Ltr to Duke Power Company fm N. C. Moseley
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Duke Power Company
Oconee 1 and 2

RO Inspection Report No. 50-269/74-3 and
50-270/74-2

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UNITED STATES
ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION II — SOUTHEAST
230 PEACHTREE STREET, NORTHWEST
ATLANTA, GEORGIA 30303

RO Inspection Report Nos. 50-269/74-3 and 50-270/74-2

Licensee: Duke Power Company
Power Building
422 South Church Street
Charlotte, North Carolina 28201

Facility Name: Oconee Units 1 and 2
Docket No.: 50-269 and 50-270
License No.: DPR-38 and 47
Category: C and B2

Location: Seneca, South Carolina

Type of License: B&W, PWR, 2568 Mwt

Type of Inspection: Routine, Unannounced

Dates of Inspection: March 18-22, 1974 and April 16, 1974

Dates of Previous Inspection: February 25-March 1, 1974

Inspector-In-Charge: G. R. Jenkins
Radiation Specialist
Radiological and Environmental Protection Branch

Accompanying Inspector: A. F. Gibson
Radiation Specialist
Radiological and Environmental Protection Branch

Other Accompanying Personnel: J. T. Sutherland, Chief
Radiological and Environmental Protection Branch

T. N. Epps
Reactor Inspector
Facilities Operations Branch

Principal Inspector: T. N. Epps 5-2-74
T. N. Epps, Reactor Inspector
Facilities Operations Branch
Date

Reviewed By: C. M. Upright 5/3/74
C. M. Upright, Acting Chief
Facilities Operations Branch
Date

SUMMARY OF FINDINGS

I. Enforcement Action

A. Violations

1. Violations considered to be of Category II severity are as follows:

a. High Radiation Areas

Contrary to 10 CFR 20.203, "Caution signs, labels, signals, and controls," a high radiation area in Room No. 104 of the Auxiliary Building was not posted with the prescribed high radiation area sign as required by (c)(1) of this section. Further, entrances to Room 104 and to high radiation areas in Rooms 112 and 122, which were posted as high radiation areas, were not controlled as required by (c)(2) of this section. (Details I, paragraph 2)

b. Evaluating, Correcting, and Reporting Radiological Problems

Contrary to 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," measures had not been established to assure that the causes of significant radiological problems, such as spills of radioactive materials, contamination of personnel and inadequate control of access to high radiation areas, were determined and corrective action taken to preclude repetition. Further, the identification of such problems, the cause of the problems and corrective action taken had not been documented and reported to appropriate levels of management. (Details I, paragraph 3)

c. Personnel Survey Instruments

Contrary to 10 CFR 50, Appendix B, Criterion XII, "Control of Measuring and Test Equipment," measures had not been established to check the performance of RM-14 personnel survey instruments at sufficient frequency to maintain accuracy within necessary limits. (Details I, paragraph 4)

d. Health Physics Procedures

Contrary to 10 CFR 50, Appendix B, Criterion VI, "Document Control," measures had not been established to control issuance of health physics procedures to assure that these procedures, including changes, were reviewed for adequacy and approved for release by authorized personnel and were distributed to personnel performing the prescribed activity. (Details I, paragraph 5)

e. Unit Vent Particulate Air Monitoring

Technical Specification 3.10.7 requires grab samples of particulate activity discharged through the unit vent to be taken and analyzed daily when the continuous particulate vent monitor is inoperable. Contrary to the above, daily grab samples had not been taken or analyzed although the licensee acknowledged that performance of the continuous particulate vent monitors was unreliable. (Details I, paragraph 6)

f. Process Radiation Monitor Set-Points

Contrary to 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," the licensee did not have adequate procedures for establishing and maintaining proper alarm set-points for the process radiation monitors. (Details I, paragraph 7)

g. Radioactive Gas Releases

Technical Specification 3.10.5.c. requires that, as far as practicable, release of radioactive gas be coordinated with favorable meteorological conditions.

Contrary to the above, the licensee has released radioactive gas from the Waste Gas Tanks to the atmosphere without regard to the presence or absence of inversion conditions. (Details I, paragraph 8)

2. Violations considered to be of Category III severity are as follows:

   a. Nuclear Safety Review Committee

      Technical Specification 6.1.2.2.h. requires that minutes of all scheduled meetings of the Nuclear Safety Review Committee identify all documentary materials reviewed.

      Contrary to the above, the minutes of the March 1, 1974 meeting do not indicate that the Committee reviewed the radioactive gas release incident of February 8, 1974. The Chairman stated that the Committee did review that incident, including drawings and other documentary materials, at the March 1 meeting. (Details I, paragraph 9)

   b. Posting Notice of Violations

      Contrary to 10 CFR 19, "Posting of Notices to Workers," the licensee did not post, within two working days after receipt, the notice of violations involving radiological working conditions contained in RO Inspection Report No. 50-270/74-1. (Details I, paragraph 10)

B. Safety Items

None

II. Licensee Action on Previously Identified Enforcement Matters

A. Violations

Not inspected.

B. Safety Items

None

III. New Unresolved Items

74-3/1 Measuring and Reporting of Effluents

Evaluation revealed that the licensee was not sampling and analyzing gaseous effluents for tritium nor controlling detection limits in accordance with guidance provided by U.S.A.E.C. Regulatory Guide 1.21. Further, discrepancies were found in effluent release data reported to the Commission by the licensee in accordance with Regulatory Guide 1.21 and Technical Specifications. (Details I, paragraph 11)

74-3/2 Solid Waste Shipping Containers

Measures had not been established to assure that containers used for shipment of solid radioactive wastes met DOT specifications. (Details I, paragraph 12)

74-3/3 Training of Unlicensed Utility Operators

The training program for utility operators not licensed by the Commission, including radwaste system operators, did not appear to conform with ANSI N.18.1, "Selection and Training of Nuclear Power Plant Personnel." (Details I, paragraph 13)

IV. Status of Previously Reported Unresolved Items

73-12/1 Calibration of Effluent Monitors (RO Report No. 50-269/73-12)

Effluent monitor values continue to disagree with results of effluent sample analyses. This item remains unresolved. (Details I, paragraph 14)

74-1/3 Records of Radioanalysis Results (RO Report No. 50-270/74-1)

No change in status.

V. Unusual Occurrences

Not inspected.

VI. Other Significant Findings

A. Contamination Control

Several apparent deficiencies in contamination control practices were observed. (Details I, paragraph 17)

B. Independent Measurements

Splits of a sample of liquid radwaste were anlayzed by the licensee and the AEC and results of the measured concentration of each isotope were compared. Four out of ten resulcs compared were considered to be unacceptable. Similarly duplicate waste gas samples were analyzed by the licensee and the AEC. Two gas analysis results were compared and both were considered acceptable. (Details I, paragraph 16)

VII. Management Interview

A. On-Site

A management interview was held on March 22, 1974, with J. W. Hampton, Assistant Plant Superintendent, O. S. Bradham, Technical Support Engineer, R. M. Koehler, Staff Engineer, S. A. Holland, Assistant Operating Engineer, C. L. Thames, Health Physics Supervisor, L. Lewis, System Health Physicist, and other staff members in attendance. Items discussed included nine apparent violations and three new unresolved items described in Sections I and III above and other information contained in this report.

B. Corporate Management Meeting

A meeting was held on April 16, 1974, in Duke Power Company's Charlotte office with A. C. Thies, Senior Vice President of Duke Power Company and members of his staff as listed in Details I, paragraph 1. C. M. Upright, Acting Operations Branch Chief, J. T. Sutherland, Radiological and Environmental Protection Branch Chief, G. R. Jenkins, Radiation Specialist and T. N. Epps, Reactor Inspector, were present from Region II.

The March 18-22, 1974, inspection of radiological controls, including the identified apparent violations, was discussed. DPC management representatives discussed action taken and planned relative to the listed violations and to management improvements in the health physics program. The inspectors pointed out to DPC management that the specific violations noted were indicative of management control system weaknesses, and emphasized that management's corrective action and response should address the underlying causes of deficiencies.

It was also emphasized that weaknesses identified during this health physics inspection may be indicative of management system weaknesses in other areas, and licensee management was urged to consider this possibility.

DPC management personnel then discussed planned programmatic and organizational improvements.

DETAILS I

Prepared By: A F Gibson 4/30/74
A. F. Gibson, Radiation Specialist Date
Radiological and Environmental
Protection Branch

G. R. Jenkins 4/30/74
G. R. Jenkins, Radiation Specialist Date
Radiological and Environmental
Protection Branch

Dates of Inspection: March 18-22, 1974

Reviewed By: J. T. Sutherland 5-1-74
J. T. Sutherland, Chief Date
Radiological and Environmental
Protection Branch

1. Individuals Contacted

a. Inspection (March 18-22, 1974)

J. E. Smith - Plant Superintendent
J. W. Hampton - Assistant Superintendent
L. Lewis - System Health Physicist
O. S. Bradham - Technical Support Engineer
R. M. Koehler - Staff Engineer
L. E. Summerlin - Staff Engineer
S. A. Holland - Assistant Operating Engineer
T. L. McConnell - Assistant Operating Engineer
C. L. Thames - Health Physics Supervisor
R. C. Adams - Instrumentation and Control Engineer
D. C. Smith - Assistant Chemist
C. Yongue - Assistant Health Physics Supervisor

b. Corporate Management Meeting (April 16, 1974)

A. C. Thies - Senior Vice President
E. D. Powell - Assistant Vice President, Production and Transmission
W. O. Parker, Jr. - Assistant Vice President, Steam Production
W. A. Haller - Manager, Chemistry and Environmental Services
T. L. Cotton - Assistant Nuclear Engineer, Steam Production

2. High Radiation Areas

a. A health physics technician performed a radiation survey of the area surrounding Bleed Holdup Tank "A" in Room 104 of the Auxiliary Building at the request of an inspector. The survey revealed a dose rate of about 120 mrem/hr in an accessible area near the bottom of the tank; however, the area was not posted as a high radiation area as required by 10 CFR 20.203(c)(1) nor was personnel access controlled as required by 10 CFR 20.203(c)(2). The health physics technician said that the radiation level near Bleed Holdup Tank "A" normally fluctuated and that it had probably increased since the area was last surveyed. The area was promptly posted and controlled as a high radiation area.

b. Entrances to Rooms 112 and 122 in the Auxiliary Building were observed to be posted as high radiation areas but access to these rooms was not controlled as required by 10 CFR 20.203(c)(2). Rooms 112 and 122 contained the Miscellaneous Waste Holdup Tank and Miscellaneous Waste Evaporator, respectively. A licensee representative said that high radiation areas did exist inside these rooms. Metal doors were installed at the entrance to each room, but the doors were open and no immediate need for access was apparent. A health physics technician immediately closed and locked the doors.

3. Evaluating, Correcting and Reporting Radiological Problems

Criterion XVI of 10 CFR 50, Appendix B, requires that measures be established to assure that causes of significant problems are identified, corrective action to preclude repetition is taken and the problem descriptions, causes and corrective actions are documented and reported to management. An inspector stated that such measures had not been established for radiological problems, as evidenced by the following examples:

a. Licensee representatives said that unlocked doors to high radiation areas, as discussed in Paragraph 2.b above, had been a recurring problem. There was no evidence that this problem had been documented or reported to management above the shift supervisor level. An inspector stated that, apparently, corrective action had not been adequate to preclude repetition.

b. Licensee representatives said that several spills of radioactivity had occurred in Room 109 of the Auxiliary Building during filling of drums containing absorbent material with liquid radwaste. An inspector stated that repetition of this problem might have been prevented, if adequate corrective action had been taken following the first spill.

c. A health physics technician said that workers did not always notify health physics personnel when they detected contamination on their skin or clothing. Oconee procedures required such notification only "if contamination is extensive". A licensee representative said that records of skin and clothing contamination were not normally maintained. An inspector stated that failure to document such occurrences deprives management of an important means of evaluating the effectiveness of its contamination control program. Further, failure to notify health physics personnel of such occurrences could preclude taking adequate corrective action to prevent recurrence, since the skin or clothing contamination could have been caused by conditions such as undetected leaks, spills, inadequate surveys or protective clothing.

4. Personnel Survey Instruments

Upon exit from the elevator on the third floor of the Auxiliary Building, the inspectors attempted to survey themselves for contamination using the Eberline RM-14 survey instrument provided in Area 304, but erratic response indicated that the instrument was out-of-order. A health physics technician removed the instrument from service and escorted the inspectors to a second RM-14 survey instrument in the Contaminated Change Room (Area 316). The second RM-14 also appeared to be out-of-order since it provided no audible or meter response to background radiation. The technician removed this instrument from service also. Criterion XII of 10 CFR 50, Appendix B, requires, in part, that measures be established to assure that instruments are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within necessary limits. Contrary to this Criterion, a licensee representative stated that performance of such survey instruments was not periodically checked, other than at the time of quarterly calibration. Licensee representatives acknowledged the need for daily response check of these instruments.

5. Health Physics Procedures

Criterion VI of 10 CFR 50, requires that measures be established to control issuance of procedures to assure that the procedures, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed. An inspector stated that measures to control issuance of health physics procedures at Oconee were not adequate to provide the above assurance, as evidenced by the following examples:

a. The only written procedures defining the size, frequency of collection, and counting time for liquid radwaste samples were on a paper which had been posted on the counting room wall. There was no date on the paper nor signatures for technical review or approval for release. The sample size and frequency specified were different from those being used by health physics technicians. Similar instructions for other effluent and environmental analyses were posted on the counting room wall in a similar fashion.

b. Several health physics procedures had been issued without identifying numbers.

c. A licensee representative said that procedures which provided instructions for use of respirators had not been distributed to all respirator users. Distribution of health physics procedures was not specified in writing.

d. A licensee representative said that health physics procedures had been changed or revised in the past; however, none of the procedures reviewed were marked to indicate that they had ever been changed or revised.

Licensee representatives said that no written instruction or procedure had been established to specify requirements for issuance of health physics procedures such as review, approval, format, numbering, distribution, etc. Also, the inspectors commented that no health physics procedures had been written or changed since April 1973. Licensee representatives confirmed this comment and acknowledged the need to review existing health physics procedures and update them if appropriate.

6. Unit Vent Particulate Air Monitoring

Comparison of radioactivity concentrations recorded by Unit 1 and Unit 2 vent particulate continuous monitors with the lab analysis results of particulate filters removed from these monitors revealed significant differences. A licensee representative said that they had been unable to correlate the continuous monitor and lab analysis results and that they considered the continuous monitor results to be unreliable. A licensee representative said that the differences in results were believed to have been caused by the influence of radon daughters and noble gases on the continuous monitors and that the problem had been referred to the Duke Power Company's engineering staff in Charlotte for further evaluation. An inspector

pointed out that Technical Specificatio 3.10. requires grab samples of particulate activity discharged through unit vents to be taken and analyzed daily when continuous particulate vent monitors are inoperable. A licensee representative said that such samples had not been taken even though continuous particulate monitor results were considered unreliable.

7. Process Radiation Monitor Set-Points

a. Based on a review of Operating and Instrument Procedures and discussions with licensee representatives, an inspector stated that, contrary to 10 CFR 50, Appendix B, Criterion V, the licensee does not have adequate procedures for establishing and maintaining proper alarm setpoints for the process radiation monitors. The following examples of procedure deficiencies were noted:

(1) Each process radiation monitor is equipped with two set-points (HIGH alarm and ALERT alarm).1/ The Instrument Procedure for each monitor specifies a set-point for the HIGH alarm only. Operating Procedures (for liquid and gaseous waste disposal systems and reactor building purge systems) specify some alarm set-points, yet many of the set-points are not established by any procedure.

(2) Instrumentation personnel stated that they set the HIGH alarm set-points only at the time of initial installation; thereafter, they record all set-point values monthly, but do not make any readjustments - they assumed that operations personnel kept alarm points properly set. However, operations personnel stated that they only adjust set-points that are specified in the operating procedures, and that they assumed that instrumentation personnel kept other alarm points properly set.

(3) Change No. 9 to OP/1&2/A/1104/18, "Gaseous Waste Disposal System," changed the set-point values for the vent gas monitors, yet there was no corresponding change made to OP/1/A/1102/14, "RB Purge System" and OP/2/A/1102/14, "RB Purge System," which also specify set-points for the vent gas monitors.

1/ Contrary to conventional nomenclature, Oconee's initial (lower level) alarm is designated HIGH and the second (higher level) alarm is designated ALERT. According to a licensee representative, this situation resulted from misinterpretation of specifications during original purchase of the monitoring system.

(4) Many of the set-points that are included in written procedures are specified as "1/2 decade above background." This terminology is easily misunderstood, as witnessed by widely different responses on the part of licensee representatives when questioned by the inspector.

b. Although this item speaks specifically to process monitors, the inspector stated at the management interview that the licensee should also determine if similar procedure deficiencies apply to alarm set-points for area radiation monitors.

8. Radioactive Gas Releases

a. An inspector held discussions with licensee representatives and reviewed OP/1&2/A/1104/18, "Gaseous Waste Disposal System," to determine if releases of radioactive gas were being coordinated with favorable meterological conditions, as required by Technical Specification 3.10.5.C. The operating procedures had no guidance or criteria to implement this technical specification requirement. Both a shift supervisor and an assistant shift supervisor, who were questioned, stated that they do not consider meterological conditions in deciding to proceed with a waste gas tank release.

b. A change to OP/1&2/A/1104/18 was issued during the inspection adding a caution to coordinate gaseous waste releases, as far as practicable, with favorable meterological conditions. A management representative stated that a memorandum would be issued and a meeting would be held with operating personnel to insure that the requirement was understood and would be met.

9. Nuclear Safety Review Committee

The minutes of recent meetings of the Nuclear Safety Review Committee (NSRC) were reviewed by an inspector to determine the scope of NSRC reviews of incidents and events of significant radiological importance. The minutes of the most recent meeting (March 1, 1974) contained no reference to the radioactive gas release of February 8, 1974, wherein Reactor Building No. 2 and the Auxiliary Building were evacuated and about 38 curies of gaseous activity were released. When this was discussed with the NSRC Chairman (by telephone), he stated that the Committee did review the gas release incident (including drawings of the gas header system) during the March 1 meeting. He agreed that the minutes should have documented that review, in

accordance with Technical Specification 6.1.2.2.h. The inspector also pointed out that the minutes of the March 1 meeting do not indicate review of the radiological aspects of the January 22 reactor coolant pump failure.

10. Posting Notices of Violations

10 CFR 19.11 requires that copies of any notice of violation involving radiological working conditions be posted within two working days after receipt. A management representative, when questioned about two violations ((1) failure to perform tritium monitoring; (2) improper alarm set-points) documented in RO Inspection Report No. 50-270/74-1, stated that the notice of violations had not been posted. The notice was posted during the inspection.

11. Measuring and Reporting of Effluents (74-3/1)

The licensee's program for measuring and reporting of effluents was evaluated for conformance with Regulatory Guide 1.21 and found to be in general agreement with this Guide except for the following:

a. Continuous effluent releases through plant vents had not been sampled and analyzed quarterly for tritium. Management stated that effluent released through plant vents would be analyzed for tritium quarterly in the future.

b. A licensee representative estimated that the minimum detectable activity for each isotope in liquid radwaste analyses was normally about 6×10^{-6} microcuries per milliliter instead of 5×10^{-7} as specified in the Guide. Management agreed to modify analysis techniques as necessary so that 5×10^{-7} microcuries per milliliter would be detectable.

c. The semi-annual report to the Commission of radioactive effluents released for July through December 1973 stated that no particulate radioactivity was released during these months. Inspection of records of lab results for weekly and monthly analyses of particulate samples from the unit vents showed low concentrations of Ba-140, La-140, Cs-137 and Co-58 were released during this period. Management said that this apparent discrepancy would be evaluated and corrective action taken if appropriate.

d. Review of records of radioactivity released from waste gas tanks revealed that this radioactivity was accounted for twice in the semi-annual report to the Commission of gaseous effluents released during July through December 1973. This overestimation resulted from a technician adding the amount of radioactivity contained by waste gas tanks (computed based on laboratory analysis of a sample of tank contents) to the amount of radioactivity measured by continuous vent monitors. No written procedure was provided for determining the amount of gaseous effluents released and management said that they had not been aware that lab sample results had been added to vent monitor results. Management agreed to further evaluate this overestimation of radioactivity released.

12. Solid Waste Shipping Containers (74-3/2)

Section 11.1.1.4 of the Oconee FSAR states that solid waste will be packaged in DOT specification containers. Review of a purchase order for these containers revealed that the licensee had ordered steel drums meeting "DOT Specification 17-H or better;" however, inspection of containers being used revealed that some did not meet DOT Specification 17-H requirements. For example:

a. Some were not marked with DOT specification numbers as required by 49 CFR 173.28(n)(1)(i).

b. Some reconditioned drums had not been returned to their original shape or contour as required by 49 CFR 173.28(m)(1).

c. Original test markings had not been removed from some drums which had been reconditioned as required by 49 CFR 173.28(m)(3)(i).

Licensee representatives stated that use of these drums was restricted to packaging of low specific activity material and, consequently, any container which was "strong and tight" would meet DOT regulations. The inspectors commented that, since the integrity of containers being used was questionable, inspection of each container prior to use to assure compliance with DOT regulations should be considered. Management agreed to consider implementing such an inspection program.

13. Training of Unlicensed Utility Operators (74-3/3)

Management said that training of utility operators not requiring AEC licenses, such as radwaste system operators, had been limited to on-the-job experience. Further, management said that a trainee's qualification was based solely on the judgement of his supervisor and that

formal qualification criteria had not been established. Records of this training and qualification were not maintained. The inspectors commented that the training program for utility operators not requiring AEC licenses did not appear to conform to ANSI N18.1, "Selection and Training of Nuclear Power Plant Personnel." Management agreed to evaluate this program and make changes, if necessary, to conform to ANSI N18.1.

14. Calibration of Effluent Monitors

Review of waste release records and discussions with licensee representatives revealed that effluent radiation monitor values continue to disagree with results of effluent sample analyses. A licensee representative stated that comparative data have been collected and included with a Station Modification Report. He said that the problem with the liquid monitors is a combination of internal contamination build-up and high background, and that the gaseous monitor problem is due to insufficient range coverage.

15. Waste Management

a. Section 9.10.1 of the Oconee FSAR states, in part, that "...the Coolant Treatment System is used for the recovery of boron and purification of water that is drained or bled from the reactor coolant system for reuse in the plant as needed." However, licensee representatives said that the Coolant Treatment System was not being used for this purpose because unreliable performance of the radwaste system evaporator had necessitated use of the Coolant Treatment System for radwaste processing. Inspection revealed that liquid radwaste is normally processed through either the waste evaporator in the Liquid Waste Disposal System or the coolant bleed evaporator in the Coolant Treatment System; however, neither the two coolant bleed evaporator demineralizers nor the two condensate demineralizers in the coolant treatment system were normally used for waste or coolant treatment. Review of records revealed that the decontamination factor for iodine across purification demineralizers in the high pressure injection system had been about one thousand. The licensee's semi-annual report of effluents released during July through December 1973 states that about 1.75 curies of radioactive iodine were released in liquid effluents during this period. An inspector stated that use of condensate and coolant bleed evaporator demineralizers for radwaste processing could significantly reduce the amount of radioactive iodine released from Oconee in liquid effluents. Management agreed to evaluate such use of these demineralizers.

b. Licensee representatives said that decontamination factors across coolant purification demineralizers had not been determined on a routine basis and used as resin exchange criteria. A licensee representative said that decontamination factors across these demineralizers had been determined several times but that this was not done as a routine and had not been done for about two months prior to the inspection. Management agreed to consider determining decontamination factors across coolant purification demineralizers routinely and establishing resin exchange criteria based on these factors.

c. Gaseous waste processing and release records were reviewed to determine if maximum use was being made of waste gas tanks for decay of gaseous effluents prior to release. Records for 1974 were reviewed to determine how much time elapsed from the time a tank was emptied until refilling it was begun. Records revealed that this elapsed time varied from about two hours to about thirteen days and averaged about six days. Reactor operators stated that it was not unusual for a waste gas tank to remain empty for as long as a week. Management agreed to evaluate to determine if more effective use could be made of waste gas tanks.

d. Inspectors observed wood and cardboard being used and stored throughout potentially contaminated areas in the Auxiliary Building. Since wood and cardboard are porous materials, once they have been exposed to radioactivity, they can seldom be released for unrestricted use and must be disposed of as radioactive waste. The inspectors commented that the volume of solid radioactive waste generated could be significantly reduced if the amount of porous material, such as wood and cardboard, taken into potentially contaminated areas was reduced. Management agreed to consider placing restrictions on taking wood and cardboard into potentially contaminated areas.

e. Separate containers were not provided in potentially contaminated areas in the auxiliary building for collection of radiologically clean and contaminated waste. The inspectors commented that the amount of solid radwaste generated could be significantly reduced if clean waste was collected separately and surveyed for unrestricted disposal. Management agreed to evaluate the feasibility of such solid waste segregation.

16. Independent Measurements

a. The licensee is required to measure the quantities and concentrations of radioactive material in effluents from his facility to assure that they are within the limits specified in the technical specifications and AEC Regulations. To test the licensee's measurements, a split sample of liquid and a duplicate sample of gas radwaste were analyzed by the licensee and the AEC, and the licensee's measurements were compared with those of the AEC's reference laboratory. The measurements made by the AEC's laboratory are referenced to the National Bureau of Standards radioactivity measurements system by laboratory intercomparisons.

b. This inspection showed some of the licensee's measurements on these samples are acceptable under the test criteria used by the Directorate of Regulatory Operations for comparing measurement results (see the attachment). However, some of the licensee's measurements are not acceptable under the test criteria. The types of samples tested and the results of measurements were:

(1) Type of sample: Liquid Radwaste

(a) ACCEPTABLE (Results in units of microcuries/milliliter)

Radionuclide	AEC Reference Measurement	Licensee's Measurement
H-3	$1.87 \pm .02 \times 10^{-3}$	$2.24 \pm .03 \times 10^{-3}$
Co-60	$1.22 \pm .05 \times 10^{-5}$	$9.6 \pm 2.10 \times 10^{-6}$
Mn-54	$9.3 \pm .4 \times 10^{-6}$	$1.17 \pm .23 \times 10^{-5}$
Fe-59	$1.8 \pm .5 \times 10^{-6}$	None Detected
Nb-95	$2.7 \pm .4 \times 10^{-6}$	None Detected
Cs-134	$3.0 \pm .5 \times 10^{-6}$	None Detected

(b) NOT ACCEPTABLE (Results in units of microcuries/milliliter)

Radionuclide	AEC Reference Measurement	Licensee's Measurement
Sr-89	$6.1 \pm .2 \times 10^{-7}$	$2.0 \pm .35 \times 10^{-7}$
I-131	$14.18 \pm .06 \times 10^{-4}$	$2.08 \pm .03 \times 10^{-3}$
Cs-137	$1.27 \pm .06 \times 10^{-5}$	$5.89 \pm .16 \times 10^{-6}$
Co-58	$1.31 \pm .02 \times 10^{-4}$	$3.58 \pm .13 \times 10^{-4}$

(2) Type of sample: Gas Radwaste

ACCEPTABLE (Results in units of microcuries/milliliter)

Radionuclide	AEC Reference Measurement	Licensee's Measurement
Xe-133	$2.66 \pm .03X10^{-1}$	$2.49 \pm .03X10^{-1}$
Xe-133m	$2.37 \pm .02X10^{-3}$	$1.2 \pm .4X10^{-3}$

c. All unacceptable results were conservative (i.e., licensee reported more than reference lab) except for SR-89 and Cs-137. If previous releases of these isotopes were increased by factors equal to the ratios of licensee to reference lab results, no regulatory limit would be exceeded and no significant increase in estimated total activity release would occur.

d. Unacceptable results have been discussed with licensee and reference lab personnel to resolve differences; however, the cause of these differences has not been determined. The licensee's strontium analysis was performed by a contractor, and licensee management agreed to contact this contractor in an effort to resolve disagreement on the strontium 89 result. Liquid and gaseous radwaste has been resampled for a second comparison of licensee and reference lab results.

17. Contamination Control

a. A two-gallon plastic bottle of water which had an open top and was marked as radioactive material was found stored on the second floor of the Auxiliary Building.

b. Yellow and magenta ropes were used to restrict access to work tables and machines in the Hot Machine Shop; however, no signs were posted on the ropes. Licensee representatives said that the ropes were the boundary of the contaminated area.

c. A health physics technician said that workers did not normally notify health physics personnel of skin contamination if it was easily removed.

d. No instrument calibration sticker was posted on the portal contamination monitor as required by an instrument procedure.

e. A laundry operator said that the laundry survey instrument was out of order; however, no maintenance tag had been attached to the instrument as required by the Health Physics Manual to preclude its inadvertent use.

f. Mop buckets, marked as radioactive material, were stored in the change room near the area where personnel removed their protective clothing.

g. Cardboard, wood, a broken bag of oily rags, and open bags of trash and absorbent material were strewn around the Hot Machine Shop tunnel. Housekeeping in other areas in the Auxiliary Building also needed improvement.

h. A health physics technician said that no continuous airborne radioactivity monitor was provided for the decon room and that grab samples from this room were not routinely collected and analyzed.

i. Sash doors to unattended contaminated sample sink and lab hoods were found open. Also, licensee representatives said that the maximum height to which sash doors could be opened while maintaining proper air flow rate into hoods had not been determined.

j. Personnel survey instruments were not provided at the exit from each contaminated area. A licensee representative said that the radiation backgrounds were low enough to permit use of such instruments at more exit points, but additional instruments were not available. Management said that additional instruments had been ordered.

18. Radioactive Gas Release Incident

a. On February 8, 1974, the licensee notified Region II by telephone that the Unit 2 Reactor Building Gas monitor (2-RIA-49) had alarmed and that a number of other radiation process monitors had alarmed or increased. The Unit 2 Reactor Building evacuation alarm had sounded automatically, and the Auxiliary Building was evacuated by decision of licensee management; Unit 1 reactor was in operation, and Unit 2 reactor had been shut down for several weeks. A licensee representative stated that, based on air samples and radiation surveys, reentry into R.B.2 and Auxiliary Building (ground elevation) was approved after about 1-1/2 hours. A possible cause of the alarms was identified as an operation in which gas from the Unit 1 Letdown Storage Tank was being sampled at the Sample Station located in the Auxiliary Building.

b. During an inspection of February 11-15, 1974, an inspector reviewed results of radiation surveys and air samples taken in the Auxiliary Building and Unit 2 Reactor Building soon after the evacuation. These records showed that airborne particulate and halogen concentrations did not exceed 10 CFR 20 limits, and that there was no appreciable radiation levels (maximum reading was 6 millirem per hour at overhead gas header in hallway). The inspector asked if noble gas concentrations in the building were determined. A licensee representative stated that they were determined by the same impregnated charcoal filters that were used for halogen sampling; however, the collection efficiency of these filters for noble gases had not been determined by the licensee. The inspector pointed out to the licensee representative and to management that, even though radiation level rather than concentration is the controlling factor for noble gases, he should have a known and reliable method for determining noble gas concentrations. Management agreed and stated that large volume gas bombs, or other appropriate method, would be used in the future.

c. In reviewing process radiation monitor recorder charts, the inspector and licensee representatives encountered considerable difficulty due to the quality of the charts. Some point identification numbers were not legible, and the handwritten reference code provided from the control room to correlate point number/color with RIA number was incorrect. The inspector pointed out that adequate identification of radiation monitor recorder charts was apparently not being maintained. Licensee management agreed that improvement was needed and stated that corrective action would be taken.

d. On February 15, a licensee representative provided an inspector with calculations which showed that the total activity (primarily ^{133}Xe) released to the environment during the incident was 38.09 curies, of which 6.48 curies were released from Unit 1 vent and 31.61 curies were released from Unit 2 vent. These data were based on the licensee's interpretation of process monitor recorder charts for 1-RIA-45 and 2-RIA-45 (vent gas monitors), respectively. No technical specification release limits were exceeded. Licensee management stated that the above values for activity released would be reported in the Semi-Annual Operating Report.

e. During the inspection of March 18-22, 1974, a licensee representative said that a subsequent test had been conducted, wherein the Letdown Storage Tank sampling was performed while health physics personnel were stationed at strategic locations for measurements.

He stated that gas had been released to the Auxiliary Building as well as to the unit vents during the original incident. He concluded that the release had resulted from leaks in the tubing of the sampling apparatus in the hood and the sampling apparatus being located too close to the hood face. He stated that the tubing has been replaced and a Station Modification Report has been submitted to provide adequate air flow into the sample hood.

19. Other Areas Inspected in Which no Deficiencies were Apparent

a. Records of personnel radiation exposure.

b. Reactor coolant and secondary system activity and sampling frequency within the Technical Specification requirements.

c. Quarterly drills of emergency procedures.

d. Environmental monitoring program.

Attachment To
Details I

CRITERIA FOR COMPARING MEASUREMENTS

1. General

This section provides the criteria for comparing results of capability tests and verification measurements. The criteria are composed of a primary and a secondary test. The primary test checks the difference between means which have a normal distribution and determines whether two values are statistically different. The result of the primary test is a numerical "Z" value. And, the results of measurements checked with the primary test are judged in AGREEMENT, POSSIBLE DISAGREEMENT, or DISAGREEMENT according to the "Z" value resulting from applying the primary test. The wide range of "Z" values used as action levels in the primary test attempts to take into account unidentified uncertainties, in addition to systematic errors, which are factors in calculating the standard deviation of the measurement. Therefore, if a "Z" value for a set of measurements is outside the agreement range, we can be fairly certain that the two values are different. However, from a practical standpoint, we are not now concerned about cases where the percent disagreement between the two values being compared is small. Consequently, a secondary test for agreement is made to take this into account. For example, a "Z" value may say that the result is in DISAGREEMENT but the percent disagreement may be small, that is, within certain ranges we have specified. In this case, the percent disagreement is taken into account and the measurement may be accepted. The acceptability in this case is called a PRACTICAL AGREEMENT.

2. Criteria

a. Primary Test for Agreement

$$Z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\sigma 1^2 + \sigma 2^2}}$$

where:

$\overline{X}_1$ = AEC reference laboratory value

$\overline{X}_2$ = Licensee value

$\sigma 1$ = Standard deviation of AEC reference laboratory measurement

$\sigma 2$ = Standard deviation of licensee measurement

Z Value	Result
<-10	Disagreement
-10 to -5	Possible Disagreement
-5 to +3	Agreement
+3 to +5	Possible Disagreement
+5 to +10	Disagreement
>+10	Disagreement

b. Secondary Test for Agreement

This is a test for PRACTICAL AGREEMENT. Practical agreement is achieved when comparisons between two values are outside the agreement range (Z = -5 to +3) but where the percent difference of the two values falls within the appropriate percentage range shown below. Percent difference is calculated using the following convention:

$$\frac{\text{AEC Reference Laboratory Value} - \text{Licensee Value}}{\text{AEC Reference Laboratory Value}} \times 100 = \text{Percent Difference}$$

PRACTICAL AGREEMENT

Range	Analysis Test Applied To:
-25% to +20%	Gamma spectrometry where principal gamma energy used for identification is greater than 250 Kev
	Tritium analyses of liquid samples.
	Iodine on adsorbers.
-40% to +30%	Gamma spectrometry where principal gamma energy used for identification is less than 250 Kev
	^{89}Sr and ^{90}Sr Determinations

3. Procedure

a. If the "Z" value for an individual measurement shows AGREEMENT, the result is acceptable, OR

b. If the "Z" value for an individual measurement shows POSSIBLE DISAGREEMENT OR DISAGREEMENT, check to see if the percent disagreement falls within the categories of the criteria for the secondary test, AND

c. If it does, the individual measurement result is acceptable as a PRACTICAL AGREEMENT.

d. Licensee results are NOT ACCEPTABLE for isotopes that are not identified by the licensee but are identified by the AEC reference lab as being present in concentrations greater than 10% of their respective MPC's as specified in 10 CFR 20.