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CRYSTAL RIVER - UNIT 3

FLORIDA POWER CORPORATION

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I. INTRODUCTION

The Radiological Environmental Monitoring Program provides information which can be used to assist in assessing the type and quantity of radiation exposure in unrestricted areas resulting from plant operation. The Program is conducted via a contract with the University of Florida, Department of Environmental Engineering Sciences, Gainesville, Florida and a grant to the State of Florida, Department of Health and Rehabilitative Services, Orlando, Florida. The parts of the Program for which each are responsible are listed in Table I-1. In essence, the Program provdes a continuation of the preoperation program so that any increases of radioactivity in the environment can be detected. No pathway has shown any confirmed increases of radioactivity in the environment due to plant operation during this report period.

The most significant achievement in 1979 was that the analyses for all nuclides in all pathways had annual average Lower Limits of Detection (LLDs) that were equal to or less than that required.

In the summary analysis tables, two terms are used which need explanation. The term "ND" means that the activity of the nuclide for the samples was non-detectable or less than half of the LLDs for those samples. The term "<LLD" means that the activity of the nuclide for the samples was less than the LLDs for those samples. In this way, an apparent change in activity below the lower limits of detection can be trended without getting bogged down in "actual" activity values.

The statistical evaluation of operational analyses were performed using one-fourth the LLD value if the activity was non-detectable and using three-fourths the LLD value if the activity was less than the LLD value. When a non-detectable or less than LLD concentration used in an evaluation, the results are prefaced with a "<" sign to show that the results do not indicate only detected activity.

Finally, the statistical evaluation of the operational concentrations where there are preoperational results includes the median values. This is done solely for comparison to preoperational results.

Table I-1

Radiological Environmental Monitoring Program

RESPONSIBILITY	PATHWAY	SAMPLE STATIONS[1]
University	Air Submersion	C04, C14H*, C14M*, C14G*, C40, C41, C43, C46
State	Air Submersion	C07, C09, C18, C26
University	Air Inhalation	C41*
State	Air Inhalation	C04, C07, C18, C26, C40, C46
State	Precipitation	C04, C26, C40
University	Sea Water	C01, C09, C13, C14H, C14M, C14G*
State	River Water	C15
State	Ground Water	C40
University	Potable Water	C07, C10, C18
University	Shoreline External Sediment	C01, C09, C14H*, C14M*, C14G*
University	Seafood Chain	C29, C30
University	Ingestion Crab	C29*, C30
University	Ingestion Fish (Carnivorous)	C29*, C30
University	Ingestion Fish (Herbivorous)	C29*, C30
University	Ingestion Oysters	C29, C30
University	Ingestion Shrimp	C27
University	Ingestion Milk	C47, C49*
University	Ingestion Animals	C45
University	Food Chain (Grasses)	C05, C40, C41

Table I-1 (Continued)

Radiological Environmental Monitoring Program

RESPONSIBILITY	PATHWAY	SAMPLE STATIONS([1])
State	Ingestion Food Crops (Citrus)	C19
State	Ingestion Food Crops (Watermelon)	C04
University	Food Chain (Soil)	C04, C07, C18, C26, C40, C41, C46
State	Meat	C50
State	Poultry	C51
State	Eggs	C51
University	Food Chain (Vegetables)	C47, C48*

*Critical Pathway Sample Stations

([1]) See ETS Table 3.2-4 and Figures 3.2-2 and 3.2-3 for the description and location of all Sample Stations.

II. MILK AND GREEN LEAFY VEGETABLE CENSUS

Environmental Technical Specification 3.2.1 requires a census of animals producing milk for human consumption to be conducted semiannually. If this census fails to locate any such animals, a census of gardens producing fresh leafy vegetables for human consumption is required annually.

The garden census, required as the result of a lack of findings on the January 16, 1979, milk animal census, was completed on June 14, 1979. The critical garden (Sample Station C48) was found to be in the east sector at 4.0 miles from the plant.

One Licensee Event Report (LER) was submitted to the Commission. LER 79-058/04L-0 was the result of not conducting a garden census within the surveillance interval required by Environmental Technical Specification 3.2.1.2. However, the late census did not alter the effectiveness of the sampling program because the results of the census were taken into account during the next required garden sample.

A semiannual milk cow survey was completed on June 27, 1979 again with no milk animals found. The critical station for green leafy vegetables was continued at the garden 4.0 miles from the plant in the east sector.

A seminannual milk cow census was completed by December 31, 1979. No milk animals were located within five miles of the plant site in this survey. The transmittal letter with report was submitted January 8, 1980.

III. MEDIA OTHER THAN EXTERNAL RADIATION

Environmental Technical Specification 3.2.2 requires that samples be taken and analyzed per ETS Table 3.2-2 and that analysis LLDs will be equal to or less than those in ETS Table 3.2-5A and B. Each analysis routine of each pathway in ETS Table 3.2-2 will be summarized, interpreted, and evaluated in the order presented.

AIR INHALATION PATHWAY

The Air Inhalation Pathway is one of two pathways split between the University and the State. In addition to the assigned stations, the University operates a station at C47.

Weekly Gross Beta Analysis

The summary for the gross beta analysis is in Table III-1. Six weekly samples were not collected and analyzed:

C04 for the week of 01-28-79 due to equipment failure.
C41 for the week of 08-03-79 due to power failure.
C41 for the week of 11-02-79 because air filter was not sent with charcoal cartridge.
C46 for the week of 11-05-79 because of operator error.
C47 for the week of 09-21-79 because of annual meter calibration.
C47 for the week of 10-05-79 due to equipment failure.

All other samples were collected and analyzed.

There are no critical stations for this type of analysis. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-5.

The operational concentrations are similar to the preoperational concentrations and are lower than the 1978 operational concentrations.

Weekly I-131 Analysis

The summary for the iodine analysis is in Table III-2. Six weekly samples were not collected and analyzed:

C41 for the week of 06-15-79 because the charcoal cartridge fell apart while being removed from the particulate filter.
C41 for the week of 08-03-79 due to power failure.
C41 for the week of 10-05-79 because the pump was reported to be unplugged.

C46 for the week of 11-05-79 due to operator error.
C47 for the week of 09-21-79 due to annual meter calibration.
C47 for the week of 10-05-79 due to equipment failure.

High LLDs for the third quarter, Station C41, can be attributed to long time elapsed until counting due to equipment failure. High LLDs were noted on 02-09-79and 02-23-79 at Station C47 due to low volume of air collected with faulty pump.

All other samples were collected and analyzed. Station C41 is the critical station for this type of analysis and no samples had activity greater than 10 times the control stations' values. A statistical evaluation of the operational data is presented in Table III-5. There are no preoperational data.

The statistical analysis of the critical and control stations for the period of this report is as follows:

Critical Station Mean Value	= <.012 pCi/m^3
Critical Station 95 Percentile Value	= <.040 pCi/m^3
Control Stations Mean Value	= <.011 pCi/m^3
Control Stations 95 Percentile Value	= <.030 pCi/M^3

As with the gross beta concentrations, the Iodine-131 concentrations in 1979 were lower than the 1978 concentrations. The critical station and control station concentrations are less than their respective 1978 concentrations. Even though all samples at the critical station resulted in non detectable activity, the 95 percentile concentration appears high because of LLD differences in the two contractors collecting the data.

Quarterly Gamma Analysis

The summary for gamma analysis of quarterly composites is in Table III-3. All samples were collected and analyzed. High LLDs noted for the fourth quarter at Station C41 were due to decreased sample volumes resulting from loss of the Air Particulate Filter and failure of person changing sample to calibrate flow to one cubic foot per minute. All other samples were collected and analyzed and had LLDs equal to or less than those required. There are no critical stations for this type of analysis.

One Licensee Event Report (LER) was issued to the Commission. LER 80-014/04L-0 was the result of the air concentration for Thorium-232 exceeding ten times the preoperational level at Sampling Station C41. The apparent cause of the occurrence was a coal slag pile, located six (6) meters south of the air sampler at Station C41.

The increased air concentration is attributed to the high Th-232 concentration in the coal slag pile.

Quarterly Sr-89 and 90 Analysis

The summary of the quarterly analysis for Strontium-89 and 90 is presented in Table III-4. All samples were collected and analyzed. There are no critical monitoring stations in this pathway for this type of analysis. Table III-5 presents a statistical analysis of the data. There are no pre-operational data.

The 1979 Sr-89/90 concentrations in this pathway are similar to previous operational years' concentrations.

Table III-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
AIR INHALATION (PCI/M3)	GROSS B 416	0.009	0.025 (389 / 416) (0.002-0.210)	C46 0.027 (51/ 52) (0.010-0.021)	SEE COLUMN 4	

Table III-2

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRF
AIR INHALATION (PCI/M3)	IODINE-131 416	0.045	< LLD (1/ 416)	C47 < LLD (1/ 1)	SEE COLUMN 4	

Table III-3

ENVIRONMENTIAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
AIR INHALATION (PCI/M3)	GAMMA ANALYSIS QUARTERLY COMPOSITE 32					
	CE-144	0.057	0.037 (1/ 32)	C41 0.037 (1/) (0.037-0.037)	SEE COLUMN 4	
	RA-226	0.031	0.003 (6/ 32) (0.002-0.005)	C47 0.003 (4/ 4) (0.002-0.005)	SEE COLUMN 4	
	TH-232	0.016	0.019 (8/ 32) (0.001-0.140)	C41 0.036 (4/ 4) (0.001-0.140)	SEE COLUMN 4	
	I-131	0.008	ND			
	BA-140	0.009	ND			
	RU-106	0.040	0.005 (1/ 32)	C41 0.005 (1/ 4) (0.005-0.005)	SEE COLUMN 4	
	CS-137	0.008	0.004 (8/ 32) (0.001-0.024)	C41 0.006 (4/ 4) (0.001-0.024)	SEE COLUMN 4	
	ZR-95	0.008	ND			
	MN-54	0.008	ND			
	ZN-65	0.017	ND			
	K-40	0.085	0.030 (6/ 32) (0.007-0.120)	C41 0.046 (3/ 4) (0.007-0.120)	SEE COLUMN 4	

Table III-4

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
R INHALATION (PCI/M3)	SR 89-90 ANALYSIS 32					
	SR-89	0.002	0.000 (2/ 32) (0.000-0.000)	C41 0.000 (2/ 4) (0.000-0.000)	SEE COLUMN 4	
	SR-90	0.001	0.000 (6/ 32) (0.000-0.001)	C47 0.000 (4/ 4) (0.000-0.001)	SEE COLUMN 4	

Table III-5

AIR INHALATION PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/m^3)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Gross Beta Analysis					
Gross	.029	.12	<.020	<.023	<.049
Iodine Analysis					
I-131*	--	--	--	<.011	<.032
Gamma Analysis					
Ce-144	.003	.172	<.015	<.015	<.028
Ra-226	<.2	.241	<.010	<.008	<.014
Th-232	<.01	.008	<.005	<.008	<.055
I-131	<.07	.004	<.003	<.002	<.004
Ba-140	<.01	.016	<.003	<.002	<.004
Ru-106	.025	.216	<.013	<.011	<.019
Cs-137	<.01	.013	<.003	<.003	<.011
Zr-95	.003	.043	<.003	<.002	<.004
Mn-54	<.01	<.01	<.003	<.002	<.004
Zn-65	<.01	<.01	<.005	<.004	<.008
K-40	<16.8	<16.8	<.028	<.027	<.064
Strontium Analysis					
Sr-89	--	--	<.001	<.0004	<.0008
Sr-90	--	--	<.0003	<.0002	<.0006

*Critical nuclide for critical station

PRECIPITATION PATHWAY

The State has the responsibility to collect and analyze precipitation samples. There are no additional stations for the pathway.

Monthly Gamma Analysis

The summary for the gamma analysis of the monthly samples is in Table III-6. All monthly samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-7.

The 1979 operational activity of the nuclides determined by gamma analysis were non detectable as were the preoperational, 1977 and 1978 operational concentrations.

Monthly Tritium Analysis

The summary for the tritium analysis of the monthly precipitation sample is in Table III-8. Two monthly samples were not analyzed:

C04 - No analysis performed on sample collected on 08-06-79. Sample was spilled during move to new laboratory.

C40 - No analysis performed on sample collected on 08-06-79. Sample was spilled during move to new laboratory.

All other samples were collected and analyzed. There are no critical stations in this pathway. A statistical evalutaion of the operational data and a comparison with the preoperational data is presented in Table III-7.

All of the 1979 operational activity data for tritium was less than the Sample LLD(s) as were the 1978 operational activities.

Table III-6

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
PRECIPITATION (PCI/L)	GAMMA ANALYSIS 36					0
	I -131	17	ND			
	BA-140	17	ND			
	CS-137	17	ND			
	CS-134	17	ND			
	CO-58	17	ND			
	MN-54	15	ND			
	ZN-65	30	ND			
	CO-60	17	ND			

Table III-7

PRECIPITATION PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Gamma Analysis					
I-131	<.4	<.4	<4.3	<4.3	<4.3
Ba-140	<10	<10	<4.3	<4.3	<4.3
Cs-137	<10	<10	<4.3	<4.3	<4.3
Cs-134	<10	<10	<4.3	<4.3	<4.3
Co-58	<10	<10	<4.3	<4.3	<4.3
Mn-54	<10	<10	<3.8	<3.8	<3.8
Zn-65	<20	<20	<7.5	<7.5	<7.5
Co-60	<10	<10	<4.3	<4.3	<4.3
Tritium Analysis					
H-3	<320	<320	<150	<150	<150

Table III-8

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
PRECIP. (PCI/L)	TRITIUM ANALYSIS 36					
AIR	H-3	200	<LLD(34 / 36)			0

SEA WATER PATHWAY

The University has the responsibility to collect and analyze sea water samples. There are no additional stations for this pathway.

Monthly Gamma Analysis

The summary for the gamma analysis of monthly samples is in Table III-9. All samples were collected and analyzed. Sample Station C14G is the critical station in this pathway and no sample had activity greater than 10 times the control station value. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-10.

The concentrations of nuclides by gamma analysis during 1979 was less than the concentrations during 1978 and the preoperational concentrations. The critical stations and the control stations concentration were almost identical and both were less than the respective concentrations during 1978.

One Licensee Event Report (LER) was issued to the Commission. LER 79-016/04-L was the result of Zn-65 analysis having an LLD greater than the required LLD for January at Station C09. Inadequate sample time was the apparent cause of the greater than required LLD.

Quarterly Sr-89 and 90 Analysis

The summary of the quarterly analysis for Sr-89 and 90 is presented in Table III-10. All samples were collected and analyzed. Strontium 89/90 are not critical nuclides in this pathway. A statistical evaluation of 1979 operational data is presented in Table III-10.

The concentrations of these nuclides are lower than both 1977 and 1978 operational concentrations.

Quarterly Tritium Analysis

The summary for the tritium analysis of quarterly composites is in Table III-11. All quarterly composites were collected and analyzed. There are no critical stations for this type of analysis.

A comparison of the preoperational and operational analyses is in Table III-10. The operational concentrations in 1979 were less than those in 1978 except for K-40, and less than preoperational concentrations except for I-131 and K-40. Some preoperational activities that were reported were less than the minimal detectable activities and this skewed the statistics downward.

Table III-9

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
SEA WATER (PCI/KG)	GAMMA ANALYSIS 72					0
	RA-226	12	28(63/ 72)	C09 34(9/ 12)	30(52/ 60)	
			(12- 60)	(12- 53)	(12- 60)	
	TH-232	10	17(5i/ 72)	C09 19(8/ 12)	17(42/ 60)	
			(9- 28)	(9- 28)	(9- 28)	
	I -131	6	ND			
	BA-140	20	18(1/ 72)	C09 18(1/ 12)	18(1/ 60)	
	RU-106	45	39(5/ 72)	C14M 42(2/ 12)	40(4/ 60)	
			(33- 46)	(38- 46)	(37- 46)	
	CS-137	6	5(6/ 72)	C09 6(2/ 12)	5(6/ 60)	
			(4- 7)	(5- 7)	(4- 7)	
	ZR -95	8	11(1/ 72)	C13 11(1/ 12)	11(1/ 60)	
	CS-134	6	6(9/ 72)	C01 10(1/ 12)	6(9/ 60)	
			(4- 10)		(4- 10)	
	MN -54	5	5(4/ 72)	C09 6(1/ 12)	5(3/ 60)	
			(2- 6)		(2- 6)	
	ZN -65	11	ND			
	K - 40	60	329(68/ 72)	C14H 488(12/ 12)	333(57/ 60)	
			(88- 2315)	(219- 2315)	(98- 2315)	

Table III-10

SEA WATER PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
	Median	95 Percentile	Median	Mean	95 Percentile	Control Stations		Critical Stations	
						Mean	95 Percentile	Mean	95 Percentile
Gamma Analysis									
Ra-226	--	600	<24.0	<25.1	<51.4	<26.0	<53.5	<20.8	<37.7
Th-232	--	7	<15.0	<13.1	<27.8	<12.9	<27.8	<14.1	<28.2
I-131*	<.4	<.4	<1.5	<1.4	<2.3	<1.5	<2.4	<1.4	<2.2
Ba-140	<10	11	<4.8	<5.1	<9.7	<5.2	<10.1	<4.6	<7.8
Ru-106	--	--	<11.5	<13.4	<29.4	<13.6	<29.9	<12.8	<27.0
Cs-137*	<10	10	<1.5	<1.7	<4.0	<1.9	<4.3	<1.3	<2.3
Zr-95	<10	<10	<2.0	<2.2	<4.8	<2.3	<5.1	<2.0	<3.3
Cs-134*	<10	<10	<1.5	<2.0	<5.5	<2.2	<5.9	<1.3	<2.1
Mn-54	<10	<10	<1.3	<1.4	<3.3	<1.4	<3.3	<1.4	<3.2
Zn-65	<20	7	<2.5	<2.8	<4.7	<2.9	<4.8	<2.6	<3.9
K-40	150.8	368.7	<291.0	<313.2	<888.4	<318.0	<944.0	<289.3	<465.3
Strontium Analysis									
Sr-89	--	--		<0.6	<1.9	<0.6	<2.0	<0.6	<1.3
Sr-90	--	--		<0.4	<2.1	<0.4	<2.3	<0.4	<1.3
Tritium Analysis									
H-3	71	87	<89.3	<152.5	<413.85	--	--	--	--

*Critical nuclides for critical station.

Table III-11

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
SEA WATER (PCI/KG)	TRITIUM ANALYSIS 24					0
	H-3	361	668(1/ 24)	*C01 668(1/ 4)	SEE COLUMN 4	

Table III-12

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
SEA WATER (PCI/KG)	SR-89/90 ANALYSIS 24					0
	SR-90	0	1(10/ 24)	C14M 3(1/ 4)	SEE COLUMN 4	
			(0- 3)			
	SR-89	1	1(7/ 24)	C01 2(2/ 4)	SEE COLUMN 4	
			(1- 3)	(1- 3)		

RIVER WATER PATHWAY

The State has the responsibility to collect and analyze river water samples. There are no additional stations for this pathway.

Quarterly Gamma Analysis

The summary for the gamma analysis of quarterly samples is in Table III-13. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-14. Neither 1979 operational, nor preoperational analyses showed detectable activities in any sample.

Quarterly Tritium Analysis

The summary for the tritium analysis of quarterly samples is in Table III-15. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-14. Neither operational, nor preoperational analyses showed detectable activities in any sample.

Table III-13

ENVIRONMENTIAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
RIVER WATER (PCI/KG)	GAMMA ANALYSIS 4					0
	I- 131	17	ND			
	BA-140	17	ND			
	CO- 58	17	ND			
	CS-137	17	ND			
	CS-134	17	ND			
	MN-54	15	ND			
	ZN-65	30	ND			
	CO- 60	17	ND			

Table III-14

RIVER WATER PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Gamma Analysis					
I-131	<.4	<.4	<4.3	<4.3	<4.3
Ba-140	<10	<10	<4.3	<4.3	<4.3
Co-58	<10	<10	<4.3	<4.3	<4.3
Cs-137	<10	<10	<4.3	<4.3	<4.3
Cs-134	<10	<10	<4.3	<4.3	<4.3
Mn-54	<10	<10	<3.8	<3.8	<3.8
Zn-65	<20	<20	<7.5	<7.5	<7.5
Co-60	<10	<10	<4.3	<4.3	<4.3
Tritium Analysis					
H-3	<320	<320	<50	<50	<50

Table III- 15

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
RIVER WATER (PCI/KG)	TRITIUM ANALYSIS 4					0
	H-3	200	ND			

GROUND WATER PATHWAY

The State has the responsibility to collect and analyze ground water samples. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of semiannual samples is in Table III-16. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data is presented in Table III-17. All operational samples had no detectable activity and there are no preoperational data.

Semiannual Tritium Analysis

The summary for the tritium analysis of semiannual samples is in Table III-18. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data is presented in Table III-17. All operational samples had no detectable activity and there are no preoperational data.

Table III-16

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
GROUND WATER (PCI/KG)	GAMMA ANALYSIS 2					0
	I- 131	17	ND			
	BA-140	17	ND			
	CO- 58	17	ND			
	CS-137	17	ND			
	CS-134	17	ND			
	MN-54	15	ND			
	ZN-65	30	ND			
	CO- 60	17	ND			

Table III-17

GROUND WATER PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Operational Values	
	Mean	95 Percentile
Gamma Analysis		
I-131	<4.3	<4.3
Ba-140	<4.3	<4.3
Co-58	<4.3	<4.3
Cs-137	<4.3	<4.3
Cs-134	<4.3	<4.3
Mn-54	<3.8	<3.8
Zn-65	<7.5	<7.5
Co-60	<4.3	<4.3
Tritium Analysis		
H-3	<50	<50

Table III-18

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
GROUND WATER (PCI/KG)	TRITIUM ANALYSIS 2					0
	H-3	200	ND			

POTABLE WATER PATHWAY

The University has the responsibility to collect and analyze potable water samples. There are no additional stations for this pathway.

Quarterly Gamma Analysis

The summary for the gamma analysis of quarterly samples is in Table III-19. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-20. The 1979 operational activity was less than both the 1978 operational concentrations and the preoperational activity levels.

Quarterly Tritium Analysis

The summary for the tritium analysis of the quarterly samples is in Table III-21. All samples were collected and analyzed. There are no critical stations in this pathway and all samples had activity that was less than the sample LLD. All preoperational samples had an average activity of less than 320 pCi/kg. There was, therefore, no evidence of increase in activity over the preoperational levels, or the 1978 operational levels.

Table III-19

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
POT. WATER (PCI/KG) INGESTION	GAMMA ANALYSIS 12					0
	I-131	6	ND			
	BA-140	19	ND			
	CS-137	5	7(1/ 12)	C07 7(1/ 4)	SEE COLUMN 4	
	CS-134	5	9(1/ 12)	C10 9(1/ 4)	SEE COLUMN 4	
	CO-58	4	ND			
	MN-54	4	ND			
	ZN-65	10	ND			
	CO-60	5	ND			

Table III-20

POTABLE WATER PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Gamma Analysis					
I-131	<.4	<.4	<1.8	<1.5	<2.7
Ba-140	<10	<10	<5.3	<4.6	<8.9
Cs-137	<10	<10	<1.3	<1.7	<5.2
Cs-134	<10	<10	<1.5	<1.9	<6.4
Co-58	<10	<10	<1.0	<1.0	<2.0
Mn-54	<10	<10	<1.0	<1.1	<2.3
Zn-65	<20	<20	<2.8	<2.6	<4.4
Co-60	<10	<10	<1.3	<1.2	<2.4
Tritium Analysis					
H-3	<320	<320	<89	<136.9	<306.1

Table III-21

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
POT. WATER (PCI/KG)	TRITIUM ANALYSIS 12					0
	H-3	361	<LLD(3/ 12)			

SHORELINE EXTERNAL SEDIMENT PATHWAY

The University has the responsibility to collect and analyze shoreline external sediment samples. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-22. All samples were collected and analyzed. The critical stations for this analysis are Sample Stations C14H, C14M, and C14G and no sample had activity greater than 10 times the control station value. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-23.

The 1979 operational nuclide concentrations are lower than the preoperational concentrations and the 1978 operational concentrations for almost every nuclide. The lack of more operational data prevents a more thorough comparison. Also, the control station data are similar to the critical station data.

Semiannual Sr-90 Analysis

The summary for the semiannual analyses for Sr-90 is presented in Table III-24. All samples were collected and analyzed. Sr-90 is not a critical nuclide in this pathway. A statistical evaluation of 1979 operational data is presented in Table III-23. There are no preoperational data. Sr-90 concentrations were consistent with previous operational years' concentrations.

Table III-22

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
BOT. SED. (PCI/KG) SHORELINE EXT	GAMMA ANALYSIS 10					0
	RA-226	12	419(10/ 10)*	C14H* 749(2/ 2)*	323(4/ 4)*	
			(158- 1050)*	(447- 1050)*	(242- 462)*	
	TH-232	12	55(9/ 10)*	C14H* 96(2/ 2)*	53(4/ 4)*	
			(11- 181)*	(11- 181)*	(40- 67)*	
	I-131	6	ND			
	BA-140	17	14(1/ 10)*	C14G* 14(1/ 2)*	0(0/ 4)*	
	RU-106	36	33(1/ 10)*	C01 * 33(1/ 2)*	33(1/ 4)*	
	CS-137	5	19(7/ 10)*	C14M* 38(1/ 2)*	15(4/ 4)*	
			(6- 38)*	*	(6- 25)*	
	ZR-95	8	ND			
	CS-134	5	7(5/ 10)*	C14H* 11(1/ 2)*	6(3/ 4)*	
			(4- 11)*	*	(4- 7)*	
	MN-54	4	8(1/ 10)*	C01 * 8(1/ 2)*	8(1/ 4)*	
	ZN-65	10	ND			
	K-40	40	245(10/ 10)*	C14M* 403(2/ 2)*	205(4/ 4)*	
			(131- 533)*	* (272- 533)*	(152- 273)*	

Table III-23

SHORELINE EXTERNAL SEDIMENT PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
						Control Stations		Critical Stations	
	Median	95 Percentile	Median	Mean	95 Percentile	Mean	95 Percentile	Mean	95 Percentile
Gamma Analysis									
Ra-226	2900	10,000	350.0	418.5	901.8	323.3	518.0	482.0	1074.6
Th-232	90	300	<34.5	<50.1	<147.6	52.5	74.4	<48.5	<178.1
I-131	<.4	34	<1.5	<1.4	<2.1	<1.5	<2.6	<1.4	<1.8
Ba-140	<10	<10	<4.3	<4.2	<7.6	<4.9	<8.3	<3.7	<7.0
Ru-106	190	690	<9.3	<11.6	<28.4	<16.9	<39.8	<8.1	<15.2
Cs-137*	<10	250	<12.0	<13.4	<36.7	<15.0	30.8	<12.4	<40.9
Zr-95	12	40	<1.8	<2.0	<3.0	<2.1	<3.6	<2.0	<2.4
Cs-134*	<10	<10	<2.3	<4.2	<10.9	<4.8	<9.0	<3.8	<12.1
Mn-54	<10	19	<1.0	<1.8	<6.1	<2.7	<9.6	<1.1	<1.4
Zn-65	--	--	<2.3	<2.5	<4.0	<2.6	<5.2	<2.4	<2.9
K-40	259.8	1,006	205.0	244.6	480.0	205.3	304.1	270.8	564.0
Strontium Analysis									
Sr-90	--	--	<10.1	<22.6	<79.8	<20.4	<48.6	<24.0	<97.4

*Critical nuclides for critical station

Table III-24

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
BOT. SED (PCI/KG) SHORELINE EXT	SR-90 ANALYSIS 10					0
	SR-90	17	47 (4/ 10) (23- 98)	C14M 98 (1/ 2)	31 (2/ 4) (23- 39)	

SEA FOOD CHAIN PATHWAY

The University has the responsibility to collect and analyze marine plants in the sea food chain. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-25. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data comparison with the preoperational data is presented in Table III-26.

The 1979 operational concentrations are less than both the 1978 operational and the preoperational concentrations.

Semiannual Sr-89 and 90 Analysis

The summary for the strontium analysis of the semiannual samples is in Table III-27. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data presented in Table III-26. There are no preoperational data.

The 1978 and 1979 operational concentrations are very similar.

One Licensee Event Report (LER) was issued to the Commission. LER 79-112/04X-0 was the result of Sr-89 analysis having an LLD greater than required LLD for the first half at C29. Inadequate sample time was the apparent cause of the greater than required LLD.

Table III-25

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
MARINE PLANT PCI/KG SEAFOOD CHAIN	GAMMA ANALYSIS 4					0
	RA-226	8	25(3/ 4)C30 (23- 28)	26(2/ 2) (23- 28)	SEE COLUMN 4	
	TH-232	6	20(4/ 4)C30 (6- 25)	24(2/ 2) (23- 25)	SEE COLUMN 4	
	I-131	4	ND			
	BA-140	12	ND			
	RU-106	29	ND			
	CS-137	4	9(1/ 4)C29	9(1/ 2)	SEE COLUMN 4	
	ZR- 95	5	ND			
	MN- 54	3	3(1/ 4)C29	3(1/ 2)	SEE COLUMN 4	
	ZN-65	7	ND			
	K-40	28	779(4/ 4)C30 (27- 1620)	1091(2/ 2) (562- 1620)	SEE COLUMN 4	

Table III-26

SEA FOOD CHAIN PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Gamma Analysis					
Ra-226	624	3300	23.0	<18.8	<42.4
Th-232	--	280	23.5	19.5	37.2
I-131	<10	37	<0.9	<0.9	<1.2
Ba-140	<10	75	<2.9	<2.9	<4.3
Ru-106	--	360	<7.3	<7.2	<12.3
Cs-137	<10	181	<1.1	<2.9	<10.9
Zr-95	18	157	<1.4	<1.3	<10.0
Mn-54	--	43	<1.0	<1.4	<3.5
Zn-65	--	156	<2.0	<1.8	<3.1
K-40	1508.4	12570	734.5	779.0	2087.1
Strontium Analysis					
Sr-89	--	--	<4.9	<9.6	<34.9
Sr-90	--	--	<0.3	<0.4	<1.2

Table III-27

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
MAR. PLANT (PCI/KG) SEAFOOD CH	SR89/90 ANALYSIS 4					0
	SR-89	5	18(2/ 4) C29	28(1/ 2)	SEE COLUMN 4	
			(9- 28)			
	SR-90	1	1(1/ 4) C29	1(1/ 2)	SEE COLUMN 4	

INGESTION CRAB PATHWAY

The University has the responsibility to collect and analyze crabs. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the edible portion of semiannual samples is in Table III-28. All samples were collected and analyzed. Sample Station C29 is the critical station in this pathway and no sample had activity greater than 10 times the control station value. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-29.

Except for naturally occurring Ra-226 and K-40, the 1979 operational concentrations are consistent with the 1978 operational and lower than the preoperational concentrations. The concentrations of the critical and control stations during 1978 were in close agreement.

One Licensee Event Report (LER) was issued to the Commission. LER 79-016/04-L was the result of Zn-65 analyses having LLDs greater than the required LLDs for the first half at Stations C29 and C30. Inadequate sample time was the apparent cause of the greater than required LLDs.

Table III-28

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
CRABS (PCI/KG) INGESTION	GAMMA ANALYSIS 4					0
	RA-226	14	153(3/ 4) (72- 280)	C29 193(2/ 2) (106- 280)	72(1/ 2)	
	TH-232	11	26(2/ 4) (24- 28)	C29 28(1/ 2)	24(1/ 2)	
	I -131	8	ND			
	BA-140	21	ND			
	RU-106	69	ND			
	CS-137	10	11(2/ 4) (10- 12)	C29 12(1/ 2)	10(1/ 2)	
	ZR- 95	10	ND			
	CS-134	6	ND			
	MN -54	6	ND			
	ZN -65	16	ND			
	K - 40	107	3205(3/ 4) (2640- 3975)	C29 3308(/2) (2640- 3975)	3000(1/ 2)	

Table III-29

INGESTION CRAB PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
						Control Stations		Critical Stations	
	Median	95 Percentile	Median	Mean	95 Percentile	Mean	95 Percentile	Mean	95 Percentile
Ra-226	1325	3600	<89.0	<115.1	<346.6	<37.1	<133.8	193.0	434.2
Th-232	92	170	<12.6	<13.6	<41.9	<12.5	<44.4	<14.6	<51.7
I-131*	<10	<10	<1.9	<1.9	<3.0	<1.8	<3.1	<2.0	<3.4
Ba-140	<10	55	<4.9	<5.3	<12.1	<4.9	<12.2	<5.6	<15.0
Ru-106	--	--	<16.6	<17.3	<20.3	<16.6	<17.7	<17.9	<22.4
Cs-137*	<10	75	<6.5	<7.0	<16.2	<6.5	<16.2	<7.5	<20.0
Zr-95	<10	13	<2.5	<2.6	<5.0	<2.5	<5.3	<2.6	<5.7
Cs-134*	<10	<10	<1.0	<1.6	<3.4	<1.5	<3.6	<1.6	<4.1
Mn-54	<80	24	<1.4	<1.4	<3.0	<1.4	<3.1	<1.5	<3.6
Zn-65	<160	127	<4.0	<4.1	<7.0	<4.0	<7.5	<4.1	<7.9
K-40	1424.6	2011.2	<2820.0	<2412.5	<5709.9	<1517.5	<5626.8	3307.5	5157.7

*Critical nuclides for critical station

INGESTION CARNIVOROUS FISH PATHWAY

The University has the responsibility to collect and analyze carnivorous fish. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the edible portion of semiannual samples is in Table III-30. All samples were collected and analyzed. Sample Station C29 is the critical station in this pathway and no sample had activity greater than 10 times the control station value. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-31.

The operational concentrations for 1979 are consistent with 1978 concentrations, and generally lower than the preoperational concentrations except for naturally occurring K-40 where the concentrations were similar.

ENVIRONMENTIAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
C. FISH (PCI/KG) INGESTION	GAMMA ANALYSIS 4					0
	RA-226	12	41(4/ 4)C30 (22- 68)	57(2/ 2) (45- 68)	57(2/ 2) (45- 68)	
	TH-232	10	25(4/ 4)C30 (14- 40)	30(2/ 2) (20- 40)	30(2/ 2) (20- 40)	
	I- 131	7	ND			
	BA-140	24	ND			
	RU-106	51	ND			
	CS-137	6	31(4/ 4)C29 (14- 65)	40(2/ 2) (14- 65)	23(2/ 2) (21- 24)	
	ZR- 95	10	ND			
	CS-134	7	ND			
	MN- 54	5	ND			
	ZN- 65	14	9(1/ 4)C29	9(1/ 2)	0(0/ 2)	
	K - 40	55	2505(4/ 4)C30 (2140- 2900)	2800(2/ 2) (2700- 2900)	2800(2/ 2) (2700- 2900)	

Table III-31

INGESTION CARNIVOROUS FISH PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
						Control Stations		Critical Stations	
	Median	95 Percentile	Median	Mean	95 Percentile	Mean	95 Percentile	Mean	95 Percentile
Ra-226	335	2400	36.0	40.5	81.3	56.5	88.4	24.5	31.4
Th-232	--	92	23.5	25.3	47.2	30.0	57.7	20.5	38.5
I-131*	<10	<10	<1.8	<1.8	<2.9	<2.3	<2.9	<1.4	<1.7
Ba-140	<10	72	<6.0	<5.9	<9.0	<7.3	<7.9	<4.6	<5.7
Ru-106	--	--	<13.1	<12.7	<20.2	<15.9	<16.9	<9.5	<13.0
Cs-137*	<10	43	17.5	31.0	76.2	22.5	26.7	39.5	110.2
Zr-95	<10	12	<2.5	<2.4	<3.7	<3.0	<3.0	<1.9	<2
Cs-134*	<10	<10	<1.8	<1.7	<2.4	<2.0	<2.0	<1.4	<1.7
Mn-54	<80	<80	<1.3	<1.3	<2.0	<1.6	<2.0	<1.0	<1.0
Zn-65	<160	99	<4.4	<5.3	<10.3	<4.4	<4.7	<6.1	<14.1
K-40	2346.4	3854.8	2490.0	2505.0	3200.6	2800.0	3077.2	2210.0	2404.0

*Critical nuclides for critical station

INGESTION HERBIVOROUS FISH PATHWAY

The University has the responsibility to collect and analyze herbivorous fish. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the edible portion of semiannual samples is in Table III-32. The sample for the second half at C29 was collected and counted but values were not reported because the sample was only 202 grams. Since the first half data at C30 had slightly high LLDs due to the small size of the sample collected, the data was not reported. All other samples were collected and analyzed. Sample Station C29 is the critical station in this pathway and no sample had activity greater than 10 times the control station value. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-33.

The 1979 operational concentrations are consistent with the 1978 operational, and lower than the preoperational concentrations.

One Licensee Event Report (LER) was issued to the Commission. LER 79-016/04-L was the result of Zn-65 analyses having LLDs greater than the required LLDs for the first half at Stations C29 and C30. Inadequate sample time and small sample size were the apparent cause of the greater than required LLDs.

Table III-32

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
H. FISH (PCI/KG) INJESTION	GAMMA ANALYSIS 4					0
	RA-226	17	60(2/ 2) (54- 66)	C29 66(1/ 1)	54(1/ 1)	
	TH-232	15	28(2/ 2) (27- 28)	C29 28(1/ 1)	27(1/ 1)	
	I- 131	8	ND			
	BA-140	27	ND			
	RU-106	68	ND			
	CS-137	9	22(1/ 2)	C30 22(1/ 1)	22(1/ 1)	
	ZR-95	13	ND			
	CS-134	9	ND			
	MN-54	8	ND			
	ZN-65	20	ND			
	K-40	73	1989(2/ 2) (858- 3120)	C30 3120(1/ 1)	3120(1/ 1)	

Table III-33

INGESTION HERBIVOROUS FISH PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
						Control Stations		Critical Stations	
	Median	95 Percentile	Median	Mean	95 Percentile	Mean	95 Percentile	Mean	95 Percentile
Ra-226	960	3100	60.0	60.0	76.6	54.0	-	66.0	-
Th-232	--	84	27.5	27.5	28.9	27.0	-	28.0	-
I-131*	<10	<10	<2.0	<2.0	<2.0	<2.0	-	<2.0	-
Ba-140	<10	50	<6.8	<6.8	<7.4	<7.0	-	<6.5	-
Ru-106	--	90	<16.9	<16.9	<20.7	<15.5	-	<18.3	-
Cs-137*	<10	110	<12.3	<12.3	<39.3	22.0	-	<2.5	-
Zr-95	<10	9	<3.3	<3.3	<3.3	<3.3	-	<3.3	-
Cs-134*	<10	<10	<2.1	<2.1	<2.5	<2.0	-	<2.3	-
Mn-54	<80	<80	<1.9	<1.9	<2.2	<1.8	-	<2.0	-
Zn-65	<160	63	<5.0	<5.0	<5.7	<4.8	-	<5.3	-
K-40	2178.8	3100.6	1989.0	1989.0	5124.0	3120.0	-	858.0	-

*Critical nuclides for critical station

INGESTION OYSTERS PATHWAY

The University has the responsibility to collect and analyze oysters. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the edible portion of semiannual samples is in Table III-34. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-35.

The 1979 operational concentrations are consistent with the 1978 operational and lower than preopoerational concentrations.

Table III-34

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
OYSTERS (PCI/KG) INGESTION	GAMMA ANALYSIS 4					0
	RA-226	18	36(4/ 4) (16- 56)	C30 45(2/ 2) (34- 56)	SEE COLUMN 4	
	TH-232	14	29(4/ 4) (20- 46)	C30 35(2/ 2) (23- 46)	SEE COLUMN 4	
	I -131	9	8(1/ 4)	C30 8(1/ 2)	SEE COLUMN 4	
	BA-140	29	ND			
	RU-106	50	36(1/ 4)	C29 36(1/ 2)	SEE COLUMN 4	
	CS-137	12	ND			
	ZR -95	10	ND			
	MN -54	6	ND			
	ZN -65	12	ND			
	K - 40	129	853(3/ 4) (551- 1270)	C30 1004(2/ 2) (738- 1270)	SEE COLUMN 4	

Table III-35

INGESTION OYSTERS PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Ra-226	--	534	35.5	35.8	67.9
Th-232	--	--	25.5	29.3	52.1
I-131	<10	<10	<3.1	<4.0	<9.4
Ba-140	<10	<10	<4.3	<7.2	<14.2
Ru-106	--	82	<17.0	<19.6	<42.2
Cs-137	<10	<10	<3.0	<3.1	<7.5
Zr-95	<10	<10	<2.6	<2.6	<4.5
Mn-54	<80	<80	<1.4	<1.4	<2.4
Zn-65	<160	33	<2.9	<2.9	<4.3
K-40	--	1843.6	<644.5	<650.3	<1644.1

INGESTION SHRIMP PATHWAY

The University has the responsibility to collect and analyze shrimp. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-36. The samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-34.

The 1979 operational concentrations are generally lower than both the 1978 operational and preoperational concentrations except for K-40.

Table III-36

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
SHRIMP (PCI/KG) INGESTION	GAMMA ANALYSIS 2					0
	RA-226	14	67(2/ 2) (64- 70)	C27 67(2/ 2) (64- 70)	SEE COLUMN 4	
	TH-232	13	29(2/ 2) (18- 40)	C27 29(2/ 2) (18- 40)	SEE COLUMN 4	
	I -131	7	ND			
	BA-140	23	ND			
	RU-106	57	ND			
	CS-137	7	16(1/ 2)	C27 16(1/ 2)	SEE COLUMN 4	
	ZR-95	11	ND			
	MN-54	7	ND			
	ZN-65	16	ND			
	K - 40	75	1900(2/ 2) (1430- 2370)	C27 1900(2/ 2) (1430- 2370)	SEE COLUMN 4	

Table III-37

INGESTION SHRIMP PATHWAY

SEMIANNUAL GAMMA ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Ra-226	--	--	67.0	67.0	75.3
Th-232	--	36	29.0	29.0	59.5
I-131	<10	<10	<1.8	<1.8	<1.8
Ba-140	<10	<10	<5.8	<5.8	<5.8
Ru-106	--	--	<14.3	<14.3	<17.7
Cs-137	<10	37	<8.9	<8.9	<28.6
Zr-95	<10	<10	<2.8	<2.8	<3.4
Mn-54	<80	<80	<1.6	<1.6	<2.0
Zn-65	<160	<160	<3.9	<3.9	<4.2
K-40	921.8	2514	1900.0	1900.0	3202.8

INGESTION MILK PATHWAY

The University has the responsibility to collect and analyze milk. There are no additional stations for this pathway.

Monthly Gamma Analysis

The summary for the gamma analysis of the monthly samples is in Table III-38. The samples at Sample Station C49 were not collected due to the unavailability of milk. All other samples were collected and analyzed. Sample Station C49 is the critical station for this type of analysis. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-39.

The 1979 operational concentrations are less than both the 1978 operational and the preoperational concentrations.

Monthly Sr-89 and 90 Analysis

The summary for the monthly analyses for Sr-89 and 90 is in Table III-40. The samples at Station C49 were not collected due to the absence of milk animals in the area. All other samples were collected and analyzed. Strontium 89/90 are not critical nuclides in this pathway. A statistical evaluation of the operational data, and comparison with preoperational data (Sr-90 only) is presented in Table III-39.

Strontium 89 showed some increase over the 1978 concentration, while Sr-90 remained consistent with 1978 concentrations and lower than preoperational concentrations.

NOTE: These milk samples were collected at Control Station C47, which is in Gainesville, 52 miles away from the plant, and beyond the plant's zone of influence.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
MILK (PCI/L) INGESTION	GAMMA ANALYSIS 24					0
	I -131	6	ND			
	BA-140	19	ND			
	CS-137	6	15(10/ 12)*C47 (9- 35)*	15(10/ 12)* (9- 35)*	15(10/ 12)* (9- 35)*	
	ZR- 95	9	14(1/ 12)*C47	14(1/ 12)*	14(1/ 12)*	
	CS-134	7	4(1/ 12)*C47	4(1/ 12)*	4(1/ 12)*	
	CO-58	5	6(1/ 12)*C47	6(1/ 12)*	6(1/ 12)*	
	MN- 54	6	ND			
	CO- 60	6	4(1/ 12)*C47	4(1/ 12)*	4(1/ 12)*	

Table III-39

INGESTION MILK PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Preoperational Values		Operational Values						
	Median	95 Percentile	Median	Mean	95 Percentile	Control Stations Mean	Control Stations 95 Percentile	Critical Stations Mean	Critical Stations 95 Percentile
Gamma Analysis									
I-131*	<10	<10	<1.3	<1.4	<2.6	<1.4	<2.6	NC/M	NC/M
Ba-140	<30	<30	<3.5	<4.8	<9.6	<4.8	<9.6	NC/M	NC/M
Cs-137	16	22	<11.0	<12.6	<29.7	<12.6	<29.7	NC/M	NC/M
Zr-95	<20	<20	<3.1	<3.3	<10.2	<3.3	<10.2	NC/M	NC/M
Cs-134	<10	<10	<2.3	<1.9	<3.9	<1.9	<3.9	NC/M	NC/M
Mn-54	<10	<10	<1.5	<1.4	<2.7	<1.4	<2.7	NC/M	NC/M
Co-58	<10	<10	<1.5	<1.7	<4.6	<1.7	<4.6	NC/M	NC/M
Co-60	<10	<10	<2.1	<1.9	<3.9	<1.9	<3.9	NC/M	NC/M
Strontium Analysis									
Sr-89	--	--	<3.7	<12.4	<59.6	<12.4	<59.6	NC/M	NC/M
Sr-90	4.0	6.0	<2.5	<2.1	<5.3	<2.1	<5.3	NC/M	NC/M

*Critical nuclides for critical station

Table III-40

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
MILK (PCI/L) INGESTION	SR 89/90 ANALYSIS 24					0
	SR-89	6	33(4/ 12) (12- 86)	C47 33(4/ 12) (12- 86)	33(4/ 12) (12- 86)	
	SR-90	0	3(9/ 12) (0- 4)	C47 3(9/ 12) (0- 4)	3(9/ 12) (0- 4)	

INGESTION ANIMAL PATHWAY

The University has the responsibility to collect and analyze small terrestrial animals. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-41. All samples were collected and analyzed. There are no critical sample stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-42.

The operational concentrations for 1979 are lower than both the 1978 operational and the preoperational concentrations except for Cs-137 and K-40. Cs-137 is still elevated due to residual Chinese weapons test fallout; K-40 concentration is similar to preoperational concentration.

Table III- 41

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
ANIMALS (PCI/KG) INGESTION	GAMMA ANALYSIS 2					0
	RA-226	12	49(1/ 2)*C45	49(1/ 2)*	SEE COLUMN 4	
	TH-232	10	38(1/ 2)*C45	38(1/ 2)*	SEE COLUMN 4	
	I -131	7	ND			
	BA-140	21	ND			
	RU-106	45	ND			
	CS-137	6	314(1/ 2)*C45	314(1/ 2)*	SEE COLUMN 4	
	ZR -95	8	ND			
	MN -54	4	ND			
	ZN -65	15	ND			
	K - 40	224	1760(2/ 2)*C45 (1400- 2120)*	1760(2/ 2)* (1400- 2120)*	SEE COLUMN 4	

Table III-42

INGESTION ANIMALS PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Ra-226	--	720	<25.8	<25.8	<90.2
Th-232	--	--	<20.0	20.0	<69.9
I-131	<10	100	<1.8	<1.8	<3.8
Ba-140	<10	<10	<5.3	<5.3	<11.5
Ru-106	--	--	<11.1	<11.1	<18.2
Cs-137	<10	80	<157.6	<157.6	<591.1
Zr-95	<10	70	<1.9	<1.9	<2.9
Mn-54	<80	<80	<1.0	<1.0	<1.7
Zn-65	<160	160	<3.6	<3.6	<4.7
K-40	1656.5	3586.6	1760.0	1760.0	2757.9

FOOD CHAIN (GRASSES) PATHWAY

The University has the responsibility to collect and analyze grass samples. There are no additional stations for this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-43. All samples were collected and analyzed. There are no critical stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-44.

The 1979 operational concentrations are similar to the 1978 operational and preoperational concentrations except for K-40.

One Licensee Event Report (LER) was issued to the Commission. LER 79-112/04X-0 was the result of the Zn-65 analysis having an LLD greater than the required LLD for the second half at C05. Inadequate sample time was the apparent cause of the greater than required LLD.

Table III-43

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
GRASS (PCI/KG) FOOD CHAIN	GAMMA ANALYSIS 6					0
	RA-226	15	90(6/ 6) (24- 203)	C05 138(2/ 2) (72- 203)	SEE COLUMN 4	
	TH-232	14	71(6/ 6) (25- 115)	C40 112(2/ 2) (108- 115)	SEE COLUMN 4	
	I -131	8	ND			
	BA-140	25	ND			
	RU-106	59	73(1/ 6)	C40 73(1/ 2)	SEE COLUMN 4	
	CS-137	8	174(6/ 6) (5- 452)	C40 350(2/ 2) (247- 452)	SEE COLUMN 4	
	ZR- 95	11	ND			
	MN- 54	6	11(1/ 6)	C05 11(1/ 2)	SEE COLUMN 4	
	ZN- 65	15	ND			
	K - 40	86	2004(5/ 6) (1120- 2570)	C05 2425(2/ 2) (2280- 2570)	SEE COLUMN 4	

Table III-44

FOOD CHAIN (GRASSES) PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
Ra-226	--	2363	66.0	90.0	219.9
Th-232	--	120	69.0	70.7	147.0
I-131	<10	<10	<2.0	<1.9	<2.9
Ba-140	26	253	<6.3	<6.3	<9.9
Ru-106	--	--	<16.1	<24.6	<72.1
Cs-137	1363	5416	153.5	173.7	505.2
Zr-95	<10	31	<2.5	<2.8	<4.7
Mn-54	--	--	<1.5	<3.0	<10.7
Zn-65	--	589	<3.4	<3.8	<6.4
K-40	578.2	2430.2	<1935.0	<1677.5	<3589.0

INGESTION FOOD CROPS (CITRUS) PATHWAY

The State has the responsibility to collect and analyze citrus samples. There are no additional stations in this pathway.

Annual Gamma Analysis

The summary for the gamma analysis of the annual samples is in Table III-45. All samples were collected and analyzed. There are no critical sample stations in this pathway. A statistical evaluation of the operational data and a comparison with the preoperational data is presented in Table III-46.

The 1979 operational concentrations were non detectable as were the 1978 operational and the preoperational concentrations.

Table III-45

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
CITRUS PCI/KG INGESTION	GAMMA ANALYSIS 1					
	I- 131	24	ND			
	BA-140	24	ND			
	CO- 58	24	ND			
	CS-137	24	ND			
	CS-134	24	ND			
	MN- 54	21	ND			
	ZN- 65	42	ND			
	CO- 60	24	ND			

Table III-46

INGESTION FOOD CROPS (CITRUS) PATHWAY

ANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Preoperational Values		Operational Values		
	Median	95 Percentile	Median	Mean	95 Percentile
I-131	<10	<10	<6.0	<6.0	--
Ba-140	<10	<10	<6.0	<6.0	--
Co-58	<10	<10	<6.0	<6.0	--
Cs-137	<10	<10	<6.0	<6.0	--
Cs-134	<10	<10	<6.0	<6.0	--
Mn-54	<10	<10	<5.3	<5.3	--
Zn-65	--	--	<10.5	<10.5	--
Co-60	<10	<10	<6.0	<6.0	--

INGESTION FOOD CROPS (WATERMELON) PATHWAY

The State has the responsibility to collect and analyze watermelon samples. There are no additional stations in this pathway.

Annual Gamma Analysis

The summary for the gamma analysis of the annual samples is in Table III-47. All samples were collected and analyzed. There is no critical sample station in this pathway. A statistical evaluation of the operational data is presented in Table III-48. There are no preoperational data for this pathway and all 1979 operational analyses resulted in non-detectable activity as did the 1978 operational analyses.

Table III-47

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
WATERMELON (PCI/KG) INGESTION	GAMMA ANALYSIS 1					
	I- 131	24	ND			
	BA-140	24	ND			
	CO- 58	24	ND			
	CS-137	24	ND			
	CS-134	24	ND			
	MN- 54	21	ND			
	ZN- 65	42	ND			
	CO- 60	24	ND			

Table III-48

INGESTION FOOD CROPS (WATERMELON) PATHWAY

ANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Operational Values	
	Mean	95 Percentile
I-131	<6.0	--
Ba-140	<6.0	--
Co-58	<6.0	--
Cs-137	<6.0	--
Cs-134	<6.0	--
Mn-54	<5.3	--
Zn-65	<10.5	--
Co-60	<6.0	--

FOOD CHAIN (MEAT) PATHWAY

The State has the responsibility to collect and analyze meat samples. There are no additional stations in this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-49. All samples were collected and analyzed. There is no critical sample station in this pathway. A statistical evaluation of the operational data is presented in Table III-50. There are no preoperational data for this pathway and all 1979 operational analyses resulted in nondetectable activity, except for Cs-137 which was detected during the first half. The 1978 operational analysis also resulted in nondetectable activity.

Table III-49

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
MEAT (PCI/KG) FOOD CHAIN	GAMMA ANALYSIS 2					0
	I- 131	38	ND			
	BA-140	39	ND			
	CO- 58	60	ND			
	CS-137	37	120(1/ 2)	C50 120(1/ 2)	SEE COLUMN 4	
	CS-134	60	ND			
	MN- 54	32	ND			
	ZN- 65	65	ND			
	CO- 60	60	ND			

Table III-50

FOOD CHAIN (MEAT) PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Operational Values	
	Mean	95 Percentile
I-131	<9.5	<9.5
Ba-140	<9.8	<9.8
Co-58	<15.0	<15.0
Cs-137	<64.6	<218.1
Cs-134	<15.0	<15.0
Mn-54	<8.0	<8.0
Zn-65	<16.5	<16.5
Co-60	<15.0	<15.0

FOOD CHAIN (POULTRY) PATHWAY

The State has the responsibility to collect and analyze poultry samples. There are no additional stations in this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-51. All samples were collected and analyzed. There is no critical sample station in this pathway. A statistical evaluation of the operational data is in Table III-52. There are no preoperational data for this pathway.

The 1979 operational concentrations were nondetectable as were the preoperational concentrations.

Table III- 51

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
POULTRY (PCI/KG) FOOD CHAIN	GAMMA ANALYSIS 2					0
	I- 131	38	ND			
	BA-140	39	ND			
	CO- 58	60	ND			
	CS-137	37	ND			
	CS-134	60	ND			
	MN- 54	32	ND			
	ZN- 65	66	ND			
	CO- 60	60	ND			

Table III-52

FOOD CHAIN (POULTRY) PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Operational Values	
	Mean	95 Percentile
I-131	<9.5	<9.5
Ba-140	<9.8	<9.8
Co-58	<15.0	<15.0
Cs-137	<9.3	<9.3
Cs-134	<15.0	<15.0
Mn-54	<8.0	<8.0
Zn-65	<16.5	<16.5
Co-60	<15.0	<15.0

FOOD CHAIN (EGGS) PATHWAY

The State has the responsibility to collect and analyze egg samples. There are no additional stations in this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-53. All samples were collected and analyzed. There is no critical sample station in this pathway. A statistical evaluation of the operational data is presented in Table III-54. There are no preoperational data for this pathway and all 1979 operational analyses resulted in non-detectable activity as did all 1978 operational analyses.

Table III-53

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
EGGS (PCI/KG) FOOD CHAIN	GAMMA ANALYSIS 2					0
	I- 131	38	ND			
	BA-140	39	ND			
	CO- 58	60	ND			
	CS-137	37	ND			
	CS-134	60	ND			
	MN- 54	32	ND			
	ZN- 65	66	ND			
	CO- 60	60	ND			

Table III-54

FOOD CHAIN (EGGS) PATHWAY

SEMIANNUAL GAMMA ANALYSIS (pCi/kg)

Nuclide	Operational Values	
	Mean	95 Percentile
I-131	<9.5	<9.5
Ba-140	<9.8	<9.8
Co-58	<15.0	<15.0
Cs-137	<9.3	<9.3
Cs-134	<15.0	<15.0
Mn-54	<8.0	<8.0
Zn-65	<16.5	<16.5
Co-60	<15.0	<15.0

FOOD CHAIN (GREEN LEAFY VEGETABLES) PATHWAY)

The University has the responsibility to collect and analyze green leafy vegetable samples. There are no additional stations in this pathway.

Semiannual Gamma Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-55. All samples were collected and analyzed. There is no critical sample station in this pathway. The critical station for this type of analysis (Sample Station C48) is in the east sector at 4.0 miles from the plant. A statistical evaluation of the operational data is presented in Table III-56. There are no preoperational data for this pathway.

The 1979 operational concentrations are generally less than the 1978 operational concentrations.

Semiannual Sr-90 Analysis

The summary for the gamma analysis of the semiannual samples is in Table III-57. All samples were collected and analyzed. There is no critical station for this type of analysis. A statistical evaluation of the operational data is presented in Table III-56. There are no preoperational data for this pathway. The 1978 operational data showed no detectable activity. The 1979 samples also showed no detectable activity.

Table III-55

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
G.L. VEG (PCI/KG)	GAMMA ANALYSIS 6					0
	RA-226	12	35(4/ 5)#C48 (20- 62)	44(2/ 3)* (25- 62)	26(2/ 2)* (20- 32)	
	TH-232	10	33(5/ 5)#C48 (24- 41)	35(3/ 3)* (24- 41)	30(2/ 2)* (25- 34)	
	I-131	5	20(2/ 5)#C47 (5- 35)	20(2/ 2)* (5- 35)	20(2/ 2)* (5- 35)	
	BA-140	18	ND			
	RU-106	44	ND			
	CS-137	6	351(3/ 5)#C48 (66- 524)	351(3/ 3)* (66- 524)	ND	
	ZR-95	8	ND			
	MN-54	4	3(1/ 5)#C48	3(1/ 3)*	0(0/ 2)*	
	ZN-65	11	ND			
	K-40	43	1400(5/ 5)#C47 (690- 1810)	1570(2/ 2)* (1490- 1650)	1570(2/ 2)* (1490- 1650)	

Table III-56

FOOD CHAIN (GREEN LEAFY VEGETABLES) PATHWAY

STATISTICAL EVALUATION OF ANALYSES (pCi/kg)

Nuclide	Operational Values					
	Mean	95 Percentile	Control Stations		Critical Stations	
			Mean	95 Percentile	Mean	95 Percentile
Gamma Analysis						
Ra-225	<28.6	70.5	26.0	42.6	30.3	<88.0
Th-232	32.6	47.9	29.5	42.0	34.7	<52.9
I-131*	<8.9	<37.7	20.0	90.3	<1.5	<2.5
Ba-140	<4.6	<7.4	<3.9	<4.9	<5.1	<8.5
Ru-106	<11.0	<17.7	<9.3	<10.6	<12.2	<20.5
Cs-137	<210.9	<720.1	<1.3	<1.3	350.7	837.7
Zr-95	<1.9	<3.0	<1.8	<2.4	<2.0	<3.5
Mn-54	<1.6	<3.2	<1.0	<1.0	<1.9	<3.8
Zn-65	<2.7	<3.9	<2.6	<3.0	<2.7	<4.8
K-40	1400.0	2245.5	1570.0	1791.7	1286.7	2391.3
Strontium Analysis						
Sr-90	<0.6	<1.7	<0.9	<2.6	<0.4	<1.0

*Critical nuclides for critical station

Table III-57

ENVIRONMENTIAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
G.I. VEG PCI/KG FOOD CHAIN	SR-90 ANALYSIS 4					0
	SR-90	1	<LLD(2/ 5)			

IV. EXTERNAL RADIATION

The External Radiation portion of the Radiological Environmental Monitoring Program (Specification 3.2.3) is split between the University and the State (See Table I-1). The University also has a TLD at Sample Station C47 and the State has additional TLDs at Sample Stations C04, C40, and C46. The summaries for the University's data is in Table IV-1 and for the State's data in Table IV-2. Fourth quarter TLDs for Station C04 were lost during transit from Crystal River to the University. Because of vandalism, the fourth quarter TLDs at Station C47 were lost. No other TLDs were lost during the report period. Sample Stations C14H, C14M, and C14G are the critical stations in this pathway.

Table IV-3 presents a statistical summary of all data. The 1979 data from all TLD stations compares very well with the 1978 data and the preoperational data. Additionally, the critical stations and the control stations of the University also compare very well. However, because the University and the State use different types of TLDs, it is necessary to report their results separately.

Table IV-1

ENVIRONMENTIAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
AIR SUBMERSION (MREM/YR)						
U OF F	EXTERNAL RADIATION 36	15	48(34/ 34) (29- 73)	C47 61(3/ 3) (54- 68)	47(22/ 22) (29- 73)	0

Table IV-2

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

CRYSTAL RIVER UNIT 3 DOCKET NO. 50-302

CITRUS COUNTY, FLORIDA REPORTING PERIOD 01/01/79-12/31/79

PATHWAY	TYPE & NO.	LLD	ALL LOCATIONS	HIGHEST MEAN LOCATION	CONTROL LOCATION	NRR
AIR SUBMERSION (MREM/YR)						
STATE	EXTERNAL RADIATION 28	20	41 (28/ 28) (28- 59)	C26 54 (4/ 4) (51- 59)	SEE COLUMN 4	

Table IV-3

EXTERNAL RADIATION PATHWAY

QUARTERLY TLD ANALYSIS (mrem/yr)

	Median Value	Mean Value	95 Percentile Value
Preoperational	62	--	77
All Stations	45	44.9	65.1
State	39	40.8	57.1
University (All Stations)	47.5	48.3	69.2
University (Critical Stations)	50.5	50.9	67.2
University (Control Stations)	45.5	46.8	69.7