

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

REPORT/DOCKET NOS. 50-213/92-24

LICENSE NO. DPR-61

LICENSEE: Connecticut Yankee Atomic Power Company  
P.O. Box 270  
Hartford, CT 06141-0270

FACILITY NAME: Haddam Neck Plant

INSPECTION AT: Haddam Neck, Connecticut

INSPECTION DATES: November 30 - December 4, 1992

INSPECTORS:

P. Patnaik.  
P. Patnaik, Reactor Engineer,  
Materials Section, EB, DRS

12-30-92

Date

H. J. Kaplan  
H. J. Kaplan, Sr. Reactor Engineer,  
Materials Section, EB, DRS

12-30-92

Date

APPROVED BY:

E. H. Gray  
E. Harold Gray, Chief, Materials Section,  
Engineering Branch, DRS

12/30/92

Date

Areas Inspected: The function of engineering and technical support was reviewed to evaluate staffing of the engineering department, training of engineers and the resolution of technical issues related to Haddam Neck plant of the Connecticut Yankee (CY) Atomic Power Company.

Results: The staffing of the Project Services Department, the Plant Engineering Department and the Corporate Engineering supporting Connecticut Yankee is adequate to provide engineering and technical support for the upcoming outage. The existing training program for new plant engineers and the training to be established in January 1993 for the Corporate Engineering, are considered to be satisfactory. Resolutions by the licensee of technical issues as determined from reviews of plant design change records, LERs, fuel inspection and reconstitution, were appropriate. The engineering backlog of plant design change records seems to be trending downwards.

## 1.0 ENGINEERING AND TECHNICAL SUPPORT (37700)

### 1.1 Scope

The function of engineering and technical support was reviewed during this inspection to evaluate staffing of the Engineering Department, training of engineers and the resolution of technical issues related to Haddam Neck plant of the Connecticut Yankee (CY) Atomic Power Company. As part of this inspection, several design changes and modifications to plant systems carried out during the 16R outage and the projects scheduled to be undertaken during the 17R (May '93) outage were reviewed. The engineering and technical support in the area of fuel inspection and reconstitution during the 16R outage was reviewed.

### 1.2 Organization

All engineering projects are carried out under the management of Connecticut Yankee's Project Services Department (PSD). This department is responsible to provide design and drafting services and project engineering services in the electrical, civil, mechanical and instrumentation/control engineering disciplines. The department also has a function of planning, scheduling, estimating and budget activities to support projects for CY. A total staff of forty-seven is dedicated to the above activities. In comparison to the projects undertaken by this department during the 16R outage, it was determined that this staff is adequate to support the upcoming 17R outage in view of the fact that the staffing increased over the past with the number and the complexity of projects being reduced. Almost fifty percent of this staff is stationed at site with the remaining staff working out of the corporate office. The department has management approval to hire temporary help when there is a need.

The Plant Engineering Department has a staff of forty engineers to support outage activities in the plant. Each project assignment has a designated lead engineer from the Plant Engineering. This department is also responsible for implementing and coordinating reviews of plant design changes, witnessing preoperational testing and providing engineering support to operations. The Plant Engineering also coordinates engineering activities of contractors on site performing inservice inspection, inservice testing, steam generator tube examination, and the erosion/corrosion monitoring program. The Corporate Engineering provides the necessary technical support in the above areas. The Plant Engineering Department also performs design changes of limited scope with in-house staff. The staffing of this department is considered to be adequate for the upcoming outage since the number and complexity of projects to be undertaken in the 17R outage are reduced in comparison to the previous outage.

The Corporate Engineering provides necessary engineering and technical support in various engineering disciplines encompassing nuclear analysis, stress analysis, chemistry and material and major design support. Approximately twenty-five percent of corporate engineering manpower is utilized in supporting CY.

### 1.3 Training

The Plant Engineering Department has a training program for CY engineering and contract personnel who perform engineering design or investigation. The training for new CY engineers includes an indoctrination program in engineering instructions, station procedures, administrative procedures, a curriculum in nuclear training and on-the-job training. The contractor's employee training covers an indoctrination in applicable department procedures, radiation worker training and familiarization of various areas onsite. All engineering personnel complete annual retraining in reviewing specific procedures and applicable sections of 10 CFR 50.

The training for new engineers in the Corporate Engineering Department covers indoctrination in applicable procedures along with specific training to be determined by engineer's supervisor. Corporate Engineering has embarked on a new training concept, "Engineering Support (ES) Training Program," to be available to all engineering support personnel. The training program is intended to meet the requirements of INPO issued Academy Document 91-017, "Guideline for Training and Qualification of Engineering Support Personnel." The implementation of the ES training program is expected to begin on January 1, 1993.

The training provided to the Plant Engineers and the Corporate Engineers to maintain their proficiency in work seems to be adequate. The training for entry level engineers adequately prepares them to perform their job.

### 2.0 DESIGN CHANGES/MODIFICATIONS

The inspectors reviewed the following plant design change records (PDCRs) which were undertaken during the 16R outage.

- Replacement of Connecticut Yankee "B" charging pump assembly (DCR 1185)

The existing "B" charging pump experienced an increasing trend of vibration levels at the outboard pump bearing in the horizontal radial direction.

- Addition of a 100,000 gallon stainless steel condensate storage tank (CST) (PDCR 1271).

The existing condensate system uses the demineralized water storage tank (DWST) as both an emergency water supply source and as a makeup water supply source for the condenser hotwell. The new CST will provide makeup water to the condenser hotwell and as an alternate supply for the electric auxiliary feedwater pump. Also, the interconnecting piping will line up the CST to supply water to the DWST in an emergency.

- CY service water header reroute to the emergency diesel generators (PDCR 1093).

This change aligns the service water pumps with their respective emergency diesel generators (EDG). Each service water pump will supply cooling water to the same EDG that supplies its emergency power. This modification simplifies the valving logic when aligning service water during refueling outages for EDG maintenance/repair.

- Modification to provide an automatic open signal to service water Adams filter bypass motor-operated valves (MOVs) on a high containment pressure (HCP) actuation signal (PDCR 1294).

Due to partial fouling of the Adams filters from both seasonal and weather related conditions, it is possible that the containment air recirculation (CAR) fan coolers would not get sufficient service water flow during a design basis accident. This modification provides for an automatic opening of the Adams filter bypass MOVs upon an HCP condition through an HCP auxiliary relay contact signal ensuring that maximum flow through the CAR fan coolers will be available regardless of the flow through the Adams filters, without any operator action.

The inspectors reviewed the design inputs, the safety evaluations and the test plans for the modifications and noted use of good engineering practice in each of these areas.

## 2.1 Engineering Backlog

The inspector reviewed the backlog of plant design change records (PDCRs) for the year 1992 and noted a decreasing trend of outstanding PDCRs from the first quarter of 1992 to the fourth quarter as summarized below.

<u>Year</u>	<u>Number of Outstanding PDCRs at the end of quarter (QTR)</u>
1st QTR 1992	105
2nd QTR 1992	66
3rd QTR 1992	56
4th QTR 1992	50
(as of 12/1/92)	

The outstanding PDCRs reflect incomplete administrative items such as drawing update and modification completion report labels, etc. which were of no impact to safety. The Engineering Department is directing necessary resources to close out most of the open PDCRs before the start of the next outage and to close out all currently open PDCRs by 1994.

## 2.2 Review of Licensee Event Reports (LERs)

The following LERs were reviewed to ascertain licensee's root cause evaluation, safety assessment and corrective action.

- Steam generator level malfunction with inadequate means of inserting a trip signal (LER 92-20).
- Blocked air intakes render both emergency diesel generators inoperable (LER 92-16).
- Excessive fouling rates of service water strainers during maintenance render both trains of service water inoperable (LER 92-15).
- Excessive fouling rates potentially render service water filters inoperable (LER 92-14).
- Postulated loss of offsite power due to transmission grid instability (LER 92-11).

Licensee's root cause evaluation and safety assessment were technically correct and the corrective actions were appropriate. There was a high degree of engineering involvement in the above LERs and the engineering was effective in closing out these LERs.

## 3.0 FUEL INSPECTION/RECONSTITUTION

During the 16R outage, ultrasonic (UT) and visual inspections of 157 fuel assemblies of the cycle 16 core were performed to detect fuel failures caused due to debris in the core leftover from the thermal shield removal effort. The ultrasonic data were evaluated using more conservative guidelines than that of the cycle 15. The failed fuel rods detected by ultrasonic testing were later confirmed by eddy current inspection.

Residual debris were removed from nine fuel assemblies prior to reconstitution and from seven fuel assemblies after reconstitution. The radiochemistry data on equilibrium I-131 concentration during the current fuel cycle indicate satisfactory fuel performance as a result of an effective fuel inspection and reconstitution effort.

## 4.0 QUALITY ASSURANCE (QA) PROGRAM

The inspection covered certain aspects of the QA program applicable to design changes and modifications. The inspector obtained the following information with regard to the plant design change records (PDCRs).

- The licensee does not generally require a QA review of PDCRs prior to issue. This is in accordance with the licensee's NRC approved QA Topical Report.



- On a case by case basis, the Quality Services Department of the Corporate Engineering conducts a post-engineering audit such as performed for the auxiliary feedwater system modification. Audit Report QSD 5100, dated May 20, 1992, indicated that a thorough post-installation review had been performed and several weaknesses were identified. These weaknesses were subsequently corrected and appropriate actions were taken to preclude recurrence including an intensive critique of the subject modification.
- Appropriate reviews of work packages are performed to assure that welding and nondestructive examination requirements are specified in accordance with the applicable code as verified by the inspector in a review of work package WO/91-11208.
- The QA supervisor is a permanent member of the PORC committee and, as such, plays a key role in the final review of PDCRs.
- QA is actively involved in various stages of a given modification. The licensee agreed to consider final overviews of safety-related modification packages implemented during an outage prior to startup from that outage.

## 5.0 CHEMISTRY AND MATERIALS (C&M) PROGRAM

The licensee's chemistry and materials group is currently conducting various long-term projects in cooperation with EPRI to characterize secondary water chemistry variables that contribute to corrosion and sludge/scale transport. These variables include electrochemical measurements, crevice hideout and return, pressure, and the effect of system or water quality changes on various parameters.

The inspector reviewed the failure analysis report of the reactor coolant system loop isolation valve (RC-MOV 513) stem failure. The failure of the 17-4 PH stainless stem was attributed to stress corrosion cracking (SCC) as a result of long-term aging effects causing embrittlement of the material and hence susceptible to SCC. Although the metallurgical evidence in the report appears to support the conclusion, the embrittlement issue as reflected by measured impact properties, is not conclusive because of the lack of original property data. The licensee ultrasonically tested the remaining seven isolation valve stems at the time of the failure and stated that they will ultrasonically test all eight valve stems again during the next outage.

## 6.0 ENTRANCE AND EXIT MEETINGS

Members of the licensee's management, engineering and technical staff were informed of the scope and the purpose of the inspection at the entrance meeting which took place on November 30, 1992. The findings of the inspection were presented to and discussed with members of the licensee's management at the conclusion of the inspection on December 4, 1992. A list of attendees at the exit meeting is appended to this report as Attachment 1.

## ATTACHMENT 1

### Connecticut Yankee Atomic Power Company

E. Annino	Staff Assistant
M. Bain	CY Engineering Manager
G. Bouchard	Unit Director
T. Cleary	Licensing Engineer
P. L'Heureux	Eng. Supervisor - CY
D. Nordquist	Director, Quality Services
G. Pitman	CYPSD
J. Stetz	Haddam Neck - VP

### U.S. Nuclear Regulatory Commission

P. Habighorst	Resident Inspector
H. Kaplan	Sr. Reactor Engineer
P. Patnaik	Reactor Engineer
W. Raymond	Sr. Resident Inspector