BEFORE THE UNITED STATES
ATOMIC ENERGY COMMISSION

12-11-70

In the Matter of	)	
	)	
	)	
	)	Docket No. 50-247
Consolidated Edison Company	)	
of New York, Inc.	)	
(Indian Point Unit No. 2)	)	

TESTIMONY OF JOHN T. STIEFEL

Hearing

TESTIMONY OF JOHN T. STIEFEL

PRESIDENT, WEDCO

Q. Mr. Stiefel, what is the nature and design of the Indian Point Unit No. 2 Pressurized Water Reactor plant?

A. The principal elements of the plant, which are described in the FSAR, are the reactor and reactor coolant system, the reactor containment system; engineered safeguards including an emergency core cooling system, a containment spray system, a containment air recirculation cooling and filtration system and hydrogen recombiners; an instrumentation and control system including a reactor protective system, and radiation monitoring equipment; an electrical supply system including emergency diesel generating units and their fuel supplies; a waste disposal system; auxiliary and emergency systems including a chemical and volume control system, closed loop auxiliary coolant system, and service water system; a primary and auxiliary building ventilation system; a control room; a heating and ventilating system; a steam and power conversion system including the turbine-generator and condenser; and various necessary buildings and structures.

These systems provide a plant capable of producing power, but also important, allow a flexible construction and test program capability that permits various construction sequences and considerable latitude in the sequence of testing the various systems of the plant.

Q. How has Westinghouse managed the design and construction of this plant?

A. Westinghouse has used many techniques during the past 20 years. Attention to key areas throughout the development, design, procurement and manufacture, construction, test and operations has developed management techniques for communications and control and an extensive understanding of the many aspects required for complete nuclear power plants. Westinghouse has accumulated many years of nuclear experience in its management team and maintains organizational flexibility to cope with changing situations as projects proceed from design to commercial operation. The most important aspects of nuclear power are safety and quality assurance. Many years of experience in management understanding is required to balance the many aspects of a plant, but Westinghouse has always been concerned regarding quality and safety. We believe our experience based on over 75 designed and operating naval and commercial plants, shows that we can design and build with our tools, techniques and experience quality plants with excellent nuclear operating records.

In the design and construction of this plant we have used this experience, including the management techniques and technical expertise that has been developed over the years.

Q. Mr. Stiefel, what is the status of the construction and test program?

A. The construction of Consolidated Edison Company Indian Point station, Unit No. 2, is substantially complete.

Q. What do you mean by substantially complete?

A. Based on Westinghouse and my personal experience at other plants we are capable of meeting the following key milestone dates:

Commence Hot Functional Testing or Air Testing of the Reactor Containment	12/29/70
Commence Core Loading	2/10/71
Achieve Criticality	3/15/71
Commence Power Test Program (Greater than 1% power)	3/25/71

We fully expect (barring unforseen circumstances) to meet the aforementioned dates.

All major Indian Point Unit No. 2 plant components are in place and, with certain exceptions, all systems have been completed to the extent that pre-operational testing is in progress.

Significant component and system testing will have progressed, by December 29, 1970, to the point such that either heatup of the Reactor Coolant System or air testing of the reactor containment may begin depending on our schedule progress. This heatup, and the concurrent system "Hot Functional" testing, unique to the pressurized water plant, will provide final assurance prior to core loading and operational testing, that completed systems have been constructed and operate in accordance with plans and commitments. Certain construction work and system tests are planned for completion during and after Hot Functional Testing and are generally listed in the following tables:

Table A

Construction Status -- Unit No. 2

1. All systems will be completed prior to December 17, 1970, except the following:

   - Reactor control
   - H_2 and carbon dioxide systems for turbine-generator
   - Waste disposal (gas)
   - Radiation monitoring
   - Nuclear instrumentation
   - Rod control drive
   - Incore instrumentation
   - Reactor protection and safeguards systems
   - Water treatment and makeup
   - Misc. lighting and heat
   - Cranes (includes fuel handling manipulator crane)
   - Heat tracing
   - Cathodic protection
   - Computer
   - City Water

   In addition, the following modifications are planned for later completion:

   a. "Backup vent system" on the hydrogen recombiners (to be completed during the first two years of operation at power)
   b. Filtered exhaust system for fuel storage building (to be completed by the end of the first year of full power operation)
   c. Redundant turbine overspeed trip (to be completed prior to power).
   d. Missile protection beam or column external to reactor containment (to be completed prior to April 1, 1971).
   e. Structural reinforcements in turbine hall and Unit No. 1 superheater building (to be completed prior to power).

   Installation of piping seismic restraints, pipe whip restraints and piping insulation will be in progress.

2. On December 25, 1970 (Hot Functional) construction status will be essentially the same as above, except that the non-nuclear portion of the computer is expected to be complete.

3. By February 10, 1971 (Core Loading) the following construction items will be incomplete:

   - Certain seismic and pipe whip restraints in areas other than the vapor containment building, and some insulation
   - Nuclear portion of the computer software package
   - Modifications planned for later completion (as stated in 1. a - e above).

4. By March 15, 1971 (Initial Criticality) some restraints external to vapor containment, grading, leveling and the five modifications mentioned earlier will remain to be completed.

5. By March 25, 1971(Start of Power Testing above 1% power) final grading, leveling and modifications a and b above will remain for future completion.

Table B

Test Status - Unit No. 2

1. The Reactor Coolant System cold hydrostatic test was completed on June 29, 1970. This test required checkout and operation of the Reactor Coolant Pumps, charging pumps component Cooling System, Electrical Power Distribution Systems and other significant systems associated with normal operation of the Reactor Plant.

   The following tests are planned for conduct after December 17, 1970 as part of the hot functional test program: Demineralizer, Reactor Coolant System, Auxiliary and Component Cooling System, Pressurizer System, Residual Heat Removal System, Sampling System and Safety Injection System.

2. The following tests are planned for conduct after completion of hot functional testing and include core loading procedures which are planned to be implemented on February 10, 1971: Boron Recycle System, Waste Disposal System, Radiation Monitoring System, Nuclear Instrumentation System, Chemical and Volume Control System, Fuel Handling Facility, Fire Protection Systems, Safety Injection System, Reactor Protection and Safeguards check-out, and Initial Core Loading.
3. The following tests are planned for conduct after core loading and prior to initial criticality: Boron Recycle System, Nuclear Instrumentation System, Reactor Coolant System, Pressurizer System, Rod Control System, Steam Generator Level Control System and Reactor Protection System.
4. The following tests, including initial criticality programmed for March 15, 1971, are planned for conduct prior to significant power operation: Initial Criticality, Boron Dilution/Addition Nuclear Instrument Checks.
5. The following tests, which include initial approach to significant power on March 25, 1971, are planned through the full power acceptance run: Startup Sequence, Nuclear Instrumentation System, Steam Generator Level Control System, Feedwater System, Steam Dump System, Reactor Control System, Natural Circulation, Load Reduction, Plant Trip.

• • ________________________ • •

Construction and testing effort during the post Hot Functional Test period will be focused on completing the prerequisites for core fuel loading. These prerequisites are expected to be complete such that fuel loading may commence February 10, 1971.

Certain planned construction and test work not prerequisite to core loading will remain to be completed following commencement of core loading, as indicated in Tables A and B.

Initial core criticality is expected to be achieved March 15, 1971, following completion of all prerequisite testing. Power testing at low levels and up to approximately 35% of full power will follow initial criticality and should commence about March 25, 1971. Construction effort to be conducted during this period, if not previously completed, is listed in Tables A and B.

The completion of all requisite testing and ascent to full power is expected to be complete in May 1971. Start of commercial operation (100 hour acceptance run) is expected at that time.

Q. Have you formed an opinion whether Indian Point Unit No. 2 has been constructed in accordance with the technical portions of the application as amended?

A. Yes, I have. As constructed, the nuclear powered generating unit, Indian Point No. 2, satisfies the safety requirements of the design set forth in the final Facility Description and Safety Analysis Report (FSAR) as amended, included in the application as amended.

This has been and is being verified by a comprehensive quality assurance program combining the talents of the principal organizations involved in the Indian Point project (Westinghouse, WEDCO, and United Engineers and Constructors) and their subcontractors.

Q. What steps is Westinghouse taking in its quality assurance program to provide a plant meeting the AEC's requirements?

A. The Westinghouse portion of the quality assurance program for Indian Point Unit No. 2 was planned to provide assurance that all phases of construction important to safety, both off-site and on-site, were conducted according to engineering and quality control standards and requirements established to meet the design set forth in the FSAR as amended included in the application as amended. The program has been carried out in accordance with the description set forth in the application as amended.

This was accomplished through the organization described in the FSAR as amended included in the application in which authority and responsibilities were assigned to provide internal checks and balances. Independent audits were carried out by Westinghouse, WEDCO, and UE&C at various times which confirmed that the quality assurance program was adequate and was being properly implemented.

Westinghouse, WEDCO and UE&C each have a quality assurance organization, whose task is to implement the quality assurance program for their respective companies.

They are independent of purchasing and construction functions and have the authority to assure that their independency of action and judgment is not impaired.

The quality assurance organizations share with the design engineers the responsibility for assuring that all equipment and structures meet the design and quality standards set forth in the FSAR as amended. The quality assurance organizations have the authority to stop work if necessary to assure adequate quality. Solutions to fabrication, installation or construction problems affecting quality require concurrence of the cognizant design engineering organization.

The design and quality engineers for each of the principal organizations participating in Indian Point Unit No. 2 evaluated suppliers and reviewed specifications, requests for quotations, and purchase orders as required to assure that the intent of regulatory requirements, industry codes and standards, and other technical requirements were complied with. In each case, to the extent contemplated by the quality assurance program, these organizations utilized quality control residents at the manufacturer's plants, or by means of scheduled vendor surveillance visits reviewed the vendor's manufacturing, welding, and quality control records, and witnessed product tests in order to provide assurance that the components did in fact meet the requirements specified by the design. Documentation required by the quality assurance program was maintained. Both design and quality assurance personnel reviewed all pressure vessels to assure that these vessels were manufactured in compliance with applicable ASME codes,were properly documented, and had nameplates affixed with stamps applied by independent insurance company inspectors under the auspices of the National Board of Underwriters.

Preparation for shipping and shipping of equipment important to safety was done in conformance with procedures established to provide adequate protection from environmental or mechanical damage and approved by the appropriate design and quality engineers.

As a further check to assure that no damage had occurred in transit, equipment was inspected upon arrival at the site. On site storage, installation, and quality control were done in compliance with specifications and procedures required by the quality assurance program described in the FSAR as amended.

Components were installed under the surveillance of engineering and inspection agencies to assure compliance with specifications.

For example, the reactor vessel had to be set to very close tolerances on elevation, plumb, level and rotation in respect to the building. All other major reactor coolant system components had to be set to very close tolerances relative to the reactor vessel. To assure compliance, after the surveyors and associated inspection agencies were satisfied that all components were positioned in accordance with the detailed procedures and specifications, the components were then grouted in place and re-checked.

All welding was performed using qualified welders and qualified welding procedures. The qualification of personnel and procedures was that required by applicable codes and specifications. Records were maintained for all welds in systems important to safety to assure that this was the case.

Quality control testing was performed in accordance with applicable codes and specifications. Examples of tests performed are nondestructive procedures, such as dye penetrant, magnetic particle and radiography tests, and, on a sampling basis, destructive tests of structural materials such as concrete and reinforcing bar splices. This testing was performed in accordance with code requirements and engineering specifications, and records were maintained by the testing laboratories. We audited those records as an independent check on the validity of the test results.

During plant construction, teams of inspectors and engineers conducted "walk-through" inspections of installed systems to provide assurance that components had been installed as required and that all installation welding was properly identified and documented.

Upon completion of installation, the reactor coolant system and those engineered safeguards systems requiring insulation were and are being inspected immediately prior to insulation to assure that the surface condition of pipes, fittings, and components meet required standards and that these surfaces were properly cleaned to assure that no deleterious amounts of materials or chemicals remained on the surface. On non-insulated engineered safeguards systems, final cleanup is performed after installation and testing is completed and prior to removal of scaffolding.

Throughout the Indian Point project various audits of quality activities were conducted. Westinghouse nuclear power non-resident specialists, together with resident engineers, monitored installation of critical systems to assure conformance to specifications. The Westinghouse Headquarters Quality Assurance group has audited Indian Point project quality activity. Also within the WEDCO Reliability section there is a Systems Reliability group, reporting to the Reliability Manager, which has conducted audits of construction activity, site quality control and vendor surveillance activities.

In those instances where quality control determined that design specifications had not been met that fact was documented. In some cases, such as defective weldments, these were repaired on site using standard repair procedures having prior engineering approval. Other cases were processed to design engineering for decisions. This separation of functions permitted the individual responsible for determining the action to be taken to be independent of the individual responsible for the construction schedule.

The WEDCO startup engineering organization is responsible for Westinghouse activities in the conduct of plant startup, including technical guidance of core loading and testing from the point of construction completion through commercial operation. This responsibility includes issue and approval of test procedures for control of these activities. Over and above the thorough check-out of systems performed by construction, engineering and quality assurance agencies, this group has performed, and will continue to perform, an independent check of systems for completion, internal cleanliness, proper installation, calibration and operation during and after the final stages of construction.

The quality assurance activities heretofore described will continue to be enforced for those items of construction remaining to be completed to assure that the completed facility will be in accordance with the design set forth in the FSAR as amended.

Prior to full power operation of Indian Point Unit No. 2, the plant will undergo a thorough, systematic testing program which successively demonstrates the capability of the plant to proceed safely to each following stage of testing until full power is achieved and maintained. Each requisite stage of the initial startup tests will be successfully completed before the next stage is undertaken. We will, of course, continue to follow the program set forth in the FSAR as amended.

The first stage of the initial tests is a program which ensures that required equipment and systems perform in accordance with design criteria prior to fuel loading. In general, the types of tests include hydrostatic, hot functional and preoperational tests and they are performed by Con Ed. They verify that equipment and systems are capable of performing the functions for which they were designated.

Fuel loading by Con Ed does not begin until the prerequisite system tests and operations are satisfactorily completed and the AEC has granted permission to load fuel.

Upon completion of core loading, precritical tests will be performed by Con Ed to assure that all equipment and systems whose installation was completed during core loading are functioning properly. After satisfactory completion of these tests nuclear operation of the reactor will be initiated by Con Ed. This final stage of startup and testing includes initial criticality, low power testing and power level escalation to establish operating characteristics of the unit and core, to verify design predictions, to demonstrate that license requirements are being met and to verify that commercial power operation can be safely undertaken. The WEDCO startup organization supplemented by appropriate Westinghouse technical experts provides technical advice, recommendations and assistance in planning and executing the respective stages of unit startup.

A great deal of care has been taken in the construction of Indian Point Unit No. 2 and will continue to be taken in completing the construction and placing the unit into operation, as described above and in much greater detail in the application as amended. In view of this, it is my professional opinion that as built and tested, Indian Point Unit No. 2 will meet the requirements set forth in the FSAR as amended included in the application as amended.