U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

DOCKET/REPORT NO.	50-309/93-15
LICENSE NO.	DPR-36
LICENSEE:	Yankee Atomic Electric Company 83 Edison Drive Augusta, Maine 04366
FACILITY NAME:	Maine Yankee
INSPECTION AT:	Wiscasset, Maine
INSPECTION DATES:	August 9 through September 3, 1993
CONTRACTORS:	William Mingus, TET,Inc., Mobile, AL David Wiggins, TET, Inc., Mobile AL

INSPECTORS:

Richard H. Harris, NDE Technician
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APPROVED BY:

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Mobile NDE Lab, EB, DRS — 2/7/94 Date

Inspection Summary and Conclusions: A routine announced inspection was conducted at Maine Yankee Nuclear Power Station during the period August 9 through September 3, 1993, using the NRC's Mobile Nondestructive Examination (NDE) Laboratory (Report No. 50-309/93-15). The purpose of the NDE Mobile Laboratory is to perform nondestructive examinations, independent evaluations of components, systems and weldments to assure that examinations performed are in compliance with codes, standards and regulatory requirements.

Areas Inspected: Areas examined during this inspection included a review of the licensee ISI program submittal and nondestructive examinations of safety-related weldments, hanger and supports selected from the safety injection (SI), residual heat removal (RH), chemical volume control (CH), containment spray (CS), pressurizer (PZR), reactor coolant (RC) and feedwater (WFPD) systems. Also included in this inspection, was the review of the erosion\corrosion program and an alloy analysis of the material for components stored in the warehouse.

DETAILS

1.0 INDEPENDENT MEASUREMENTS - NRC NONDESTRUCTIVE EXAMINATION AND QUALITY RECORDS REVIEW OF SAFETY-RELATED SYSTEMS

During the period of August 9 through September 3, 1993, an onsite independent inspection was conducted at Maine Yankee Nuclear Power Station. The objectives of this NRC inspection were to assess the adequacy of the licensee's inservice inspection program and the licensee's actions regarding the as-built configuration of pipe hanger/supports, and erosion/corrosion program. This was accomplished by duplicating those examinations performed by the licensee, required by regulations and codes, and then evaluating the results. Section 5.0 of this report contains a listing of the specific welds, hangers and supports inspected.

1.1 Nondestructive Examination (NDE)

Inspection of Pipe Hanger/Support (57050)

Five (5) safety-related pipe hanger/supports were visually inspected per NRC Procedure NDE-10, Rev. 0, Appendix A and B in conjunction with Yankee Atomic Electric Company (YAEC) Procedure YA-VT-11, Rev. 3, and quality control (QC) documents and associated isometric drawings. Included in this inspection were hanger/supports selected from the SI, CS and CH systems. The accessible surface area and adjacent base metal for a distance of one-half inch on either side of the weld was examined. Component integrity was also examined, including proper installation, configuration or modification of supports, evidence of mechanical or structural damage, corrosion, bent, missing or broken members.

Results: The NRC inspection results closely matched those of the licensee. No deviations were identified.

Visual Examination (57050)

Twenty-four (24) safety-related pipe weldments and adjacent base material (1/2 inch on either side of the weld) were visually examined in accordance with NRC Procedure NDE-10, Rev. 0, Appendix A, and the comparable Yankee Atomic Electric (YAEC) Procedure YA-VT-11, Rev. 3, quality control documents, isometric and as-built drawings. Examined during this inspection were ASME Class 1, and 2 pipe weldments selected from the SI, MS, and CV systems. Inspections were performed specifically to identify any cracks or linear indications, gouges, leakage, arc strikes with craters, or corrosion, which may infringe upon the minimum pipe wall thickness and modifications to piping or components. Mirrors, flash lights and weld gauges were used to aid in the inspection and evaluation.

Results: Most of the welds examined were ground prior to surface and volumetric examinations. The surfaces had many pits and sharp edges which were leftover from the as-welded condition. These pits and sharp edges were the cause of the nonrelevant indication mentioned in the following paragraphs. The welding and overall workmanship inspected was acceptable. The inspection reports of the licensee reflected the as-found conditions. No deviations were identified.

Liquid Penetrant Examination (57060)

Seventeen (17) safety-related pipe weldments and adjacent base material (1/2 inch on either side of the weld) were examined using the visible dye, solvent removable method per NRC Procedure NDE-9, Rev. 1, in conjunction with YAEC Procedure YA-PE-2, Rev. 7. Included in this inspection were ASME Class 1 and 2 stainless steel pipe, weldments selected from the RH, CS, CH and RC systems.

Results: The surface areas examined were adequately prepared for the examination, however, many nonrelevant indication were noted on these inspections. The licensee recorded the same relevant indications that were noted by the NRC. No rejected indications were identified; no deviations noted.

Magnetic Particle Examination (57070)

Four (4) safety-related pipe weldment and adjacent base material (1/2 inch on either side of the weld) were examined using the dry powder method per NRC Procedure NDE-7, Rev. 1, in conjunction with YAEC Procedure YA-MP-11, Rev. 4. Included in this inspection were ASME Class 2 steel pipe; weldments were selected from the WFPD system.

Results: The surface areas examined were adequately prepared for the examination. The licensee recorded relevant indications that were noted by the NRC. No rejected indications were identified, no deviations noted.

Ultrasonic Examination (57080)

Fifteen (15) safety-related pipe weldments were ultrasonically examined using NRC Procedure NDE-1, Rev. 1, in conjunction with the licensee's Procedure Y-UT-2, Rev. 2, and associated isometric drawings and ultrasonic data reports. Included in this examination were ASME Class 1 and 2 pipe weldments selected from the RH, CH, CS, and RC systems. To obtain the greatest possible repeatability in performing the NRC independent evaluations, the examinations were performed utilizing ultrasonic units, transducers and cables that matched, as closely as possible to those used by the licensee. A distance amplitude correction curve was established utilizing Maine Yankee calibration standards.

Results: The inspections performed by the licensee compared well with those of the NRC within the variations and tolerances normally expected in these types of examinations. The indications found by the NRC were noted by the licensee on their inspection reports. The sensitivity level for the examination was found to be adequate for the material being tested. One feedwater line weld (14"WFPD-4-38D) was found by the NRC to have a transverse indication. This indication was left as an unresolved item (URI 309/93013-01). At the time of this report, the licensee was evaluating this indication.

Radiographic Examination (57090)

Two (2) safety-related pipe weldments were radiographed by the NRC contracted radiographers. The procedure and technique used to make the radiographs were in accordance with NRC Procedure, NDE-10, Rev. 18, the licensee's radiographic examination requirements Y-RT-111, Rev. 3, radiographic data sheets and associated isometric drawings. Included in this sample were ASME Class 2 pipe weldments selected from the CH system. The resulting radiographs were reviewed and compared with the licensee's radiographs and evaluated.

Results: The code used for modification of components at Maine Yankee does not stipulate the total weld reinforcement allowed and if interpreted in the manner used by Maine Yankee does not stipulate any internal limits at all. The welds revealed excessive root reinforcement if evaluated by today's standards. The licensee will resolve this interpretive difference by determining the weld reinforcement limits based on considerations of stress and fracture mechanics.

Erosion/Corrosion (49001)

Concerns regarding erosion/corrosion (E/C) in balance of plant piping systems has heightened as a result of the December 9, 1986, feedwater piping line rupture which occurred at Surry and other later pipe ruptures. This event was the subject of the NRC Information Notice 86-106, issued December 16, 1986, and its supplement issued on February 13, 1987.

The licensee's actions with regard to the detection of erosion/corrosion in plant components were reviewed with respect to NUREG-1344, "Erosion/Corrosion Induced Pipe Wall Thinning in U. S. Nuclear Power Plants," dated April 1989, Generic Letter 89-08 issued May 2, 1989, and NUMARC Technical Subcommittee Working Group on Piping and Erosion/Corrosion Summary Report, dated June 11, 1987. The licensees Procedure, 17-232, Rev. 1, outlines the implementation of the erosion/corrosion program. The areas that were reviewed by the NRC were system selection, component selection, ultrasonic inspection, and data evaluation.

The selection of systems to be analyzed was based on the systems susceptibility to erosion/corrosion (flow velocity, steam quality, material of the components and temperature). Also, a ranking system was used to determine whether or not to include the systems in the analysis, including, risk of personnel injury, plant reliability, industry history and isolability of the system. The parameters used to exclude systems from analysis were based on the Electric Power Research Institute guidelines. These systems are then categorized high, moderate, or low according to the individual ranking. Individual components are then categorized in the same manner for inspection.

Components selected for inspection are mainly ultrasonically inspected for thickness. Other nondestructive methods are utilized when UT is not applicable. A gridding system is used for the ultrasonic inspection to establish reference points for repeatability. 100% of the grid area is inspected with the lowest reading in each grid location recorded. Four components, (16"WHPD-1-301 #10, 11, 12, & 18"WHPD-2-301 #2) were independently inspected by the NRC to determine the accuracy of the licensees measurements.

The licensee's ultrasonic data are evaluated by the E/C coordinator for accuracy, complete records and a preliminary review for wall thickness and passed on to the YAEC responsible engineer. All data which are below the allowable wall thickness are evaluated and dispositioned prior to plant restart.

Results: The ability to update the program makes Maine Yankee's E/C a living program. Trending of the components wear and replacement gave the licensee a calibrated database for predication. The thickness readings the NRC obtained closely matched those of the licensee. At the time of this inspection, MY was in the process of revising the E/C program to clearly define the boundaries and implementation of the E/C program.

At the request of the senior resident inspector at Maine Yankee, a ultrasonic thickness verification was performed on the diesel start air tanks. The concern is if the tanks remaining wall thickness is adequate to be able to withstand the design pressure. The air going into the tanks is not dried or heated. The moisture in the air is causing internal oxidation. The licensee inspects the tanks as part of their maintenance program. Four of the tanks were spot inspected every 18" along the axis and approximately every 30° starting at 90°. The results were relayed to the senior resident inspector for further evaluation.

Material Analysis (71500)

During this inspection, components were randomly select from materials stored in the licensee's warehouse. These components were examined using the Texas Nuclear (TN) Alloy Analyzer. The TN Alloy Analyzer is a field-portable instrument specifically designed for nondestructive, onsite verification of elemental composition and material type for standard alloys. The TN Alloy Analyzer uses a radioisotope excited x-ray florescence analytical technique to accomplish verification of grade or alloy type and the quantitative analysis of the chemical composition. The documents associated with the material examined such as the

licensee's receiving inspection reports, certified mill test reports, approved vendor list, audit reports and certificates of compliance were reviewed and compared with the NRC findings. The specific components examined are listed in Section 5.0 of this report, Table 3.

Results: The chemical composition and material type of the components were found to be in compliance with ASME Code, 1989 Section II, the reference code, and closely matched the results of the NRC inspections. No deviations were identified.

2.0 REVIEW OF SITE NDE PROCEDURES AND MANUALS (73052)

The following licensee procedures were reviewed, in the regional office and at the site, during this inspection period for compliance to the licensee's FSAR comments and applicable codes, standards and specifications.

Procedure Title	Number/Revision	Date
Magnetic Particle Examination Dry Method	Y-MP-111, Rev. 4	6/28/93
Liquid Penetrant Examination	Y-PE-2, Rev. 8	6/28/93
Visual Examination VT-1, 2, 3, & 4	Y-VT-111, Rev. 4	6/28/93
Ultrasonic Examination of Similar and Dissimilar Piping Welds	Y-UT-2, Rev. 3	6/23/93
Ultrasonic Thickness Measurements	Y-UT-112, Rev. 4	2/23/93
Radiography Examination Requirements	Y-RT-111, Rev. 3	2/23/93
Manual Ultrasonic Examination for the Detection of Intergranular Stress Corrosion Cracking	Y-UT-100, Rev. 2	6/23/93
Ultrasonic Examination Procedure	Y-UT-1, Rev. 8	2/23/93

Results: Procedures were found to meet the intent of the referenced codes. No violations were identified.

3.0 INSERVICE INSPECTION PROGRAM (ISI) (73051, 73052, 73755)

Maine Yankee defines their ISI program in the Yankee Nuclear Services Division Procedure YA-ISI-2, Revision 5, dated January 3, 1992. The program requires that a work plan be developed by the Plant ISI Coordinator which specifically defines each examination area, procedure number, calibration block, reference drawings, extent of examination, and size and material of the component to be examined. A review of the work plan for this outage, generated from a computer reduction of the general ISI plan, revealed various instances where the full complement of information, required by the procedure, was not recorded. The ISI Coordinator was made aware of these omissions and committed to correcting the data base to prevent recurrence.

It was also noted that YA-ISI-2, Revision 5, included a statement that "components whose examination ... reveals flaw indications that are not in excess of allowable flaw indications of the acceptance standards designated in the examination procedures, shall be acceptable for continued service." This is not in keeping with the statement made by ASME Section XI, 1986 Edition, the code in effect at Maine Yankee, Paragraph IWB-3112 (a): "Components whose volumetric or surface examination either confirms the absence of or reveals flaws that do not exceed the standards of Table IWB-3410-1 shall be acceptable for service provided the verified flaws are recorded in accordance with the requirements of IWA-1400(h), IWA-2220(b), and IWA-6220 in terms of location, size, shape, orientation, and distribution within the component." This requirement for recording of verified flaws does not appear in the code in effect in the previous ISI cycle at Maine Yankee. Because this change in Code requirements became effective in the current outage, and because no flaws had been verified before this procedural failure was pointed out to the licensee there was no compliance failure involved.

In addition to the above procedural problems, a review of the ISI program submittal to NRR, from which the current ISI was being performed, revealed some areas of weakness and misinterpretation of the Code. It was noted that the 25% rule for B-J piping was being used incorrectly. However the procedure and program had been submitted to NRR for review. A response from NRR had not been received in time to rectify these issues before the outage, no compliance failures were noted by the NDE Mobile Laboratory and the issues raised by the inspector would have been addressed in the normal exchange between the NRR reviewer and Maine Yankee.

4.0 MANAGEMENT MEETINGS

Licensee management was informed of the scope and purpose of the inspection at the entrance interview on August 9, 1993. The findings of the inspection were discussed with the licensee representatives during the course of the inspection and presented to licensee management at the exit meeting September 3, 1993. The licensee did not indicate that proprietary information was involved within the scope of this inspection. The following individuals were contacted:

*	R. Jordan	Licensing
*	N. Caruto	Project Manager
	J. Hebert	Licensing
*	S. Nichols	Technical Support Manager
	J. McCumber	Project Engineer
*	S. Volk	Level III/NDE
	C. Shaw	Manager Plant Engineering
*	A. Mason	Coordinator/ISI
*	P. Oikle	Level III Examiner
*	C. LLoyd	Quality Control Manager
	J. Atkinson	Material Manager
*	P. Melhorn	Coordinator/ISI

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J. Yerokun	Sr. Resident Inspector, Maine Yankee
W. Olsen	Resident Inspector, Maine Yankee
K. Battige	Intern/NRR

* Denote those attending entrance and exit meeting.

The above listed personnel were present at the exit meeting. The inspector also contacted other administrative and technical personnel during the inspection. The licensee voiced no objections to the findings of this inspection.

5.0 COMPONENTS INSPECTED

Following is a list of the components inspected by the NRC NDE Mobile Laboratory at Maine Yankee

NRC NDE MOBILE LABORATORY TABLE 1									
WELD ID. NO. OR ISO/DRAWING	SYS OR LIN	NONDESTRUCTIVE TEST						SHT.# 1	
		CL	RT	UT	PT	MT	VT	ACC	REJ
2 1/2" CH-45-1504 S-1A	CH	1	X				X	X	
2 1/2" CH-45-1504 S-1B	CH	1	X				X	X	
14" CS-15-S11	CS	2		X	X		X		
12" RH-20-24	RH	2		X	X		X	X	
12" RH-20-H3	RH	2		X	X		X	X	
4" CH-324-705	CH	2			X		X	X	
4" CH-324-696	CH	2			X		X	X	
4" CH-20-S-4	CH	2		X	X		X	X	
4" CH-20-S-5	CH	2		X	X		X	X	
4" CH-20-S-2	CH	2		X	X		X	X	
18" CS-11-76	CS	2		X	X		X	X	
18" CS-11-77	CS	2		X	X		X	X	
18" CS-12-S-13	CS	2		X	X		X	X	
18" CS-12-77	CS	2		X	X		X	X	
2" CH-27-6	CH	2			X		X	X	
4" RC-19-45F	RC	1		X	X		X	X	
4" RC-19-SE-2	RC	1		X	X		X	X	
PN-1	PN	1		X			X	X	
14" WFPD-4-38D	FW	2				X	X	*	
14" WFPD-4-38B	FW	2				X	X	X	
30" SHP-5-S28	FW	2				X	X	X	
30"SHP-3-S40	FW	2				X	X	X	
14"RH-1-77	RH	2		X	X		X	X	
14"RH-1-76	RH	2		X	X		X	X	

* unresolved item

NRC INDEPENDENT MEASUREMENTS PROGRAM HANGER/SUPPORTS TABLE 2					
IDENTIFICATION	SYS	CL	ACC	REJ	COMMENTS
H-5	CS	1	X		
6"CH-9	CH	1	X		
H-501	CH	1	X		
H-10	SI	1	X		
H-37	SI	1	X		

MATERIAL INSPECTION
TN ALLOY ANALYZER
TABLE 3

COMPONENT ID	MATL. ID	CL	ALLOY ANALYZER	CERTIFIED MILL TEST	P. O.#
SHAFT	INCO 750X	1	Cr 15.08 Ni 71.46 Ti 02.37	CR 15.09 Ni 70.63 Ti 02.37	55264
4" GLOBE VALVE BODY	SS/316	1	Cr 14.29 Ni 12.02	Cr 16.30 Ni 13.09	4096
3" SCH 10 tee	SS/304	1	Cr 17.83 Ni 10.32	Cr 18.55 Ni 10.10	9117
90 Elbow 2" SCH 10	SS/304	2	Cr 16.77 Ni 10.92	Cr 18.26 Ni 10.26	4960
90 Elbow 3" SCH 40	SS/304	2	Cr 17.77 Ni 10.04	Cr 18.50 Ni 08.26	44834
Reducing Tee 3"X3"X2"	SS/304	1	Cr 18.10 Ni 09.97	Cr 18.40 Ni 10.20	45001
2.5" SCH 80 Pipe	SS/304	2	Cr 17.94 Ni 11.23	Cr 18.58 Ni 10.00	6741
3" SCH 80 Pipe	SS/304	2	Cr 18.38 Ni 10.14	Cr 18.80 Ni 10.25	6741
1.5" Coupling	SS/304	1	Cr 18.93 Ni 08.94	Cr 18.22 Ni 08.94	64113
1" Grooved Flange	SS/316	1	Cr 16.94 Cr 12.39 Mn 02.07	Cr 16.63 Ni 12.82 Mn 02.03	58024
Bonnet Screw Cap 1.25"x6.5"	SS/416	1	Cr 11.59 Ni 02.01 Mn 02.42	Cr * Ni * Mn *	55264
Eye Bolt	SS/174PH	N/A	Cr 15.76 Ni 0.391 Cu 02.96	Cr * Ni * Cu *	55264

* ASME 1989 SECTION II indicates chemical range requirements as follows
Bonnet Screw SA-193/SA-193M AISI type 410
Cr 11.50-13.50 +/- 0.15 Ni 00.00 Mn 01.00 +/- 0.03 over
Eye Bolt Cr 15.00-17.50 Ni 03.00-05.00 Cu 03.00-05.00