UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-338/84-24 and 50-339/84-24

Licensee: Virginia Electric and Power Company
Richmond, VA 23261

Docket Nos.: 50-338 and 50-339

License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Date: June 18 - 22, 1984

Inspection at North Anna site near Mineral, Virginia

Inspector: J. J. Blake (for) W. J. Ross — 7/9/84 Date Signed

Approved by: J. J. Blake — 7/9/84 Date Signed
J. J. Blake, Section Chief
Engineering Branch
Division of Reactor Safety

SUMMARY

Areas Inspected

This routine, unannounced inspection involved 49 inspector-hours on site in the areas of plant chemistry and employee concerns.

Results

No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *E. W. Harrell, Station Manager
   G. Kane, Assistant Station Manager
   *L. A. Johnson, Superintendent, Technical Services
   *A. H. Stafford, Superintendent, Health Physics
   *L. B. Jones, Chemistry Supervisor
   *S. B. Eisenhart, Licensing Coordinator
   J. Paul, Engineering
   D. Thomas, Mechanical Superintendent
   R. E. Sidle, Supervisor, Maintenance Services
   P. Hensley, Operations-Water Treatment
   A. Stall, Operations - Shift Supervisor

   Other licensee employees contacted included four technicians, two operators, and two contractor craftsmen.

   Other Organization

   Babcock & Wilcox - D. Sislo

   NRC Resident Inspector

   *M. Branch

   *Attended exit interview.

2. Exit Interview

   The inspection scope and findings were summarized June 22, 1984, with those persons indicated in paragraph 1 above. The licensee acknowledged the inspection results with no dissenting comments.

3. Licensee Action on Previous Enforcement Matters

   Not inspected.

4. Unresolved Items

   Unresolved items were not identified during this inspection.

5. Plant Water Chemistry (92706)

   This inspection consisted of the following interrelated efforts:

   - Assessment of the capability of the major components of the secondary water system to protect the primary coolant pressure boundary by ensuring the absence of corrosive environments in the steam generator,

- Assessment of the adequacy of the licensee's water chemistry program to monitor the quality of water in primary and secondary water systems, and

- Assessment of the licensee's ability to control the quality of water in the plant through implementation of the North Anna water chemistry program.

a. Assessment of the Design of Components in the Secondary Water System

At the time of this inspection Unit 2 was operating and approaching the end of its second fuel cycle, while Unit 1 was shutdown for refueling at the end of its fourth fuel cycle. During the Unit 1 reloading outage, the licensee was performing a 100% eddy current test of the steam generator tubes, sludge lancing the three steam generators, and replacing the tubes in the moisture separator reheaters as part of its program to protect the integrity of the primary-secondary pressure boundary.

The inspector reviewed the "as built" secondary water system against the description that is in the 1982 revision of the Final Safety Analysis Report (FSAR), especially Section 10.4.2, "Circulating Water System," Section 10.4.3, "Condensate and Feedwater System," Section 10.4.4, "Main Condenser," and Section 10.4.8, "Condensate Polishing System - Powdered Resin Type." The inspector also interviewed cognizant plant personnel to review the operational history of the following components of the secondary water system and to determine what efforts have been taken to maximize the effectiveness of this system.

(1) Main Condenser

The two North Anna units dissipate waste heat energy by means of a once-through cooling system that circulates water from Lake Anna through the main condenser into a series of cooling lagoons and then back into the lake. Industry experience has shown that the main condenser has been the principal path of air and water inleakage into a plant's secondary water system. Through contamination of the condensate and feedwater, such inleakage may provide the inorganic and organic impurities that cause corrosive environments in the steam generator and in the low-pressure turbines.

The inspector established that the quality of Lake Anna water is relatively high for circulating cooling water; i.e., pH ~ 7, conductivity ~ 60 umhos, sodium and chloride ~ 55ppm, silica ~ 6 ppm, and sulfate ~ 10 ppm. However, because of the limited cooling capacity of the lagoons and lake, the temperature of the water at the intakes of the circulating cooling water, the bearing cooling water, and the service cooling water is >90°F. Serious corrosion problems (primarily pitting) have been observed in the carbon steel pipes that are used to provide cooling water to the closed-cycle bearing-cooling water. Similarly, the clay base of the reservoir that supplies service water to the plant has been degraded and the service water lines have been seriously clogged by a combination of metallic corrosion products from the pipes and insoluble aluminum silicates from the reservoir. The licensee is attempting to reverse the aggressive chemical behavior of the lake water by using chemical treatments (chlorine and polysilicates) to eliminate bacterial formation that is thought to initiate pitting. Also the smaller (4-inch) service water pipes are being cleaned with polyacrylamide or being replaced. The inspector was informed that asiatic clams have also been observed in the service water reservoir and are under surveillance as potential causes of fouling pipes, valves, and pumps and heat exchanges that are associated with safety-related plant components.

Although the Lake Anna water has caused deterioration of carbon steel pipes there has been no detrimental effect on the stainless steel (type 304) tubes and tube sheets in the main condenser and no tube failures. The licensee uses an Amertap system to clean the inner surfaces of the condenser tubes and does not chlorinate the circulating cooling water. Additional protection against galvanic corrosion of the condenser tubes is maintained by impressing a small, continual electrical current on the tubes. The licensee informed the inspector that the integrity of the main condenser had been good throughout the operational history of the plant; however, air inleakage through the seals of the condensate filter and condensate (hotwell) pumps had been observed.

The licensee monitors ingress of both air and circulating cooling water at the discharge of the condensate pumps but does not have the capability to monitor individual sections of the hotwell for water inleakage, other than through isolation of the section from the condensate header. The specific and cation conductivities of the condensate are used as key parameters to detect water inleakage and are displayed continually in the Control Room. Also, dissolved oxygen and sodium are continually monitored and displayed locally. Other parameters (pH, silica, ammonia, hydrazine, copper, and iron) that are representative of the quality of condensed steam are determined periodically through the use of 'grab' samples.

The main condenser was designed to reduce the inleakage of air into the condensate to 0.055 cc per liter. The stainless steel components of the condenser appear to be resistive to the anomolous chemical behavior of the water from Lake Anna. Consequently, the condenser is considered to provide an effective barrier against potentially corrosive contaminants.

(2) Condensate Makeup Water

A second potential source of corrosive contaminants in the condensate/feedwater is the water used for condensate makeup. Lake Anna water is also used for this purpose, after being processed through a 350 gpm purification system that consists of sand filters, a flash evaporator, a series of filters, and a mixed ion-exchange resin bed. The processed water is stored either in a 300,000 gallon Condensate Storage Tank (CST), or in a 180,000 gallon Primary Water Storage Tank (PWST), or in a 110,000 gallon Emergency Condensate Storage Tank (ECST). The CST is open to air and, although the dissolved oxygen content of the effluent from the water treatment system is only ~ 1 ppb, the water in the CST normally contains ~ 1 to 6 ppm of oxygen. The PWST, however, has an inner "bladder" that provides protection against air contamination as the level of the tank is lowered; thereby, reducing the need for large amounts of hydrazine or hydrogen to remove excessive oxygen in the reactor coolant when makeup water is pumped from the PWST. The inspector was informed that, because of air inleakage and the inability to circulate the water in the ECST, the quality of the water in this tank (that is used for suction of the auxiliary feedwater pumps) is degraded by oxygen and metal oxides.

Normal condensate makeup is achieved by valving the effluent of the water purification plant directly to the hotwell, thereby bypassing the CST. This procedure provides makeup water of higher, but unmonitored, quality than available for the CST. The licensee's water chemistry program places upper limits on five chemical parameters in the CST water (i.e., pH, silica, sodium, cation conductivity, and specific conductivity).

(3) Condensate Polisher Demineralizer

The inspector observed that both North Anna units have the powdered-resin (Powdex) demineralizer systems that are described in the FSAR. The licensee's experience with these polishing systems has not been good; consequently, the polishers are used only as cleanup filters during plant startup and are bypassed during plant operation above 30% power.

Each cleanup system consists of five vessels, each containing 420 filter elements (or cartridges) on which filter/demineralizer resins can be precoated or overlayed. When the system is in use, the licensee applies cation resins in ammonia and/or hydrogen form and anion resin in the hydroxide form. Normally, the filter elements are recoated when their differential pressure exceeds 17 psid or the quality of the effluent (as determined from the turbidity or conductivity or concentration of iron or sodium) drops below specified limits.

The inspector was informed that the usefulness of this cleanup system had been impaired throughout the operational history of the plant by leakage of corrosive resin particles into the feedwater and also by multiple failures of the butterfly valves in the influent and effluent lines. (During this inspection the inspector noted maintenance request tags on all five of the holding pump subsystems of the Unit 2 polisher system.) The inspector also observed that no holding pump was operating, even though two or three vessels are supposed to be in standby when the polishing system is being bypassed.

(4) Chemical Feed System

The inspector verified that the licensee was injecting chemicals into the condensate/feedwater, downstream from the condensate polishers, to control the quality of water that is pumped into the steam generators. The licensee originally added ammonia and hydrazine as part of an AVT program to control pH and oxygen. Denting was observed however, in the steam generators of Unit 1 during the first fuel cycle. Subsequently, boric acid has been added to provide 5 - 10 ppm of boron in the steam generator water to counteract the chemical reactions that appeared to be associated with denting of steam generator tubes and tube sheets. Inasmuch as this treatment has been successful, a solution of 1% boric acid is continually pumped into each steam generator. Because of problems that have been encountered with the use of carbon steel for boric acid injection lines, the licensee is currently converting these lines to stainless steel. Ammonia is no longer added, except during plant startup, because sufficient ammonia is produced by the thermal decomposition of hydrazine to maintain the pH of the feedwater within an acceptable range.

(5) Feedwater Lines

A third principal source of corrosive contaminants in the steam generator is the transport of soluble or solid corrosion products from other parts of the secondary water system. Of special concern is the transfer of oxides of iron (because of the potential mass of sludge produced) and oxides of copper (because of the enhanced potential for the formation of localized corrosive environments within the matrix of an iron-copper oxide layer).

In the North Anna secondary water system, the condensate/feedwater, after the addition of hydrazine (and ammonia during startup), is pumped through five pairs of low - and intermediate - pressure feedwater heaters to the suction of the three feedwater pumps. The feedwater is then pumped through the high-pressure heaters and a long (200-300 feet) run of pipe into the steam generators. During plant startup, the condensate is purified to the desired quality by cycling the water through the condensate polishers and back to the hotwell in short and long cleanup cycles that effectively remove soluble and insoluble contamination from the feedwater lines up to the feedwater pumps. Also during startup, the drains from the feedwater heaters are cycled back to the hotwell, thereby flushing solid material from the extraction steam lines and from the drain lines associated with these heaters and with the moisture separator reheaters. When the plant reaches 30% power, these drains are cycled forward to the suction of the feedwater pumps.

Although the licensee has converted the original 90-10 copper-nickel tubes in the four moisture separator reheaters (MSR) of Unit 1 to stainless steel, the MSRs in Unit 2 and the feedwater heaters in both units are still tubed with either copper-nickel alloys (80-20 or 90-10 copper-nickel) or arsenic admiralty brass (copper (71%), zinc (28%), titanium (1%), and arsenic (0.004%)). During plant operation, there is the possibility that copper will be eroded or corroded from these tubes and transported to the steam generator as soluble or insoluble species.

During plant operation, the quality of the feedwater is monitored by continually measuring the specific conductivity, with readout in the Control Room, and by daily analyses for sodium, hydrazine, dissolved oxygen, cation conductivity, and pH. Copper and iron are determined at least once a week.

(6) Steam Generators

Each North Anna unit has three Model 51 steam generators with tubes, fabricated from Inconel 600, that are fully rolled into the tube sheets to eliminate crevices. Because of tube failure during the first cycle of Unit 1, all the first row tubes (tubes with the tightest bend) in both units have been plugged. Unit 2 has not experienced any tube leaks, and no indication of tube failure was observed during partial eddy current tests performed in March 1982 and April 1983. Unit 1 has had tube leaks as well as failure of tube plugs. During the current refueling outage, 100% of the Unit 1 tubes are being eddy-current tested.

Failure of tubes in Unit 1 has resulted in contaminated turbine rotors and condensate polishers because both units have had leaking fuel elements during the last two operating cycles.

The licensee has attempted to minimize the potential for tube failure caused by corrosion and denting associated with the buildup of sludge on the tubesheets of the steam generators. The steam generators in Unit 1 were sludge lanced in November 1979, January 1981, July 1982, and during the current outage. Unit 2 steam generators were sludge lanced in March 1982. All earlier lancings yielded less than 75 pounds of sludge per steam generator, however, the inspector was informed that more than 500 pounds of sludge had been removed from each of the two generators in Unit 1 that had been lanced so far during the current outage. The licensee is not sure if this increase should be attributed to the lancing technique being used or was caused by buildup during the last fuel cycle.

The inspector was informed that significant leakage of ionexchange resin has occurred in Unit 1 during its operational life. Also, approximately eight gallons of sulfuric acid was inadvertently injected into the condensate/feedwater of Unit 2 earlier this year. The damage caused by the presence of these corrosive chemicals has not been fully analyzed. Degradation of water quality resulting from such intrusions can be reversed by either increasing the blowdown rate or by shutting down the unit and then draining the steam generators and refilling them with high quality water. The North Anna Units are usually operated with a blowdown rate of ~10 gpm to ensure that the impurities that enter the steam generator are not concentrated by more than a factor of 10. Although this blowdown rate can be increased to 30-50 gpm, this increased rate may be too slow to prevent chemical attack of the steam generator tubes or structural components. The inspector was informed that this was not recognized when, in 1979, the licensee attempted to remove the corrosive disintegration products from 3 to 5 pounds of ion exchange resins by blowdown while still operating the unit at power; thereby, extending the time that the steam generator was subjected to a corrosive environment.

The licensee also uses blowdown in conjunction with boric acid soaks to reduce the concentration of such corrosive ions as sulfate and chloride in the steam generator. This treatment facilitates hideout return of these ions during an outage and during return to power so that they are more easily extracted from pockets of sludge.

The water in the steam generator is monitored by continually measuring cation conductivity (local readout) and by daily analyses of the water for such key parameters as pH, specific conductivity, sodium, dissolved oxygen, boron, and hydrazine. Silica and chloride are determined five times a week and ammonia three times a week.

(6) Steam Lines

The inspector reviewed the operation and surveillance of the steam lines relative to two concerns. During an outage it is not usually possible to maintain the steam lines in a layed up condition that will prevent the formation of rust on the inner surfaces. Consequently, relatively large amounts of iron oxide will be transported to the hotwell during the early stages of steaming during startup. The inspector was informed that the hotwells are cleaned during refueling or other major shutdowns so that sludge buildup will be kept at a minimum and solids will not be transported with the condensate.

During plant operation, the steam is a potential pathway for transport of silican and corrosive ions to the turbines. The licensee has taken two actions to minimize corrosion and to prevent failure of turbine rotor blades and disks. First, the licensee monitors the quality of the steam by determining ten chemical parameters on frequencies of one to seven times a week; the specific conductivity is also displayed continually in the Control Room. Also, the licensee has been removing the low-pressure rotors for refurbishing after each fuel cycle and replacing them with spares. The inspector was informed that low-pressure rotors of an improved design were being installed in Unit 1 during the current outage as an additional effort to prevent the formation of keyway and bore cracks.

As discussed above, the moisture separator reheaters in both Units 1 and Unit 2 were initially equipped with 90-10 copper-nickel tubes. As part of a program to eliminate copper alloys from the secondary water system, the licensee has replaced the tubes in Unit 1 with stainless steel tubes and plans to replace the tubes in Unit 2 during the next refueling outage.

<u>Summary</u>

On the basis of partial eddy current tests in 1982 and 1983 and the absence of steam generator tube leaks to date, the integrity of the primary-secondary boundary in Unit 2 appears to be acceptable. The licensee will be able to assess the damage, if any, of the sulfuric acid intrusion when Unit 2 steam generators are examined during the upcoming refueling outage. Likewise, the results of the on-going 100% eddy current examination in Unit 1 will help the licensee assess whether the resin intrusions in the past or the presence of several hundred pounds of sludge have been detrimental to the integrity of the steam generator tubes in this unit.

Other than the change out of MSR tubes in Unit 1, the inspector did not observe deviations from the description of the secondary water system that was given in the 1982 FSAR. (The inspector was informed that a new revision of the FSAR would be submitted to the NRC in the near future). On the basis of current technology and understanding of corrosion phenomena, the inspector considers the following aspects of the secondary water systems to have potentials for causing degradation of the steam generator tubes and, therefore, the primary-secondary coolant pressure boundary:

(a) The known aggressiveness of the hot lake water when in contact with carbon steel should provide an additional incentive to prevent inleakage of the circulating cooling water into the condensate/feedwater lines.

(b) The quality of water in the ECST should be equivalent to that of the feedwater, otherwise the water in the steam generator will be contaminated whenever the auxiliary feedwater pumps are actuated.

(c) Operational experience at other nuclear plants has shown that powdex-type resin demineralizers can provide effective condensate polishing either on a continual or part-time basis. (This subject is discussed further in Section 5b of this report).

(d) More effective pre-operational cleanup of the condensate/feedwater lines could be achieved by extending the "long cleanup cycle" to include the long run of feedwater pipes from the feedwater pumps to the steam generator.

(e) The quality of the water in the feedwater drain tanks should be monitored during startup so that this water will not be pumped into the feedwater lines if it will degrade the quality of feedwater.

(f) The presence of copper-containing tubing in the feedwater heaters provides a potential source of soluble and insoluble copper compounds that would be transported to the steam generator and increase the possibility of stress corrosion cracking of the steam generator tubes.

b. Scope and Adequacy of the Licensee's Water Chemistry Program

Table 3.4-1 of the North Anna Technical Specifications identifies the chemical parameters (chloride, fluoride, and dissolved oxygen) that must be monitored and controlled in the primary coolant system. In addition, Technical Specification 4.1.27 requires that the boron concentration in the Boric Acid Storage Tank and in the Refueling Water Storage Tank be monitored and controlled. Technical Specification 6.8.4.c requires that the licensee shall have a program for monitoring secondary water chemistry to inhibit steam generator tube degradation. The program shall include the following elements:

° Identification of a sampling schedule for the critical variables and control points for these variables,

- Identification of the procedures used to measure the values of the critical variables.

- Identification of process sampling points,

- Procedures for the recording and management of data,

- Procedures defining corrective actions for all control point chemistry conditions,

- A procedure identifying (a) the authority responsible for the interpretation of the data, and (b) the sequence and timing of administrative events required to initiate corrective actions, and

- Monitoring of the condensate at the discharge of the condensate pumps for evidence of condenser inleakage. When condenser inleakage is confirmed, the leak shall be repaired, plugged, or isolated within 96 hours.

In Section 10.4.3 of the 1982 FSAR, the licensee has briefly outlined the AVT chemistry program that both units have used during their operational life times. Recently, the licensee has revised its corporate chemistry guidelines to incorporate the guidelines of the Steam Generator Owners Group (SGOG) and the Electric Power Research Institute (EPRI). The corporate guidelines were to have been incorporated into the North Anna Water Chemistry Program by July 1, 1984.

The inspector reviewed current procedures and drafts of proposed revisions to these procedures and established that responsibilities had been designated and guidance had been provided for the following administrative activities that are required to implement Technical Specification 6.8.4.c.

- Establishing key parameters to be monitored when the plant is in wet layup, hot shutdown/standby, and power operation,

- Developing, reviewing, approving, and updating chemical procedures,

- Scheduling tests and analyses,

- Training analysts,

- Performing chemical measurements,

- Providing calibrations and quality control,

- Documenting and reviewing tests results, and

- Taking required action on the basis of test results.

Through interviews of licensee personnel, the inspector was informed that the management of the plant and in corporate positions are cognizant of the need to meet the objectives listed in the FSAR and in the SGOG/EPRI guidelines and are supportive of the water chemistry program. The inspector also verified that the plant's table of organization provides for the chain of responsibility and authority needed to implement the day-to-day chemistry control program.

On the basis of this review, the inspector concluded that the licensee has developed the framework for an effective water chemistry program.

c. Implementation of the North Anna Water Chemistry Program

The inspector assessed the degree to which the licensee is fulfilling the requirements of the North Anna Technical Specifications and is implementing the water chemistry program that is currently being used to meet the FSAR objectives. This assessment was based on discussions with licensee personnel, review of procedures, observations of the performance of chemistry tests, and an audit of recent test results. This part of the inspection is summarized as follows:

(1) Activities related to plant chemistry are performed by personnel in both in the Chemistry Section, under the Chemistry Supervisor (who reports to the Superintendent of Technical Services), and in the Water Treatment Section of the Operations Department. The Operations Department has primary responsibility for operating the water treatment plant, the condensate polishers, and the demineralizers in the primary water system. Currently, the Water Treatment Section consists of an engineer and one operator who is assigned on a short-term basis from a pool of operator trainees. These two employees also have responsibilities related to radwaste management.

Surveillance required by the Technical Specifications and by the water chemistry program, for both the primary and secondary water systems, are performed by the Chemistry Section. The Chemistry Section currently has a staff of 11 personnel, including the supervisor and assistant supervisor. During five days each week there is one technician on each back shift; however, on Saturday and Sunday there are two eight-hour shifts (noon - 8:00 p.m., and midnight - 8:00 a.m.) manned by one technician each - during the remaining hours no member of the Chemistry Section is normally on site.

(2) Technical training is provided to new technicians principally through on-the-job training after they have received a brief indoctrination course. Chemistry technicians can advance through seven steps of proficiency, each of which involves at least six months of on-the-job experience and successfully passing a written qualification test. The North Anna Training Department provides subsequent formal retraining.

(3) All parameters associated with the Primary (Reactor) Water System and the Component Cooling Water System, as well as the six steam generators, are determined by taking grab samples in the Primary Water Sample Room. The licensee has in-line monitors for sodium that are also located at this operation; however, two of three were inoperable during this inspection.

The specific and cation conductivity of the condensate, as well as the specific conductivity of the condensate polisher effluent, feedwater, and main steam, are continually monitored and displayed in the Control Room. The visual and audio alarms associated with these displays have been defeated to eliminate false "nuisance" alarms. Inline analyzers for hydrogen, oxygen, and sodium are also displayed at panels in the Turbine Building; however, the hydrogen and oxygen analyzers were inoperable during this inspection. All of the other parameters for the secondary water system are determined using grab samples taken from sampling panels in the secondary chemistry laboratory or in the hot (Primary System) sampling room in the Auxiliary Building. Parameters associated with the operation of the condensate polishers are displayed on the polisher operations panel; however, most of these were tagged out for maintenance during this inspection.

(4) The inspector established that results of analyses were being documented on log sheets and were being reviewed daily (except weekends) by the Shift Foreman (the senior chemical technician on the day shift) and by the Assistant Chemistry Supervisor. Key parameters are logged on a daily chemistry report, and brought to the attention of the chemistry supervisor and plant management. The inspection verified that the Technical Specifications related to the reactor water were being implemented, and selected parameters from the secondary water system were within specified limits and were being analyzed on the schedules specified in the appropriate procedure.

(5) Current limits and specifications are listed in each Periodic Test, as well as the action to be taken if the limit is exceeded. The inspector verified that procedures are being implemented to inform the Control Room Operators by telephone and by written communications when a parameter does not meet the limits in a Technical Specification or in a Periodic Test. The inspector also verified that the Operations Department has a written procedure that must be followed for corrective action in the event of deviation from normal Chemistry Control Specifications.

(6) The inspector also verified that the licensee has written instructions regarding calibration of instruments and chemical reagents and the use of standard samples for quality assurance.

(7) The licensee is currently trending selected parameters manually and is developing the capability to use the computerized data base for this purpose.

Summary

The inspector did not identify any violations or deviations during this inspection; however, the following areas of concern were identified and discussed with the licensee.

All key parameters in the Primary, Auxiliary, and Secondary Water Systems are identified in the Corporate Chemistry Guidelines along with recommendations for acceptable limits and frequency of determination. It appeared to the inspector that the sampling frequency had been established to accommodate the relatively small North Anna chemistry staff more than to meet the goals of the SGOG/EPRI guidelines; i.e., essentially continuous surveillance of key chemical parameters. The inspector considered the inoperability of several inline analyzers was reducing the effectiveness of the monitoring programs and was inconsistent with the maintenance criteria in the SGOG/EPRI guidelines. Another degradation of surveillance capabilities, that apparently can be attributed to maintenance problems, was the decision to defeat the audio and visual alarms in the Control Room that are associated with the conductivity recorders on the Control Room Board. Although these displays are not needed for safe shutdown, these recorders provide the only means for detecting short-term trends (such as caused by inleakage or throw of ions or polisher resins) in water quality available to the licensee unless grab samples are taken much more frequently. Removal of the alarms places greater responsibility on the operators to monitor the strip recorders frequently. As discussed above, the inspector considers the weekend work schedule of two 8-hour shifts to be inconsistent with the SGOG/EPRI guidelines that the chemistry staff should have the responsibility for "timely and knowledgeable data review to identify unusual conditions quickly" and for "initiation of any required actions."

Finally, the inspector expressed special concern over the licensee's policy for operating and maintaining the condensate cleanup system. The type of polisher demineralizer system installed at North Anna is in use at approximately half of the nuclear plants in NRC Region II. It is the inspector's position that the licensee has not provided the necessary resources (dedicated operators on each shift, thorough training in the vendor's and licensee's procedures, and timely maintenance) to ensure effective operation of the condensate cleanup system. The licensee's policy is to provide operators to precoat the resin elements and place the polishing system into use for cleanup when the plant is returning to power after an outage. When a managerial decision has been made that the quality of the feedwater is acceptable, the polishers are bypassed. During this inspection, the Unit 2 cleanup system was not available to either provide additional polishing or to furnish protection against an unanticipated intrusion of contaminants into the condensate/feedwater. Also during this period, the only licensee employee who had been trained in depth on the polisher demineralizers was assigned to another priority task.

6. Employee Concerns

While the inspector was at the North Anna site, he was requested by a contract welder to review, with the welder's supervision and with appropriate VEPCO personnel, the validity of decisions that had been made by a VEPCO Level 3 weld examiner and the effect of these decisions on the ALARA concept. The basis of the welder's concern was that field welds made by himself and others, under adverse environmental and radiation conditions, had been rejected and were to be cut out and redone. The welder's General Foreman stated that the welds were being made according to an approved procedure and that three training welds made by the same welders, under simulated conditions, had been approved by a VEPCO Level 2 examiner.

The inspector and the Senior Resident Inspector brought these concerns to the attention of plant management and asked that they be addressed in a manner that would ensure maximum compliance with the ALARA concept. The inspectors were informed that the rejected welds had already been cut out, but field welding would not be continued until the welders had been trained further under improved mock-up of the field conditions. Also, the VEPCO Level 3 weld examiner would participate in the training and he, as well as other members of the licensee's management, would discuss with the welders the reasons for the rejections of the initial field welds.

A followup of this matter was made on June 29, 1984, through a telephone discussion with the North Anna Senior Resident Inspector and is summarized as follows. The licensee has initiated the mock-up training program under the direction of the same Level 3 examiner who will inspect the field welds. Field welds are again being made by welders who have made new training welds that were approved by this Level 3 examiner. The Senior Resident Inspector is monitoring the licensee's activities as to their compliance with the ALARA concept.

7. IE Bulletin 83-03, "Check Valve Failures in Raw Cooling Systems of Diesel Generators"

This Bulletin was issued on March 10, 1983, to inform licensees of failures of the referenced valves and to require that certain actions be taken to verify the integrity of these valves. The licensee responded by letter dated June 14, 1983, informing the NRC that this Bulletin does not apply to North Anna because this plant does not use a raw water cooling system for the purpose of cooling the diesel generators. Instead, an air to water cooling system is used, and the check valves in this system have not exhibited any failures.

The licensee's letter is considered to be an acceptable response to IE Bulletin 83-03, and this action is closed.