



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

JAN 12 1990

Report Nos.: 50-338/89-33 and 50-339/89-33

Licensee: Virginia Electric and Power Company
 Glen Allen, VA 23060

Docket Nos.: 50-338 and 50-339

License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: December 11-15, 1989

Inspectors:

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1/9/90

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Facilities Radiation Protection Section
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SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of occupational radiation protection, radioactive waste systems, water chemistry, maintaining occupational exposure as low as reasonably achievable, Information Notices, and licensee action on previously identified inspection findings.

Results:

In the areas inspected, one violation was identified for failure to adequately survey equipment being released for unrestricted use (Paragraph 5.a). Although this violation was similar to a violation which occurred on September 28, 1987 (50-338, 339/88-18-03), it did not appear to be indicative of a programmatic breakdown nor did it appear to be a careless disregard of NRC requirements. Based on interviews with licensee management and staff; review of records, procedures, and health physics data; and observation of work in progress; it appeared that the licensee's water chemistry program was adequate and the radiation protection program was functioning as necessary to protect the health and safety of occupational radiation workers.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- R. Boehling, Corporate Engineer
- *M. Bowling, Assistant Station Manager (Acting Station Manager)
- E. Dreyer, Supervisor, Health Physics Technical Services
- R. Irwin, Supervisor, Health Physics Operations
- T. Johnson, ALARA Coordinator, Health Physics
- *P. Kemp, Supervisor, Licensing
- J. Leberstein, Licensing Engineer
- N. Nicholson, Staff Health Physicist
- T. Peters, Supervisor, Exposure Control
- *D. Quarz, Licensing Engineer
- J. Schleser, ALARA Technician
- *O. Sloane, Supervisor, Chemistry
- *A. Stafford, Superintendent, Radiological Protection
- M. Terry, System Engineer
- *F. Thomasson, Supervisor, Corporate Health Physics

Other licensee employees contacted during this inspection included engineers, operators, technicians, and administrative personnel.

*Attended exit interview

2. Audits and Appraisals (83750, 84750)

Technical Specification (TS) 6.5.3.1 requires audits of facility activities to be performed under the cognizance of the Quality Assurance (QA) Department encompassing conformance of facility operation to provisions contained within the TSs and applicable license conditions at least once per 12 months; radiological environmental monitoring program and the results thereof at least once per 12 months; Offsite Dose Calculation Manual and implementing procedures at least once per 24 months; and the Process Control Program and implementing procedures for processing and packaging of radioactive wastes at least once per 24 months.

The inspectors reviewed and discussed the following audits of radiological protection and environmental monitoring activities conducted from January 1989 through December 1989:

- ° Health Physics, N-89-15, November 10, 1989
- ° Radiological Environmental Monitoring and Offsite Dose Calculation Manual, N-89-02, May 15, 1989

In general, the audits were found to be well planned and adequately documented. The commitments and responses to audit findings from QA Audit N-89-15 were not available for review since the report was only issued on December 7, 1989. Normally, licensee management has 30 days to respond to audit findings.

Additionally, the inspectors reviewed a Health Physics (HP) Department Performance Evaluation (undated) which was conducted by the North Anna HP technical staff in October 1989 to assess the performance of the HP Department during the Units 1 and 2 1989 refueling outages. This self-assessment contained items of substance related to the radiological protection program. The inspectors observed that the self-assessment contained responsive commitments by management to effect corrective actions for the deficiencies which had been identified.

QA Audit N-89-02 identified one finding concerning estimated pump run times of the environmental air samplers when the elapsed timers on the pumps malfunctioned and the proper documentation of these malfunctions. Although this finding had not been completely resolved at the time of this inspection, corrective actions had been and were being actively pursued.

No violations or deviations were identified.

3. Changes (83750)

By observation and discussion with cognizant supervisory and management personnel, the inspectors determined if significant changes occurred since the last inspection in organization, personnel, facilities, equipment, programs, and procedures that may affect occupational radiation protection. The inspectors only observed relatively minor changes to the licensee's radiation protection organization. Although the staff size was not reduced, the Radwaste/Decon Supervisor position was eliminated and the responsibilities of that position were shared between HP Operations and HP Technical Services. The licensee indicated that this position would be reinstated once the New Radwaste Facility is completed. The licensee's HP staff consisted of 39 HP technicians and six HP shift supervisors. Additional contractor support included 12 decon technicians and six HP technicians. The licensee's chemistry organization, as of November 1, 1989, was moved under the radiation protection group with the chemistry supervisor reporting to the Radiation Protection Superintendent. Total chemistry group staffing also increased from 23 to 26 persons, indicating increased attention to plant chemistry. There appeared to be sufficient management support to implement the essential elements of the program as necessary.

With regard to equipment changes, the licensee had purchased 500 Merlin-Gesin Model DMC-90 digital alarming dosimeters (DADs). The licensee plans to replace the pocket ion chambers with the DADs. In its five-year plan, the licensee was committed to upgrading its laundry facility and purchase a stand-up fast scanning whole-body counter. No other significant changes to the program were noted.

No violations or deviations were identified.

4. Internal Exposure Control (83750)

a. Respiratory Protection

The licensee was required by 10 CFR 20.103, 20.201(b), 20.401, and 20.403 to control intakes of radioactive material, assess such intakes, and keep records of and make reports of such intakes.

The inspectors verified that the licensee issued respirators for use after verifying the user's training and qualifications for the type of respirator issued; the date of last annual medical review; the user's respirator fit testing date; whole body counter results; and the user's total maximum permissible concentration-hours in the last seven days. The licensee hand washed each respirator after use and verified that there was no fixed radioactive material greater than 0.2 mCi/hr. The inspectors toured the respirator issuance and repair areas and determined that respirators needing repair were separated from those stored for issue.

No violations or deviations were identified.

b. Internal Assessment

The inspectors reviewed selected whole body results for calendar year 1989 and observed that no administrative limits had been exceeded. The licensee's administrative limit was five percent of the maximum permissible body burden (MPBB) and was defined in H.P.-5.2.B.11, "Bioassay Data Evaluation and Followup."

Additionally, the inspectors reviewed the calibration records and quality control (QC) checks of the licensee's whole body counting system. The whole body counting system consisted of two Nuclear Data "moving bed" geometry counters (ND100 and ND6620) which were located in the dose control and bioassay field office located outside the protected area. The two counters were calibrated on April 26, 1989, and the inspectors reviewed the following records: (1) background check; (2) energy calibration; (3) full-width-half-maximum (FWHM) check; (4) detector efficiency determination; and (5) lower limit of detection verification. The inspectors also reviewed daily QC records for the time period covering December 6-13, 1989. The licensee checked shifts in photopeak widths (i.e., FWHM) and changes in detector efficiency on a daily frequency. The scope of the review was limited since the licensee transmitted the QC records to the station's records vault on a weekly cycle. The whole body counting facility did not maintain a copy of the QC records nor maintain graphs of the QC data for trending analysis. The primary purpose of the QC data is for the equipment operators to monitor system performance. The inspectors and licensee representatives discussed the importance of trending analysis and its use in monitoring

electronic drifts or recognizing failures of the analog-to-digital converters. The licensee agreed that the trending of whole body counting QC data would be a program enhancement.

During tours of the facility, the inspectors observed work in progress in the Decon Bay area where the drumming of radwaste was being performed. The inspectors observed a continuous low-volume air sample being collected. The air sampler appeared to be located so that a representative sample of air in zones occupied by the workers could be collected.

No violations or deviations were identified.

c. Engineering Controls

10 CFR 20.103(b)(1) requires that licensees use process or other engineering controls, to the extent practicable, to limit concentration of radioactive materials in the air to levels below those which delimit an airborne radioactivity area as defined in 10 CFR 20.203(d)(1)(ii).

The inspectors discussed the use of engineering controls to reduce the number of radioactive airborne areas in the plant. It was observed that the licensee attempted to reduce airborne areas by reducing the contaminated floor space to approximately 7,000 square feet (ft²) (or 7 percent of the total area). Additionally, the following equipment was purchased during the last year:

- ° Glove bags (although the glove bags have had limited use, the licensee plans to train the mechanics on how to use them)
- ° Tents
- ° Wet/dry vacuum HEPA units (10 purchased)
- ° Portable HEPA units (10 purchased)

The inspectors regarded the equipment purchases and the aggressive plant clean-up activities as program improvements.

No violations or deviations were identified.

5. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (83750)

a. Surveys

During plant tours, the inspectors measured radiation levels outside selected rooms and cubicles in the Auxiliary Building. The inspectors observed that the independent radiation level survey results were comparable with licensee survey results. The inspectors

also examined the licensee's radiation protection instrumentation and verified that selected instruments were in current calibration.

10 CFR 20.201(b) requires each licensee to make or cause to be made such surveys as: (1) may be necessary for the licensee to comply with the regulations in 10 CFR 20; and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

TS 6.8.1 requires written procedures to 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, requires written procedures for contamination control.

HP Procedure HP-7.1.10, "Radioactive Material Control Program," requires that loose surface contamination on items to be released for unrestricted use be less than or equal to 1,000 dpm/100 cm² beta-gamma activity and less than or equal to 20 dpm/100 cm² alpha activity. Additionally, the procedure requires that the total beta-gamma activity on the surface (fixed plus removable contamination) shall be less than or equal to 5,000 dpm/100 cm² and the total alpha surface activity be less than or equal to 100 dpm/100 cm².

During this inspection, the inspectors were following up on an incident which occurred on August 25, 1989, involving a shipment of contaminated instrumentation from the North Anna Power Station to another facility (Waterford 3). The licensee documented this incident in a Radiological Incident Report (RIR) dated September 21, 1989. The information that follows was based on that RIR and interviews with selected personnel. On August 25, 1989, a Teledose (trademark) dosimetric system (owned by the Westinghouse Integrated Radiological Services Program (IRSP)) was shipped from the North Anna Power Station in an unlabeled package to the Waterford 3 facility. The contamination was detected when the instrumentation caused an alarm on the portal monitor at the entrance to the Waterford plant. No contamination was found on the exterior package nor interior packing. The Teledose system consisted of a base station and five remote units and had been used in North Anna's Radiological Controlled Area (RCA) during the licensee's simultaneous dual unit outage. The Teledose system had been released from the RCA and was presumed to meet the licensee's criteria for unrestricted release (HP-7.1.10). According to the licensee's instrument issue log, the Teledose system was last used on June 22-23, 1989. Apparently, the equipment was contaminated when it was returned to the instrument issue room and was decontaminated by an HP instrumentation specialist. Based on interviews conducted by the licensee, the equipment was surveyed and released by a health physics technician; however, the release survey was not documented, nor was the HP technician identified. Additionally, the Teledose equipment was not

tagged or otherwise identified as equipment released for unrestricted use. The equipment was initially stored in the high range calibration facility and subsequently transferred out of the Protected Area to the Westinghouse office in Warehouse 2. The licensee was unable to determine if the Teledose system was hand carried out of the Protected Area through the exit portal monitors or if it was transported with other boxes via a vehicle through the security gate.

The survey and analytical data that were used to determine the total activity in the package were furnished by the Waterford 3 HP staff. The survey results indicated the following:

Three remote units:

1,000-2,000 dpm/100 cm² loose (antenna and connector)
1,500-50,000 dpm/100 cm² fixed (general area)

Base station:

10,000 dpm/100 cm² fixed (receiver plug)

The Waterford 3 licensee performed a spectral analysis of a smear taken of the Teledose system and identified the following nuclides: Co-58, Co-60, Mn-54, Cs-137, and Nb-97. The licensee estimated the total activity for loose surface contamination to be 2.08 E-3 uCi and fixed contamination to be 3.13 E-1 uCi. The calculated total activity values were less than the limits specified in 10 CFR 30.71, Schedule B.

The licensee identified the following possible causes which contributed to this incident:

- ° Inadequate survey. A more detailed survey of the Teledose system should have indicated the presence of radioactivity.
- ° No survey documentation. Survey documentation may have indicated the type and location of contamination found.

The licensee had recommended several corrective actions to prevent recurrence of similar events, including the maintenance of a survey log of items released from the RCA. The inspectors observed the use of a survey log at the main personnel exit of the RCA. The survey log included information such as the date, time, serial or identification number of the item, item name, whether or not release criteria were met, signature of technician authorizing the release, and the exit location from the RCA. The following three release survey logs were maintained: (1) Personnel Decontamination Area log; (2) Decon Bay Area log; and (3) HP Shift Supervisor "floating" log. There were no procedural requirements to maintain or use these survey logs. The inspectors discussed the use of survey logs with selected HP technicians and it appeared that there was some reluctance to use the survey log, especially in the case where a particular item leaves

the RCA several times in one day and is surveyed by more than one technician. The concern deals with a technician who performs an inadequate survey and fails to make an entry in the survey log and the responsibility more than likely placed on the technician who properly surveyed and documented the same piece of equipment. Licensee management was made aware of this concern.

The inspectors discussed this incident with licensee representatives and noted that a similar event occurred on September 28, 1987, involving an inadequate survey of boxes of tools and cutting equipment and subsequent release and shipment to the owner of the equipment. An inadequate survey and lack of survey documentation attributed to this event. Since similar violations are of significant concern to the NRC, this matter was discussed with licensee representatives and Regional management. It was noted that the safety significance of the Teledose equipment shipment event was relatively minor and that it did not appear that there was a careless disregard of NRC requirements nor an indication of a programmatic breakdown. However, failure to survey adequately material being released to unrestricted use was identified as a repeat violation of 10 CFR 20.201(b) and TS 6.8.1 (50-338, 339/89-33-01).

One violation was identified.

b. Area and Personnel Contamination

The inspectors reviewed records of personnel contamination events (PCEs) for 1989. Through October 1989, the licensee identified 549 skin and clothing contaminations. This was an increase over the 258 PCEs reported in 1988. In discussions with HP engineering, the inspectors noted that an explanation for the increase had not been determined since the trending of PCEs was not being performed from January - August 1989. The NRC identified in Inspection Report No. 89-15, dated June 15, 1989, that HP was documenting the occurrence of PCE's and was forwarding these data to the Human Performance Evaluation Section (HPES) for trending and analysis, and providing corrective actions to reduce PCEs. However, no provisions had been made for HPES to perform an evaluation and trend the data. In August 1989, the HP group resumed the responsibility for PCE trending and analysis. HP representatives stated that this transfer occurred after the two major outages and since August the PCE occurrences have decreased. The licensee observed no trend except that the percentage of shoe contaminations was high. The licensee maintained approximately 105,000 ft² of the RCA as controllable for decontamination purposes.

The licensee reported that 9,852 ft² of the RCA was contaminated at the beginning of 1989. The station goal was established to have less than 8,000 ft² of contaminated RCA by December 1989. Through an aggressive leak reduction/decontamination program, the licensee has reduced the contaminated RCA to 7,708 ft². Based on tours of the

RCA, the inspectors determined that housekeeping had greatly improved at the station and that management support for this program was evident.

No violations or deviations were identified.

6. Program for Maintaining Exposures As Low As Reasonably Achievable (ALARA) (83750)

10 CFR 20.1(c) states that persons engaged in activities under licenses issued by the NRC should make every reasonable effort to maintain radiation exposures ALARA. The recommended elements of an ALARA program were contained in Regulatory Guides 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposure at Nuclear Power Stations will be ALARA;" and 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposure ALARA."

The inspectors discussed the ALARA program with licensee representatives and reviewed post outage reports issued by HP. On February 20, 1989, the licensee shut Unit 2 down for a scheduled 64-day refueling and maintenance outage. The licensee expended 628 person-rem which was under the projected 678 person-rem for the 77-day outage. The post refueling outage report stated that considerably more dose was expended during this outage as compared to the last Unit 2 outage. For example, the extended steam generator (S/G) inspection and repair work accounted for approximately 42 person-rem more than it did during the 1987 outage (186 versus 144 person-rem). Additionally, removal of large bore snubbers also added 82 person-rem to the outage dose total.

Five days after the scheduled shutdown of Unit 2, Unit 1 reactor tripped from 76 percent power due to a steamflow/flow mismatch in "C" S/G. During the ensuing transients, a mechanical plug failed causing a S/G tube rupture. This event initiated the refueling and maintenance outage for Unit 1 that was scheduled to begin during the second week of April 1989. The Unit 1 outage duration was 141 days and resulted in a expenditure of 799 person-rem.

During the review of licensee collective dose expended for major tasks, the inspectors compared the licensee's performance to industry averages for similar tasks listed in NUREG/CR-4254, "Occupational Dose Reduction and ALARA at Nuclear Power Plants: Study on High Dose Jobs, Radwaste Handling, and ALARA Incentives," April 1985. For tasks such as refueling, snubber inspection, scaffolding installation/removal, and in-service-inspection, the licensee performance during outages from 1985 through 1989 compared favorably with the exception of S/G maintenance. S/G maintenance dose has increased from 13 percent of annual collective dose in 1986 to 28 percent and 30 percent in 1987 and 1989, respectively.

A number of good dose reduction practices and concerns were listed in each of the refueling outage reports for 1989. Since the outages ran concurrently, the reports reflected almost the same good practices and

concerns. The following dose reduction practices were noted: (1) use of the reactor head shield during refueling operations where a dose savings of 50-60 percent; (2) implementation of a computerized hold for radiation work permits that exceeded 125 percent of projected dose; and (3) use of a packing extraction tool in valve work. The following major concerns were listed: (1) excessive dose to manually remove sludge from the cavity because the transfer canal drain line was located four inches above the floor; (2) HP coverage of eddy current operations from inside the S/G cubicles; (3) high radiation levels on the pressurizer spray lines; and (4) high radiation levels on the RTD by-pass manifold/lines. The most significant concern appeared to be the excessive dose rates and accumulated dose during work near the RTD manifold. Data were presented by the HP group that showed since 1985, dose from work in the vicinity of the RTD by-pass manifold area was responsible for 21 percent of the station's total annual dose, and that replacement could result in a savings of dose on the order of 50 percent in the loop rooms and reactor coolant pump cubicles.

In discussions with the inspectors, licensee representatives stated that concerns listed in the post outage reports were listed as action items and tracked to completion on an HP Improvement Log or other methods such as design changes and maintenance work requests. The inspectors and the Section Chief from Facilities Radiation Protection, Region II, discussed the importance of dose reduction initiatives, such as the replacement of the RTD by-pass manifold and lines with station management. The licensee indicated that funding for the project was awaiting approval. The inspectors stated that progress on this project, as well as other major source term reduction projects, would be reviewed during subsequent inspections.

No violations or deviations were identified.

7. Plant Chemistry (79701)

The inspectors reviewed the Units 1 and 2 secondary trends graphs for the period June - December 1989 and held discussions with cognizant chemistry personnel. S/G blowdown cation conductivity in both units had been maintained between 0.30-0.35 micromhos/cm (umho/cm) (0.18-0.20 umho/cm when corrected for Boric Acid contribution). This was well below the recommended industry guideline of 0.8 umho/cm.

S/G blowdown chloride concentrations in Unit 1 averaged about 10 parts per billion (ppb) with sulfate and sodium concentration both at about 5 ppb. Although the chloride levels are within the recommended level of 20 ppb, these concentration were considered by the licensee to be indicative of slight Unit 1 condenser in-leakage since only about 10 percent of the total feedwater flow is demineralized during power operations.

Unit 2 S/G blowdown conductivity (corrected for boric acid contribution) had been maintained at about 0.18 umho/cm during power operations.

Sodium, chloride, and sulfate concentrations had been generally maintained below 5 ppb for the period.

Condenser air ejector noble gas activity measurements performed during December 1989 indicated primary to secondary leak rates of approximately 3 to 4 gallons per day in Unit 1 and less than 0.5 gallons per day in Unit 2.

In order to mitigate further denting of S/G tubes, boric acid continued to be added to the steam cycle of both units (6-7 ppm). This was to continue at least until S/G replacements in the middle 1990's. Although boric acid addition had been effective in preventing further denting, S/G bulk pH was reduced from 9.0 (normal levels without boric acid) to 7.5 as a result of boric acid concentration in the S/Gs.

Both North Anna units continued to remove large amounts of sludge from the S/Gs during the last outages. During Spring 1989, almost 4,200 pounds of sludge was lanced from the Unit 1 steam generators. This was a 22 percent (750 pound) increase over last outage in 1987. About 830 pounds of sludge was removed from the Unit 2 S/Gs during the last outage in early Spring 1989. This was a 12 percent (90 pounds) increase over the last outage also in 1987.

To help reduce this sludge buildup in the S/Gs, the licensee planned to begin the use of morpholine as a pH control agent in the steam cycle, which would begin within 30 days in Unit 1 and the next fuel cycle in Unit 2. Current pH control was accomplished with excess hydrazine, an oxygen scavenger, which breaks down to ammonia. Hydrazine will continue to be used as an oxygen scavenger during morpholine pH control. Morpholine, an alkalizing organic amine, has a distribution coefficient that is more favorable toward the liquid phase than ammonia in two-phase systems (moisture separator - reheaters, heater drain systems, extraction lines) which would result in a higher pH in the liquid phase. The higher pH in these areas was to hopefully reduce iron corrosion in these normally susceptible areas and therefore reduce sludge buildup in the S/Gs.

Service water corrosion control was accomplished with a molybdate/phosphate corrosion inhibitor. Biological attack (Microbiologically Influenced Corrosion) was controlled with a treatment scheme consisting of a surfactant, a chloro-bromo based biocide, and a deposit penetrant. Since beginning this treatment scheme, corrosion rates in the service water system had been reduced to about 1 mil per year. Corrosion rates were monitored with corrosion coupons and a newly installed in-line corrosion monitoring system that was partially operational at the time of the inspection.

The inspectors, along with a licensee representative, toured the recently installed make-up water treatment plant. The plant contained three parallel trains capable of about 120 gpm each. Each train consisted of sand flow filters (common to all trains), ultra-filters, electrodialysis reversal units, reverse osmosis units, mixed bed ion exchangers and

dissolved oxygen removal units. This sophisticated system produced excellent quality make-up water from Lake Anna with the system effluent conductivity at 0.056 umho/cm and total organic carbon less than 10 ppb.

No violations or deviations were identified.

8. Semiannual Effluent Reports (84750)

The inspector reviewed the Semiannual Radioactive Effluent Release Report for the period January 1 through June 30, 1989. This review included an examination of the liquid and gaseous effluent release data for this period as compared with 1987 and 1988. These data are summarized in the attachment to this report.

Neither gaseous nor liquid radioactive effluents showed any statistically significant trends from 1987 through the first half of 1989. These effluents were also well within TSs, 10 CFR 20, Appendix B, and 10 CFR 50, Appendix I, effluent limitations.

No violations or deviations were identified.

9. Confirmatory Measurements (84750)

The results of a recent confirmatory measurements program between the NRC and the licensee of selected radionuclides (June 1989) indicated that the licensee was in agreement for Strontium-89, Strontium-90, and Iron-55 but was in disagreement for Tritium. (See supplement to Inspection Report Nos. 50-338/89-09 and 50-339/89-09, dated October 19, 1989.) During this inspection, the reasons for the disagreement and the corrective actions were discussed with licensee representatives.

A confirmatory measurements program for tritium administered by the corporate HP staff in May 1989 also indicated disagreement. Investigations by the plant staff revealed that inaccurately prepared liquid scintillation counter calibration standards most likely caused by improper pipetting was the cause for the disagreement. After procedural improvements, a later recount showed good agreement.

The previously discussed disagreement of tritium values in June 1989 between the NRC and the licensee prompted further investigations which revealed that poor distillation techniques during sample purification had caused carryover of non-volatile radioisotopes with the distillate. This caused interferences during sample counting resulting in high values. Since the licensee's value was over twice as high as the NRC's value, this conclusion appeared reasonable. Subsequent comparisons conducted between the plant, an outside vendor (June 1989) and the corporate HP staff (September 1989) showed good agreement in all cases.

To further confirm the adequacy of the licensee's corrective actions, the inspector informed the licensee that another NRC spiked sample would be shipped for subsequent analysis at a later date. The comparison of these

sample results will be reviewed during a subsequent inspection and will be tracked by the NRC as an inspector followup item (IFI) (IFI: 50-338/89-33-02).

No violations or deviations were identified.

10. Radiological Environmental Monitoring (84750)

The licensee's Annual Radiological Environmental Operating Report for 1988, as required by Section 6.9.1.8 of the TSs, was reviewed and discussed. The following observations were noted:

- a. Gross beta air particulate activities were comparable to 1982-1987 levels with no significant trends noted (except for a five-week period in 1986 after the Chernobyl accident).
- b. No fission or activation products were detected at any of the offsite air monitoring stations during 1988 except low levels of Cesium-137 detected in the first quarter composite sample from station No. 3, but this could be attributable to past atmospheric nuclear weapons testing.
- c. Surface water tritium samples collected from Lake Anna at the plant discharge lagoon averaged 3,915 picocuries/liter for 1988. This was consistent with a slow increasing trend noted since 1978 (preoperational) when the average lake tritium activity was below 300 picocuries/liter. Although the 1988 levels were well below the reporting level of 20,000 picocuries/liter (TS table 4.12-2 as required by Regulatory Guide 4.8), it was still an increasing trend. The licensee attributed the increase to possibly a combination of the following:
 - (1) Relatively low flow through Lake Anna
 - (2) Increased fuel cycle lengths
 - (3) Primary to secondary leakage
 - (4) "Contaminated" boric acid (reactor poison)
 - (5) Slightly higher lithium (Li) contamination of LiOH used in reactor pH control.

Tritium was also detected at an average level of 3,010 picocuries/liter at station No. 9 (upstream of the plant). The licensee attributed this to lake seasonal mixing variations since the range of these samples were 1,110-4,130 picocuries/liter.

Although no significant offsite doses would result from these slight increases in lake tritium activity, it is an item that will continue to be monitored by the NRC.

- d. The licensee's 1988 Land Use Census, as required by TS 3.12.2, resulted in no significant changes to the radiological environmental monitoring program or the offsite dose calculation pathway models. No milk cows or milk goats were observed within a five-mile radius of the plant.

In summary, no significant radiological consequences attributable to the operation of North Anna were noted from airborne, waterborne, aquatic, ingestion, or direct exposure pathways.

No violations or deviations were identified.

11. Information Notices (92701)

The inspectors determined that the following Information Notice had been received by the licensee, reviewed for applicability, distributed to appropriate personnel, and that action, as appropriate, was taken or scheduled:

IN 89-27: Limitations on the Use of Waste Forms and High Integrity Containers for the Disposal of Low-level Radioactive Waste.

12. Action on Previous Inspection Findings (92701, 92702)

(Closed) Violation (VIO) 50-338, 339/89-05-01: Failure of personnel to have a radiation monitoring device as specified, or to be accompanied by a qualified HP technician during entry into high radiation areas (four examples). The inspectors reviewed data that supported a number of corrective actions taken by the licensee to prevent recurrence of these events. The most significant corrective action to preclude management's acceptance of the casual worker attitudes and lack of individual accountability was a course developed to instruct supervisors on management's expectations for good radiological work practices and methods for recognizing good work practices. The inspectors reviewed the lesson plan and supervisor signatures for both the course content and attendance. The inspectors noted that all affected supervisors were in attendance. The course outline adequately covered good radiological work practices. This item is considered closed.

13. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on December 15, 1989. The inspectors summarized the scope and findings of the inspection, including the violation and IFI. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Description and Reference</u>
50-338, 339/89-33-01	VIO - Failure to survey adequately material being released for unrestricted use (Paragraph 5.a).
50-338, 339/89-33-02	IFI - Review licensee's H-3 analysis results of NRC spiked sample (Paragraph 9).

Licensee management was informed that the violation discussed in Paragraph 12 was considered closed.

ATTACHMENT

North Anna Radioactive Effluent Summary

	<u>1987</u>	<u>1988</u>	<u>1st half 1989</u>
No. of unplanned releases			
a. Liquid	0	0	0
b. Gaseous	0	0	0
Activity Released (Curies)			
a. Liquid			
1. Fission and Activation Products	1.33E+00	4.32E-01	6.93E-01
2. Tritium	8.45E+02	1.94E+03	3.03E+02
3. Gross Alpha	2.81E-04	N/D*	N/D*
b. Gaseous			
1. Fission and Activation Gases	1.05E+03	4.83E+02	1.24E+03
2. Iodines	1.27E-02	1.56E-03	2.23E-03
3. Particulates	4.60E-03	7.36E-04	4.61E-04
4. Tritium	1.73E+01	9.44E+01	2.62E+01
c. Volume of Liquid Wastes released (prior to dilution) (liters)	2.83E+08	3.38E+08	1.07E+08

*Non-detectable