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October 20, 1989

Re: Indian Point Unit No. 2
Docket No. 50-247

Document Control Desk
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

Subject: Steam Generator Tube Inservice Inspection Program Supplemental
Information to the 1989 Inspection Results

This letter is in response to the request for additional information regarding our July 26, 1989 submittal setting forth the results of 1989 inservice steam generator tube inspection program results. The request was transmitted in the course of a telephone discussion with your staff on October 5, 1989.

In accordance with your request, Attachment A to this letter contains further information concerning foreign objects on the secondary side of the steam generators (see also section 3.d, page 6 of the July 26, 1989 report), together with a discussion of specific actions taken during the 1989 refueling outage to minimize loose parts in the steam generators.

Should you or your staff have any questions regarding this matter, please contact Mr. Jude G. Del Percio, Manager, Nuclear Safety and Licensing.

Very truly yours,



cc: Mr. William Russell
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Attachment A

Steam Generator Tube Examination Program and Results
1989 Refueling Outage
Supplemental Information

Consolidated Edison Company of New York, Inc.
Indian Point Unit No. 2
Docket No. 50-247
October, 1989

During the 1989 refueling outage at Indian Point 2, an extensive inspection and repair effort was undertaken to restore the girth welds of the plant's four steam generators. The work, lasting over nine weeks and involving well over 150 people, required extensive time spent in the secondary side of the vessel. Station management, well aware of the potential for loose parts in the generators resulting from this activity, pursued a comprehensive program of physical barriers, accountability and FOSAR for the minimizing of loose parts. This report defines the extensive program that was undertaken.

PHYSICAL BARRIERS

The primary means of controlling loose parts in the steam generators was the use of physical barriers. Any time the secondary manway or any inspection port cover was removed, it was manned by a Quality Control technician or was blocked by a temporary cover marked with explicit instructions to notify Q.C. before starting work. Covers were placed over the primary moisture separators before any other work was performed to prevent any items from falling within the tube wrapper. Plates were installed on top of the Downcomer Flow Resistance Plates (DFRPs) in order to prohibit any material from falling into the downcomer barrel. Small tools were lanyarded to preclude them from being lost. Personal items including dosimetry, eyeglasses, and hoods were taped to the workers before entry to the vessel.

The scope and unusual nature of the work also required some specialized control procedures. Foam rubber seal offs and sheet metal slag catchers were installed to catch the majority of the debris generated when the DFRPs were cut out. After the plates were removed a new style of seal off that also acted as a work platform was installed. The work area was periodically vacuumed and debris removed to keep the total amount of equipment in the vessel to a minimum.

ACCOUNTABILITY

The primary goal of any accountability program is to ensure that every person and item (tool, gauge, instrument, etc.) that enters the vessel also leaves. Initially, Con Edison Quality Control provided individuals to log people and equipment in and out of each steam generator. Logs were maintained any time the steam generator was open for access. As the scope of the project escalated, the responsibility for this task was taken over by the service vendor, Westinghouse. This "change in command" was accompanied by extensive cross-checking to account for items (e.g. shielding, droplights) that entered the vessel under the Con Ed program and left while the generator was under Westinghouse control.

Detailed logs were kept on all items entering and leaving the generators. These logs were cross-checked to ensure that no items were left in the vessels. Over 2000 log entries were reviewed including a total of 10 tons of shielding and all of the tools associated with the nine week repair effort. This check identified all items that entered a steam generator but were not logged out. Additionally, workers reported losing a dosimetry pack (consisting of a digi-dose, TLD, and a DRD) and an 8" level. Some of these items were found and removed as a result of FOSAR efforts. For conservatism, the remaining items were assumed to be still in the generator and are listed on Attachment 1 as belonging to category 3 (FOSAR parts categories are defined below).

FOSAR EFFORTS

Foreign Object Search and Retrieval (FOSAR) typically follows any maintenance activity that includes entry of personnel or equipment into the steam generators. This activity consists of pushing a fiberscope around the annulus of the steam generator just above the tube sheet. Grapples are used to pick up and remove any objects found in the annulus or projecting from the tube bundle. Clearly, the substantial scope of the girth weld repair work dictated an extensive FOSAR effort. As a general rule, FOSAR can be performed in a steam generator in four to six hours. More than twelve hours of post-girth weld FOSAR inspection was performed per generator in this instance due to the extensive work done and the desire by Station management for a complete accounting of the condition of the generators. FOSAR activities were documented on videotape and procedures underwent both Westinghouse and station review prior to the start of work.

The search effort began with a list of items that were known to be in the generators at the end of the 1987 refueling outage. These objects were either wedged between tubes or too heavy to be removed by FOSAR equipment at that time. The items that could not be accounted for or were reported lost by personnel during girth weld repair activities were added to this list to be searched for by FOSAR technicians.

Due to repeated draining and refilling of the steam generators and the slag produced by the removal of the DFRPs, there was an accumulation of small (1/2" or less) pieces of material in the annulus that impeded initial FOSAR efforts. Technicians used magnets and a vacuum hose dragged through the annular region to remove as much debris as possible. Grappling fingers were used to pick up and remove larger objects from the steam generators. These objects are listed in Attachment 2. Recovered items were either removed to storage or photographed.

Attachment 1 is a composite listing of all known objects that may have been left in the generators at the end of the 1989 outage. Category 1 objects are those that were unretrievable in 1987 and were found in the same locations in 1989. An attempt was made to remove each of these objects to ensure that it had not been loosened during Cycle 9 operation. Category 2 represents objects that were expected to be seen from 1987, but were not observed during the 1989 FOSAR effort. These objects may have been moved or removed through sludge lance operations or during power operation.

Category 3 objects were determined to be missing through accountability logs or by worker reports. They were not observed during FOSAR and are assumed to be free moving within the generator for purposes of wear rate calculations. Category 4 includes objects that were new in 1989, but had not been predicted from accountability log reviews. These objects could be a result of either Cycle 9 operation or girth weld activities. Attempts to remove each of these objects were unsuccessful due to the object being too heavy, too bulky or wedged into position by the tube bundle.

A video camera was also employed from the girth weld region looking down the annulus of steam generator 22. The effort was curtailed when the camera head wedged between the wrapper and the shell. Extensive attempts to retrieve the camera head were made, but proved futile. The presence of the camera head during operation has been analyzed to be acceptable. Prior to aborting the process, however, the entire transition cone was examined by this method to ensure that no large items had fallen below the work area.

OPERATION WITH FOREIGN OBJECTS

All items left in the Indian Point 2 steam generators have been analyzed to predict the time for the object to wear any tube to minimum wall thickness. This analysis is contained in Westinghouse 10 CFR 50.59 Safety Evaluation SECL-89-827 (submitted with July 26, 1989 report). The safety evaluation discusses the assumptions made and the methods used to predict wear times. This analysis has been utilized by Indian Point for several outages, and is the same method used to justify continued operation with foreign objects after the 1987 refueling outage.

Attachment 2

Items recovered from Steam Generators through FOSAR efforts

9" plastic level
1.5" grinding wheel
several wire ties
14" x 1/8" weld electrode
small pieces of duct tape
1/4"-20 machine screw
wire cutters
shielding clip
DRD
small pieces of 1/8" tie wire
Oxygen monitor sensing head
small pieces of fire blanket
small slag particles from DFRP removal
4 HP smear samples
1" x 5" wedge

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