

APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Dockets: 50-313/82-12
50-368/82-25

Licenses: DPR-51
NPF-6

Licensee: Arkansas Power and Light Company
P. O. Box 551
Little Rock, Arkansas 72203

Facility Name: Arkansas Nuclear One (ANO), Units 1 and 2

Inspection at: ANO Site, Russellville, Arkansas

Inspection Conducted: May 24-27, 1982

Inspector:

J. Blais Nicholas
J. B. Nicholas, Radiation Specialist

9/9/82
Date

Approved:

Blaine Murray
Blaine Murray, Chief, Facility Radiation Protection
Section

9/9/82
Date

Inspection Summary:

Inspection conducted during the period of May 24-27, 1982
(Reports 50-313/82-12 and 50-368/82-25)

Areas Inspected: Routine, unannounced inspection of the licensee's radiochemistry program including organization, staffing, training program, sample collection, sample treatment and analysis, chemistry analytical procedures, laboratory instrument calibration and quality controls of analytical measurements, licensee audits of radiochemistry activities, and independent confirmatory measurements using the Region IV mobile counting laboratory for onsite comparisons of split sample results. The inspection involved a total of 35 hours onsite by one NRC inspector.

Results: No violations or deviations were identified. Eight open items are summarized in Section 4.

DETAILS1. Persons ContactedArkansas Power and Light (AP&L)

- *J. Levine, ANO General Manager
- *T. Baker, Technical Analysis Superintendent
- *L. Dugger, Special Projects Manager
- *E. Ewing, Acting Engineering and Technical Support Manager
- *G. Fiser, Radiochemistry Supervisor
- *M. Frala, Assistant Radiochemistry Supervisor
- L. Hodges, Radiochemistry Technician
- R. McCormick, Radiochemistry Technician
- R. Pool, Assistant Radiochemistry Supervisor
- *D. Provencher, Quality Assurance Supervisor
- *L. Sanders, Maintenance Manager

*Denotes those present during the exit interview on May 27, 1982.

The NRC inspector also interviewed several other ANO station personnel during the inspection.

2. Scope of Inspection

The purpose of this inspection was to review the licensee's radiochemistry instrument calibration and quality control programs for the period January 1, 1981, through April 30, 1982, radiochemistry organization, staff training, and perform confirmatory measurements on selected plant radioactive effluent samples. The previous quality control inspection of analytical measurements and confirmatory measurements was performed during January 13-15, 1981.

3. Licensee Action on Previous Inspection Findings

There were no outstanding violations, deviations, unresolved items, or open items in previous confirmatory measurements inspections.

4. Open Items this Inspection

(Open) Open Item (313/8212)/(368/8225)-(01): Radiochemistry Organization - The licensee had not developed job/position descriptions for radiochemistry personnel or implemented procedures governing functional area assignments. See Section 5 for details.

(Open) Open Item (313/8212)/(368/8225)-(02): Radiochemistry Personnel Qualifications - The licensee had not developed a selection and qualification criteria for radiochemistry personnel. See Section 6 for details.

(Open) Open Item (313/8212)/(368/8225)-(03): Radiochemistry Training - The licensee had not developed a formal training and retraining program for radiochemistry personnel. See Section 7 for details.

(Open) Open Item (313/8212)/(368/8225)-(04): Licensee's Internal Audits - The licensee had not included on the audit team for chemistry/radiochemistry audits a member knowledgeable in radiochemistry procedures and activities at nuclear power facilities. See Section 8 for details.

(Open) Open Item (313/8212)/(368/8225)-(05): Quality Control of Radiological Analytical Measurements - The licensee had not designated in any procedure who was responsible for managing and conducting the radiochemistry quality control program. See Section 9 for details.

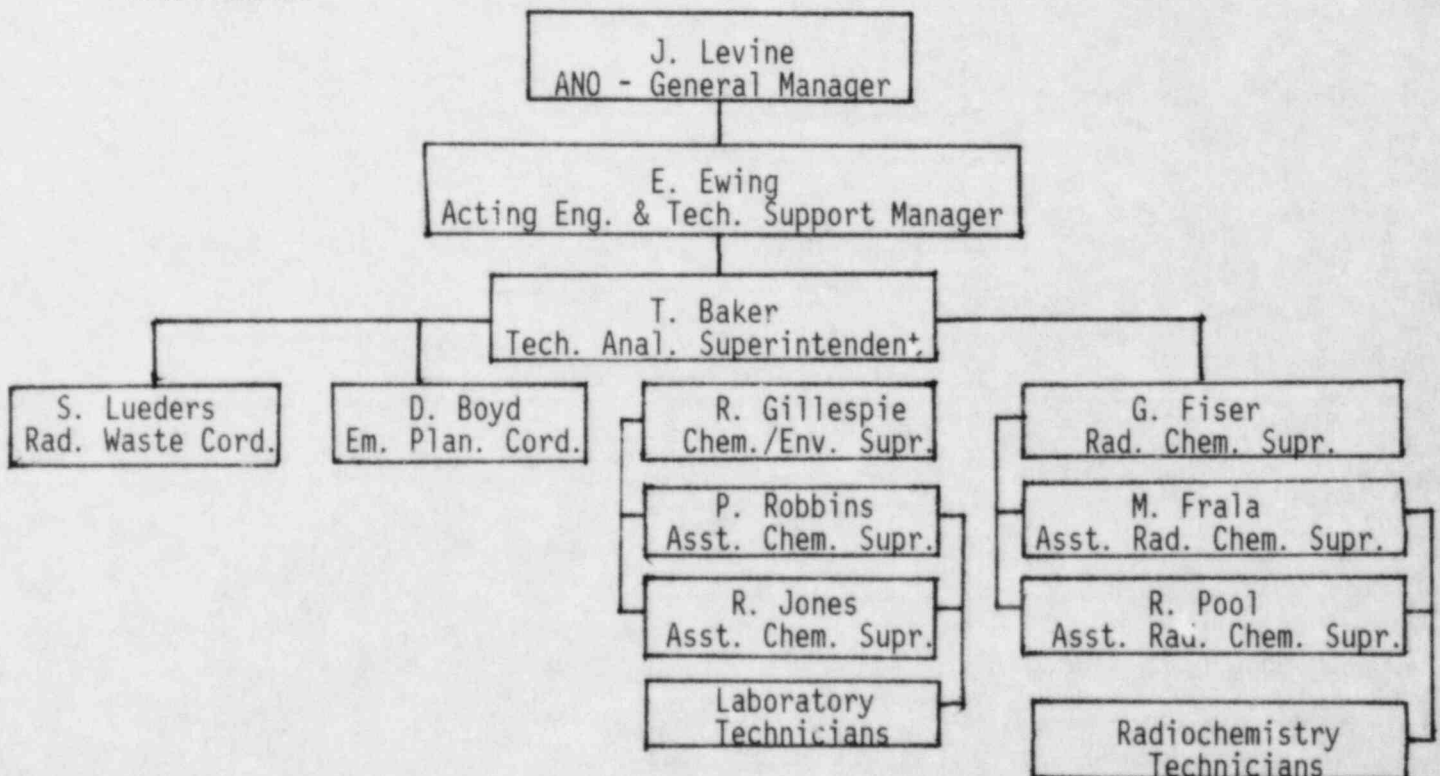
(Open) Open Item (313/8212)/(368/8225)-(06): Instrument Calibration and Performance Checks - The licensee had not developed detailed radiochemistry analytical instrument calibration and performance check procedures. See Section 9 for details.

(Open) Open Item (313/8212)/(368/8225)-(07): Radioactive Standard Preparation - The licensee had not developed detailed procedures for preparation of radioactive standards. See Section 9 for details.

(Open) Open Item (313/8212)/(368/8225)-(08): Confirmatory Measurements - The licensee was unable to analyze a prepared radioactive charcoal cartridge standard for quantitative isotopic content with satisfactory agreement to certified values. See Section 10.b.(7) for details.

5. Radiochemistry Organization

The NRC inspector reviewed the Arkansas Nuclear One plant staff assignments in regard to chemistry and radiochemistry responsibilities. The following diagram shows the present structure and assigned individuals:



The NRC inspector is concerned regarding the present onsite management organization, in that job/position descriptions, staff qualification requirements, and implementing procedures for functional area assignments have not been developed.

Job/position descriptions had not been developed which detail the duties and responsibilities of members of the radiochemistry staff. A job description for the Radiochemistry Supervisor had been completed. However, similar job descriptions for other staff positions had not been established.

This item is considered open (313/8212)/(368/8225)-(01) pending issuance of radiochemistry staff job descriptions and implementing procedures governing functional area assignments.

No violations or deviations regarding the radiochemistry organization were identified.

6. Radiochemistry Personnel Qualifications

The NRC inspector reviewed the qualifications of the radiochemistry personnel to determine agreement with commitments in the FSAR and the recommendations of Regulatory Guide 1.8 and ANSI N18.1-1971.

The educational background and nuclear experience of all radiochemistry personnel are tabulated in Table I:

TABLE I

ANO RADIOCHEMISTRY PERSONNEL QUALIFICATIONS

Name	Title	Degree Above High School	Date Employed AP&L	Total Nuclear Experience		Commercial Nuclear Operating Plant Experience	
				(yrs)	(mos)	(yrs)	(mos)
G. Fiser	Rad. Chem. Supr.	B.S.-Chem.	8/73	8	9	8	9
M. Frala	Asst. Rad. Chem. Supr.	B.S.-Math	6/73	8	11	8	11
R. Pool	Asst. Rad. Chem. Supr.		5/77	11	-	5	-

Name	Title	Degree Above High School	Date Employed AP&L	Total Nuclear Experience		Commercial Nuclear Operating Plant Experience	
				(yrs)	(mos)	(yrs)	(mos)
R. McCormick	Rad. Chem. Tech.	B.S.-Chem.	6/79	2	11	2	11
G. Thornton	Rad. Chem. Tech.	B.S.-Chem.	3/80	2	2	2	2
E. Neal	Rad. Chem. Tech.	B.S.-Sci.	7/80	1	10	1	10
S. Burris	Rad. Chem. Tech.	B.S.-Med. Tech.	12/80	1	5	1	5
B. McKellvy	Rad. Chem. Tech.	B.S.-Chem.	2/81	1	3	1	3
L. Hodges	Rad. Chem. Tech.	B.S.-Sci.	5/81	1	-	1	-
M. Churchwell	Rad. Chem. Tech.	B.S.-Chem.	6/81	-	11	-	11
R. Richardson	Rad. Chem. Tech.	B.S.-Chem.	6/81	-	11	-	11
S. Gann	Rad. Chem. Tech.	B.S.-Chem.	3/82	-	2	-	2
K. Lewis	Rad. Chem. Tech.	B.S.-Chem.	5/82	-	1	-	1

The licensee has committed to, in the FSAR, the qualification requirement recommended in ANSI N18.1-1971. The NRC inspector noted that 8 out of the 13 radiochemistry staff listed in Table I do not appear to meet the experience qualification requirements for radiochemistry technicians as outlined in Sections 4.3 and 4.4 of ANSI N18.1-1971. The NRC inspector also noted that the licensee had not developed procedures which would provide definitive guidance for the determination of acceptable radiochemistry experience for station personnel.

This item is considered open (313/8212)/(368/8225)-(02) pending development of selection and qualification criteria for radiochemistry personnel.

No violations or deviations regarding radiochemistry staff qualifications were identified.

7. Radiochemistry Training

The NRC inspector reviewed the licensee's radiochemistry training program to determine compliance with FSAR commitments, 10 CFR 19.12 requirements, and the recommendations of ANSI N18.1-1971, and Regulatory Guide 1.8.

Documents Reviewed

- . FSAR, Section 13.2, "Training Program"
- . 1023.05, "On-the-Job Training Program," Revision 1, December 7, 1980
- . 1023.13, "Radiochemist Training Program," Revision 0, December 7, 1980
- . Individual Training Summary for each radiochemistry staff member
- . Radiochemistry staff member's OJT record books

The NRC inspector reviewed the radiochemistry staff individual training records maintained by the Training and Counseling Department. The records indicated that all of the staff had completed initial site training, general employee training, plant procedures training, plant systems training, and specific course training conducted by the training department or vendor schools depending on employee seniority and job responsibilities. The Babcock and Wilcox radiochemistry course has been attended by the radiochemistry supervisor, one of the assistant radiochemistry supervisors, and the senior radiochemistry technician. The On-Job-Training (OJT) record books for the radiochemistry staff were reviewed and found in order. The NRC inspector noted that 8 out of the 10 radiochemistry technicians have most OJT tasks signed-off at the "D" level of performance. The "D" level indicates the trainee can perform the task from start to finish, including coordinating the effort and analyzing the completed task. A written training program which includes defined goals, objectives, schedules, and a method of evaluating the effectiveness of the training, had not been established at the time of the inspection. The licensee stated that the Training and Counseling Department is in the process of developing formal training and retraining programs which include objectives, scope, and a training schedule.

This item is considered open (313/8212)/(368/8225)-(03) pending development of a formal training and retraining program.

No violations or deviations regarding the radiochemistry training program were identified.

8. Licensee's Internal Audits

The NRC inspector reviewed the quality assurance organization and audit program to determine compliance with FSAR commitments, 10 CFR 50, Appendix B requirements, and the recommendations of ANSI N18.7-1976, and Regulatory Guide 1.33. Reports of audits conducted in the area of chemistry/radiochemistry during the period from January 1980 through May 1982 were reviewed for scope and timely followup action of problem areas identified during the audit.

Documents Reviewed

- . "Quality Assurance Audit/Activity Plan for 1980," Revision 0, January 4, 1980
- . "Quality Assurance Audit/Activity Plan for 1981," Revision 0, January 15, 1981
- . "Quality Assurance Audit/Activity Plan for 1982," Revision 0, January 21, 1982
- . "QAA-1, "Quality Assurance Organization," Revision 0, October 31, 1980
- . QAA-6, "Quality Assurance Audits," Revision 0, December 22, 1980
- . QAP-22, "Quality Assurance Procedure-Chemistry," Revision 0, April 2, 1981
- . Operating Plant Surveillance Audit Chemistry, QAP-22, December 4, 1981

The NRC inspector noted that a QAP-22 audit in chemistry is scheduled for September 1982.

The NRC inspector reviewed quality assurance procedure, QAP-22, and the results of the audit performed under this procedure dated December 4, 1981. The audit was designed to determine compliance with existing procedures. The audit scope did not include evaluations regarding the effectiveness of the chemistry/radiochemistry department, facilities, equipment, or recommended changes to the existing chemistry/radiochemistry program. The NRC inspector noted that the audit team did not include a member with radiochemistry experience. A licensee representative stated that in the future the audit team would include a member knowledgeable in radiochemistry procedures and activities at nuclear power facilities. This item is considered open (313/8212)/(368/8225)-(04) pending followup action by the licensee.

The NRC inspector took special notice of the Audit Finding Reports (AFR) 1-327, 1-328, and 1-329 issued in the reviewed chemistry/radiochemistry audit. Appropriate responses and corrective actions have been completed and documented. No major problem areas were identified in radiochemistry.

No violations or deviations regarding the licensee's audit program of chemistry/radiochemistry were identified.

9. Quality Control of Radiological Analytical Measurements

The NRC inspector visited the radiochemistry counting room and reviewed the program for quality control of radiological analytical measurements to determine compliance with Technical Specifications and recommendations of Regulatory Guide 4.15.

Documents Reviewed

- . 1042.002, "Quality Control Guidelines and Acceptable Criteria," Revision 0, December 1, 1981
- . 1604.001, "Gross Alpha Measurement," Revision 5, October 22, 1981
- . 1604.004, "Liquid Scintillation Counting for Gross Beta and Tritium Measurements," Revision 3, September 30, 1981
- . 1605.005, "Gross Gamma Activity Measurements," Revision 5, November 23, 1981
- . 1605.006, "Determination of Low Chloride Using a Specific Ion Electrode," Revision 1, August 21, 1981
- . 1604.022, "Use of the ND-6620 for Radiochemistry," Revision 3, October 6, 1981
- . 1604.027, "Determination of Fluoride - Specific Ion Electrode Method," Revision 1, November 19, 1981
- . 1604.030, "Determination of Boron - High Range," Revision 1, November 30, 1981

The NRC inspector examined the licensee's radiochemistry quality control procedures listed, counting instrument calibration data, and counting instrument performance check data. Data for the period January 1982 through May 1982 were reviewed for the ND-6620 Gamma Spectrometer, NaI Gross Gamma Detector, and Packard Tri-Carb 300CD Liquid Scintillation Spectrometer. The licensee's records were in order and indicated that an adequate quality control program was being maintained.

The NRC inspector reviewed Procedure 1042.002, "Quality Control Guidelines and Acceptance Criteria," Revision 0, December 1, 1981, which replaces the former quality control Procedure 1604.09. The NRC inspector noted that the procedure did not contain a section which assigned the responsibility of managing and conducting the radiochemistry quality control program to a specific staff position. This item is considered open (313/8212)/(368/8225)-(05) pending the assignment of responsibility to manage and conduct the radiochemistry quality control program to a specific member of the plant staff.

The NRC inspector reviewed the above listed procedures for content including the following items: instrument operation, instrument calibration, instrument performance checks, and analytical measurements and calculations. In general, all the procedures reviewed covered these items. However, the NRC inspector is concerned that these items should be made more clear to the technicians by addressing each of the above topics in a separate stand-alone procedure for each instrument or at least place each of the topics in a separate titled section within an operating procedure for each instrument. Each function of instrument operation should contain sufficient detail so that the technician can perform each function independently of any other function. For example, an instrument calibration procedure should contain details on how to operate the instrument, preparation of standards, specific sample geometries to be calibrated, calculations for determination of instrument parameters from analytical data, methods of plotting and verifying data, frequency of calibration, and acceptance criteria. This item is considered open (313/8212)/(368/8225)-(06) pending the licensee's evaluation of calibration and performance check procedures for all radiochemistry analytical instrumentation.

The NRC inspector was unable to determine precisely how the licensee prepared radioactive standards for calibration of the ND-6620 Gamma Spectrometer, NaI Gross Gamma Detector, Packard Tri-Carb 300 CD Liquid Scintillation Spectrometer, and NMC Decade Proportional Alpha Counting System. This item is considered open (313/8212)/(368/8225)-(07) pending development of detailed procedures for preparation of radioactive standards for all types of counting configurations which are NBS traceable.

The NRC inspector noted while reviewing the calibration data for the ND-6620 Gamma Spectrometer that counting geometry efficiency curves were last generated during a period from February 1981 to May 1981; therefore, requiring a recalibration on the system to be due at the time of the inspection according to Procedure 1042.002, "Quality Control Guidelines and Acceptance Criteria," which requires an annual recalibration of the ND-6620 Gamma Spectrometer System.

A licensee's radiochemistry technician informed the NRC inspector that all radioactive standards had been prepared for the recalibration of the ND-6620 Gamma Spectrometer System and were currently being counted as permitted. The recalibration should be completed within 30 days.

No violations or deviations regarding the licensee's radiochemistry quality control program were identified.

10. Analytical Measurements

a. Confirmatory Measurements

Confirmatory measurements were performed on the following samples in the mobile laboratory at Arkansas Nuclear One during the inspection:

- (1) Unit I Vent Charcoal
- (2) Unit I Vent Particulate Filter
- (3) Liquid Radwaste Effluent
- (4) Gaseous Radwaste Effluent
- (5) Unit I Reactor Coolant Gas
- (6) Unit I Reactor Coolant Liquid
- (7) RESL Charcoal Cartridge Standard
- (8) RESL Particulate Filter Standard

The confirmatory measurements test consists of comparing measurements made by the licensee, NRC's mobile laboratory, and NRC's reference laboratory, Radiological and Environmental Sciences Laboratory (RESL) in Idaho Falls, Idaho. RESL's and the NRC's mobile laboratory measurements are referenced to the National Bureau of Standards by laboratory intercomparisons. Confirmatory measurements are made only for those nuclides identified by the mobile laboratory or RESL as being present in concentrations greater than 10% of the respective isotopic values for liquid and gas concentrations as stated in 10 CFR Part 20, Appendix B, Table II, and above the Lower Limit of Detection (LLD) for stack samples. Stack charcoal cartridge and stack particulate filter comparisons are based on established LLD for total activity per sample.

Attachment No. 1 contains the criteria used to compare results.

Attachment No. 2 lists the LLD's for stack samples.

b. Results

The following tables show the various sample comparison results:

(1) Vent Charcoal from Unit No. 1 (Collected 09:38 CDT, May 25, 1982)

<u>Nuclide</u>	<u>NRC Result (uCi/cc)</u>	<u>ANO Result (uCi/cc)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
^{131}I	2.07±0.26E-13	2.09±0.34E-13	1.01	Agreement
^{133}I	1.25±0.23E-13	1.36±0.23E-13	1.09	Agreement

(2) Vent Particulate Filter from Unit No. 1 (Collected 08:45 CDT, May 25 1982)

No significant nuclide concentrations greater than the lower level of detectability were identified by the licensee or by the Region IV mobile laboratory. No comparison is made.

(3) Liquid Radwaste Effluent from Monitor Tank T-16B (Collected 16:12 CDT, May 25, 1982)

<u>Nuclide</u>	<u>NRC Result (uCi/ml)</u>	<u>ANO Result (uCi/ml)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
^{51}Cr	2.62±0.12E-04	3.11±0.26E-04	1.19	Agreement
^{54}Mn	9.53±0.17E-05	1.10±0.03E-04	1.15	Agreement
^{57}Co	1.03±0.09E-05	8.91±2.52E-06	0.86	Agreement
^{58}Co	3.02±0.01E-03	3.53±0.01E-03	1.17	Agreement
^{59}Fe	1.88±0.24E-05	2.27±0.46E-05	1.21	Agreement
^{60}Co	9.53±0.04E-04	1.09±0.01E-03	1.14	Agreement
^{75}Se	4.32±1.57E-06	Not Reported	-	No Comparison
^{95}Zr	8.35±0.26E-05	8.47±0.52E-05	1.01	Agreement
$^{110\text{m}}\text{Ag}$	2.64±0.03E-04	3.36±0.05E-04	1.27	Possible Agreement
^{122}Sb	1.06±0.22E-05	3.69±4.98E-06	0.35	Disagreement
^{141}Ce	6.06±1.48E-06	Not in Library	-	No Comparison
^{92}Sr	1.47±0.03E-04	2.12±0.05E-04	1.44	Disagreement
^{95}Nb	1.95±0.02E-04	2.28±0.04E-04	1.17	Agreement
^{97}Nb	1.06±0.01E-03	3.50±0.04E-04	0.33	Disagreement

^{97}Zr	$1.32 \pm 0.15\text{E-}05$	$1.21 \pm 0.30\text{E-}05$	0.92	Agreement
^{103}Ru	$2.02 \pm 0.16\text{E-}05$	$1.95 \pm 0.36\text{E-}05$	0.96	Agreement
^{113}Sn	$1.38 \pm 0.17\text{E-}05$	$9.99 \pm 2.37\text{E-}06$	0.72	Agreement
^{124}Sb	$7.38 \pm 1.01\text{E-}06$	$8.20 \pm 1.15\text{E-}06$	1.11	Agreement
^{125}Sb	$1.29 \pm 0.05\text{E-}04$	$1.31 \pm 0.09\text{E-}04$	1.02	Agreement
^{134}Cs	$1.17 \pm 0.02\text{E-}04$	$1.44 \pm 0.04\text{E-}04$	1.23	Agreement
^{137}Cs	$2.98 \pm 0.02\text{E-}04$	$3.20 \pm 0.04\text{E-}04$	1.07	Agreement
^{144}Ce	$4.84 \pm 0.66\text{E-}05$	$3.78 \pm 1.92\text{E-}05$	0.78	Agreement
tritium	$1.86 \pm 0.02\text{E-}02$ ^{1/}	$1.34 \pm 0.0001\text{E-}02$	0.72	Possible Agreement
gross beta	$2.30 \pm 0.08\text{E-}03$ ^{1/}	$1.31 \pm 0.005\text{E-}03$	0.57	Possible Agreement
^{89}Sr	$5.0 \pm 2.0\text{E-}07$ ^{1/}	<u>2/</u>	-	<u>3/</u>
^{90}Sr	$9.0 \pm 1.1\text{E-}07$ ^{1/}	<u>2/</u>	-	<u>3/</u>

^{1/} Analytical results as reported by the Radiological and Environmental Science Laboratory, Idaho Falls, Idaho.

^{2/} Analytical results were not available at the time of the report. Formal documentation of these analyses will appear in the next confirmatory measurements inspection report.

^{3/} Analytical results were not available at the time of the report; therefore, no comparison is made.

(4) Gaseous Radwaste Effluent from Gas Decay Tank 2T-18C
(Collected 18:10 CDT, May 24, 1982)

Nuclide	NRC Result (uCi/cc)	ANO Result (uCi/cc)	ANO/NRC Ratio	Decision
^{85}Kr	$1.31 \pm 0.16\text{E-}03$	$1.80 \pm 0.08\text{E-}03$	1.37	Agreement
$^{131\text{m}}\text{Xe}$	$4.07 \pm 0.15\text{E-}04$	$4.10 \pm 0.11\text{E-}04$	1.01	Agreement
$^{133\text{m}}\text{Xe}$	$1.16 \pm 0.28\text{E-}05$	$1.08 \pm 0.09\text{E-}05$	0.93	Agreement
^{133}Xe	$8.54 \pm 0.01\text{E-}03$	$1.08 \pm 0.01\text{E-}02$	1.26	Possible Agreement
$^{135\text{m}}\text{Xe}$	Not Reported	$6.44 \pm 1.54\text{E-}06$	-	<u>1/</u>
^{135}Xe	Not Reported	$6.39 \pm 1.15\text{E-}07$	-	<u>1/</u>

^{1/} Activity was below the lower level of detectability at the time of sample analysis by the NRC. The sensitivity analysis

parameter used by the NRC was 5.0 as compared to 2.9 used by the licensee; therefore, no peaks for Xe-135m and Xe-135 were identified by the NRC analyzer software. No comparison is made.

(5) Reactor Coolant Gas from Unit No. 1 (Collected 16:24 CDT, May 24, 1982)

<u>Nuclide</u>	<u>NRC Result (uCi/cc)</u>	<u>ANO Result (uCi/cc)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
^{41}Ar	4.61±0.02E+00	5.11±0.03E+00	1.11	Agreement
$^{85\text{m}}\text{Kr}$	1.56±0.01E+00	1.59±0.01E+00	1.02	Agreement
^{87}Kr	2.25±0.02E+00	2.50±0.02E+00	1.11	Agreement
^{88}Kr	4.08±0.03E+00	2.72±0.02E±00 ^{1/}	0.67	Possible Agreement
$^{133\text{m}}\text{Xe}$	2.16±0.35E-01	1.63±0.32E-01	0.75	Agreement
^{133}Xe	7.96±0.03E+00	8.51±0.03E+00	1.07	Agreement
$^{135\text{m}}\text{Xe}$	9.30±0.19E-01	1.04±0.02E±00	1.12	Agreement
^{135}Xe	8.26±0.02E+00	8.58±0.02E+00	1.04	Agreement
^{138}Xe	2.78±0.08E+00	2.59±0.07E+00	0.93	Agreement

^{1/} Licensee used a branching ratio of 35.0% in calculating the result. Upon recalculation of the isotopic data using a branching ratio of 26.3%, which was used by the NRC mobile laboratory, the analytical result of 3.4±0.02E+00 uCi/cc was in agreement.

(6) Reactor Coolant Degassed Liquid from Unit No. 1 (Collected 16:24 CDT, May 24, 1982)

<u>Nuclide</u>	<u>NRC Result (uCi/ml)</u>	<u>ANO Result (uCi/ml)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
^{24}Na	5.85±0.24E-03	4.34±0.34E-03	0.74	Possible Agreement
^{58}Co	6.86±0.31E-03	6.21±0.49E-03	0.91	Agreement
^{89}Rb	Not Reported	1.47±0.80E-02	-	No comparison
^{91}Sr	2.26±0.10E-02	1.99±0.15E-02	0.88	Agreement
$^{91\text{m}}\text{Y}$	4.80±0.16E-02	1.25±0.10E-02	0.26	Disagreement
^{92}Sr	3.31±0.07E-02	2.77±0.09E-02	0.83	Agreement
^{92}Y	1.07±0.25E-02	1.85±0.36E-03	0.17	Disagreement
^{94}Nb	1.52±0.17E-03	2.19±0.38E-03	1.44	Agreement
$^{95\text{m}}\text{Nb}$	3.42±0.69E-03	9.94±0.45E-04	0.29	Disagreement

⁹⁵ Nb	2.78±0.21E-03	3.71±0.37E-03	1.33	Agreement
^{99m} Tc	1.01±0.05E-02	2.12±0.26E-03	0.21	Disagreement
¹⁰⁶ Ru	5.85±0.32E-02	1.03±0.04E-01	1.76	Disagreement
^{110m} Ag	Not Reported	7.02±0.13E-02	-	No comparison
¹²² Sb	Not Reported	1.10±0.53E-03	-	No comparison
¹³¹ I	1.49±0.03E-02	1.42±0.05E-02	0.95	Agreement
¹³² I	8.65±0.09E-02	7.82±0.09E-02	0.90	Agreement
¹³³ I	1.05±0.01E-01	8.96±0.08E-02	0.85	Agreement
¹³⁴ I	2.25±0.04E-01	1.76±0.02E-01	0.78	Possible Agreement
¹³⁵ I	1.58±0.02E-01	1.29±0.03E-01	0.82	Agreement
¹³⁸ Cs	3.46±0.07E-01	2.24±0.04E-01	0.65	Possible Agreement
¹³⁹ Ba	1.14±0.02E-01	2.05±0.06E-02	0.18	Disagreement
¹⁴⁰ Ba	3.93±0.84E-03	3.15±0.73E-03	0.80	Agreement
²⁰³ Hg	Not Reported	5.06±3.65E-04	-	No comparison
gross beta	3.65±0.01E-01	3.28±0.01E-01	0.90	Agreement

(7) RESL Charcoal Cartridge Face Loaded Standard No. 80-06 (Standardized 09:00 CST, March 19, 1980)

<u>Nuclide</u>	<u>NRC Result^{1/} (uCi/gm)</u>	<u>ANO Result^{2/} (uCi/gm)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
⁵⁷ Co	2.27±0.10E-02	4.30±0.09E-02	1.89	Possible Agreement
⁶⁰ Co	1.73±0.07E-01	3.10±0.02E-01	1.79	Disagreement
⁸⁸ Y	2.92±0.11E-01	5.30±0.09E-01	1.82	Disagreement
¹¹³ Sn	5.75±0.23E-02	4.54±2.06E-02	0.79	Agreement
¹³⁷ Cs	1.29±0.05E-01	2.37±0.01E-01	1.83	Disagreement
²⁴¹ Am	3.19±0.13E-02	Not reported ^{3/}	-	Disagreement

^{1/} NRC results were taken from standard certificate supplied with the standard as prepared by RESL and traceable to the National Bureau of Standards.

2/ Licensee's results were based on a detector efficiency curve established using a face loaded cartridge standard which was counted with the deposited activity face of the standard against the detector during the entire analysis count. The RESL face loaded cartridge standard analysis was performed by the licensee in the same manner. In comparison, RESL rotates the cartridge during analysis and the Region IV mobile laboratory flips the cartridge at the midpoint of the analysis count. This may account for the higher results reported for most isotopes by the licensee. It should be noted that the licensee's measurements are more conservative than the standard's certified activities. Therefore, there is assurance that effluent releases based on the licensee's measurements would not exceed established limits.

3/ The licensee does not search a charcoal cartridge analysis spectrum for lines less than 75 KeV since the iodine isotopes of interest do not have gamma lines in that energy range.

The NRC inspector is concerned with the high number of disagreements found in the analysis of the RESL face loaded charcoal cartridge standard. Because of this fact, this item is considered open (313/8212)/(368/8225)-(08) pending an evaluation by the licensee as to its charcoal cartridge standard preparation and counting technique.

(8) RESL Particulate Filter Standard No. 80-7 (Standardized 09:00 CST, March 19, 1980)⁽¹⁾

<u>Nuclide</u>	<u>NRC Result</u> ^{2/} <u>(uCi/gm)</u>	<u>ANO Result</u> <u>(uCi/gm)</u>	<u>ANO/NRC</u> <u>Ratio</u>	<u>Decision</u>
⁵⁷ Co	2.28±0.10E-02	2.96±0.09E-02	1.30	Agreement
⁶⁰ Co	1.73±0.07E-01	1.99±0.02E-01	1.15	Agreement
⁸⁸ Y	2.92±0.11E-01	3.80±0.79E-01	1.30	Agreement
¹¹³ Sn	5.75±0.23E-02	4.26±1.90E-02	0.74	Possible Agreement
¹³⁷ Cs	1.29±0.05E-01	1.42±0.01E-01	1.10	Agreement
²⁴¹ Am	3.19±0.13E-02	Not Reported ^{3/}	-	Disagreement

1/ The activity on the actual vent particulate filter was less than the LLD's listed in Attachment No. 2. Therefore, a prepared particulate filter standard was analyzed by the licensee.

- 2/ NRC results were taken from the standard certificate supplied with the standard as prepared by RESL and traceable to the National Bureau of Standards.
- 3/ The licensee's peak search lower limit energy was set at 70 KeV. Therefore, the licensee did not report the Am-241 isotope as being present in the sample at a gamma energy of 59.54 KeV.

c. Previous Confirmatory Measurements

Confirmatory measurements were performed on a sample of liquid waste during an inspection conducted January 1981 (Reports 313/8102 and 368/8102). The analytical results were not available at the time of the report for formal comparison. The following table shows the result comparisons:

(1) Liquid Radwaste Effluent from Monitor Tank T-16A (Collected 14:50 CST, January 14, 1981)

<u>Nuclide</u>	<u>NRC Result (uCi/ml)</u>	<u>ANO Result (uCi/ml)</u>	<u>ANO/NRC Ratio</u>	<u>Decision</u>
tritium	4.77±0.02E-02	4.83±0.02E-02	1.01	Agreement
⁸⁹ Sr	1.40±0.10E-06	1.40±0.02E-06	1.00	Agreement
⁹⁰ Sr	1.80±0.20E-07	1.37±0.35E-07	0.76	Agreement

No violations or deviations in the area of confirmatory measurements were identified.

11. Facilities and Equipment

The NRC inspector visited the radiochemistry counting room. The counting facility and nuclear analytical instrumentation were found acceptable and adequate.

No violations or deviations were identified.

12. Exit Interview

The NRC inspector met with the licensee representatives identified in Section 1 of this report at the conclusion of the inspection on May 27, 1982. The NRC inspector summarized the scope of the inspection, discussed the inspection findings, and informed the licensee of the agreements and disagreements found between ANO and NRC measurements performed on various intercomparison samples.

ATTACHMENT NO. 1

Criteria for Comparing Analytical Measurements

The following are the criteria used in comparing the results of capability tests and verification measurements. The criteria are based on an empirical relationship established through prior experience and this program's analytical requirements.

In these criteria, the judgement limits vary in relation to the comparison of the resolution.

$$\text{Resolution} = \frac{\text{NRC Value}}{\text{NRC Uncertainty}}$$

$$\text{Ratio} = \frac{\text{Licensee Value}}{\text{NRC Value}}$$

Comparisons are made by first determining the resolution and then reading across the same line to the corresponding ratio. The following table shows the acceptance values.

RESOLUTION	RATIO		
	Agreement	Possible Agreement A	Possible Agreement B
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.

Iodine on adsorbers.

"B" criteria are applied to the following analyses:

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

⁸⁹Sr and ⁹⁰Sr Determinations.

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

ATTACHMENT NO. 2

LLDs for Nuclides on Particulate and Charcoal Filters

<u>Nuclide</u>	<u>LLD (uCi/sample)</u>
51Cr	1E-04
54Mn	1.5E-05
58Co	1.5E-05
59Fe	3E-05
57Co	2E-05
60Co	3E-05
65Zn	3E-05
89Sr	1E-05
90Sr	2E-07
131I	2E-05
134Cs	2E-05
137Cs	2E-05
140Ba	2E-05
140La	4E-05
141Ce	2E-05
144Ce	1E-04

ATTACHMENT B

OPEN ACTION ITEMS LIST

Date: _____
 Docket No: SO-313
 (8)

Type Code:
 A=Allegation
 B=Bulletin
 C=Circular
 D=Deviation
 E=50.55(e)
 L=LER

M=Miscellaneous
 O=Open Item
 R=Part 21 Report
 T=Temporary Instructions
 U=Unresolved Item
 V=Violation

Note - Max characters allowed for each entry shown in (1)

1	2	3	4	5	6	7	8
Type Item (1)	Item No. (8)	Report Paragraph (6)	Responsible Section (4)	Module (7)	Description (186)	Update/Closeout Report (30)	Status Code (1)
O	8212-01	4	T-RP	84711B	Licensee had not developed job/position descriptions for radiochemistry personnel.		
O	8212-02	5	T-RP	84711B	Licensee had not developed selection and qualification criteria for radiochemistry personnel.		
O	8212-03	6	T-RP	84711B	Licensee had not developed a formal training and retraining program for radiochemistry personnel.		
O	8212-04	8	T-RP	84711B	Licensee had not designated what staff position was responsible for managing and conducting the radiochemistry quality control program.		

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O 8212-05 8 T-RP 84711B Licensee had not developed detailed radiochemistry analytical instrument calibration and calibration check procedures.

O 8212-06 8 T-RP 84711B Licensee had not developed detailed procedures for preparation of radioactive standards.

O 8212-07 9.b(7) T-RP 84711B Licensee was unable to analyze a standard charcoal cartridge for quantitative isotopic content with satisfactory agreement to certified values.

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(30)
(1)

(186)
(7)

(4)
(4)

(6)
(8)

(8)
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O 8212-07 9.b(7) T-RP 84711B Licensee was unable to analyze a standard charcoal cartridge for quantitative isotopic content with satisfactory agreement to certified values.