



ADP CR3, LLC

Crystal River Nuclear Plant
2760 South Falkenburg Rd
Riverview, FL 33578
Docket 50-302
Docket 72-1035
Operating License No. DPR-72

ODCM

April 6, 2022

3F0422-02

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

Subject: Crystal River Unit 3 – 2021 Annual Radiological Environmental Operating Report

Dear Sir or Madam:

ADP CR3, LLC hereby provides the 2021 Annual Radiological Environmental Operating Report for Crystal River Unit 3 in accordance with 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, 2021 through December 31, 2021.

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Mr. Mark Van Sicklen, Licensing Manager, at (352) 436-5572.

Sincerely,

Phyllis A. Dixon
ISFSI Manager

PAD/mvs

Attachment 1: 2021 Annual Radiological Environmental Operating Report

cc: NMSS Project Manager
Regional Administrator, Region I

ADP CR3, LLC

**DOCKET NUMBER 50-302 / 72-1035
LICENSE NUMBER DPR-72**

ATTACHMENT 1

2021 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

2021



ADP CR3, LLC

CRYSTAL RIVER UNIT 3

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INTRODUCTION

This report is submitted as required by procedure CP-500: Special Actions and Reporting Requirements, Section 4.2.1.a, and the Offsite Dose Calculation Manual (ODCM).

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.
- Inter-laboratory 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).

Additional Information

On February 5, 2013, Duke Energy decided to permanently retire Crystal River Unit 3. The decision was made due to the risk associated with repairing the containment building's delaminated concrete wall. The company placed the facility in a SAFSTOR status until Sept 30th, 2020. Beginning on October 1st 2020, the site radiological license was transferred from Duke Energy to ADP CR3, LLC and active decommissioning commenced. Also in 2020, CR3 received approval from the NRC to reduce the licensed area of the site to 884 acres as part of the Partial Site Release project. This had no effect on any REMP sample location or REMP sample frequency. Additionally, all spent nuclear fuel was transferred from the spent fuel pool to the onsite Independent Spent Fuel Storage Installation (ISFSI) for dry storage in January 2018 and most plant systems have been abandoned.

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 2021 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.

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 is shown on 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 intake pathway. Additionally, the Florida aquifer groundwater flows in a west-southwest direction across the site toward the Gulf of Mexico, and since the location 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 listed in the ODCM. When measurable results are reported, the values are also usually less than the required "a priori" LLD.

Trace levels of Cs-137 are still occasionally seen in vegetation samples due to past global fallout. The vegetation control sample station located in Orlando, FL is also experiencing similar Cs-137 deposition on the broad leaf sample media. Traces of Cs-137 can also be detected occasionally in soil/sediment for the same reason.

The results of the 2021 REMP samples 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, CR3 plant related radioactive material is occasionally 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.

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 above LLD.

TABLE I-1

ADP CR3, LLC- 2021

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
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
C14G		W	2.0
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)

ADP CR3, LLC- 2021

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	2.0
	C13-Control	WSW	3.4
GROUND WATER	C40-Control	E	3.7
SITE GROUND WATER	CR3-1	E	0.1
	CR3-2	E	0.1
	CR3-3S and 3D	SSE	0.1
	CR3-4	SSE	0.1
	CR3-5	SSW	0.05
	CR3-6S	W	0.04
	CR3-6D	W	0.04
	CR3-7	WNW	0.06
	CR3-8	WNW	0.07
	CR3-9	NW	0.1
DRINKING WATER	CR3-10	NNE	0.1
	C07-Control	ESE	7.4
	C10-Control	ESE	6.0
SHORELINE SEDIMENT	C18-Control	N	5.3
	C09-Control	S	3.2
	C14H	NW	0.1
	C14M	W	1.2
FISH & OYSTERS	C14G	W	2.0
	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	6.0
CITRUS	C19	ENE	9.6

TABLE I-2

ADP CR3, LLC- 2021

SAMPLING AND ANALYSIS PROGRAM

SAMPLE MEDIA	# OF STATIONS	FREQUENCY	ANALYSIS	LLD ¹	
TLD	32*	Quarterly	γ Dose	---	
Air Particulate	6	Weekly	Gross β	0.01 pCi/m ³	
		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
				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 listed in the ODCM

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

TABLE I-2 (Cont'd)

ADP CR3, LLC- 2021

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 :	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

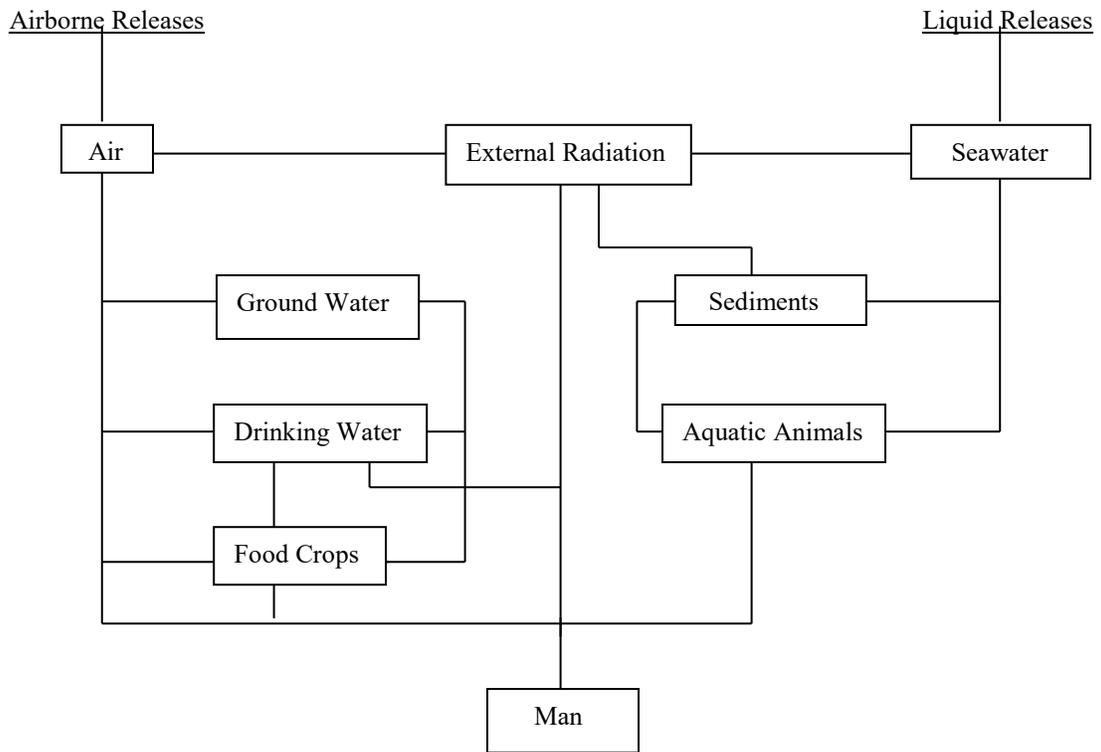


FIGURE I-1: Environmental Media and Exposure Pathways

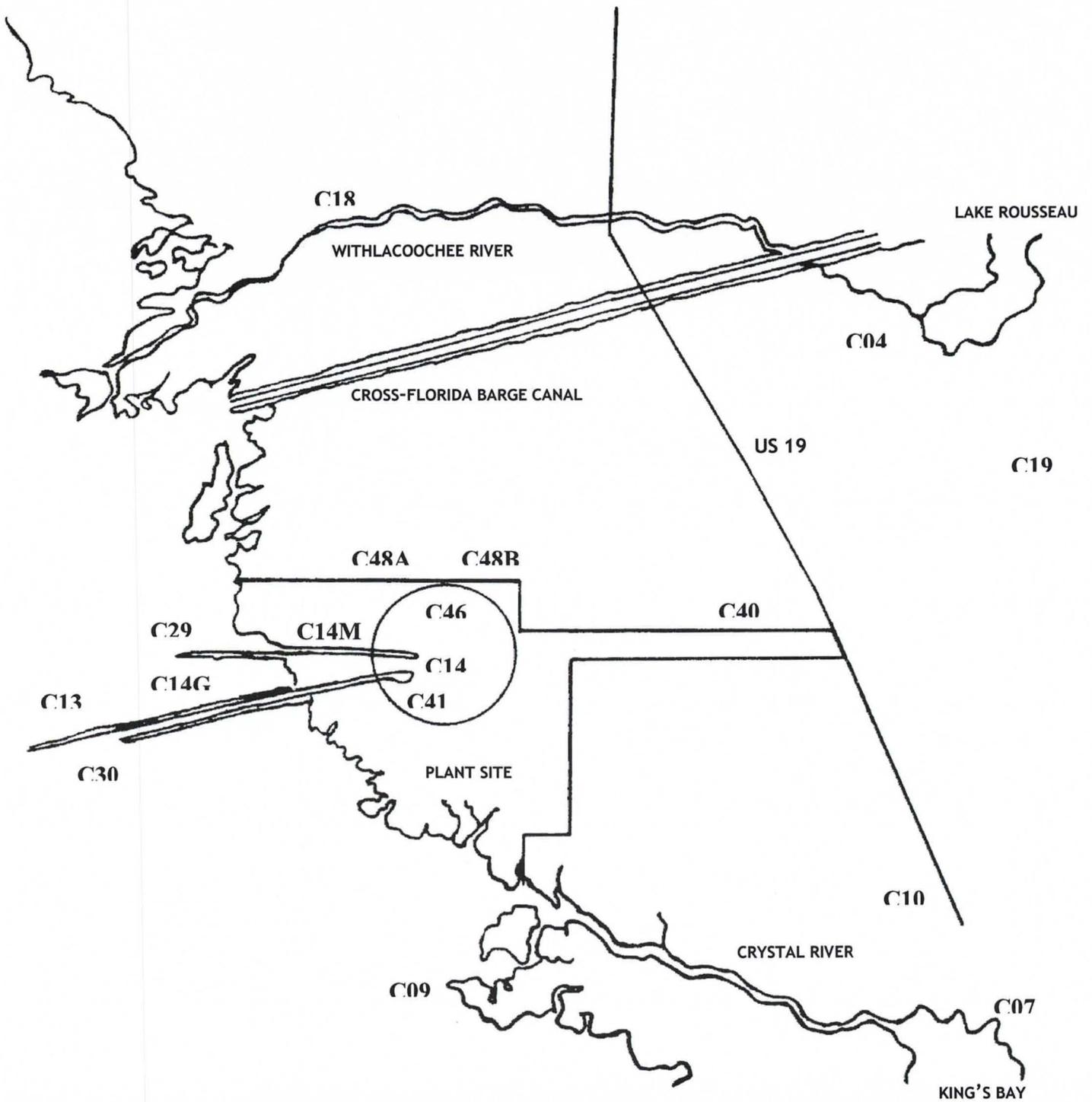
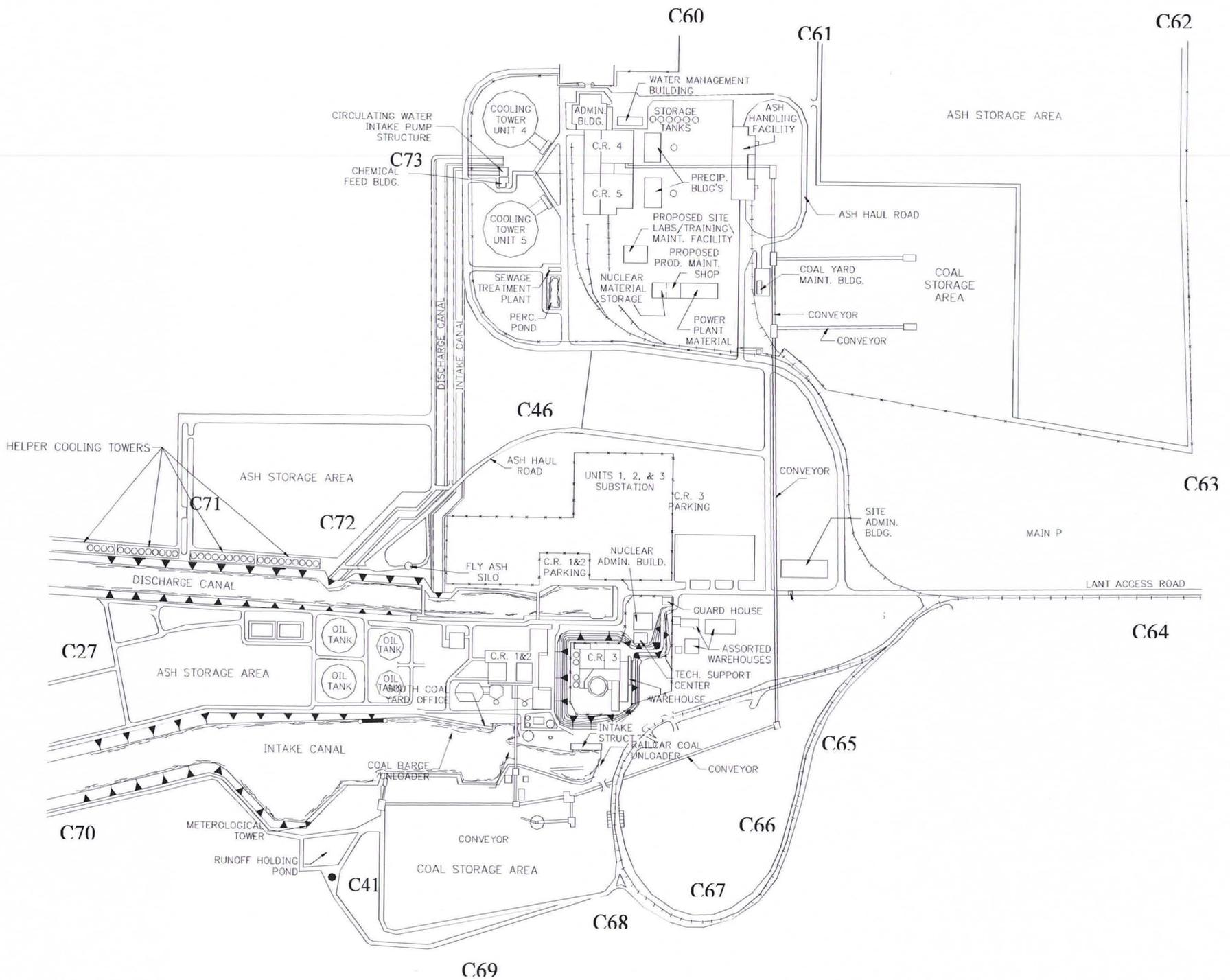


FIGURE I-2: Environmental Monitoring Sample Stations (non-TLDs)

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



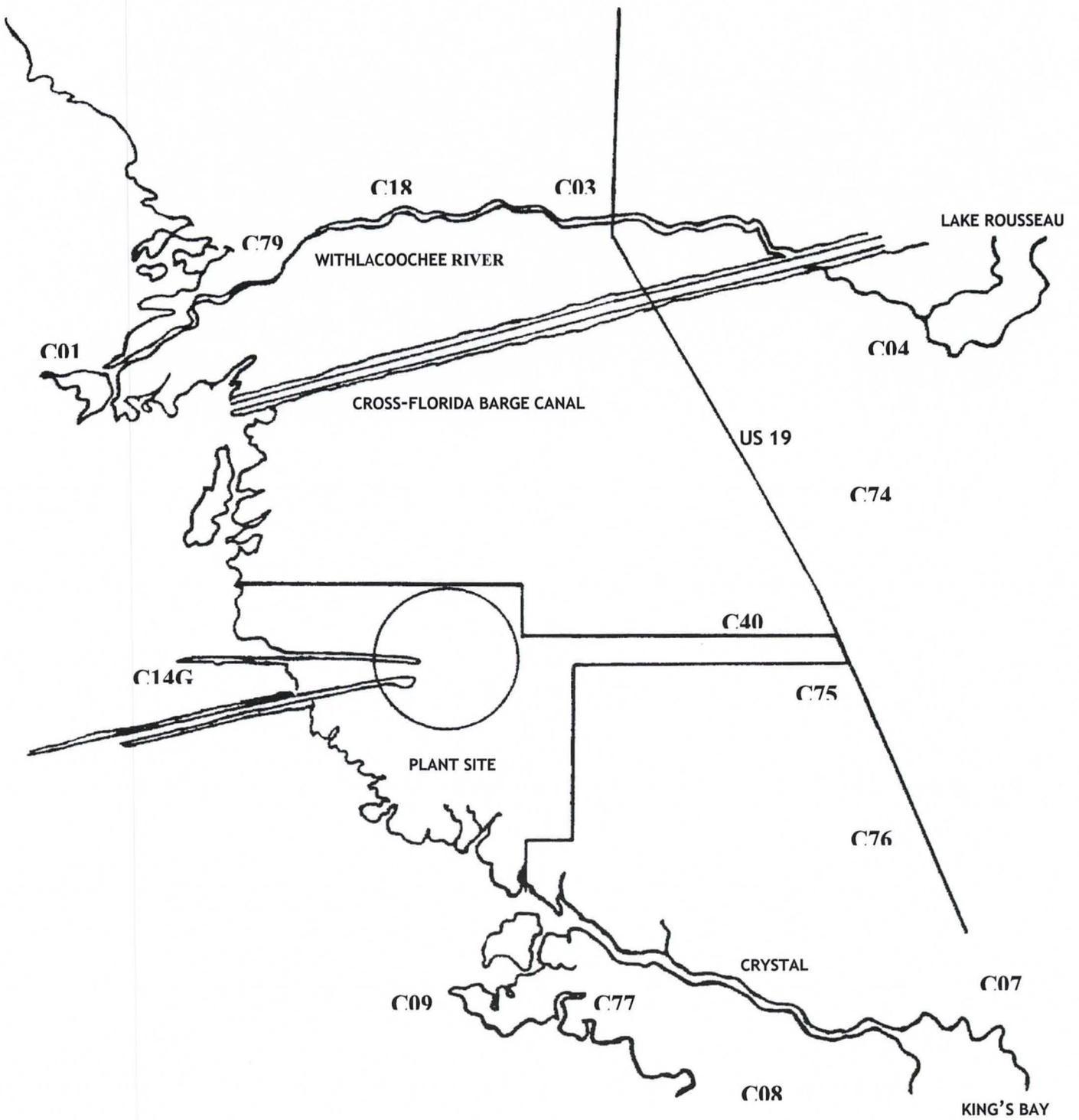
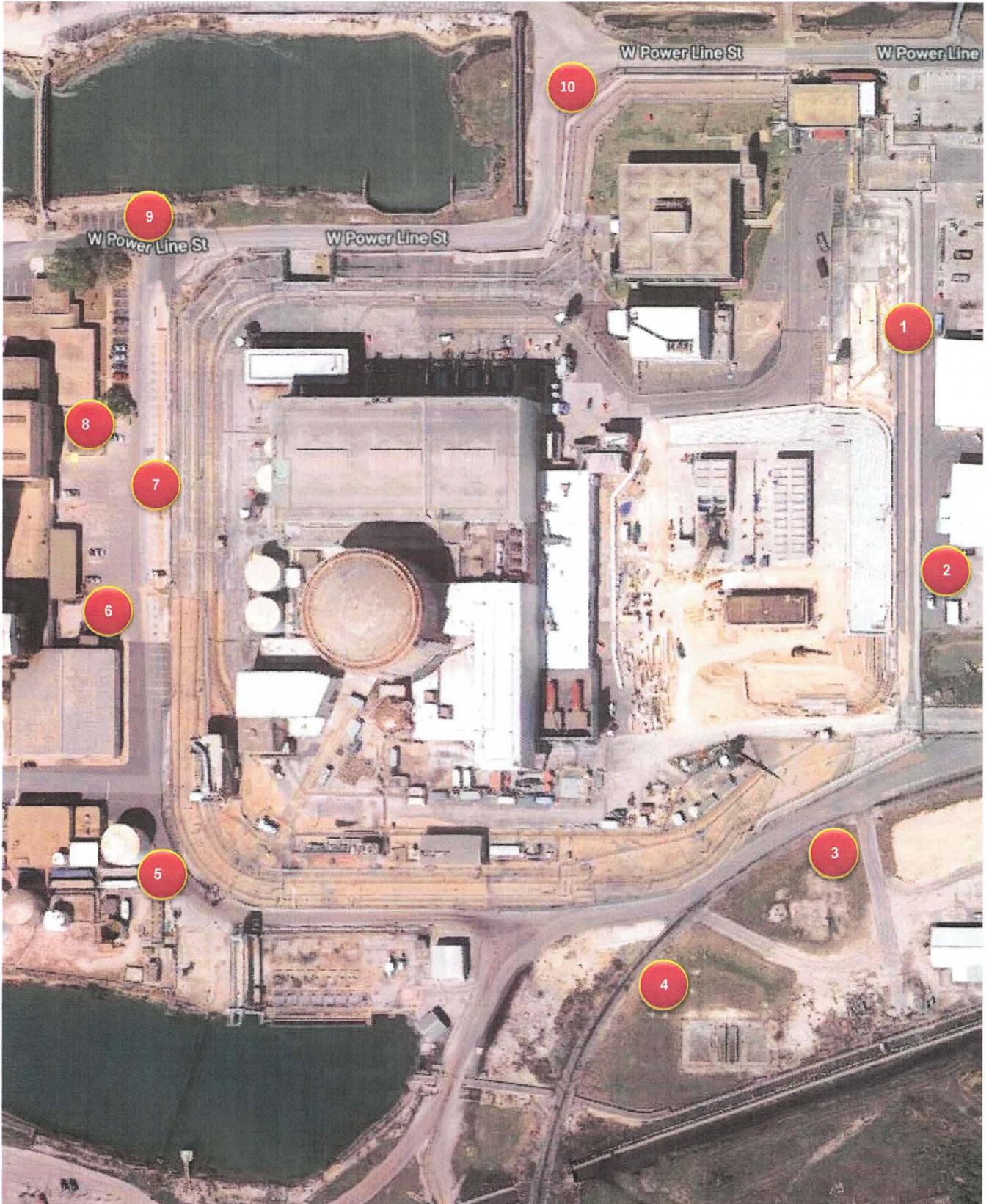


FIGURE I-4: Environmental Monitoring TLD Locations (off site)

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



II. LAND-USE CENSUS

A 2021 land-use census was conducted in June and July. The purpose of the 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. No vegetable gardens or milk-producing animals were found within a 5 mile radius of the plant, same as 2020.

SECTOR	NEAREST RESIDENCE	NEAREST GARDEN (A)	NEAREST MILK ANIMAL
N	4.5 @ 2°	*	*
NNE	4.6 @ 15°	*	*
NE	3.8 @ 54°	*	*
ENE	3.4 @ 57°	*	*
**E	2.4 @ 92°	*	*
ESE	4.2 @ 102°	*	*
SE	4.8 @ 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.

** Not a permanent resident but occupied intermittently by various DEP personal

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). For 2021, all results were within the indicated Acceptance Ranges, as shown below.

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".

MAPEP Results for February 2021:

Media	Nuclide	Result	% Bias	Acceptance Range	Flag
Air Filter	Cs-134	1.841	-14.0	1.50-2.78	A
Air Filter	Cs-137	0.004	-	False Positive Test	A
Air Filter	Zn-65	0.358	1.7	0.246-0.458	A
Air Filter	Co-60	0.018	-	False Positive Test	A
Air Filter	Mn-54	0.300	-3.8	0.218-0.406	A
Soil	Cs-134	0.12	-	False Positive Test	A
Soil	Cs-137	1541.25	-0.6	1085-2015	A
Soil	Co-57	838.63	-8.8	644-1196	A
Soil	Co-60	1320.00	-3.7	959-1781	A
Soil	Mn-54	0.70	-	False Positive Test	A
Soil	Zn-65	630.88	4.5	423-785	A
Vegetation	Cs-134	3.861	7.3	2.5-4.7	A
Vegetation	Cs-137	5.409	15.3	3.28-6.10	A
Vegetation	Co-57	6.197	22.7	3.54-6.57	A
Vegetation	Co-60	3.213	7.5	2.09-3.89	A
Vegetation	Mn-54	5.956	13.4	3.68-6.83	A
Vegetation	Zn-65	0.005	-	False Positive Test	A
Water	Cs-134	10.908	-5.1	8.1-15.0	A
Water	Cs-137	8.270	4.7	5.5-10.3	A
Water	Co-60	0.100	-	False Positive Test	A
Water	Mn-54	0.300	-3.8	0.218-0.406	A
Water	Zn-65	0.358	1.7	0.246-0.458	A
Water	H-3	568.4	-5.2	473.5-595.6	A

IV-A. AIRBORNE PATHWAY

Air samples are taken at five locations near the plant. The control location (station C-47) 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 308 gross beta samples.

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

In 2021, 308 particulate samples were analyzed for gross beta activity, and 307 had measurable activity above LLD. For the four week time period between 7/21/21 to 8/17/21, samples at location C07 (downtown Crystal River) were unavailable due to local construction which caused the sampler to be without power. The average indicator concentration for collected samples was 18 pCi/1000 m³ with a range of 4 to 51 pCi/1000 m³. In 2020 the average value was 16 pCi/1000 m³ and in 2019 it was 18 pCi/1000 m³. The average indicator concentration since 1996 has been in the range of 14 to 24 pCi/1000 m³. The control location concentration for 2021 averaged 16 pCi/1000 m³, with a range of 4 to 30 pCi/1000 m³. The control location in 2020 averaged 14 pCi/1000 m³. In 2021, location C18 had the highest yearly indicator concentration at 20 pCi/1000 m³. C18 was also the highest location in 2020, with an average of 18 pCi/1000 m³.

Quarterly composite data are summarized in Table IV-A.3. In 2021, measurable quantities of cesium were not identified in any particulate filter sample. The highest cesium 137 LLD was 1.7 pCi/1000 m³, versus 1.2 pCi/1000 m³ in 2020.

The 2021 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 nine instances of an air sampler partial run time. They were identified during the routine weekly sample change-outs. The July-August C07 outage documented in #6 below and discussed above was by far the longest.

1. C07: 23-Mar-21 - Power outage. Estimated run time 169.8 out of 191.3 hours. Air filter missing.
2. C41: 08-Jun-21 - Power outage. Estimated run time 152.8 out of 167.4 hours.
3. C46: 13-Jul-21 - No power. Estimated run time 19.9 out of 167 hours. Power restored later the same day. (Documented in CR3 NCR 2021000074)
4. C46: 20-Jul-21: Power outage. Estimated run time 164.9 out of 169 hours.
5. C41: 20-Jul-21 – Power outage. Estimated run time 144.7 out of 169 hours.
6. C07: 20-Jul-21 – No power due to construction. Outage lasted one month. (Documented in CR3 NCR 2021000098)
7. C46: 17-Aug-21 – Power Outage. Estimated run time 124.4 out of 166.2 hours.
8. C41: 26-Oct-21 – No Power. Estimated run time 143.8 hours out of 168.5 hours. (Documented in CR3 NCR 2021000133)
9. C18: 26-Oct-21 – Pump malfunction. Estimated run time 4.9 hours out of 168.5 hours.
10. C41: 2-Nov-21 – Power outage. Estimated run time 60.4 out of 168.3 hours.
11. C41: 29-Dec-21 – Power outage. Estimated run time 140.1 out of 216.4 hours.

The yearly percentages of missed (zero) or partial air samples (14) was 5.3 % of the total indicator samples (260).

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, 2021

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
AIRBORNE PARTICULATES (pCi/1000m ³ for Gross β, pCi/1000m ³ for γ Spec)	Gross β 308 γ Spec 24	4.0	18 (255/256) (4-51)	C18 5.3 miles North	20 (52/52) (4-51)	16 (52/52) (4-30)	0
	Cs-134	1.4	<LLD	--	--	<LLD	0
	Cs-137	1.7	<LLD	--	--	<LLD	0

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

TABLE IV-A.2

ADP CR3, LLC - 2021

pCi/1000 m³ GROSS BETA IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
04-Jan-21	13	18	12	12	17	12
12-Jan-21	28	26	24	29	27	22
19-Jan-21	16	23	20	23	19	19
25-Jan-21	23	19	24	21	26	20
01-Feb-21	15	20	17	19	21	17
08-Feb-21	16	16	13	16	18	17
15-Feb-21	8	11	10	10	7	10
23-Feb-21	8	15	14	12	14	13
02-Mar-21	14	18	23	19	16	15
08-Mar-21	17	21	15	17	17	17
15-Mar-21	22	25	30	26	25	26
23-Mar-21	*	20	20	11	16	19
29-Mar-21	12	17	13	11	16	14
Average:	15	19	18	18	17	17

* Air filter missing and found on ground

TABLE IV-A.2 (Cont'd)

ADP CR3, LLC - 2021

pCi/1000 m³ GROSS BETA IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
06-Apr-21	21	24	24	22	23	21
13-Apr-21	19	24	22	16	20	23
20-Apr-21	27	24	27	23	22	23
27-Apr-21	23	20	18	20	22	18
04-May-21	25	23	20	26	22	21
11-May-21	16	18	22	17	14	17
18-May-21	14	13	16	16	18	15
26-May-21	18	18	17	21	17	18
01-Jun-21	22	28	21	27	22	25
08-Jun-21	10	10	9	9	9	6
15-Jun-21	10	14	12	10	10	13
22-Jun-21	17	20	20	20	20	16
29-Jun-21	11	9	12	14	9	9
Average	18	19	19	19	18	17

TABLE IV-A.2 (Cont'd)

ADP CR3, LLC - 2021

pCi/1000 m³ GROSS BETA IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
06-Jul-21	6	4	8	5	7	6
13-Jul-21	16	17	19	17	37**	13
20-Jul-21	16	12	15	14	14	12
27-Jul-21	*	20	15	21	9	11
03-Aug-21	*	16	13	10	16	10
10-Aug-21	*	12	14	10	11	8
17-Aug-21	*	12	9	12	12**	9
24-Aug-21	12	15	12	12	12	9
31-Aug-21	14	13	17	18	7	16
07-Sep-21	15	20	19	21	20	19
14-Sep-21	18	20	21	18	20	18
21-Sep-21	7	6	5	4	7	6
28-Sep-21	15	17	17	19	16	16
Average	13	14	14	14	14	12

* Not Collected – See CR2021000098

** Less than normal run time

TABLE IV-A.2 (Cont'd)

ADP CR3, LLC - 2021

pCi/1000 m³ GROSS BETA IN AIR

Collection Date	SAMPLE SITE					
	C07	C18	C40	C41	C46	C47
04-Oct-21	32	36	28	37	22	30
12-Oct-21	12	12	10	15	8	9
19-Oct-21	19	24	18	20	20	21
26-Oct-21	28	*	23	29	31	22
02-Nov-21	19	21	20	11**	17	18
08-Nov-21	15	23	16	17	15	13
16-Nov-21	27	26	20	24	26	22
22-Nov-21	17	17	18	24	15	11
30-Nov-21	24	23	26	35	25	21
07-Dec-21	33	27	31	27	30	28
14-Dec-21	16	21	14	15	14	18
20-Dec-21	12	14	13	13	10	4
29-Dec-21	25	28	24	29**	22	22
Average	22	23	20	23	20	18

* Vacuum pump failure. Only 5 hours run time.

** Reduced run time.

TABLE IV-A.3

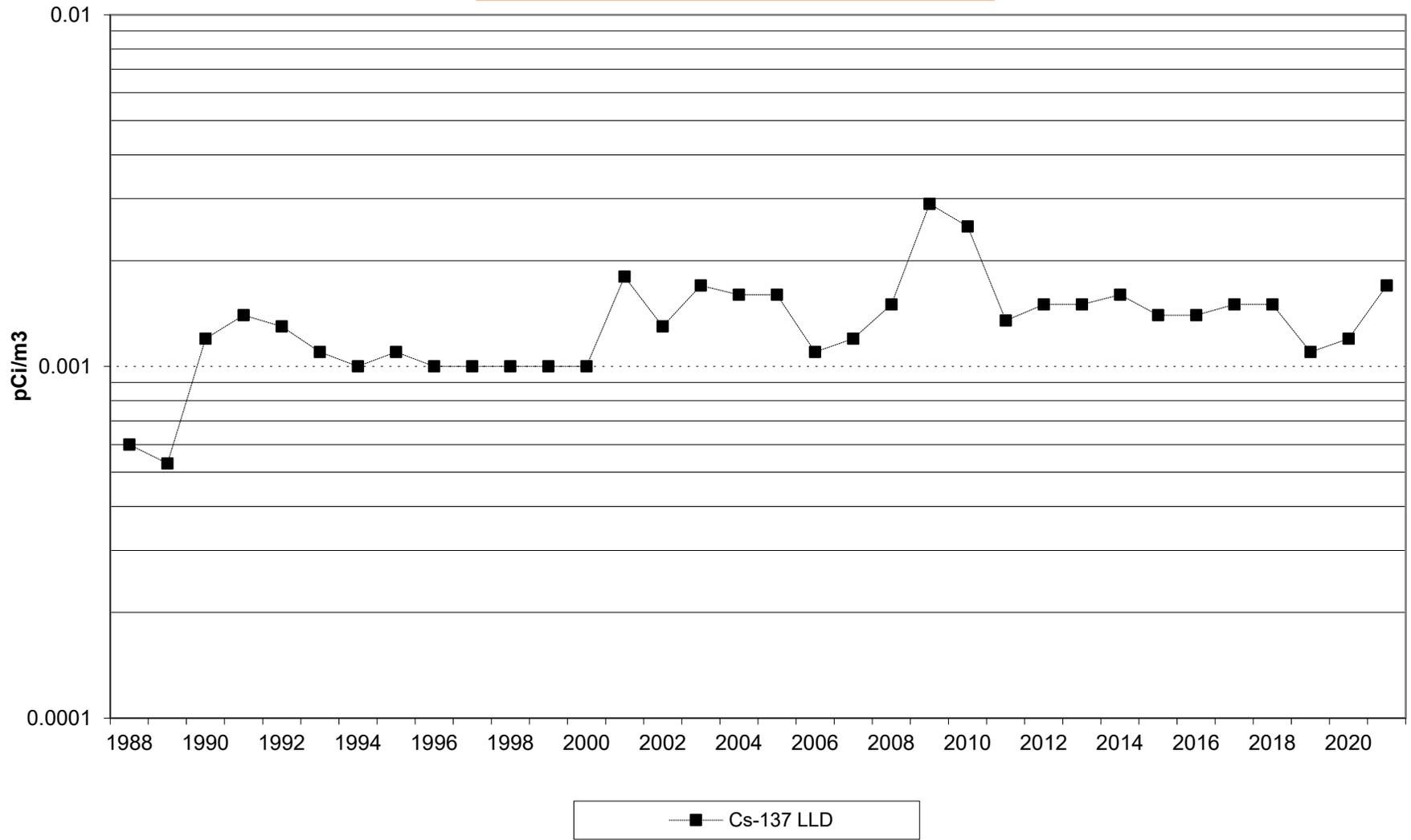
ADP CR3, LLC - 2021

pCi/1000 m³ GAMMA EMITTERS IN QUARTERLY COMPOSITES OF AIR PARTICULATES

STATION	NUCLIDE	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER
C07	Be-7	133	142	103	149
	K-40	<18	<13	<24	<13
	Cs-134	<1	<1.2	<1.8	<1.2
	Cs-137	<0.8	<0.8	<1.7	<0.9
C18	Be-7	150	171	83	140
	K-40	<21	<16	<17	<15
	Cs-134	<0.8	<1.1	<0.9	<1.3
	Cs-137	<0.7	<0.9	<0.8	<1.1
C40	Be-7	147	139	81	137
	K-40	<17	<18	<15	<16
	Cs-134	<0.9	<0.9	<1	<1.3
	Cs-137	<0.8	<0.6	<0.7	<1
C41	Be-7	139	153	127	166
	K-40	<18	<10	<14	<13
	Cs-134	<0.9	<1.2	<1.3	<1.3
	Cs-137	<0.8	<0.9	<0.9	<1
C46	Be-7	164	126	102	159
	K-40	<17	<14	<17	<13
	Cs-134	<1.1	<0.9	<1.1	<1.4
	Cs-137	<1	<0.8	<0.8	<1
C47	Be-7	154	150	102	154
	K-40	<14	<11	<16	<15
	Cs-134	<1.2	<1	<1.3	<1.2
	Cs-137	<0.9	<0.7	<0.9	<0.9

Airborne (highest values plotted)

2011 Measured Values due to Fukushima Event



IV-B. DIRECT RADIATION

Direct radiation measurements (using TLDs) were taken at 31 locations surrounding the plant, and at one control location 78 miles from the site (C47). Of the 124 non-control quarterly TLDs, 123 were collected. Location C07 could not be collected during the third quarter as the siren pole was found removed during routine change-out on 8/10/21. A new TLD was placed on an adjacent pole.

Table IV-B provides a statistical summary of the analytical results for 124 non-control TLDs sampled throughout the year.

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

In 2021, the highest annual average on-site dose was 61 mrem at station C71 (WNW at 3600 feet). It was also the highest in 2020 at 55 mrem and in 2019 at 56 mrem. 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 average on-site dose was 51 mrem at station C70 (WSW at 3692 feet near coal units 4 & 5). For 2020, C71 was also the highest and C65 (ESE at 1743 feet southeast of the coal rail loop) was second highest.

The highest annual average off-site dose was 40 mrem at station C77 (SSE at 3.4 miles). C40 (east at 3.5 miles) at 40 mrem was the highest offsite location in 2020. The control station (C47) average annual dose was 36 mrem in 2020 versus 32 mrem in 2020. The average for all stations (except control) was 40 mrem for 2021 versus 35 mrem for 2020. Direct radiation results in 2021 are similar to previous results and do not show any indication of a trend.

The Independent Spent Fuel Storage Installation (ISFSI) was loaded with spent fuel beginning June 2017 and completed January 2018. Calculations performed prior to fuel movement into dry storage, derived a conservative dose rate at ~ 400 meters from the ISFSI pad of ~ 2.0 E-4 mrem/h gamma plus neutron (Ref. N16-0003, Table 11-27). The gamma component contributes most of the dose. Greater than class C waste, stored at the ISFSI in May 2018, has a much lower gamma dose rate (Ref. N18-0002). The combined dose at 400 meters is ~ 0.4 mrem for 90 days of exposure. 90 days is the approximate exposure period for REMP TLDs, and 400 meters is the approximate nearest distance from the ISFIS pad (center) for any of the REMP TLDs (e.g. C65). A review of quarterly TLD results shows that normal quarter to quarter variation in dose is greater than the dose increment due to ISFSI. Likewise, four of the REMP TLDs (C65, C66, C67, and C68) most likely to be influenced by the ISFSI based on no discernable step change increases in annual dose over the period of 2018 through 2021 when compared to the period of 2014 through mid-2017.

TABLE IV-B

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

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, 127	15	40 (123/123) (24 - 71)	C71 0.6 @ 296°	62 (4/4) (52 - 70)	36 (4/4) (29 - 42)	0

TABLE IV-B.1

ADP CR3, LLC- 2021

Annual gamma (γ) Dose (mrem)

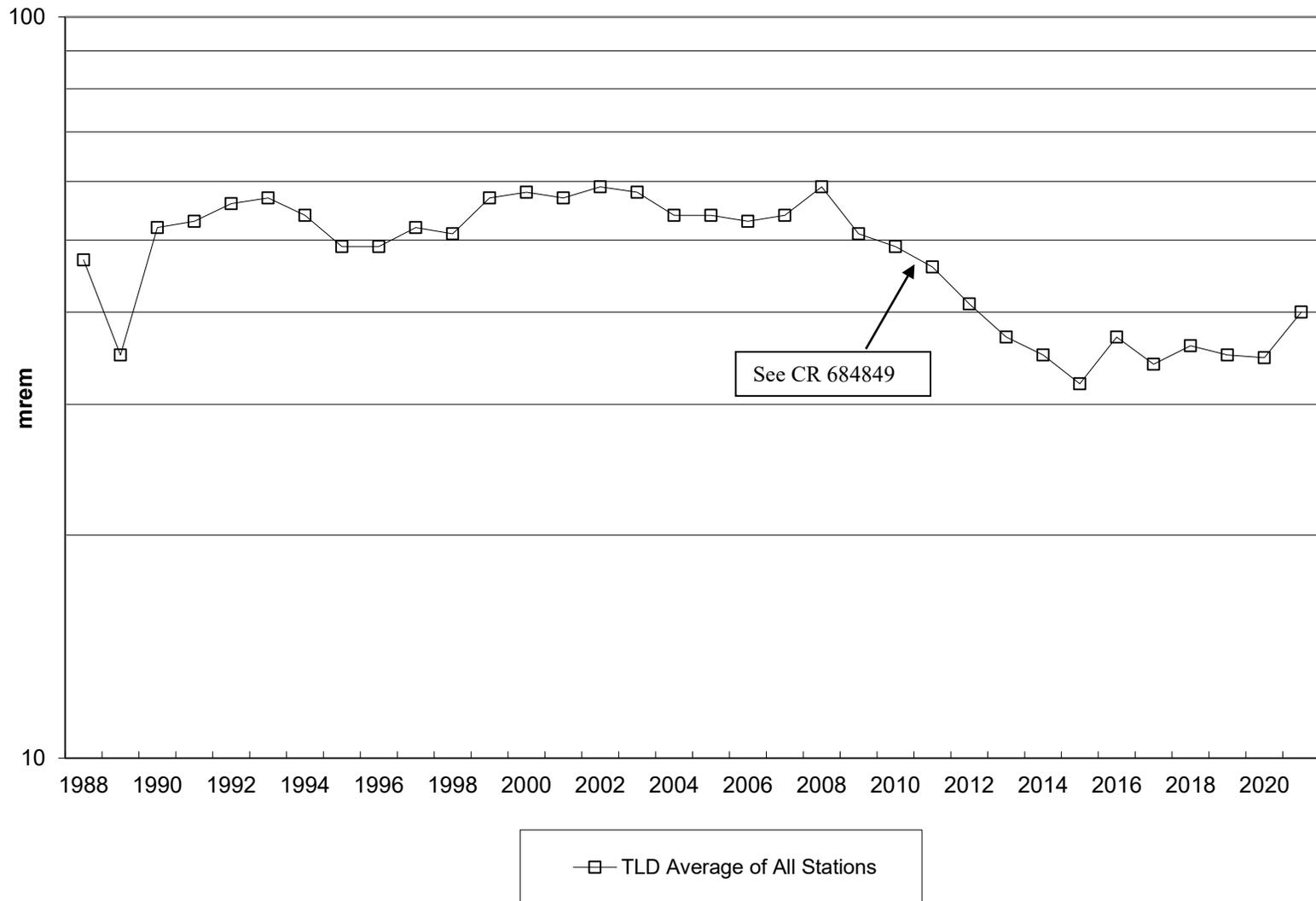
TLD STATION	Quarter	1	2	3	4
C01		40	26	37	29
C03		39	26	39	30
C04		37	26	38	44
C07*		37	26	**	33
C08		38	26	36	29
C09		38	25	38	31
C14G		44	31	45	35
C18		41	28	41	31
C27		52	34	52	40
C40*		52	36	52	38
C41		44	29	44	36
C46*		46	71***	48	38
C47 (CONTROL)		40	29	42	31
C60		48	31	48	37
C61		48	34	48	39
C62		50	34	52	40
C63		50	34	48	37
C64		45	32	45	36
C65		53	38	54	43
C66		52	35	48	40
C67		52	35	52	42
C68		49	32	48	39
C69		51	36	49	48
C70		57	40	59	49
C71		70	52	66	57
C72		48	36	50	41
C73		44	31	44	35
C74		36	24	35	29
C75		44	31	43	33
C76		41	28	41	32
C77		35	24	33	28
C79		40	29	41	33

*TLDs not required by the ODCM.

** Missing

*** Reported high uncertainty associated with measurement

Direct Radiation



IV-C. WATERBORNE PATHWAY

To evaluate the waterborne pathway, samples are taken of seawater, groundwater, 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 2021, of twenty-four indicator samples, none had measurable tritium.

Gamma spectral analysis was performed on all thirty-six samples, (including the 12 control samples at C13) and none of them 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 3.7 miles east of CR-3 at well station #12. Gamma spectral and tritium analyses are performed. In 2021, 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 ODCM required sensitivity for measuring tritium in groundwater is 2000 pCi/L. Analysis of groundwater 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. The C40 groundwater sample is taken from pump #12.

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 groundwater samples are taken at thirteen locations surrounding the perimeter of the CR-3 protected area (See Figure 1-5). Historically five of these groundwater 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 known leaking plant components.

In 2021, one groundwater well - CR3-5 - continued to show tritium at very low concentrations above LLD, same as in 2020. Well CR3-5 had an average tritium concentration of 183 pCi/L with a range of 160 to 203 pCi/L based on all four 2021 quarterly samples. This compares to an average value of 227 pCi/l in 2020 and thus represents a slight decrease. Well 3-6S, which is just north of well CR3-5, showed 134 pCi/liter for the first quarter sample and less than LLD for the other three samples.

Along with these wells, two other wells that are not presently part of the REMP program were sampled. They are on either side (north and south) of the plant settling ponds (percolation ponds) and are referred to as MWC-27 and MWC-IF2. Both wells did not show tritium concentrations above LLD levels in 2021, same as in 2020.

Due to ongoing demolition of the coal plants, several well samples could not be obtained in 2021. This is documented in CR 2021000125 and CR 2022000006. Third quarter samples for wells CR3-6S, CR3-6D, CR3-7, CR3-8 and CR3-9 were missed. The fourth quarter samples for these wells was obtained in the first week of 2022.

IV-C. WATERBORNE PATHWAY Cont'd

There have been no measurable amounts of gamma emitting radionuclides in any of these wells. There have also 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. As already noted, site ground water flows in a west-southwest direction toward the Gulf of Mexico. This flow was re-verified in 2017, after the ISFSI pad sub-surface construction was completed, with a new ground water flow study performed by a certified hydro-geologist as part of the NEI Ground Water Protection Initiative. In 2012 a previous groundwater flow study was performed to evaluate groundwater flow post installation of CR Units 4 & 5 clean air scrubber system. This scrubber system utilizes groundwater from the Florida aquifer. The flow studies 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 or the ISFSI pad.

It is noted that groundwater at the CR3 site is too saline for use as a potable water source, hence there is no drinking water intake 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.

4. Quarterly non-REMP required well samples at two locations were collected as discussed in item #3 above. 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, 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) and are now less than the minimum detectable.

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 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. All samples are Control samples.

In 2021, none of the samples yielded measurable activities of tritium or the required gamma emitters, same as in 2020. The measurement sensitivity for drinking water samples is the same as those for ground water samples.

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.

IV-C. WATERBORNE PATHWAY Cont'd

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 2021, five of the six samples showed Cs-137 below LLD and all other radionuclides were also below LLD. The reported positive sample was at C14H at a concentration of 16 pCi/kg Cs-137, which is close to the LLD. For 2020, all results were reported as LLD. In 2019, higher than usual Co-60 was detected in the three February 2019 samples – 67, 29 and 394 pCi/kg, for locations C14H, C14M and C14G, respectively. These locations all showed less than LLD when resampled in August 2019. Cs-137 results showed two of the three locations (C14M and C14G) with positive results in February (17 and 64 pCi/kg, respectively). For the August set of samples, only C14M showed Cs-137 above LLD at 13 pCi/Kg. In 2018, one of the six samples showed Cs-137 above LLD levels (location C14M had 6 ± 2 pCi/kg in the Aug 2018 sample).

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. There were no unmonitored spills or releases of radioactive material in 2021 that had 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, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
SEAWATER (pCi/L)	<u>Tritium, 36</u>	142	<LLD			<LLD	0
	<u>γ Spec, 36</u>						
	Mn-54	4	<LLD	--	--	<LLD	0
	Fe-59	10	<LLD	--	--	<LLD	0
	Co-58	4	<LLD	--	--	<LLD	0
	Co-60	5	<LLD	--	--	<LLD	0
	Zn-65	9	<LLD	--	--	<LLD	0
	Zr-Nb-95	7	<LLD	--	--	<LLD	0
	Cs-134	4	<LLD	--	--	<LLD	0
	Cs-137	5	<LLD	--	--	<LLD	0
Ba-La-140	8	<LLD	--	--	<LLD	0	

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

TABLE IV-C.1.a
ADP CR3, LLC- 2021
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	Cs-134	Cs-137	Ba-La-140
C13	JAN	<136	179±17	<4	<4	<9	<4	<8	<6	<4	<3	<5
	FEB	<137	198±19	<3	<3	<6	<3	<8	<6	<3	<3	<4
	MAR	<139	216±21	<3	<3	<7	<3	<8	<6	<3	<4	<4
	APR	<134	245±24	<3	<3	<7	<4	<7	<6	<4	<4	<4
	MAY	<135	256±25	<4	<3	<7	<4	<7	<6	<3	<4	<4
	JUN	<139	252±25	<4	<3	<7	<3	<8	<6	<3	<4	<4
	JUL	<138	218±21	<4	<4	<7	<3	<8	<6	<3	<3	<4
	AUG	<137	175±17	<4	<4	<7	<4	<9	<7	<3	<4	<7
	SEP	<136	168±16	<3	<3	<7	<4	<7	<6	<3	<4	<4
	OCT	<136	286±28	<4	<4	<7	<4	<8	<7	<4	<4	<5
	NOV	<140	319±31	<3	<4	<7	<4	<8	<7	<4	<4	<8
	DEC	<136	207±20	<3	<4	<7	<4	<8	<6	<3	<4	<4
C14G	JAN	<136	182±18	<4	<5	<10	<4	<8	<8	<4	<4	<5
	FEB	<142	187±18	<3	<3	<6	<3	<7	<6	<3	<4	<4
	MAR	<139	222±22	<3	<3	<6	<4	<8	<6	<4	<4	<4
	APR	<134	214±21	<4	<3	<6	<3	<8	<6	<3	<4	<8
	MAY	<135	132±13	<3	<3	<6	<3	<8	<6	<3	<4	<4
	JUN	<139	297±29	<3	<3	<6	<3	<7	<6	<3	<4	<4
	JUL	<138	206±20	<3	<3	<7	<4	<7	<6	<4	<4	<4
	AUG	<137	<57	<4	<4	<7	<4	<7	<7	<4	<4	<5
	SEP	<134	120±12	<3	<3	<7	<4	<8	<6	<4	<4	<4
	OCT	<136	260±26	<4	<4	<7	<4	<9	<7	<4	<4	<5
	NOV	<135	284±28	<4	<3	<7	<4	<8	<6	<4	<4	<7
	DEC	<136	249±24	<4	<4	<8	<4	<8	<7	<4	<4	<7

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

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
C14H	JAN	<136	193±19	<4	<4	<8	<4	<8	<7	<3	<5	<5
	FEB	<137	206±20	<3	<3	<6	<3	<9	<6	<3	<4	<4
	MAR	<139	153±15	<4	<4	<7	<3	<8	<6	<4	<4	<4
	APR	<134	173±17	<3	<3	<6	<4	<8	<6	<4	<4	<4
	MAY	<135	178±17	<3	<3	<7	<3	<8	<7	<3	<4	<4
	JUN	<139	209±20	<3	<3	<7	<3	<7	<5	<3	<4	<4
	JUL	<138	108±10	<4	<3	<7	<3	<8	<6	<4	<4	<4
	AUG	<137	112±11	<3	<3	<8	<4	<8	<7	<4	<4	<7
	SEP	<134	132±13	<3	<3	<5	<3	<7	<5	<3	<4	<4
	OCT	<136	214±21	<4	<4	<9	<4	<9	<8	<4	<4	<6
	NOV	<135	234±23	<4	<4	<7	<3	<9	<5	<4	<4	<8
	DEC	<136	126±12	<4	<4	<7	<3	<8	<6	<4	<4	<5

Seawater

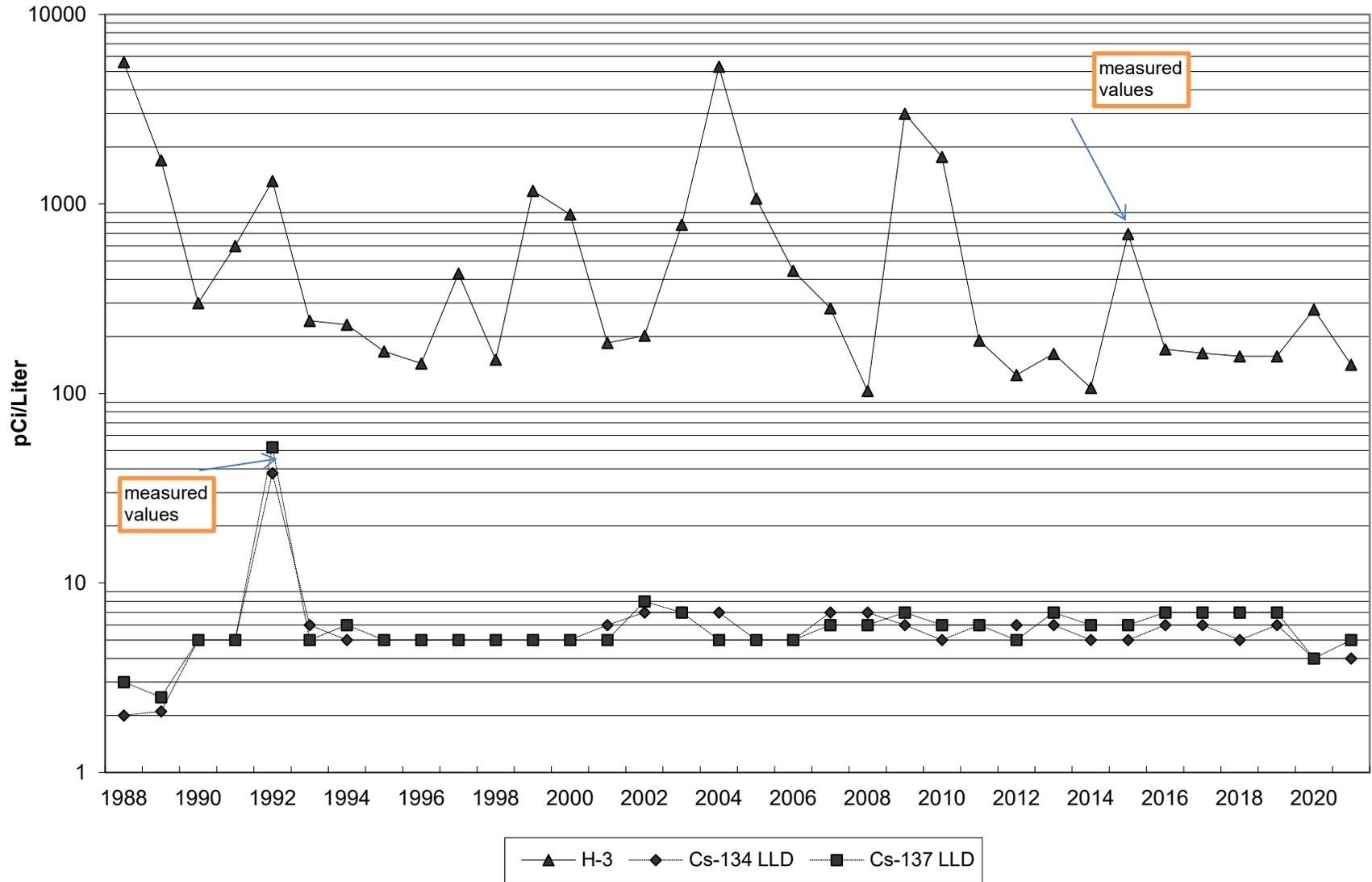


TABLE IV-C.2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	<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
GROUND WATER ² (pCi/L)	<u>Tritium, 2</u>	139	<LLD	--	--	<LLD	0
	<u>γ Spec, 2</u>						
	Mn-54	4	<LLD	--	--	<LLD	0
	Fe-59	7	<LLD	--	--	<LLD	0
	Co-58	4	<LLD	--	--	<LLD	0
	Co-60	3	<LLD	--	--	<LLD	0
	Zn-65	9	<LLD	--	--	<LLD	0
	Zr-Nb-95	7	<LLD	--	--	<LLD	0
	Cs-134	6	<LLD	--	--	<LLD	0
	Cs-137	4	<LLD	--	--	<LLD	0
Ba-La-140	4	<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

ADP CR3, LLC- 2021

pCi/L γ EMITTERS AND TRITIUM IN GROUND WATER

STATION	NUCLIDE	FIRST HALF	SECOND HALF
C40	H-3	<139	<137
	Mn-54	<4	<4
	Fe-59	<6	<7
	Co-58	<3	<4
	Co-60	<3	<3
	Zn-65	<8	<9
	Zr-Nb-95	<5	<7
	Cs-134	<3	<6
	Cs-137	<4	<4
	Ba-La-140	<4	<4
	K-40	<40	<72

Semi-Annual Ground Water

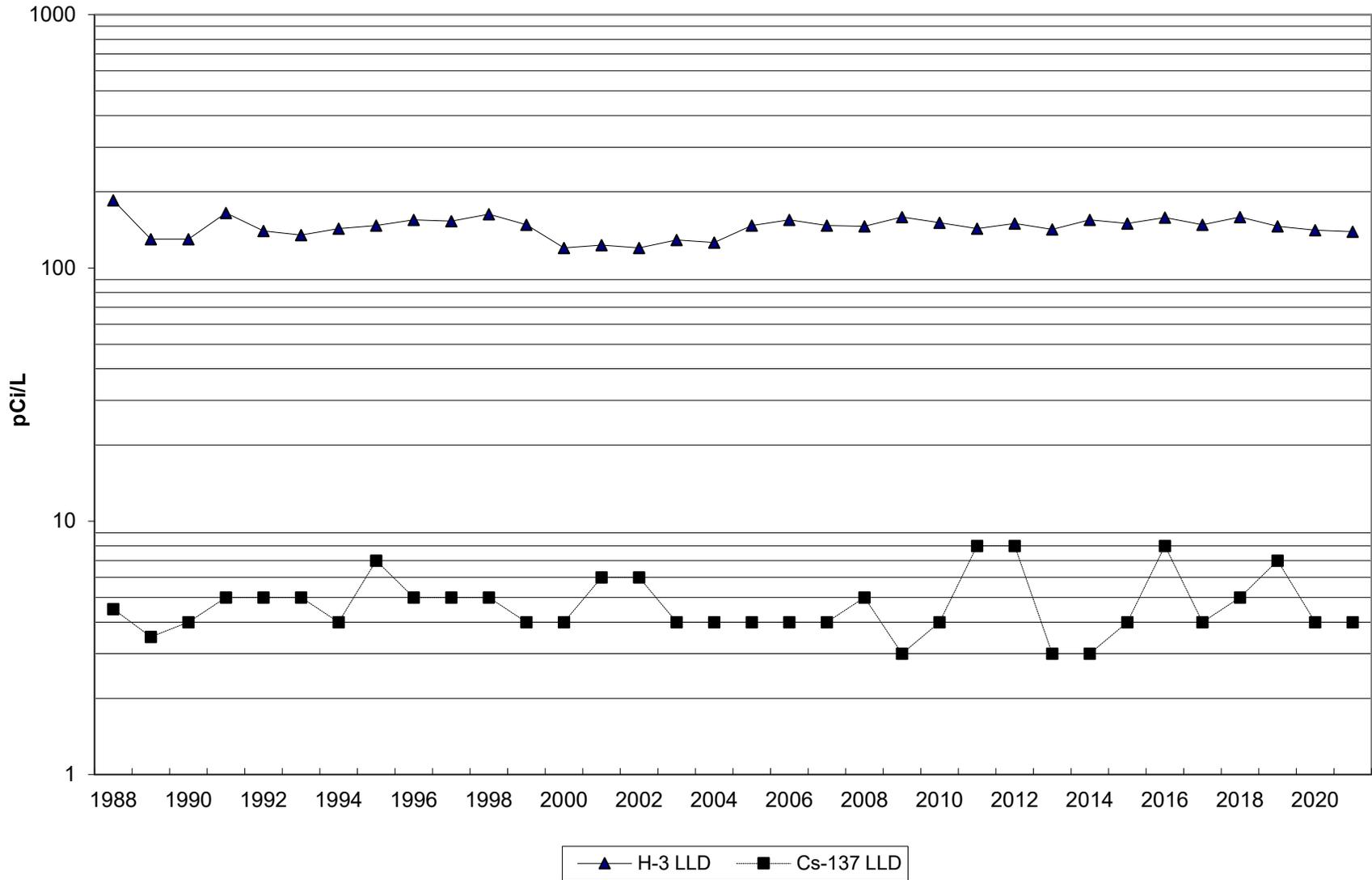


TABLE IV-C.3.a.1

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
CR3-1D	01-27	<133	<74	<4	<4	<7	<4	<8	<6	<4	<4	<7
	05-20	<141	<50	<3	<4	<8	<3	<6	<5	<3	<4	<6
	09-28	<136	<80	<4	<4	<7	<4	<10	<7	<4	<4	<8
	12-28	<132	<46	<4	<3	<7	<3	<9	<6	<4	<4	<4
CR3-1S	01-27	<133	<73	<4	<4	<8	<4	<9	<6	<4	<4	<5
	05-20	<139	<69	<4	<4	<8	<3	<7	<7	<3	<3	<6
	09-28	<136	<74	<4	<4	<8	<4	<8	<7	<4	<4	<10
	12-28	<132	<42	<4	<4	<6	<4	<8	<7	<4	<4	<4
CR3-2	01-27	<133	<83	<4	<4	<7	<4	<10	<7	<4	<5	<6
	05-20	<135	<47	<4	<4	<7	<4	<8	<7	<4	<3	<5
	09-28	<136	<78	<4	<4	<8	<5	<9	<7	<4	<5	<9
	12-28	<132	<58	<4	<4	<8	<4	<9	<6	<4	<4	<4

TABLE IV-C.3.a.1

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
CR3-3D	01-27	<142	<46	<3	<4	<6	<3	<8	<7	<4	<4	<5
	05-20	<139	<27	<4	<3	<6	<3	<6	<6	<4	<4	<5
	09-28	<136	<85	<5	<5	<10	<5	<11	<8	<5	<5	<11
	1-04*	<132	<39	<3	<3	<7	<3	<7	<6	<4	<3	<4
CR3-3S	01-27	<133	<42	<3	<4	<8	<3	<8	<7	<3	<4	<5
	05-20	<141	<48	<3	<3	<7	<4	<8	<6	<4	<4	<5
	09-28	<136	<73	<3	<4	<7	<4	<9	<7	<4	<4	<6
	1-04*	<132	<36	<3	<3	<6	<3	<8	<5	<3	<3	<4
CR3-4	01-27	<133	<42	<4	<3	<7	<3	<8	<6	<4	<4	<5
	05-20	<141	<53	<4	<4	<7	<4	<11	<7	<4	<5	<5
	09-28	<136	<54	<4	<4	<8	<4	<11	<7	<5	<5	<4
	1-04*	<132	<53	<4	<4	<9	<4	<11	<7	<5	<5	<5

TABLE IV-C.3.a.1

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
CR3-5	01-27	203	<26	<4	<3	<7	<4	<9	<6	<4	<5	<4
	06-01	200	<50	<3	<4	<7	<4	<9	<6	<4	<4	<4
	09-28	160	<58	<4	<4	<8	<4	<9	<6	<5	<5	<5
	1-06*	171	<27	<4	<4	<8	<5	<11	<7	<5	<5	<5
CR3-6S	01-27	134	<49	<4	<3	<7	<4	<10	<7	<4	<4	<4
	06-09	<140	<68	<2	<2	<4	<2	<4	<3	<2	<2	<3
	01-06*	<133	<29	<4	<3	<6	<3	<7	<7	<3	<3	<4
CR3-6D	01-27	<133	<36	<3	<3	<7	<4	<7	<5	<4	<4	<4
	06-09	<140	<51	<2	<2	<5	<2	<5	<4	<2	<2	<4
	01-06*	<133	<32	<4	<3	<7	<3	<8	<6	<4	<4	<4

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

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
CR3-7	01-27	<133	<50	<3	<4	<6	<4	<9	<7	<4	<4	<4
	06-09	<139	<57	<4	<4	<7	<4	<11	<7	<4	<5	<4
	01-06*	<133	<51	<4	<4	<7	<4	<10	<6	<4	<4	<4
CR3-8	01-27	<137	<61	<5	<4	<9	<4	<14	<8	<5	<6	<5
	06-09	<140	<27	<1	<1	<3	<1	<3	<2	<2	<2	<2
	01-06*	<133	<56	<4	<4	<8	<5	<11	<7	<5	<5	<5
CR3-9	01-27	<133	<55	<4	<4	<6	<4	<9	<6	<4	<4	<2
	05-20	<141	<55	<4	<4	<7	<4	<10	<6	<4	<4	<4
	09-28	<136	<53	<4	<4	<8	<4	<10	<7	<4	<4	<4

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

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
CR3-10	01-27	<133	<45	<4	<4	<7	<4	<10	<7	<4	<5	<4
	05-20	<141	<53	<5	<5	<8	<5	<12	<7	<5	<5	<5
	09-28	<136	<52	<4	<4	<9	<5	<11	<8	<5	<5	<4
	1-04*	<133	<52	<4	<4	<7	<4	<10	<7	<4	<4	<5

*Collected January 2022

Tritium Measurement GW Well # CR3-1S

All results are < LLD since 2010



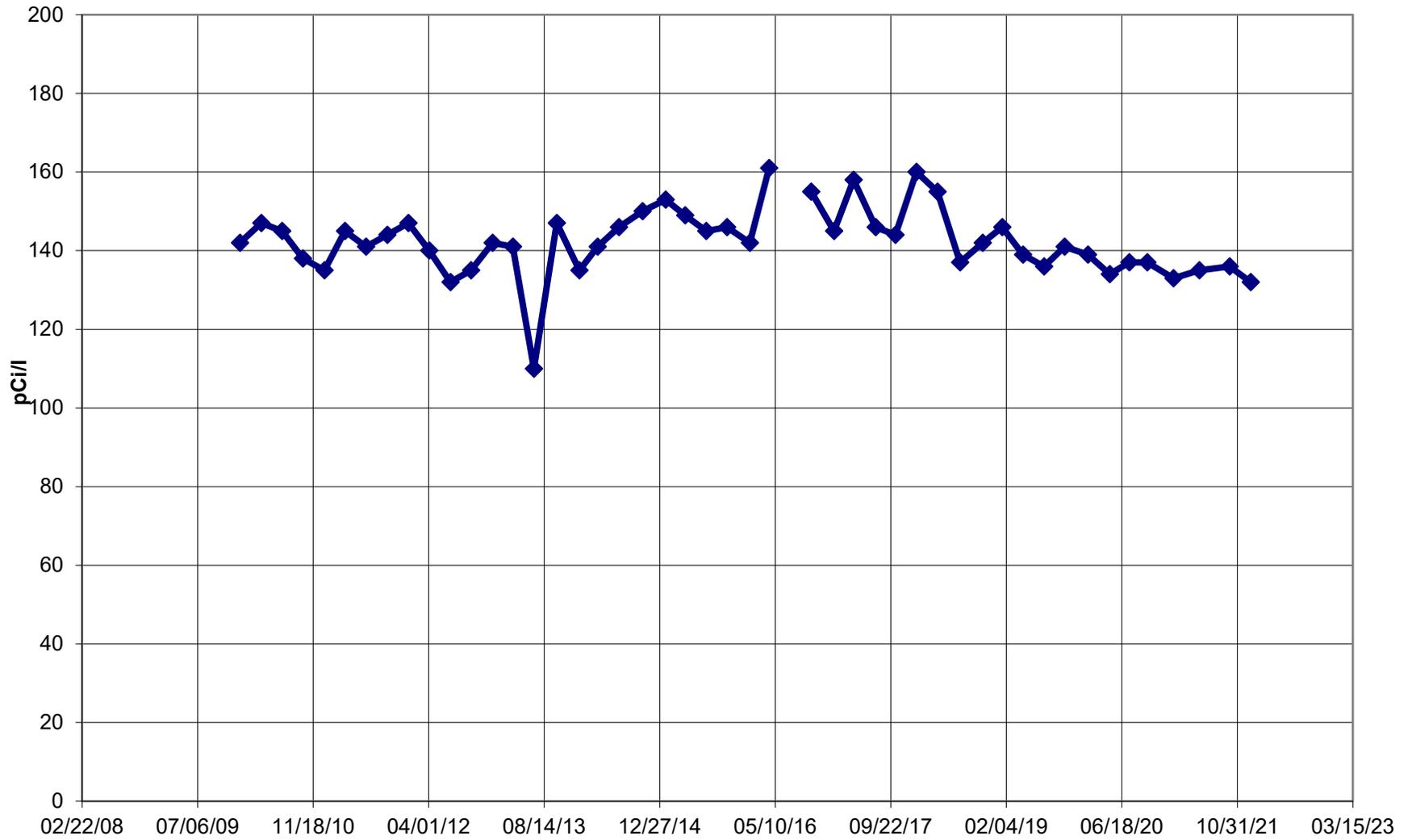
Tritium Measurement GW Well # CR3-1D

All results are < LLD



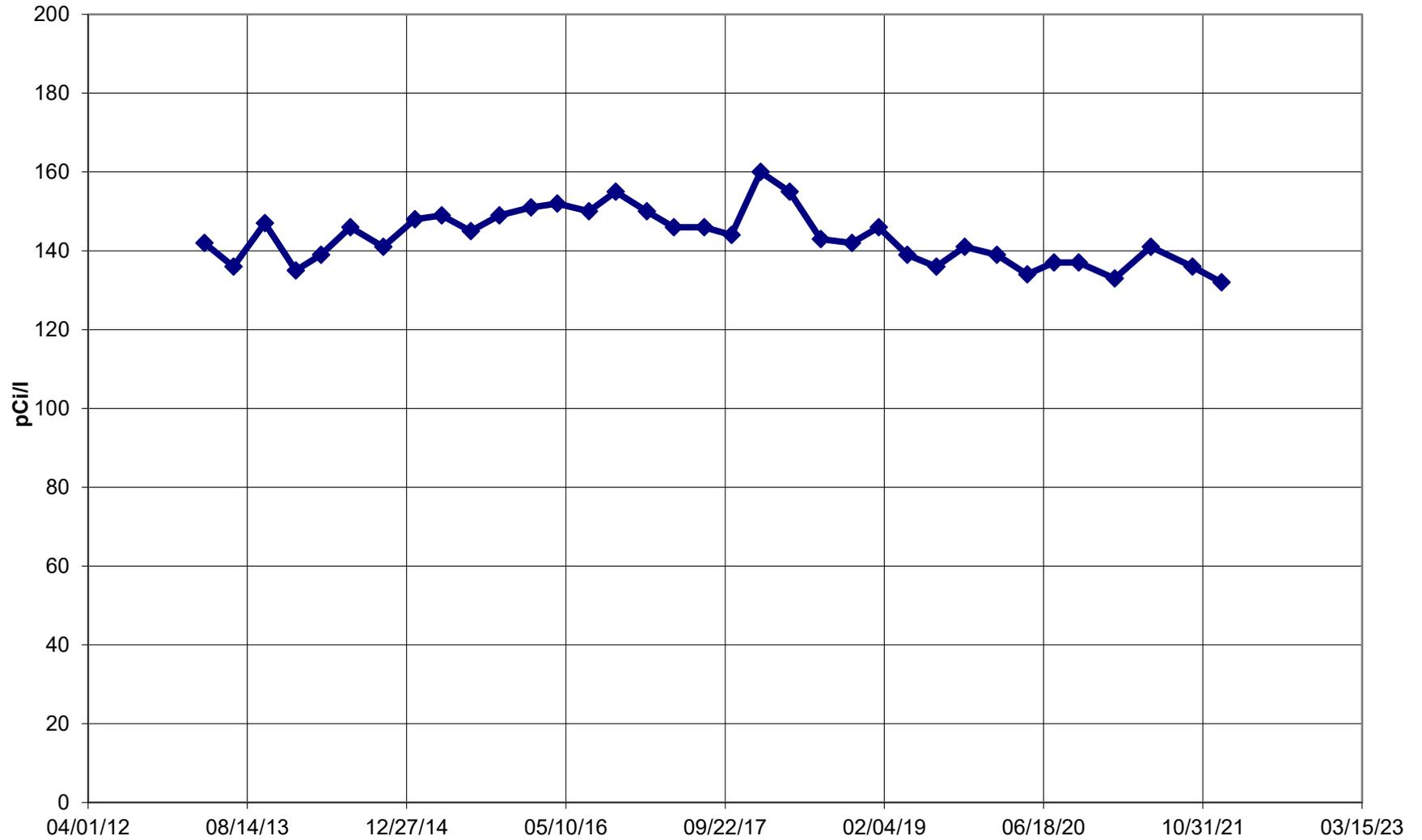
Tritium Measurement GW Well # CR3-2

All results are < LLD



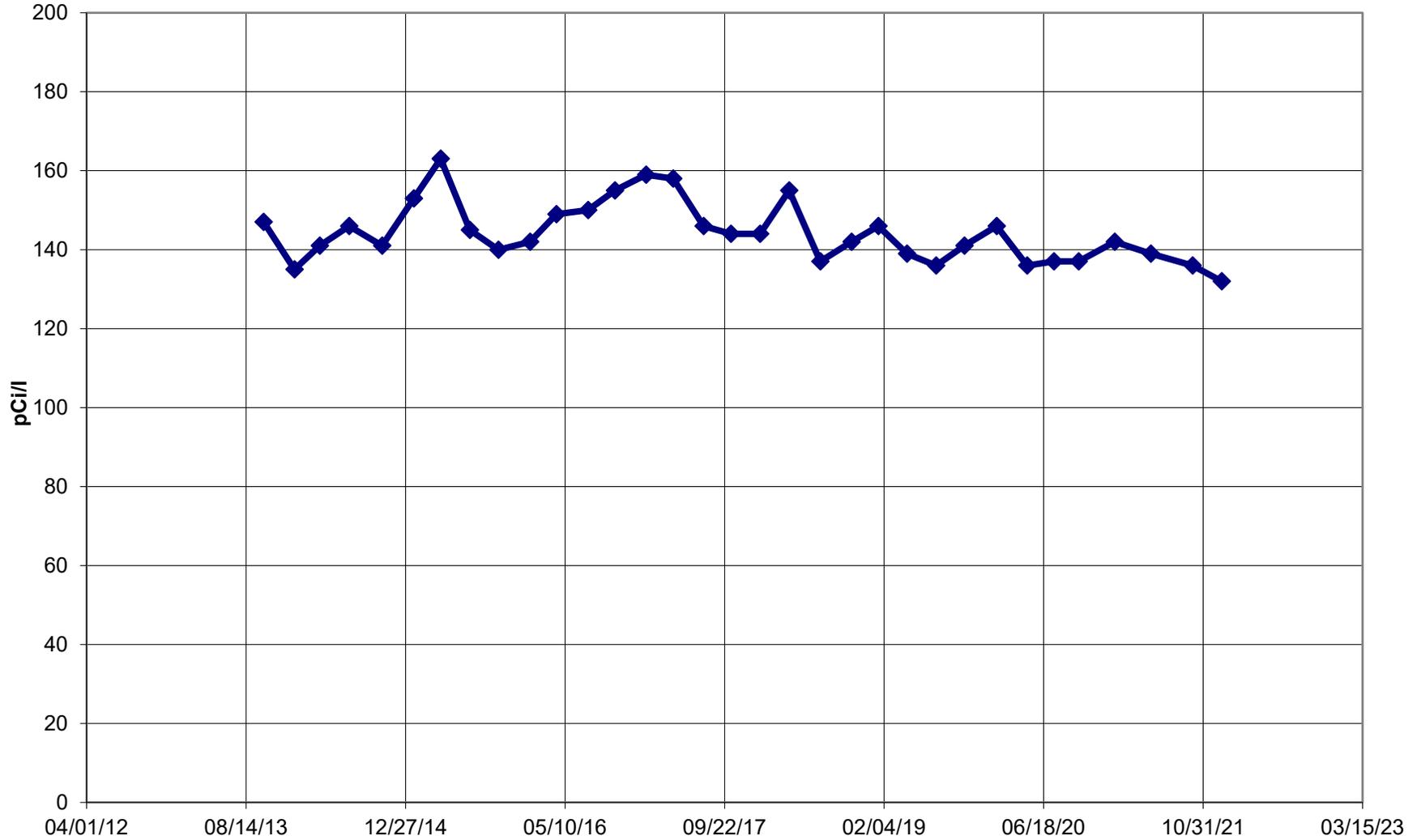
Tritium Measurement GW Well # CR3-3S

All results are < LLD unless noted



Tritium Measurement GW Well # CR3-3D

All results are < LLD

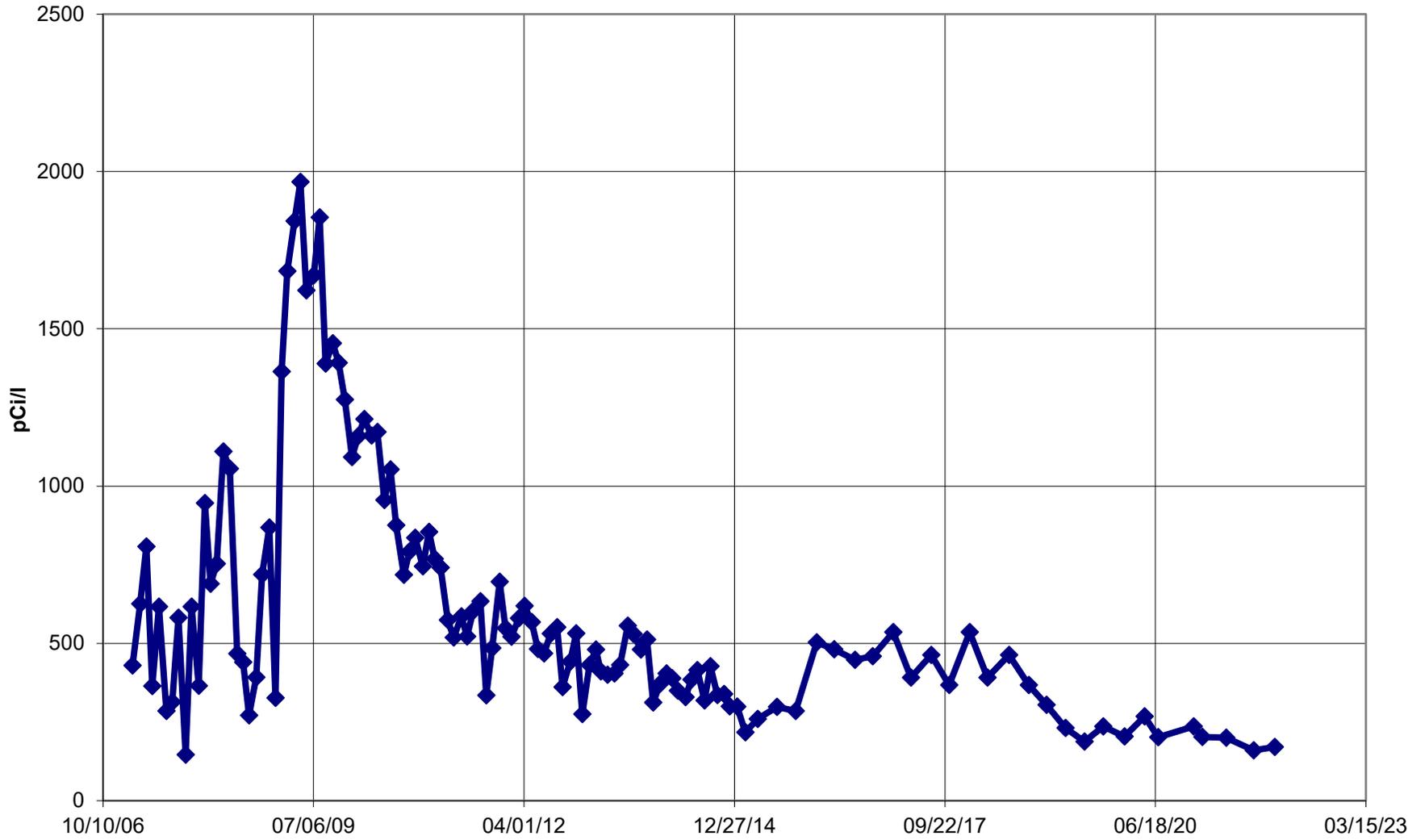


Tritium Measurement GW Well # CR3-4

All results are < LLD since 2013



Tritium Measurement GW Well # CR3-5
All results greater than LLD

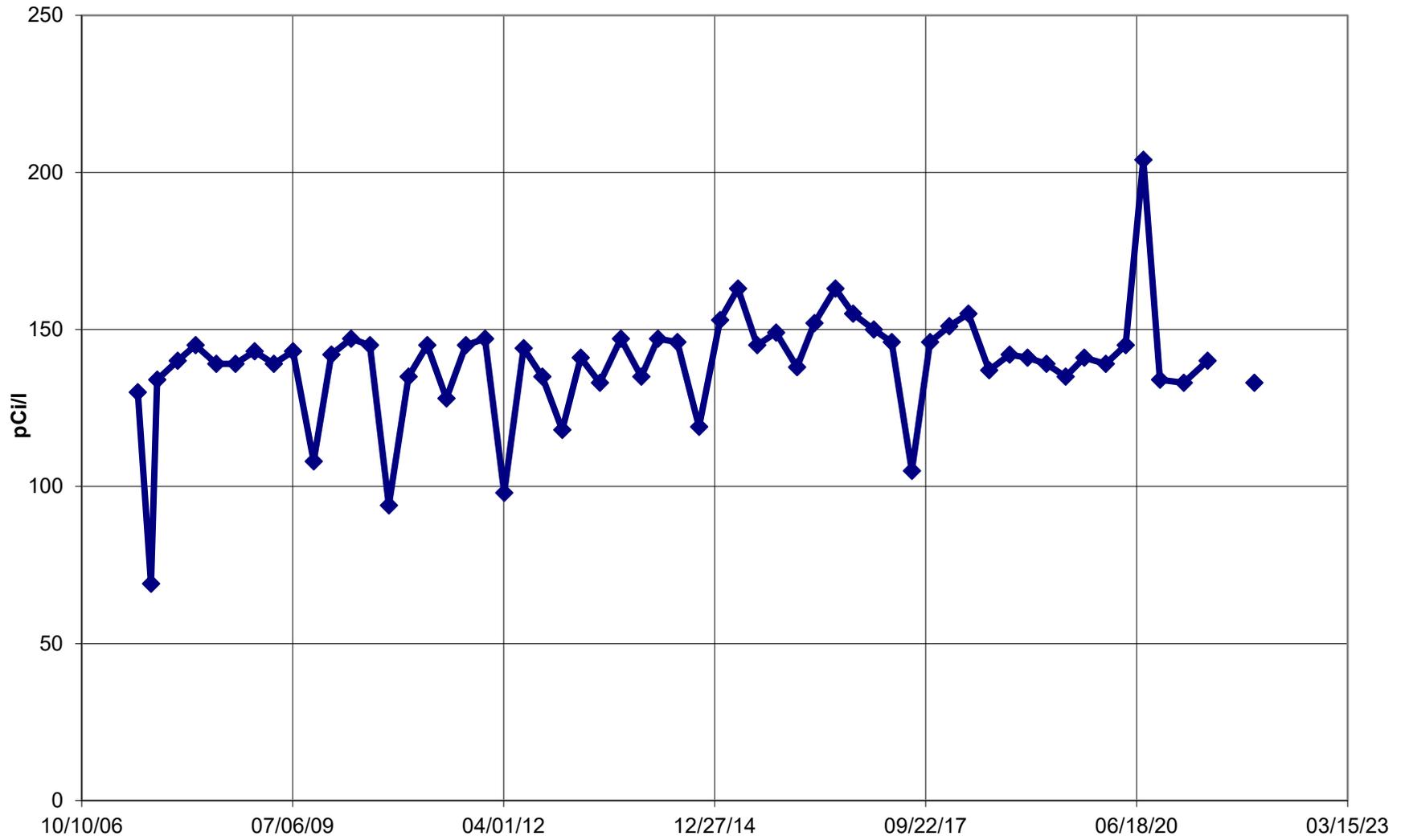


Tritium Measurement GW Well # CR3-6S

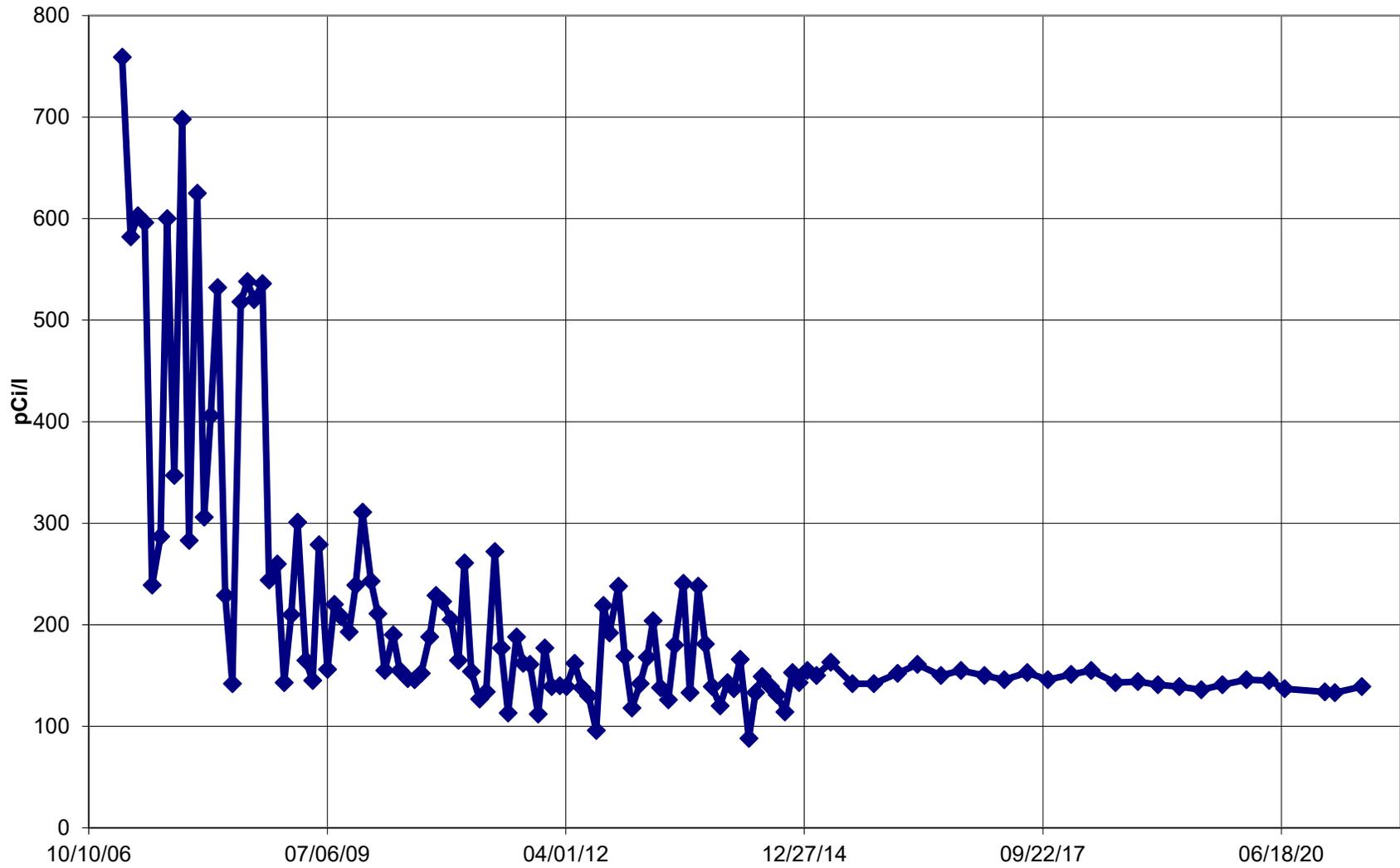


Tritium Measurements GW Well # CR3-6D

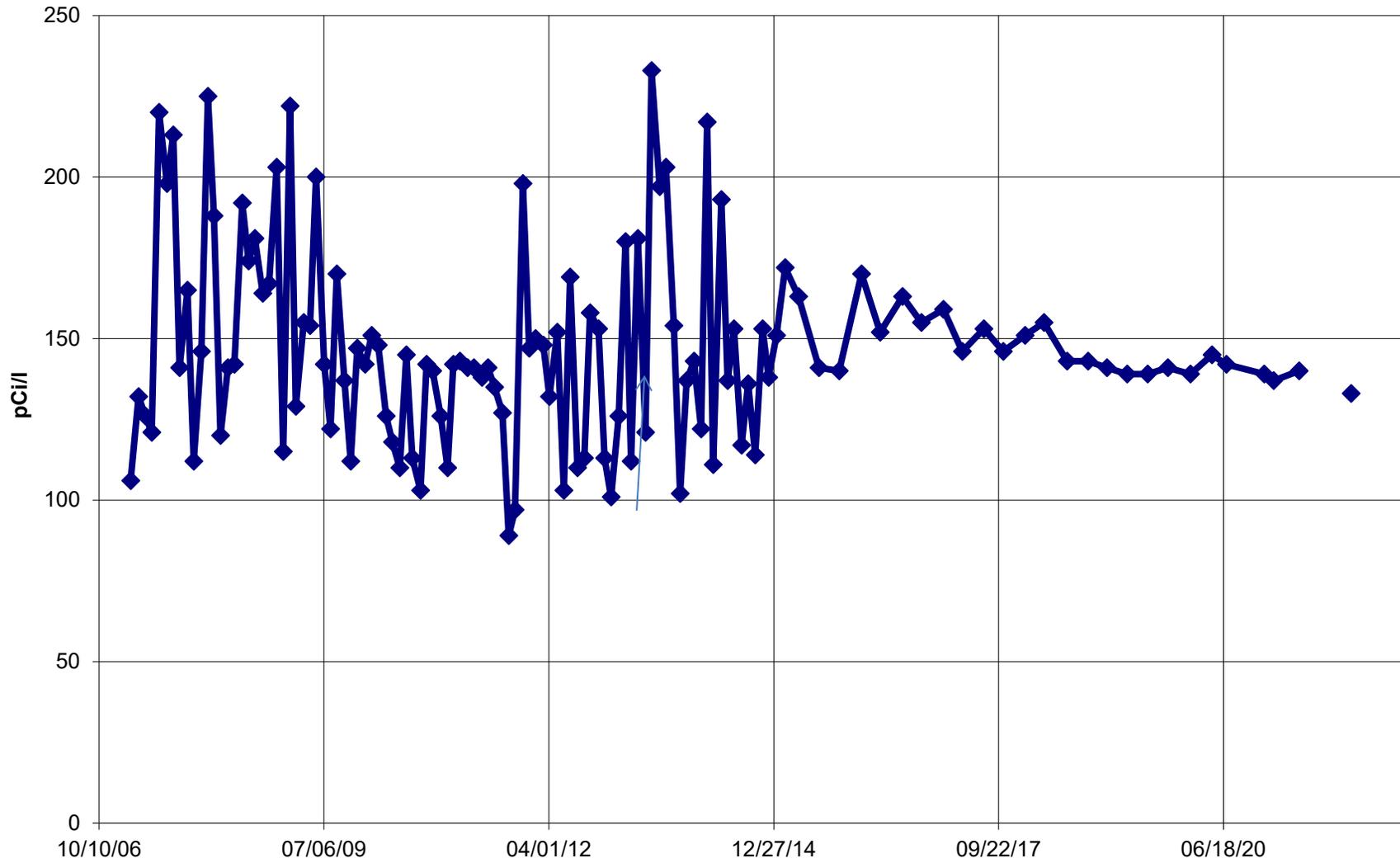
All results are < LLD after 2010



Tritium Measurements GW Well # CR3-7
All measurements LLD after 2015

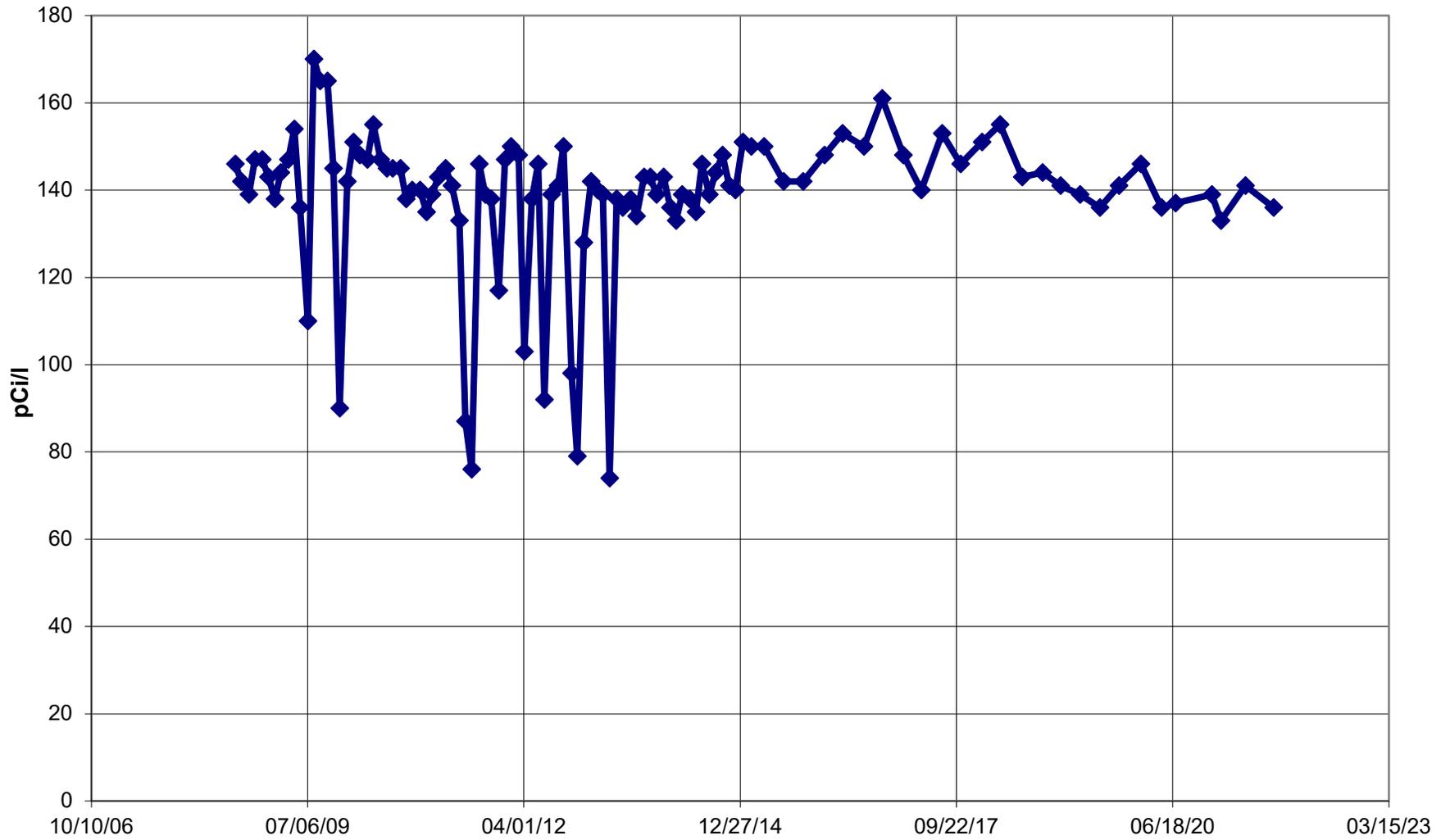


Tritium Measurements GW Well # CR3-8
All measurements <LLD after 2016



Tritium Measurements GW Well # CR3-9

All measurements <LLD after 2013



Tritium Measurements GW Well # CR3-10

All measurements <LLD after 2012

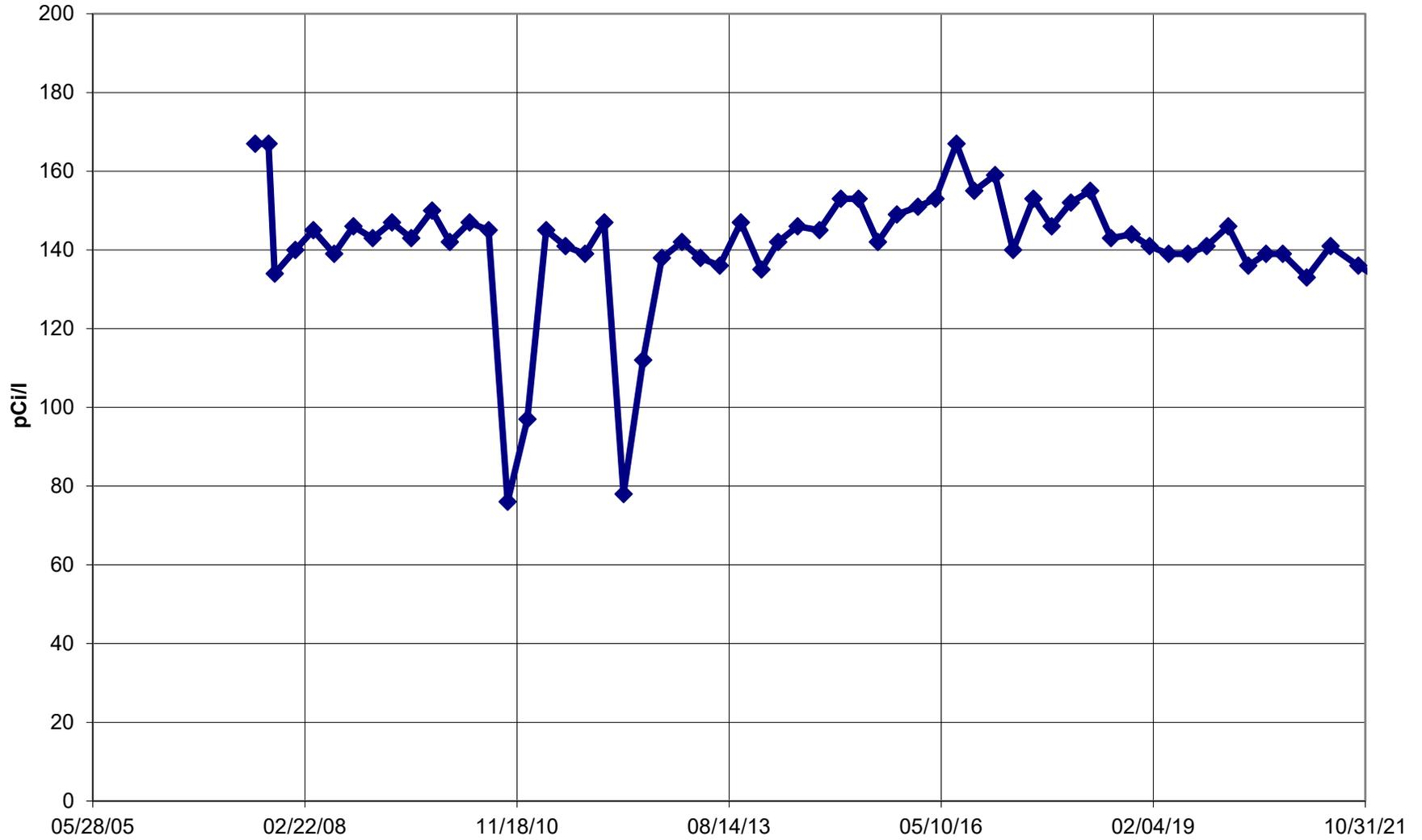


TABLE IV-C.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	<u>ALL INDICATOR LOCATIONS</u> MEAN RANGE	<u>LOCATION WITH HIGHEST MEAN</u> NAME DISTANCE & BEARING	<u>MEAN</u> RANGE	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
*CR3 SITE GROUND WATER (pCi/L)	Tritium 8 <u>γ Spec 8</u>	146	<LLD	MWC-27 0.30 mi.@266°	(0/4) (<LLD)	** -	0
	Mn-54	4	<LLD	-	-	-	0
	Fe-59	8	<LLD	-	-	-	0
	Co-58	4	<LLD	-	-	-	0
	Co-60	4	<LLD	-	-	-	0
	Zn-65	11	<LLD	-	-	-	0
	Zr-Nb-95	8	<LLD	-	-	-	0
	Cs-134	5	<LLD	-	-	-	0
	Cs-137	5	<LLD	-	-	-	0
	Ba-La-140	8	<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

** REMP location C-40 is the site background. All C-40 results are <LLD

TABLE IV-C.4.a
ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
MWC-27*	01-27	<137	<37	<5	<5	<8	<4	<13	<7	<5	<5	<5
	05-20	<141	<33	<4	<4	<8	<4	<12	<7	<4	<5	<4
	09-28	<136	<37	<4	<4	<9	<4	<11	<7	<5	<5	<5
	01-04**	<133	<36	<4	<4	<7	<4	<10	<6	<4	<4	<5

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

** Collected 2022

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

ADP CR3, LLC- 2021

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

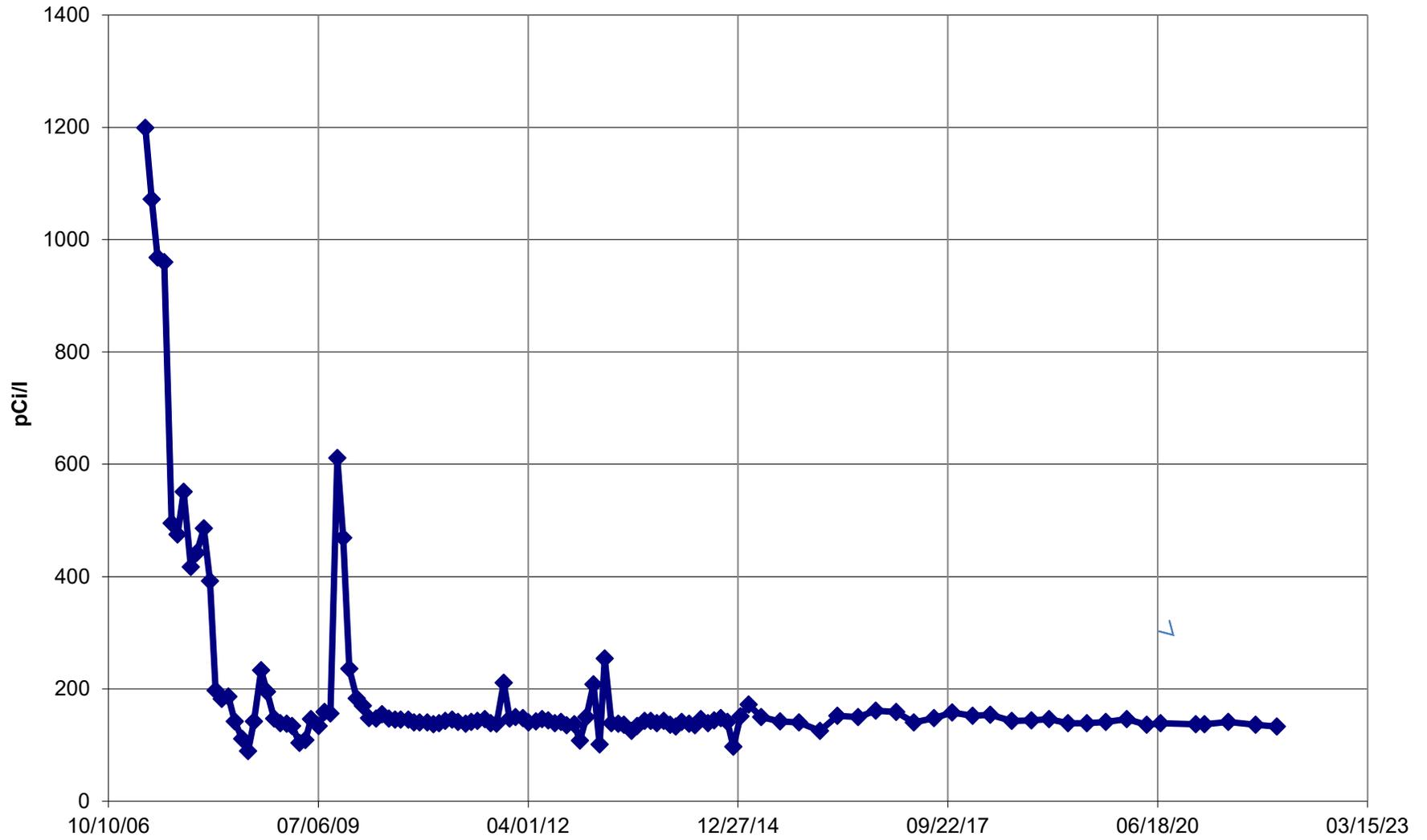
STATION	DATE	H-3	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zn-Nb-95	Cs-134	Cs-137	Ba-La-140
MWC-IF2*	01-27	<133	<51	<4	<4	<8	<4	<11	<7	<4	<4	<4
	05-20	<139	<53	<4	<4	<8	<4	<9	<7	<4	<4	<4
	09-28	<136	<17	<2	<2	<5	<2	<5	<5	<3	<3	<4
	01-04**	<132	<14	<2	<2	<4	<2	<5	<4	<2	<2	<3

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

** Collected 2022

Tritium Measurements GW Well # MWC-27

All measurements <LLD after 2010



Tritium Measurements GW Well # MWC-IF2

All measurements <LLD after 2012

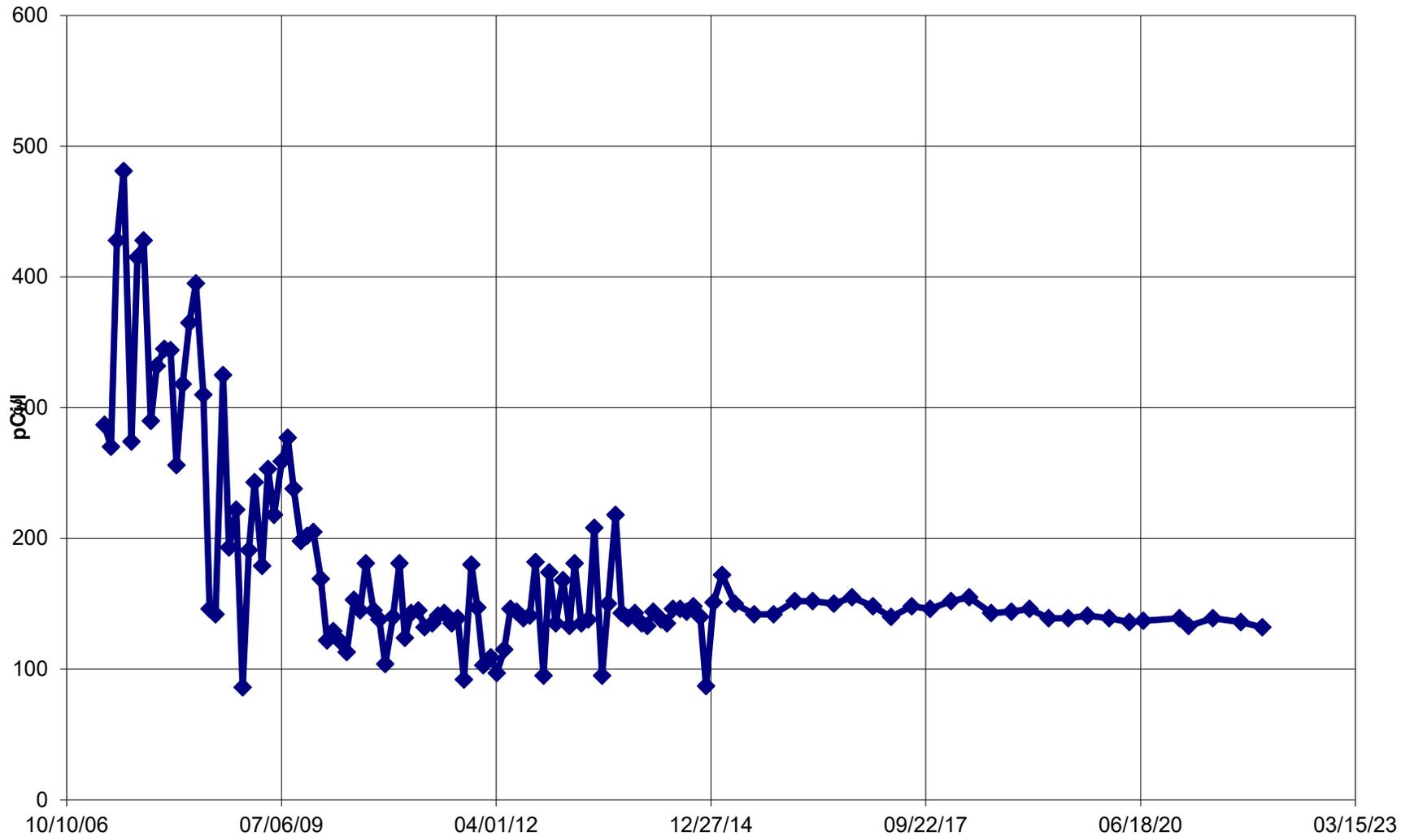


TABLE IV-C.5.a

ADP CR3, LLC- 2021

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	Cs-134	Cs-137	Ba-La-140
C07	01-19	<135	<35	<3	<3	<7	<4	<7	<5	<3	<4	<4
	04-13	<134	<32	<3	<3	<6	<3	<7	<6	<3	<4	<4
	08-20	<137	<39	<3	<4	<7	<3	<7	<5	<3	<3	<5
	12-13	<131	<37	<3	<3	<7	<3	<7	<6	<3	<4	<4
C10	01-19	<135	<41	<4	<3	<6	<3	<8	<6	<3	<4	<4
	04-13	<134	<37	<3	<3	<7	<3	<6	<6	<4	<3	<4
	08-20	<137	<65	<4	<3	<8	<4	<7	<6	<4	<4	<5
	12-13	<132	<35	<3	<3	<6	<3	<7	<5	<3	<4	<4
C18	01-19	<135	<45	<3	<3	<6	<3	<8	<6	<3	<4	<4
	04-13	<134	<39	<3	<3	<7	<3	<8	<6	<3	<4	<4
	08-20	<137	<75	<4	<4	<7	<4	<9	<7	<4	<4	<7
	12-13	<132	<74	<4	<4	<8	<4	<7	<7	<4	<4	<9

Quarterly Drinking Water

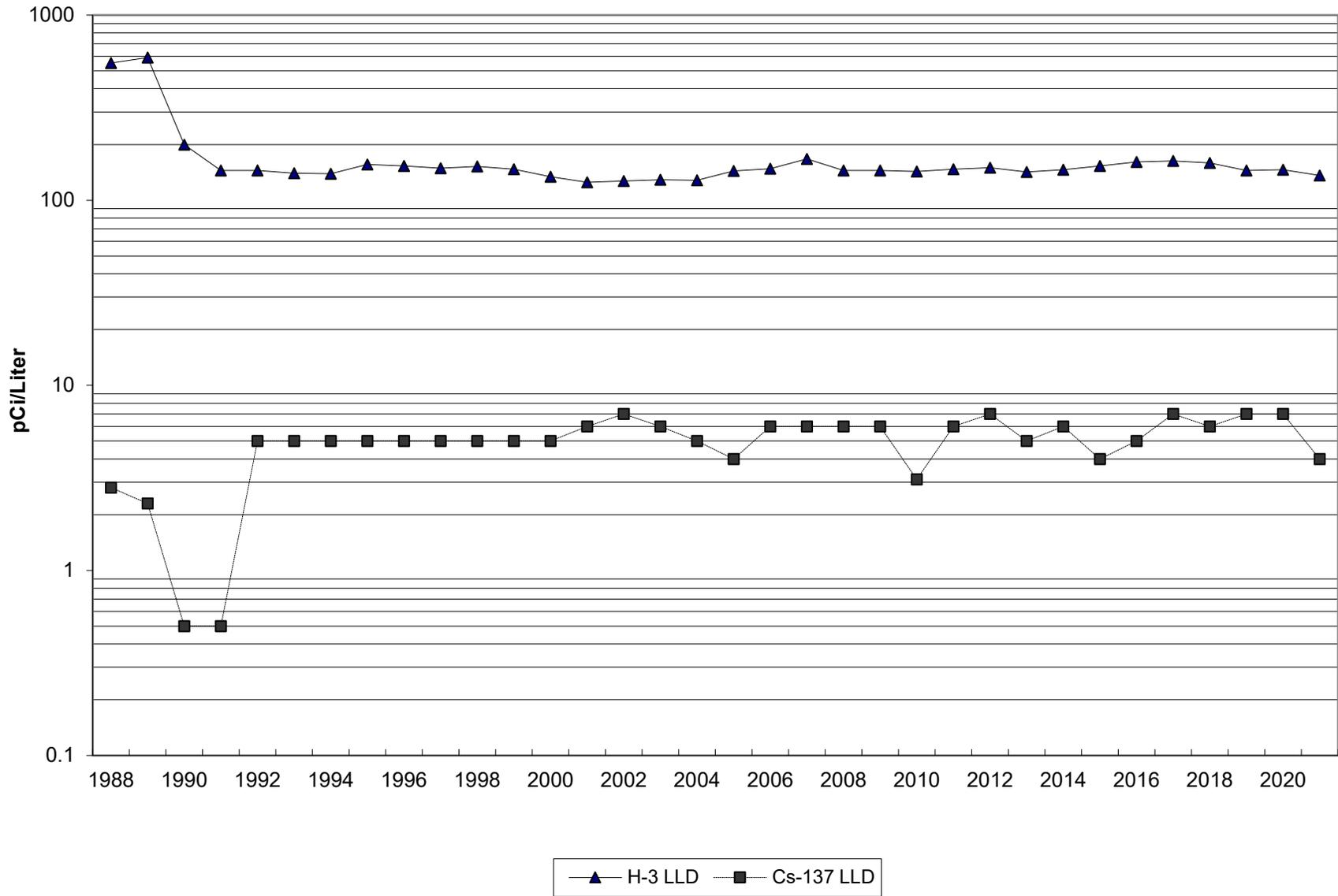


TABLE IV-C.6

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
CRYSTAL RIVER UNIT 3 **DOCKET NO. 50-302**
CITRUS COUNTY, FLORIDA **JANUARY 1 TO DECEMBER 31, 2021**

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	<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
SHORELINE SEDIMENT (pCi/kg)	γ Spec 8 Cs-134 Cs-137	19 18	<LLD 16	— —	— ---	<LLD <LLD	0 0

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

TABLE IV-C.6.a

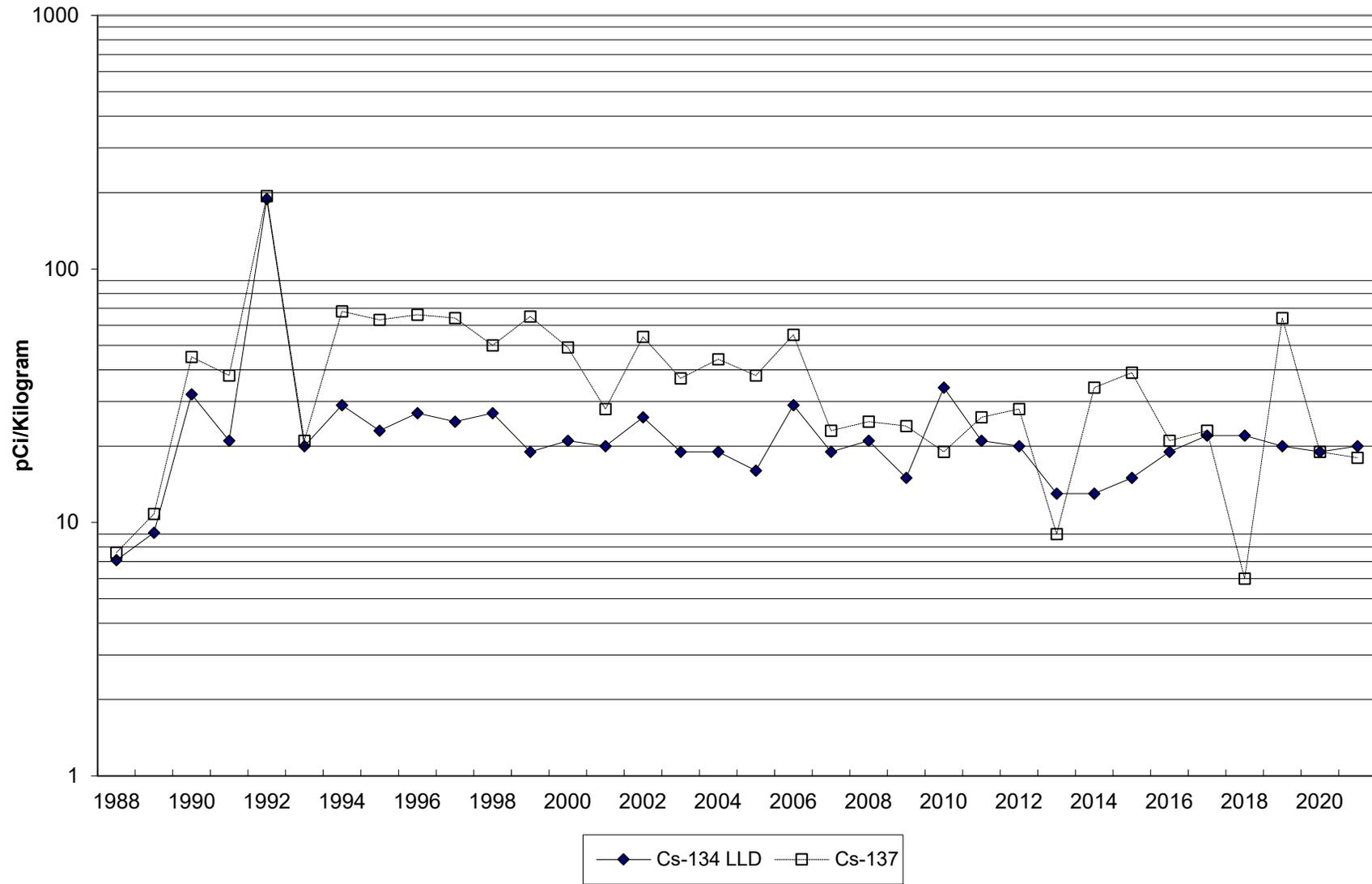
ADP CR3, LLC- 2021

pCi/kg γ EMITTERS IN SHORELINE SEDIMENT

STATION	PERIOD	Co-58	Co-60	Cs-134	Cs-137	K-40
C09	First Half	<8	<7	<8	<7	207±31
	Second Half	<10	<7	<7	<7	235±50
C14H	First Half	<18	<16	<19	<18	674±69
	Second Half	<15	<12	<15	<16	556±57
C14M	First Half	<15	<15	<14	16	562±74
	Second Half	<13	<12	<13	<12	269±44
C14G	First Half	<8	<8	<10	<9	<102
	Second Half	<11	<10	<11	<11	97±32

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, milk 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. The fish sample for C30 was not available in the first quarter.

In 2021, none of the required radionuclides were found in measurable quantities. The highest Cs-137 LLD for stations C29 and C30 was 24 pCi/kg. Naturally occurring K-40 was quantified in all eight samples at an average concentration of 2,345 pCi/kg.

In 2020, none of the required radionuclides were found in measurable quantities.

In 2019, none of the required radionuclides were found in measurable quantities.

In 2018, none of the required radionuclides were found in measurable quantities.

In 2017, none of the required radionuclides were found in measurable quantities.

In 2016, none of the required radionuclides were found in measurable quantities.

In 2015, none of the required radionuclides were found in measurable quantities.

In 2014, none of the required radionuclides were found 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 2021, none of the required radionuclides were found in measurable quantities. Only two samples could be collected at location C29 and one sample at C30 due to lack of oysters.

In 2020, none of the required radionuclides were found in measurable quantities.

In 2019, none of the required radionuclides were found in measurable quantities.

In 2018, none of the required radionuclides were found in measurable quantities.

In 2017, none of the required radionuclides were found in measurable quantities.

In 2016, none of the required radionuclides were found in measurable quantities.

In 2015, none of the required radionuclides were found in measurable quantities.

In 2014, none of the required radionuclides were found in measurable quantities. Additionally, silver-110m was found in one sample at location C29 with a concentration of 35 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.

In 2021, 11 out of the 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 83 pCi/kg and a range of 12 to 212 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137 in 8 of 12 samples ranging from 10 to 96 pCi/kg. The results at location C48B are slightly greater than in 2020 mainly due to the July sample. The other samples at C48B were consistent with historical values. July was a very wet month and may have influenced the sample result. The K-40 result for July was also the highest of the year.

In 2020, 12 out of the 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 51 pCi/kg and a range of 10 to 116 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137 in 10 of 12 samples ranging from 16 to 336 pCi/kg. These results are similar to those in 2019.

In 2019, 11 out of the 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 52 pCi/kg and a range of 6 to 329 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137 in 7 of 12 samples ranging from 13 to 154 pCi/kg. These results are similar to those in 2018.

In 2018, 13 out of 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 27 pCi/kg and a range of 13 to 48 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137. In 12 of 12 control station samples there were measurable amounts of Cs-137 with an average concentration of 111 pCi/kg and a range of 38 to 184 pCi/kg. These results are similar to those in 2017.

In 2017, 12 out of 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 30 pCi/kg and a range of 17 to 66 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137. In 10 of 12 control station samples there were measurable amounts of Cs-137 with an average concentration of 99 pCi/kg and a range of 19 to 186 pCi/kg. These results are similar to those in 2016.

In 2016, 13 out of 24 indicator locations (C48A and C48B) had measurable amounts of Cs-137 with an average concentration of 46 pCi/kg and a range of 11 to 179 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137. In 10 of 12 control station samples there were measurable amounts of Cs-137 with an average concentration of 73 pCi/kg and a range of 10 to 174 pCi/kg. These results are similar to those in 2015.

In 2015, fourteen of twenty four indicator samples had measurable amounts of cesium-137 with an average concentration of 50 pCi/kg and a range of 12 to 105 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137. In 11 of 12 control station samples there were measurable amounts of Cs-137 with an average concentration of 67 pCi/kg and a range of 15 to 150 pCi/kg. The Cs-137 values are similar in concentration as compared to samples collected in 2014 which experienced radionuclide deposition as a result of the Fukushima earthquake event in 2011 and are not a result of the operation of CR3.

In 2014, sixteen of twenty four indicator samples had measurable amounts of Cs-137 with an average concentration of 53 pCi/kg and a range of 4 to 159 pCi/kg. The control station (C47) located in Orlando, Fl. also had measurable amounts of Cs-137. In 10 of 12 control station samples there were measurable amounts of Cs-137 with an average concentration of 43 pCi/kg and a range of 17 to 71 pCi/kg. The Cs-137 values are similar in concentration as compared to samples collected in 2013 which experienced radionuclide deposition as a result of the Fukushima earthquake event in 2011 and are not a result of the operation of CR3.

4. In 2021 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected at station C19. None of the required radionuclides were found in measurable quantities in the citrus sample. There were also four milk samples collected in 2021, all at location C28. Location C28 is about 20 miles SSE of the plant. All showed less than LLD for Cs-134 and Cs-137. Milk samples are not required per the ODCM.

In 2020 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected at station C19. None of the required radionuclides were found in measurable quantities in the citrus sample. There were also three milk samples collected in 2020, all at location C28. Location C28 is about 20 miles SSE of the plant. All showed less than LLD for Cs-134 and Cs-137. Milk samples are not required per the ODCM.

In 2019 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected at station C19. None of the required radionuclides were found in measurable quantities in the citrus sample. There were also three milk samples collected in 2019, all at location C28. Location C28 is about 20 miles SSE of the plant. All showed less than LLD for Cs-134 and Cs-137. Milk samples are not required per the ODCM.

In 2018 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected at station C19. None of the required radionuclides were found in measurable quantities in the citrus sample.

In 2017 the State was unable to locate a watermelon field at location C04 or anywhere in the vicinity of C04. This is documented in plant condition report 2192486. Also, only one citrus sample was collected versus the usual two samples. It showed above MDA levels of Cs-137 at 9 pCi/kg with an uncertainty of 2 pCi/kg. It was collected at location C19 which is 9.6 miles ENE of CR3. This reported value is less than the MDA of 11 pCi/kg reported in 2016 and is likely due to natural background.

In 2016 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected at station C19. None of the required radionuclides were found in measurable quantities in the citrus sample.

In 2015 one watermelon sample was collected at station C04. None of the required radionuclides were found in measurable quantities. One citrus sample (oranges and grapefruit) was collected 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 9 pCi/kg. It is not unusual to periodically see Cs-137 in citrus samples due to widespread deposition of Cs-137 from fallout due to past weapons testing and more recent from the Fukushima earthquake and tsunami event that occurred in 2011.

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, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	<u>ALL INDICATOR LOCATIONS</u> MEAN RANGE	<u>LOCATION WITH HIGHEST MEAN</u> NAME DISTANCE & BEARING	CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
CARNIVOROUS FISH (pCi/kg)	γ Spec 8						
	Mn-54	20	<LLD	-	-	<LLD	0
	Fe-59	45	<LLD	-	-	<LLD	0
	Co-58	20	<LLD	-	-	<LLD	0
	Co-60	24	<LLD	-	-	<LLD	0
	Zn-65	55	<LLD	-	-	<LLD	0
	Cs-134	21	<LLD	-	-	<LLD	0
	Cs-137	24	<LLD	-	-	<LLD	0

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

TABLE IV-D.1.a

ADP CR3, LLC- 2021

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	<19	<19	<31	<14	<45	<19	<21	2660±174
	2	<14	<15	<33	<21	<42	<17	<18	2820±178
	3	<16	<14	<30	<16	<34	<17	<18	1770±125
	4	<20	<17	<38	<19	<44	<20	<24	2520±175
C30	1	<16	<17	<34	<15	<39	<16	<19	2180±144
	2	<23	<20	<45	<24	<53	<21	<22	2690±202
	3	<18	<15	<33	<16	<32	<17	<20	2280±150
	4	<19	<20	<40	<21	<55	<21	<23	1840±163

Carnivorous Fish

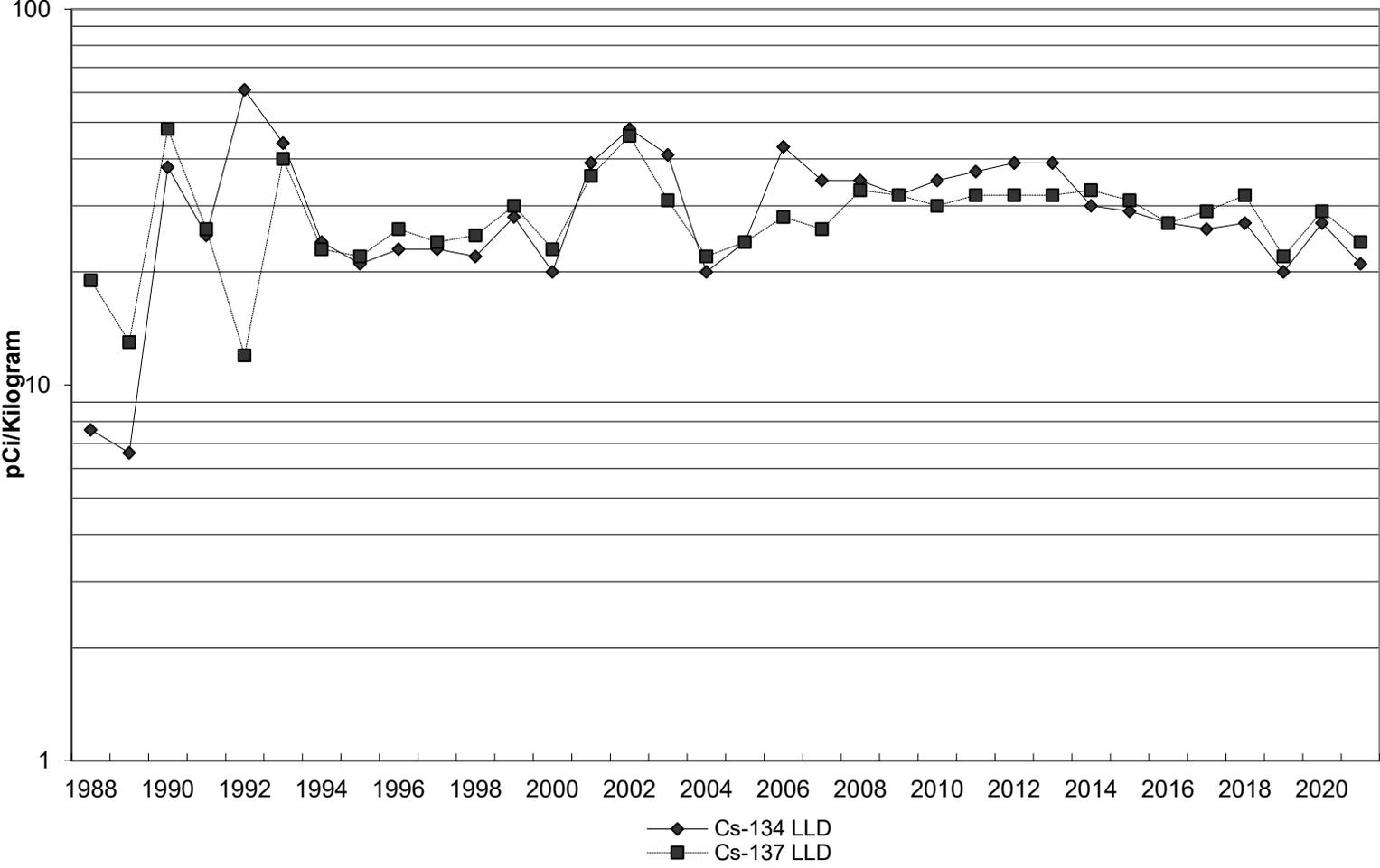


TABLE IV-D.2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	<u>ALL INDICATOR LOCATIONS</u>	<u>LOCATION WITH HIGHEST MEAN</u>		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
OYSTERS (pCi/kg)	γ Spec 3						
	Mn-54	21	<LLD	-	-	<LLD	0
	Fe-59	44	<LLD	-	-	<LLD	0
	Co-58	22	<LLD	-	-	<LLD	0
	Co-60	19	<LLD	-	-	<LLD	0
	Zn-65	45	<LLD	-	-	<LLD	0
	Cs-134	21	<LLD	-	-	<LLD	0
	Cs-137	22	<LLD	-	-	<LLD	0

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

TABLE IV-D.2.a

ADP CR3, LLC- 2021

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	<19	<19	<36	<19	<40	<21	<20	822±103
	2	<16	<17	<34	<19	<34	<18	<17	794±102
C30	1	<21	<22	<44	<19	<45	<21	<22	1230±524

Oysters

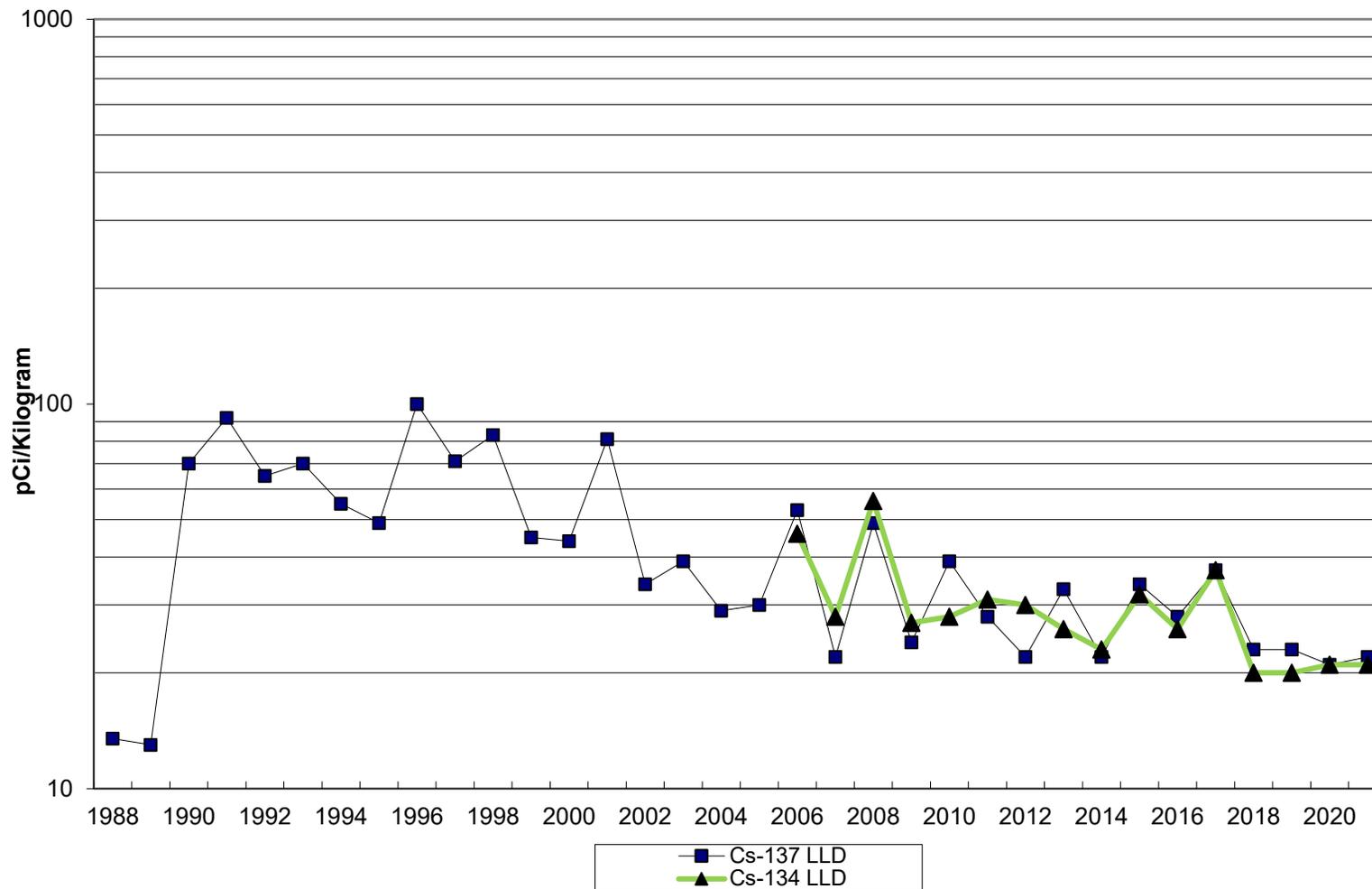


TABLE IV-D.3

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	NAME	MEAN RANGE		
BROAD LEAF VEGETATION (pCi/kg)	γ Spec 36						
	Cs-134	13	<LLD	–	–	<LLD	0
	Cs-137 ²	15	84 (11/24) (12-212)	C48B 0.9 @ 73°	90(10/12) (12-212)	47 (8/12) (10-151)	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 global fallout including the Fukushima earthquake and tsunami event that occurred in 2011.

TABLE IV-D.3.a

ADP CR3, LLC- 2021

pCi/kg OF γ EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	Cs-134	Cs-137	K-40
C47	JAN	<10	151±8	2100±115
	FEB	<10	28±4	2050±119
	MAR	<10	96±6	2130±123
	APR	<10	10±4	2400±134
	MAY	<13	<15	3200±162
	JUN	<12	31±4	2520±133
	JUL	<10	<12	2820±139
	AUG	<11	15±4	2920±153
	SEP	<10	24±4	2130±122
	OCT	<11	<14	3570±174
	NOV	<10	<12	3050±139
	DEC	<13	24±5	3250±163
C48A	JAN	<12	<12	3880±168
	FEB	<9	<9	3950±166
	MAR	<9	<12	4370±176
	APR	<11	21±4	2790±139
	MAY	<10	<11	2510±122
	JUN	<11	<12	2400±132
	JUL	<11	<13	2750±148
	AUG	<12	<13	2510±139
	SEP	<10	<11	3290±155
	OCT	<10	<10	3220±150
	NOV	<9	<11	2390±117
	DEC	<9	<12	1050±75

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

ADP CR3, LLC- 2021

pCi/kg OF γ EMITTERS IN BROAD LEAF VEGETATION

STATION	MONTH	Cs-134	Cs-137	K-40
C48B	JAN	<11	128±8	1260±88
	FEB	<12	12±4	1160±101
	MAR	<9	<13	1510±97
	APR	<10	23±4	1730±108
	MAY	<10	119±7	2020±119
	JUN	<9	22±4	1740±100
	JUL	<11	212±10	2260±125
	AUG	<10	18±3	1190±82
	SEP	<11	122±8	1470±108
	OCT	<10	131±7	1580±90
	NOV	<9	113±7	1590±91
	DEC	<10	<12	1740±114

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

Broad Leaf Vegetation

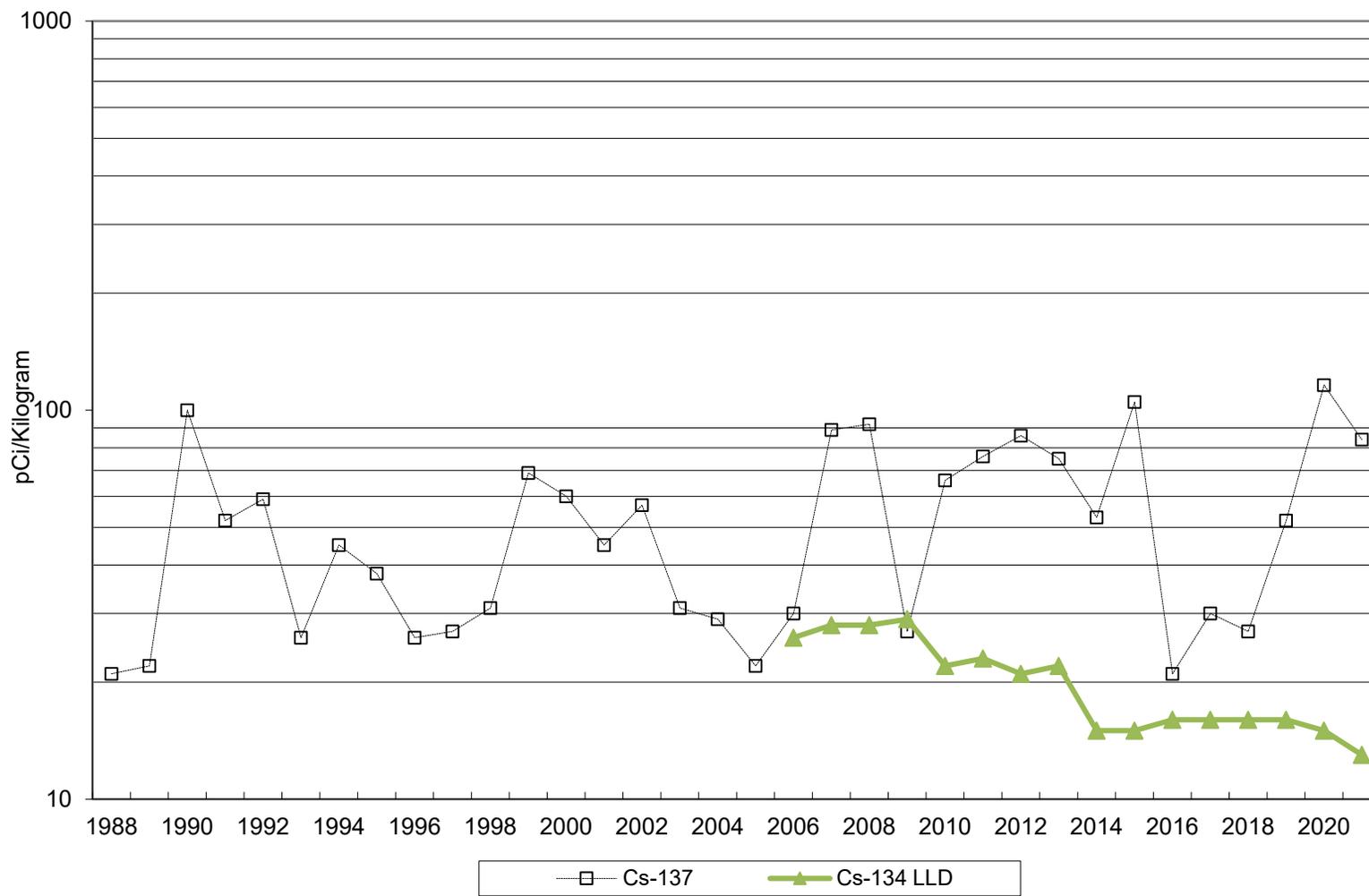


TABLE IV-D.4

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA

JANUARY 1 TO DECEMBER 31, 2021

MEDIUM OR PATHWAY SAMPLED (UNITS)	ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMIT OF DETECTION (LLD) ¹	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST MEAN		CONTROL LOCATION MEAN RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			MEAN RANGE	MEAN RANGE	NAME DISTANCE & BEARING	MEAN RANGE		
WATERMELON (pCi/kg)	γ Spec 1							
		Cs-134	6	<LLD			None	0
		Cs-137	7	<LLD	C04 NE (6.0 miles)		None	0
CITRUS (pCi/kg)	γ Spec 1							
		Cs-134	7	<LLD	— —		None	0
		Cs-137	10	<LLD	C19 ENE (9.6 miles)		None	0

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

TABLE IV-D.4.a

ADP CR3, LLC- 2021

pCi/kg OF γ EMITTERS IN WATERMELON AND CITRUS

STATION	MONTH	Cs-134	Cs-137	K-40
C04 – Watermelon	June	<6	<7	1200±70
C19 – Citrus	February	<6	<7	1390±74