ATTACHMENT A

CON EDISON PROGRAM

FOR

MONITORING AND EVALUATING

METALLIC LOOSE OBJECT INDICATIONS

IN THE INDIAN POINT UNIT NO. 2 REACTOR VESSEL

Revision 1
May 4, 1978

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I. INTRODUCTION

In 1971, Con Edison agreed to participate in a Research and Development program with Westinghouse, part of which included the development of instrumentation systems to determine the capability of detecting the presence of loose objects in a reactor primary system during plant operation. The program included the analysis of accelerometer signals gathered from transducers positioned on the steam generators and the reactor vessel.

As a direct result of that program, a Metal Impact Monitoring System (MIMS) for Indian Point Unit No. 2 was installed during the 1976 refueling outage and was operational when the plant returned to service in September, 1976. Component "signature acquisition" of the nuclear steam supply system components (baseline data) were obtained at selected plant operating conditions for future reference. These data indicated the possible presence of a loose object at the bottom of the Reactor Vessel.

In order to confirm the presence of a loose object, vibration data were recorded on magnetic tape on September 12, 13, 14, and 17, 1976. Impacts were noted during pump transients and during steady-state pump operation with one and two pumps. Intermittent impacts were also noted with three pump operation. No impacts were observed with four pump steady state operation.

The results of analysis of these data showed that the impacts were most likely caused by a single loose object, free to move during pump transients but not during steady state normal full flow operation. Based on simulation experiments, the weight of the object was predicted to be between 0.2 lbs and 1.5 lbs.

The results of triangulation analysis indicated that the object was moving in a random manner and there was no clear indication in the data that the object was confined to any particular quadrant at the bottom of the vessel. The fact that at full temperature, impacts were noted during pump transients and none during normal full flow operation indicated that the object was not wedged but remained at rest under normal steady state operations.

The NRC Region 1 inspector was informed on September 21, 1976 of the detection of a metal impact signal indicative of a loose object. The NRC was formally notified of these results in a letter dated November 29, 1976. This letter also answered a number of questions the NRC had with regard to the MIMS operation. These results were further described at the June 2, 1977 meeting with the NRC Staff. An additional set of MIMS measurements were taken on August 3 to August 6, 1977. The results of the analysis of these data were submitted to the NRC by letter dated September 29, 1977 and were also presented at the October 31, 1977 meeting with the NRC Staff. These results confirmed that the behavior is the same as that indicated by the earlier data. Details of the Westinghouse methodology involved in the analysis of MIMS results will be presented in a separate report.

A review of the potential effects of this object on control rod operation and fuel assembly coolant flow was undertaken and it was concluded that the plant could be safely operated. The results of this review and our MIMS monitoring program were the subject of a meeting with the NRC Staff on February 10, 1978. The results and conclusions of this meeting were documented in our February 27, 1978 letter to NRC as well as in the NRC minutes of the meeting dated March 28, 1978.

Subsequent to the February 10, 1978 meeting, additional MIMS data were taken on February 13, 1978 during shutdown of the unit for its second refueling outage. These data were taken utilizing additional transducers mounted on the reactor vessel for a total of five transducers. Westinghouse triangulation analysis of the impact data indicated that following reactor coolant pump shutdown, the loose object had most likely come to rest at the bottom of the vessel on the centerline. This information was furnished to Con Edison by Westinghouse on March 23, 1978. Since the probable location of the loose object was established, Con Edison decided to use an underwater camera to observe the object. The object remains unidentified but by camera observations the size has been determined to be approximately 1-3/4 x 7-½ x ¼ inches and the material is a non-magnetic metal, probably stainless steel. Assuming stainless steel, the loose object would weigh approximately .8 lbs., which is within the original Westinghouse predicted weight range of .2 to 1.5 lbs. and closely approximates the most recent Westinghouse estimate of .5 lbs.

Based on this latest information, the potential effects of this object on control rod operation and fuel assembly flow were reviewed and this

review confirmed our previous conclusion that the plant could be safely operated. In addition, because of the dimensions of the loose object, it has been determined that it cannot become lodged between the energy absorbing device and the vessel bottom. Therefore, there is no need for special heatup procedures for continuous surveillance of the loose object during plant heatup. Furthermore, based on independent evaluations of both Con Edison and Westinghouse, it is believed that the observed loose object did not come from the reactor internals, the fuel, steam generators, reactor coolant pumps or any other component of the Reactor Coolant System and appears to be external to any equipment in the Indian Point Unit No. 2 plant. Accordingly, no special monitoring is required.

II. MIMS MONITORING PROGRAM

The on-line MIMS consists of two transducers permanently installed at the bottom of the reactor vessel. The signals from these two detectors are continuously recorded on a strip chart and the signals are available for audio verification at the MIMS console in the control room. In addition, two transducers are temporarily installed at the bottom of the reactor vessel to provide additional data for off-line analysis.

During the hot shutdown condition for the second refueling outage, MIMS data were taken on February 13, 1978 while sequentially turning off the reactor coolant pumps one at a time. Data were also obtained for one, two, three, and four pump operation by restarting the pumps.

During the plant startup following the second refueling outage, routine MIMS monitoring and data recording will be performed. In addition, we will continue our neutron noise R & D program during Cycle 3 operation.

III. DELETED

DELETED

IV. FUEL INSPECTIONS

During the current refueling outage, visual inspections using remote equipment were performed for the two lead burnup fuel assemblies in each region (a total of six fuel assemblies were inspected).

The inspection program for these fuel assmblies included visual inspection of the bottom of the lower end fitting of each of the six fuel assemblies. No evidence of any impacting in the flow inlet regions of any fuel assembly was observed.

V. CYCLE 3 STARTUP TEST PROGRAM

A startup physics program is planned following the current refueling outage. This program will be similar to that carried out following the first refueling outage. The program will include Movable Incore Detector Flux Maps taken at approximately 0%, 90% and 100% of full power.

IV. REPORTING

A. Routine Reports

Routine and reportable occurrence reports will be made to NRC as may be required by existing Technical Specifications.

B. Special Reports

Within 60 days following completion of the Cycle 2/3 startup testing program, a report will be provided to the NRC containing as a minimum, the results of the startup physics program and the results of 0%, 90% and 100% flux maps comparing actual power distributions to predicted.

In addition, Westinghouse has informed us that they estimate approximately 3 months will be required to prepare and submit to NRC a report of MIMS qualification work that they have performed.