U. S. NUCLEAR REGULATORY COMMISSION

REGION I

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Report No.:	50-443/98-05
Licensee:	North Atlantic Energy Service Corporation
Facility:	Seabrook Generating Station, Unit 1
Location:	Post Office Box 300 Seabrook, New Hampshire 03874
Dates:	July 5, 1998 - August 22, 1998
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EXECUTIVE SUMMARY

Seabrook Generating Station, Unit 1
NRC Inspection Report 50-443/98-05

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 7 week period of resident and specialist inspection.

Operations:

- The operators performed routine reactor plant evolutions, including the reactor start-up and an emergency feedwater pump surveillance test well. (Section O1.1)

- A minor weakness was noted in that an adverse condition report (ACR) was not initially written to evaluate improperly stored nitrogen bottles. Additionally, the ACR was subsequently approved without fully considering all the potential generic concerns. Licensee evaluation determined that this condition did not challenge the operability of any safety-related components. (Section O2.1)

Maintenance:

- Corrective actions taken following the maintenance rule baseline inspection were appropriate. (Section M8.1, M8.2, M8.3, M8.4, M8.5, and M8.6)

- Appropriate procedural guidelines were in place to manage the 12 week work planning process. The newly instituted work process was functioning as intended, however, final determination of its effectiveness remains to be determined. (Section M1.1)

- Maintenance technicians performed several activities well during the period including: installation of a freeze seal and replacement of a safety-related relief valve, installation of new spent fuel racks, and testing of a power range nuclear instrument rate circuit. (Section M1.2)

- The licensee-identified failure to properly calibrate the power operated relief valve low temperature overpressure protection channels was considered a violation of minor significance. (Section M8.8)

- The corrective actions performed in response to an unexpected engineered safeguards feature actuation during surveillance testing were appropriate. (Section M8.7)

Engineering:

- Engineering design and documentation of the new SFP rack safety evaluation was adequate. Engineering personnel provided good support during installation of the new SFP racks. (E2.1)

Plant Support:

- The licensee was conducting security and safeguards activities in a manner that protected public health and safety in the areas of access authorization, alarm stations, communications, and protected area access control of personnel and packages. This portion of the program, as implemented, met the licensee's commitments and NRC requirements. (Section S1)

- The licensee's security facilities and equipment in the areas of protected area assessment aids, protected area detection aids, and personnel search equipment were determined to be well maintained and reliable and were able to meet the licensee's commitments and NRC requirements. (Section S2)

- The security force members (SFMs) demonstrated that they had the requisite knowledge necessary to effectively implement the duties and responsibilities associated with their position. Security force personnel were being trained in accordance with the requirements of the Training and Qualification Plan and training documentation was properly maintained and accurate. (Sections S3, S4 and S5)

- The level of management support was adequate to ensure effective implementation of the security program, and was evidenced by adequate staffing levels and the allocations of resources to support programmatic needs. (Section S6)

- The review of the licensee's audit program indicated that the audits were comprehensive in scope and depth, that the audit findings were reported to the appropriate level of management, and that the program was being properly administered. In addition, a review of the documentation applicable to the self-assessment program indicated that the program was being effectively implemented to identify and resolve potential weaknesses. (Section S7)

- Overall performance in the radiation protection program was effective based on the well-implemented RWP work controls in the RCA, use of survey information, posting and labeling practices, actual observations of radiological areas and radiological work activities, good initiatives to effect improved sensitivity with regard to personnel contamination detection, self-assessment of previous personnel contamination occurrences to improve worker performance and radiological conditions, and the training and qualification process for senior radiological control technicians being well proceduralized, detailed, and implemented. (Sections R1.1 and R1.2)

- In recognition of the increased source term that may affect future radiological work, the licensee initiated actions to effect better ALARA performance and radiation protection implementation by: increased management attention and control of radiological work planning, implementation, and control; more active participation of the Radiation Safety Committee in the oversight of plant radiation protection activities; and improved integration of ALARA and radiation protection responsibility

and accountability to all plant organizations that are involved in radiological work. (Section R1.3)

- Staff training and qualification was effective based on the fact that the requirements for training and qualification of senior radiological control technicians were proceduralized, detailed, and implemented. Selected records for new senior technicians were properly documented in a detailed and thorough manner. (Section R5)

- Quality assurance and self-assessment activities, and the problem identification process resulted in a thorough and programmatic evaluation of the radiation protection (RP) program and were instrumental in identifying a need for improvement in oversight of, and involvement in, RP by management and supervision from outside of the RP organization. The licensee is actively engaged in self-assessment activities and consequent corrective action initiatives relative to radiation protection. (Section R7)

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Report Details

Summary of Plant Status

The period began with the facility shutdown to restore the control building air conditioning system. The operators performed the plant start-up and power ascension on July 10, 1998. The plant operated at essentially 100% power for the remainder of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, routine operations were performed in accordance with station procedures and plant evolutions were completed in a deliberate manner with clear communications and effective oversight by shift supervision. Control room logs accurately reflected plant activities and observed shift turnovers were comprehensive and thoroughly addressed questions posed by the oncoming crew. Control room operators displayed good questioning perspectives prior to releasing work activities for field implementation. The inspectors found that operators were knowledgeable of plant and system status.

O2 Operational Status of Facilities and Equipment

a. Inspection Scope (71707, 62707)

The inspectors routinely conducted independent plant tours and walkdowns of selected portions of safety-related systems during the inspection report period. These activities consisted of the verification that system configurations, power supplies, process parameters, support system availability, and current system operational status were consistent with Technical Specification (TS) requirements and Updated Final Safety Analysis Report (UFSAR) descriptions. Additionally, system, component, and general area material conditions and housekeeping status were noted. The inspectors identified some minor material deficiencies that were appropriately addressed by the licensee.

O2.1 Low Temperature Rating of Nitrogen Bottles Installed in Several Plant Locations

a. Inspection Scope

On July 15, the inspector identified four (4) pressurized nitrogen bottles located in the stairwell adjacent to the east main steam and feedwater pipe chase, that were limited to a maximum storage temperature of 125 °F. The bottles were restrained with a rope tied to a handrail in the stairwell. Seabrook's Service Environment Chart, listed in Section 3.11, of the UFSAR, indicates that the stairwell temperature could reach 130 °F during normal operation. The inspector questioned the potential

consequences of this condition, including any potential impact on safety related systems.

b. Observations and Findings

Mechanical maintenance technicians immediately moved the nitrogen bottles to a location outside the building. From conversations with design engineering, the inspector determined that the pressurized gas bottles were fitted with approved safety relief devices (such as rupture discs of fusible plugs) to prevent an overpressurization problem. There are two different setpoints for these devices (165°F and 212°F) based on their application. Therefore, there would have been no adverse consequences associated with the location of the nitrogen bottles identified by the inspector. Design engineering also stated that the bottles did not require seismic supports or designated gas storage racks because they were considered temporary.

The inspector was concerned, however, because the licensee did not initially generate an adverse condition report (ACR) to evaluate the potential generic consequences of this condition (compressed gas bottles located in high temperature areas throughout the plant), including the operability of components which use pressurized gas to supply the safety related function of some valves. The inspector then reviewed ACR 98-2101, which had been subsequently approved by the management review team (MRT) on July 24, 1998, and noted that the listed corrective action was narrow in scope. Specifically, the licensee did not evaluate the potential impact of pressurized bottles stored in other plant locations. The inspector considered this a minor corrective action program weakness.

Additionally, the inspector questioned whether nitrogen bottles installed inside the east and west steam and feedwater pipe chases could perform their safety function during a steam line break event. These bottles provide a backup driving force for operation of the emergency feedwater system (EFW) steam supply valves (MS-V-393 and 394) to the turbine driven pump. During a steam line break event the temperature in this area could reach 325°F.

The licensee evaluated the inspector's questions and concluded that operability of the EFW steam supply valves was not affected as the valves are designed to fail open on loss of nitrogen pressure, and in-line check valves would prevent the escape of steam to a faulted steam line, thereby ensuring that adequate steam supply is provided to the EFW turbine driven pump.

c. Conclusion

The inspector identified a minor weakness in the licensee's corrective actions, in that an adverse condition report (ACR) was not initially written to evaluate nitrogen bottles installed in areas that could exceed the manufacturer's temperature limits. Additionally, the adverse condition report was subsequently approved without considering the potential generic concerns of this finding. The subsequent

evaluation determined that operability of applicable safety related valves was not affected.

O4.1 Operator Performance Observations

a. Inspection Scope

The inspectors observed the control room (RO) and nuclear systems operator (NSO) performance while the plant was shutdown, and during the reactor start-up on July 11, 1998. Additionally, the inspectors observed operator performance during a turbine driven emergency feedwater pump (EFW) quarterly surveillance test on August 18.

b. Observations and Findings

The operators controlled plant shutdown conditions well. The licensee developed and implemented appropriate Mode change restrictions for the plant heatup and start-up. The reactor start-up was performed well. The operators maintained good control of plant conditions during the approach to criticality, and power ascension.

The EFW pump surveillance was performed satisfactorily and in accordance with operations procedure OX1436.02. Field personnel and control room operators communicated and coordinated the test activities well. The pump discharge pressure and flow rate requirements were met. Measuring and test equipment (MT&E) were verified to be in current calibration.

c. Conclusions

The operators performed routine reactor plant evolutions and the emergency feedwater pump surveillance test well.

O8 Miscellaneous Operations Issues

O8.1 (Closed) LER 50-443/98006: plant shutdown due to an inoperable control building air conditioning (CBA) system. This event was discussed in Inspection Report 98-04, and involved a plant shutdown on June 11, 1998 per Technical Specification (TS) 3.0.3 after both CBA system trains were declared inoperable. No new issues were revealed by the LER.

O8.2 (Closed) Violation 50-443/98004-03: failure to properly implement a temporary procedure change. The inspector identified that the operators changed the safety injection (SI) system test header return path from the primary drain tank to the refueling water storage tank without properly revising procedure OS 1005.05, "Safety Injection System Operation". Specifically, the intent change to this procedure was implemented prior to review by a Station Qualified Reviewer (SQR), or the Station Operation Review Committee (SORC). The licensee's completed corrective actions included: revision of the SI System operating procedure, enhancement of the miscellaneous component log guidance, and review of this

event with the operations staff. The inspector found the licensee's actions to be reasonable and complete. This violation is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 12 Week System Week Work Process

a. Inspection Scope (62700)

The inspector reviewed the recently instituted 12 week system week work process and associated procedural guidelines that control the identification, scheduling, preparation and execution of work week maintenance activities.

b. Observations and Findings

The inspector found the 12 week system week work process to be a detailed, well orchestrated effort designed to managed the planning, scheduling, and implementation of maintenance activities. The 12 week system work week is controlled by six designated work week managers, and their responsibilities are detailed in Work Week Manager Desk Guide PSO-51. Each work week manager has sole responsibility of work week activities once every six weeks. Designated trains (A or B) of certain systems are scheduled for work once every 12 weeks, thus enabling a periodic evaluation or scheduling of work activities. Goals for the 12 week system week includes the review, and possible scheduling, working, and closure of all outstanding deficiencies on that system during its scheduled work week.

The inspector attended a T-10 (work scope) and a T-4 (work freeze) meeting and noted that all disciplines were in attendance, and for the most part, well prepared for the meeting. Designated work week managers controlled the meetings and adequately addressed all aspects of the T-10 and T-4 work week.

The first cycle of the 12 week work system was just recently implemented in May of this year. Also, during this cycle, the licensee encountered a forced outage that further impeded the implementation since emergent work activities took precedence over previously scheduled work activities, thus the inspector was unable to assess the effectiveness of the process. However, the licensee has "key performance indicators" in place that should, in time, indicate to management the effectiveness of the 12 week system week process.

c. Conclusions

Appropriate procedural guidelines were in place to manage the 12 week system week work process. The inspector determined that the newly instituted work process was functioning as intended, however, final determination of its effectiveness was yet to be determined due to the limited time this system has been in place.

M1.2 Freeze Seals to Support Repairs of Relief Valve SI-V-101

a. Inspection Scope

On July 17, the inspector observed pipe freeze seal activities performed by mechanical maintenance technicians to support replacement of the "A" safety injection pump discharge relief valve (SI-V-101). This valve had identified seat leakage at approximately 4 gallons per hour, that caused a level decrease in the "D" safety injection accumulator. The inspector performed field walkdowns of the proposed freeze seals, reviewed the work package and applicable procedure, attended the pre-job brief, interviewed the work supervisor, and observed portions of the work. The inspector also observed removal of relief valve SI-V-101 to evaluate the licensee's corrective actions to prevent the wetting of insulation.

b. Observations and Findings:

The briefing conducted by the mechanical supervisor, prior to performing the freeze seal, was excellent. The mechanical supervisor took the necessary steps to prevent the wetting of insulation during removal of the relief valve. The work package was thorough and included an adequate on-line maintenance assessment. Required precautions, and system lineup contingencies were included to prevent or mitigate the consequences of a freeze seal failure.

The inspector observed pr[illegible]r field coverage by fire protection, health physics technicians and managem[illegible]. The oversight group performed the required liquid penetrant test of the affec[illegible]pipes before and after the freeze, which confirmed adequate pipe conditions. The mechanical supervisor demonstrated excellent work practices and supervised all activities well. The freeze seal and subsequent relief valve replacement were completed successfully.

c. Conclusion:

The briefing conducted by the mechanical supervisor, prior to performing the freeze seal, was excellent. Adequate measures to prevent the wetting of insulation during removal of the relief valve were implemented. The mechanics performed the freeze seal and relief valve replacement well. The work package and associated on-line maintenance and freeze seal evaluations were also adequate.

M1.3 Power Range Nuclear Instrument System Testing

a. Inspection Scope

The inspector observed instrument and controls technicians test the power range nuclear instrument rate circuit (NM311) per surveillance procedure, IX1656.943, "Operational Test and Overpower Trip High Range Bistable Adjustment for Power Range Channel N43".

b. Observations and Findings

The test was designed to verify proper operation of the power range rate circuit card (NM311) that controls the positive and negative power rate trip signals. The rate circuit delay time is determined by measuring the time required for the NM311card output voltage to decay to 37% of its peak value following a step input signal change.

The technicians performed the rate circuit testing properly and in accordance with the test procedure. All test equipment was verified to be within the calibration periodicity. The control room operator was aware of the expected protection system alarms generated during the test.

The inspector identified and questioned the technician regarding an output voltage anomaly on the system response curve. The inspector was concerned that this anomaly could affect the interpretation of the rate circuit response curve. The technician promptly contacted his supervisor and the system engineer to resolve this question.

The licensee subsequently initiated an adverse condition report (ACR) and conducted bench top testing to identify the source and potential effect of the anomaly. The testing indicated that this anomaly was caused by actuation of an alarm bistable. The licensee planned to revise the surveillance procedure to specify the test equipment settings to remove the anomaly, and also to require the output response curve to be evaluated later in time away from the initial output voltage peak. The inspector concluded that these actions were appropriate.

c. Conclusions

Instrument and Controls technicians performed nuclear instrument system testing well. The licensee developed appropriate corrective actions to address a concern involving an anomaly on the system output response curve.

M1.4 Spent Fuel Pool Rack Installation

a. Inspection Scope

The inspector observed activities associated with the installation of the six new spent fuel pool racks (SFP). These racks were installed to complete the storage

capability of the SFP as stated in the original license. The inspector observations included the diving activities performed to remove several tool support brackets and inspect the SFP drain valve (SF-V-61). The inspector observed pre-evolution briefings, reviewed applicable documentation, and interviewed personnel.

b. Observations and Findings

The pre-evolution briefings for both the diving activities and the SFP racks installation were excellent, and included lessons learned from recent industry experience. Personnel demonstrated a good questioning attitude during the briefings. The maintenance supervisors coordinated and controlled the dives and SFP rack installation well. The inspector observed excellent coordination between the disciplines which contributed to the successful completion of these. The system engineer and other required support disciplines provided extensive coverage. Additionally, the licensee implemented good foreign material exclusion (FME) practices.

c. Conclusion

The briefing conducted by the mechanical supervisor and rad protection technician were excellent. Diving and SFP rack installation activities were performed well.

M8 Miscellaneous Maintenance Issues

M8.1 (Closed) Violation 50-443/97-80-01: omission of three system functions from the Seabrook maintenance rule monitoring program. The licensee had failed to include under the scope of the maintenance rule three functions for three different systems. The licensee subsequently revised their maintenance rule scoping documentation, such that rod control function, CP-04; containment air handling function , CAH-02; and sample system function, SS-03 were included under the scope of the maintenance rule. The inspector verified that the appropriate scoping and performance criteria data sheets had been revised to reflect the inclusion of functions CP-04, CAH-02, and SS-03 into the maintenance rule program.

M8.2 (Closed) Unresolved item 50-443/97-80-02: additional maintenance rule scoping issues. The licensee was unable to provide appropriate documentation to support why seven system functions for three systems were not included under the scope of the maintenance rule. Upon further review by the licensee, they determined that auxiliary steam heating function, ASH-02; fuel oil function, FO-01; lube oil function, FO-04; and fire protection functions, FP-02; 03; 04; and 05; should have been included under the scope of the maintenance rule. The inspector verified that the scoping and performance criteria data sheets had been appropriately revised. No additional violations resulted from this review.

M8.3 (Closed) Inspector Follow-up Item 50-443/97-80-03: balancing reliability and unavailability. It was determined that the appropriateness of the licensee's balancing of reliability and unavailability could not be determined until the licensee's periodic assessment was performed. A review of the licensee's periodic assessment covering the time frame of 7/10/1996 through 7/9/1998, indicated that appropriate balancing of reliability and unavailability was accomplished during a review of all SSC's that were covered under the maintenance rule.

M8.4 (Closed) Inspector Follow-up Item 50-443/97-80-04: review of emergency electrical distribution-evaluate (a)(1) dispositioning to (a)(2). The NRC was concerned that the time period of the goal for the 480 Vac vital MCCs motor operated valve (MOV) unitized starter contact carrier assemblies was not sufficient to ensure that corrective actions were correct and effective. The inspector performed a review of a revised maintenance rule action plan and goals for the unitized starter contact carrier assemblies. As a result of additional failures (unrelated to the previous failures) following the MR inspection, the licensee had instituted additional corrective actions, completed a 100 percent inspection of all safety-related unitized starter assemblies, and extended the return date to (a)(2) from 6/30/98 to 6/30/99.

M8.5 (Closed) Violation 50-443/97-80-05: reliability performance criteria established without safety consideration. The licensee did not account for the number of demands or running time over the rolling two year period in establishing reliability performance criteria. A review was performed of Engineering Evaluation SS-EV-97-022, which addressed the basis for reliability performance criteria for risk significant structures, systems, and components. It was noted that demand reliability and operating reliability, was based on Seabrook specific data.

M8.6 (Closed) Inspector Follow-up Item 50-443/97-80-06: review process/criteria for placing structures in (a)(1) category. There was no guidance for placing degraded structures into the (a)(1) category. A review was performed of recently revised technical support group instruction (TSGI) - 04, which detailed specific actions to be taken by the structural system engineer for degraded structures. Performance criteria guidelines are based on conditioning monitoring, such that corrective actions can be taken before a loss of function occurs. Periodic visual inspection results and reviews of structural related adverse condition reports are reviewed by the structural system engineer on an on-going basis. A sample review of several periodic visual inspection reports was performed by the inspector. Deficiencies were appropriately identified and documented.

M8.7 (Closed) LER 50/443/98-008: This LER discussed an event involving an unexpected ESF actuation during surveillance testing. The actuation occurred upon removal of electrical jumpers that had been installed during the test procedure to simulate a main steam pressure signal. The jumper removal from two out of the three steam pressure protection channels caused the protection system to sense a high negative main steam pressure rate signal that resulted in a main steam line isolation. The event occurred while the plant was in a cold shutdown condition and had no actual plant impact.

The protective signal initiated when the second jumper was removed before the negative rate signal, generated following removal of the first jumper, had decayed. The licensee attributed this event to personnel error, and a procedural weakness. The planned corrective actions included: training of personnel, and revision of the test procedure. The inspector performed an in-office review of this event and concluded that the event involved a minor performance weakness and that the licensee's root cause and corrective actions were appropriate. No violations were identified. This LER is closed.

M8.8 (Closed) LER 50/443/98-007: On June 19, 1998 the licensee identified that the power operated relief valve (PORV) channel calibration did not include the entire channel as required. The licensee revised the applicable test procedure to correct the identified concern, satisfactorily retested the channels, and declared both PORVs operable for providing low temperature overpressure protection. The PORVs were subsequently relied upon to provide low temperature overpressure protection while the plant was in cold shutdown and the residual heat removal suction relief valves were isolated.

On July 9, 1998, the licensee, while performing a more extensive review of this event, determined that an additional portion of the PORV channel had not been tested. The plant was in Mode 3 at the time of this discovery, and did not require use of the PORVs for low temperature overpressure protection. The licensee again revised the applicable procedure and satisfactorily tested the PORVs. The inspector observed a minor corrective action program weakness in that the licensee did not question whether the corrective actions implemented following identification of the first test deficiency were adequate.

The event was of minor significance and the protection channels functioned properly when tested. The failure to properly test the PORV channels as required is a violation of minor significance and not subject to formal enforcement action.

M8.9 (Closed) Inspection Follow up Item (IFI) 50-443/97-03-03: Main Steam Safety Valves Testing. The inspector identified in Inspection Report 97-03 that the station procedure revision process did not require an updated safety review if a prior revision of the document contained an appropriate safety review. In this case, the inspector identified that main steam valves testing was performed with new equipment that was different from the original test equipment without updating the safety evaluation. This item was left open as an IFI pending completion of the licensee's implementation of the 50.59 Change Management Plan which was geared to fully enhance this process. Corrective actions completed, include: procedural revision to: 1) require written basis for answering the 50.59 applicability questions, and 2) to ensure that if an existing screening or 50.59 evaluation is used, it must be reviewed in each case to ensure that it covers the proposed change entirely; and completion of refreshing training on 50.59 evaluations for required plant personnel. This inspection Follow up item is closed.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Installation of Six New Rack in the Spent Fuel Pool (SFP)

a. Inspection Scope

The inspector reviewed the engineering support and applicable documentation for the design and installation of the new SFP racks (DCR 97-0014).

b. Observations and findings

The six new SFP racks will provide an additional 576 storage cells, increasing the total storage capability to 1236 storage cells. The racks were supplied by the original spent fuel rack supplier and manufactured to equivalent standards as the existing racks. The inspector found that the applicable documentation, including the safety 50.59 evaluation, was adequate. The technical specification (TS) requirements were satisfied by the new SFP racks design.

The inspector identified surface rust and "melt through" on two of the new racks and questioned whether the racks met the specified ANSI N45.2.1 Class "B" cleanliness requirements. The licensee promptly evaluated the inspector's observations, and determined that these issues had been previously reviewed and evaluated as acceptable. The licensee also stated that the surface rust would dissipate once the racks were inserted into the pool and exposed to the borated water. The inspector reviewed a video inspection of the existing racks and noted that no rust was present.

The inspector questioned whether the on-site vendor quality assurance representative identified the surface anomalies prior to the inspector's review. The licensee stated that the rust was not present at the time of the vendor cleanliness inspection, and that it had formed after the racks were cleaned with demineralized water. The inspector concluded that these actions were reasonable.

c. Conclusion

Engineering design and documentation of the new SFP rack safety evaluation was good. Engineering personnel provided good support during installation of the new SFP racks.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Radiological Controls-External and Internal Exposure

a. Inspection Scope (83750-01)

A selective review of individual dosimetry results for 1997 and for 1998 (up to mid June), the use of personal electronic dosimeters (EDs) and the automated access control system for the radiologically controlled area (RCA), dose to the embryo/fetus and exposures of declared pregnant women, use of current survey information for dose control, the radiation work permit program, access controls to locked high radiation areas (HRAs), and posting and labeling practices was performed. Information was gathered through observation of activities, tours of the RCA, discussions with cognizant personnel, and review and evaluation of procedures and documents.

b. Observations and Findings

The highest recorded total effective dose equivalents for 1997 and for 1998, through June, were well below regulatory requirements and within the licensee's administrative limits. There were no recorded committed effective dose equivalents greater than 10 millirem in 1997, or thus far in 1998. The highest shallow and extremity dose equivalents for 1997 were also below regulatory requirements and within the licensee's administrative limits. Personnel exposures due to discrete particles were effectively monitored and well within regulatory limits.

Activities observed during tours of the RCA access control point, RCA tunnels, residual heat removal (RHR) vaults, primary auxiliary building (PAB), spent fuel building (SFB), and the waste processing building (WPB) demonstrated effective use of survey information and radiation work permits (RWPs), control of HRAs and locked HRAs, and appropriate posting and labeling practices.

c. Conclusions

Performance in radiological controls for individual external and internal exposures for 1997 and for 1998 through June was effective based on the well-implemented RWP work controls in the RCA, good radiological survey performance, appropriate radioactive material control, and good radiological area posting practices.

R1.2 Radiological Controls-Radioactive Materials, Contamination, Surveys, and Monitoring

a. Inspection Scope (83750-01)

The scope of the inspection included physical examination of the radiologically controlled area (RCA), discussions with cognizant personnel, and review and evaluation of procedures and documents with respect to:
(1) selective review of the licensee's control of radioactive material, contamination control monitoring, radiological survey performance, and radiation monitoring;
(2) the application of personal contamination monitors and friskers, adequacy of surveys necessary to identify and control radiological areas, and evaluations of personnel contamination occurrences.

b. Observations and Findings

Radiologically affected areas were posted and controlled. Comprehensive radiological surveys were performed to identify and control contaminated, radiation, and high radiation areas. High radiation area controls were implemented in accordance with technical specifications.

The licensee established increased use of remote monitoring of radiation levels. Initiatives were established to decrease the rate of personnel contamination occurrences. New exit portal monitors (PMs) had been purchased and were being prepared to be put into service. The licensee intended to use these new PMs in the "pause" mode in order to gain increased detection efficiency. An AM-16 remote area monitoring system was installed to remotely monitor radiation readings on the liquid radioactive waste processing skid. The plant radionuclide mix was actively monitored, trended, and evaluated on a quarterly basis by health physics personnel.

Personnel contaminations were tracked and trended on a routine basis. The licensee documented all contamination events, including noble gas events. In December of 1997, the licensee performed a "Common Cause Evaluation and Corrective Actions for 1997 Personnel Contaminations" as an initiative to reduce the number of personnel contaminations. The evaluation resulted in fifteen corrective actions being identified. In response, the licensee initiated actions to improve worker performance and radiological conditions.

c. Conclusions

Effective overall performance in the area of radiological controls for radioactive materials, contamination control, radiological survey performance and application, and radiological area monitoring was evident based on actual observations of radiological areas and radiological work activities; good initiatives to effect improved sensitivity with regard to personnel contamination detection; and self-assessment of previous personnel contamination occurrences to improve worker performance and radiological conditions.

R1.3 Radiological Controls-As Low As Reasonably Achievable (ALARA)

a. Inspection Scope (83750-01)

A selective review of the licensee's organizational structure for ALARA responsibilities, the basis for establishing goals and objectives, the projected and actual doses for OR05 outage tasks and ALARA report for the outage, and radiological goals, projections, and results for 1998 was performed.

b. Observations and Findings

Outage collective dose management was significantly challenged during the OR05 refueling outage. Consequently, the projected collective dose for the outage was exceeded, i.e., 90 person-rem was projected versus 160 person-rem actually accumulated. The licensee believes that the reasons for exceeding the projected dose included expansion of inspection scope for steam generator eddy current testing, significant emergent work, the unexpected generation of abnormally high amounts of activated corrosion products at shutdown as the result of highly radioactive crud bursts (probably associated with the long run time and plant chemistry), and some weakness relative to timely identification of work scope for certain planned activities. To address improvement in this area, the licensee revised the ALARA responsibilities of radiation worker supervisors and managers, as defined in the site's Radiation Protection Program Manual; revised the charter for the Radiation Safety Committee to increase management oversight of radiation protection and ALARA activities (particularly, with regard to ALARA reviews for outage tasks); and initiated action to benchmark ALARA and radiation protection performance by planned visits to five other nuclear power plants. Additionally, the licensee initiated actions relative to plant chemistry management to effect mitigation of the affect of crud bursts during the next major outage, OR06; and took action to streamline the ALARA Recommendation Program to increase employee participation. The licensee intends for these actions to effect better preparation for the next outage, and improve the integration of ALARA and radiation protection responsibility and accountability to all plant organizations that are involved in radiological work planning, implementation, and control.

c. Conclusions

In recognition of the increased source term that may affect future radiological work, the licensee initiated actions to effect better ALARA performance and radiation protection implementation by: increased management attention and control of radiological work planning, implementation, and control; more active participation of the Radiation Safety Committee in the oversight of plant radiation protection activities; and improved integration of ALARA and radiation protection responsibility and accountability to all plant organizations that are involved in radiological work.

R5 Staff Training and Qualification in RP&C

a. Inspection Scope (83750-01)

A selective review of the training and qualification for several new senior radiological control technicians was performed. Information was gathered through discussions with cognizant personnel and review and evaluation of procedures and documents.

b. Observations and Findings

The training and qualification requirements for senior radiological control technicians were proceduralized, detailed, and implemented. The reviewed training and qualification records for new senior technicians were properly documented in a detailed and thorough manner. Since the last NRC inspection, five radiological control technician slots were filled by the hiring of five senior level technicians. The training folders for selected individuals contained properly completed qualification guides for HP junior technician, for HP senior technician, for shift qualification, and for specialty tasks.

c. Conclusions

Staff training and qualification was effective based on the fact that the requirements for training and qualification of senior radiological control technicians were proceduralized, detailed, and implemented. Selected records for new senior technicians were properly documented in a detailed and thorough manner.

R7 Quality Assurance in RP&C Activities

a. Inspection Scope (83750-01)

A selective review of the licensee's audit, surveillances, corporate assessments, and self-assessments was performed. Information was gathered through discussions with cognizant personnel and review and evaluation of procedures and documents. The reviewed documents included the following:

- Nuclear Oversight Quarterly Report for Fourth Quarter of 1997 and First Quarter of 1998,
- QA Audit No. 98-A01-01 Radiation Protection Program, and
- Common Cause Analysis Radiation Protection 1997.

b. Observations and Findings

Quality assurance and self-assessment activities, and the problem identification process were instrumental in identifying a need for improvement in oversight of, and involvement in, radiation protection and ALARA by management and supervision other that just the radiation protection organization. The quality assurance and self-assessment activities were very candid and direct in identifying issues for improvement. As a consequence of these efforts, the licensee initiated the action discussed in Section R1.3 of the report.

All three of the previously-listed, licensee-generated documents were consistent in the identification that ALARA and radiation protection were plant-wide responsibilities, requiring improved integration of all organizations that were involved in radiological work planning, implementation, and control. As a result of these efforts, three adverse condition reports (ACRs) were developed which required improved Radiation Safety Committee (RSC) oversight and involvement, improved development of annual radiation protection goals, and independent oversight and review of program performance. In response, the charter for the RSC was revised to clarify its oversight and involvement responsibilities; actions were initiated to increase the surveillance, inspection, and audit activities by the QA oversight function; and radiation protection program improvement initiatives were developed for 1998, including revision of the site's Radiation Protection Manual.

Subsequent audit findings and observations were incorporated in the site corrective action tracking system and assigned for action. The improvement recommendations developed from the licensee's radiation protection Common Cause Assessment activity were developed for action in accordance with the licensee procedures. Eight self-assessment have been accomplished with regard to the radiation protection program, so far in 1998.

c. Conclusions

Quality assurance and self-assessment activities, and the problem identification process resulted in a thorough and programmatic evaluation of the radiation protection (RP) program and were instrumental in identifying a need for improvement in oversight of, and involvement in, RP by management and supervision from outside of the RP organization. The licensee is actively engaged in self-assessment activities and consequent corrective action initiatives relative to radiation protection.

R8 Miscellaneous RP&C Issues

R8.1 Inspection Follow-up Item 50-443/97-07-04(Closed): Revision 01 (10-01-97) of the Seabrook Station Process Control Program (PCP) did not include complete information describing or referencing the waste processing and packaging methods used, the applicable regulatory requirements, and the burial ground requirements. The PCP, revised as Appendix C of the Seabrook Station Radiation Protection Manual (Rev. 28), included complete information.

R8.2 Inspection Follow-up Item 50-443/97-07-05(Closed): A study (Health Physics Study/Technical Information Document (HPSTID) 96-015, "Natural Drying Times for Saturated Process Filters")(12-01-96), used to justify a change to the PCP to include a natural air drying option, needed a clearer description of the rationale supporting this change to the PCP. HPSTID 98-001, which replaced HPSTID 96-015, provided a clear rationale.

R8.3 Inspection Follow-up Item 50-443/97-07-06(Closed): Chemistry Procedure (CP)5.1 (Rev. 15), "Isotopic Characterization of Radioactive Waste," which addressed the generation and use of scaling factors or correlation factors to quantify the concentration of difficult-to-measure radionuclides in materials or for classification of wastes, lacked clarity on when and how measures were taken to check on the appropriateness of the current scaling factors used. CP 5.1 (Rev. 15 Chg, 02) provided the clarifying information.

S1 Conduct of Security and Safeguards Activities

a. Inspection Scope (81700)

Determine whether the conduct of security and safeguards activities met the licensee's commitments in the NRC-approved security plan (the Plan) and NRC regulatory requirements. The security program was inspected during the period of July 13-16, 1998. Areas inspected included: access authorization program; alarm stations; communications; and protected area (PA) access control of personnel and packages.

b. Observations and Findings

Access Authorization Program. The inspectors reviewed implementation of the access authorization (AA) program to verify implementation was in accordance with applicable regulatory requirements and Plan commitments. The review included an evaluation of the effectiveness of the AA procedures, as implemented, and an examination of AA records for 10 individuals. Records reviewed included both persons who had been granted and had been denied access. The AA program, as implemented, provided assurance that persons granted unescorted access did not constitute an unreasonable risk to the health and safety of the public. Additionally, the inspectors verified, by reviewing access denial records and applicable procedures, that appropriate actions were taken when individuals were denied access or had their access terminated. Those actions included the availability of a formalized process that allowed the individuals the right to appeal the licensee's decision.

Alarm Stations. The inspectors observed operations of the Central Alarm Station (CAS) and the Secondary Alarm Station (SAS) and verified that the alarm stations were equipped with appropriate alarms, surveillance and communications capabilities. Interviews with the alarm station operators found them knowledgeable of their duties and responsibilities. The inspectors also verified, through observations and interviews, that the alarm stations were continuously manned,

independent and diverse so that no single act could remove the capability for detecting a threat and calling for assistance and the alarm stations did not contain any operational activities that could interfere with the execution of the detection, assessment and response functions.

Communications. The inspectors verified, by document reviews and discussions with alarm station operators, that the alarm stations were capable of maintaining continuous intercommunications, communications with each security force member (SFM) on duty, and were exercising communication methods with the local law enforcement agencies as committed to in the Plan.

PA Access Control of Personnel and Hand-Carried Packages. On July 14, 1998, the inspectors observed personnel and package search activities at the personnel access portals. The inspectors determined, by observations, that positive controls were in place to ensure only authorized individuals were granted access to the PA and that all personnel and hand carried items entering the PA were properly searched.

c. Conclusions

The licensee was conducting its security and safeguards activities in a manner that protected public health and safety and that this portion of the program, as implemented, met the licensee's commitments and NRC requirements.

S2 Status of Security Facilities and Equipment

a. Inspection Scope (81700)

Areas inspected were: Testing, maintenance and compensatory measures; PA detection aids and PA assessment aids.

b. Observations and Findings

Testing, Maintenance and Compensatory Measures. The inspectors reviewed testing and maintenance records for security-related equipment for the previous 3 months, and found that documentation was on file to demonstrate that the licensee was maintaining and testing systems and equipment as committed to in the Plan. A priority status was being assigned to each work request and repairs were normally being completed within the same day a work request necessitating compensatory measures was generated. The inspectors reviewed security event logs and maintenance work requests generated since the last inspection. These records indicate the need for compensatory measures was minimal. When necessary, the licensee implemented compensatory measures that did not reduce the effectiveness of the security system as it existed prior to the need for the compensatory measure.

PA Detection Aids. Testing was accomplished by observing operations in the CAS and in the field. Individuals walked around the perimeter, and randomly generated alarms in numerous zones. The Plant Intrusion Detection System (PIDS) successfully detected all attempted intrusions.

Assessment Aids. The inspectors evaluated the effectiveness of the assessment aids, by observing on closed circuit television (CCTV), a walkdown of the PA by both licensee personnel and an NRC inspector. The camera view, overlap and picture quality were very good.

c. Conclusions

The licensee's security facilities and equipment were determined to be well maintained and reliable, and were able to meet the licensee's Plan commitments and NRC requirements.

S3 Security and Safeguards Procedures and Documentation

a. Inspection Scope (81700)

Areas inspected were implementing procedures and security event logs.

b. Observations and Findings

Security Program Procedures. The inspectors verified that the procedures were consistent with the Plan commitments, and were properly implemented. The verification was accomplished by reviewing selected implementing procedures associated with PA access control of personnel and packages, testing and maintenance of personnel search equipment and performance testing of PA detection aids.

Security Event Logs. The inspectors reviewed the Security Event Log for the previous six months. Based on this review, and discussion with security management, it was determined that the licensee appropriately analyzed, tracked, resolved and documented safeguards events that the licensee determined did not require a report to the NRC within 1 hour.

c. Conclusions

Security and safeguards procedures and documentation were being properly implemented. Event Logs were being properly maintained and effectively used to analyze, track, and resolve safeguards events.

S4 Security and Safeguards Staff Knowledge and Performance

a. Inspection Scope (81700)

Area inspected was security staff requisite knowledge.

b. Observations and Findings

Security Force Requisite Knowledge. The inspectors observed a number of SFM's in the performance of their routine duties. These observations included alarm station operations, personnel and package searches, and performance testing of the intrusion detection system. Additionally, the inspectors interviewed SFMs and, based on the responses to the inspectors, determined that the SFMs were knowledgeable of their responsibilities and duties, and could effectively carry out their assignments.

c. Conclusions

The SFMs adequately demonstrated that they had the requisite knowledge necessary to effectively implement the duties and responsibilities associated with their position.

S5 Security and Safeguards Staff Training and Qualification (T&Q)

a. Inspection Scope (81700)

Areas inspected were security training and qualifications and training records.

b. Observations and Findings

The inspectors reviewed the training records for 10 security personnel. This review indicated that SFMs are being trained and qualified in accordance with the approved T&Q Plan. In addition, through both interviews and observation of security force activities, it was determined that officers were knowledgeable of their duties.

c. Conclusions

Security force personnel were being trained in accordance with the requirements of the Plan. Training documentation was properly maintained and accurate and the training provided by the training staff was adequate.

S6 Security Organization and Administration

a. Inspection Scope (81700)

Areas inspected were management support, effectiveness and staffing levels.

b. Observations and Findings

Management Support. The inspectors reviewed various program enhancements made since the last program inspection. These enhancements included the allocation of resources for replacement of perimeter assessment aids, replacement of a perimeter alarm zone, and purchase of new mobile radios.

Management Effectiveness. The inspectors reviewed the management organizational structure and reporting chain and noted that the Manager of Security's position in the organizational structure provides a means for making senior management aware of programmatic needs. Senior management's positive attention is evident by the program improvements as noted in this report.

Staffing Levels. The inspectors verified that the total number of trained SFMs immediately available on shift met the requirements specified in the Plan. Staffing levels were adequate to ensure excessive use of overtime was not required.

c. Conclusions.

The level of management support was adequate to ensure effective implementation of the security program, and was evidenced by adequate staffing levels and the allocations of resources to support programmatic needs.

S7 Quality Assurance (QA) in Security and Safeguards Activities

a. Inspection Scope (81700)

Areas inspected were: audits, problem analyses, corrective actions and effectiveness of management controls.

b. Observations and Findings

Audits. The inspectors reviewed the 1998 QA audits of the access authorization (AA), security, and the FFD programs. The audits were conducted in accordance with the appropriate regulatory requirements. To enhance the effectiveness of the audits, audit teams included independent technical specialists.

The inspector determined that all audit findings were minor and not indicative of programmatic weaknesses, and that implementation of corrective actions for the findings would enhance program effectiveness. Inspectors' discussions with security management revealed that the responses to the audits were completed, and the corrective actions were implemented and effective.

Problem Analyses. The inspectors reviewed data derived from the security department's self-assessment program. Potential weaknesses were being properly identified, tracked, trended, and corrective actions were properly implemented.

Corrective Actions. The inspectors reviewed corrective actions implemented by the licensee in response to the QA audits and self-assessment program. The corrective actions were determined to be effective.

Effectiveness of Management Controls. The inspectors observed that the licensee had programs in place for identifying, analyzing and resolving problems. They include the performance of annual QA audits, a departmental self-assessment program and the use of industry data such as violations of regulatory requirements identified by the NRC at other facilities, as a criterion for self-assessment.

c. Conclusions

The review of the licensee's audit program indicated that the audits were comprehensive in scope and depth, that the audit findings were reported to the appropriate level of management, and that the program was being properly administered. In addition, a review of the documentation applicable to the self-assessment program indicated that the program was being effectively implemented to identify and resolve potential weakness.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors met with licensee representatives at the conclusion of the inspection on September 2, 1998. Exit meetings were also held at the conclusion of each of the specialist inspections. The licensee acknowledged the preliminary inspection findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

W. Diprofio, Unit Director
J. Grillo, Technical Support Manager
R. White, Design Engineering Manager
J. Peterson, Maintenance Manager
G. StPierre, Operations Manager
B. Seymour, Security Manager
J. Linville, Chemistry and Health Physics Manager
M. Ossing, Senior Project Engineer
G. House, Processing Supervisor
J. Marchi, Audit Manager
S. Heckscher, Drug and Alcohol Screening Technician
M. Campbell, HP Analyst
W. Cash, HP Dept. Supervisor
D. Hampton, HP Supervisor
D. Perkins, Oversight Analyst
J. Rafalowski, C&HP Project Supervisor
D. Robinson, Senior Chemist
M. Scannell, Senior Health Physicist
R. Sterritt, ALARA Coordinator
R. Thurlow, HP Technical Supervisor

Contractor

C. Goodnow, Chief of Security, Green Mountain Security Services

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observation
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 81700:	Physical Security Program for Power Reactors
IP 83750:	Occupational Radiation Exposure
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Closed:

VIO 97-80-01:	omission of three system functions from the Seabrook maintenance rule monitoring program
URI 97-80-02:	additional maintenance rule scoping issues
IFI 97-80-03:	balancing reliability and unavailability
IFI 97-80-04:	review of emergency electrical distribution-evaluate (a)(1) dispositioning to (a)(2)
VIO 97-80-05:	reliability performance criteria established without safety consideration
IFI 97-80-06:	review process/criteria for placing structures in (a)(1) category
IFI 97-07-04:	increase scope of PCP
IFI 97-07-05:	additional information to be added to HPSTID 96-015
IFI 97-07-06:	revise procedure CP 5.1
LER 98-006:	plant shutdown due to an inoperable control building air conditioning system
VIO 98-04-03:	failure to properly implement a temporary procedure change
LER 98-007:	failure to properly test power operated relief valve protection circuitry
LER 98-008:	unexpected engineered safeguards feature actuation during testing
IFI 97-03-03:	main steam valve testing

LIST OF ACRONYMS USED

AA	Access Authorization
ACR	Adverse Condition Report
ALARA	As Low As is Reasonably Achievable
ASME	American Society of Mechanical Engineers
CAS	Central Alarm Station
CBS	Containment Building Spray
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
DAC	Derived Air Concentration
ED	Electronic Dosimeter
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
FFD	Fitness-for-Duty
FME	Foreign Material Exclusion
FSB	Fuel Storage Building
gpd	gallons per day
gpm	gallons per minute
HEPA	High Efficiency Particulate
HP	Health Physics
HPSTID	Health Physics Study/Technical Information Document
HRA	High Radiation Area
IPM	Installed Personnel Monitor
LCO	Limiting Condition for Operation
LHRA	Locked High Radiation Area
MOV	motor operated valve
MPCS	Main Plant Computer System
MREM	MilliREM
NSARC	Nuclear Safety and Audit Review Committee
NSARC OS	NSARC Operations Subcommittee
ORO5	Outage Refueling No. 5
ORO6	Outage Refueling No. 6
PA	Protected Area
PAB	Primary Auxiliary Building
PAD	Personnel Alarming Dosimeter
PC	Protective Clothing
PCP	Process Control Program
PCR	Personnel Contamination Report
PM	Portal Monitor
psig	pounds per square inch gauge
QA	Quality Assurance
QC	Quality Control
RC	Radiological Control
RCA	Radiologically Controlled Area
RHR	Residual Heat Removal
RP	Radiation Protection
RP&C	Radiological Protection and Chemistry

RSC	Radiation Safety Committee
RWP	Radiation Work Permit
SAS	Secondary Alarm System
SFM	Security Force Member
SG	steam generator
SIR	Station Information Report
SORC	Station Operations Review Committee
SUFP	Startup Feedwater Pump
SW	Service Water
TDEFW	Turbine Driven Emergency Feedwater Pump
TEDE	Total Effective Dose Equivalent
the Plan	NRC-approved Physical Security Plan
TLD	ThermoLuminescence Dosimeter
T&Q	Training and Qualification
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
WBC	Whole Body Count
WPB	Wast Processing Building
WR	work request