U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-293/78-27

Docket No. 50-293

License No. DPR-35 Priority _____ Category C

Licensee: Boston Edison Company (BECo)

800 Boylston Street

Boston, Massachusetts 02199

Facility Name: Pilgrim Nuclear Power Station, Unit 1 (PNPS)

Inspection at: PNPS, Plymouth, Massachusetts and BECo Corporate Offices in Boston, Massachusetts

Inspection conducted: November 28 - December 1, 1978

Inspectors: _____ 12/29/78
M. M. Shanbaky, Radiation Specialist — date signed

_____ 1/2/79
R. E. Architzel, Reactor Inspector — date signed

_____
date signed

Approved by: _____ 12/29/78
J. P. Stolz, Chief, Environmental and Special Projects Section, FF&MS Branch — date signed

Inspection Summary:

Inspection on November 28-December 1, 1978 (Report No. 50-293/78-27)
Areas Inspected: Routine, unannounced inspection of environmental monitoring programs for operations including: management controls for these programs; the licensee programs for quality control of analytical measurements; implementation of the environmental monitoring programs - radiological; implementation of the environmental monitoring programs - biological/ecological; nonradioactive effluent release rates and limits; a followup on the licensee's actions on previous inspection findings; review of Safety Limits, Limiting Safety System Setpoints, and Limiting Conditions for Operation; IE Bulletin responses; and, review of licensee reports. A facility tour was conducted. The inspection involved 70 inspector-hours onsite by two NRC regional based inspectors.
Results: Of the five areas inspected, no items of noncompliance were found in four areas. One apparent item of noncompliance (Deficiency - failure to report abnormal radioactive releases as required - Paragraph 8) was identified in one area.

DETAILS

1. Persons Contacted

*P. J. McGuire, Pilgrim Station Manager, BECo
C. Vantrease, Chief Technical Engineer, BECo
*M. Hensch, Chief Radiological Engineer, BECo
E. Cobb, Chief Operations Engineer, BECo
H. Balfour, Methods, Training and Compliance Group Leader, BECo
*C. Mathis, Senior Plant Engineer, BECo
P. Manderino, Chemistry and Radiological Protection Technician, BECo
*S. L. Rosen, Nuclear Engineering Department Manager, BECo
*F. Mogolesko, Group Leader - Environmental Sciences, BECo
*S. Little, Senior Licensing Engineer, BECo
*R. Swetnam, Senior Radiation Protection Engineer, BECo
*R. Machon, Plant Support Group Leader, BECo
*C. Ondash, Senior Nuclear Engineer, BECo
*R. Anderson, Senior Biologist, BECo
*T. Sowdon, Senior Radiological Engineer, BECo

* denotes those present at the exit interview

2. Licensee Action on Previous Inspection Findings

(Closed) Noncompliance (77-25-01): Reporting of required analytical data. The inspector determined through review of the annual Environmental Radiation Monitoring Report No. 10 and discussions with the licensee, that all the analytical data was reported as required (Details, 5.a).

(Closed) Noncompliance (77-25-02): Reporting of domestic water analysis for Sr-90. The required data was submitted to the NRC in a letter dated December 1, 1977. The inspector noted through review of the licensee's current administrative controls, that during the last sampling period prior to report submittal, environmental media were collected early to allow for sample analyses, data review and reporting.

(Open) Unresolved (77-25-03): Upgrading TLD handling procedures. The inspector determined that action was initiated by the licensee to upgrade the environmental TLD handling procedures. The inspector noted that action in this area was not completed (Details, 5.b).

(Closed) Noncompliance (77-25-05): Failure to provide exposure records to terminated employees. The inspector examined a sample of terminated employee files and noted that copies of the employee exposure records were sent to the individual, the NRC and the plant files. The inspector determined through review of records and discussion with the licensee, that employee's exposure records and related correspondence were reviewed on a routine basis and kept in an updated condition.

(Open) Noncompliance (77-25-07): Failure to report abnormal releases in the semiannual effluent report. The inspector noted through records and reports review, that abnormal releases of radioactive material occurring during 1977 were not reported in the semiannual effluent report (Details, 8).

3. Management Controls

a. Assignment of Responsibility

The inspector reviewed the organization and administration of the environmental monitoring programs with respect to changes made since the last inspection of this area. The environmental radiation monitoring program is now supervised by Mr. T. Sowdon, Senior Radiological Engineer. The biological and ecological studies are supervised by Mr. R. Anderson, Senior Biologist. Mr. Sowdon and Mr. Anderson report to Mr. S. Rosen, Nuclear Engineering Department Manager, through Dr. F. Mogolesko, Environmental Sciences Group Leader. As needed, consultation services in this area are provided by Mr. J. Jow and Mr. M. Strom from Yankee Atomic Company. The plant nonradiological effluents monitoring program is supervised by Mr. R. Smith, Chemical Engineer, who reports to Mr. C. Vantrease, Chief Technical Engineer, who in turn reports to Mr. P. McGuire, Pilgrim Station Manager.

b. Program Review and Audits

The inspector reviewed the environmental monitoring program audits and noted that audits were performed by the BECo QA Group and Consultant Services during 1978. The inspector discussed with the licensee the results of an audit of the nonradiological effluent monitoring program which was performed by the BECo QA Group on May 15-19, 1978. The inspector noted that the audit results were reported to licensee management and corrective actions for audit identified inadequacies initiated or completed at the time of the inspection.

The inspector noted that the environmental radiation monitoring program was audited during 1978. This audit included program responsibilities performed by the Clapp Laboratory, Yankee Atomic Environmental Laboratory, and General Test Division - BECo. The inspector discussed with the licensee the audit results. The inspector noted that action was initiated to correct inadequacies identified during this audit. The inspector stated that completion of the required corrective actions will be examined during a subsequent environmental inspection (78-27-05). The inspector had no further questions in this area at this time.

No items of noncompliance were identified in this area.

4. Licensee Program for Quality Control of Analytical Measurements

The inspector discussed with the licensee the quality control (QC) of analytical measurements as related to the radiological analyses of environmental media. All environmental media analyses were performed during 1978 by the Yankee Atomic Environmental Laboratory (YAEL). The licensee stated that the YAEL QC program was initiated at the beginning of 1978. The licensee stated that the program includes QC measures for instrumentation control, QC charts, chemical reagent control, laboratory personnel qualification and U. S. Environmental Protection Agency (EPA) crosscheck program. The licensee stated that the QC program results and procedures were not available at BECo offices at the time of the inspection. The licensee stated that copies of the program results and procedures will be requested from the YAEL. The inspector stated that the QC program results and procedures will be examined during a subsequent environmental inspection (78-27-01).

No items of noncompliance were identified in this area.

5. Implementation of the Environmental Monitoring Program - Radiological

a. Routine and Nonroutine Reports

The inspector reviewed the licensee's annual environmental radiological monitoring report (Report No. 10) for the period from January 1 to December 31, 1977. The inspector verified that the report was submitted to the NRC at the required time and included the required environmental radiation monitoring program results. The inspector also reviewed the licensee's nonroutine reports (LERs 78-50, 78-42, 78-37, 78-34, 78-30, 78-27, 78-22, 78-18, 78-10, 78-06, 77-52, 77-42, 77-38 and 77-37). The inspector noted through reports review, that the LERs were submitted to the NRC as required (Details, 5).

b. Environmental Direct Radiation

Environmental direct radiation is measured with thermoluminescent dosimeters (TLDs). The inspector examin d the environmental direct radiation monitoring stations and noted that all the examined stations were provided with TLDs and located as required. The licensee stated that the environmental TLDs are handled by the BECo General Test Division (GTD). The inspector noted that the GTD procedures were audited by the Environmental Health Consultant on May 3, 1978. During this audit, inadequacies in TLD handling were identified and reported to the licensee's management.

The inspector reviewed the direct gamma radiation monitoring data for the period from January 1977 to December 1977 and noted relatively high exposure rates near the site. The licensee stated that above background exposure rates were only observed at the plant exclusion zone. The inspector noted that the maximum exposure rate (131 uR/hr) was measured at the Overlook Area near the new parking lot in December 1977. The licensee stated that the parking lot was not used by the public during 1977.

The inspector discussed with the licensee the current performance criteria for environmental TLD (NRC Regulatory Guide 4.13 and ANSI N-545-1975). Areas discussed included uniformity, reproductibility, dependence of exposure interpretation on the length of the field cycle, energy dependence, directional dependence, light dependence, moisture dependence, fading and self dosing. The licensee stated that performance in these areas will be evaluated. The inspector stated that this area will be reexamined during a subsequent inspection (78-27-02).

c. Air Sampling and Analyses

The inspector examined several of the offsite environmental air sampling stations. The inspector noted that the monitoring stations were in an operable condition and located at the required locations at the time of inspection. The inspector reviewed a sample of the air particulate analytical results for 1977-1978 and noted that the air particulate samples were collected and analyzed as required.

d. Other Environmental Media

The inspector reviewed a sample of the 1977-1978 analytical results for other environmental media including milk, water, mussel, sediment, Irish moss and cranberries.

The inspector noted that mussel samples taken from the discharge canal showed above ambient concentrations of Co-60. These levels were reported to the NRC. The levels were more than 10 times those detected at the control station. Both the licensee's and the inspector's evaluations concluded that the observed levels were related to PNPS operations and the dose equivalent was about 0.02 mrem/yr. (This constituted about 1% of the 10 CFR 50 Appendix I limit.

The inspector noted that all of the Irish moss samples taken from the discharge outfall area showed above 10 times the control station of Co-60 and Mn-54. The observed levels appeared to be related to the plant operations. The licensee's calculations showed that the resulting dose would be unlikely to exceed 1×10^{-4} mrem/hr due to the small amount of commercial Irish moss harvested from the area, processing and marketing dilution. (An infant consuming 1 Kg/yr would receive a dose equivalent to 0.14 mrem/yr.)

The inspector discussed with the licensee the analytical results of the cranberry samples taken during October 1977. The licensee stated that the observed Zr-Nb concentrations in the Bartlett Pond Bog cranberry samples were apparently related to nuclear weapons testing. The licensee stated that a special study was conducted during 1978 to evaluate environmental radionuclides in cranberry. In this study several spectroscopic analyses will be performed of samples from the total plant, berries and leaves. These cranberry samples were collected from locations near the site and far from the site. The inspector noted through discussions with the licensee, that the analyses of the cranberry sample for this special study were in progress and the study results will be reported in the 1978 Annual Environmental Radiation Monitoring Report. The inspector had no further questions in this area at this time.

e. Meteorology

The inspector examined the meteorological instrumentation during the inspection at both the 160' and 220' towers and the associated readout system at the control room. With the exception of the 33' level wind instruments at the 160' tower, the required meteorological instrumentation appeared to be in an operable condition at the time of the inspection. The inspector determined through examination of the quarterly system calibrations that the meteorological instruments had been calibrated on a routine basis. The inspector discussed with the licensee the system performance. The licensee's records showed the meteorological data recovery during the first calendar quarter of 1978 to be less than 90%. The overall data recovery during this period was 76%. This inadequacy was identified by the licensee through his internal program audit and review. The licensee stated that the relatively low data recovery was attributed to a severe weather condition and the lack of an adequate stock of spare parts for the system. The licensee stated that the required spare parts were ordered and now available. The inspector noted that the overall data recovery for the second quarter of 1978 was above 90%. At the conclusion of the inspection during the management interview, the licensee stated that the 33' level wind instrument on the 160' tower was repaired. This instrument outage duration was less than 48 hours. The inspector had no further questions in this area at this time.

No items of noncompliance were identified.

6. Implementation of the Environmental Monitoring Program - Biological/Ecological

The inspector reviewed by discussion with the licensee and examination of the reported biological data the implementation status of the biological/ecological monitoring program. The licensee stated that the five year biological study program was completed by the end of 1977. The inspector determined through reports review, that the summary of the five year biological monitoring program was submitted to the NRC as required. The inspector discussed with the licensee the continuing portions of the biological monitoring program including Section 3.B and 3.C of the Nonradiogological Technical Specifications. The licensee stated that these programs, including reporting, will be continued. The inspector had no further questions in this area at this time.

No items of noncompliance were identified in this area.

7. Nonradioactive Effluent Release Rates and Limits

a. Thermal

The licensee's current requirements in this area are listed in Amendment No. 32 to the Nonradiological Technical Specifications (NRTS), effective July 7, 1978. The inspector noted that LER 78-27 in this area was submitted to the NRC as required. The inspector determined through review of the plant thermal discharge records and examination of the thermal monitoring equipment and the associated readout systems, that the plant thermal discharges were in compliance with the current NRC regulatory limits. The inspector had no further questions in this area at this time.

b. Chlorination and Chlorine Monitoring

The inspector reviewed the plant circulating water chlorination operation and a copy of the residual chlorine monitoring procedures. The inspector reviewed a sample of the chlorine monitoring data and determined that NRTS limits were not exceeded during 1978. The residual chlorine analytical procedures (7.1.31) requires that the plant discharge samples be collected and analyzed during the entire hypochlorite injection period and for some period after such injection has been stopped. The inspector noted that samples were taken from the discharge canal and analyzed for chlorine at 15 minute intervals during the entire chlorination period, however, on several occasions no samples were taken after the termination of hypochlorite injection. The licensee stated that communications between the Plant Operator who performs the chlorination and the Chemistry Technician who performs the sampling and analysis will be improved. The licensee stated that the page system at the pedestrian bridge will be repaired. The inspector stated that this area will be reexamined during a subsequent inspection (78-27-03).

c. Neutralizing Sump pH

The inspector reviewed the waste neutralizing sump pH records for the period from January 28, 1978 through November 28, 1978. The inspector determined through records review and discussion with the licensee, that the discharge pH limits were not exceeded.

8. Reporting of Radioactive Effluents

The inspector reviewed the licensee's semiannual radioactive effluent report for the period from July 1 through December 31, 1977. Technical Specifications Section 6.9.C.1 requires, in part, that the format and content of the report shall be in accordance with Regulatory Guide 1.21 (Revision 1) dated June, 1974. Regulatory Guide 1.21 requires the reporting of all radioactive releases from the site, including abnormal releases to unrestricted areas, to be included in the semiannual effluent report. In a Licensee Event Report (LER No. 77-051/03L-0) the licensee described an abnormal release of radioactive liquid from the site to an unrestricted area. This abnormal release was not included in the semiannual effluent report. The inspector discussed this item with the PNPS personnel and was informed that the preparation of the semiannual effluent report is the responsibility of the Environmental Science Group (ESG) at the BECo Corporate offices in Boston. This matter was also discussed with the ESG and during the management interview at the conclusion of the inspection. The licensee stated that this area will be evaluated and action will be taken to ensure reporting is made in accordance with the Technical Specification requirements. The inspector stated that failure to include the abnormal release of radioactive liquid in the semi-annual effluent report as required is an item of noncompliance (78-27-04). The inspector stated that this item is a recurrent item and the proposed corrective action in this area provided in the BECo letter to the NRC dated December 16, 1977, was evidently not successfully implemented.

9. Facility Tour

A facility tour was conducted on November 28, 1978. The tour included the Control Room, the Turbine Building, and the Reactor Building. Facility conditions were checked for general housekeeping, cleanliness, fire and safety hazards, radiation area access and monitoring equipment. During the plant tour, the inspector noted that access to the refueling floor was controlled and all entrances to the area were locked and posted with "High Radiation Area" signs. However, access to the area through the elevator was neither controlled nor posted. At the time of the inspection, the licensee's surveys of the area showed a maximum general radiation exposure rate of about 15 mR/hr. The inspector noted that this exposure rate was significantly lower than that at which the area access is required to be locked; however, radiation exposure rate on the refueling floor is subject to changes depending on type of operations performed in the area. This matter was discussed with the licensee

who initiated immediate corrective action by turning off the elevator control switch for the refueling floor. The licensee stated that the elevator's refueling floor key will be signed out by supervisors. The inspector stated that this area will be reexamined during a subsequent inspection (78-27-05).

10. NRC In Office Review of LERs

NRC:RI in office review of the following LERs has been completed with no unacceptable conditions identified:

LER	Dated	Subject
78-052	11/27/78	Off Gas Process Radiation Monitoring System Inoperable
78-053	11/29/78	Fire Suppression System Inoperable

NRC:RI in office review of the following reports has been completed with no unacceptable conditions identified:

October, 1978, Monthly Report (BECo Letter No. 78-190)

11. On Site Review of LERs

In addition to the in office review described in Paragraph 10 above, LER 78-051, Less than Minimum Required SRMs, was reviewed on-site.

A plant startup was in progress on October 30, 1978, with SRM "D" bypassed because of a failed detector. SRMs (Source Range Monitors) A, C and B had been satisfactorily tested for operability prior to the startup. During the startup, SRM "A" started to fail intermittently downscale, resulting in a rod block.

The ORC was called in to approve placement of a jumper to bypass the downscale rod block, since this function was not required by TS. Actual placement of the jumper bypassed the entire SRM "A" trip logic, and the reactor startup was continued. Three of the four SRMs not fully inserted trips and upscale trips are required to be operable (TS 3.2. C.1) therefore, the LCO (Limiting Condition for Operation) for minimum number of SRM trip inputs to the rod block system was not satisfied. This is a licensee identified item which was reported as required. Improper placement of the jumper was identified during the performance of a Quality Assurance Audit (No. 78-18) and licensee management was informed on November 21, 1978.

The licensee notified the NRC on November 11, 1978 and stated that corrective action would include revision of the Jumper and Lifted Lead procedure (3.M.1-3) to require (for TS related jumpers) ORC examination of jumper termination points and utilization of station diagrams to ensure that only functions which are not required are affected. The inspector reviewed these changes in draft form. While reviewing current operability of the SRM detectors, the inspector noted that SRMs "A" and "D" were still inoperable. The licensee stated that SRM "A" would be repaired (a loose cable connection is suspected in the Drywell) prior to restarting the reactor following the next shutdown. This LER remains open pending revision of the jumper procedure and demonstration of SRM operability.

12. NRC Bulletins

The inspector reviewed the action taken on the following NRC Bulletins. In each case, the inspector found that a member of the plant staff had been assigned responsibility for the specified reviews and analysis. Plant administrative controls were used to track the engineering review and implementation of any required actions.

a. Bulletin 78-01, Flammable Contact - Arm Retainers in GE CR120A Relays

As reported in the response dated February 21, 1978, the licensee plans wholesale replacement of all contact arm retainers (GE CR120A relays) with Valox parts and has ordered, but not received all retainers. The licensee stated that replacement is scheduled during the next refueling outage (late 1979). The inspector examined a quantity of retainers which had been received and several of the installed relays. This Bulletin will remain open pending completion of the replacement program and verification by the NRC.

b. Bulletin 78-05, Malfunctioning of Circuit Breaker Auxiliary Contact Mechanism - General Electric Model CR105X

The licensee responded to this Bulletin in a letter dated June 5, 1978 stating that no CR105X auxiliary contact mechanisms were utilized. The Bulletin referred to certain series of CR105, 106 and 109 relays. The inspector and the Station Electrical Engineer examined the Reactor Protective System Scram Relays auxiliary contactors. These relays are CR105D with NEMA size 2 contactors which are not part of the series addressed by the Bulletin. Examination of station switchgear and control room back panels by the inspector on a sampling basis did not identify any applicable relays. The

inspector also discussed a recent failure at another facility of NEMA Size 2 contactors caused by loose plunger screws. The licensee acknowledged the inspector's comments.

No unacceptable conditions were identified.

c. Bulletin 78-06, Defective Cutler-Hammer Type M Relays with DC Coils

As reported by the licensee on, July 14, 1978, Cutler-Hammer Type M, DC relays, catalog number D23 MRD are not used at Pilgrim.

The licensee is currently undergoing a replacement program for other Cutler-Hammer relays (6-2-2 and 6-2-3 DC relays) under PDCR 76-89. The licensee had determined the cause of DC relay failures to higher than rated voltage during battery charging (115 V rated, max. voltage 140 V during equalizing charge) and is replacing these relays with Type M Cutler-Hammer relays. The inspector examined the replacement relays and verified that they were the recommended (26 MRD) series.

No unacceptable conditions were identified.

d. Bulletin 78-10, Bergen-Paterson Hydraulic Shock Suppressors

The licensee responded to this Bulletin in a letter dated August 9, 1978. The type of carbon steel accumulator springs described in the Bulletin are used at Pilgrim, and during the 1977 refueling outage one was found broken and one was found severely corroded. The licensee's proposed corrective action is to replace the springs when the snubbers are removed for functional testing. The inspector noted that this course of action could take as long as 10 refueling outages. The licensee stated that operability of the snubbers would be demonstrated through the surveillance program and that ALARA considerations resulted in the decision to replace the springs over the functional test intervals. All snubbers were checked during the 1977 refueling outage and corroded springs were cleaned or replaced in kind. The adequacy of a 10 year program to replace the corrodible springs with stainless steel is in question. This Bulletin will remain open pending completion of the licensee's actions and further review by the NRC.

13. Review of Safety Limits (SL), Limiting Safety System Settings (LSSS) and Limiting Conditions for Operations (LCO)

A sampling inspection was conducted to ascertain whether reactor operations were in conformance with selected Technical Specification requirements for safety limits, limiting safety settings, and limiting conditions for operations. The results of this review are delineated in the attached table.

Technical Specification Reference	Item	Required Condition	As Found	Basis
3.6.F.1	RCS - Recirc. Pump Speed Mismatch	≤ 15%	0%	IO*
3.10.C	Auxiliary - Spent Fuel Pool	≥ 33 feet	36 feet	IO*
3.9.A	Electrical -			
	Offsite Transmission Lines	≥ 1	2	IO*
	Auxiliary Transformer	1	1	IO*
	Startup Transformer	1	1	IO*
	Diesel Generators	2	2	RR**
	Buses A5 and A6	Energized	Energized	IO*
	250 VDC Bus	> 210 VDC	270 VDC	IO*
	125 VDC Bus A	> 105 VDC	132 VDC	IO*
	Shutdown Transformer	1	1	IO*
3.3.0	CRD Accumulators Inoperable	No more than 1 in a 9-rod square array	None	IO* (Core Status Board Lights
3.7.A.1.m	Torus Water Level	Downcomer submergence of 3.75 to 4.00 ft	-4"	IO* (Level Indicator)
3.8.B.4.b	Main Stack Dilution Fans	Minimum flow maintained	One fan run, one in standby	IO* (Control Switches)

* IO denotes item verified by direct inspector observation and discussion with licensee.

** RR denotes records reviewed by inspector.

3.5.A.3	Low Pressure Coolant Injection Systems	Operable	A and B Loops set for Automatic Initiation (NOTE 1)	IO* (Control Switches)
3.5.C.1	High Pressure Coolant Injection	Operable	Set for Automatic Operation, 4230 gpm (NOTE 2)	IO* (Control Switches)
3.5.D.1	Reactor Core Isolation Cooling System	Operable	Set for Automatic Operation, 400 gpm	IO* (Control Switches)
3.4.A.1	Standby Liquid Control Squib Valves	Continuity of Ignition Circuit	Intact	IO* (Indicative Lights)
3.7.A.1.i	Drywell Pressure	1.5psid	1.6psid	IO*
3.3.1 (Table)	LPRM Inputs to ARPMs	2 per level and 50% of assigned complement (NOTE 3) (as found is APRM Channel No. of LPRM Inputs, No. Bypassed No. Left in that level)	A, 14, 2C, 2C, B, 14, 0, C, 15, 1C, 3C, D, 14, 0, E, 15, 1C, 3C, 13, 1A, 3A	IO*

NOTE 1. The minimum flow valve for this system (B loop) was inoperable. The licensee had opened the valve and removed power from the motor, and demonstrated proper flow through surveillance testing. Repair of this valve will be examined during future NRC inspections.

NOTE 2. During surveillance testing a flow of 4250 gpm is required to be demonstrated.

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* IO denotes item verified by direct inspector observation and discussion with licensee.

**RR denotes records reviewed by inspector.

The inspector questioned the operator concerning the setting for the HPCI and RCIC flow controllers. Technical Specifications require monthly demonstration of ability of the systems to deliver at least 4250 and 400 gallons per minute, respectively. The setting for the HPCI flow controller was set at 4230 gpm. The RCIC controller was set at exactly 400 gpm. The operator raised the HPCI setting to slightly in excess of 4250 gpm when questioned. The licensee stated that instructions would be given to the operator to ensure setting these flow controllers would be at least at the required flows. This item (293/78-27-06) is unresolved and will be reexamined during future NRC inspections.

14. Exit Interview

On November 30 and December 1, 1978, at the conclusion of the inspection, the inspector met with the licensee representatives denoted in Paragraph 1. The scope and findings of this inspection, including the item of noncompliance were discussed. The licensee acknowledged the findings.