

RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS
(RETS) IMPLEMENTATION - ARKANSAS NUCLEAR ONE UNITS 1 AND 2

William Serrano
Stephen W. Duce
John W. Mandler
Ferrol E. Simpson
Thomas E. Young

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EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

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ABSTRACT

A review of the Radiological Effluent Technical Specifications (RETS) of the Arkansas Nuclear One Units 1 and 2 was performed. The principal review guidelines used were NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," and Draft 711 of NUREG-0472, Revision 3, "Radiological Effluent Technical Specifications for Pressurized Water Reactors." Draft submittals were discussed with the Licensee by both EG&G and the NRC staff until all items requiring changes to the Technical Specifications were resolved. The Licensee then submitted final proposed RETS to the NRC which were evaluated and found to be in compliance with the NRC review guidelines. The proposed Offsite Dose Calculation Manual and Process Control Manual were reviewed and generally found to be in compliance with the NRC review guidelines.

FOREWORD

This Technical Evaluation Report was prepared by EG&G Idaho, Inc. under a contract with the U. S. Nuclear Regulatory Commission (Office of Nuclear Reactor Regulation, Division of Systems Integration) for technical assistance in support of NRC operating reactor licensing actions. The technical evaluation was conducted in accordance with criteria established by the NRC.

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1.0 INTRODUCTION

1.1 Purpose of the Technical Evaluation

The purpose of this Technical Evaluation Report (TER) is to review and evaluate the proposed changes in the Technical Specifications of the Arkansas Nuclear One Units 1 and 2 with regard to Radiological Effluent Technical Specifications (RETS), the proposed Offsite Dose Calculation Manual (ODCM) and the proposed Process Control Program (PCP).

This evaluation used criteria proposed by the Nuclear Regulatory Commission (NRC) staff in the model Technical Specifications for pressurized water reactors (PWRs), NUREG-0472,^[1] and subsequent revisions. This effort is directed toward the NRC objective of implementing RETS which comply with the regulatory requirements, primarily those of 10 CFR Part 50, Appendix I,^[2] Other regulations pertinent to the control of effluent releases are also included within the scope of compliance.

1.2 Generic Issue Background

Since 1970, 10 CFR Part 50, Section 50.36.a,^[3] "Technical Specifications on Effluents from Nuclear Power Reactors," has required licensees to provide Technical Specifications which ensure that radioactive releases will be kept as low as is reasonably achievable (ALARA). In 1975, numerical guidance for the ALARA requirement was issued in 10 CFR Part 50, Appendix I. The licensees of all operating reactors were required^[4] to submit, no later than June 4, 1976, their proposed ALARA Technical Specifications and information for evaluation in accordance with 10 CFR Part 50, Appendix I. However, in February 1976, the NRC staff recommended that proposals to modify Technical Specifications be deferred until the NRC completed the model RETS.

The model RETS deal with radioactive waste management systems and environmental monitoring. Although the model RETS address the 10 CFR Part 50, Appendix I requirements, subsequent revisions include provisions for addressing issues not covered in Appendix I. These provisions are stipulated in the following regulations:

- 10 CFR Part 20,^[5] "Standards for Protection Against Radiation," Sections 20.105.c, 20.106.g and 20.405.c which require that nuclear power plants and other Licensees comply with 40 CFR Part 190,^[6] "Environmental Radiation Protection Standards for Nuclear Power Operations," and submit reports to the NRC when the 40 CFR Part 190 limits have been or may be exceeded.
- 10 CFR Part 50, Appendix A,^[7] "General Design Criteria for Nuclear Power Plants," which contains Criterion 60--Control of releases of radioactive materials to the environment; Criterion 63--Monitoring fuel and waste storage; and Criterion 64--Monitoring radioactive releases.
- 10 CFR Part 50, Appendix B,^[8] which establishes the quality assurance required for nuclear power plants.

The NRC position on the model RETS was established in May 1978 when the NRC's Regulatory Requirements Review Committee approved the model RETS: NUREG-0472 for PWRs and NUREG-0473 for BWRs. Copies of the model RETS were sent to licensees in July 1978 with a request to submit proposed site-specific RETS on a staggered schedule over a six-month period. Licensees responded with requests for clarifications and extensions.

The Atomic Industrial Forum (AIF) formed a task force to comment on the model RETS. NRC staff members first met with the AIF task force on June 17, 1978. The model RETS were subsequently revised (Revision 1) to

reflect comments from the AIF and others. A principal change was the transfer of much of the material concerning dose calculations from the model RETS to a separate document, the ODCM.

Revision 1 of the model RETS was sent to licensees on November 15 and 16, 1978 with guidance (NUREG-0133)[9] for preparation of the RETS and the ODCM and a new schedule for responses, again staggered over a six-month period.

Four regional seminars on the RETS were conducted by the NRC staff during November and December 1978. Subsequently, a preliminary copy of Revision 2 of the model RETS and additional guidance on the ODCM and a PCP were issued in February 1979 to each utility at individual meetings. NUREG-0472, Revision 2[1] and NUREG-0473, Revision 2[10] were published in July 1979 and updated in January 1980 and February 1980. In response to the NRC's request, operating reactor licensees subsequently submitted initial proposals on plant RETS and the ODCM. Review leading to ultimate implementation of these documents was initiated by the NRC in September 1981 using subcontracted independent teams as reviewers.

As the RETS reviews progressed, feedback from the licensees led the NRC to modify some of the provisions in the February 1, 1980 version of Revision 2 to clarify specific concerns of the licensees and thus expedite the reviews. Starting in April 1982, the NRC distributed revised versions of RETS in draft form to the licensees during the site visits. The new guidance on these changes was presented in an AIF meeting on May 19, 1982.[11] Some interim changes regarding the Radiological Environmental Monitoring Section were issued in August 1982.[12] With the incorporation of these changes, the NRC issued Draft 7'' of Revision 3 of NUREG-0472[13] and NUREG-0473[14] in September 1982 to serve as new guidance for the review teams.

1.3 Plant-Specific Background

By letters dated March 9, 1979^[15] and May 10, 1979,^[16] Arkansas Power and Light Company (AP&L), the Licensee for Units 1 (ANO-1) and 2 (ANO-2) at the Arkansas Nuclear One (ANO) site, submitted proposed RETS for ANO-1 and ANO-2, respectively. A modified RETS proposal was resubmitted in July 1979. By letter dated July 9, 1979, AP&L submitted the Offsite Dose Calculation Manual (ODCM) for ANO-1&2. Revision A to the ODCM was submitted by letter dated October 22, 1979. A meeting on October 23, 1979 in Bethesda, Maryland was held to discuss with AP&L the NRC's position on the submittals and the changes necessary to make the RETS and ODCM acceptable to the staff.^[17]

EG&G Idaho, Inc. (EG&G), selected as an independent task review team, initiated a review and evaluation of the July 1979 RETS submittals. The submittals were compared to the model RETS and assessed for compliance with the requirements of 10 CFR Part 50, Appendix I and 10 CFR Part 50, Appendix A. The July 1979 ODCM submittal was reviewed and compared to the guidelines of NUREG-0133.

Copies of the review comments on the effluent Technical Specifications and the ODCM were transmitted to NRC and the Licensee by letter dated May 4, 1982.^[18] On June 22-24, 1982, a site visit to the ANO site was made for the purpose of discussing the comments and the changes necessary to the submittals identified in the May 1982 review. The site visit discussion was summarized in letter dated July 15, 1982.^[19]

At the site visit it was agreed that AP&L would provide EG&G with draft RETS and ODCM submittals for review and comment.^[20] As agreed at the site visit, EG&G would provide an annotated copy of the draft submittal to AP&L prior to transmittal to NRC.^[21] It was also agreed at the site visit that EG&G would attempt to resolve via telephone conference with AP&L personnel the comments on the annotated copy. A telephone conference was made on November 22, 1982^[22] to discuss the

annotated RETS submittals and the ODCM. Based on this telecon AP&L requested an extension to a response date in letter dated November 30, 1982.[23] A summary of the subjects discussed during the November 22, 1982 telecon was transmitted to NRC in letter dated December 15, 1982.[24]

The unresolved RETS issues were discussed between EG&G personnel and Mr. C. A. Willis at a meeting in Albuquerque, New Mexico on January 11, 1983. A summary of the discussion was prepared and transmitted to NRC in letter dated January 24, 1983.[25]

In a letter dated September 30, 1983,[26] AP&L in response to an NRC letter dated May 10, 1983, submitted to NRC revised RETS for ANO-1 and ANO-2 and an updated ODCM. These proposals superceded all previous submittals. EG&G reviewed the September 1983 submittals and transmitted review comments to NRC in letter dated November 4, 1983.[27] The review comments were resolved between NRC and AP&L resulting in another RETS and ODCM submittal dated April 13, 1984[28] and supplemented on April 26, 1984.[29] These April submittals superceded all previous submittals. A summary of the RETS resolutions agreed upon was transmitted in a memo to EG&G dated May 8, 1984[30] allowing the EG&G review team to complete a TER for transmittal to NRC.

The April 13, 1984 ODCM was reviewed and review comments transmitted to NRC in letter dated May 29, 1984.[31] It was concluded that the ODCM contains methodology consistent with the guidelines of NUREG-0133.

AP&L submitted a Process Control Program (PCP) in letter dated February 21, 1980.[32] The February 1980 PCP was not reviewed as it consisted of a vendors solidification procedures. A modified PCP was transmitted April 13, 1984[28] which was compared[31] to the NRC review guidelines contained in letter dated January 3, 1983.[33] It was concluded that the PCP contains a descriptive overview which provides

controlled guidance on the appropriate handling and solidification of wet radioactive wastes at A10 and is consistent with NRC criteria.

2.0 REVIEW CRITERIA

Review criteria for the RETS were provided by the NRC in three documents:

1. NUREG-0472, RETS for PWRs
2. NUREG-0473, RETS for BWRs
3. NUREG-0133, Preparation of RETS for Nuclear Power Plants

Twelve essential criteria are given for the RETS and ODCM:

1. All significant releases of radioactivity shall be controlled and monitored.
2. Offsite concentrations of radioactivity shall not exceed the 10 CFR Part 20, Appendix B, Table 2 limits.^[4]
3. Offsite radiation doses shall be ALARA.
4. Equipment shall be maintained and used to keep offsite doses ALARA.
5. Radwaste tank inventories shall be limited so that failures would not cause offsite doses exceeding 10 CFR Part 20 limits.
6. Hydrogen and/or Oxygen concentrations in the waste gas system shall be controlled to prevent explosive mixtures.
7. Wastes shall be processed to shipping and burial ground criteria under a documented program, subject to quality assurance verification.

8. An environmental monitoring program, including a land use census, shall be implemented.
9. The radwaste management program shall be subject to regular audits and reviews.
10. Procedures for control of liquid and gaseous effluents shall be maintained and followed.
11. Periodic and special reports on environmental monitoring and on releases shall be submitted.
12. Offsite dose calculations shall be performed using documented and approved methods consistent with NRC methodology.

In addition to NUREG-0472 and NUREG-0473 and their subsequent revisions, the NRC staff issued guidelines,[35,36] clarifications,[37,38] and branch positions[39,40,41] establishing a policy that requires the licensees of operating reactors to meet the intent, if not the letter, of the model RETS requirements. The NRC branch positions issued since the RETS implementation review began have clarified the model RETS for operating reactors.

Review criteria for the ODCM are based on the following NRC guidelines: Branch Technical Position, "General Content of the Offsite Dose Calculation Manual";[42] NUREG-0133;[9] and Regulatory Guide 1.109.[43] The format for the ODCM is left to the licensee and may be simplified by tables and grid printouts.

Review criteria for the PCP is based on NRC review guidelines contained in letter dated January 3, 1983.[33]

3. TECHNICAL EVALUATION

3.1 General Description of Radiological Effluent System

This section briefly describes the liquid and gaseous radwaste effluent treatment systems, release paths, and control systems installed at ANO-1 and ANO-2.

3.1.1 Radioactive Liquid Effluents

There is a single liquid radwaste release point for Unit 1 and a single release point for Unit 2; the liquid radwaste discharge line.

The liquid radwaste discharge line at Unit 1 is the common release line to the circulating water discharge canal from the treated waste monitor tank, filtered waste monitor tank and the laundry drain tank.

The liquid radwaste discharge line at Unit 2 is the common release line to the circulating water discharge canal from the boric acid condensate tank, waste condensate tanks, and the non-radioactive regenerative holdup tank.

The turbine floor drains at each unit are normally released directly to the discharge canal. However, a high ^{16}N activity in the main steam lines from a primary-to-secondary leak will automatically divert the floor drain discharge to a neutralizing tank which is grab sampled before discharge. In addition, the condenser air ejector noble gas monitor also triggers the administrative controls for isolation of the tank and grab samples on the turbine building sump.

A block diagram description of the systems is shown in Figure 1.

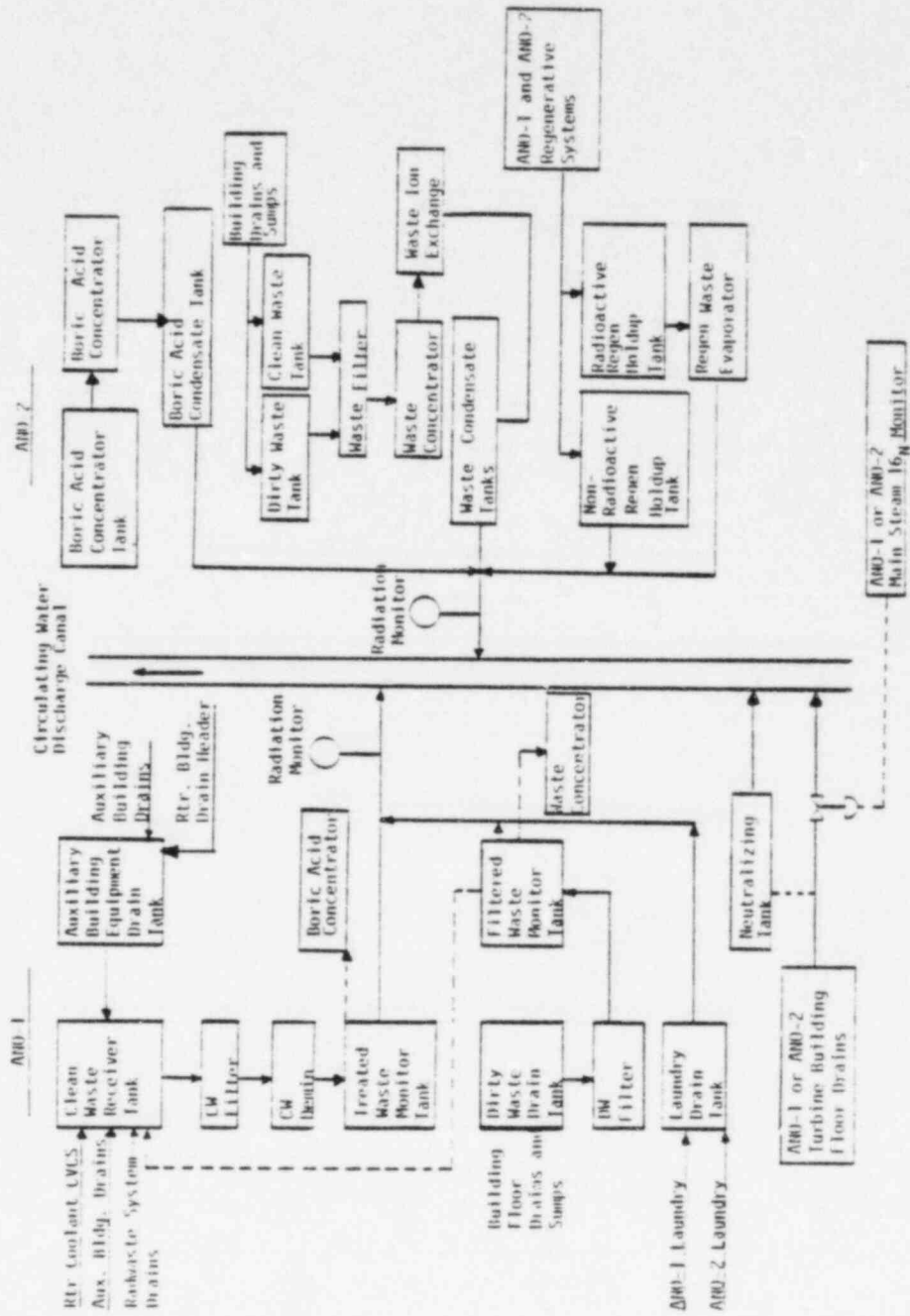


Figure 1. Arkansas Units 1 and 2 radioactive liquid effluent release paths.

The service water at both units is released directly to the discharge canal. The component cooling water system at each unit is a closed system and is cooled by the service water system. The radioactive components, i. e., the reactor building air cooler and decay heat coolers have process monitors which provide alarm and will isolate these legs of the system from the discharge header.

The intermediate cooling water system is only drained during an outage and is sampled prior to release. This system is also cooled by the service water system.

3.1.2 Radioactive Gaseous Effluents

There are three radioactive gaseous effluent release points for Unit 1 and four for Unit 2:

1. The auxiliary building ventilation system.
2. The spent fuel pool area ventilation system.
3. The reactor building purge and ventilation system.
4. The Unit 2 auxiliary building extension ventilation system.

The auxiliary building vent is also the release point for gaseous effluents from the radwaste area, the condenser air ejector, and the waste gas holdup system.

A block diagram description of the gaseous effluent discharge pathways is shown in Figure 2.

3.2 Radiological Effluent Technical Specifications

The following subsections describe the primary objectives of each section of the model RETS and a summary of the commitments of the Licensee's RETS. A cross-reference between the numbering in the model RETS and the Licensee's RETS is contained in Table 1. The chronological

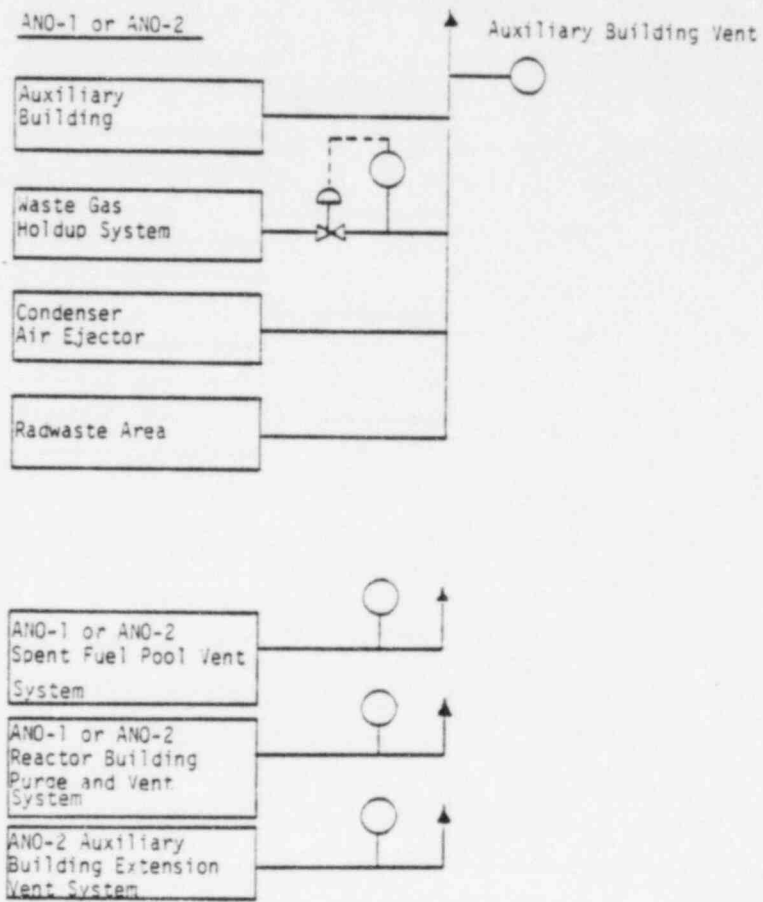


Figure 2. Arkansas Units 1 and 2 radioactive gaseous effluent release paths.

sequence of the RETS review was described in the Plant-Specific Background, Section 1.3 of this report.

3.2.1 Effluent Instrumentation

The objective of the model RETS with regard to effluent instrumentation is to ensure that all significant liquid and gaseous radioactive effluents are monitored. The model RETS specify that all effluent monitors be operable with periodic surveillance and that alarm/trip setpoints be determined in order to ensure that offsite radioactive effluent concentrations do not exceed maximum permissible concentration (MPCs) listed in 10 CFR Part 20.

The licensee has provided radiation monitors for all effluent lines with potential for release of significant amounts of radioactivity in liquid or gaseous effluents.

3.2.1.1 Radioactive Liquid Effluent Instrumentation

All liquid effluents from ANO-1 and ANO-2 that are potentially high in radioactivity are released through their respective liquid radwaste effluent line and monitored with provisions for automatic termination of release. There is a flow monitor for the liquid radwaste discharge line and adequate instrument surveillance is performed on the monitoring system.

There are no steam generator blowdown monitors for either unit as they are once-through generators at ANO-1 and the blowdown is a closed system at ANO-2.

There are no monitors on the service water discharge as the process monitors in the component cooling water system to isolate the source would have to fail and a leak in the component cooling-to-service water system would have to occur. Thus, it was determined the omission of service water monitors met the intent of NUREG-0472.

There are no monitors for the turbine building sumps as the sumps are pumped to a neutralizing tank upon a high ^{16}N reading in the main steam lines. The neutralizing tanks are grab sampled and analyzed before discharge which was determined to meet the intent of NUREG-0472.

3.2.1.2 Radioactive Gaseous Effluent Instrumentation

The radioactive gaseous effluent release points for ANO-1 and ANO-2 are fully monitored with adequate surveillance requirements.

The waste gas holdup system has a noble gas monitor which is operable during releases. The system discharges through the auxiliary building ventilation system which supplements the monitoring requirements.

The steam generator blowdown closed system at ANO-2 is off-gassed through the main condenser air ejector. Consequently the off-gasses are fully monitored at the auxiliary building vent.

3.2.1.3 Liquid and Gaseous Instrumentation Setpoints

The licensee's Technical Specifications require that the concentration of radioactive material will be monitored "during releases via this pathway" for all monitored effluent paths. The setpoints at each release point are established to prevent exceeding the release concentrations for liquid releases or corresponding dose rates for gaseous releases of 10 CFR Part 20 in unrestricted areas. The setpoints for the liquid and gaseous effluent instrumentation will be determined according to the Offsite Dose Calculation Manual (ODCM).

The licensee's RETS submittal on liquid and gaseous effluent monitoring instrumentation has satisfied the provisions and meets the intent of NUREG-0472.

3.2.2 Concentration and Dose Rates of Effluents

3.2.2.1 Liquid Effluent Concentration

The Licensee's RETS include a commitment to maintain the concentration of radioactive liquid effluents released from the site to the unrestricted areas to within 10 CFR Part 20 limits, and if the concentration of liquid effluents to the unrestricted area exceeds these limits, immediate action will be taken to restore concentrations to a value equal to or less than the MPC values specified in 10 CFR Part 20. Batch releases are sampled and analyzed periodically in accordance with an acceptable sampling and analysis program.

Therefore, the Licensee's RETS submittal on liquid effluent concentrations meets the intent of NUREG-0472.

3.2.2.2 Gaseous Effluent Dose Rate

The Licensee's RETS include a commitment to maintain the gaseous dose rate from the site to within NUREG-0472 limits and if the concentration of gaseous effluents exceeds these limits or the equivalent dose rate values, it will be restored without delay to a value within these limits.

The radioactive gaseous waste sampling and analysis program provides adequate sampling and analysis of the discharges.

Therefore, the Licensee's RETS submittal on gaseous effluent dose rates meets the intent of NUREG-0472.

3.2.3 Offsite Doses from Effluents

The objectives of the model RETS with regard to offsite doses from effluents are to ensure that offsite doses are kept ALARA, are in

compliance with the dose specifications of NUREG-0472 and are in accordance with 10 CFR Part 50, Appendix I and 40 CFR Part 190.

The Licensee's RETS include a commitment to:

1. Limit the quarterly and annual dose due to liquid effluents to within the NUREG-0472 criteria
2. Limit the quarterly and annual air dose due to noble gas releases to within the NUREG-0472 criteria
3. Limit the quarterly and annual dose to any organ due to release of Iodine-131, tritium, and radionuclides in particulate form with half-lives greater than eight days to within the NUREG-0472 criteria and to
4. Limit the dose to any member of the public so as not to exceed the 40 CFR Part 190 requirements.

Therefore, the Licensee's RETS submittal on offsite doses from radioactive effluents meets the intent of NUREG-0472.

3.2.4 Effluent Treatment

The objectives of the model RETS with regard to effluent treatment are to ensure that the radioactive waste treatment systems are used to keep releases ALARA and to satisfy the provisions for Technical Specifications governing the maintenance and use of radwaste treatment equipment.

The Licensee's RETS commits to using the liquid radwaste treatment equipment when it is projected that the cumulative dose during a calendar quarter would exceed 0.18 mrem to the total body or 0.625 mrem to any organ. The dose projections shall be made in accordance with the ODCM at least once every 31 days.

The Licensee's RETS commits to using the ventilation exhaust treatment system when projected air doses due to gaseous effluent releases

would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation or when the projected dose due to Iodine-131, tritium, and radionuclides in particulate form with half-lives greater than eight days would exceed 1.0 mrem to any organ over a calendar quarter.

When degasifying the reactor coolant system the gaseous radwaste treatment system shall be used when projected air doses due to gaseous releases to unrestricted areas would exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation over a calendar quarter.

The dose projections due to gaseous releases shall be made in accordance with the ODCM at least once every 31 days.

Therefore the Licensee's RETS submittal on the usage of liquid and gaseous radwaste treatment systems meets the intent of NUREG-0472.

3.2.5 Tank Inventory Limits

The objective of the model RETS with regard to a curie limit on liquid-containing tanks is to ensure that in the event of a tank rupture, the concentrations in the nearest potable water supply and the nearest surface water supply in an unrestricted area would not exceed the limits of 10 CFR Part 20, Appendix B Table II. The objective of the model RETS with regard to a curie limit on gas-containing tanks is to ensure that in the event of an uncontrolled release of the tank's contents the resulting total body exposure to an individual at the nearest exclusion area boundary will not exceed 0.5 rem.

The Licensee's RETS include a commitment to limit the quantity of radioactivity in temporary radwaste storage tanks to less than or equal to 10 curies, excluding tritium and dissolved or entrained noble gases.

The Licensee's RETS include a commitment to limit the quantity of radioactivity contained in each gas storage tank to 300,000 curies noble

gases (Xe-133 equivalent). This is a suitable fraction of the quantity of radioactive material which if released over a two hour period, would result in a total body exposure to a member of the public at the exclusion area boundary of 500 mrem.

Therefore, the Licensee's RETS submittal on tank inventory limits meets the intent of NUREG-0472.

3.2.6 Explosive Gas Mixtures

The objective of the model RETS with regard to explosive gas mixtures is to prevent hydrogen explosions in the waste gas system.

The requirement to monitor hydrogen and oxygen to guard against explosive gas concentrations is being addressed as a separate issue by the NRC for ANO-1 and ANO-2 and is not addressed in this review.

3.2.7 Solid Radwaste System

The objective of the model RETS with regard to the solid radwaste system is to ensure that radwaste will be properly processed and packaged before it is shipped from the plant to the burial site to satisfy the requirements of 10 CFR Part 20, Section 20.301 and 10 CFR Part 71.[35]

The Licensee's RETS include a commitment to use the solid radwaste system in accordance with a Process Control Program to process wet radioactive wastes to meet shipping and burial ground requirements.

Therefore, the Licensee's RETS submittal on solid radioactive waste meets the intent of NUREG-0472.

3.2.8 Radiological Environmental Monitoring Program

The objectives of the model RETS with regard to a radiological environmental monitoring program are to ensure that (a) an adequate full-area coverage environmental monitoring program exists, (b) there is an appropriate land use census, and (c) an acceptable Interlaboratory Comparison Program exists. The monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50, the land use census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50, and the requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks are performed as part of the quality assurance program for environmental monitoring to demonstrate that valid results are obtained for Section IV.B.2 of Appendix I to 10 CFR Part 50.

The Licensee's RETS on a radiological environmental monitoring program have followed the model RETS and the Branch Technical Position on the subject issued November 1979,^[31] as applicable to the site, and have provided an adequate number of sample locations for pathways identified. The Licensee's method of sample analysis and maintenance of the monitoring program satisfies the requirements of Appendix I, 10 CFR Part 50. The Licensee's RETS contain a land use census specification which requires the appropriate annual information for a PWR. The RETS also state that the Licensee will participate in an NRC approved Interlaboratory Comparison Program.

Thus, the Licensee's RETS submittal for a radiological environmental monitoring program meets the Intent of NUREG-0472.

3.2.9 Audits and Reviews

The objective of the model RETS with regard to audits and reviews is to ensure that audits and reviews of the radwaste and environmental monitoring programs are properly conducted.

The Licensee's administrative structure identifies the Plant Safety Committee (PSC) and the Safety Review Committee (SRC) as the two groups comparable to the Unit Review Group (URG) and the Company Nuclear Review and Audit Group (CNRAG), respectively.

The PSC is responsible for reviewing all changes to the ODCM and the PCP. It was determined the requirement to review accidental, unplanned or uncontrolled radioactive releases was satisfied by the existing Specifications.

The SRC is responsible for auditing the radiological environmental monitoring program and the results thereof at least once per 12 months; for auditing the offsite dose calculation manual and process control program and implementing procedures at least once per 24 months; and the performance of activities required by the Operational Quality Assurance Program to meet the criteria of 10 CFR 50 Appendix B at least once per 24 months.

Therefore, the PSC and the SRC encompass the total responsibility for reviews and audits and meet the intent of NUREG-0472.

3.2.10 Procedures and Records

The objective of the model RETS with regard to procedures is to ensure that written procedures be established, implemented, and maintained for the PCP, the ODCM, and the QA program for effluent and environmental monitoring. The objective of the model RETS with regard to records is to ensure that documented records pertaining to the radiological environmental monitoring program are retained for the duration of the operating license.

The Licensee's RETS include a commitment to establish and implement procedures for the ODCM and the PCP. The establishment and implementations of procedures for the Quality Assurance Program for the

effluent and environmental monitoring program was determined to be a requirement of 6.8.1.a of the existing Specifications.

The Licensee's RETS state the "Records of analyses results required by the Radiological Environmental Monitoring Program," shall be retained for the duration of the Facility Operating License.

Therefore, the Licensee's RETS submittal on procedures and records meets the Intent of NUREG-0472.

3.2.11 Reports

The objective of the model RETS with regard to reporting requirements is to ensure that appropriate annual and semiannual periodic reports and special reports are submitted to the NRC.

The Licensee's RETS include commitments to submit the following reports:

1. Annual Radiological Environmental Operating Report

This report includes summaries, interpretations and analysis of trends of the results of the radiological environmental monitoring surveillance program. The report also includes the results of the land use census and results of participation in the Interlaboratory Comparison Program. The report will be submitted prior to May 1 of each year.

2. Semiannual Radioactive Effluent Release Report

This report contains a summary of the quantities of radioactive liquid and gaseous effluents released and is submitted within 60 days after January 1 and July 1 of each year. The report also includes a summary of solid waste shipped offsite, an assessment of offsite doses, and doses to individuals due to their activities inside the unrestricted area. The report may include

the prescribed meteorological data. The report shall also contain a listing of new locations required by the land use census as well as any changes to the ODCM and the FCP. The report may include a description of major changes to the radioactive waste systems (liquid, gases, and solid) during the previous calendar year.

3. Special Reports

The Licensee's RETS include a commitment to file a special report under the following conditions:

- Exceeding the liquid effluent dose limits according to ANO-1 Specification 3.15.1.2.B and ANO-2 Specification 3.11.1.2 within 30 days of determination.
- Exceeding the gaseous effluent dose limits according to ANO-1 Specifications 3.25.2.2.B and 3.25.2.3.B and ANO-2 Specifications 3.11.2.2 and 3.11.2.3 within 30 days of determination.
- When radioactive liquid or gaseous effluents are discharged without treatment and in the excess of the projected dose limits according to ANO-1 Specifications 3.15.1.3.C and 3.25.2.4.C and ANO-2 Specifications 3.11.1.3, 3.11.2.5 and 3.11.2.6.
- Exceeding the total dose limits according to ANO-1 Specification 3.25.3.2 and ANO-2 Specification 3.11.3 within 30 days.
- Exceeding the reporting levels for the radioactivity measured in ANO-1 environmental sampling program Specification 4.30.1.2.b and ANO-2 Specification 3.12, within 30 days.

Therefore, the Licensee's RETS submittal on reports meets the intent of NUREG-0472.

3.2.12 Other Administrative Controls

Additional objectives of the model RETS in the administrative controls section are to ensure that any changes to the PCP and ODCM and major changes to the radioactive waste treatment systems are reported to the NRC.

The Licensee's RETS require that changes to the ODCM and PCP be reported to NRC in the semiannual radioactive effluent release report. Notification of Licensee initiated major changes to the radioactive waste systems (liquid, gaseous and solid) may be reported in the semiannual report or included in the next FSAR update.

Therefore, the Licensee's RETS submittal for these administrative controls meets the intent of NUREG-0472.

3.3 OFFSITE DOSE CALCULATION MANUAL

As specified in NUREG-0472, the ODCM is to be developed by the Licensee to document the methodology and approaches used to calculate offsite doses and maintain the operability of the effluent system. As a minimum, the ODCM should provide equations and methodology for the following topics:

- alarm and trip setpoints for effluent instrumentation
- liquid effluent concentration in unrestricted areas
- gaseous effluent dose rate or concentrations at or beyond the site boundary
- liquid and gaseous effluent dose contributions
- total dose compliance, including direct shine
- liquid and gaseous effluent dose projections

In addition, the ODCM should contain flow diagrams, consistent with the systems being used at the station, defining the treatment paths and

the components of the radioactive liquid, gaseous, and solid waste management systems. A description and the location of samples in support of the environmental monitoring program are also needed in the ODCM.

3.3.1 Evaluation

The Licensee's ODCM satisfies the equation in the addendum of NUREG-0133 to determine the alarm and trip setpoints for the liquid effluent monitors. This assures that the alarm and trip actions will occur prior to exceeding the 10 CFR Part 20, Appendix B, Table II values at the discharge point to the unrestricted area.

The alarm and trip setpoints for the gaseous effluent monitors are calculated to assure that alarm and trip actions will occur prior to exceeding the limits set in 10 CFR Part 20 for annual dose rates to unrestricted areas. The Licensee uses equations similar to those contained in NUREG-0133 with the dose rate values identified in NUREG-0472.

Liquid radwaste is released by batch mode only. The Licensee's ODCM contains the methods and calculational relationships that are used to compare the radioactivity concentrations in liquid releases at the point of release to the 10 CFR Part 20 limits prior to release for gamma emitters. The ODCM does not state the same methodology will be used to demonstrate that alpha and beta emitters are also assured to be within their respective MPC limits.

The Licensee's ODCM demonstrates that noble gas discharges are assured to be within the NUREG-0472 dose rate limits by correctly determining the setpoints for the noble gas monitors. The dose rate due to the release of I-131, tritium, and particulates with half-lives greater than eight days is assured to be within the NUREG-0472 limit of 1500 mrem per year by calculating the dose rate to an infant via the inhalation, food and ground pathways due to the actual release using a dispersion parameter of $2.8 \text{ E-}6$

sec/m³ for the inhalation pathway and a value of $1.4 \text{ E-}8 \text{ m}^{-2}$ for the food and ground plane pathways.

The ODCM contains methodology for demonstrating compliance with 10 CFR Part 50, Appendix I by calculating dose commitments for liquid and gaseous effluents. Cumulative calculations shall be made at least once per 31 days.

Methodology is included to project the monthly doses due to anticipated liquid and gaseous releases to determine if the liquid or gaseous radwaste treatment equipment must be operated.

Specific parameters of distance and the direction sector from the plant and additional information have been provided for each and every sample location in RETS Environmental Monitoring Table 4.30-1. The sample locations are described in ODCM Table 4-1 and locations illustrated in Figures 4-1a and 4-1b. However, Figure 4-1b is illegible and should be replaced.

The ODCM does not contain block diagram descriptions of the flow paths and treatment systems for radioactive liquid, gaseous, and solid wastes.

The ODCM does not include methodology to demonstrate compliance to 40 CFR 190. More specifically, the direct radiation component to arrive at the total dose is not included.

The Licensee's ODCM for ANO-1 and ANO-2 is generally in compliance with the NRC guidelines and uses methods consistent with the methodology and guidance of NUREG-0133.

3.4 Process Control Program

NUREG-0472 specifies that the Licensee develop a PCP to ensure that the processing and packaging of solid radioactive wastes will be accomplished in compliance with 10 CFR Part 20, 10 CFR Part 71, and other

Federal and State regulations or requirements governing the offsite disposal of the low-level radioactive waste.

The PCP is not intended to contain a set of detailed procedures; rather, it is the source of basic criteria for the detailed procedures to be developed by the Licensee. The criteria used for the PCP are to address only today's requirements. The uncertainty about PCP requirements results from the recent promulgation of 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

3.4.1 Evaluation

The PCP submitted with letter dated April 13, 1984^[28] was reviewed and it was concluded the PCP was generally in compliance with NRC guidelines contained in a letter dated January 3, 1983.^[33]

4.0 CONCLUSIONS

The Licensee's proposed RETS, ODCM and PCP were reviewed, evaluated and it was concluded that:

- The Licensee's proposed RETS for ANO-1 and ANO-2 submitted April 13, 1984 and supplemented April 26, 1984 meet the intent of the NRC staff's "Standard Radiological Effluent Technical Specifications for Pressurized Water Reactors," NUREG-0472.
- The Licensee's ODCM submitted April 13, 1984 uses documented and approved methods that are applicable to the Arkansas Nuclear One site and are generally consistent with the guidelines of NUREG-0133 with the following exceptions:

1. Methodology is not included to demonstrate that alpha and beta emitters released in radioactive liquid discharges are within the 10 CFR Part 20 MPC limits as required in ANO-1 Specification 4.29.1.1.E and ANO-2 Specification 4.11.1.1.2.
 2. Figure 4-1b should be replaced with a more legible figure.
 3. Block diagram descriptions of the flow paths for the liquid or gaseous release paths and the radioactive solid waste system are not included.
 4. Methodology to demonstrate compliance to 40 CFR 190 with the direct radiation component is not included.
 5. Three food locations are required in the ANO technical specifications whereas, only two locations are identified in the ODCM.
- The Licensee's PCP submitted April 13, 1984 is generally in compliance with the NRC guidelines contained in NRC letter dated January 3, 1983.

A correspondence between (a) NUREG-0472, (b) the Licensee's current RETS, and (c) the Licensee's proposed RETS for ANO-1 and ANO-2 are shown in Tables 1 and 2.

TABLE 1. CORRESPONDENCE OF PROVISIONS OF NUREG-0472, THE LICENSEE'S CURRENT TECHNICAL SPECIFICATIONS, AND THE LICENSEE'S PROPOSAL FOR ANC-1

<u>RETS Requirement</u>	<u>NUREG-0472</u>	<u>Current Technical Specifications</u>	<u>Licensee Proposal</u>
Effluent Instrumentation	3.3.3.10	2.4.1.4	3.5.6
	3.3.3.11	2.4.2.5, 2.4.2.8	3.5.7
Concentrations	3.11.1.1	2.4.1.1, 2.4.1.3	3.25.1.1
	3.11.2.1	2.4.2.3, 2.4.2.4	3.25.2.1
Offsite Doses	3.11.1.2	- - - - -	3.25.1.2
	3.11.2.2	- - - - -	3.25.2.2
	3.11.2.3	- - - - -	3.25.2.3
	3.11.4	- - - - -	3.25.3
Radwaste Treatment	3.11.1.3	2.4.1.5	3.25.1.3
	3.11.2.4	2.4.2.6, 2.4.2.7	3.25.2.4
Tank Inventory Limits	3.11.1.4	2.4.1.6	3.25.1.4
	3.11.2.6	2.4.2.2	3.25.2.5
Explosive Gas Mixtures	3.11.2.5	- - - - -	- - - - -
Solid Radwaste	3.11.3	- - - - -	3.25.4
Environmental Monitoring	3.12.1	4.2	4.30.1
Land Use Census	3.12.2	- - - - -	4.30.2
Interlaboratory Comparison	3.12.3	- - - - -	4.30.3
Reviews	6.5.1	- - - - -	6.5.1.7
Audits	6.5.2	5.3.2	6.5.2.8
Procedures	6.8	- - - - -	6.8.1
Records	6.10	5.8.1.b	6.9
Reports	6.9.1.11	5.6.1	6.12.2.5
	6.9.1.12	- - - - -	6.12.2.6
PCP	6.13	- - - - -	6.12.2.6
ODCM	6.14	- - - - -	6.12.2.6
Radwaste Treatment	6.15	5.7.3.A	6.12.2.6

TABLE 2. CORRESPONDENCE OF PROVISIONS OF NUREG-0472, THE LICENSEE'S CURRENT TECHNICAL SPECIFICATIONS, AND THE LICENSEE'S PROPOSAL FOR ANO-2

<u>RETS Requirement</u>	<u>NUREG-0472</u>	<u>Current Technical Specifications</u>	<u>Licensee Proposal</u>
Effluent Instrumentation	3.3.3.10	2.2.1.4	3.3.3.10
	3.3.3.11	2.2.2.5,2.2.2.6,2.2.2.7	3.3.3.9
Concentrations	3.11.1.1	2.2.1.1, 2.2.1.3	3.11.1.1
	3.11.2.1	2.2.2.3, 2.2.2.4	3.11.2.1
Offsite Doses	3.11.1.2	- - - - -	3.11.1.2
	3.11.2.2	- - - - -	3.11.2.2
	3.11.2.3	- - - - -	3.11.2.3
	3.11.4	- - - - -	3.11.3
Radwaste Treatment	3.11.1.3	2.2.1.5	3.11.1.3
	3.11.2.4	- - - - -	3.11.2.4,3.11.2.5
Tank Inventory Limits	3.11.1.4	2.2.1.6	3.11.1.4
	3.11.2.6	2.2.2.2	3.11.2.6
Explosive Gas Mixtures	3.11.2.5	- - - - -	- - - - -
Solid Radwaste	3.11.3	- - - - -	3.11.4
Environmental Monitoring	3.12.1	3.1, 3.2	3.12, 6.14
Land Use Census	3.12.2	- - - - -	6.14
Interlaboratory Comparison	3.12.3	- - - - -	3.12, 6.14
Reviews	6.5.1	- - - - -	6.5.1.6
Audits	6.5.2	5.3.2.d	6.5.2.8
Procedures	6.8	- - - - -	6.8.1
Records	6.10	5.8.1.b	- - - - -
Annual Report	6.9.1.11	5.6.1	- - - - -
Semiannual Report	6.9.1.12	- - - - -	6.9.3
PCP	6.13	- - - - -	- - - - -
ODCM	6.14	- - - - -	6.15
Radwaste Treatment	6.15	5.7.3.A	- - - - -

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