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RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS (RETS) IMPLEMENTATION - COOPER NUCLEAR STATION

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Operated by the U.S. Department of Energy

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EG&G Idaho

ATTACHMENT 1

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ABSTRACT

A review of the Radiological Effluent Technical Specifications (RETS) for the Cooper Nuclear Station was performed. The principal review guidelines used were NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," and Draft 7'' of NUREG-0473, Revision 3, "Standard Radiological Effluent Technical Specifications for Boiling 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 was 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.

CONTENTS

		Page
	Abstract	i
	Foreword	ii
1.	INTRODUCTION	1
	1.1 Purpose of the Technical Evaluation	1
	1.2 Generic Issue Background	1
	1.3 Plant-Specific Background	4
2.	REVIEW CRITERIA	6
3.	TECHNICAL EVALUATION	8
	3.1 General Description of Radiological Effluent System	8
	3.2 Radiological Effluent Technical Specifications	12
	3.3 Offsite Dose Calculation Manual	23
4.	CONCLUSIONS	26
5.	REFERENCES	28

FIGURES

1.	Liquid Radwaste System and Effluent Pathways	9
2.	Gaseous Radwaste System and Effluent Pathways	11

TABLE

Number	Title	Page
1	Correspondence of Provisions of NUREG-0473, The Licensee's Current Technical Specifications and the Licensee's Proposal for Cooper Nuclear Station	27

1. 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 Cooper Nuclear Station (CNS) with regard to Radiological Effluent Technical Specifications (RETS), and the proposed Offsite Dose Assessment Manual (ODAM*).

The evaluation used criteria proposed by the Nuclear Regulatory Commission (NRC) staff in the model Technical Specifications for boiling water reactors (BWRs), NUREG-0473,[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 50.36a,[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

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* The Licensee has elected to use the term "Offsite Dose Assessment Manual" which is equivalent to the NRC's "Offsite Dose Calculation Manual". These terms will be used interchangeably throughout this report.

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 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 Standards for Nuclear Power Operations," and submit reports to the NRC when the 40 CFR Part 190 limits have been or may 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 the 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 Process Control Program (PCP) were issued in February 1979 to each utility at individual meetings. NUREG-0473, Revision 2,[1] was 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. Reviews leading to ultimate implementation of these documents were initiated by the NRC in September 1981 using subcontracted independent teams as reviewers.

As the RETS review progressed, feedback from the licensees led the NRC to modify some of the provisions in the February 1, 1980 versions of the model RETS to clarify specific concerns of the licensees and thus expedite the reviews. Starting in April 1982, the NRC distributed revised versions of the model 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.[10] Some interim changes regarding the Radiological Environmental Monitoring Section were issued in August 1982.[11] With the incorporation of these changes, the NRC issued Draft 7'' of Revision 3 of NUREG-0473[12] in September 1982 to serve as new guidance for the review teams.

1.3 Plant - Specific Background

In conformance with the 1975 directive[4] Nebraska Public Power District (NPPD), the Licensee of the Cooper Nuclear Station (CNS), filed with the commission on June 4, 1976[13] information necessary to permit evaluation of the CNS Technical Specifications with respect to the requirements of 10 CFR Part 50, Section II.A, II.B, and II.C of Appendix I. Additional information was furnished by letters dated February 14, 1977,[14] June 27, 1977,[15] November 14, 1977,[16] and February 8, 1978.[17] These submittals showed that the radioactive waste treatment systems installed at CNS are capable of maintaining releases of radioactive materials in effluents to ALARA levels in conformance with the requirements of 10 CFR Part 50, Section 50.34a.[18] NPPD did not submit proposed new RETS at this time.

Proposed RETS were submitted in 1979 to NRC and revised January 7, 1980.[19] EG&G Idaho, Inc. (EG&G), selected as an independent task review team, initiated a review and evaluation of the submittal. This submittal was compared with the model RETS and assessed for compliance with the requirements of 10 CFR 50, Appendix I, and 10 CFR 50, Appendix A.

Review comments and questions dated March 19, 1982[20] were mailed to the NRC and the Licensee prior to a site visit to the Cooper Nuclear Station. The site visit was arranged for the purpose of resolving questions identified in the March 1982 review of the January 1980 CNS RETS submittal.

During the site visit on April 5 and 6 of 1982, technical discussions resolved many of the shortcomings of the Cooper Nuclear Station RETS identified in the March 1982 review.

On June 9, 1982 the Licensee submitted revised RETS[21] to the NRC, addressing most of the discrepancies discussed during the site visit. These revised RETS were reviewed by the EG&G team and review comments and questions were transmitted to the NRC and J. W. Pilant of NPPD on October 11, 1982.[22] These comments and questions were discussed in a telephone conference between the Licensee and EG&G on November 5, 1982,[23] and between the NRC and EG&G on November 16, 1982.[24] A telephone conference was held between the NPPD consultant and EG&G on November 18, 1982[25] to discuss the items still outstanding. On December 20, 1982[26] EG&G forwarded a RETS status report to the NRC. A conference was held between EG&G and NRC personnel on January 11-13, 1983[27] to discuss the items identified in the status report. Following the conference, a letter identifying all unresolved issues in the Licensee's RETS, was transmitted to the NRC on February 15, 1983.[28]

In response to a request from the NRC,[29] the Licensee submitted revised RETS proposals on September 12, 1983.[30] This submittal was reviewed and information on a few remaining unresolved items was forwarded[31] to the NRC for final decisions. These issues were resolved in discussions between the NRC staff and representatives of NPPD, and appropriate modifications to the Cooper Nuclear Station RETS were submitted to the NRC on March 7, 1984[32] and April 10, 1984.[33] Resolution of the outstanding RETS issues allowed preparation of a TER for submittal to the NRC. The proposed RETS, submitted March 1984, with the April 1984 revisions are evaluated in Section 3.

The Licensee submitted a proposed ODAM in January 1980.[19] The submittal was reviewed and review questions[20] were mailed to the NRC and the Licensee prior to the site visit in April 1982. In July 1982, the Licensee submitted a revised ODAM to the NRC.[21] This revision was reviewed by EG&G and comments and questions were transmitted to the NRC and J. W. Pilant of NPPD on October 11, 1982.[22] These comments and questions were discussed in telephone conferences between EG&G personnel,

representatives of NPPD, and the NRC staff.[23,24,25] These telephone conferences were followed by a status report to the NRC on December 20, 1982[26] and a conference of EG&G personnel with the NRC staff on January 11-13, 1983.[27] Following this conference, a letter identifying all unresolved issues in the Licensee's ODAM was transmitted to the NRC on February 15, 1983.[28] In response to a request from the NRC[29], the Licensee submitted a revised ODAM submittal on September 12, 1983.[30] A review of this proposed ODAM was transmitted to the NRC by EG&G on November 10, 1983.[34] In March 1984 the NRC forwarded a revised ODAM dated January 1984 to EG&G. This ODAM was reviewed and the review transmitted to the NRC on April 9, 1984.

2. REVIEW CRITERIA

Review criteria for the RETS and ODCM were provided by the NRC in two documents:

1. NUREG-0473, RETS for BWRs,

2. 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 II limits.[35]

3. Offsite radiation doses shall be ALARA.

4. Equipment shall be maintained and used to keep offsite doses ALARA.

5. Radwaste tanks 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-0473, as revised, the NRC staff issued guidelines,[36,37] clarifications,[38,39] branch positions,[40,41] and NUREG-0543,[42] 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 is based on the following NRC guidelines: Branch Technical Position, "General Contents of the Offsite Dose Calculation Manual;[43] NUREG-0133;[9] and Regulatory Guide 1.109.[44] The format for the ODCM is left to the Licensee and may be simplified by tables and grid printouts.

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 the Cooper Nuclear Station generating plant, a BWR. The unrestricted area boundary for both liquid and gaseous effluent coincides with the property line as shown in Figure 1.1 of the Technical Specifications.

3.1.1 Radioactive Liquid Effluents

As shown in Figure 1, there are two radioactive liquid effluent release paths to the circulating water discharge canal: the liquid radwaste effluent line and the service water system. The liquid radwaste effluent line is the common release line for potentially radioactive liquids from the waste sample tanks, floor drain sample tank, and the laundry drain tank. All releases from these systems are by batch mode. Sampling and analysis is performed prior to discharge to ensure 10 CFR 20 limits are not exceeded, and all releases are monitored at the radwaste effluent line. Water that may be contaminated with radioactive material is either reused or discharged to the Missouri River after dilution in the circulating water discharge canal.

High purity wastes are processed through filters and ion exchange

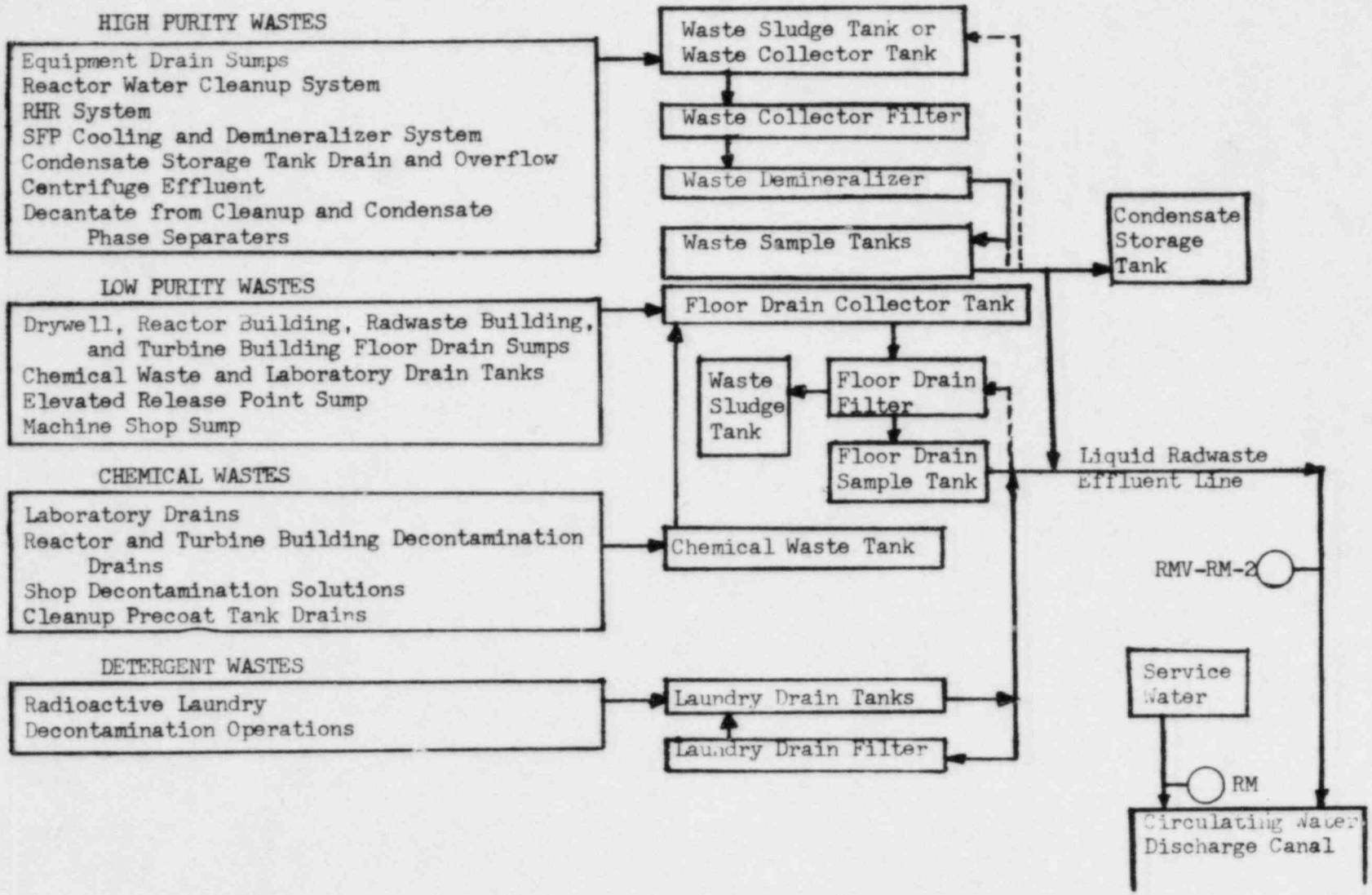

Figure 1. Liquid Radwaste System and Effluent Pathways

demineralizers and then sampled at the waste sample tanks. If the waste is suitable for reuse it is transferred to the condensate storage tank for reuse. If the water is not suitable for reuse it is normally returned to the system for additional processing. A pathway exists by which these wastes can be discharged to the circulating water discharge canal.

Low purity wastes are collected in the floor drain collector tank, then filtered and stored in the floor drain sample tank for sampling and analysis before being released to the circulating water discharge canal. Chemical wastes are normally neutralized, then transferred to the floor drain collector tanks for processing through the floor drain filter. They are then collected in the floor drain sample tank and sampled before discharge. If radioactivity content precludes discharge, the chemical wastes are processed and disposed of as solid waste.

Detergent wastes are collected in the laundry drain tanks, where they are sampled and then released to the circulating water discharge canal.

The normally non-radioactive releases from the service water system are monitored during discharge to the circulating water discharge canal.

3.1.2 Radioactive Gaseous Effluents

As shown in Figure 2 there are four radioactive gaseous effluent release points at the CNS. They are (a) elevated release point (ERP), (b) the reactor building vent, (c) the turbine building vent, and (d) the radwaste building vent. The sources of radioactive gases, the treatment given the gases, and their paths to the release points are outlined in Figure 2.

The condenser SJAE system is the major source of radioactive noble gases in the ERP effluents, which also include releases from the startup mechanical vacuum pump, the gland seal condensers, and the standby gas

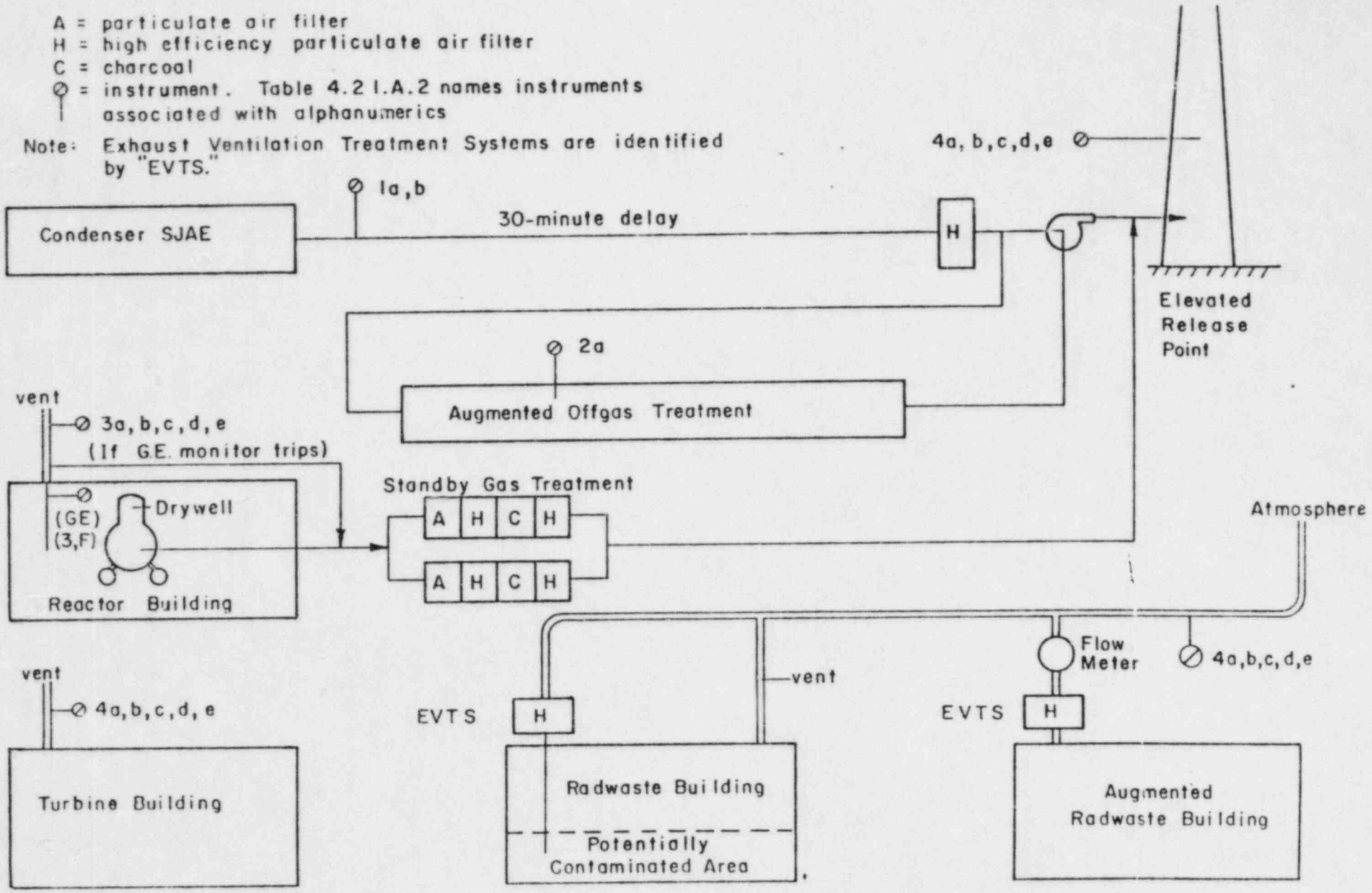

Figure 2. Gaseous Radwaste System and Effluent Pathways

treatment system. Gas from the drywell is routed through the standby gas treatment system before release at the ERP. Effluents from the HPCI gland seal are routed through a 1-minute delay line before being discharged.

Gaseous effluents from the radwaste building and the turbine building are released from the radwaste building vent and turbine building vent, respectively. Effluents from the reactor building are normally released at the reactor building vent, but may be routed through the standby gas treatment system. All radioactive gaseous effluent release points are monitored.

3.2 Radiological Effluent Technical Specifications

The following subsections describe the primary objectives of each section of the model RETS and summarize the commitments of the Licensee's RETS. A cross reference between the model RETS and the Licensee's RETS is contained in Table 1. The chronological 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 concentrations (MPCs) listed in 10 CFR Part 20.

3.2.1.1 Radioactive Liquid Effluent Instrumentation

The radioactive liquid effluent lines leading to the common release point at the CNS site are monitored during releases with adequate

instrumentation surveillance being performed. The locations of the monitors are shown in Figure 1.

Radiation readings above the monitors' setpoints initiate control room alarm annunciation. The radwaste effluent line monitor also initiates automatic termination of release when the setpoints are exceeded. The proposed applicability of monitoring "during release" for the liquid radwaste effluent line is acceptable since only batch releases are possible via this pathway. The RETS contain a commitment to perform surveillance of the monitoring instrumentation that ensures they will be OPERABLE.

3.2.1.2 Radioactive Gaseous Effluent Instrumentation

The radioactive gaseous effluent release points are monitored with adequate instrument surveillance being performed.

The main source of radioactive gaseous effluents from the elevated release point (ERP) is the unit's off-gas system. The off-gas system has its own radiation monitor capable of isolating the off-gas release pathway. The monitor is located between the steam jet air ejector and the 30-minute delay. A high gross activity release condition at this monitor (>1 Ci/sec) gives control room alarm annunciation. If the high radiation condition persists for longer than 15 consecutive minutes the off-gas isolation valve will close, reactor shutdown will be initiated immediately, and the reactor will be placed in cold shutdown within 24 hours. (See Table 3.2.D of the Technical Specifications.)

The ERP, reactor building ventilation, radwaste building ventilation, and turbine building ventilation noble gas monitors give control room alarm annunciation at high radiation levels. Each monitoring system has a gas monitor, an iodine sampler, a particulate sampler, and a flow rate measuring device. A separate noble gas monitor in the reactor building ventilation system will also isolate the reactor building and route the

effluent through the standby gas treatment system. The Licensee's RETS state that monitoring and sampling will be performed "during releases via this pathway" for all effluent monitors.

3.2.1.3 Liquid and Gaseous Instrumentation Setpoints

The setpoints for the radioactivity monitors at each release point are established to prevent exceeding concentrations in liquid releases or corresponding dose rates for gaseous releases of 10 CFR Part 20 in unrestricted areas. Figure 1.1 of the Technical Specifications shows the unrestricted area boundaries. The setpoints for the liquid and gaseous effluent instrumentation will be determined in accordance with the ODAM.

The Licensee's RETS submittal on liquid and gaseous effluent monitoring instrumentation and their corresponding setpoints have satisfied the provisions and meets the intent of NUREG-0473.

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 20.106 limits, as determined for reasonable resolution times for the measurements, and if the concentration of liquid effluents released to the unrestricted areas exceeds these limits, the cause will be attended to without delay and the concentration will be restored to within the above limits. Both batch and continuous 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-0473.

3.2.2.2 Gaseous Effluent Dose Rate

The Licensee's RETS include a commitment to maintain the offsite gaseous dose rates from the site to areas at and beyond the site boundary to within 10 CFR Part 20 limits, and if the dose rates due to gaseous effluents exceed these limits the release rate will be decreased to comply with the limits.

The radioactive gaseous waste sampling and analysis program provides for adequate sampling and analysis of the discharges. Therefore, the Licensee's submittal on gaseous effluent dose rates meets the intent of NUREG-0473.

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-0473, and are in accordance with 10 CFR Part 50, Appendix I and 40 CFR Part 190.

The Licensee's RETS include commitments (a) to maintain doses due to liquids effluents to within the NUREG-0473 quarterly and annual dose criteria, (b) to maintain noble gas air doses in unrestricted areas to within the NUREG-0473 quarterly and annual dose criteria, (c) to maintain the dose level due to release of iodine-131, iodine-133, and materials in particulate form with half-lives greater than eight days to within the NUREG-0473 quarterly and annual dose criteria, and (d) to limit the annual dose to any member of the public due to release of radioactivity and radiation from uranium fuel cycle sources to within the requirements of 40 CFR Part 190.

Therefore, the Licensee's RETS submittal on offsite doses from radioactive effluents meets the intent of NUREG-0473.

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 include a commitment to use the liquid radwaste treatment system when the pre-release analysis indicates a radioactivity concentration (exclusive of tritium and dissolved noble gases) of 0.01 μCi/ml or higher. This trigger point for treatment is justified by a cost benefit analysis contained in the basis statements. The Licensee's RETS include a commitment to submit a special report within 31 days of the end of the quarter in which the limit was exceeded if radwaste requiring treatment was discharged without treatment.

The Licensee has committed to make every reasonable effort to operate at least one train of the charcoal adsorbers in the offgas treatment system whenever the main condensor is in operation except during startup or shutdown with the reactor operating at less than 10% of rated power or when the system cannot function due to low offgas flow. A commitment is also made to submit a special report if gaseous wastes are discharged for more than seven days without treatment.

The CNS RETS also require the ventilation exhaust treatment system to be operated to reduce the radioactive materials in gaseous waste prior to discharge when the projected dose, due to gaseous effluent releases via vent exhaust to unrestricted areas, averaged over 31 days would exceed 0.3 mrem to any organ.

Therefore, the Licensee's RETS submittal on effluent treatment meets the intent of NUREG-0473.

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.

There are no permanent undiked outside storage tanks at CNS. The Licensee has committed to keep the contents of any unprotected temporary outside storage tanks below 10 curies: and if the contents exceeds 10 curies (excluding H-3 and dissolved noble gases) to immediately suspend additions to the tank, begin measures to reduce the contents to 10 curies without delay, and describe the events leading to the condition in the next semiannual Radioactive Materials Release Report.

Therefore, the Licensee's RETS submittal on tank inventory limits meets the intent of NUREG-0473.

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. Flammability curves[45] show that if H_2 is less than or equal to four percent, oxygen can be at any concentration and a flammable mixture will not result.

The Licensee has committed to limit the concentration of hydrogen in the offgas system downstream of the recombiners to $\leq$ 2% by volume. The hydrogen concentration will be determined by use of two hydrogen monitors, or by one hydrogen monitor or recombiner temperature sensor with daily sampling and analysis for hydrogen within the ensuing four hours.

Therefore, the Licensee's RETS submittal on explosive gas mixtures meets the intent of NUREG-0473.

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 implement the requirements of 10 CFR Part 20, Section 20.301, and 10 CFR Part 71.[40]

The Licensee's RETS include a commitment to process wet radioactive wastes in accordance with a PCP to ensure the solid waste shall meet the requirements of 10 CFR Part 61.56[44] before shipping from the CNS site.

Therefore, the Licensee's RETS submittal on solid radioactive waste meets the intent of NUREG-0473.

3.2.8 Radiological Environmental Monitoring Program

The objectives of the model RETS with regard to radiological environmental monitoring 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 for a radiological environmental monitoring program have followed in general the intent of the model RETS and the

Branch Technical Position on the subject issued November 1979, [41] as applicable to the site, and have generally 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 obtaining the appropriate annual information for a BWR. 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 environment program meets the intent of NUREG-0473.

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 Station Operations Review Committee (SORC) and the Safety Review and Audit Board (SRAB) as the entities comparable to the Unit Review Group (URG) and the Company Nuclear Review and Audit Group (CNRAG), respectively.

The SORC is responsible for reviewing every unplanned release of radioactive material, and reviewing ODAM and PCP procedures at least once every 24 months. Review of these procedures effectively consitutues review of changes in the ODAM and PCP since any significant changes in these documents would be reflected in the procedures.

The SRAB is responsible for auditing the radiological environmental monitoring program and the ODAM and their implementing procedures at least every 24 months. (The audit frequency was implemented in 1969.) The SRAB audits the solidification procedures, which would reflect any significant changes in the PCP. The quality assurance program is reviewed by the SRAB. (The QA program requires that this review be performed at least every 12 months.)

The Station Operations Review Committee and Safety Review and Audit Board encompass the total responsibility for reviews and audits specified in NUREG-0473. Therefore, the Licensee's requirements for audits and reviews meet the intent of NUREG-0473.

3.2.10 Procedures and Records

The objective of the model RETS with regard to rocedures 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.

The Licensee's RETS include a commitment to establish, implement, and maintain written procedures for the PCP, ODAM and QA programs. The Licensee's existing technical specifications state that records of off-site environmental monitoring surveys will be retained for the life of the plant.

Therefore, the Licensee's RETS submittal on procedures and records meets the intent of NUREG-0473.

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. Environmental Program Data (Annual Report)

   The Licensee's RETS includes a commitment that this report will be submitted prior to May 1 of each year. It will include:

- A summary description of the radiological environmental monitoring program.

- A map and table of distances and directions of locations of sampling stations.

- A summary of the land use census.

- Results of analyses of samples required by the radiological environmental monitoring program.

- An assessment of radiation doses to a member of the public likely to be most exposed due to radioactive liquid and gaseous effluents released from CNS during the year.

- Results of participation in the Interlaboratory Comparison Program.

- Deviation from the environmental sampling schedule.

- A report of all analyses in which the required LLD is not achieved.

- A report of any changes in sample locations.

2. Radioactive Effluent Release Report (Semiannual)

A report of radioactive material released from the Station shall be submitted to the NRC within 60 days after January 1 and July 1 of each year. It will include a summary by calendar quarter of liquid, gaseous, and solid wastes released from the station. The summary is to be in the format recommended in Regulatory Guide 1.21, Appendix B, Tables 1 and 2.

The report will also include summary descriptions of any changes to the PCP or ODAM. A summary description of meteorological data collected during the year will be included in the

Semiannual Report submitted within 60 days after January 1 of each year. The report will include a description of each unplanned release of radioactive materials that causes a limit in Specification 3.21.B.1.a, 3.21.B.2.a, 3.21.C.1.a, or 3.2.1.C.3.a. to be exceeded.

3. Special Reports

The Licensee's RETS include a commitment to file a special report, within 30 days of the time specified in each Technical Specifications under the following conditions:

- Exceeding the liquid effluent dose limits according to Specification 3.21.B.2.b.

- Exceeding the gaseous effluent dose limits according to Specifications 3.21.C.2.b or 3.21.C.3.b.

- Exceeding the total dose limits according to Specifications 3.21.B.2.a, 3.21.C.2.a, and 3.21.C.3.a.

- Exceeding the reporting levels for the radioactivity measured in environmental sampling program according to Specification 3.21.F.3.

- When radioactive liquid or gaseous effluents are discharged without treatment according to Specifications 3.21.B.2.d or 3.21.C.4.c.

Therefore, the Licensee's RETS submittal on reports meets the intent of NUREG-0473.

3.2.12 Other Administrative Controls

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

shall be reviewed and accepted by the URG before implementation.

The Licensee's RETS state that changes in the ODAM and PCP shall become effective upon review and acceptance by the Station Operations Review Committee (SORC). Change(s) in the ODAM and PCP shall be submitted to the NRC by inclusion in the next Semiannual Radioactive Material Release Report for the period in which the change(s) was made effective.

The Licensee will transmit information concerning major changes to the Radwaste Treatment System to the NRC in the form of updates to the FSAR.

Therefore, the Licensee's RETS submittal for these administrative controls meets the intent of NUREG-0473.

3.3 Offsite Dose Calculation Manual

Cooper Nuclear Station has chosen to use the title "Offsite Dose Assessment Manual" (ODAM) for their document equivalent to the "Offsite Dose Calculation Manual" required by NUREG-0473. As specified in NUREG-0473, 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 ODAM 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 locations of samples in support of the environmental monitoring program are also needed in the ODCM.

3.3.1 Evaluation

The ODAM submitted was reviewed and determined to be generally in compliance with the requirements of NUREG-0133.

The Licensee's ODAM addresses the equation in the addendum of NUREG-0133 to determine the alarm and trip setpoints for the liquid effluent monitors. The setpoints of the radiation monitors on the liquid radwaste effluent line and the service water effluent line are determined so the concentration of radioactive materials at the point of release to unrestricted areas is within the 10 CFR 20, Appendix B, Table II, Column 2 limits without dilution, dispersion, or decay of radioactive material in the river.

The Licensee's ODAM contains methodology for comparing the radioactivity concentrations in liquid effluents at the point of release to the 10 CFR Part 20 limits.

The Licensee's ODAM described methods for assuring that noble gas discharges are within the NUREG-0473 dose rate limits of 500 mrems/yr to the total body and 3000 mrems/yr to the skin by correctly determining the setpoints for the noble gas monitors. Methods are described by which the dose rate due to the release of I-131, I-133, tritium, and particulates with half-lives greater than eight days is assured to be within the NUREG-0473 limit of 1500 mrem per year to any organ by calculating the dose rate to a person using the appropriate selection of age group and pathway. (The resolution times for these dose rate determinations will be 3 months for H-3, SR-89, and Sr-90, and 31 days for other radionuclides,) as required in Specification 3.21.C.1.b.)

The ODAM contains methodology for demonstrating compliance to 10 CFR Part 50, Appendix I by calculating the dose or dose commitment at least once every 31 days for liquid and gaseous effluents. The ODAM methodology includes a near-field mixing factor for calculating doses from the fish or drinking water pathway. The cumulative doses calculated are compared to the RETS dose limits to ensure the limits have not been exceeded.

The Licensee's RETS contain a cost-benefit analysis that justifies usage of the liquid radwaste treatment when pre-release analysis indicates a radioactivity concentration of 0.01 μCi/ml or higher. Thus, dose projections in the ODAM to determine when to use the liquid radwaste treatment equipment would be superfluous. Methods are described for calculating the projected dose due to gaseous effluents during the current quarter. Dose projections for the current year can be made by the method described for the dose projection for the quarter.

Specific parameters of distance and the direction of locations of all sampling stations for the environmental monitoring program are provided in the Table and Figure C-2 of Appendix C to the ODAM. The ODAM also contains maps showing the unrestricted area boundary and the location of the elevated release point and the discharge canal. A simplified diagram of the gaseous effluent streams, treatment and monitoring equipment, and discharge points is included as Figure 3-1 in the ODAM. No comparable diagram is included for the liquid radwaste system.

The Licensee's ODAM contains methodology for demonstrating compliance with 40 CFR 190. The fish consumption pathway will be included only if a significant increase in fishing downstream in the river near the station occurs during the previous twelve months.

The Licensee's ODAM is generally in compliance with the NRC guidelines and uses methods consistent with the methodology and guidance prescribed in NUREG-0133 to demonstrate compliance to the NUREG-0473 requirements.

4.0 Conclusions

The Licensee's proposed RETS and ODAM were reviewed and evaluated and the following conclusions were reached:

- The Licensee's proposed RETS for the Cooper Nuclear Station submitted March 7, 1984 and supplemented by the submittal dated April 10, 1984, meets the intent of the NRC staff's "Standard Radiological Effluent Technical Specifications for Boiling Water Reactors," NUREG-0473.

- The Licensee's ODAM dated January 1984 generally uses documented and approved methods that are consistent with the methodology and guidelines in NUREG-0133 with the following exceptions:

  a. The ODAM allows a near-field mixing factor for the fish and drinking water pathway dose calculations.

  b. The fish consumption pathway will be included when demonstrating compliance to 40 CFR 190 only if a significant increase in fishing occurs during the previous twelve months.

  c. No diagram of the liquid radwaste system is included.

A correspondence between (a) NUREG-0473, (b) the Licensee's current RETS, and (c) the Licensee's proposed RETS is shown in Table 1.

TABLE 1. CORRESPONDENCE OF PROVISIONS OF NUREG-0473, THE LICENSEE'S CURRENT TECHNICAL SPECIFICATIONS AND THE LICENSEE'S PROPOSAL FOR COOPER NUCLEAR STATION

RETS Requirement	NUREG-0473	Licensee's Current Technical Specifications (Appendix B)(a)	Licensee's Proposed Technical Specifications (Appendix A)
Effluent (Liquid)	3.3.3.10	3.2.D,(App.B)2.4.1.b.3	3.21.A.1
Instrumentation (Gaseous)	3.3.3.11	3.2.D,(App.B)	3.21.A.2
Concentrations in Liquids	3.11.1.1	(App.B) 2.4.1.b	3.21.B.1
Dose Rate for Gases	3.11.2.1	(App.B) 2.4.3.a	3.21.C.1
Offsite Doses from Liquids	3.11.1.2	-----	3.21.B.2
Offsite Doses from Gases	3.11.2.2	(App.B) 2.4.3.a	3.21.C.2
Offsite Doses from Iodine-131, etc.	3.11.2.3	(App.B) 2.4.3.a	3.21.C.3
Total Offsite Dose	3.11.4	(App.B) 2.4.3.a	3.21.D.1
Liquid Radwaste Treatment	3.11.1.3	(App.B) 2.4.1.b.4	3.21.B.2
Gaseous Radwaste Treatment	3.11.2.4	3.7.B	3.21.C.4
Ventilation Exhaust Treat	3.11.2.5	-----	3.21.C.4
Tank Inventory Limits	3.11.1.4	(App.B) 2.4.1.b.5	3.21.B.3
Explosive Gas Mixtures	3.11.2.6	(App.B) 2.4.3.a.9	3.21.C.5
Main Condenser Effluent	3.11.2.7	-----	3.21.C.6
Mark I or Mark II Containment	3.11.2.8	-----	3.21.C.7
Solid Radwaste (PCP)	3.11.3	-----	3.21.E.1
Radiological Environmental Monitoring	3.12.1	(App.B) 4.4	3.21.F.1
Land Use Census	3.12.2	-----	4.21.F.2
Interlaboratory Comparisons	3.12.3	----	3.21.G.1
Audits and Reviews	6.5.1 6.5.2	6.2,(App.B)5.1	6.2,6.11,6.12
Procedures and Records	6.8, 6.10	(App.B) 5.5.6	6.3.1, 6.3.2.F, 6.6.2.D
Reports	6.9	(App.B) 5.4.1	6.5.1
Other Administrative Controls (PCP, ODCM, Changes to Radwaste Systems)	6.13 6.14 6.15	(App.B) 5.4.2.C	6.9 6.10 6.11

(a) Being deleted.
(b) Concentration in gases.
(c) Not required.

5.0 REFERENCES

1. United States Nuclear Regulatory Commission, Radiological Effluent Technical Specifications for Boiling Water Reactors, NUREG-0473, Revision 2, July 1979.

2. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 50, Appendix I, "Numerical Guide for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as Is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents."

3. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 50, Section 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors."

4. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 50 Appendix I, Section V.B., "Effective Dates."

5. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation.

6. United States Office of the Federal Register, Title 40, Code of Federal Regulations, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations."

7. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants."

8. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

9. United States Nuclear Regulatory Commission, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, NUREG-0133, October 1978.

10. C. A. Willis and F. J. Congel, "Summary of Draft Contractor Guidance of RETS," AIF Environmental Subcommittee Meeting, Washington D.C., May 19, 1982.

11. F. J. Congel, memo to RAB Staff (NRC), Interim Changes in the Model RETS, August 9, 1982.

12. United Stated Nuclear Regulatory Commission, Standard Radiological Effluent Technical Specifications for Boiling Water Reactors, NUREG-0473, Revision 3, Draft 7'', September 1982.

13. "Response to 10 CFR Part 50, Appendix I Correspondence: Cooper Nuclear Station." Letter of Transmittal, June 4, 1976. Enclosed Evaluation of Cooper Nuclear Station to Demonstrate Conformance to the Design Objectives of 10 CFR Part 50, Appendix I, dated June 1976.

14. "Additional Information for Appendix I Evaluation for Cooper Nuclear Station," Letter of Transmittal, February 14, 1977.

15. "Additional Information for Appendix I Evaluation for Cooper Nuclear Station," Letter of Transmittal, June 27, 1977.

16. "Additional Information for Appendix I Evaluation for Cooper Nuclear Station," Letter of Transmittal, November 14, 1977.

17. Additional Information for Appendix I Evaluation for Cooper Nuclear Station, Letter of Transmittal, February 8, 1978.

18. NRC Memorandum, DSE Evaluation of Cooper Nuclear Station With Respect to Appendix I to 10 CFR Part 50, September 12, 1978.

19. J. M. Pilant, letter of transmittal, Radiological Effluent Technical Specifications, January 7, 1980.

20. W. Serrano, letter of transmittal, Transmittal of Questions for Cooper RETS Review, Serr-7-82, March 19, 1982.

21. Jay M. Pilant, letter of transmittal, Proposed Radiological Effluent Technical Specifications (RETS), Cooper Nuclear Station (CNS), NRC Docket No. 50-298, DPR-46, June 9, 1982.

22. William Serrano, letter of transmittal, Draft of Review Document for Cooper Station RETS Submittal, Serr-12-82, October 11, 1982.

23. Jeff Weaver (NPPD) and William Serrano (EG&G), telephone conference November 5, 1982.

24. C. Willis (NRC) and William Serrano (EG&G), telephone conference, November 16, 1982.

25. Henry Morton (NPPD consultant) and William Serrano (EG&G) telephone conference, November 18, 1982.

26. William Serrano, letter of transmittal, Status of Cooper Station RETS Review, Serr-22-82, December 20, 1982.

27. William Serrano (EG&G), Steven Duce (EG&G), and C. Willis (NRC), personal conference (Alberquerque, New Mexico), January 11-13, 1983.

28. W. Serrano, letter of transmittal, Transmittal of Unresolved Issues for Cooper, Serr-5-83, February 15, 1983.

29. D. B. Vassallo, Radiological Effluent Technical Specifications (RETS) Cooper Nuclear Station (CNS), May 18, 1983.

30. Jay M. Pilant, letter of transmittal, Radiological Effluent Technical Specifications, Cooper Nuclear Station, NRC Docket No. 50-208, DPR-46 September 12, 1983.

31. William Serrano, letter of transmittal, Cooper RETS Review, Serr-27-83, October 25, 1983.

32. Domenic B. Vassallo, letter of transmittal, Proposed Change No. 7 to Technical Specifications, Radiological Effluent Technical Specifications (RETS), Cooper Nuclear Station, NRC Docket No. 50-298, DPR-46, March 7, 1984.

33. Domenic B. Vassallo, letter of transmittal, Revision to Proposed Change No. 7 to Technical Specifications, Radiological Effluent Technical Specifications (RETS), Cooper Nuclear Station, NRC Docket No. 50-298, DPR-46, April 10, 1984.

34. William Serrano, letter of transmittal, Review of August 1983 Cooper ODCM, Serr-29-83, November 10, 1983.

35. United States Office of Federal Register, Title 10, Code of Federal Federal Regulations, Part 20, Appendix B, Concentrations in Air and Water Above Natural Background.

36. C. A. Willis, leter to F. B. Simpson (summarizing changes to RETS requirements following meeting with Atomic Industrial Forum), November 20, 1981.

37. W. E. Kreger (NRC), memo to R. J. Mattson (NRC), Plans for Dealing with the Explosive Gas Issue in Implementing the Radiological Effluent Technical Specifications (RETS), December 14, 1981.

38. C. A. Willis and F. J. Congel, "Status of NRC Radiological Effluent Technical Specification Activities," Atomic Industrial Forum Conference on HEPA and Nuclear Regulations, October 4-7, 1981.

39. C. A. Willis, memo to P. C. Wagner, Plans for Implementing Radiological Effluent Technical Specifications for Operating Reactors, November 4, 1981.

40. W. P. Gammill (NRC), memo to P. C. Wagner (NRC), Current Position on Radiological Effluent Technical Specifications (RETS) Including Explosive Gas Controls, October 7, 1981.

41. United States Nuclear Regulatory Commission, Radiological Assessment Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program. November 1979.

42. United States Nuclear Regulatory Commission, Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190), NUREG-0543, February 1980.

43. United States Nuclear Regulatory Commission, Branch Technical Position, General Contents of the Offsite Dose Calculation Manual, Revision 1, February 8, 1979.

44. Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, October 1977.

45. C. A. Willis (NRC) and J. W. Beogli (NRC), memo to W. P. Gammil (NRC), Tech Spec on Control of Explosive Gas Mixtures in the Waste Gas System at TMI-1, July 22, 1982.

46. United States Office of the Federal Register, Title 10, Code of Federal Regulations, Part 71, "Packaging of Radioactive Material for Transport and Transportation of Radioactive Material Under Certain Conditions.

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A review of the Radiological Effluent Technical Specifications (RETS) for the Cooper Nuclear Station was performed. The principal review guidelines used were NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," and Draft 7'' of NUREG-0473, Revision 3, "Standard Radiological Effluent Technical Specifications for Boiling 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 was reviewed and generally found to be in compliance with the NRC review guidelines.

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