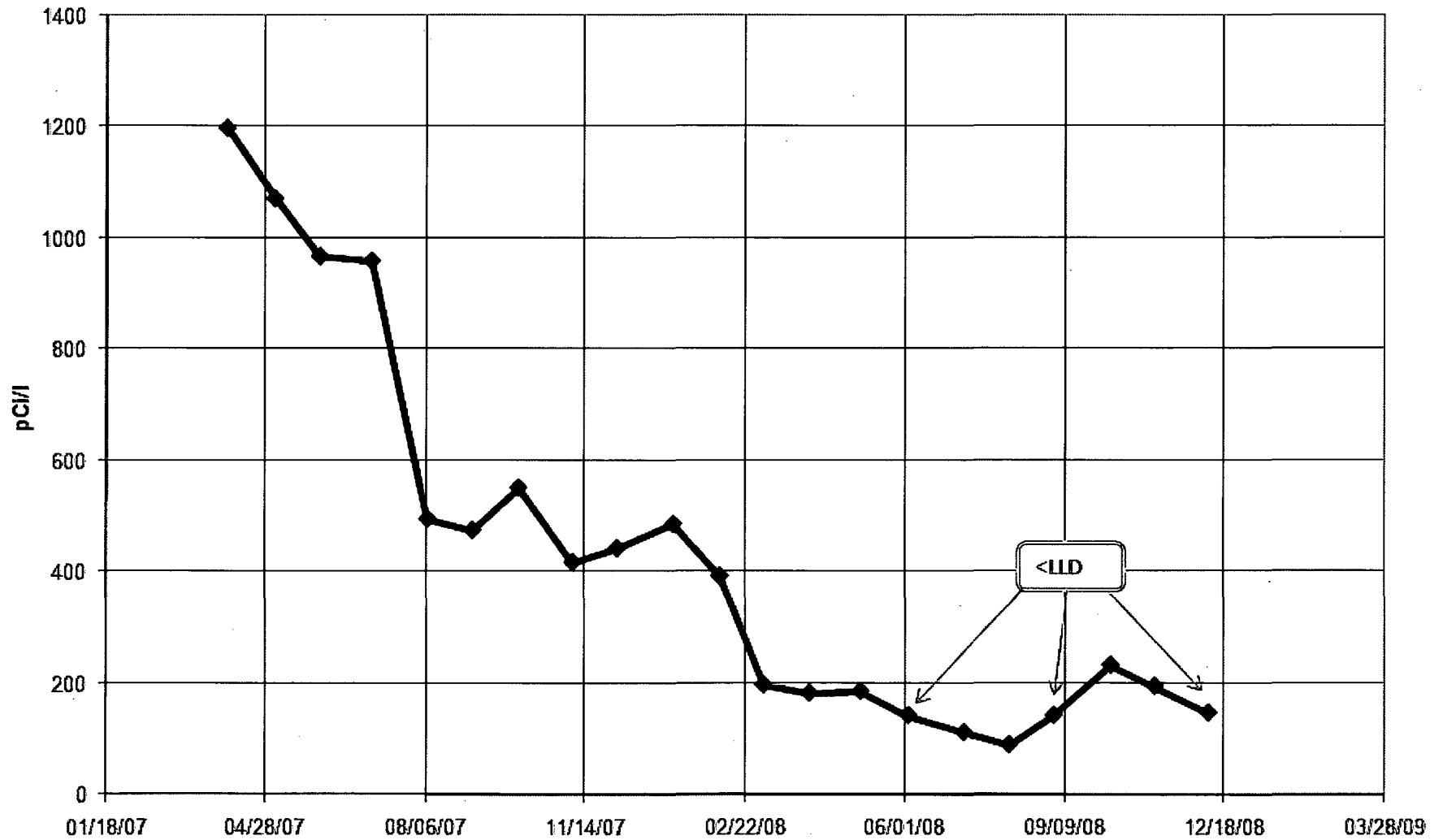
PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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*	01-08	345±51	<60	<4	<4	<6	<5	<7	<6	<5	<5	<4	<8
	02-06	344±52	<116	<6	<8	<13	<8	<16	<11	<10	<9	<6	<12
	03-04	256±50	<73	<5	<5	<11	<6	<10	<10	<7	<7	<6	<9
	04-02	318±51	<51	<3	<3	<7	<4	<9	<6	<6	<4	<4	<5
	05-05	365±51	<57	<4	<3	<6	<4	<8	<7	<5	<6	<4	<7
	06-03	395±52	<31	<2	<2	<4	<2	<4	<3	<2	<2	<2	<4
	07-07	310±50	<75	<4	<4	<10	<4	<9	<7	<6	<5	<4	<10
	08-05	<146	<88	<4	<6	<10	<5	<11	<9	<7	<7	<5	<7
	09-02	<142	<63	<3	<3	<7	<4	<8	<7	<4	<4	<4	<5
	10-07	325±50	<70	<3	<4	<7	<4	<7	<6	<4	<5	<4	<9
	11-04	193±49	<39	<2	<2	<5	<3	<5	<4	<3	<3	<2	<5
	12-02	222±50	<87	<4	<5	<8	<5	<10	<7	<5	<6	<5	<9

\*= 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



### Tritium Measurements GW Well # MWC-IF2

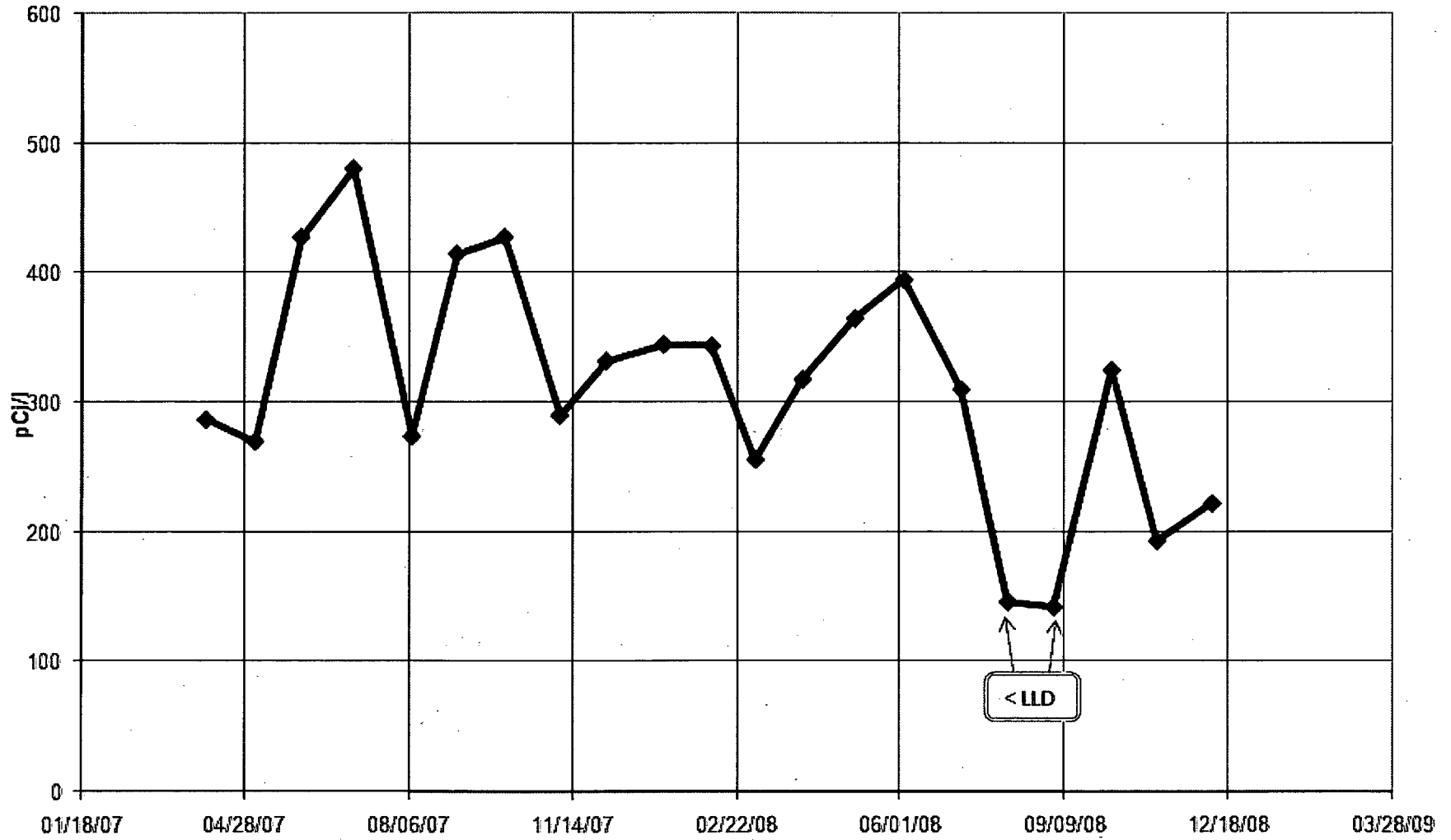




TABLE IV-C.3

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	<u>ALL INDICATOR LOCATIONS</u>	<u>LOCATION WITH HIGHEST MEAN</u>		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
DRINKING WATER (pCi/L)	Tritium 12	145	None	-	-	<LLD	0
	γ Spec 12						
	Mn-54	6	None	-	-	<LLD	0
	Fe-59	10	None	-	-	<LLD	0
	Co-58	5	None	-	-	<LLD	0
	Co-60	6	None	-	-	<LLD	0
	Zn-65	11	None	-	-	<LLD	0
	Zr-Nb-95	10	None	-	-	<LLD	0
	I-131	6	None	-	-	<LLD	0
	Cs-134	7	None	-	-	<LLD	0
	Cs-137	6	None	-	-	<LLD	0
Ba-La-140	15	None	-	-	<LLD	0	

<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-C.3.a

PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/L  $\gamma$  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	01-08	<134	<62	<4	<3	<8	<5	<9	<8	<6	<5	<5	<8
	04-02	<145	<57	<3	<3	<7	<4	<8	<6	<5	<4	<4	<6
	07-07	<140	<70	<4	<5	<9	<5	<11	<10	<6	<7	<6	<10
	10-07	<145	<56	<3	<3	<6	<3	<7	<5	<4	<4	<4	<6
C10	01-08	<138	<72	<5	<5	<9	<5	<11	<8	<4	<6	<5	<9
	04-02	<145	<48	<3	<3	<7	<2	<9	<6	<6	<4	<3	<5
	07-07	<139	<75	<5	<3	<9	<4	<9	<6	<5	<5	<5	<11
	10-07	<145	<49	<4	<5	<10	<6	<11	<8	<6	<6	<5	<12
C18	01-08	<134	<72	<6	<5	<9	<6	<11	<8	<6	<6	<4	<9
	04-02	<145	<30	<2	<2	<4	<2	<4	<4	<3	<2	<2	<3
	07-07	<139	<62	<4	<5	<9	<6	<9	<10	<5	<5	<5	<12
	10-07	<145	<90	<5	<5	<10	<5	<11	<8	<6	<6	<4	<15

### Drinking Water

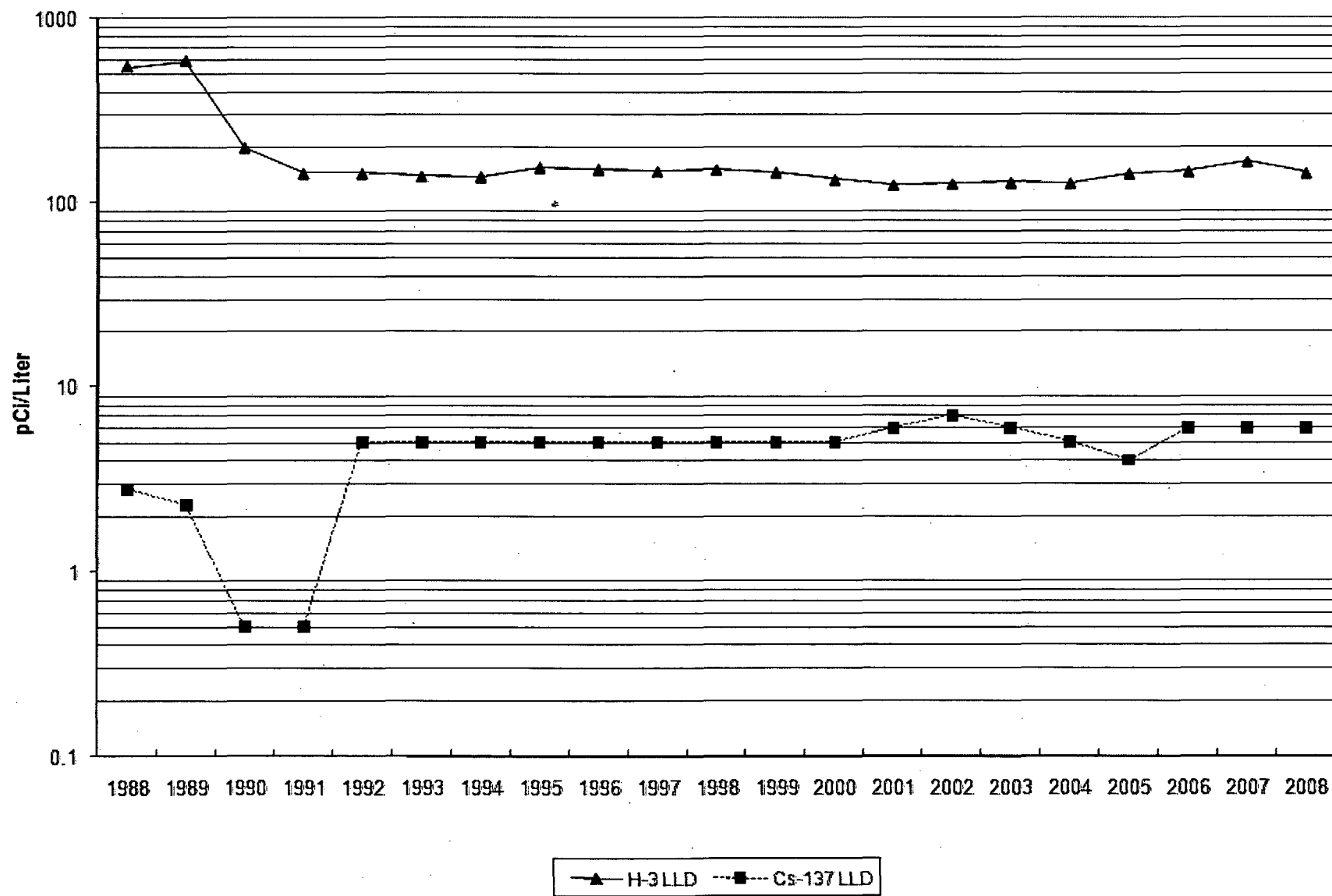


TABLE IV-C.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	<u>ALL INDICATOR LOCATIONS</u>	<u>LOCATION WITH HIGHEST MEAN</u>		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
SHORELINE SEDIMENT (pCi/kg)	γ Spec 8 Cs-134 Cs-137	29 31	<LLD 25 (2/6) (20-29)	— C14M 1.2 @ 270°	— 29 (1/2)	<LLD <LLD	0 0

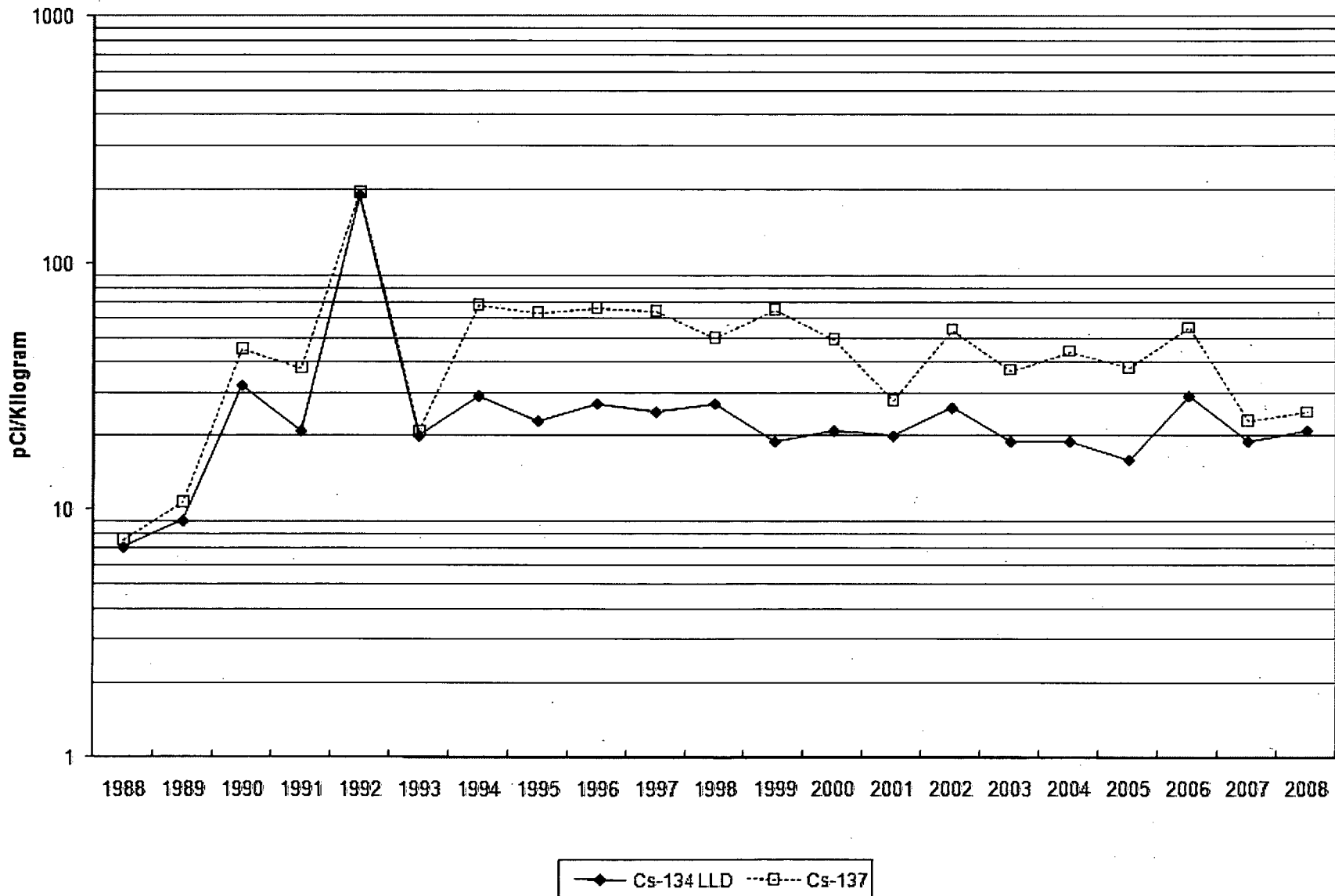
<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

**TABLE IV-C.4.a**  
**PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008**  
**pCi/kg  $\gamma$  EMITTERS IN SHORELINE SEDIMENT**

STATION	PERIOD	Co-58	Co-60	Cs-134	Cs-137	K-40	Ra-226
C09	First Half	<12	<13	<15	<15	<245	536 $\pm$ 133
	Second Half	<9	<9	<13	<10	114 $\pm$ 57	420 $\pm$ 139
C14H	First Half	<19	<21	<29	<19	570 $\pm$ 127	1350 $\pm$ 210
	Second Half	<19	<16	<26	<31	2350 $\pm$ 205	1510 $\pm$ 198
C14M	First Half	<15	<20	<19	29 $\pm$ 8	1375 $\pm$ 116	872 $\pm$ 160
	Second Half	<15	<20	<18	<24	701 $\pm$ 132	1154 $\pm$ 175
C14G	First Half	<14	<24	<17	20 $\pm$ 7	<303	1856 $\pm$ 192
	Second Half	<17	<25	<18	<20	452 $\pm$ 107	1346 $\pm$ 192

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

### Shoreline Sediment



#### 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. None of the required radionuclides were found in measurable quantities. The highest cesium-137 LLD for station C29 was 33 pCi/kg. Naturally occurring potassium-40 was quantified in all eight samples at concentrations near 3000 pCi/kg.

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. Of the isotopes required to be evaluated, none indicated measurable amounts of radioactivity. Silver-110m was not quantified in any oyster samples collected in 2008. In 2007, silver-110m was quantified in three samples at C29 near the end of the discharge canal, with an average concentration of 85 pCi/kg and a range of 58 to 118 pCi/kg. In 2006, silver-110m was quantified in four samples at C29 and one sample at C30 with an average concentration of 350 pCi/kg and a range of 38 to 845 pCi/kg.

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. Three of twenty-four indicator samples had measurable amounts of cesium-137 with an average concentration of 92 pCi/kg and a range of 12 to 246 pCi/kg. This is comparable to the levels found in 2007, but is higher than the previous four years. One sample had a measured concentration of 246 pCi/kg, which has caused the average value to increase. It is believed this 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. Seven of eight samples collected following the spike sample contained no measurable Cs-137 with the exception of one sample that had a measured Cs-137 concentration of 12 pCi/kg. Seven of twelve control station samples had measurable amounts of cesium-137 with an average concentration of 47 pCi/kg and a range of 22 to 107 pCi/kg.

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. Citrus samples are taken at station C19. In 2008 there were no watermelon samples available at station C04. Due to crop rotation there were no locally grown watermelons in the area nearby the facility. None of the required radionuclides were found in measurable quantities in the citrus samples.

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, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
CARNIVOROUS	γ Spec 8						
FISH							
(pCi/kg)	Mn-54	30	<LLD	-	-	<LLD	0
	Fe-59	66	<LLD	-	-	<LLD	0
	Co-58	28	<LLD	-	-	<LLD	0
	Co-60	36	<LLD	-	-	<LLD	0
	Zn-65	65	<LLD	-	-	<LLD	0
	Cs-134	35	<LLD	-	-	<LLD	0
	Cs-137	33	<LLD	-	-	<LLD	0

<sup>1</sup>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 - 2008

pCi/kg  $\gamma$  EMITTERS IN CARNIVOROUS FISH

STATION	QUARTER	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	K-40
C29	1	<28	<28	<40	<25	<50	<33	<33	2810±279
	2	<17	<20	<45	<24	<36	<22	<20	2104±210
	3	<29	<22	<63	<27	<53	<33	<29	2540±245
	4	<30	<20	<65	<36	<65	<34	<26	2654±270
C30	1	<25	<26	<54	<34	<58	<35	<32	2777±251
	2	<6	<6	<12	<8	<15	<7	<6	2436±74
	3	<25	<25	<66	<32	<55	<28	<29	2579±241
	4	<16	<18	<40	<25	<47	<23	<19	2698±190

### Carnivorous Fish

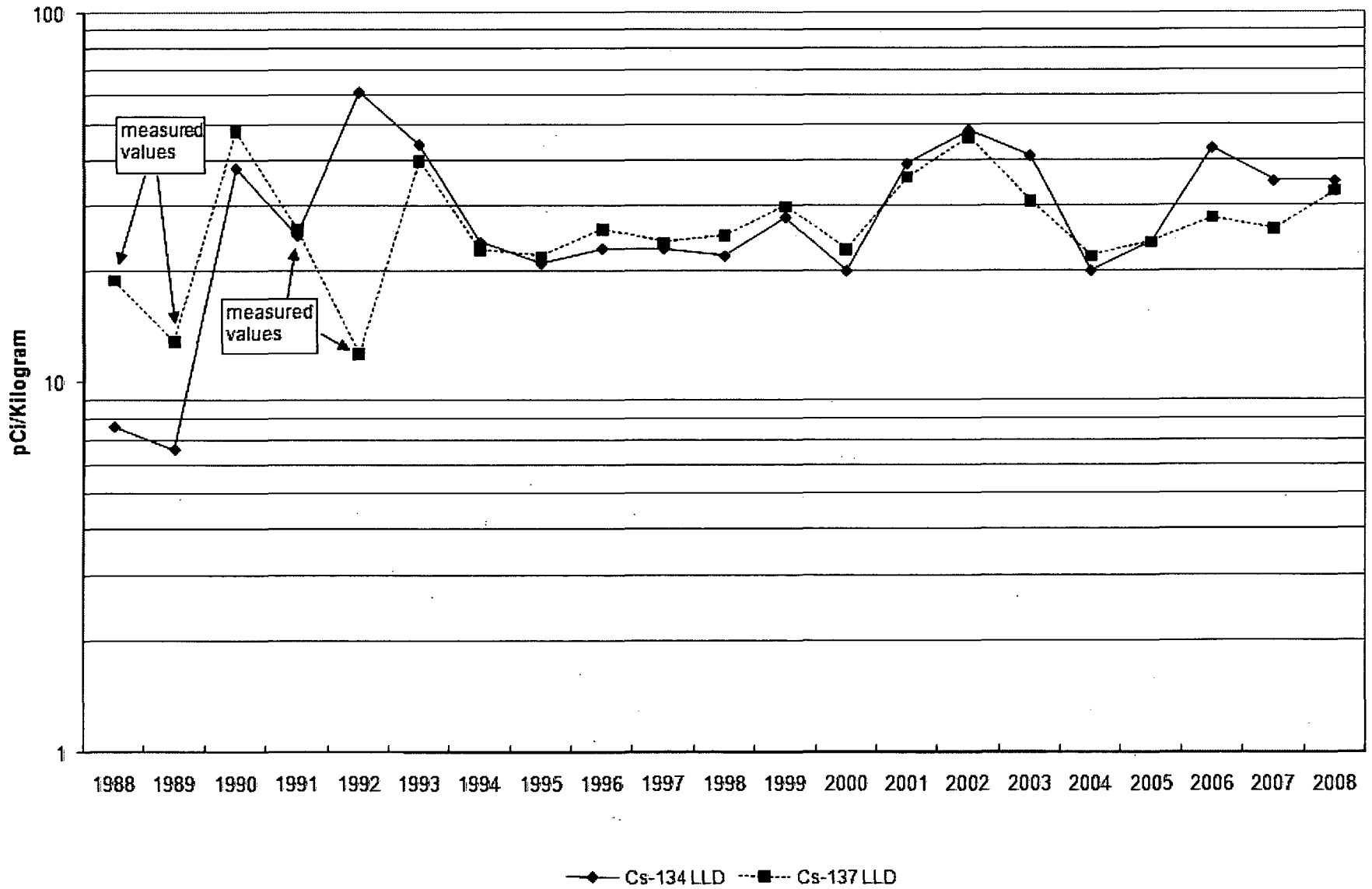


TABLE IV-D.2

## RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	<u>ALL INDICATOR LOCATIONS</u>	<u>LOCATION WITH HIGHEST MEAN</u>		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
OYSTERS (pCi/kg)	γ Spec 8						
	Mn-54	31	<LLD	-	-	<LLD	0
	Fe-59	87	<LLD	-	-	<LLD	0
	Co-58	51	<LLD	-	-	<LLD	0
	Co-60	55	<LLD	-	-	<LLD	0
	Zn-65	115	<LLD	-	-	<LLD	0
	Cs-134	56	<LLD	-	-	<LLD	0
	Cs-137	49	<LLD	-	-	<LLD	0

<sup>1</sup>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 - 2008

pCi/kg  $\gamma$  EMITTERS IN OYSTERS

STATION	QUARTER	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137	K-40
C29	1	<26	<28	<65	<31	<43	<27	<26	1087±225
	2	<9	<10	<22	<10	<20	<10	<9	1050±75
	3	<31	<28	<79	<27	<80	<44	<28	<632
	4	<43	<45	<76	<41	<110	<56	<39	1290±278
C30	1	<27	<19	<39	<20	<48	<28	<20	1537±178
	2	<19	<18	<46	<20	<47	<20	<20	640±128
	3	<25	<25	<57	<26	<56	<30	<21	1084±205
	4	<53	<51	<87	<55	<115	<55	<49	1036±270

# Oysters

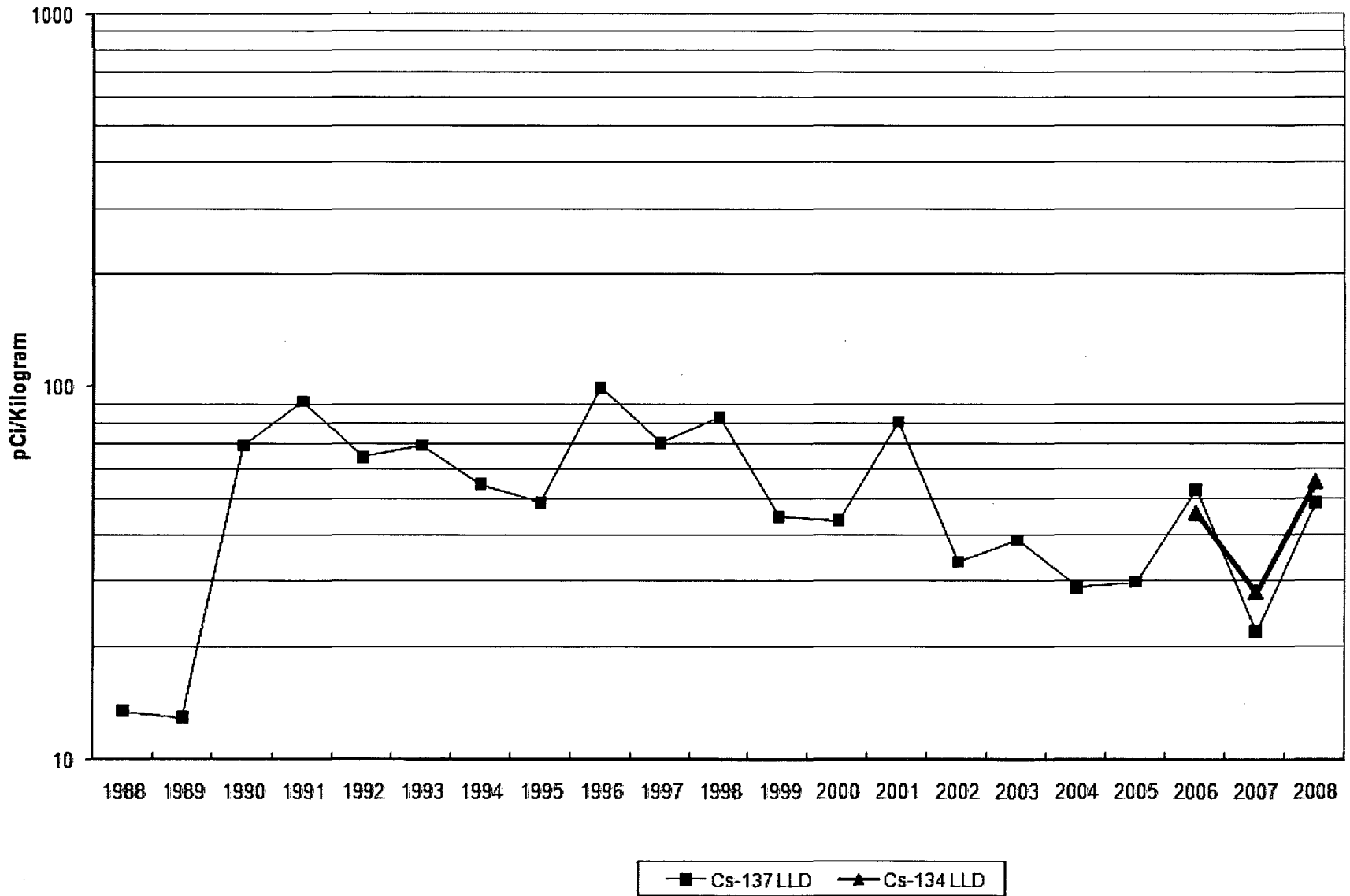


TABLE IV-D.3

## RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	<u>ALL INDICATOR LOCATIONS</u>	<u>LOCATION WITH HIGHEST MEAN</u>		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
BROAD LEAF VEGETATION (pCi/kg)	γ Spec 36						
	I-131	26	<LLD	-	-	<LLD	0
	Cs-134	28	<LLD	-	-	<LLD	0
	Cs-137	27	92 (3/24) (12-246)	C48B 0.9 @ 45°	129 (2/12) (12-246)	47 (7/12) (22-107)	0

<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

TABLE IV-D.3.a

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/kg OF  $\gamma$  EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C47	JAN	<13	<18	<22	6325±208
	FEB	<15	<11	<16	4030±170
	MAR	<24	<23	<27	4316±245
	APR	<7	<8	<7	3526±106
	MAY	<13	<12	30±6	3722±135
	JUN	<12	<13	<16	2889±134
	JUL	<18	<21	31±5	3456±212
	AUG	<5	<7	53±4	3237±70
	SEP	<16	<23	28±7	2699±195
	OCT	<15	<18	60±12	3746±241
	NOV	<15	<15	22±8	3091±162
	DEC	<11	<14	107±10	2191±131
C48A	JAN	<18	<28	<22	6508±288
	FEB	<15	<19	<18	7210±228
	MAR	<26	<25	<24	6881±299
	APR	<10	<7	<6	7609±89
	MAY	<17	<22	<17	7541±305
	JUN	<15	<19	<17	7364±261
	JUL	<14	<18	<17	6908±211
	AUG	<19	<23	<21	6571±312
	SEP	<12	<11	<18	4195±177
	OCT	<16	<23	<22	7143±309
	NOV	<10	<12	<10	7120±156
	DEC	<16	<22	<18	5782±253

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

## PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008

pCi/kg OF  $\gamma$  EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C48B	JAN	<17	<21	<21	1817±170
	FEB	<16	<22	<17	3095±238
	MAR	<24	<23	<24	3112±231
	APR	<21	<20	14±18	2456±173
	MAY	<6	<9	<8	7798±136
	JUN	<9	<12	<10	5637±170
	JUL	<14	<19	<13	3539±188
	AUG	<8	<11	<8	4628±143
	SEP	<8	<9	4±8	2951±90
	OCT	<10	<13	<11	3192±138
	NOV	<6	<6	<6	3714±74
	DEC	<12	<20	<18	3011±202



### Broad Leaf Vegetation

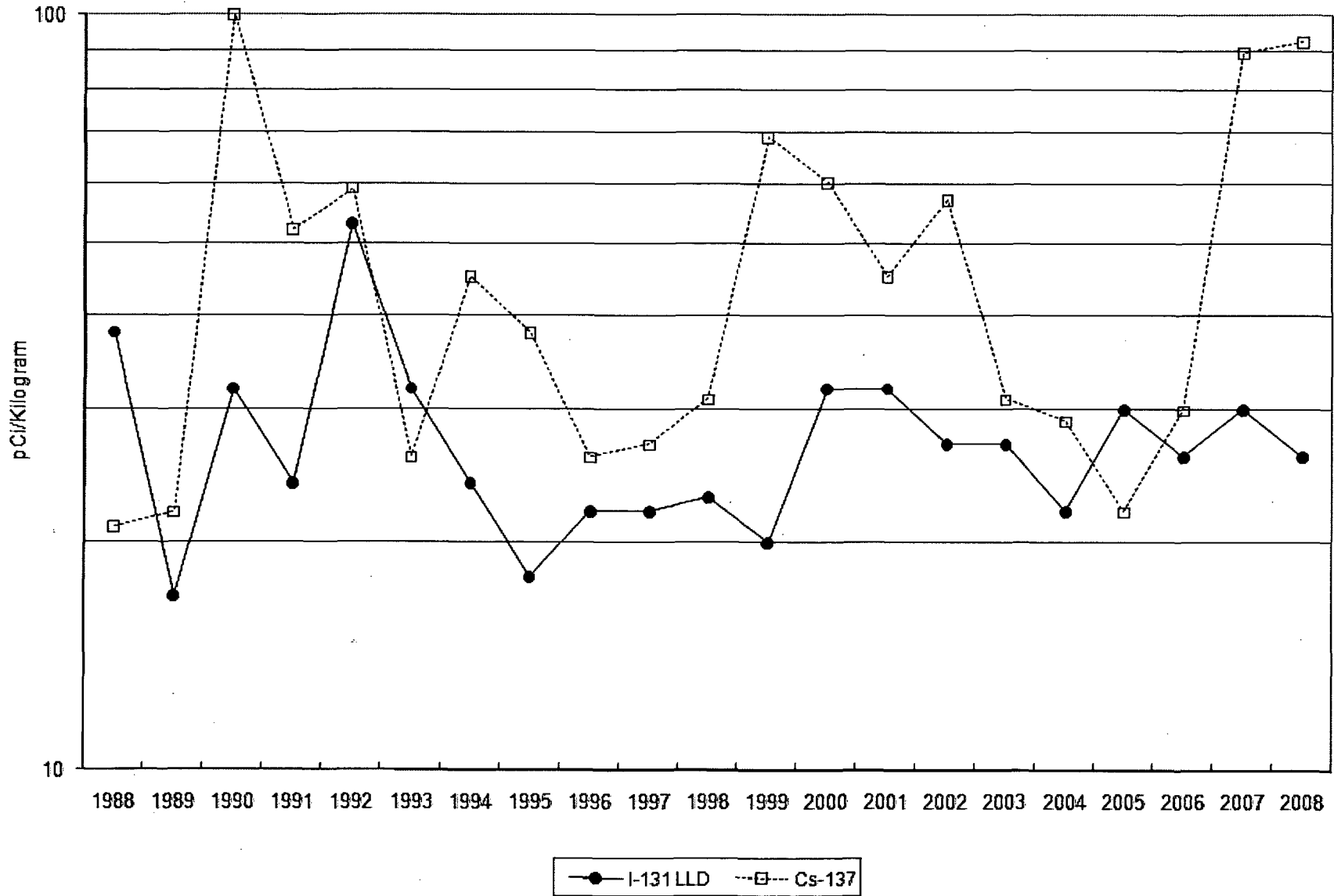


TABLE IV-D.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2008

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) <sup>1</sup>	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
(WATERMELON) <sup>2</sup> (pCi/kg)	γ Spec 0						
	I-131	5	-	-	-	None	0
	Cs-134	4	-	-	-	None	0
	Cs-137	8	-	-	-	None	0
CITRUS (pCi/kg)	γ Spec 1						
	I-131	13	<LLD	-	-	None	0
	Cs-134	8	<LLD	-	-	None	0
	Cs-137	9	<LLD	-	-	None	0

<sup>1</sup>The "a priori" LLD which meets or exceeds the requirements of Table 2-9 of the CR-3 ODCM.

<sup>2</sup>Watermelon samples not available in the area due to crop rotation.

**TABLE IV-D.4.a**

**PROGRESS ENERGY FLORIDA, INC. - CR3 - 2008**

**pCi/kg OF  $\gamma$  EMITTERS IN WATERMELON AND CITRUS**

STATION	MONTH	I-131	Cs-134	Cs-137	K-40
C04 – (Watermelon) <sup>1</sup>	June	-	-	-	-
C19 – Citrus	January	<13	<8	<9	1928 $\pm$ 100

<sup>1</sup>Watermelon samples not available due to crop rotation in the area.