

SUMMARY/MINUTES OF THE
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
SUBCOMMITTEE MEETING ON MATERIALS AND METALLURGY
DECEMBER 16, 1993
BETHESDA, MARYLAND

INTRODUCTION

The ACRS Subcommittee on Materials and Metallurgy held a meeting on December 16, 1993, in Room P-110, 7920 Norfolk Avenue, Bethesda, Maryland. The purpose of the meeting was to discuss the steam generator operating experience and steam generator rulemaking activities. A copy of the proposed schedule for the meeting is attached. Handouts of the presentations are attached to the office copy of the minutes. The Subcommittee had received neither written comments nor requests for time to make oral statements from members of the public. Dr. Seale was acting chairman for the Subcommittee in lieu of Dr. Shack because of an apparent conflict of interest. Mr. Elpidio Igne was the cognizant ACRS staff member for this meeting. The meeting was begun at 8:30 a.m. and adjourned at 1:45 p.m. and was held entirely in open session.

ATTENDEES: Principal meeting attendees included:

ACRS

R. Seale, Acting Subcommittee Chairman
W. Shack, ACRS Member
W. Lindblad, ACRS Member
H. Lewis, ACRS Member
T. Kress, ACRS Member
P. Davis, ACRS Member
E. Igne, Cognizant Staff Engineer

NRC

T. Sullivan
J. Strosnider
K. Karwoski
S. Long
E. Murphy
T. Reed

OTHERS

C. Welty, EPRI
J. Blomgren, Commonwealth Edison
D. Modeen, NUMARC
R. Mullins, Southern Nuclear Operating
P. Naughton, Virginia Power
C. Snyder, NUS

OPENING REMARKS

Dr. Seale convened the meeting at 8:30 a.m. and mentioned that Dr. Shack, Chairman of the Materials and Metallurgy Subcommittee, may have a potential conflict of interest due to the participation of Argonne National Laboratory staff in the preparation of the document NUREG-1477. Dr. Seale noted that the Subcommittee has been made aware of the NRC staff's contact with the French concerning the operating experiences of their steam generators. The results of the staff's trip to France will be documented and sent to the Subcommittee when published.

NRC STAFF PRESENTATION

Introduction, Mr. J. Strosnider, NRR

In his introductory comments, Mr. Strosnider noted changes to steam generator regulations in the areas of nondestructive examination (NDE) and steam generator tube degradation. In the NDE area, there is a much greater capability to collect, analyze and track large amounts of data during each steam generator inspection period. Tube inspection equipment is also becoming more sensitive in detecting tube flaws, which provides for a refined plugging criteria. Mr. Strosnider stated that the utilities are finding it more economical to apply improved NDE techniques to manage steam generator tube degradation.

Mr. Strosnider stated that changes with regard to tube degradation mechanisms are being experienced. In the mid-1970s, wastage and then denting were the major tube degradation mechanisms. With improved primary and secondary water chemistry wastage and denting have been significantly reduced and new forms of degradation are occurring, perhaps due to operational changes, or due to aging.

There is a large number of tubes now experiencing stress corrosion cracking (SCC). Circumferential cracking is increasing and incidents of freespan stress corrosion cracking have been observed. These new degradation mechanisms are creating new challenges—crack depth is difficult to measure reliably and the crack growth rate is difficult to determine. The consequences of new degradation mechanisms are that the present regulatory criteria become obsolete and ad hoc regulation results in inconsistencies, unstable regulatory environment, and drain on resources. There is a need for a performance based generic approach for steam generator tube degradation.

In reply to a question from Dr. Seale, Mr. Welty, EPRI, stated that EPRI publishes an annual steam generator progress report that provides a status of steam generator tube degradation problems. He committed to provide this report to the ACRS.

Mr. Strosnider stated that circumferential cracks are difficult to detect using present bobbin coil NDE techniques and crack depth measurements are unreliable unless the proper NDE method is used. The use of rotating pancake coil (RPC) sensor will detect and size circumferential cracks while the bobbin coil will not. In the 1970s, Mr. Strosnider stated that wastage, which was easily detected and sized using the bobbin coil, was the dominant degradation mechanism and the 40 percent plugging criteria (plugging of a steam generator tube when the cracks or wastage is equal to or greater than 40 percent of the original tube wall thickness) was an appropriate criteria. Now that intergranular stress corrosion cracking (IGSCC) is the predominant degradation mechanism, which is difficult to detect and size, Mr. Strosnider stated that the 40 percent plugging criteria may not be appropriate, whereas other NDE parameter for example, voltage from a bobbin coil sensor may be more appropriate.

Mr. Lindblad asked about the safety risks that are involved in the tube degradation problem. Mr. Strosnider stated that the freespan IGSCC type of degradation is more risk-significant than outside diameter stress corrosion cracking (ODSCC) at the support plate because the failure at the freespan results in an unrestrained tube failure, while a tube failure at the support plate is restrained.

Recent Operating Experience and Some Regulatory Implications, Mr. E. Murphy, NRR

Mr. Murphy stated that the steam generator tube degradation problems are widespread. There have been nine tube rupture events worldwide of which seven have been in the U.S. These events have led to several forced outages per year. These degradation problems have led to steam generator replacement at eleven plants to date, and twelve more are planned. The estimated cost of a steam generator replacement is approximately \$170 million. There is no end in sight to the steam generator tube degradation problems for plants operating with their original steam generators.

In reply to a question by Mr. Lindblad, Mr. Murphy defined tube rupture as a tube leakage exceeding the normal makeup capacity of the primary coolant system.

Mr. Murphy presented a sketch of steam generator tube degradation mechanisms. Lately, the industry has experience widespread ODSCC at the tube support plates. For example, the Catawba nuclear power plant, during the current fuel outage, found in excess of 8000 tubes having indications of stress corrosion cracks (SCC). Stress corrosion cracking in the freespan region of the tube is also becoming more prevalent, e.g., McGuire 1 and 2, Palo Verde 2, Farley 1 and Braidwood 1. Further, circumferential SCC is becoming

more widespread. Detection and sizing of stress corrosion cracks poses a significant challenge to eddy current test capabilities in the field. The SCC can only be detected if the licensee uses RPC probes at the susceptible SCC locations. The growth rate of SCC can be very high, and that mid-cycle inspections are sometimes necessary to ensure that limiting crack configurations are detected before exceeding the margins specified in Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes." In fact, Mr. Murphy stated that since 1992, at least five plants may have experienced 1 or more tubes with insufficient margins per R.G. 1.121 to sustain the tube internal pressure caused by a main steam line break (MSLB) accident condition. Further, that experience shows that tubes with freespan axial or circumferential cracking may become vulnerable to catastrophic failures without significant precursor leakage. In reply to a question by Dr. Shack, Mr. Murphy stated that a tube with a uniform circumferential crack of up to 92 percent through-wall is needed to sustain a MSLB accident condition.

Mr. Murphy briefly described some of the implications of recent tube degradation experience. He stated that there is a need for (1) improved inservice inspections, (2) flaw specific plugging criteria, and (3) more restrictive limits and improved monitoring of primary to secondary leakage. He noted that the standard Technical Specification plugging criteria of 40 percent through-wall limit is conservative for some flaw types of tube flaws that can lead to unnecessary plugging of tubes. Mr. Murphy mentioned the case of a deep (greater than 40 percent through-wall) crack that is very short in length, e.g., pitting, exhibiting very high burst pressures. In the case of tube pitting degradation, a 1-volt tube plugging criteria, which is a relaxation of the 40 percent limit, is consistent with the actual burst pressure.

In response to a question by Mr. Lindblad about the relative risk involved from a change in tube plugging criteria, Mr. Strosnider stated that the staff is not prepared to discuss the full scope of risk assessment during this meeting, but will be prepared to discuss this issue at a later Subcommittee meeting.

Mr. Murphy stated that inspection difficulties are most acute for stress corrosion/intergranular attack (IGA) cracks due to instrumentation having low output amplitude and low signal to noise (S/N) ratio. He noted that 40 percent through-wall cracks cannot be reliably detected or sized with NDE techniques and practices currently being applied in the field, although cracks can be reliably detected before tube integrity is impaired. This is so only if the licensee uses the appropriate test equipment, test procedures, data analysis procedures and if the analysts have been adequately trained. Mr. Murphy stated that there have been widespread deficiencies in this regard throughout the industry.

Mr. Murphy stated that inspection practices and capabilities have been significantly upgraded in recent years with the use of (1) digital multifrequency eddy current test (ECT) systems, (2) alternatives to the conventional bobbin probe e.g., motorized rotating pancake coil (MRPC) probe, (3) the 1990 addenda to ASME Section XI, Appendix IV inspection guides, and (4) the EPRI Steam Generator Examination Guidelines. However, the degree of adherence to these guidelines varies widely among different utilities. Much remains to be done and these upgraded practices and capabilities will be factored into the NRC Integrated Steam Generator plan.

Mr. Murphy stated that a meeting was held two days ago between the headquarters and the region staffs to discuss eddy current test issues and their relationship to the steam generator tube integrity problem. Some of the matters covered are as follows:

- Locations in the tube subject to circumferential cracking that should be inspected by the MRPC probe.
- For dented tubes, tube locations with dent signals greater than 5 volts with the use of bobbin probe signal, should be inspected on a sample basis with rotating pancake coil.
- Tubes at the U-bends that are potentially subject to SCC should be inspected with RPC.
- All eddy current indications should be reported and dispositioned as pluggable or nonpluggable.

In response to a question by Dr. Kress on how one is to make a dispositioned judgment, Mr. Murphy stated that generally tube inspection is performed using the bobbin probe and if a difficult distorted indication is present indicating a potential flaw, a RPC probe could then be used to resolve that indication. Mr. Murphy stated that the bobbin probe is, for all practical matters, used as a screening method. In reply to a question by Mr. Lindblad on the reliability of detecting a 40 percent through-wall crack, Mr. Murphy stated that typically both bobbin and RPC probes are not going to detect shallow cracks, e.g., less than 40 percent through-wall cracks, but should detect with a high reliability, cracks that are greater than 40 percent through-wall. Further, Mr. Murphy stated that the bobbin probe was not designed to detect circumferential cracks, although the RPC probe is capable of detecting circumferential cracks.

Tube Plugging Limits, Mr. K. Karwoski, NRR

Mr. Karwoski presented a brief background on how the tube plugging limits have historically been calculated and discussed some of the

alternate repair criteria that the industry has proposed. Regulatory Guide 1.121 contains the methodology for determining the tube plugging limits. The structural criteria which must be met to show acceptable tube integrity margins are either a margin of safety of three under normal operating pressure differentials or a margin of safety of 1.4 under a postulated accident condition, e.g., main steam line break. These structural criteria, in addition to allowances for eddy current uncertainty and a margin for crack growth between inspections, are used to calculate the required tube minimum wall thickness. When this method was implemented in the 1970s, a typical tube was plugged when wastage or a flaw or crack was 40 percent through-wall or greater. This typical technical specification tube plugging limit has been applied to all degradation mechanisms and at all tube locations. Mr. Karwoski stated that this criteria worked reasonably well for tube wastage but tend to be conservative for very tight SSCs. As a result of this conservatism, the industry has submitted various other alternatives to the 40 percent limit, some of which have been approved and some of which the staff is now evaluating. Alternative limits have been approved, e.g., when the tube degradation was primary water SCC and the cracks were located well below the tube sheet to prevent tube bursting, tube axial pullout and uncontrolled leakage. Tube pitting of a depth of approximately 60 percent through-wall was allowed at Indian Point Unit 2 for one cycle of operation.

Rather than wastage or denting, Mr. Karwoski stated that the staff is currently more concerned with other forms of tube degradation, such as axial ODSCC at the support plates and axial primary water (PW) SCC at the tube roll transition. The staff has different plugging criteria for the different degradation mechanisms. For axial ODSCC at the support plate a voltage-based limit is proposed,

and for axial PWSCC at the roll transition a length-based limit is planned.

The voltage-based limit is applicable only to axially oriented ODSCC at the tube support plate elevations. The voltage-based limit will be determined from the bobbin voltage/tube burst pressure correlation obtained from pulled tubes (steam generator degraded tubes removed from the steam generator assembly) and laboratory specimens of axial ODSCC. Using this data, and fitting the lower 95 percent tolerance limit curve where it intersects with the margin or safety criteria from Reg. Guide 1.121 defines a typical voltage of 4-5 volts. Accounting of eddy current measuring error and crack growth occurring between inspections typically result in the voltage being reduced to approximately 2-3 volts. Under this voltage-based approach bobbin probe indications less than a certain voltage are allowed to remain in service, regardless of the actual depth of the degraded tube. (Through-wall defects are potentially left in-service under this approach, and a more leak restricted rate limit under MSLB conditions must be accounted for.) Mr. Karwoski stated that implementation of voltage-based limits requires, in part, specific ECT procedures and more restrictive operational leak rate limits.

The Subcommittee asked about the differences between the French volt and U.S. volt in the voltage-based limit matter. Mr. Karwoski and Mr. Blomgren, Commonwealth Edison, stated that the calibration methods are different—depending on some parameters such as technique used, type of degradation mechanism being monitored, equipment being used, frequencies of the sensors used, size of the probes, geometry and material calibration block, standards used, etc. These differences result in the voltage-based limits in France and the U.S. being different. Dr. Lewis stated that the one sure way to determine how the calibration is done is to visit a

plant or laboratory and ask for a calibration demonstration. Mr. Blomgren did say that the industry is able to cross-calibrate the U.S. test results to the French results. Dr. Seale summed up this matter by stating that the interim plugging criteria (IPC) is essentially based on a voltage related to degraded tube burst pressure test results and applicable code allowable stresses.

Mr. Karwoski stated that since the bobbin coil voltage cannot be correlated with crack depth, there is a potential for through-wall cracks to exist in service. As a result, the industry has developed a correlation between leak rate and bobbin voltage. The staff is still evaluating this matter, especially the determination of the best fit curve of the bobbin voltage vs. leak rate test data. The generic voltage based plugging criteria have also not yet been determined, but Mr. Karwoski stated that the staff has approved restricted versions of the voltage-based criteria for Trojan, D.C. Cook Unit 1, Catawba 1, and Farley Units 1 and 2. By restrictive, Mr. Karwoski mentioned a conservative 1-volt criteria as compared with a burst pressure correlation voltage of 4.2. The lower voltage (1 volt) accounts for continued tube degradation between tube inspections and for uncertainties in the voltage measurements.

The Subcommittee, after much discussion, noted that the NDE parameter, e.g., voltage, may not be the indicator one should use to determine the safety of degraded tubes. The staff mentioned another NDE parameter that may be of use is phase angle, but noted that it is useful for characterizing a single crack only, and not with many small randomly oriented cracks. It was noted by the staff that voltage measurements can be directly correlated with tube wastage or tube material loss. Dr. Kress asked if another parameter is found, e.g., vibration of the degraded tube that correlates better with burst pressure than with voltage would the

staff allow it. Mr. Strosnider said that the regulations as presently written would allow the vibration/burst pressure correlation, as long as the degraded tube burst pressure margins are within the allowable limits. Mr. Strosnider stated that the staff wants the plugging criteria to be performance based and not be prescriptive.

Mr. Karwoski stated that the staff has approved the voltage-based limits on an interim basis as drafted in NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes," dated June 1993. The NUREG requires detailed tube leakage predictions under MSLB conditions and that destructive tube pull test data be obtained to confirm the degraded mechanism and to provide added confidence of the voltage measured from the specific degradation. Mr. Karwoski stated that the interim voltage-based limit apply to bobbin coil voltage for axially oriented ODS-CC at the tube support plate elevations.

Mr. Karwoski briefly discussed length-based limits that is applicable to axial primary water SCC at the roll transition. He noted that the length-based limits are similar, in principle, to the voltage-based limits.

Resolution of Public Comments on NUREG-1477, Mr. E. Murphy, NRR

Mr. Murphy stated that the technical basis for developing the staff generic position on voltage-based plugging criteria is documented in NUREG-1477. He mentioned that public comments have been solicited and received and the NUREG will be revised to reflect these comments by March 1994. A generic letter on this matter and the final NUREG will be issued in June 1994.

Mr. Murphy summarized the major issues raised during the public comment period. Some are as follows:

- Need for additional degraded tube pulls
- Methodology for estimating degraded tube leak rate at MSLB conditions
- Treatment of outliers
- Eddy current test issues
- Realistic assumptions of offsite dose assessments
- Severe accidents

Mr. Long, NRR, in response to a question by Mr. Lindblad on the 1-volt criteria not needing to account for severe accident conditions, stated that it is the staff's belief that the 1-volt interim plugging criteria is not a relaxation of the current tube plugging criteria (40 percent through-wall) and therefore severe accident conditions can be neglected. Mr. Strosnider added that the staff believes that the 1-volt limit is overly conservative—but when higher voltage limits are proposed, the staff believes that a more detailed evaluation of severe accidents is necessary. Mr. Davis pointed out that additional work in the area of risk assessment is needed. Mr. Long stated that additional risk assessment work is being performed.

NRC Steam Generator Integrated Plan, Mr. T. Reed, NRR

Mr. Reed stated that the integrated plan contains three main areas, they are as follows:

- Voltage based steam generator tube repair criteria
- Industry proposed degraded specific management program
- Steam generator rule and regulatory guide

The integrated plan is a multi-disciplined (radiological, systems, materials, risk, and severe accident) effort that emphasizes a generic approach. Mr. Reed stated that NUREG-1477 and the generic letter will provide an interim position on voltage based criteria for ODSCC until completion of the longer term program. Further, the new rule and regulatory guide will be developed to implement the industry proposed degraded specific management plan which will be applicable to all PWRs, and will be based on performance and flexibility (i.e., accommodate changes in operating experience and technology), and encourage and reward improved inspection methods.

Mr. Reed presented an outline of a steam generator rule. The requirements of the rule will include the following items:

- Licensee surveillance and maintenance program
- Accident mitigation
- Radiological consequences
- Severe accidents

Mr. Strosnider in conclusion stated that the staff would like to present to the Subcommittee periodic status report on this matter with the next presentation on the risk assessment aspects of the steam generator degradation program sometime in the February/March 1994 timeframe.

INDUSTRY PRESENTATION

Overview of the Steam Generator Degraded Tube Problem, Mr. C. Welty, EPRI

Mr. Welty discussed the status of the steam generator problem based on an EPRI report entitled "Steam Generator Progress Report Revision 9," dated October 1993. He stated that earlier problems such as wastage and denting are reasonably under control. Present problems include SCC/IGA of tubes in the tubesheet crevices, at the tube support plates, and in the freespan region. Additional damage mechanisms include primary side cracking in high stress regions of the tube, pitting and tube fretting.

During the last 10 years, the average percentage of reactors plugging steam generator tubes has been approximately 45 percent. This trend has not changed significantly. In 1992, 50 percent of the operating units were required to plug steam generator tubes. Mr. Welty stated that in 1971 more than 3.0 million tubes have been plugged. The percentage of tubes plugged per year decreased from an average of .39 percent for 1971 through 1979, to .23 percent for 1983 through 1992. Although the 10 year average of .23 percent may appear insignificant, over a 30 or 40 year steam generator life this amounts to plugging 5.9 to 9.2 percent of the available tubes. Not all steam generators are degrading equally. Tube degradation has already caused steam generators to be replaced at thirteen nuclear units. In 1992, inside diameter SCC (20.8 percent), outside diameter SCC and IGA (37.6 percent) and fretting (7.4 percent) accounted for over 65 percent of all the tubes plugged. Pitting and fretting have been slightly more of a problem for U.S. plants while primary side SCC (inside diameter) has been more of a problem in non-U.S. plants. In reply to a Subcommittee question, Mr. Welty stated that the U.S. capacity factor loss due to steam

generator problems (including steam generator replacement) is about 3.3 percent with a goal of reducing it to 2.5 percent. In reply to a question by Mr. Lindblad, Mr. Welty noted that as the inspection methodology became more sensitive, more degradation mechanisms were identified that may have occurred earlier but didn't know of it. Mr. Welty stated that experience from the eleven steam generators that were replaced show that no tubes need to be plugged. Further, he stated that the steam generator replacement activity is manageable and not a traumatic experience as first thought.

Mr. Welty discussed some emerging steam generator tube degradation issues such as free span cracking, upper bundling fouling, high crack growth rates, circumferential cracking, adequacy of eddy current inspection and the use of ultrasonic inspection techniques.

Mr. Welty discussed the steam generator strategic management project (SGPM) which is funded by EPRI and directed to solving problems related to steam generator operation. The SGMP consists of 28 domestic utilities and 7 international entities. This project is a follow-on to earlier EPRI programs, namely the Steam Generator Owners Group I and II and the Steam Generator Reliability Project. The SGMP industry-wide goals are to reduce the capacity loss factor to less than 2.5 percent for forced and extended outages, to replace degraded steam generators, if needed, to less than 100 days and to reduce tube leak outages.

Mr. Welty briefly discussed secondary water chemistry as a means to control ODSOC including advanced amine application, sludge transport control and molar ratio control. He noted that the PWR secondary chemistry guidelines are being revised and planned to be issued during December 1995. Mr. Welty briefly mentioned a direct tube repair process where a weld bead of corrosion resistant material is directly applied to the tube inside diameter at the

damaged/cracked location using a laser/fiber optic delivery system. Compared to current-repair methods the direct tube repair process keeps degraded tubes in service and is performed faster for less cost. Mr. Welty mentioned that another repair process, the laser surface remelt process, where the defective tube surface is remelted by a laser beam (without laying down a filler bead) is being tested on several plants.

In conclusion, Mr. Welty stated that some damage forms have been virtually eliminated with chemistry control measures e.g., denting, wastage and sludge pile IGA. Other damages have been eliminated by in-situ repair e.g., expansion zone primary water SCC and antivibration bar wear. The industry is still seeking for a satisfactory remedy for tube support plate ODSCC. Molar ratio control shows some definite signs of improving tube performance, and inhibitor or buffer development that would passivate the film in the crevices also shows promise. The replacement steam generator units have shown minimal damage to date (greater than 12 years of experience, due to a change in tube material to Inconel 690, and improved steam generator management and chemistry control.

In response to a question from Mr. Lindblad, Mr. Welty stated that tube damage occurs principally during operating conditions and not during down-time.

Steam Generator Degradation Specific Management (SGDSM) Program,
Mr. J. Blomgren, Commonwealth Edison Co.

Mr. Blomgren stated that the mission of the SGDSM program is to define and implement a new methodology for management and regulation of steam generator tube integrity that provides assurance for: PWR safety, utility flexibility of steam generator

operation and repair, adequacy of reliability of steam generator in-service-inspection and effective management of emerging degradation modes. Mr. Blomgren described the industry organization and how it interfaces with the NRC Steam Generator Rulemaking Task Group. In a reply to questions by Mr. Lindblad, Mr. Blomgren stated that the in-service inspection of steam generator tubes is performed by specialized inspectors from about four or five inspection contractors in the U.S. that essentially perform only steam generator tube inspections.

The acting Subcommittee Chairman, Dr. Seale, thanked the participants for a well prepared and coordinated presentation.

ACTION, AGREEMENT, AND COMMITMENTS

1. Mr. C. Welty, EPRI, agreed to provide an EPRI report entitled, "Steam Generator Progress Report, Revision 9," dated October 1993. He also agreed to provide a definition and a formula for the term, capacity factor.
2. The Subcommittee agreed to hear a presentation on the use of risk assessment in the staffs voltage-based plugging criteria for degraded steam generator tubes during the February/March 1994 full ACRS meeting.
3. Mr. Strosnider agreed to provide a trip report concerning the results of the French operating experiences of their steam generators.
4. A Subcommittee report will be presented to the ACRS during its January 1994 meeting.

FUTURE ACRS ACTIONS

The Subcommittee will hear a presentation by the NRC staff on the use of risk assessment in the staff's voltage-based interim plugging criteria for steam generator tubes in the February/March 1994 timeframe. A Subcommittee report will be presented to the full ACRS during the January 1994 meeting. The Subcommittee will recommend to the full Committee that the ACRS review and comment on NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes," after the public comments have been resolved.

LIST OF DOCUMENTS PROVIDED TO THE SUBCOMMITTEE

1. Memorandum to William Shack, Chairman of the ACRS Materials and Metallurgy Subcommittee and its members, from Elpidio Igne, ACRS staff, dated December 3, 1993, Subject: "STATUS REPORT: Materials and Metallurgy Subcommittee Meeting on December 16, 1993"
2. NUREG-1477, "Voltage-Based Interim Plugging Criteria for Steam Generator Tubes," draft report for comment, June 1993
3. Presentation materials provided during the meeting

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NOTE: Additional meeting details can be obtained from a transcript of this meeting available in the NRC Public Document Room, 2120 L Street, NW, Washington, DC 20006, (202) 634-3273, or can be purchased from Ann Riley and Associates, Ltd., 1612 K Street, NW, Suite 300, Washington, DC 20006, (202) 293-3950.

ATTACHMENT

MASTER.

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MEETING OF THE ACRS SUBCOMMITTEE ON
 MATERIALS AND METALLURGY ON NRC
 STAFF AND INDUSTRY BRIEFING ON THE
 STATUS OF STEAM GENERATOR INTERIM
 PLUGGING CRITERIA AND RELATED MATTERS
 7920 NORFOLK AVENUE, ROOM P-110
 BETHESDA, MARYLAND
 DECEMBER 16, 1993

- TENTATIVE SCHEDULE - (revised)

	<u>Approx. Time</u>
I. Acting Chairman's Opening Statements and Comments	
• Dr. R. Seale	8:30 ² -8:40 a.m. <i>reported late</i>
II. NRC Staff Presentation	
• Introduction, Jack Strosnider	8:40-9:00 a.m.
• Recent Experience and Regulatory Implications, Emmett Murphy	9:00- 9:00 a.m. 9:55
• Eddy Current Issues, Emmett Murphy	9:55 9:30-10:30 a.m. 10:28
***** BREAK *****	10:28 10:30-10:45 a.m. OK
• Repair Limit Issues, Ken Karwoski	10:45- 11:15 a.m. 11:30
• NUREG-1477 Background and Status, including status of resolution of public comments, Emmett Murphy	11:30 11:35-11:45 a.m. 12:00
• NRC Integrated Plan, Tim Reed	12:00 11:45-12:15 p.m. 12:25
***** LUNCH ***** - 10 min Break -	12:25 12:15-1:15 p.m. 12:35
III. Industry Presentation, <i>John Blongren</i> Commonwealth Edison <i>CHUCK WELTY</i>	12:35 1:15-2:15 p.m. 1:45
• Steam Generator Management Program (SGMP) Overview	
• Perspective on Operating Experience	
• Industry Initiative on Steam Generator Degraded Specific Management (SGDSM), Relationships to NRC staff plans for rulemaking	
• Industry Comments on NUREG-1477	
IV. Open Discussion and Adjournment	2:15-3:00 p.m.

NOTE: Representatives of the NRC Staff (NRR, RES, etc.), NUMARC (Rasin, Modecn) and EPRI (Welty, Steininger) will be in attendance at the Subcommittee meeting to answer Subcommittee questions, if any.