



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

Report No. 50-302/82-16

Licensee: Florida Power Corporation  
Attn: Mr. John A. Hancock, Vice President  
Nuclear Operations  
P. O. Box 14042, M.A.C. H-2  
St. Petersburg, FL 33733

Facility Name: Crystal River

Docket No. 50-302

License No. DPR-72

Inspection at Crystal River site near Crystal River, Florida

Inspector: *C. D. Evans* 7/28/82  
C. D. Evans Date Signed

Accompanying Personnel: P. C. McPhail

Approved by: *D. M. Montgomery* 7/28/82  
D. M. Montgomery, Section Chief  
Independent Measurements and  
Environmental Protection  
Division of Emergency Preparedness  
and Operational Support Date Signed

SUMMARY

Inspection on July 12-16, 1982

Areas Inspected

This routine, unannounced inspection involved 52 inspector-hours on site in the areas of quality control and confirmatory measurements including: review of the laboratory quality control program; review of chemistry and radiochemistry procedures; airborne effluent sampling and accountability; and comparison of the results of split samples analyzed by the licensee and the NRC:RII Mobile Laboratory.

Results

Of the 5 areas inspected, no violations or deviations were identified.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*G. Ruzala, Chemistry and Radiation Protection Manager
- \*C. Brown, Compliance Specialist
- \*V. Hernandez, Site Quality Assurance Auditor
- \*M. Unger, Site Quality Assurance Auditor
- \*S. Robinson, Chemistry Manager
- \*D. Wilder, Effluent Accountability Supervisor
- \*R. Pinner, Chemistry Supervisor

Other licensee employees contacted included two technicians.

#### NRC Resident Inspector

- \*Barry Smith

- \*Attended Exit Interview

### 2. Exit Interview

The inspection scope and findings were summarized on June 16, 1982, with those persons indicated in paragraph 1 above. The inspector requested that the licensee provide permanent electrical power receptacles for the NRC:RII Mobile Laboratory. Licensee representatives stated that they would evaluate the possibility of allocating space and electrical power receptacles for the NRC:RII Mobile Laboratory near the newly constructed Technical Support Building.

### 3. Licensee Action on Previous Inspection Findings

(Closed) Infraction (302/81-03-04): Failure to obtain approval and review of the Chemistry 200 procedure series by the Nuclear Plant Manager and the Nuclear General Review Committee. The licensee has incorporated all Chemistry procedures into the Plant Operating Quality Assurance Manual. This requires all Chemistry procedures to be approved by the Nuclear Plant Manager and reviewed by the NGRC as required by the Environmental Technical Specifications.

(Closed) Infraction (302/81-03-05): Failure to implement procedure CH-213 which requires semiannual interlaboratory crosschecks for analyses associated with effluent releases. The licensee has commissioned a commercial laboratory to provide crosschecks to implement procedure CH-213.

### 4. Unresolved Items

Unresolved items were not identified during this inspection.

## 5. Laboratory Quality Control Program

The inspector reviewed the licensee's quality control program for chemical and radiochemical measurements in the following areas:

### a. Assignment of Responsibility to Management and Conduct the QC Program.

The chemistry procedures do not specifically address the assignment of authority to manage and conduct the QC program. The responsibility for day-to-day quality control is delegated to the supervisors of the various chemistry sections.

### b. Provisions for Audits/Inspections

There are no provisions for audits and/or inspections to review program results beyond first-line supervision, i.e., Chemistry Supervisor. Section 5.3.9 of the Environmental Technical Specifications (Appendix B) specifies that audits of conformance to procedures and ETS requirements shall be carried out at least once per twelve months under the cognizance of the Nuclear General Review Committee (NGRC). These audits are not directed to the review of quality control data for the purpose of identifying problems or inadequacies of the laboratory QC program.

### c. Methods for Assuring Deficiencies and Deviations in the Program are Recognized, Identified, and Corrected.

The Chemistry 400 Series procedures specify a schedule for quality control checks and analyses that are performed to identify problems in the analytical program. Documentation of deficiencies is accomplished by issuance of Form 912915, "Chem-Rad Follow-Up Report," which provides a tracking mechanism to ensure that corrective action is taken.

## 6. Review of Radiochemistry and Chemistry Procedures

### a. The inspector reviewed the following procedures:

1. CH-213, "Quality Control Requirements for Radiochemistry Procedures," 7-31-81.
2. CH-407, "Laboratory Radiochemistry Instrumentation Quality Control Scheduling Program," 9-30-81.
3. CH-102, "Determination of Boron, Carminic Acid Method," 9-30-81.
4. CH-338, "Sampling the Waste Gas Decay Tanks," 9-17-81.
5. CH-211, "Quality Control Requirements for Nuclear Counting Instrumentation," 1-5-82.
6. CH-348, "Sampling at the Reactor Building Purge Duct Gas Monitor (RM-A1)," 9-10-81.

7. CH-259, "Determination of Tritium in Liquids and Gas Streams," 12-18-81.
8. CH-231, "Gamma Spectrometer System," 2-19-82.
9. CH-260, "Determination of Radionuclides Using Gamma Spectroscopy," 11-11-81.
10. CH-106, "Operating Instructions for the Beckman Model 25 Vis/Uv Spectrophotometer," 5-7-81.
11. CH-406, "Laboratory Chemistry Analytical Quality Control Scheduling Program," 9-30-81.
12. CH-408, "Laboratory Chemistry Instrumentation Quality Control Scheduling Program," 9-30-81.
13. CH-101, "Determination of Boron, Mannitol Complex Titration Method," 4-30-81.

The inspector discussed the procedure review with licensee representatives as noted in paragraphs 5.b. through 5.g.

- b. The inspector noted that procedure CH-213 does not provide acceptance criteria for the interlaboratory crosscheck analyses. Licensee representatives indicated that they would investigate the acceptance criteria used by the commercial laboratory participating in the crosscheck program and incorporate it into the procedure. The revised procedure will be reviewed in a subsequent inspection (302/82-16-01).
- c. The inspector noted that requirements specifying the efficiency calibration frequency of the counting room instrumentation had been included into the procedure CH-407, "Laboratory Radiochemistry Instrumentation Quality Control Scheduling Program." This closes a previously identified item (302/81-03-03).
- d. Procedure CH-407 does not specify the frequency for plateau voltage checks for the BA-530/FC-2 Gas Flow Proportional Counter. Licensee representatives agreed to revise the procedure to specify the frequency for plateau voltage checks. The revised procedure will be reviewed in a subsequent inspection (302/82-16-02).
- e. Procedure CH-338 for sampling of the waste gas decay tanks has been modified to include greater detail of the tritium trap for removing of tritiated water from the sample line. This closes a previously identified item (302/81-03-02).
- f. The inspector reviewed the procedure for determination of boron in reactor coolant samples, CH-101 and noted that no standardization check is required. The inspector noted to licensee representatives that a daily standardization check consisting of titrating a known boron concentration should be made to ensure the validity of the analysis. A

licensee representative agreed to increase the quality control requirements of the boron analysis. This area will be reviewed in a subsequent inspection (302/82-16-03).

- g. The inspector reviewed the procedure for operation of the Beckman Uv/Vis Spectrophotometer and its associated quality control data and noted that no response check is required. The inspector noted to licensee representatives that a response check using a standard solution should be made to ensure proper instrument operation by verification of the absorbance versus concentration curve. A licensee representative agreed to increase the quality control requirements of the Uv/Vis Spectrophotometer. This area will be reviewed in a subsequent inspection (302/82-16-04).
- h. The inspector noted that procedure CH-231 for operation of the Ge(Li) gamma spectroscopy system permits counting samples with analyzer dead time as high as 20 percent. The inspector stated that dead time levels in excess of 10 percent could result in pulse pile-up losses which would underestimate the radionuclide concentrations. Licensee representatives indicated that laboratory tests would be conducted to establish appropriate deadtime control limits. This area will be reviewed in a subsequent inspection (302/82-16-05).

## 7. Review of Records and Logs

- a. The inspector reviewed the following records and logs
  1. Ge(Li) Calibration Records for Detectors 1, 2, and 3, 1981-1982.
  2. Daily Instrument Checks for the Liquid Scintillation Counter and the Ge(Li) Detectors, June 1981 to June 1982.
  3. Interlaboratory Cross Check Comparison Reports for 1981-1982.
  4. Waste Gas Tank Release Permits: 82/17-82/23. (Includes gamma spectra data)
  5. Liquid Release Permits: 82/119-82/239.

The inspector discussed the record review with licensee representatives as noted in paragraphs 7.b. through 7.c.

- b. The inspector determined from discussions with licensee representatives that the charcoal cartridge used for radioiodine sampling (CESCO-727) was not TEDA impregnated and might not be as efficient for organic radioiodine species. The inspector noted that collection efficiencies for cartridges used for effluent accountability should be tested or verified for the radioiodine species actually released. A licensee representative agreed to initiate action to use TEDA impregnated cartridges. This will be carried as an Inspector Follow-up Item (302/82-16-06).

- c. The inspector noted the addition of Xe-133 to the radionuclide library used to quantify gamma ray spectra for liquid effluent samples. This will ensure that Xe-133 concentrations do not exceed the Xe-133 MPC value in water for liquid releases. This closes a previously identified item (302/81-03-06).

## 8. Confirmatory Measurements

- a. Liquid and gaseous samples were collected during this inspection and counted by the licensee and NRC:RII Mobile Laboratory to verify the licensee's capability to measure radionuclides in effluent and reactor coolant samples. Samples were analyzed by gamma-ray spectroscopy and included: an auxiliary building process vent gas sample, a waste gas decay tank sample, a charcoal cartridge from the reactor building ventilation system, a miscellaneous waste holdup tank sample (prior to demineralization), a reactor coolant sample and a reactor coolant crud filter. The crud filter was counted in place of a particulate filter since a particulate filter sample of sufficient activity was not available. An aliquot of a liquid sample was also sent to the NRC contract laboratory for tritium and radiostrontium analyses. The results will be compared to licensee results in a subsequent inspection (302/82-16-07).
- b. The comparison of licensee and NRC results are presented in Table 1 with acceptance criteria in Attachment 1. The results show agreement or possible agreement for all samples except the miscellaneous waste holdup tank. The nuclide library associated with the geometry code used for the miscellaneous waste holdup tank did not contain the radionuclides Sb-122, I-135, and Xe-133; therefore, these radionuclides were not reported. This geometry code is used only for performance checks of the demineralizer trains and not for effluent accountability. The inspector noted that the licensee's nuclide libraries used for radionuclide identification were not as complete as needed and that the libraries had not recently been updated to reflect more current nuclear decay data. A licensee representative agreed to review and update the nuclide libraries. This area will be reviewed in a subsequent inspection (302/82-16-08).
- c. The inspector reviewed licensee results for H-3, Sr-89, and Sr-90 analyses of a spiked sample prepared by the NRC contract laboratory. The comparison of licensee results with the values of the spiked sample are given in Table 2, with acceptance criteria in Attachment 1. The comparisons show "agreement" for H-3, "agreement" for Sr-89, and "possible agreement" for Sr-90. The inspector noted that the licensee performance on recent radiostrontium crosschecks prepared by the licensee commissioned commercial laboratory have shown "agreement."

Table 1

RESULTS OF CONFIRMATORY MEASUREMENTS AT CRYSTAL RIVER, 7/13-14/82  
CONCENTRATION, MICROCURIES/CC

<u>SAMPLE</u>	<u>NUCLIDE</u>	<u>LICENSEE</u>	<u>NRC</u>	<u>RATIO</u>	<u>RESOLUTION</u>	<u>COMPARISON</u>
Rx.-Bldg. Internal Ventilation System Charcoal Cartridge	I-131	5.39 E-01	5.24 ± .01 E-01	1.03	524	Agreement
Aux.-Bldg. Process	Xe-133	5.38 E-06	5.57 ± .13 E-06	.97	43	Agreement
Vent. Gas Marinelli	Xe-135	7.93 E-07	5.76 ± .26 E-07	1.51	22	Possible Agreement
Waste Gas	Xe-133	2.91 E-02	2.53 ± .01 E-02	1.15	194	Agreement
33 cc. Bulb	Xe-133m	8.75 E-05	1.39 ± .61 E-04	.62	3	Agreement
	Xe-135	2.07 E-04	1.94 ± .11 E-04	1.07	18	Agreement
Reactor Coolant	I-131	2.56 E-02	2.20 ± .03 E-02	1.16	73	Agreement
	I-133	1.24 E-01	1.08 ± .001 E-01	1.15	1080	Agreement
	I-135	1.21 E-01	1.15 ± .16 E-01	1.05	7	Agreement
	Cs-137	1.03 E-03	1.04 ± .09 E-03	.99	12	Agreement
Miscellaneous	Xe-133	*N.I.	6.51 ± .04 E-04	*N.C.	162	*N.C.
Waste Holdup Tank	I-135	*N.I.	1.22 ± .01 E-04	*N.C.	122	*N.C.
	I-133	3.66 E-04	3.69 ± .02 E-04	.99	184	Agreement
	I-131	7.65 E-04	7.77 ± .27 E-04	.98	23	Agreement
	Cs-134	6.95 E-04	7.04 ± .29 E-04	.99	24	Agreement
	Cs-137	1.30 E-03	1.32 ± .004 E-03	.98	330	Agreement
	Co-60	5.96 E-05	5.64 ± .10 E-05	1.06	56	Agreement
	Co-58	3.90 E-05	4.09 ± .09 E-05	.95	45	Agreement
	Sb-122	*N.I.	8.09 ± .16 E-05	*N.C.	50	*N.C.

\*N.I. - Not Identified

\*N.C. - No Comparison

Table 1 (Cont'd)

<u>SAMPLE</u>	<u>NUCLIDE</u>	<u>LICENSEE</u>	<u>NRC</u>	<u>RATIO</u>	<u>RESOLUTION</u>	<u>COMPARISON</u>
RCS Crud Filter	Cr-51	1.53 E-03	1.35 ± .02 E-03	1.13	68	Agreement
	Co-58	2.92 E-03	2.86 ± .01 E-03	1.02	286	Agreement
	Co-60	3.51 E-04	3.17 ± .04 E-04	1.10	79	Agreement
	Zr-95	2.22 E-04	2.13 ± .02 E-04	1.04	53	Agreement
	Nb-95	2.73 E-04	2.45 ± .03 E-04	1.11	82	Agreement
	Fe-59	5.99 E-04	5.53 ± .38 E-04	1.08	53	Agreement



Table 2

RESULTS OF CONFIRMATORY MEASUREMENTS AT CRYSTAL RIVER, 7/13-14/82  
 CONCENTRATION, MICROCURIES/CC

<u>SAMPLE</u>	<u>NUCLIDE</u>	<u>LICENSEE</u>	<u>NRC</u>	<u>RATIO</u>	<u>RESOLUTION</u>	<u>COMPARISON</u>	
Simulated Liquid	H-3	7.53 E-03	6.22 ± .06	E-03	1.21	124	Agreement
Waste Sample	Sr-89	8.08 E-03	7.38 ± .08	E-03	1.09	92	Agreement
(4-22-81)	Sr-90	9.13 E-04	5.87 ± .24	E-04	1.65	24	Possible Agreement

Attachment 1

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the NRC Reference Laboratory's value to its associated uncertainty. As that ratio, referred to in this program as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement must be considered acceptable as the resolution decreases.

$$\text{RATIO} = \frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$$

<u>Resolution</u>	<u>Agreement</u>	<u>Possible Agreement A</u>	<u>Possible Agreement B</u>
<3	0.4 - 2.5	0.3 - 3.0	No Comparison
4 - 7	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
8 - 15	0.6 - 1.66	0.5 - 2.0	0.4 - 2.5
16 - 50	0.75 - 1.33	0.6 - 1.66	0.5 - 2.0
51 - 200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.66
>200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma Spectrometry where principal gamma energy used for identification is greater than 250 Kev.

Tritium analyses of liquid samples.

"B" criteria are applied to the following analyses:

Gamma Spectrometry where principal gamma energy used for identification is less than 250 Kev.

<sup>89</sup>Sr and <sup>90</sup>Sr Determinations.

Gross Beta where samples are counted on the same date using the same reference nuclide.