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RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS (RETS) IMPLEMENTATION - CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT

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Operated by the U.S. Department of Energy

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EG&G Idaho

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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.

ABSTRACT

A review of the Radiological Effluent Technical Specifications (RETS) of the Crystal River Unit No. 3 Nuclear Generating Plant 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-0472, Revision 3, "Radiological Effluent Technical Specifications for PWR's." Draft submittals were discussed with the Licensee 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 requirements of the NRC review guidelines with the exception of one item in the environmental monitoring program. The proposed Offsite Dose Calculation Manual was reviewed.

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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 Crystal River Unit No. 3 Nuclear Generating Plant with regard to Radiological Effluent Technical Specifications (RETS), the proposed Offsite Dose Calculation Manual (ODCM), and the Process Control Program (PCP).

The evaluation used criteria proposed by the Nuclear Regulatory Commission (NRC) staff in the model Technical Specifications for pressurized water reactors (PWR's), 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 50.36a,[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 deferred until the NRC completed the model RETS. The initial NRC position on the model RETS was established in May 1978 when the NRC's Regulatory Requirements Review Committee approved the first model RETS (NUREG-0472 for PWR's and NUREG-0473 for boiling water reactors [BWR's]).

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.

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 a draft Revision 3 of NUREG-0472[13] in September 1982 to serve as new guidance for the review teams.

1.3 Plant-Specific Background

In conformance with the 1975 directive[4] Florida Power Corporation (FPC), the Licensee of the Crystal River Unit No. 3 Nuclear Generating Plant, had the NUS Corporation submit information for an "Appendix I Analysis for Crystal River Nuclear Unit," dated May 28, 1976.[14] This information was evaluated by the Nuclear Regulatory Commission Division of Site Safety and Environmental Analysis and found to meet the requirements of Appendix I.[15] The Licensee did not propose new RETS at this time.

The RETS were addressed in the next submittal by the Licensee[16] to the NRC dated February 13, 1979. The submittal followed the format of NUREG-0472

for PWR's. EG&G Idaho Inc. (EG&G), selected as an independent task review team, initiated a review and evaluation of this submittal. The submittal was compared with the model RETS and assessed for complaince with the requirements of 10 CFR Part 50, Appendix I, and 10 CFR Part 50, Appendix A.

Review comments and questions dated November 23, 1981[17] were mailed to the NRC and the Licensee prior to arranging a site visit with the Licensee. The Licensee chose to prepare another submittal based on the questions included in the review and postponed the site visit. The Licensee's revised RETS (Revision 1) were received July 15, 1982 by EG&G. This submittal was reviewed for compliance with Revision 3 of the model RETS. Review comments and questions on the Revision 1 submittal (September 14, 1982[18]) were mailed to the NRC and the Licensee prior to a site visit at the Crystal River Unit No. 3 Generating Plant. The site visit was arranged for the purpose of resolving questions identified in the review of the Revision 1 submittal.

During the site visit (October 27-28, 1982), the Licensee presented a revised RETS (Revision 2) which, together with technical discussions, resolved most of the shortcomings of the Crystal River RETS (e.g., missing information and other deviations from the requirements) identified in the review of the Revision 1 submittal.

On November 11, 1982 another RETS submittal (Revision 3) was received which reflected the agreements made at the October 27-28, 1982 meeting. This document was compared with Revision 3 of NUREG-0472[13] to ensure that all items met the intent of the model RETS requirements proposed by the NRC. A telephone conference call was held on December 13, 1982[19] between NUS and EG&G personnel (NUS is preparing the FPC submittal). This telecon clarified the few unresolved items identified in the review of the Revision 3 submittal. A telecon was then held between NRC and EG&G personnel on December 13, 1982[20] for concurrence on deviations identified in the submittal. It was agreed that the Licensee's Revision 3 submittal was acceptable. Based on the acceptance of these reviews the FPC submitted final proposed RETS to the NRC.

A copy of FPC's final proposed Technical Specifications[21] was received by the EG&G review team on January 28, 1983. The Licensee's final proposed

RETS submittal was reviewed against NUREG-0472[13] and it was concluded that one open item remained in the environmental monitoring program. All other items regarded as deviations from the intent of the NUREG-0472 requirements were resolved, allowing the EG&G review team to complete a TER for submittal to the NRC.

The Licensee's proposed ODCM[22] was received by the EG&G review team on May 3, 1983. The ODCM submitted was reviewed against NUREG-0133 and Regulatory Guide 1.109 and it was concluded that the ODCM contains methods consistent with the criteria of NUREG-0133. Discrepancies in the ODCM are identified in the cover letter for this document.

The Licensee has not submitted a PCP. The Licensee has committed to having a PCP in the Technical Specifications. Therefore, a PCP will be submitted to the NRC for review and approval.

2.0 REVIEW CRITERIA

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

1. NUREG-0472, RETS for PWR's
2. NUREG-0473, RETS for BWR's
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 II limits.[23]

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,[24,25] clarifications,[26,27] and branch positions[28,29,30] 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 Content of the Offsite Dose Calculation Manual"[31]; NUREG-0133[9]; and Regulatory Guide 1.109[32]. The format

for the ODCM is left to the Licensee and may be simplified by tables and grid printouts.

Review criteria for the Process Control Program is based on guidance provided by the NRC staff[33].

3.0 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 Crystal River Unit No. 3 Nuclear Generating Plant, a PWR.

3.1.1 Radioactive Liquid Effluents

Miscellaneous wastes from (a) radioactive laboratory drains, (b) building and equipment drains and sumps, (c) regeneration solution for deborating demineralizers, (d) demineralizer backwash, and (e) radioactive laundry and shower drains are processed through the miscellaneous liquid process system. The miscellaneous processing system consists of the miscellaneous waste storage tank, cation demineralizer, miscellaneous waste evaporator, evaporator condensate demineralizer, and evaporator condensate storage tanks. The evaporator condensate demineralizers and storage tanks are common to both the primary coolant process system and the miscellaneous liquid process system. The contents of the evaporator condensate tanks may be transferred to the reactor coolant bleed tanks for feed to the primary system or to the nuclear service seawater system for release to the discharge canal.

The secondary drain tank receives liquid from the turbine building drains and sump, any leakage from the component cooling water (CCW) and service water (SW) systems and the steam generator blowdown. These liquids are not treated prior to collection in the secondary drain tank as the liquid radioactivity concentration is normally very low.

Cooling water is withdrawn from and returned to the Gulf of Mexico. The CCW and SW systems are both closed loop systems, i.e., have no direct discharge pathway.

The secondary drain tank discharges to the nuclear service seawater system. This discharge path is monitored by RM-L7, which will terminate the discharge upon reaching the alarm/trip setpoint. The auxiliary building radwaste line receives liquid wastes from the (a) laundry and shower tanks (A and B), and (b) radwaste evaporator condensate storage tanks (A and B). The discharge is monitored by RM-L?, which will terminate the discharge upon reaching the alarm/trip setpoint, and goes to the nuclear service seawater discharge system. The intake and discharge canals constructed for the plant are considered to be navigable waters and the State of Florida requires public access to navigable waters. The radioactive liquid effluents are released to the discharge canal as shown in Figure 1. Figure 1 identifies the site boundary for liquid effluents as being in the discharge canal; however, it is not clear if it is a site boundary or an unrestricted area within the site boundary. A schematic diagram of the liquid radwaste and the miscellaneous liquid process systems are shown in Figures 2 and 3, respectively.

3.1.2 Radioactive Gaseous Effluents

The waste gas vent header system is essentially split into two sections: one section within the reactor building and one section within the auxiliary building. Condensing water vapor and liquids entering the section of the vent header system within containment drain to the reactor coolant drain tank, while those entering the vent header system within the auxiliary building drain to the miscellaneous waste storage tank. The vent line from the reactor coolant drain tank discharges to the miscellaneous waste storage tank. The gases from the miscellaneous waste storage tank and the three reactor coolant bleed tanks are joined and discharged to the suction of the waste gas compressors via an intermediate waste gas surge tank. The compressed gas portion of the waste gas system starts at the waste gas compressors and includes the three waste gas decay tanks (WGDT's).

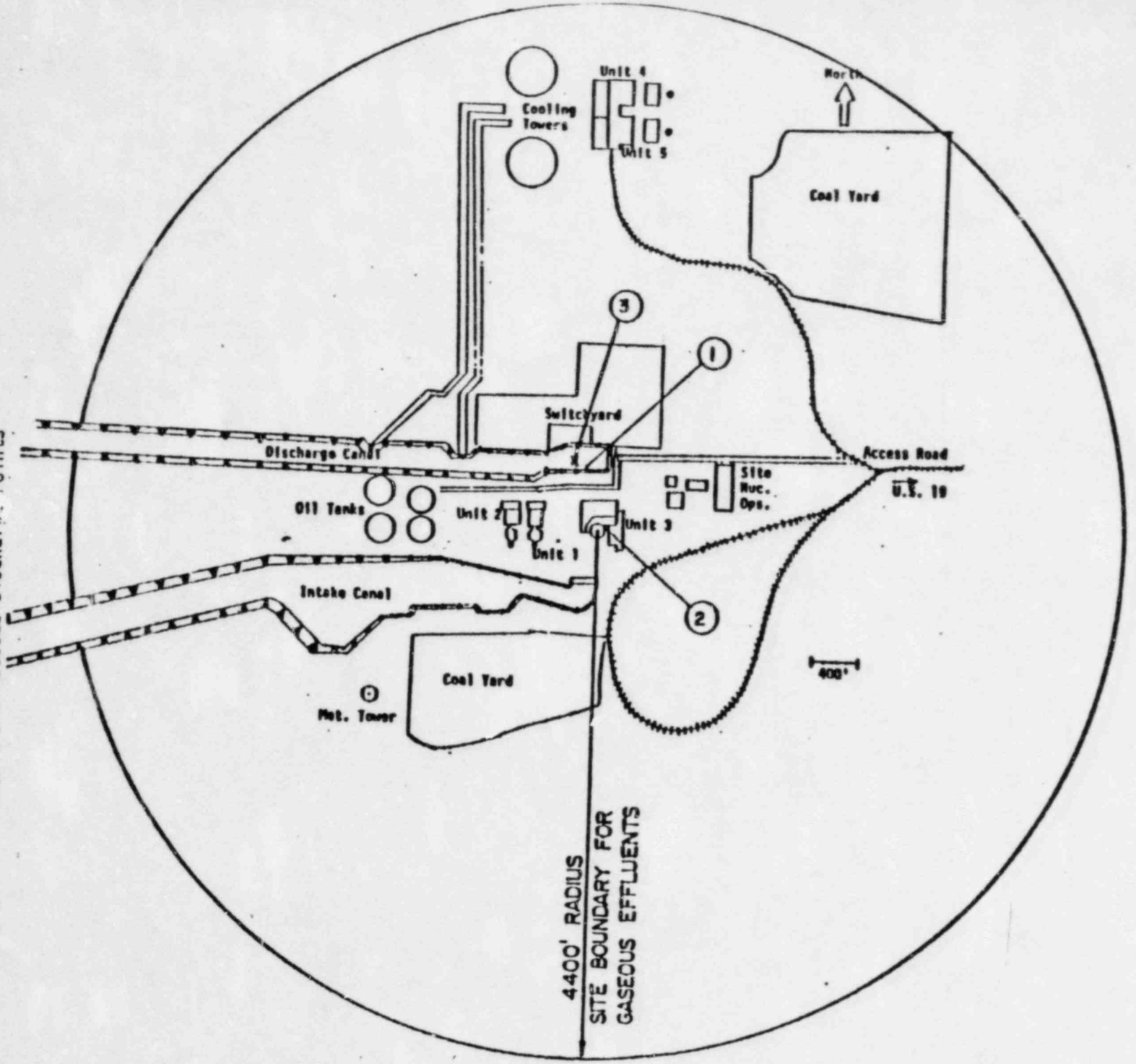


Figure 1. Liquid and Gaseous Discharge Points

1) DISCHARGE POINT FOR LIQUID EFFLUENT

2) DISCHARGE POINT FOR GASEOUS EFFLUENTS

3) SITE BOUNDARY FOR LIQUID EFFLUENTS

Figure 2. Liquid Radwaste System

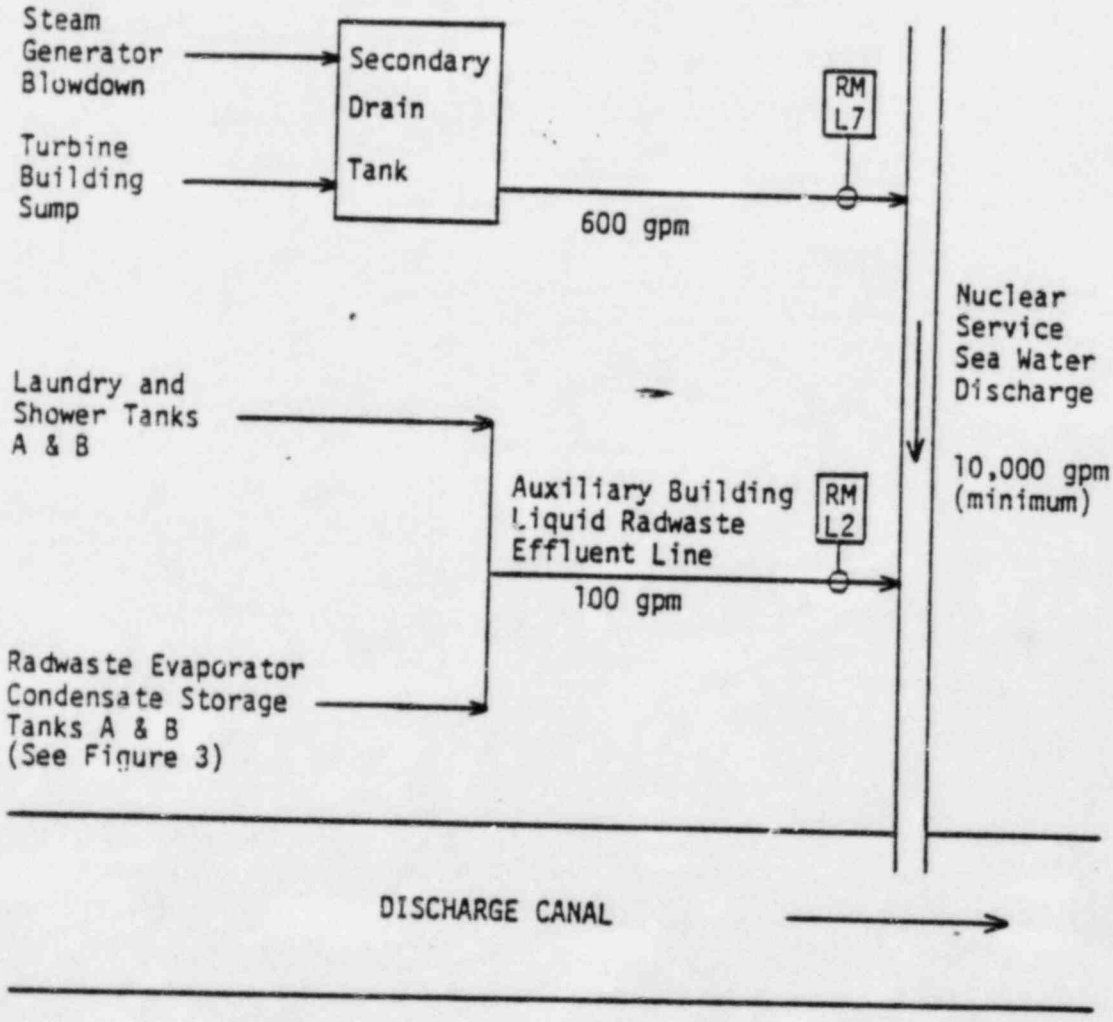


Figure 3. Miscellaneous Liquid Process System

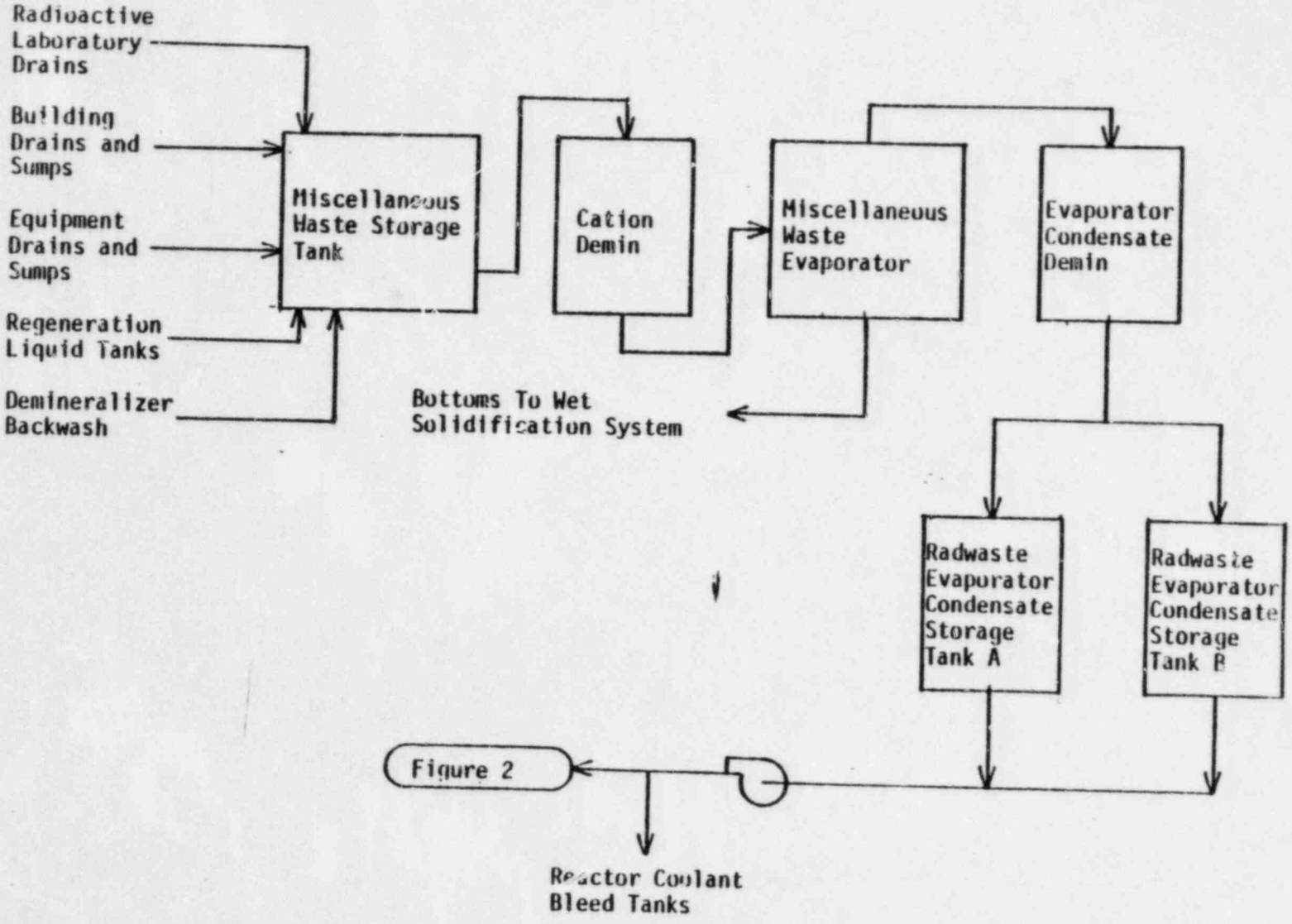
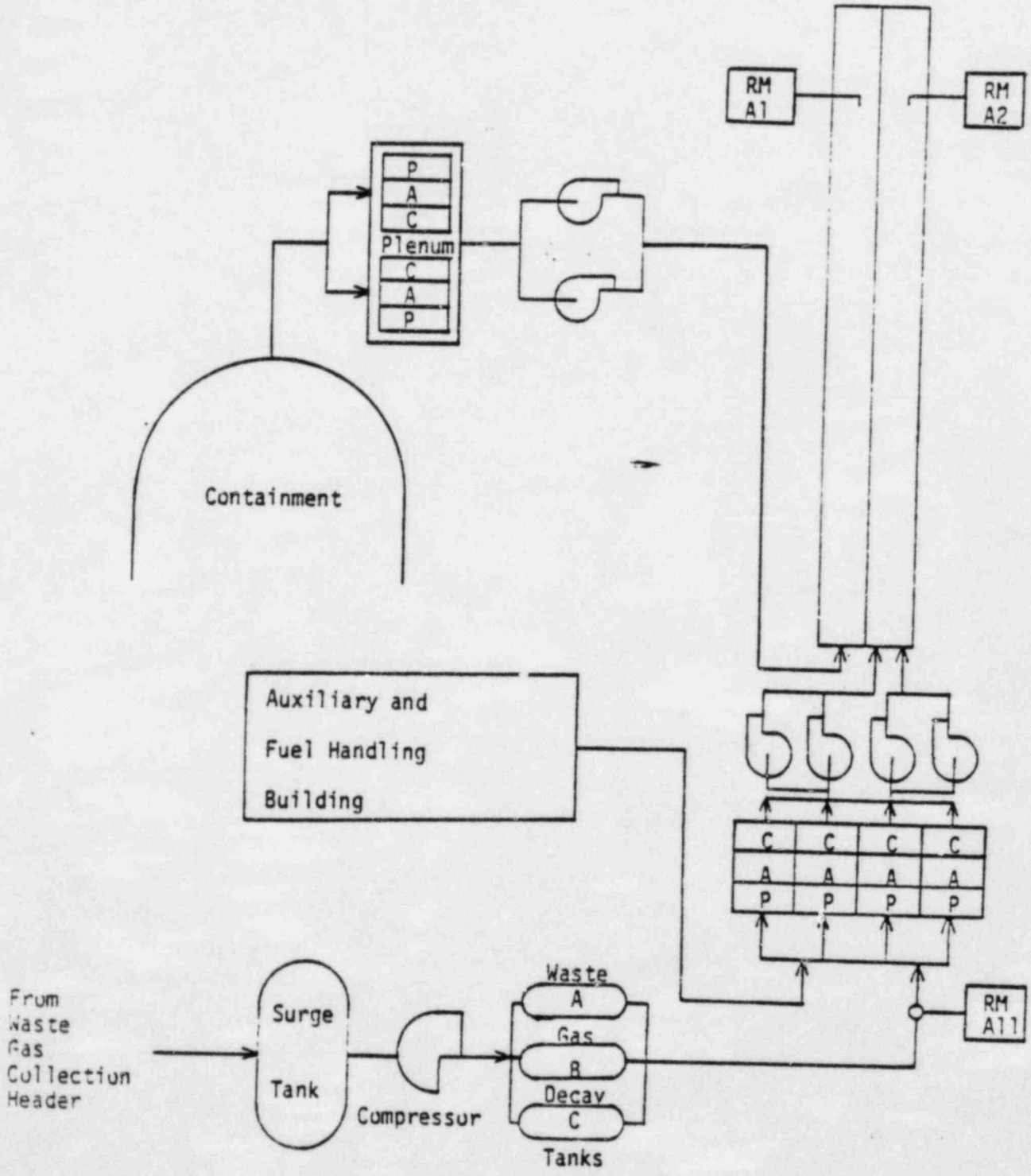


Figure 4. Gaseous Radwaste/Effluent Treatment System



Gaseous discharge from the WGDT's go to the auxiliary and fuel handling building ventilation. This discharge ventilation air is processed through a ventilation exhaust treatment system (which is a train of prefilters, HEPA filters, and charcoal adsorbers) prior to release out the plant vent. The containment atmosphere is processed through a ventilation exhaust treatment system (also a train of prefilters, HEPA filters, and charcoal adsorbers) prior to release out the containment vent. Gaseous discharge from the WGDT's is monitored by RM-A11 which will terminate the discharge upon reaching the alarm/trip setpoint. The facility vent is a single cylinder which is divided by a septum creating two separate discharge pathways (i.e., plant vent and containment vent). The plant vent is continuously monitored by RM-A2, which will also terminate the discharge of a WGDT upon reaching the alarm/trip setpoint of the noble gas monitor. The containment vent is continuously monitored by RM-A1 when ventilation air is being discharged. This monitor will terminate the discharge when the alarm/trip setpoint is reached. Figure 1 shows the gaseous discharge point. Figure 4 shows a schematic of the gaseous radwaste/effluent treatment system.

3.2 Radiological Effluent Technical Specifications

The following sub-sections 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 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 (MPC's) listed in 10 CFR Part 20.

The Licensee has provided radiation monitors for potential liquid or gaseous effluent lines. In addition, automatic isolation is provided for major effluent lines such as the liquid radwaste, the WGDT effluent, and the containment purge.

There are two radioactive liquid effluent release points at Crystal River Unit No. 3: the auxiliary building liquid radwaste effluent line and the secondary drain tank liquid effluent line. Both of these systems are monitored with adequate instrument surveillance being performed. The CCW and the SW systems are both closed loop systems. Potential leakage from these systems would be discharged through the secondary drain tank system.

All gaseous effluent releases at Crystal River Unit No. 3 are discharged through either the auxiliary building and fuel handling area vent or the reactor building purge exhaust vent. Both of these systems are monitored with adequate instrument surveillance being performed. Both will isolate the release pathway on alarm of the noble gas monitor. In addition, a noble gas monitor on the WDGT discharge line will isolate this release on alarm. This instrument also has adequate surveillance requirements.

The Licensee has stated that the concentration of radioactive material will be monitored "at all times," or "during releases" for batch releases. 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, it will be restored without delay to a value equal to or less than the MPC values specified in 10 CFR Part 20. Both batch and continuous releases are sampled and analyzed periodically in accordance with a 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 offsite gaseous dose rate from the site to areas at and beyond the site boundary to within 10 CFR Part 20 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 equal to or less than 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 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 commitments (a) to meet the quarterly and yearly dose criteria for liquid effluents and to use the ODCM methodology for determining the cumulative dose to individuals, (b) to maintain the air doses for noble gases in unrestricted areas to those specified in 10 CFR Part 50,

Appendix I, Section II.B., (c) to maintain the dose level to an individual from release of Iodine-131, tritium, and particulates with half-lives greater than eight days to meet the design objectives of 10 CFR Part 50, Appendix I, Section II.C, and (d) to limit the annual dose to the maximally exposed member of the public due to releases 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-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 include a commitment to use the liquid and gaseous radwaste treatment systems when the projected monthly doses exceed 25 percent of the annual dose design objectives and to use the ventilation exhaust treatment system if the projected monthly dose exceeds the limits prescribed in the model RETS. The projections are to be made at lease once per 31 days. The Licensee's RETS include a commitment to prepare a special report if radwaste treatment is required before release and the radwaste treatment equipment is inoperable.

Therefore, the Licensee's RETS submittal on effluent treatment 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 does not include a specification on curie limits for outside tanks containing liquids. The Crystal River site is adjacent to the Gulf of Mexico and any water flows are to the Gulf; consequently, any leakage would not effect drinking or surface water supplies. Thus, a technical specification is not required.

The Licensee's RETS state that each WGDT is limited to less than or equal to 39,000 curies (Xe-133 equivalent) which is less than the value corresponding to 0.5 rem at the exclusion area boundary. Surveillance on the WGDT's will be performed once per 24 hours during degassing periods and weekly at other times.

This surveillance is acceptable since the tank is sampled at the frequency required by the model RETS during degassing which is the time that has the greatest potential for exceeding the dose limit.

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 Licensee's RETS include a commitment to maintain a safe concentration of oxygen in the WGDT's when the hydrogen concentration is equal to or greater than four percent. Flamability curves[34] show that if H_2 is less than or equal to four percent, oxygen can be at any concentration and a flamable mixture will not result. Both hydrogen and oxygen are monitored and the system is being modified to sample exclusively from the in-service WGDT.

Although the Licensee does not have the number of channels specified in the model RETS, the number of channels and the modification to sample only the in-service WGDT were accepted on an interim basis at the site meeting[25].

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 has committed to use the methods prescribed in a Process Control Program (PCP) to ensure that the requirements of 10 CFR Part 20 and 10 CFR Part 71 are met prior to shipment of radwaste from the site. The plant will use the Chem Nuclear Services waste solidification system which is currently being evaluated by the NRC.

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 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 CFRPart 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 environmental monitoring program obtains milk samples from a control location as there are no other milk samples available within the radii specified in the model RETS. If milk samples become available, they will be identified in the land use census and included in the environmental monitoring program. Since milk sampling is not performed, emphasis should be placed on vegetation sampling in the two highest D/Q sectors. There are no foods grown on land that is irrigated by water in which liquid plant wastes have been discharged.

The Licensee performs a gamma spectral I-131 analysis on green leafy vegetable samples taken semi-annually during harvest. The collection frequency should be increased to monthly when available and the sample should be any broad leaf vegetation at two different offsite locations of highest predicted annual average ground level D/Q.

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,[29] as applicable to the site, and have provided an adequate number of sample locations for pathways identified except for the broad leafy vegetation. 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 program meets the intent of NUREG-0472 except for one item.

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 Review Committee (PRC) and the Nuclear General Review Committee (NGRC) as the two groups comparable to the Unit Review Group (URG) and the Company Nuclear Review and Audit Group (CNRAG), respectively.

The PRC is responsible for reviewing every unplanned release of radioactive material and any changes to the ODCM and PCP, as required by the model RETS.

The NGRC is responsible for reviewing the radiological environmental program and results thereof, the ODCM and implementing procedures, the PCP and implementing procedures, and the performance of activities required by the quality assurance (QA) program. These reviews are performed at the frequency required by the model RETS. These reviews were determined to be acceptable substitutes for the audit requirements described in the model RETS.

The PRC and NGRC encompass the total responsibility for reviews and audits specified in 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 the 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, ODCM, and QA programs. The Licensee's RETS state that the records of the radiological environmental monitoring program will 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 semi-annual 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 surveillance program. The report also includes the results of the land use census and results of the participation in the interlaboratory comparison program. The report will be submitted prior to March 1 of each year.

2. Semiannual Radioactive Effluent Release Report This report contains a summary of the quantities of radioactive liquid and gaseous effluents 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, doses to individuals due to their activities inside the site boundary, doses to the hypothetical worst case individual (including direct radiation), the prescribed meterological data, and a list of unplanned releases. A listing of new locations required by the land use census as well as any changes to ODCM, PCP and the radioactive waste treatment system is included.

3. Special Reports The Licensee's RETS include a commitment to file a special report within 30 days under the following conditions:

- Exceeding the liquid effluent dose limits according to Specification 3.11.1.2.

- Exceeding the gaseous effluent dose limits according to Specifications 3.11.2.2 and 3.11.2.3

- Exceeding the total dose limits according to Specification 3.11.3.

- Exceeding the reporting levels for the radioactivity measured in environmental sampling program Specification 3.12.1.1.

- When radioactive liquid or gaseous effluents require treatment before discharge and the waste treatment equipment is inoperable as specified in 3.7.13.2 and 3.17.13.3.

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

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 the aforementioned changes will be reported to the NRC after review and acceptance by the PRC.

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 rate to unrestricted areas. The Licensee uses equations similar to those contained in NUREG-0133 with the dose rate values identified in NUREG-0472.

The Licensee's ODCM contains the methods and calculational relationships that are used to compare the radioactivity concentrations at the point of release to the 10 CFR Part 20 limits prior to the release and after the release.

The Licensee's ODCM states 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. Therefore, additional sampling and analysis are not required. 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 to a child via the

inhalation pathway by calculating the dose rate due to the actual release using the highest calculated annual average dispersion parameter X/Q used for estimating dose to an individual.

The Licensee's ODCM demonstrates compliance with 10 CFR Part 50, Appendix I by calculating the monthly dose commitments for liquid and gaseous effluents at least once per 31 days. The calculated cumulative values are compared to the quarterly and annual limits to demonstrate compliance. The doses due to liquid releases are calculated using the adult ingestion pathway since drinking water is not affected by plant discharges. The doses due to gaseous releases are calculated using the inhalation, ingestion, and ground plane pathways.

The Licensee's ODCM contains the method used to project the monthly doses due to anticipated liquid and gaseous releases. The dose projection is made at least once every 31 days. If the projected values exceed 25 percent of the annual dose prorated monthly the radwaste treatment system must be operated.

The Licensee's ODCM contains a description and map of the sample locations for the environmental monitoring program. In addition, the ODCM contains block diagram descriptions of the flow paths and treatment systems for the liquid and gaseous releases.

The Licensee's ODCM for Crystal River Unit No. 3 is in compliance with the NRC requirements and uses methods consistent with the methodology and guidance prescribed in 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." The NRC staff's technical positions are presently being developed by the Division of Waste Management[33].

3.4.1 Evaluation

The Licensee did not submit a PCP for review. A PCP will be submitted to the NRC for review and approval.

4.0 CONCLUSIONS

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

- The Licensee's proposed RETS for the Crystal River Unit No. 3 Nuclear Generating Plant, submitted January 17, 1983, meets the intent of the NRC staff's "Standard Radiological Effluent Technical Specifications," NUREG-0472 except for the item in the radiological environmental monitoring program.

- The Licensee's ODCM, submitted May 1983 uses documented and approved methods that are applicable to Crystal River Unit No. 3 and are consistent with the criteria of NUREG-0133. Discrepancies are identified in the cover letter for this report.

- The Licensee did not submit a PCP for review. A PCP will be submitted to the NRC for review and approval.

A correspondence between (a) NUREG-0472, (b) the Licensee's current RETS, and (c) the Licensee's proposed RETS is shown in Table 1. A more detailed explanation of how each Specification in the Licensee's RETS meets the intent of NUREG-0472 is contained in Appendix A.

TABLE 1. CORRESPONDENCE OF PROVISIONS OF NUREG-0472, THE LICENSEE'S CURRENT TECHNICAL SPECIFICATIONS AND THE LICENSEE'S PROPOSAL FOR CRYSTAL RIVER UNIT NO. 3

RETS Requirement	NUREG-0472[1]	Current Technical Specification[2] Appendix B (Section)	Licensee Proposal (Section)
Effluent Instrumentation	3.3.3.10 3.3.3.11	2.4.1 2.4.2	3.3.3.8 3.3.3.9
Concentrations	3.11.1.1 3.11.2.1	2.4.1 2.4.2	3.11.1.1 3.11.2.1
Offsite Doses	3.11.1.2 3.11.2.2 3.11.2.3 3.11.4	2.4 2.4	3.11.1.2 3.11.2.2 3.11.2.3 3.11.3
Effluent Treatment	3.11.1.3 3.11.2.4		3.7.13.2 3.7.13.3
Tank Inventory Limits	3.11.1.4 3.11.2.6	 2.4.2	--- 3.7.13.1
Explosive Gas Mixtures	3.11.2.5		3.7.13.5
Solid Radwaste	3.11.3	2.4.3	3.7.13.4
Environmental Monitoring	3.12.1	3.2	3.12.1.1
Land Use Census	3.12.2		3.12.1.2
Interlaboratory Comparisons	3.12.3		3.12.1.3
Audits and Reviews	6.5.1 6.5.2	5.3	6.5.1 6.5.2
Procedures and Records	6.8,6.10	5.5	6.8.1
Reports	6.9	5.6.1 5.6.1	6.9.1.5.c 6.9.1.5.d
Other Administrative Controls	6.13,6.14,6.15		6.14,6.15,6.16

1 Section number sequence is according to NUREG-0472, Rev. 3, Draft 7'.

2 Being Revised or Deleted

5. REFERENCES

1. United States Nuclear Regulatory Commission, Standard Radiological Effluent Technical Specifications for Pressurized Water Reactors, NUREG-0472, Revision 2, July 1979.

2. United States Office of The Federal Register, Title 10, Code of Federal Regulations, Part 50, Appendix I, "Numerical Guides 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 Critera 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. United States Nuclear Regulatory Commission, Standard Radiological Effluent Technical Specifications for Boiling Water Reactors, NUREG-0473, Revision 2, July 1979.

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

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

13. United States Nuclear Regulatory Commission, Standard Radiological Effluent Technical Specifications for Pressurized Water Reactors, NUREG-0472, Revision 3, Draft 7', September 1982.

14. NUS Corporation, letter of transmittal, Appendix I Analysis for Crystal River Nuclear Unit, NUS-1721 (Revision 1), May 28, 1976.

15. R. Vollmer, letter of transmittal, Supplement No. 2 to the Safety Evaluation Report for Crystal River Unit No. 3 With Respect to Appendix I to 10 CFR Part 50, August 30, 1976.

16. R. M. Bright, letter of transmittal, Technical Specification Change Request No. 36, February 13, 1979.

17. F. B. Simpson, letter of transmittal, Transmittal of Questions for Crystal River RETS Review, SIM-28-81, November 23, 1981.

18. W. Serrano, letter of transmittal, Transmittal of Questions for Crystal River RETS Review, Serr-11-82, September 14, 1982.

19. E. W. Ford (NUS) and S. W. Duce (EG&G), telephone conference, December 13, 1982.

20. C. A. Willis (NRC), S. W. Duce (EG&G), and W. Serrano (EG&G), telephone conference, December 13, 1982.

21. G. R. Westafer, letter of transmittal, Technical Specification Change Request No. 36, January 17, 1983.

22. G. R. Westafer, letter of transmittal, Offsite Dose Calculation Manual, May 1983.

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

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

25. 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.

26. 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.

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

28. 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.

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

30. 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.

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

32. 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.

33. C. A. Willis, letter of transmittal, Guidance on the Review of the Process Control Programs (PCP), January 3, 1983.

34. C. A. Willis (NRC) and J. S. Boegli (NRC), memo to W. P. Gammill (NRC), Tech Spec on Control of Explosive Gas Mixtures in the Waste Gas System at TMI-1, July 22, 1981.

35. 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."