

U. S. NUCLEAR REGULATORY COMMISSION
REGION V

Report Nos. 50-528/91-33, 50-529/91-33 and 50-530/91-33

License Nos. NPF-41, NPF-51 and NPF-74

Licensee: Arizona Public Service Company
P. O. Box 53999, Station 9012
Phoenix, Arizona 85072-3999

Facility: Palo Verde Nuclear Generating Station - Units 1, 2, and 3

Inspection at: Wintersburg, Arizona

Inspection conducted: August 26 - 30, 1991

Inspection by:

M. Cillis
M. Cillis, Senior Radiation Specialist

9/27/91
Date Signed

Approved by:

G. P. Juhas for
G. P. Juhas, Chief
Reactor Radiological Protection Branch

9-27-91
Date Signed

Summary:

Areas Inspected:

Routine unannounced inspection of occupational exposures during extended outages, radiological environmental monitoring, and liquid and gaseous radwaste systems. The inspector also addressed followup items, and conducted tours of the licensee's facilities. Inspection modules 83729, 84750, 92700 and 92701 were used.

Results:

One non-cited violation involving a failure to obtain chemistry samples from the Nuclear Cooling (NC) system is discussed in Section 2.H. One open item concerning trace concentrations of radioactivity reported in Retention Basin sludge is discussed in Section 2.D. One open item involving an unmonitored, uncontrolled release is discussed in Section 2.G. In the areas inspected, the licensee's programs appeared adequate to accomplish their safety objectives.



DETAILS

1. Persons Contacted

Licensee

- T. Shriver, Assistant Plant Manager, Unit 2
- *T. Bradish, Compliance Manager
- *P. Hughes, Radiation Protection (RP) Manager
- *J. Scott, General Manager, Site Chemistry
- *D. Fuller, Chemistry Manager, Unit 1
- *T. Hilmer, RP Support Services Manager
- *P. Gauy, Chemistry Manager, Unit 3
- J. Steward, Radiological Engineer, Outage Support Group
- *R. Fullmer, Quality Assurance & Monitoring Manager
- W. Blaxton, Chemistry/Radiation Monitoring System (RMS) Supervisor, Unit 1
- J. Gafney, Outage Support Supervisor
- J. Sills, RP Manager, Unit 1
- M. St. Lawrence, RP Supervisor, Unit 1
- *T. Murphy, RMS/Effluent Supervisor
- W. Wattson, System Engineer, RMS
- *M. Shea, RP Manager, Unit 2
- *R. Rouse, Compliance Supervisor
- *W. Barley, Acting Manager, RP Technical Services

NRC

- *D. Coe, Senior Resident Inspector
- *J. Sloan, Resident Inspector

*Denotes those personnel in attendance at the exit interview held on August 30, 1991.

In addition, the inspectors met and held discussions with other licensee and contractor personnel.

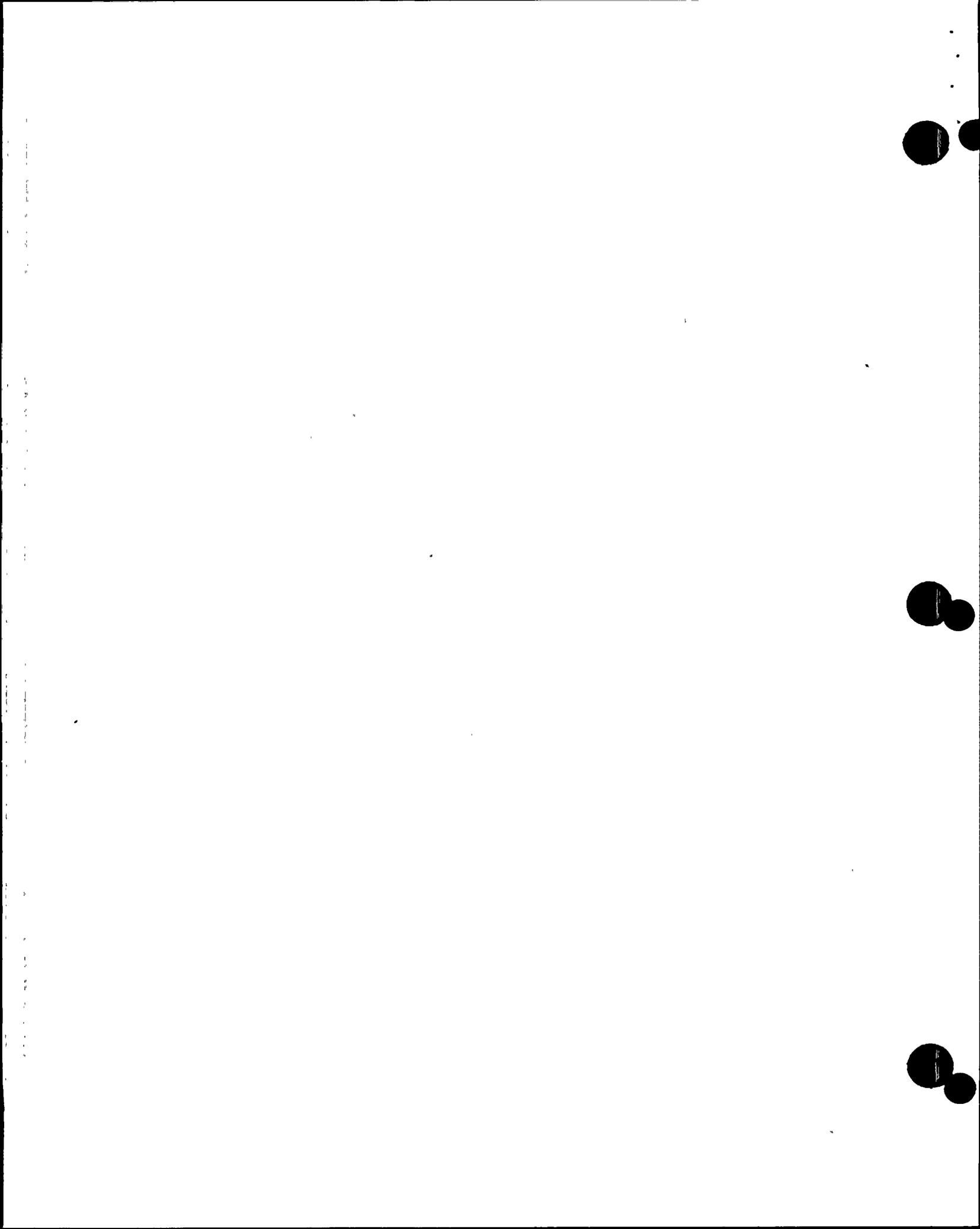
2. Radwaste Treatment, Effluents, and Environmental Monitoring

This program area was reviewed by observation, review of applicable procedures and records, and interviews with responsible personnel. In addition, a walkdown inspection of the evaporation ponds, retention basins, land burial site, Chemical Waste Neutralization Tank, Refueling Water Tank, and Chemical Volume Control System holdup tank was performed.

A. Audits and Appraisals

The inspector reviewed the following audit reports:

- * 90-11 Radiation Protection and Radiation Protection Training
- * 90-22 Plant Chemistry and Chemistry Training
- * 91-03 Radiological Environmental Monitoring Program and Gaseous Effluents



- * 91-07 Radiological Environmental Monitoring Program and Effluent Technical Specifications
- * 91-09 Non-Radiological Environmental Monitoring Program
- * 91-10 Radioactive Material and Process Control Program

In addition the inspector reviewed approximately 236 monitoring reports related to plant chemistry and radiation protection activities. The monitoring activities had been performed by the licensee's Quality Assurance and Monitoring group since January 1, 1991.

The audits and monitoring activities covered a wide cross section in each of the areas that were examined. No violations of regulatory requirements were found; however, many deficient conditions were identified. Audit and monitoring findings were generally addressed in a timely manner. The inspector concluded that the licensee's audit and monitoring activities provided ANPP management with a viable tool for measuring the licensee's performance in the areas that were appraised.

B. Changes

No major changes in the licensee's liquid radwaste system or facilities had occurred since the last inspection.

C. Post Accident Sampling System

The inspection included an examination of the licensee's program for ensuring compliance with Technical Specification (TS) 6.8.1.e, "Post-Accident Sampling." TS 6.8.1.e requires that the program include capabilities to obtain and analyze samples of reactor coolant, plant gaseous effluents, and containment atmosphere under accident conditions. The TS also requires the program to include provisions for: (1) training of personnel, (2) procedures for sampling and analysis, and (3) provisions for maintenance of sampling and analysis equipment.

The examination included a review of surveillance test procedures, inspection of sampling and analysis equipment, review of training records, and discussions with the plant staff in Units 1, 2, and 3.

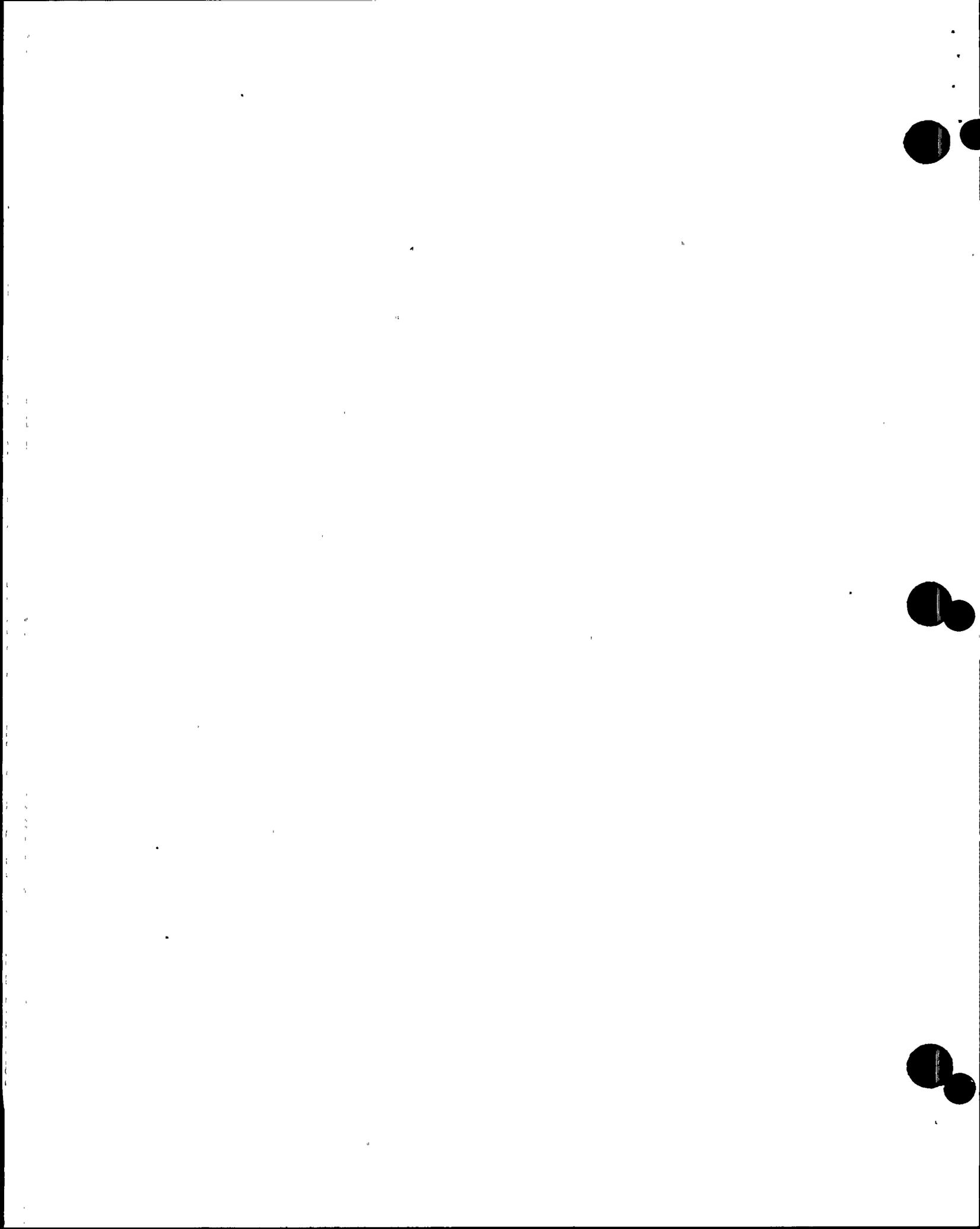
The inspector concluded that the licensee's program was in compliance with the TS requirements.

D. Radiological Environmental Monitoring Program

The licensee's radiological environmental monitoring program (REMP) was examined for compliance with:

- * TS 3/4.12.1, "Monitoring Program"
- * TS 3/4.12.2, "Land Use Census"

The program was examined by a review of applicable procedures, appropriate records, monitoring and analysis schedules, discussions with cognizant personnel, and observations in progress. The following items were noted:



- * The licensee had recently completed the 1990 Land Use Census, performed in accordance with TS requirements, and had identified no changes.
- * The licensee's sampling schedules and records indicated that sample collection had been done at the locations and frequencies prescribed in TS Table 3.12-1. Laboratory analysis had been accomplished by a Phoenix, Arizona vendor. The inspector was informed that recent audits of the vendor's performance had resulted in a licensee decision to award the contract to another vendor. This change was expected to become effective about the end of September 1991, upon completion of the current contract with the Phoenix, Arizona vendor.
- * The REMP included provisions for performing interlaboratory comparisons with several independent organizations.
- * The program also included provisions for the maintenance and calibration of sampling equipment. The inspector verified that air sampling equipment was being calibrated in accordance with the recommendations prescribed in Regulatory Guide 8.25, "Calibration and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled."

The REMP includes provisions for sampling and analysis of liquid effluents and sludges taken from the following areas:

<u>Area</u>	<u>Type of Sample</u>
Reservoir	Surface water
Evaporation Ponds Nos. 1 & 2	Surface water and sludge
Water Reclamation Facility (WRF)	Influent water and sludge
Cooling Towers, Units 1, 2, & 3	Surface water and sludge
Retention Basin Nos. 1 & 2	Surface water and sludge
Sedimentation Basin No. 2	Surface water and sludge

Sampling frequencies for the above areas appeared adequate.

The inspector noted that trace amounts of radioactivity had been identified in cooling tower and WRF sludges. These sludges were being given land disposal in accordance with Special Permits approved by the State of Arizona (see Region V Inspection Report 50-528/90-27). Review of associated records and activity levels indicated that these sludges were being controlled in accordance with 10 CFR 20.301 and 20.302 requirements for waste disposal.

The inspector noted that trace amounts of radioactivity were also being reported in Retention Basins Nos. 1 and 2 (see the licensee's 1990 Annual Radiological Operating Report). The major radionuclides and highest activity levels reported were as follows: (1) 2610 pCi/Kg of Cobalt-60, (2) 2080 pCi/Kg of Cesium-137, (3) 1020 pCi/Kg of Cesium-134, and (4) 300 pCi/Kg of Manganese-54. Records indicated that Retention Basin activity levels had been approximately the same over the past several years.

The inspector noted that 10 CFR 20.203(e) states in part:

"Each area or room in which licensed material is used or stored and which contains any radioactive material (other than natural uranium or thorium) in an amount exceeding 10 times the quantity of such material specified in Appendix C of this part shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words, CAUTION: RADIOACTIVE MATERIAL."

The inspector discussed with the licensee the potential need for posting the 500,000-gallon Retention Basins to ensure compliance with 10 CFR 20.203(e). The licensee had not quantified the amount of sludges contained in the Retention Basins, and could not determine with certainty whether the areas should be posted. The inspector determined that it would require approximately 3832 Kilograms of sludge to exceed 10 times the activity levels listed in 10 CFR 20, Appendix C.

The inspector asked the licensee whether similar trace amounts of radioactivity might be present in the Evaporator Pond sludges. The licensee stated that the Evaporator Pond sludges were not routinely sampled, and could not be sampled unless the ponds were drained. In addition, the licensee stated that preparations were being made to replace the liner in Evaporation Pond No. 1 within the next several months, and that sludge samples would be taken from this pond after it had been drained. This item will be examined during a subsequent inspection (50-528/91-33-01).

E. Spray Pond Monitoring

TS 6.8.1.f, "Spray Pond Monitoring," requires the licensee to identify and describe the parameters and activities used to control and monitor the Essential Spray Pond and Piping. The TS requires that the program shall be conducted in accordance with station manual procedures.

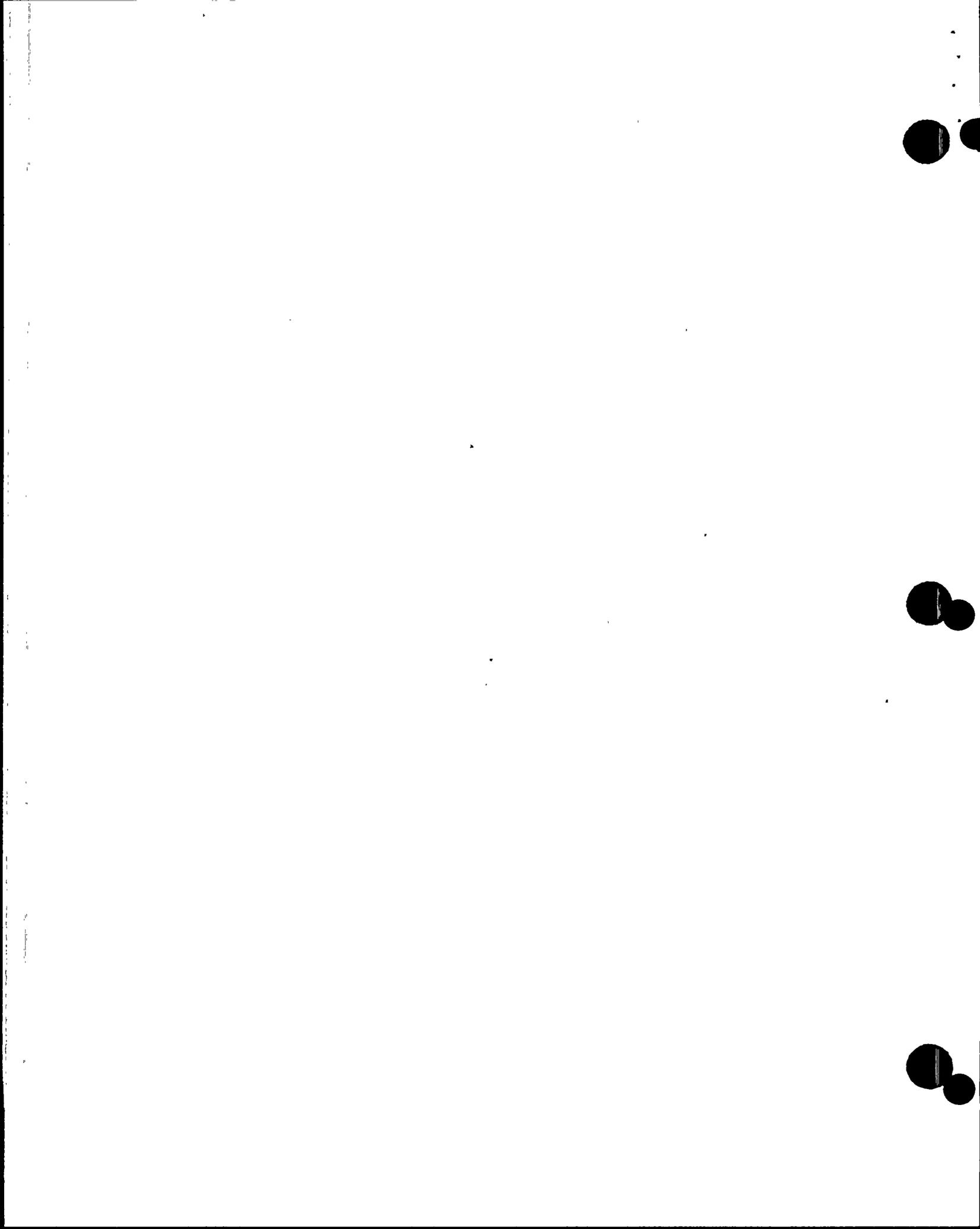
The licensee's monitoring program, which is described in procedure 74CH-9XC16, "Sampling and Analytical Schedules," includes frequent sampling and analysis of the effluents for fourteen different parameters. The inspector verified that the program was being implemented in accordance with the TS requirements.

F. Liquid Holdup Tanks

TS 3.11.1.3 requires that the quantity of radioactive material contained in each outside temporary tank and the reactor makeup water tank shall be limited to less than or equal to 60 curies, excluding tritium and dissolved or entrained noble gases.

An examination of the licensee's surveillance program for meeting this requirement was conducted. The examination included a review of licensee procedure 74ST-9ZZ03, "Liquid Holdup Tank Surveillance Test," and an inspection of outdoor tanks.

The inspector verified that the quantity of radioactive material in the reactor water makeup tank was maintained well below the 60-curie limit. No temporary tanks were being used to store radioactive materials. The



licensee performed the verifications at the frequency (at least once per seven days) specified in the TS.

G. Unmonitored Noble Gas Release

The inspector reviewed circumstances related to an unplanned and unmonitored noble gas release which had occurred in Unit 2 on August 11, 1991. The unmonitored release had been reported to the Region V staff by the NRC Senior Resident Inspector. A description of the event follows.

At 2010 MST, August 11, 1991, Unit 2 was in Mode 3 at 370 degrees Fahrenheit and 2000 psia when a chemistry sample of the nuclear cooling (NC) water system showed Xenon-133 (Xe-133) activity present at $2.41E-7$ microcuries per gram. Subsequent samples indicated and confirmed that activity was also present in the essential cooling water, essential chilled water, turbine cooling water, and normal chilled water systems, and in the nitrogen cover gas of the surge tanks for these systems. The condensate storage tank nitrogen cover gas was also found to have Xe-133 activity.

The licensee immediately reported the contamination levels found in the NC system to the Palo Verde NRC Resident Office and initiated an incident investigation in accordance with licensee procedure 90AC-OIP01, "Incident Investigations for Category 1 and 2 Events."

The licensee's preliminary investigation and subsequent licensee and NRC analysis disclosed the following details:

- (1) At the time the activity was discovered in the NC System, samples were being taken every 12 hours in accordance with the requirement of an April 13, 1991, "Justification for Continued Operations-Potential for Small Break Loss of Cooling Accident Due to Pipe Rupture in the Reactor Coolant Pump Seal Cooler" (JCO) and procedure 74CH-9XC16, "Sampling and Analytical Schedule."

A sample taken at 0800 MST indicated no activity present. Earlier during that day, (0805 MST) rupture disc 2J-GAN-PSE0147 had failed on the low pressure Nitrogen System (see Region V Inspection Report 50-529/91-29) causing depressurization of the header to atmosphere. The header was isolated to allow replacement of the rupture disc, resulting in the header being at atmospheric pressure. This allowed contamination to backfeed from the Equipment Drain Tank (EDT) into the nitrogen header. When the header was repressurized following rupture disc replacement, the contamination was spread throughout the systems supplied by the nitrogen header. The EDT level had increased during the period of time that the header was open. Gas from the EDT had apparently been vented through pressure control valve 2J-CHN-PCV0831 into the low pressure nitrogen header. This vent path was open until 1000 MST, August 11, 1991.

- (2) On August 12, 1991, the NRC resident inspector identified the potential for the unmonitored release path through the ruptured disc. The licensee had not considered this potential up to that time.



- (3) The licensee incident investigation report (IIR) determined that the rupture disc had failed approximately 28 previous times in the three units (see Inspection Report 50-529/91-29). Each of the previous rupture disc failures represented a potential unmonitored and uncontrolled release to the environment. None of the previous failures were evaluated as a potential release pathway. The licensee performed an evaluation of the 28 previous events using worse case data during the inspection and determined that TS limits would not have been exceeded. The licensee considered all of the previous ruptured disc events to be abnormal releases as defined by Regulatory Guide 8.21. These events will be reported in the next Semiannual Radioactive Effluent Release Report as required by TS 6.9.1.8.

For the August 11, 1991, event, the licensee initiated abnormal release permits. The licensee calculated the release concentration to have been $4.46 \text{ E}+5$ microcuries per cubic centimeters ($\mu\text{Ci/cc}$) of noble gas, principally Xe-133. The air dose and the resulting whole body, skin, and organ doses were insignificant.

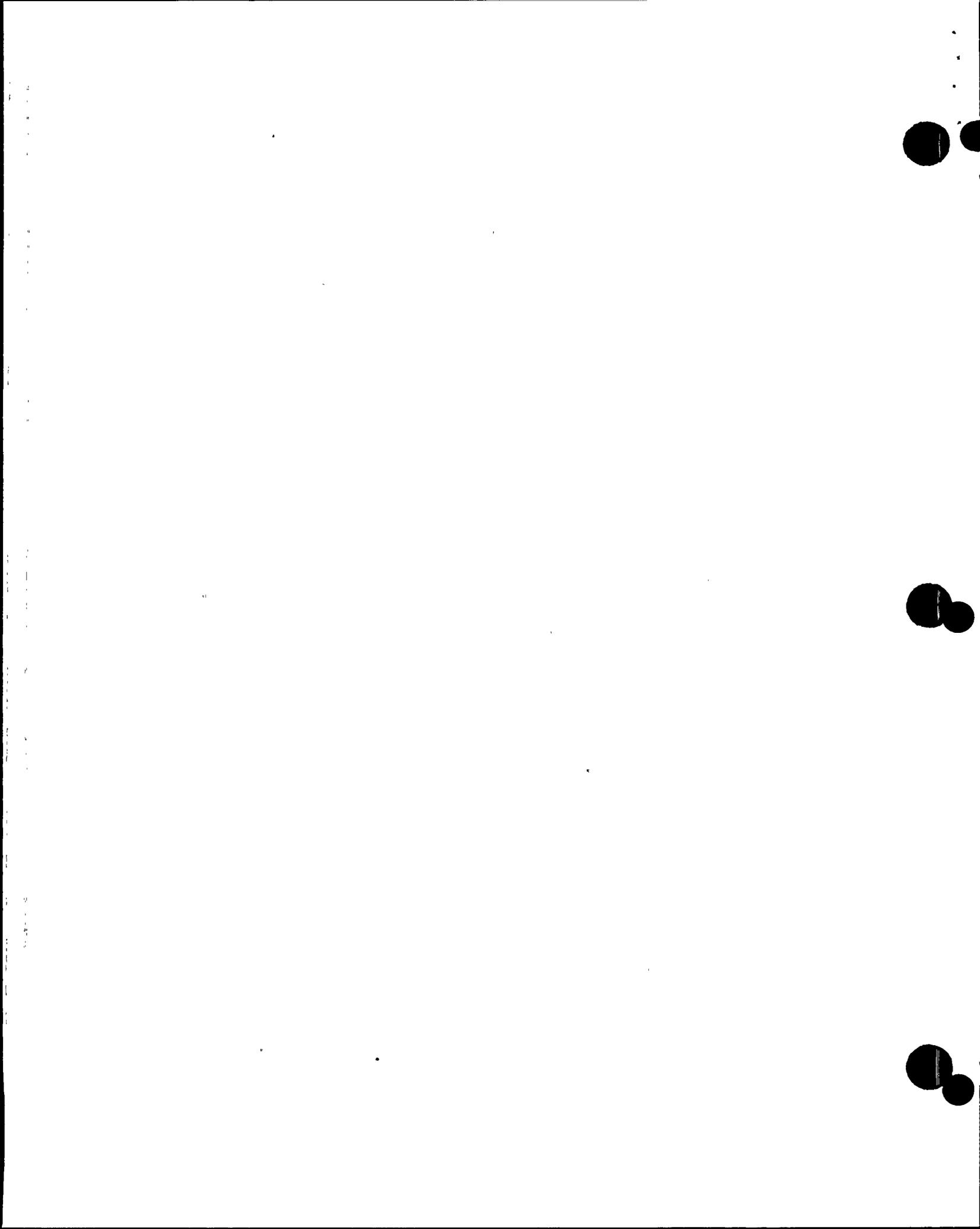
- (4) IE Bulletin 80-10, "Contamination of Nonradioactive System and Resulting Potential For Unmonitored, Uncontrolled Release of Radioactivity to Environment," states that if continued operation with the system contaminated is considered necessary, an immediate safety evaluation must be performed in accordance with 10 CFR 50.59. The inspector noted that licensee procedure 75AC-9RP07, "Control of Contaminated Normally Clean System," Revision 0, dated August 1, 1991, included the recommendations of IE Bulletin 80-10. The inspector also noted that procedure 75RP-OZZ07, "Control of a Contaminated Clean System," Revision 1, dated September 22, 1987, did not consider the need for implementing IE Bulletin 80-10 requirements.

On August 13, 1991, the inspector contacted a licensee representative and asked whether an evaluation of potential unreviewed safety questions had been conducted pursuant to IE Bulletin 80-10. The licensee representative questioned was not aware of such an evaluation being performed. The inspector later determined, however, that another licensee representative had independently identified that such an evaluation should have been performed.

The licensee's staff subsequently conducted the safety evaluation on August 14, 1991.

The inspector concluded that the unmonitored release did not pose a threat to the health and safety of workers or the general public. The inspector noted, however, that licensee recognition of the unmonitored release and implementation of IE Bulletin 80-10 requirements were not timely. These observations were brought to the licensee's attention at the exit interview.

The licensee had implemented short term corrective actions to prevent a recurrence of this event. Long term corrective actions will be addressed



upon completion of the IIR. The inspector informed the licensee that this item would be examined during a subsequent inspection (50-529/91-33-01).

H. Missed Nuclear Cooling System Sample

Chemistry procedure 74CH-9XC16, "Sampling and Analytical Schedule," requires the NC system to be sampled every 12 hours, not to exceed 14 hours. In addition, the JCO discussed in Section 2.G, above, requires certain compensatory measures related to NC system sampling, as follows:

- * With radiation monitor RU-6 operable, samples must be obtained every 12 hours, not to exceed 14 hours, as noted above.
- * Backup samples must be obtained every 4 hours, not to exceed 5 hours, whenever RU-6 is out of service or whenever a radiation monitor alarm is received or manual sampling detects short lived fission product activity.

The JCO sampling requirements have been established for the purpose of determining whether to start an orderly plant shutdown to Mode 3.

During the licensee's investigation of the unmonitored noble gas release (discussed in Section 2.G, above), the licensee discovered that they had failed to comply with the compensatory measures of the JCO as given above.

The inspector noted the following previous failures to meet the JCO compensatory measures:

- * Condition Report Disposition Request (CRDR) 1-1-0035, dated July 31, 1991, reported that a backup sample of the NC system was not performed at Unit 1 on July 30, 1991, following the determination that positive activity was present in a sample taken at 0800 MST, July 30, 1991.
- * A second licensee report, dated August 3, 1991, identified that a backup sample had not been taken within the 5 hour time period at Unit 1 on May 28, 1991.
- * CRDR 1-1-0047, dated August 12, 1991, reported that a required 12 hour sample of the NC system was missed at Unit 1.

The inspector noted, in addition, that during a management meeting held at the licensee Corporate Office during the early part of August, the Region V Regional Administrator had emphasized to the licensee's staff the importance of obtaining the samples required by the JCO and procedure.

TS 6.8.1 requires that written procedures shall be established, implemented, and maintained covering the activities recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Regulatory Guide 1.33, Appendix A.7.a, requires that procedures be established for sampling and monitoring of liquid radwaste systems.

The inspector concluded that the failure to meet the JCO compensatory measures for NC system sampling constituted a violation of TS 6.8.1. This



violation is not being cited, however, because the criteria specified in Section V.G of the Enforcement Policy were satisfied (50-528/91-33-02). The licensee was taking appropriate measures to prevent recurrence.

The licensee's radioactive waste treatment and environmental monitoring program appeared adequate in accomplishing the licensee's safety objectives. One non-cited violation was identified.

3. Occupational Exposure During Extended Outages

A. Audits and Appraisals

Audits and appraisals are addressed in Section 2.A, above.

B. Changes

No significant organizational, procedural, or facility changes had occurred since the previous inspection of this area.

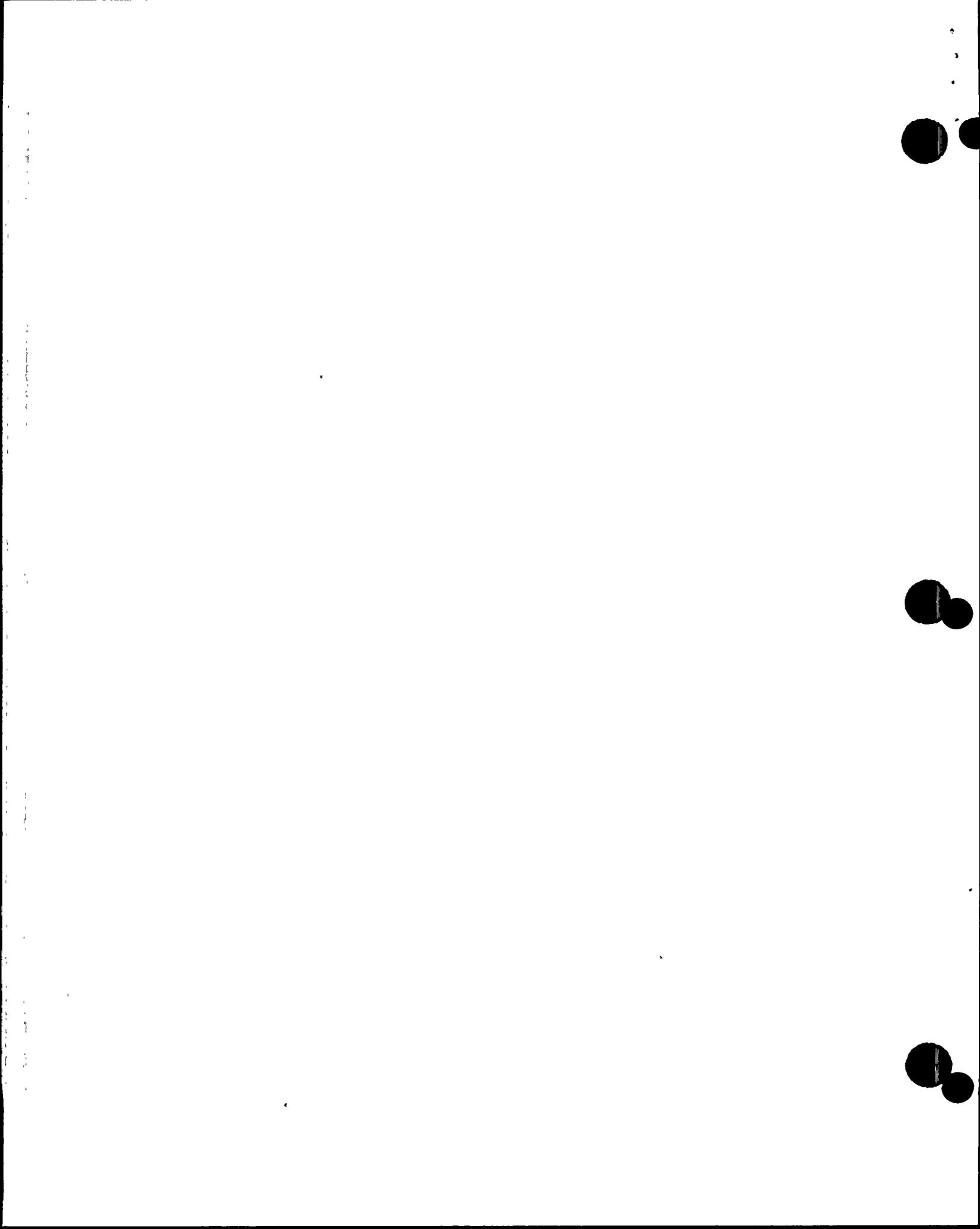
C. Planning and Preparations

The inspector reviewed activities associated with licensee planning and preparations for the Unit 2 refueling outage. The refueling outage is expected to start on October 17, 1991, and to complete within 70 days. The inspector's examination included:

- * Review of staffing, training and qualifications of contractor personnel;
- * Review of selected refueling outage work packages and related radiation exposure permits (REPs);
- * Review of the ALARA program and exposure goals;
- * Review of selected procedures and discussions with the licensee's staff responsible for Unit 2 refueling outage planning and preparations; and
- * Verification that ample supplies of radiation protection equipment, such as radiation survey meters and other materials, would be made available in the quantities needed to support the outage.

The inspector was informed that an ALARA exposure goal of 230 Person-Rem had been established. Approximately 90% of this value will be associated with the following work:

- * Reactor coolant system cleanup
- * Destacking/restacking of reactor vessel components, including in-core instrumentation cable cutup, control element drive mechanism motor change-out, and core off-load and on-load
- * Reactor cavity decontamination
- * Steam generator (SG) eddy current inspection and SG tube plugging
- * In-service inspections (e.g., snubber inspections)



- * Motor-operated-valve acceptance testing
- * Inconel 600 hot leg nozzle replacement
- * Ultrasonic testing of the reactor coolant pump shafts
- * Check valve inspection and repair
- * Pressurizer heater replacement
- * Local leak rate testing
- * Heated junction thermocouple replacement

The radiation outage support group informed the inspector that mockups were to be provided for training associated with the SG and Inconel 600 sleeve replacement work activities. The licensee has purchased a robot so that surveys can be performed remotely inside the hotleg for work associated with the Inconel 600 sleeve replacement.

The inspector noted that the lessons learned from the recent refueling outages completed at Unit 1 and Unit 3 had been factored into the Unit 2 refueling work packages and REPs.

The Unit 2 radiation protection staff was being augmented with contractor radiation protection technicians (RPTs) and with at least ten individuals from Units 1 and 3. At least 50% of the contractor RPTs were expected to be returnees from previous refueling outages. All contractor RPTs will be required to meet the qualifications of ANSI/ANS-3.1-1978, "Selection and Training of Nuclear Power Plant Personnel." Contractor RPTs not having previous APS experience will be required to pass an entrance examination; in addition, they will be required to attend 40 hours of plant specific training, which concludes with a written examination.

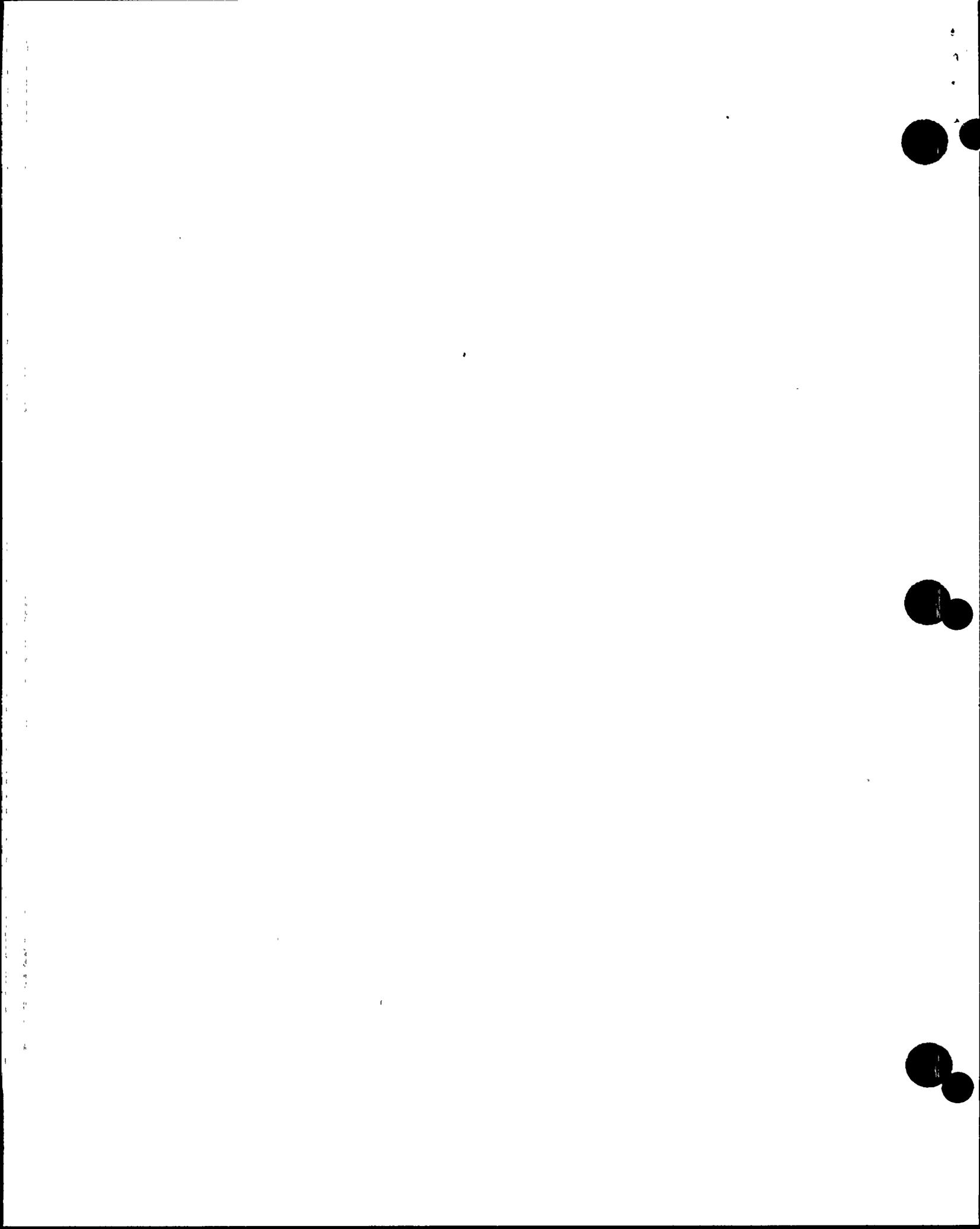
The inspector noted the following licensee methods of emphasizing ALARA awareness for workers: (1) general employee training, (2) ALARA status posters, (3) ALARA pre-job briefings, (4) worker suggestion program, and (5) refueling outage reference hand books, which are distributed to the workers.

The inspector concluded that the licensee's planning and preparations for the upcoming Unit 2 refueling outage were consistent with Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations will be As Low As Is Reasonably Achievable," and with licensee ALARA procedures.

The licensee appeared to be maintaining its previous level of performance in this area, and the associated radiation protection programs appeared to be accomplishing the licensee's safety objectives. No violations or deviations were identified.

4. Onsite Followup of Licensee Event Reports (LERs)

LER 91-04-L0 and 91-05-L0 (Closed): Both of these events involved spurious containment purge isolation signals that were initiated by the balance of plant engineered safety features actuation system (CPIAS). The first instance occurred on July 13, 1991, and the second on July 31, 1991.



In both instances the unit was in Mode 1 at approximately 100% power, when the CPIAS resulted in trips of the control room essential filtration actuation signal (CREFAS). The actuations occurred when the Train A Power Access Purge Area Radiation Monitor (RU-37) spiked above its high alarm/trip set point.

On both occasions, no containment purges were in progress and the Containment Purge System isolation valve was closed. Control room and radiation protection personnel verified that normal radiation levels existed in the area around RU-37.

The cause of both events was determined to be premature failure of the monitor's Geiger-Muller tube in the detector assembly. The Geiger-Muller tubes were replaced in both instances and the licensee's system engineering personnel have contacted the detector assembly vendor and the Geiger-Muller tube manufacturer to determine if action can be taken to reduce the rate of detector failures. This matter is closed.

LER 91-01-10 (Closed): This LER involved a CPIAS/CREFAS actuation at Unit 2 on June 5, 1991. The cause was determined to be personnel error, when a chemistry radiation monitoring system technician changed the alarm setpoint on the wrong radiation monitor (RU-38) at the Remote Indication and Control Unit outside the Control Room. The Unit was in Mode 1 at approximately 100% power at the time of the event.

The inspector discussed the event with the licensee's staff and reviewed the corrective actions that were taken. The inspector concluded that the corrective actions were satisfactory. This matter is closed.

5. Followup Items

Item 50-528/IN-91-35 and 50-528/91-40: This item refers to Information Notice (IN) 91-35, "Labeling Requirements For Transporting Multi-Hazard Radioactive Material," and IN-91-40, "Contamination of Nonradioactive System and Resulting Possibility For Unmonitored, Uncontrolled Release to the Environment." The licensee had distributed both notices to appropriate individuals. The licensee's staff were cognizant of the applicable issues identified in the notices. This matter is closed.

6. Facility Tours

Tours of the licensee's facilities were conducted during the inspection period. Radioactive waste storage areas and the radioactive material receipt areas at the warehouse were included in the tours. Independent radiation measurements were made using an ion chamber survey instrument, Model RO-2, Serial Number 2691, due for calibration on October 19, 1991. The following observations were made:

- (a) Posting and labeling practices were consistent with 10 CFR Parts 19.11 and 20.203.
- (b) Work practices observed were in accordance with applicable radiation exposure permits and the licensee's ALARA program.



- (c) Cleanliness in the areas toured was excellent.
- (d) All portable instruments observed were in current calibration.
- (e) All personnel observed in the licensee's controlled areas were equipped with appropriate dosimetry devices.
- (f) Standing water was observed on the lids of 55-gallon radioactive waste drums that were packaged for shipment. Additionally, many of the lids on the 55-gallon drums and B-25 boxes of packaged radioactive waste were noted to be severely rusted.

Item (f) was brought to the licensee's attention during the inspection. The licensee had been made aware of the condition from another independent audit and was in the process of implementing corrective actions to replace the lids and better protect the packaged waste stored in the outdoor environment. The licensee's program in this area appeared capable of meeting its safety objectives.

7. Exit Interview

The inspector met with the individuals denoted in Section 1 at the conclusion of the inspection on August 30, 1991. The scope and findings of the inspection were summarized. The licensee was informed of the non-cited violation discussed in Section 2.H. The licensee acknowledged the inspector's observations.

