

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-285/92-19

Operating License: DPR-40

Licensee: Omaha Public Power District
444 South 16th Street Mall
Mail Stop 8E/EP4
Omaha, Nebraska 68102-2247

Facility Name: Fort Calhoun Station

Inspection At: Fort Calhoun Station, Washington County, Nebraska

Inspection Conducted: August 31 through September 4, 1992

Inspector: J. B. Nicholas, Ph.D., Senior Radiation Specialist
Facilities Inspection Programs Section

Approved:

Blaine Murray
Blaine Murray, Chief, Facilities Inspection
Programs Section

9/29/92
Date

Inspection Summary

Areas Inspected: Routine, announced inspection of the liquid and gaseous radioactive waste management programs and the radiological environmental monitoring program including organization and management controls, training and qualifications, quality assurance, radioactive liquid and gaseous effluent systems, reports of radioactive effluents, air cleaning ventilation systems, implementation of the radiological environmental monitoring program, and internal exposure control.

Results:

- The radioactive waste effluent management program was being properly implemented (paragraph 1.1).
- The radiological environmental monitoring program was being properly implemented (paragraph 1.1).
- The chemistry department and the radiological services department had experienced a very low turnover of personnel (paragraph 1.1).

- An excellent training program had been implemented for personnel responsible for radioactive waste effluent management activities (paragraph 2.1).
- A satisfactory number of personnel were trained and qualified to perform radioactive waste effluent activities (paragraph 2.1).
- An excellent training program had been initiated for personnel responsible for conducting radiological environmental monitoring activities (paragraph 2.1).
- A good quality assurance audit program of the radioactive waste effluent program, Offsite Dose Calculation Manual, and radiological environmental monitoring program had been implemented as required (paragraph 3.1).
- A good quality assurance surveillance program of the radioactive waste effluent program and the radiological environmental monitoring program had been implemented (paragraph 3.1).
- An excellent liquid and gaseous radioactive waste effluent program was being implemented (paragraphs 4.1 and 5.1).
- A excellent testing and calibration program had been established for the radioactive waste effluent radiation monitors (paragraphs 4.1 and 5.1).
- Semiannual Radioactive Effluent Release Reports were submitted in a timely manner and contained the required information. The licensee committed to review the format of their reports (paragraph 6.1).
- A good program had been established for testing the air cleaning systems (paragraph 7.1).
- An excellent radiological environmental monitoring program was being implemented (paragraph 8.1).
- The biennial land use censuses had been performed and documented (paragraph 8.1).
- The licensee's environmental thermoluminescent dosimeter results compared very well with the NRC's and state's results at collocated sites (paragraph 8.1).
- Good quality Annual Radiological Environmental Operating Reports were submitted in a timely manner (paragraph 8.1).
- The contractor laboratory's performance in the U. S. Environmental Protection Agency's Environmental Radioactivity Laboratory Intercomparison Program and the international Intercomparison of Environmental Dosimeters Program was excellent (paragraph 8.1).

Summary of Inspection Findings:

- No violations or deviations were identified.
- Unresolved Item 50-285/9219-01 was opened (paragraph 9.1).
- Inspection Followup Item 50-285/9041-04 was closed (paragraph 10.1).
- Inspection Followup Item 50-285/9119-02 was closed (paragraph 10.2).

Attachments:

- Attachment 1 - Persons Contacted and Exit Meeting
- Attachment 2 - Summation of Liquid Effluent Releases
- Attachment 3 - Summation of Airborne Effluent Releases
- Attachment 4 - Maximum Doses to the Public Due to Radioactivity Released in Gaseous and Liquid Effluents

DETAILS

1 ORGANIZATION AND MANAGEMENT CONTROLS (84750)

The inspector reviewed the organization, management controls, staffing, and the assignment of radioactive waste effluent program and radiological environmental monitoring program responsibilities to determine agreement with commitments in Chapter 12 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specification 5.2.

1.1 Discussion

The inspector verified that the organizational structures of the chemistry department, which is responsible for the implementation of the radioactive waste effluent program, and the radiological services department, which is responsible for the implementation of the radiological environmental monitoring program, were as defined in the Updated Safety Analysis Report and Technical Specifications. Management control procedures were reviewed for the assignment of responsibilities for the management and implementation of the radioactive waste effluent program and the radiological environmental monitoring program. The chemistry department was assigned the responsibility for preparing radioactive waste release permits, evaluating the radioactive waste effluent releases, calculating the radiation doses resulting from the releases to the environment, and maintaining the radioactive waste effluent release data. The chemistry and environmental services section of the radiological services department was assigned the responsibility for collecting and shipping environmental samples for radiological analyses, evaluating and maintaining the radiological environmental sample data, and performing the required land use censuses in the vicinity of the station. The inspector determined that the duties and responsibilities of the chemistry department and the radiological services department specified in the administrative procedures were being implemented. Twelve shift chemistry technicians were responsible for collecting and analyzing radioactive waste effluent samples and preparing the effluent release permits. A senior analyst and analyst in the chemistry and environmental section of the radiological services department were responsible for implementing and maintaining all aspects of the radiological environmental monitoring program. The inspector interviewed several of the shift chemistry technicians and the two chemistry and environmental section analysts and determined that they were familiar with the requirements of the respective programs for which they were responsible, and each maintained a high level of understanding and performance.

The inspector reviewed the staffing of the chemistry department and noted, that since the previous NRC inspection of the chemistry department conducted in April 1991, there had been one resignation from the chemistry supervisory staff, and two chemistry technician positions had been vacated. The vacated chemistry supervisory position was filled in February 1992 by a chemistry qualified individual who transferred from the quality assurance auditor staff. One of the vacated chemistry technician positions was filled in December 1991 by a former contractor chemistry technician, and the second vacated chemistry technician position was not filled reducing the number of chemistry department

technical staff positions to 21 including three contractor chemistry technicians and one part-time technician. These personnel changes represented approximately a 5 percent turnover in the chemistry department technical staff and had no negative affect in accomplishing the required tasks assigned to the chemistry department. The chemistry department staffing was determined to be adequate and in accordance with licensee commitments.

The inspector reviewed the staffing of the radiological services department and noted, that since the previous NRC inspection of the radiological environmental monitoring program conducted in March 1990, there had been one transfer from the chemistry and environmental section supervisory staff leaving that position vacant presently. The two chemistry and environmental section analysts responsible for implementing the radiological environmental monitoring program had remained unchanged.

1.2 Conclusions

The chemistry department and radiological services department organizational structures and staffing met the Technical Specification requirements. The radioactive waste effluent management program and the radiological environmental monitoring program were being implemented in accordance with station procedures. During the past one and one-half years, the chemistry department and the radiological services department had experienced a very low turnover of technical personnel.

2 TRAINING AND QUALIFICATIONS (84750)

The inspector reviewed the training and qualification programs for the chemistry technicians, and non-licensed operators responsible for implementing the radioactive waste effluent program and for the chemistry and environmental analysts responsible for implementing the radiological environmental monitoring program to determine agreement with commitments in Chapter 12 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 5.3 and 5.4.

2.1 Discussion

The inspector reviewed the training programs for the chemistry technicians, non-licensed operators, and chemistry and environmental analysts including a review of training program master plans, qualification guides and manuals for initial and requalification training, training procedures, selected lesson plans, performance evaluation checklists, personnel training records, and qualification cards. It was determined that the licensee's training programs for chemistry technicians, non-licensed operators, and chemistry and environmental analysts were being implemented in accordance with the nuclear training department accredited programs.

The inspector reviewed individual staff computerized training records and qualification cards for the shift qualified chemistry technicians and non-licensed operators responsible for performing radioactive waste effluent program activities. Based on the review of the individual chemistry technician and non-licensed operator staff training records and qualification

cards, it was verified that the 12 chemistry technicians responsible for performing radioactive waste effluent program activities had completed the required training to perform their assigned duties, and that the six non-licensed operators who currently served on shift and performed radioactive waste effluent program activities were trained and qualified as equipment operator nuclear-auxiliary operators. It was determined that the chemistry department and operations department had adequate, qualified staffs to perform radioactive waste effluent activities.

A new environmental training program was approved on August 1, 1991. Since that time the two chemistry and environmental analysts responsible for implementing the radiological environmental monitoring program had attended training courses outlined in the environmental training program master plan. The inspector reviewed the individual records and qualification cards for the two chemistry and environmental analysts and noted that they were progressing in their formalized training in accordance with the environmental training program master plan as time allowed. Due to their extensive experience in performing radiological environmental monitoring program activities (combined total experience of 36 years at the Fort Calhoun Station), the inspector knowledgeable that the chemistry and environmental analysts conducting the radiological environmental monitoring program were well qualified to perform their assigned duties.

The inspector reviewed the three chemistry training instructors experience and qualifications and determined that they were qualified to instruct in the radioactive waste effluents technical area. Two of the three chemistry training instructors and the supervisor - chemistry and radiation protection training had previously worked in the station's chemistry department and had been shift qualified chemistry technicians.

2.2 Conclusions

The licensee had implemented excellent accredited initial and requalification training programs for chemistry technician and non-licensed operator personnel. Six non-licensed operators were qualified as equipment operator nuclear-auxiliary operators to perform radioactive waste effluent processing, and 12 chemistry technicians were qualified to perform independent sampling, analyses, and processing of radioactive waste effluent release permits to meet Technical Specification and Offsite Dose Calculation Manual requirements. The chemistry department and operations department had adequate, well qualified staffs to meet shift staffing requirements. The licensee had initiated an excellent training and qualification program for chemistry and environmental personnel. The chemistry training instructors were well qualified.

3 **QUALITY ASSURANCE PROGRAM (84750)**

The inspector reviewed the quality assurance audit and surveillance programs regarding the radioactive waste effluent program and the radiological environmental monitoring program activities to determine agreement with commitments in Chapters 12 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specification 5.5.2.8.

3.1 Discussion

The inspector reviewed the quality assurance audit schedule, revision 3, issued August 1992. The schedule showed completed and scheduled audits for the period 1989 through 1992. The audit schedule indicated that the radiological effluent and environmental monitoring programs audit (Audit No. 63), which included the Offsite Dose Calculation Manual and implementing procedures, was scheduled and performed on even numbered years. This audit schedule was in compliance with the Technical Specification audit frequency requirement.

The inspector reviewed the audit plan and checklist for Audit No. 63 and the qualifications of the quality assurance auditors and technical specialists who performed the audit and surveillances of the radiological effluent and environmental monitoring programs. Audit and surveillance reports of quality assurance activities performed during 1990, 1991, and thus far in 1992 of the radiological effluent and environmental monitoring programs and the Offsite Dose Calculation Manual and implementing procedures were reviewed for scope, thoroughness of program evaluation, and timely followup of identified deficiencies. Quality assurance Audit No. 63, which was reviewed, was performed in November 1990 in accordance with quality assurance procedures and schedules by qualified auditors and a technical specialist, who were knowledgeable in radiological waste effluent program, radiological environmental monitoring program, and Offsite Dose Calculation Manual requirements at nuclear power facilities. One audit discrepancy report was issued in the 1990 audit report concerning the radiological environmental monitoring program and the completion of Surveillance Test RS-ST-MM-0006, "Environmental Sample Collection Land Use." Specific locations of land use parameters as a result of conducting the land use survey had not been marked on the survey map as required by the surveillance test. Prompt corrective action by the chemistry and environmental section staff corrected this discrepancy and the discrepancy report was closed by the completion of the audit. The audit of the radiological effluent program, radiological environmental monitoring program, and Offsite Dose Calculation Manual was of good quality and satisfactory to evaluate the licensee's performance in implementing the radioactive waste effluent program and radiological environmental monitoring program and meeting the Technical Specification and Offsite Dose Calculation Manual requirements.

The inspector reviewed the seven quality assurance surveillances performed during the period January 1990 through August 1992 in the areas related to the performance of the radioactive waste effluent program and the radiological environmental monitoring program. Three of these surveillances involved activities pertaining to the radioactive waste effluents program including the calibration and performance checking of radioactive waste effluent monitoring equipment, the sampling and analyses requirements of the radioactive waste effluents, the preparation and processing of radioactive waste effluent release permits, and the data included in and the issuance of the semiannual radioactive waste effluent release reports. One of the surveillances involved the chemistry quality control and sampling of the containment atmosphere and the radioactive liquid waste monitor tanks. The remaining three surveillances involved activities pertaining to the radiological environmental monitoring

program including collection and processing for shipment of radiological environmental air and surface water samples, operability and calibration of air sampling equipment, operability and reliability of the meteorological tower equipment, and the placement and collection of the thermoluminescent dosimeters. The quality assurance surveillances were of excellent quality and satisfactory to evaluate the licensee's performance and provide periodic management oversight.

The licensee was using three independent contractor laboratories to perform Technical Specification required analyses on radioactive waste effluent composite samples and radiological environmental samples and to perform in-place filter testing and laboratory charcoal adsorber analyses on the station's air cleaning systems. The licensee had used audits of the three contractor laboratories to evaluate the performance of each of the contractors to perform their respective analytical functions and to retain their current status on the Fort Calhoun Station routine suppliers list. The audit used of the first contractor's radiochemistry laboratory was performed by a Toledo Edison quality assurance audit team on May 30, 1991, to evaluate the contractor's laboratory to perform analyses on radioactive waste effluent samples. The licensee had performed their own quality assurance audit of the second contractor's laboratory on May 24-25, 1990, to evaluate the contractor's laboratory to perform analyses on radiological environmental samples. The third audit used by the licensee of the air cleaning systems filter testing laboratory was performed by a Wolf Creek Nuclear Operating Corporation quality assurance audit team on September 26-28, 1990. The inspectors reviewed the above listed most recent audits performed on each of the three contractors and found the audits to be comprehensive and satisfactory to evaluate each of the contractor's abilities to perform their respective Technical Specification required analyses and surveillance activities.

3.2 Conclusions

A quality assurance audit of the radioactive waste effluent program, Offsite Dose Calculation Manual and implementing procedures, and the radiological environmental monitoring program had been performed as required. This audit was technically comprehensive and provided adequate program evaluation and management oversight. Quality assurance surveillances had been performed which directly monitored the performance of radioactive waste effluent release activities and the implementation of the radiological environmental monitoring program. Audits of the contractor laboratories used to perform radioactive waste effluent program and radiological environmental monitoring program Technical Specification required surveillance analyses and the in-place filter testing and charcoal adsorber analyses on the air cleaning systems had been performed as required to retain the contractors current status on the licensee's routine suppliers list.

4 LIQUID RADIOACTIVE WASTE EFFLUENTS (84750)

The inspector reviewed the liquid radioactive waste effluent program including liquid waste processing, liquid waste sampling and analyses, procedures for control and release of radioactive liquid waste effluents, surveillance tests,

and liquid effluent instrumentation and radiation monitor tests and calibrations to determine agreement with commitments in Chapter 11 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 2.9.1, 3.12.1, Table 3-11, 5.8 and the Offsite Dose Calculation Manual Sections 2.1, 2.2, 2.5.1, 3.0, 4.3, and 5.0.

4.1 Discussion

The inspector reviewed the licensee's implementation of the liquid radioactive waste effluent program and the Offsite Dose Calculation Manual to ensure compliance with the sampling and analyses requirements; analyses sensitivities; analytical results; surveillance test requirements; radwaste operations procedures; offsite dose results from radioactive liquid effluents; and operational tests, calibrations, and the establishment of alarm setpoints for the radiation monitors associated with the radioactive liquid waste processing systems.

The inspector reviewed selected standing orders and procedures governing the release of liquid radioactive waste effluents. These standing orders and procedures provided for the following: recirculation and sampling of the radioactive liquid waste; chemical and radionuclide analyses prior to release; calculation of effluent release rate, projected offsite radionuclide concentrations, and offsite doses prior to release; verification of liquid waste effluent radiation monitor setpoints and the testing of the liquid waste effluent isolation valves prior to release; and the verification of the effluent discharge flow rate, the effluent volume discharged, and the dilution volume during the release.

The inspector reviewed a representative number of batch radioactive waste liquid release permits and selected continuous liquid waste release data from the steam generator blowdown for the period January 1, 1991, through June 30, 1992. It was determined that the processing, sampling, and analyses of liquid radioactive waste effluent and the approval and performance of batch liquid radioactive waste discharges were conducted in accordance with Technical Specification and Offsite Dose Calculation Manual requirements. Quantities of radionuclides released in the liquid effluents were within the limits specified in the Technical Specifications and the Offsite Dose Calculation Manual. Offsite doses were calculated according to the Offsite Dose Calculation Manual and were within Technical Specification limits. The inspectors verified that the licensee was performing the Technical Specification requirements for tritium analysis, gross alpha analysis, and strontium-89 and strontium-90 analyses on composite samples of batch and continuous liquid radioactive releases.

The inspector reviewed selected liquid radioactive waste effluent radiation monitor channel check, source check, functional test, and calibration records. All records reviewed indicated that the liquid effluent radiation monitors were properly tested and calibrated in compliance with Technical Specification requirements.

4.2 Conclusions

The licensee was implementing an excellent liquid radioactive waste effluent program in accordance with the Technical Specifications and the Offsite Dose Calculation Manual. The quantities of radionuclides released in the liquid radioactive waste effluents were within Technical Specification and Offsite Dose Calculation Manual limits. Offsite doses to the environment from the liquid radioactive waste effluents had been calculated using Offsite Dose Calculation Manual methodologies, and the dose results were within Technical Specification and Offsite Dose Calculation Manual limits. Liquid radioactive waste effluent radiation monitors were tested and calibrated in compliance with Technical Specification requirements.

5 GASEOUS RADIOACTIVE WASTE EFFLUENTS (84750)

The inspector reviewed the gaseous radioactive waste effluent program including gaseous waste processing, gaseous waste sampling and analyses, procedures for the control and release of gaseous waste effluents, surveillance tests, and gaseous effluent radiation monitor tests and calibrations to determine agreement with commitments in Chapter 11 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 2.9.1, 3.12.1, Table 3-12, 5.8 and the Offsite Dose Calculation Manual Sections 2.3, 2.4, 2.5.2, 6.0, 7.0, and 8.0.

5.1 Discussion

The inspector reviewed the licensee's implementation of the gaseous radioactive waste effluent program and the Offsite Dose Calculation Manual to ensure compliance with sampling and analyses requirements, analyses sensitivities, analytical results, surveillance test requirements, radwaste operations procedures, offsite dose results from radioactive gaseous effluents, and operational tests and calibrations of radiation monitors associated with the radioactive gaseous waste processing systems.

The inspector reviewed selected standing orders and procedures governing the release of gaseous radioactive waste effluents. These standing orders and procedures provided for the sampling and analysis of the radioactive gaseous waste effluents, calculation of effluent release rate, calculation of projected offsite radionuclide concentrations and doses, and verification of gaseous effluent radiation monitor setpoints prior to release; and the recording of dilution parameters and the verification of effluent discharge flow rate, the effluent volume discharged, and the dilution volume during the release.

The inspector reviewed selected gaseous waste release data and permits which included the condenser air ejector vent, auxiliary building stack, and the laboratory and radioactive waste processing building exhaust stack continuous releases and batch releases from the waste gas decay tanks and containment vents and purges for the period January 1, 1991, through June 30, 1992. It was determined that the processing, sampling, and analyses of the gaseous radioactive waste effluents and the approval and performance of the batch radioactive gaseous waste releases were conducted in accordance with Technical

Specification and Offsite Dose Calculation Manual requirements. Quantities of gaseous and particulate radionuclides released were within the limits specified in the Technical Specifications and the Offsite Dose Calculation Manual. Offsite doses had been calculated according to Offsite Dose Calculation Manual methodologies and were within required limits. Particulate effluent composite sample analyses for gross alpha, strontium-89, and strontium-90 had been performed and met Technical Specification and Offsite Dose Calculation Manual requirements.

The inspector reviewed selected gaseous radioactive waste effluent radiation monitor channel check, source check, functional test, and calibration records. All records reviewed indicated that the gaseous effluent radiation monitors were properly tested and calibrated in compliance with Technical Specification requirements.

5.2 Conclusions

The licensee was implementing an excellent gaseous radioactive waste effluent program in accordance with the Technical Specifications and the Offsite Dose Calculation Manual. The quantities of radionuclides released in the gaseous radioactive waste effluents were within Technical Specification and Offsite Dose Calculation Manual limits. Offsite doses to the environment from the gaseous radioactive waste effluents had been calculated using Offsite Dose Calculation Manual methodologies, and the dose results were within Technical Specification and Offsite Dose Calculation Manual limits. Gaseous radioactive waste effluent radiation monitors were tested and calibrated in compliance with Technical Specification and Offsite Dose Calculation Manual requirements.

6 REPORT OF RADIOACTIVE EFFLUENTS (84750)

The inspector reviewed the licensee's reports concerning radioactive waste effluent releases to determine compliance with the requirements of 10 CFR 50.36(a)(?) and Technical Specification 5.9.4.a.

6.1 Discussion

The inspector reviewed the licensee's Semiannual Radioactive Effluent Release Reports for the periods January 1 through June 30, 1990; July 1 through December 31, 1990; January 1 through June 30, 1991; July 1 through December 31, 1991; and January 1 through June 30, 1992. These reports contained the specific information required by the Technical Specifications, and the radioactive effluent release data was tabulated in the format described in NRC Regulatory Guide 1.21, Revision 1, June 1974. However, it was noted that the Semiannual Radioactive Effluent Release Reports did not contain and present in the suggested format all the supplemental information recommended in Appendix B of Regulatory Guide 1.21, such as, regulatory limits, maximum permissible concentrations, average energy, measurements and approximations of total radioactivity, batch release summary, and abnormal releases. This observation was discussed with the licensee during the inspection and at the exit meeting on September 4, 1992. The licensee agreed to evaluate and compare the information provided in their Semiannual Radioactive Effluent Release Report with the supplemental information recommended in Appendix B of Regulatory

Guide 1.21. During the time period January 1, 1990, through June 30, 1992, the licensee had performed 639 liquid batch releases and 297 gaseous batch releases. The licensee reported one abnormal radiological gaseous release during the fourth calendar quarter of 1990. The abnormal release was from a leaking sample relief valve on December 9, 1990. The inspector reviewed the details of the abnormal release and determined that no radioactivity or dose Technical Specification limits were exceeded. One revision to the Process Control Program was made on November 27, 1991, which reflected the change in the vendor used for processing liquid radioactive waste. Revision 9 was made to the Offsite Dose Calculation Manual on May 15, 1991, to add radiation monitors RM-041, RM-042, and RM-043 located in the new chemistry and radwaste building. On June 1, 1992, the licensee had submitted to the NRC an application for amendment to the Fort Calhoun Station Technical Specifications to implement NRC Generic Letter 89-01. The inspector reviewed a copy of the application which proposed the relocation of the radiological effluent technical specifications to the Offsite Dose Calculation Manual and included draft copies of the proposed revised Technical Specifications and proposed revised Offsite Dose Calculation Manual. The licensee was waiting NRC approval of the proposed amendment prior to implementation. A summary of the radioactive liquid and gaseous effluent releases and associated doses for 1990 and 1991 is presented in Attachments 2 through 4 to this inspection report.

6.2 Conclusions

The licensee had submitted their Semiannual Radioactive Effluent Release Reports in a timely manner, and these reports contained the radioactive effluent release data required by the Technical Specifications presented in the format described in NRC Regulatory Guide 1.21. The abnormal radioactive gaseous release did not exceed any Technical Specification limits. Changes to the Process Control Program and the Offsite Dose Calculation Manual were properly documented.

7 AIR CLEANING SYSTEMS (84750)

The inspector reviewed the air cleaning ventilation system testing program to determine agreement with the commitments in Chapter 9 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 3.2, Table 3-5, and 3.6.

7.1 Discussion

The inspector reviewed the licensee's surveillance tests, and selected records and test results for the testing of the air cleaning ventilation systems which contained high efficiency particulate air filters and activated charcoal adsorbers. The inspector verified that the surveillance tests provided for the required periodic functional checking of the ventilation systems' components, evaluation of the high efficiency particulate air filters and activated charcoal adsorbers, and the replacement and in-place filter testing of the filter systems. Selected records and test results for the period January 1990 through July 1992 for the control room air treatment system, the spent fuel storage-decontamination areas air treatment system, the safety injection pump room air treatment system, and the containment recirculating

air cooling and filtering system were reviewed. The activated charcoal laboratory tests had been performed in accordance with approved procedures and surveillance tests by a contract laboratory, and selected test results were verified to be within Technical Specification limits. The inspector noted that the Technical Specification requirement for testing the various ventilation systems' activated charcoal adsorber material prior to 720 hours of operation following previous laboratory testing was being tracked by the control room on Surveillance Test Procedure OP-ST-SHIFT-0001, "Operations Technical Specification Shift Surveillance Log."

7.2 Conclusions

The air cleaning and filter ventilation systems conformed to the commitments in the Updated Safety Analysis Report and Technical Specification requirements. The licensee's safety related ventilation systems had been tested in accordance with Technical Specification requirements, and all test results were within Technical Specification limits.

8 **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (84750)**

The inspector reviewed the radiological environmental monitoring program to determine agreement with the commitments in Chapter 2 of the Updated Safety Analysis Report and compliance with the requirements in Technical Specifications 3.11, Table 3-9, and 5.9.4.b and the Offsite Dose Calculation Manual Section 9.

8.1 Discussion

The inspector reviewed the licensee's implementation of the radiological environmental monitoring program to ensure compliance with the sampling and analyses requirements, analyses lower limits of detection, analytical results, and reporting limits and requirements specified in the Technical Specifications and the Offsite Dose Calculation Manual. Surveillance tests for the administration of the radiological environmental monitoring program including the collection, processing, and shipment of samples were written in sufficient detail to ensure compliance with Technical Specification and Offsite Dose Calculation Manual requirements. All sample analyses for the radiological environmental monitoring program were performed by a contractor laboratory.

The inspector reviewed the Annual Radiological Environmental Operating Reports for 1989, 1990, and 1991 and determined that the sampling and analyses requirements and reporting requirements specified in the Technical Specifications and the Offsite Dose Calculation Manual had been met. The inspector reviewed the biennial land use censuses which were conducted in 1990 and 1992 and found them to be conducted in accordance with Technical Specification requirements. The results of these land use censuses were documented as required in the appropriate Annual Radiological Environmental Operating Reports.

The inspector inspected selected environmental media sampling locations associated with the radiological environmental monitoring program. The

following types of sampling locations were inspected: airborne, surface water, milk, broad leaf vegetation, and thermoluminescent dosimeters. The required equipment at the selected sampling locations was in place, operational, and calibrated. During the inspection of the selected environmental sampling locations, the inspector verified that the sampling locations were as described in the Offsite Dose Calculation Manual. The inspector reviewed the calibration program and records for the radiological environmental monitoring program air samplers. Calibration of each of the operating air samplers was performed prior to placement in the field and every six months while in operation. The inspector verified that all five air samplers currently in operation were in calibration. The inspector also verified that the 11 thermoluminescent dosimeters surrounding the plant were exchanged quarterly and sent to the contractor laboratory for processing. The licensee, in addition to the 11 quarterly exchanged thermoluminescent dosimeters, had also established a network of 32 additional thermoluminescent dosimeters positioned in two concentric rings around the plant with one dosimeter in each of the 16 meteorological sectors as part of the station's emergency plan. It was verified that these thermoluminescent dosimeters were exchanged annually as required. The licensee's quarterly thermoluminescent dosimeter results for 1990 and 1991 were compared to the NRC's and state's thermoluminescent dosimeter results for the collocated thermoluminescent dosimeter sites, and the results were in satisfactory agreement.

The contractor laboratory participated in the Environmental Protection Agency's Environmental Radioactivity Laboratory Intercomparison Program as required by the Technical Specifications. The inspector reviewed the contractor laboratory's performance in the Environmental Protection Agency's intercomparison program as reported in the 1989, 1990, and 1991 Annual Radiological Environmental Operating Reports and verified that a very high percentage of the analytical results were within the acceptance criteria of three standard deviations of the Environmental Protection Agency's known values. The contractor laboratory had also participated in six of the eight International Intercomparison of Environmental Dosimeter Program studies conducted since 1976, and the laboratory's results were reported in the licensee's Annual Radiological Environmental Operating Reports as required. The contractor laboratory's dosimeter results were in excellent agreement with the known values.

8.2 Conclusions

The licensee was implementing an excellent radiological environmental monitoring program in accordance with the Technical Specifications and the Offsite Dose Calculation Manual. The environmental sampling locations were as described in the Offsite Dose Calculation Manual, and the required sampling equipment was available, operational, and calibrated. The biennial land use censuses had been performed and documented as required. The environmental thermoluminescent dosimeter program was being implemented in compliance with Technical Specification and Offsite Dose Calculation Manual requirements. The licensee's thermoluminescent dosimeter results compared very well with the NRC's and state's thermoluminescent dosimeter results at collocated sites. The Annual Radiological Environmental Operating Reports had been issued and contained the information as required by the Technical Specifications. The

contractor laboratory's performance in the Environmental Protection Agency's Environmental Radioactivity Laboratory Intercomparison Program and the International Intercomparison of Environmental Dosimeter Program was excellent and met the Technical Specification requirements.

9 INTERNAL EXPOSURE CONTROL (83725)

The inspector reviewed the details concerning a licensee identified internal exposure intake to determine compliance with 10 CFR 20.103 requirements.

9.1 Discussion

On April 16, 1992, during the change out of the reactor letdown filters CH-17A and B, a radiation protection technician received an intake of airborne radioactive material. The radiation protection technician who received the intake of radioactive material was originally stationed outside room 11, where the reactor system letdown filters were being replaced. His function was to escort the sealed drums containing the used filters to a storage area. Respiratory protection equipment was not required for this function. Both filter assemblies were changed out successfully, and the drums containing the used filters were transported to storage escorted by the radiation protection technician. The radiation protection technician returned to room 11 expecting to see the maintenance personnel exiting the area.

Since the maintenance personnel were not in the process of exiting room 11, the radiation protection technician proceeded into room 11A to see if assistance was needed since the process of changing out the filters was physically demanding and this was compounded by the protective clothing and respiratory protection equipment requirements. When the radiation protection technician reached the boundary of the highly contaminated area, he observed two of the maintenance personnel in obvious physical stress and still dressed in protective clothing and wearing respirators. The radiation protection technician immediately began helping undress the stressed maintenance workers. The highly contaminated clothing was removed, placed in a bag, and left near the highly contaminated area boundary. The radiation protection technician escorted the stressed workers to an area where they could rest and recover, and he returned to room 11 to see if further assistance was needed. The radiation protection technician then assisted a second radiation protection technician inside the highly contaminated area in transferring the highly contaminated protective clothing across the highly contaminated area boundary.

According to interviews with the two radiation protection technicians involved, the initial assessment of the intake of radioactive material by the first radiation protection technician, who had not been required to wear respiratory equipment in conjunction with his original work assignment by the radiation work permit, probably took place during the process of helping to place a bag of highly contaminated clothing into a clean bag for transport at which time a localized airborne radioactivity area was generated allowing the inhalation of radioactive material by the radiation protection technician not wearing respiratory equipment. The event was discovered when the radiation protection technician attempted to exit the radiation controlled area and alarmed the personnel contamination monitor. The radiation protection

technician was placed on an exclusion from the radiation controlled area, and invitro and invitro bioassay sampling and measurements were initiated. The radiation protection technician showed possible internal contamination from whole body counts and positive nasal smears. Respirator cartridges and air sampler filters were retained for analysis. Air sample activity was verified to be higher than expected due to airborne alpha contamination. On April 15, 1992, the licensee started their initial investigation of the event, and bioassay sample collections were started on the internally contaminated radiation protection technician. Four urine samples, one fecal sample, one air sampler filter, and two respirator cartridges were sent to a contractor laboratory for analyses. Based on the initial gamma isotopic analysis results of the four urine samples, the licensee requested a transuranic analysis on one of the urine samples. From the initial gamma isotopic results of the urine samples and preliminary dose calculations, radiological occurrence report 92-030 assigned 45.52 MPC-hours to the radiation protection technician as a result of his intake of radioactive material.

Upon receipt of the results from the initial gross alpha, gross beta, and gamma isotopic analyses of the air sampler filter, two respirator cartridges, and the fecal sample, a transuranic analysis of the air sampler filter was requested. The transuranic analysis of the first urine sample showed a positive Pu-238 result. On July 17, 1992, initial dose calculations were performed by the licensee using the transuranic analysis results from the radiation protection technician's urine sample. These dose calculations indicated a possible exposure to the radiation protection technician in excess of the 10 CFR 20.103 limit (520 MPC-hours). The licensee met with the NRC resident inspectors and informed them of the preliminary dose results from the dose calculations and provided the resident inspectors with a copy of the radiological occurrence report 92-030 which contained the preliminary analysis of the incident for their review. The exposed radiation protection technician was also informed of the analytical results of the bioassay samples and the preliminary analysis of the event and associated dose commitment.

On July 31, 1992, the licensee informed the NRC Region IV office of the event and the licensee's plans for a followup investigation. Arrangements were made by the licensee with a consultant to assist in performing the MPC-hour calculations. Additional results from the urine samples were received from the contractor laboratory on August 7, 1992, and dose calculations based on these transuranic analytical results indicated a possible intake of radioactive material in excess of 1800 MPC-hours. However, the consultant's calculated MPC-hours, based primarily on the radiation protection technician's whole body count data, projected an MPC-hour exposure value of approximately 363 MPC-hours.

On August 20, 1992, the licensee informed the NRC Region IV office of the projected internal exposure of 363 MPC-hours. A second consultant was contracted by the licensee to assist in the investigation and dose assessment. The second consultant had submitted a draft report which indicated a calculated upper bounds dose of 514 MPC-hours for the transuranics, 1 MPC-hour for cobalt-58 and cobalt-60, and 2 MPC-hours for the remaining activation and fission product contribution to the total dose. Therefore, the preliminary upper bounds dose was estimated at 517 MPC-hours. However, the second

consultant also indicated that the most probable intake dose result would be close to the 363 MPC-hours calculated by the first consultant, and that the value was probably very conservative. At the time of the inspection, the licensee had not completed their investigation and had not made a final assignment of the internal exposure to the radiation protection technician and whether the internal exposure to the radiation protection technician exceeded the 10 CFR 20.103 limit of 520 MPC-hours.

This is considered an unresolved item pending completion of the final MPC-hour evaluation and a review of radiological controls associated with the event (285/9219-01).

9.2 Conclusion

An unresolved item (285/9219-01) was identified.

10 FOLLOWUP (92701)

10.1 (Closed) Inspection Followup Item (285/9041-04): Radiological Services Group Effluent Dose Calculations

This inspection followup item was identified in NRC Inspection Report 50-285/90-41 and involved differences in the calculated dose results between the licensee's radiological services group and the NRC for the various age groups and critical organs resulting from radioactive liquid and gaseous effluents. The inspector determined that the licensee had completed their study and research of the computer code, GASPAP, and confirmed that hand calculated doses from selected radionuclides matched the doses calculated by GASPAP. The inspector performed additional confirmatory dose calculations with the licensee after verifying all input data to be correct and verified that all calculated doses resulting from radioactive iodines and particulates in gaseous effluents compared exactly (within round-off error) between the licensee and the NRC for all age groups (adult, teen, child, and infant) and for all critical organs (liver, thyroid, kidney, lung, gastro-intestine, and total body). The comparative dose results from the confirmatory dose calculations were satisfactory to close this item.

10.2 (Closed) Inspection Followup Item (285/9119-02): Updated Safety Analysis Report Update Regarding Radioactive Waste Processing Building

This inspection followup item was identified in NRC Inspection Report 50-285/91-19 and involved the lack of the description of the new radioactive waste processing building in the Updated Safety Analysis Report. The licensee submitted on July 22, 1992, an update to the Safety Analysis Report which added and described the new radioactive waste processing building and chemistry and radiation protection building in Sections 1.2, 7.6, 9.10, 9.11, 11.1, 11.2, 11.3, and 14.20. The inspector reviewed the details of the update submitted to the Updated Safety Analysis Report as proposed in the above listed sections and found the licensee's submittal satisfactory to resolve the inspector's concern.

ATTACHMENT 1

1 PERSONS CONTACTED

1.1 Licensee Personnel

- *T. L. Patterson, Acting Division Manager, Nuclear Operations
- *R. L. Andrews, Division Manager, Nuclear Services
- *S. K. Gambhir, Division Manager, Production Engineering
 - R. M. Bilau, Surveillance Test Clerk
 - C. J. Brunnert, Supervisor, Operations Quality Assurance
- *V. A. Caragiulo, Instructor, Chemistry/Radiation Protection Training
- *J. W. Chase, Acting Plant Manager
- *A. J. Clark, Acting Manager, Administration
 - A. A. Costanzo, Senior Analyst, Radiological Services
 - M. L. Ellis, Supervisor, Instruments and Controls
- *F. F. Franco, Manager, Radiological Services
- *J. K. Gasper, Manager, Nuclear Training
 - J. F. Gass, Supervisor, Operations Training
- *S. W. Gebers, Health Physicist, Radiological Services
- *J. M. Glantz, Chemist, Radiological Services
 - R. G. Haug, Supervisor, Chemistry/Radiation Protection Training
- *R. L. Jzworski, Manager, Station Engineering
- *L. T. Kusek, Manager, Nuclear Safety Review
- *D. L. Lippy, Engineer, Nuclear Licensing
- *D. L. Lovett, Supervisor, Radiation Protection
- *W. W. Orr, Manager, Quality Assurance/Quality Control
- *B. A. Schmidt, Supervisor Radiochemistry
- *R. W. Short, Manager, Nuclear Licensing
- *F. K. Smith, Supervisor, Chemistry
 - D. E. Spires, Supervisor, Secondary Chemistry
- *K. E. Steele, Acting Supervisor, Radiological Health and Engineering
 - M. A. Wilson, Analyst, Radiological Services

1.2 NRC Personnel

- *R. P. Mullikin, Senior Resident Inspector

*Indicates those present at the exit meeting on September 4, 1992.

2 EXIT MEETING

An exit meeting was conducted on September 4, 1992. During this meeting, the inspector reviewed the scope and findings of the inspection. The licensee stated that they would evaluate the content of the Semiannual Radioactive Effluent Release Reports. The licensee did not identify as proprietary, any of the materials provided to, or reviewed by the inspector during the inspection.

ATTACHMENT 2

SUMMATION OF ALL LIQUID EFFLUENT RELEASES

	1990				1991			
	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
	1. Number of batch releases	77	102	71	51	51	28	56
2. Fission & Activation Products (Curies)	1.41 E-01	2.61 E-01	1.47 E+00	2.61 E-01	1.03 E+00	6.60 E-02	9.47 E-01	4.17 E-02
3. Tritium (Curies)	4.45 E+01	9.35 E+00	8.19 E+01	3.79 E+01	4.15 E+01	2.95 E+01	6.02 E+01	4.53 E+01
4. Dissolved & Entrained Mobile Gases (Curies)	4.30 E-01	1.34 E-02	1.54 E-01	3.83 E-01	5.57 E-02	3.20 E-02	4.89 E-02	3.12 E-01
5. Waste Volume Released (liters)	2.39 E+07	2.06 E+07	3.84 E+07	3.61 E+07	3.44 E+07	3.83 E+07	3.16 E+07	3.06 E+07

ATTACHMENT 3

SUMMATION OF ALL AIRBORNE EFFLUENT RELEASES

	1990				1991			
	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4
1. Number of batch releases	30	29	28	33	29	17	34	26
2. Fission & Activation products (Curies)	2.53 E+02	6.09 E+00	8.16 E+01	1.18 E+02	2.03 E+01	2.18 E+01	2.77 E+02	3.85 E+01
3. Total Iodine-131 (Curies)	3.03 E-04	4.69 E-05	1.72 E-04	1.25 E-03	1.36 E-04	8.30 E-06	4.71 E-05	1.03 E-05
4. Particulates with Half-lives > 8 days (Curies)	0.00 E+00	5.22 E-08	1.63 E-05	1.91 E-05	9.63 E-06	6.98 E-05	3.93 E-05	1.70 E-06
5. Tritium (Curies)	2.25 E+00	8.87 E-01	2.79 E-01	3.96 E+00	2.92 E-02	2.23 E-02	2.49 E-01	3.95 E-02

ATTACHMENT 4

MAXIMUM DOSES TO THE PUBLIC DUE TO RADIOACTIVITY RELEASED IN GASEOUS AND LIQUID EFFLUENTS

	1990 Dose	Annual Limit Per Unit	Percent of Limit
Liquid Effluents			
Whole Body	1.04 μ rem	3 μ rem	34.7%
Organ (liver)	1.47 μ rem	10 μ rem	14.7%
Gaseous Effluents			
Noble Gas		10 μ rad	0.287%
Gamma (Air Dose)	0.028 μ rad	20 μ rad	0.389%
Beta (Air Dose)	0.078 μ rad		
Iodine-131, Iodine-133, tritium, and particulates with half-lives > 8 days	1.71 E-03 μ rem	15 μ rem	0.011%
	1991 Dose	Annual Limit Per Unit	Percent of Limit
Liquid Effluents			
Whole Body	0.54 μ rem	3 μ rem	18.0%
Organ (liver)	0.75 μ rem	10 μ rem	7.5%
Gaseous Effluents			
Noble Gas		10 μ rad	0.23%
Gamma (Air Dose)	0.023 μ rad	20 μ rad	0.30%
Beta (Air Dose)	0.060 μ rad		
Iodine-131, Iodine-133, tritium, and particulates with half-lives > 8 days	2.59 E-04 μ rem	15 μ rem	0.002%