

Lessons-Learned From the Indian Point Unit 2 Steam Generator Tube Failure: A Regulatory Perspective on Technical Issues

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ABSTRACT

Workers at Indian Point Nuclear Power Plant, Unit 2 (IP2), manually shut down the reactor in Buchanan, N.Y., at 7:29 p.m. on Tuesday, February 15, 2000 following indications of a steam generator tube failure in one of the plant's four steam generators. The operators received a nitrogen-16 alarm in the 4-loop, Westinghouse, pressurized-water reactor which is indicative of a steam generator tube failure while the unit was at 99% power. The unit has four Westinghouse Model 44 SGs with mill annealed alloy 600 tubing, carbon steel drilled hole tube support plates (TSPs), and partial depth rolled joints in the tubesheet. Subsequent inspections revealed that the source of the leakage was Primary Water Stress Corrosion Cracking (PWSCC) at the apex of a row 2 U-bend tube in steam generator 24.

An IP2 steam generator tube failure lessons-learned task group was formed to conduct an evaluation of the staff's technical and regulatory processes related to assuring steam generator tube integrity in order to identify and recommend areas for improvements applicable to the US Nuclear Regulatory Commission and/or the industry. The findings of the lessons-learned task group based on the February 15 tube failure will be presented in this paper.

INTRODUCTION

Steam Generator Tube Failure Event

On February 15, 2000, a single tube in one of four steam generators (SGs) at Consolidated Edison's (Con Ed's) Indian Point 2 (IP2) plant failed, leading to a transient and shutdown of the reactor. The tube failure consisted of a through-wall crack in one of the 3,260 tubes in one of the SGs that allowed reactor cooling water to flow through the crack into the steam generating side of the SG at the rate of about 150 gallons per minute. The reactor was safely shutdown by the plant systems and operators. The event resulted in a minor radiological release to the environment that was well within regulatory limits.

After placing the unit in the cold shutdown condition, Con Ed inspected SG 24 and found that the row 2, column 5 (R2C5) tube had failed. This small-radius, low-row tube had cracked at the apex of the tube U-bend due to primary water stress corrosion cracking (PWSCC). Con Ed's inspection included an eddy current test (ECT) examination of the SG tubes and visual examinations of the secondary side of the SGs. During these ECT inspections, Con Ed found that greater than 1% of the tubes in SGs 21 and 24 contained defects, placing the unit in a condition that required U.S. Nuclear Regulatory Commission (NRC) approval before restarting the plant in accordance with the technical specifications (TSs).

By letter dated June 2, 2000, Con Ed provided its Condition Monitoring and Operational Assessment (CMOA) report which documented the as-found condition of the tubes during the SG examinations conducted following the February 2000 tube failure [1]. Additionally, the CMOA report provided Con Ed's technical justification for the continued operation with the current SGs until SG replacement at the end of 2000. However, on August 11, 2000, as the NRC continued its review of the CMOA and other information provided by the licensee for restart approval, Con Ed announced that it would replace all four SGs before returning the plant to power operation.

Lessons-Learned Charter

The IP2 SG Tube Failure Lessons-Learned Task Group and Charter were proposed by the NRC's Director of the Office of Nuclear Reactor Regulation (NRR) and approved by the NRC's Executive Director for Operations in June 2000 [2]. The objective of the effort was, in light of the recent IP2 event, to evaluate the NRC staff's regulatory processes related to assuring SG tube integrity in order to identify and recommend areas for improvements applicable to the NRC and/or the industry. A multi-disciplined Task Group was established in accordance with the charter consisting of staff from the Office of Research, Region I and NRR. Support was provided by the Office of the General Counsel.

The Task Group was directed to focus attention on issues directly related to the February 15, 2000, tube failure event and operation of the current SGs at IP2. The documents that the Task Group reviewed included Con Ed SG examination information and NRC SG inspection procedures and reports, nuclear industry generic SG examination guidance and

associated NRC review information, NRC and Con Ed license amendment proposals and safety evaluation reports, and the Con Ed event root cause analysis [3] and the associated NRC Special Inspection Report [4].

The Task Group also reviewed two other reports. One was a March 16, 2000 report presenting an Office of Research (RES) independent technical review [5]. Following the IP2 tube failure event, NRR had requested RES to review the NRC safety evaluation associated with an IP2 license amendment that approved an extension to the SG inspection interval. The other report provided the details of the Office of the Inspector General's (OIG) Event Inquiry on the "NRC's Response to the February 15, 2000, Steam Generator Tube Rupture at Indian Point Unit 2 Power Plant," dated August 29, 2000 [6].

The Task Group developed conclusions and recommendations, discussed in a final report issued October 23, 2000 [7], based on reviews of documents and discussions with NRC staff, nuclear industry representatives involved in SG programs, and NRC SG expert consultants. Public input was not sought as part of the Task Group effort based on the understanding that the report and other efforts would be integrated into an activity that would allow for input from a broad range of stakeholders. Public input would be considered in the development of the activities listed in the steam generator action plan, issued November 16, 2000 [8].

The Task Group effort did not consider IP2 issues unrelated to SG tube integrity or issues being addressed by other regulatory processes, such as the NRC's response to petition for regulatory action submitted pursuant to 10 CFR 2.206 or a differing professional opinion regarding steam generator issues. The Task Group did not evaluate Con Ed performance relative to regulatory requirements.

TASK GROUP FINDINGS

The conclusions and recommendations provided in the lessons learned report represented the views of the Task Group. The recommendations were developed to address the conclusions/lessons-learned that were reached, so that with respect to SG tube integrity, the NRC can continue to maintain safety, increase public confidence, increase the efficiency and effectiveness of NRC programs, and reduce unnecessary regulatory burden. Quantitative costs and benefits were not developed for each recommendation. The objective was to provide a basis for each recommendation to support both the internal NRC planning process and the appropriate regulatory process for considering actions for the industry.

Safety Significance

The Task Group evaluated the safety significance of the event using safety assessment studies performed before and after the event [2]. A NRC Special Inspection Team, sent to IP2 after the tube failure event, noted that there were no actual radiological consequences of the event, and that the event did not impact the public health and safety. The Task Group agreed with this assessment.

The Task Group also considered the NRC staff's preliminary risk assessment of the IP2 event associated with the NRC significance determination process (SDP). The staff concluded that the IP2 tube failure resulted from degraded conditions allowed to exist in the SGs during operating cycle 14, in which the event occurred. The staff determined that the licensee's SG tube integrity and quality assurance program was deficient and did not detect the degraded conditions. These tube conditions presented a safety concern because of a reduction in safety margin and an increased risk of SG tube rupture (SGTR) during IP2's operating cycle 14. The Task Group considered the preliminary staff assessment appropriate for the SDP process and agreed with its conclusion.

The Task Group also evaluated the overall significance of the event and condition of SG tubes relative to the NRC measures for maintaining safety in the NRC's Strategic Plan. The risk from the IP2 SG event and risk from the tube condition prior to the event were well within NRC Strategic Plan measures for maintaining public health and safety.

The Task Group concluded that the weaknesses in the Con Ed program that contributed to the poor condition of the failed SG tube have generic implications. The examination guidance in use at IP2 is common throughout the pressurized water reactor (PWR) industry. While the replaced IP2 SGs were the last of their particular model, Task Group review of other SG designs and tube materials indicate potential generic applicability of the IP2 lessons. Review of PWR risk analysis confirms that SG tube integrity is important at all PWRs. Therefore, the Task Group concluded that a high priority should be assigned to improvements in the SG tube integrity program at IP2, for the industry guidance on SG tube integrity programs, and associated NRC regulatory programs.

The Task Group concluded that communicating the safety significance of the IP2 experience is difficult. They noted that, in some instances, media reports concerning the event did not accurately portray its safety significance in that they implied significant radiological consequences from the tube failure. Although the staff concluded that the degraded SG tube condition during the operating cycle was risk significant, the plant response to the event resulted in no adverse public health

and safety consequences. The Task Group acknowledged that the NRC would probably face this communications challenge in the future. Therefore, the Task Group recommended that the NRC should incorporate experience gained from the IP2 event into agency initiatives on risk communication and outreach to the public.

Con Ed

The Task Group reviewed major aspects of the 1997 Con Ed SG examinations [9] and plans [10] leading up to these examinations. These same activities were the subject of an NRC Special Inspection Team review and are documented in its report of August 31, 2000[2]. The Task Group agreed that the inspection findings are of potential high significance, as proposed in the Special Inspection Team Report. The key deficiencies noted were that:

- 1) During the 1997 SG eddy current examination by Con Ed, a defect caused by primary water stress corrosion cracking (PWSCC) was identified for the first time in a tube similar in type and location to the tube that failed at IP2, and Con Ed did not effectively evaluate the susceptibility of similar tubes to this degradation during the upcoming operating cycle.
- 2) During the 1997 SG examination, a form of degradation called tube denting was identified when restrictions were encountered as the eddy current probes were inserted into the U-bend portion of similar tubes. Con Ed did not evaluate the potential for, and significance of, this degradation.
- 3) During the 1997 examination, significant eddy current signal interference (noise) was encountered in the data obtained from a number of tubes similar to the tube that failed, and Con Ed's program was not adjusted to compensate for the noise, particularly when the new PWSCC defect was found in this area of the SG.

Industry/NEI/EPRI

In addition to the plant-specific SG examinations conducted by Con Ed at IP2 during 1997, the Task Group reviewed the industry SG examination guidance used by Con Ed during the 1997 outage and concluded that there were weaknesses in the guidance as well as in their implementation. The guidance was developed and is maintained by the Electric Power Research Institute (EPRI), who provides it to the industry as licensed material. Since the EPRI guidance is an integral part of the industry initiative on steam generator program management now being coordinated with the Nuclear Energy Institute (NEI), the Task Group recommended that the industry should be requested by the NRC to expeditiously ensure that the lessons learned from the IP2 event are incorporated into the guidelines and implemented by all licensees and that feedback be provided to the NRC on the status.

The Task Group concluded that the guidance in use during the 1997 IP2 examinations was not explicit with respect to the quality of eddy current data and the significance of noise in the data. The need for increased licensee attention when "new" types of degradation are found should be emphasized in the guidance. The Task Group understood that industry is already taking steps to make improvements and believed they should be discussed with the staff, and schedules determined for their incorporation.

The following additional issues that should be pursued with the industry for improvements in the guidance and implementation by licensees were identified by the Task Group:

- 1) Licensees should review generic industry guidelines carefully to ensure that the conditions/assumptions supporting the guidelines apply to their plant-specific situation. The plant-specific qualification of eddy current techniques to perform inspections is fundamental to an adequate inspection.
- 2) Licensees should use caution when assessing SG tube structural integrity by using unqualified sizing techniques for growth rates and threshold of detection. Licensees should use a conservative approach to screen tubes for in-situ testing.
- 3) A noise study performed by NEI indicates that SG tube U-bend noise may be significant regardless of tube age or outside deposits. The study was discussed at a public meeting held between NEI and NRC staff on July 26, 2000 at NRC headquarters. Flaw detection capabilities in the U-bend region should be assessed by licensees for all SGs.
- 4) Vendors that conduct the actual examinations, including collection and analysis of the data, are important to the SG examination process. The industry initiative should address vendor oversight by licensees.

Industry Initiative and Framework

In recent years, the NRC staff has examined the regulatory programs which comprise the framework for ensuring the integrity of SG tubes. In the mid 1990's, the staff concluded that existing regulations provided an adequate regulatory basis for dealing with SG issues, but thought them to be prescriptive, out of date, and not fully effective. In 1997, the Commission approved the staff's approach to upgrade plant technical specifications, and the Nuclear Energy Institute voted to adopt NEI

97-06, "Steam Generator Program Guidelines," [11] as a formal industry initiative to provide a consistent industry approach for managing SG programs and for maintaining SG tube integrity. In 1998, the Commission approved a revised approach to work with the industry consistent with Direction Setting Initiative 13, "The Role of Industry," to more efficiently resolve program concerns and move toward NRC endorsement of NEI 97-06, coupled with voluntary industry implementation of improved SG technical specifications.

The Task Group considered the implications on the industry initiative and framework, given the IP2 event and its lessons-learned, the weaknesses in the EPRI guidance, and the safety significance of the issues. The Task Group believed that the industry initiative remains an effective means to continue to maintain safety in this area. However, the lessons-learned discussed above identify issues that should be incorporated into the framework in an integrated way. The Task Group concluded that the industry should be requested to evaluate and propose modifications to the framework that consider the lessons-learned from IP2. These should include, as a minimum: 1) means to ensure plant-specific licensee attention to lessons-learned; 2) improvements to the EPRI guidelines; and 3) content of the improved technical specifications relating to SG degradation mechanisms, examination techniques, primary-to-secondary leakage limits, and reporting requirements (both content and schedule of reports).

As stated above, the Task Group believed these activities should receive a high priority. Therefore, in the interim, the Task Group recommended that the NRC should issue a generic communication to clarify the current NRC position on industry guidance and to highlight SG tube integrity program weaknesses manifested by the IP2 experience that could exist at other plants.

NRC Regulatory Processes - Licensing

The license amendment process is used by the NRC to review facility operating license changes proposed by a licensee. Such a request was made by Con Ed in December 1998 to postpone its SG examination from June 1999 to June 2000 [12]. In effect, because of an approximate 10 month period the plant was shut down, the licensee was actually requesting an extension of the examination interval of approximately 2 months beyond the already authorized 24 months (June 1997 to June 1999). Because the licensee followed industry guidelines for maintaining water chemistry in the SGs to minimize corrosion of the SG tubes and the reactor coolant system was at low temperature conditions during the shutdown, any degradation that would have occurred during the shutdown period should have been negligible.

The 1997 SG examination performed by Con Ed, which has now been determined to be deficient as discussed above, was the underlying basis for the SG inspection interval extension amendment that was requested by Con Ed. Thus, the Con Ed amendment request and the NRC licensing review provided an opportunity for Con Ed and the NRC to reevaluate the adequacy of the 1997 examination. After the February tube failure event, NRR requested RES to review this extension request along with the associated NRR safety evaluation of the proposal. The RES technical review was provided in a report dated March 16, 2000 [5]. The OIG also evaluated this licensing review and provided its findings in a report dated August 29, 2000 [6]. Both of these reports identified shortcomings in the licensing review. They were considered in detail by the Task Group, along with the specific licensee and staff documents and review guidance, in reaching conclusions and recommendations.

The significant conclusions from the Task Group review of the licensing review process associated with the Con Ed amendment request to extend the SG inspection interval were:

- 1) There was an opportunity for Con Ed during preparation of the amendment request and subsequent response to an NRC request for additional information [13] to recognize the significance of a new degradation mechanism that was observed during the 1997 SG examination in a tube similar to the one that failed in February 2000 (PWSCC at tube apex in a small radius U-bend).
- 2) In hindsight, during the amendment review process, the issue regarding the PWSCC degradation could have been pursued further by the NRC staff. If the staff had denied the amendment request, an examination would have been required prior to the tube failure. However, based on a review of information available to the licensee and the staff during the amendment review, it is not clear to the Task Group if additional staff questions posed during the review would have changed the outcome of the license amendment request or uncovered the issues related to the root cause of the tube failure, i.e., the poor quality of the SG examination. For example, Con Ed had performed an examination of all other similar tubes using an inspection plan previously reviewed and approved by the staff.
- 3) The IP2 tube failure occurred on February 15, 2000, which was approximately 8 months after the originally scheduled inspection date (i.e., less than the duration justified by the 10 month shutdown). Therefore, the extension of approximately 2 months did not contribute to the tube failure event.

- 4) While the staff used existing NRC review guidance in performing the review, no specific guidance exists for SG inspection interval extensions, especially how to consider previous inspection reports, or how to consider or reference the inspection program.

While the Task Group did not evaluate the area of staff SG expertise in detail, this was brought up by the OIG report, and was mentioned in conversations with NRC staff and managers responsible for these programs. The Task Group concluded that agency SG expertise is limited and focused primarily at headquarters. The Task Group recommended that NRC take steps to evaluate SG expertise needs to support the licensing (as well as inspection) program.

In summary, the Task Group concluded that the problem related back to the quality of the Con Ed 1997 examination and to shortcomings in the NRC licensing review that was conducted after the 1997 examination. Improvements to industry SG examinations (discussed above) and NRC regulatory inspection processes that focus on these examinations (discussed below) will maintain plant safety and improve the efficiency and effectiveness of NRC programs. The Task Group also concluded that additional review guidance for SG examination license amendments will improve the effectiveness and efficiency of these reviews.

NRC Regulatory Processes - Inspection

The objective of the NRC inspection program is to obtain factual information providing objective evidence that power reactor facilities are operated safely. The SG tube failure at IP2 occurred at a time when the NRC was transitioning to a new reactor oversight process (ROP). Effective April 2, 2000, the NRC implemented this new process for all plants. The Task Group reviewed both the old and new NRC inspection processes to develop lessons-learned and recommendations.

The baseline inspection in the new ROP for inservice inspection (ISI) is to be performed at all operating reactors, once every two years during a refueling outage. Supplemental inspections are performed as a result of risk-significant licensee performance issues that are identified by either performance indicators (PIs), baseline inspections, or event analysis.

Prior to April 2000, an NRC ISI inspection was performed at each facility in accordance with the core inspection program. This program was in effect during the NRC inspection of IP2 in 1997. The scope of the inspector's review was based on a judgement regarding current significant issues and also as directed by the inspector's supervisor. The planning did not usually involve NRC headquarters personnel. It did not require that industry information be factored in, although it sometimes was. New industry and generic information, such as Information Notices and Generic Letters, did not always get to the regional inspectors in time to be factored into their inspection activities. The site inspection involved one inspector for a period of one week and was not necessarily limited to SG activities, but it could also include non-destructive examination (NDE) activities on other components.

NRR has routinely held conference calls with licensees during their refueling outages to assess the adequacy of the licensee's SG tube eddy current inspections. These conference calls involve regional participation on occasion and include discussion of the results of the licensee steam generator inspections and repair plans. In the last few years, the staff has focused on plants with known SG tube degradation issues. This effort has not been a formal part of the inspection program, and the results are not documented in inspection reports. The Task Group determined that these calls are important activities that should be factored into the inspection process.

The new ROP baseline inspection procedure for ISI does not include guidance on the scope and depth of NRC inspection of licensee SG tube examinations. The inspection procedure contains significantly less guidance for conduct of the inspection than the previous core inspection procedure. Available supplemental procedures contain considerably more detail. Under the new ROP, risk-informed thresholds are to be applied to inspection findings to determine when a significant degraded condition has occurred that warrants additional NRC interaction and supplemental inspection above the baseline program. Such thresholds do not currently exist to identify when the degree of SG tube degradation has reached a level that warrants additional NRC action.

There are no specific requirements for ISI inspector training or expertise. Region staff interviewed indicated that as part of the training program, prior to conducting individual ISI inspections, inspectors assist other inspectors on NRC's NDE inspections at other reactor sites. A number of inspectors have received detailed training in eddy current examination and have personal NDE experience.

The Task Group also carefully reviewed the licensee submittal to the NRC dated July 29, 1997, regarding the IP2 1997 SG examination [9]. The level of detail provided in the 1997 examination report submitted by Con Ed was not sufficient to pinpoint the technical and implementation problems, such as the eddy current data quality and noise issues discussed above. The Task Group noted that the tube that failed was not reflected in the licensee's report as a degraded tube, since it was not identified by the licensee as such during the 1997 examination. The NRC's OIG report dated August 29, 2000 [6], concluded that had the NRC staff or contractor with technical expertise evaluated the 1997 results of the IP2 SG

examination, the NRC could have identified the flaw in the U-bend of the row 2, column 5 (R2C5) tube in SG 24 that was indicated in the licensee's inspection (examination) report. After careful review, the Task Group concluded that the NRC staff could not have identified the degradation in the tube that subsequently failed from its review of the licensee's SG examination report. That report did not indicate that there was a flaw in the tube or provide any information on the tube. Even if the staff should have been prompted by the report's identification of a new degradation mechanism (PWSCC) in a similar tube that was plugged, it would have required further discussion with the licensee, additional staff review of the 1997 raw eddy current data of the failed tube, and identification of the flaw from the data, which clearly was of poor quality due to noise. Experts that the Task Group interviewed held different views on whether the flaw in R2C5 could have reasonably been detected from the data. Licensee reports in general, and this licensee's SG examination report in particular, do not provide information on data quality or related discussions or evaluation of eddy current data. For the NRC to have this information, an eddy current specialist would have to review the raw data independently. This is not typically included within the scope of NRC inspection or review.

Overall, the Task Group recommended that:

- 1) The NRC should develop additional SG inspection guidance for the baseline inspection program.
- 2) Inspector training should be reviewed and tailored to support the objectives of the SG inspection program.
- 3) Information needs and processes to support the objective of the SG inspection program should be determined. In this regard, the Task Group concluded that the telephone calls conducted with licensees during the outages are effective and should be formally incorporated into the inspection program.
- 4) Risk-informed thresholds should be established to identify when increased NRC interaction is warranted in response to SG tube degradation.
- 5) The baseline program and/or performance indicators should be modified to identify adverse trends in primary-to-secondary leakage. Risk-informed thresholds should be established to identify when increased NRC interaction is warranted in response to an adverse trend.

ONGOING ACTIVITIES IN RESPONSE TO LESSONS-LEARNED REPORT

NRC's Steam Generator Action Plan

There are many recently completed and ongoing activities by both the NRC and industry that relate to steam generator tube integrity. To ensure that safety from a steam generator integrity standpoint is maintained, that public confidence in the steam generator tube integrity area is improved, and that NRC and stakeholder resources are effectively and efficiently utilized, the NRC's Office of Nuclear Reactor Regulation has developed a Steam Generator Action Plan [8]. The action plan is intended to direct and monitor the NRC's effort in this area and to ensure that the issues are appropriately tracked and dispositioned.

This plan is intended to disposition the lessons-learned recommendations in an integrated manner with other ongoing SG activities, such as the NEI 97-06 generic licensing change package review. The action plan consolidates numerous activities related to SGs including: 1) the NRC's review of the industry initiative related to the steam generator tube integrity (i.e., NEI 97-06); 2) resolution of Generic Safety Issue (GSI) 163 - Multiple Steam Generator Tube Leakage; 3) evaluation and implementation of recommendations from the NRC's Indian Point 2 (IP2) Lessons Learned Task Group report; 4) evaluation and implementation of recommendations from the NRR staff review of the Office of the Inspector General report on the IP2 steam generator tube failure event; 5) staff review of Advisory Committee on Reactor Safeguards (ACRS) recommendations on an NRC differing professional opinion (DPO) on steam generator activities. The action plan also includes activities that have broader implications than steam generators but arose out of steam generator activities (i.e., generic improvements to the inspection and licensing review processes as recommended by the Lessons Learned Task Group report).

The NRC established a Web page (<http://www.nrc.gov/NRC/REACTOR/SGAP/index.html>) that contains the steam generator action plan document that discusses the activities and milestones in the plan. The Web page will be updated to reflect the progress on the activities in the action plan. The Web page also lists correspondence and documents associated with the action plan. Examples of tasks in the plan include: 1) issue Regulatory Issue Summary on SG Lessons Learned; 2) review ACRS recommendations on the DPO; 3) determine GSI-163 resolution strategy; 4) review and issue safety evaluation on NEI 97-06; 5) develop guidance for NRC inspectors; 6) develop formal written guidance for NRC technical reviewers; 7) develop guidance for review of licensee SG inspection results and conference calls with licensees during outages; and 8) hold a steam generator workshop with stakeholders.

The Regulatory Issue Summary was issued on November 3, 2000 and can be accessed on the NRC web site at <http://www.nrc.gov/NRC/GENACT/GC/RI/2000/ri00022.html>. A steam generator workshop with industry and the public is

planned for February 27 and 28, 2001. Sessions at the workshop include SG Programmatic Issues, SG Inspection Oversight Issues, SG Inspection Technical Issues, and SG Tube Integrity Technical Issues.

Industry

With respect to the industry's response, by letter dated October 6, 2000, NEI provided the industry's lessons-learned report based on the IP2 tube failure. The industry is working on revising the Electric Power Research Institute guidelines that support the SG industry initiative framework (NEI 97-06) and generic licensing change package based on their lessons-learned activity and input from the NRC staff. The industry discussed with the NRC staff their plan to provide interim guidance on data quality to assist licensees with fall 2000 outages that include SG examinations. On their own initiative, some of the plants used a high frequency eddy current probe during the spring and fall 2000 outages to improve the data quality in the small radius U-bend region of the tubes. Many of these actions to improve the SG programs directly relate to the framework of the industry initiative, NEI 97-06, that has been the focus of industry and NRC staff efforts to improve the industry SG management programs during the past three years. The industry is developing response and guidance to issues identified in the Regulatory Issues Summary issued in November, 2000, and the IP2 Lessons Learned Report.

SUMMARY AND CONCLUSION

In accordance with their charter, the Task Group identified recommendations for Con Ed, industry, and the NRC. The recommendations fell into the following general areas. The Task Group recommended that Con Ed must correct the deficiencies in its SG tube integrity program. The Task Group recommended that the commercial nuclear industry should improve the EPRI guidelines, the SG technical specifications, and the NEI 97-06 initiative. The Task Group recommended that the NRC: 1) should improve its SG oversight and inspection process; 2) should improve its licensing review process; 3) should assign a high priority to its review of the NEI initiative and the associated EPRI guidelines; 4) should issue a generic communication regarding SG tube integrity program guidance; and 5) should improve risk communication to the public.

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