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April 9, 1997

1CAN049702

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Request For Enforcement Discretion

Gentlemen:

This letter documents the Arkansas Nuclear One, Unit-1 (ANO-1) position (enclosed) discussed on April 9, 1997, with members of the Nuclear Regulatory Commission staff. During this discussion, ANO formally requested enforcement discretion from the requirements of Technical Specification 4.18 regarding surveillance of Once Through Steam Generator tubes. This enforcement discretion was requested in order to allow sufficient time for the submittal and NRC review and approval of an exigent change request for a one time exception to the requirements of Section 4.18.5.b. This exception will allow tubes with Intergranular Attack indications within the upper tube sheet with potential through-wall depths of greater than the plugging limit to remain in service for the remainder of cycle 14. A markup of the proposed change is attached.

The attached request was reviewed and approved by the ANO Plant Safety Committee at approximately 0800 CDT on April 9, 1997. Verbal approval of this enforcement discretion request was received at 1535 CDT on April 9, 1997. This discretion will be in effect until May 7, 1997, or until the Staff acts on the proposed technical specification change request, whichever occurs first.

Very truly yours,

Dwight C. Mims

Dwight C. Mims
Director, Nuclear Safety

DCM/rhs

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ATTACHMENT 1

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REQUEST FOR ENFORCEMENT DISCRETION REGARDING ONCE THROUGH STEAM GENERATOR TUBE SURVEILLANCE

Description of Condition/Requirements for which Enforcement Discretion is Requested

Intergranular Attack (IGA) is known to be present above the 15th Tube Support Plate (TSP) within the ANO-1 Once Through Steam Generators (OTSGs) as verified by destructive examination (DE) from previous tube pulls. IGA is a damage mechanism caused by corrosion of the material grain boundaries. The corrosion resulted from contaminants introduced on the tubing during the early years of plant operation. The contaminant causing IGA of the ANO-1 tubing is sulfur as a result of thermal decomposition of ion exchange resins. The ANO-1 IGA can be categorized as volumetric, or "patch-like", with no specific orientation. Since discovery, there has been no evidence of leakage from IGA flaws at ANO-1.

During the 1R13 refueling outage, an eddy current (EC) technique was employed to depth size the IGA. This technique had been qualified per Appendix "H" of the EPRI "PWR Steam Generator Tube Examination Guidelines." This technique was used to depth size all IGA flaws within the upper tubesheet (UTS). During this inspection, 25% of all indications detected within the UTS region by bobbin coil were examined using Rotating Pancake Coil (RPC) to characterize these flaws. All IGA indications between the 15th TSP and the secondary face of the UTS were removed from service by plugging. All UTS IGA indications with a depth size of $\geq$ 40% through-wall (TW), as determined by the qualified sizing technique, were also removed from service by plugging.

Three tube samples containing IGA flaws were removed from the "B" OTSG for future development of an Alternate Repair Criteria (ARC) and to further support the qualified EC sizing technique employed during the 1R13 refueling outage.

Preliminary DE results of IGA flaws contained within tube samples removed from "B" OTSG indicate that the flaw depths do not correlate well with the depths sized using the qualified EC technique. The entire data set, including the results of the most recent outage, still satisfies the qualification requirements of Appendix H.

The inservice inspection of the ANO-1 steam generators is conducted in accordance with ANO-1 Technical Specifications 4.18. Specification 4.18.2 states: *"Inservice inspection of steam generator tubing shall include non-destructive examination by eddy-current testing or other equivalent techniques."* Specification 4.18.3 requires that a minimum sample size be examined in accordance with specification 4.18.5. Specification 4.18.5.b. notes: *"The steam generator shall be determined operable after completing the corresponding actions (plug or sleeve all tubes exceeding the plugging limit and all tubes containing through-wall cracks) required by Table 4.18-2."* Table 4.18-2 specifies the expansion criteria for sampling of the steam generator tubes and requires "*defective*" tubes to be plugged or sleeved. Specification 4.18.5 defines <u>Defect</u> as follows: *"an imperfection of such severity that it exceeds the plugging limit except where the*

imperfection has been spanned by the installation of a sleeve. A tube containing a defect in its pressure boundary is defective." Plugging Limit is defined in the same specification as follows: *"the imperfection depth at or beyond which the tube shall be restored to serviceability by the installation of a sleeve or removed from service because it may become unserviceable prior to the next inspection; it is equal to 40% of the nominal tube wall thickness."*

The Bases for Specification 4.18 states: *"The surveillance requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1."*

Criterion IX, "Control of Special Processes," contained in Appendix B to 10 CFR Part 50 states, in part, that "Measures shall be established to assure that special processes, including nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures."

Criterion XI, "Test Control," requires, in part, that a test program be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

To demonstrate the eddy current bobbin coil's ability to adequately depth size IGA patches within the upper tubesheet, ANO qualified a technique in accordance with Appendix "H" of EPRI "PWR Steam Generator Tube Examination Guidelines," Revision 4 dated June 1996. Compliance with the EPRI guideline was considered an acceptable method to qualify non-destructive examination (NDE) techniques for the detection and sizing of damage mechanisms. This was the only qualification technique available at that time.

The qualification data set demonstrating the capability of the inspection process consisted of service-degraded tube specimens (i.e., tube samples removed from the ANO-1 and Crystal River steam generators). The nondestructive examination parameter responses for the Crystal River tubes were fully consistent with the nondestructive examination parameter responses of the ANO-1 flaws.

During 1R13, three tubes with bobbin indications within the upper tubesheet were removed from the steam generator. Two of the three tubes contained flaws that would have required repair. The third tube was near the repair limit and may have been preventively repaired. The tubes were selected on the basis of their containing multiple indications with depths representative of the average indication depths as sized by EC. After bursting the tubes in the laboratory, the flaws were examined and sized. If a flaw was not opened by the burst of the tube it was bent open for destructive examination. The DE results are not consistent with the previous qualification data of the bobbin coil for sizing IGA flaws in the upper tubesheet. The reason for the inconsistency in sizing IGA in the upper tubesheet is still under review. As a result of this condition, it is possible

that tubes were left in service with through-wall defects greater than the technical specifications plugging limit.

Therefore, ANO is requesting enforcement discretion regarding technical specification 4.18 to allow sufficient time for submittal and NRC review and approval of a proposed technical specification change request for a one-time exception to the requirements of Section 4.18.5.b which will allow tubes with IGA defects within the upper tube sheet with potential through-wall depths greater than the plugging limit to remain in service for the remainder of cycle 14.

Since the subject flaws do not represent a structural or leakage concern, ANO has concluded that the presence of inservice upper tubesheet IGA defects with through-wall extents that may exceed the technical specification plugging limit does not pose a concern relative to safe operation of the plant or the health and safety of the public. The basis for this conclusion is presented below. Initiation of a plant shutdown to perform the subject surveillance action would increase the potential for a plant upset. Although this increased potential has not been quantified, it is considered by ANO to represent a greater risk than continuing to operate with the existing tube flaws for the remainder of the current cycle. Therefore, NOED criterion B.1.(a) is considered applicable to this request.

Compensatory Measures

Extensive measures have been previously taken by ANO to enhance the operators ability to detect and respond to steam generator tube leakage. Additionally, ANO has previously implemented more restrictive shutdown limits based upon primary-to-secondary leakage than those required by the technical specifications. Since these measures were already in place, no additional compensatory measures were determined necessary to address the surveillance deficiency. A summary of ANO-1's detection/monitoring capability, shutdown limits, operator guidance, and training is provided below.

The methodology for monitoring the secondary system for leakage includes the use of process monitors to check radiation levels in the condenser off gas, N-16 gamma levels from the OTSGs, chemistry samples, and RCS mass balances to calculate leakage. Additionally ANO-1 has a procedural limit of 0.1 gpm (144 gpd) that is more conservative than the 0.347 gpm (500 gpd) limit allowed by Technical Specification (TS) 3.1.6.3.b. Management has previously established a conservative administrative limit of 0.069 gpm (100 gpd) at which, upon confirmation, a plant shut down is to be initiated.

Operations personnel trend information from the steam, condenser off-gas and OTSG process monitor systems to determine indication of an OTSG tube leak. Steam lines are monitored by radiation monitors and N-16 gamma detectors that provide chemists and operators with the capability of promptly detecting primary-to-secondary leakage.

The amount of N-16 present in the secondary system is influenced by the size of the leak, location, and the power level. ANO-1 utilizes scintilation type detectors as N-16 monitors.

These monitors are normally selected to measure gross activity from the OTSG but are selected to monitor N-16 in accordance with Abnormal Operating Procedure (AOP) guidance for small OTSG tube leaks. The monitors provide input to control room annunciators associated with OTSG tube leakage. These N-16 monitors have only a single point correlation of leakage to an N-16 reading based on 100% power level. Guidance is given in AOP 1203.023, "Small Steam Generator Tube Leaks", to correlate an N-16 reading of 1x10E4 CPM as being indicative of tube leakage of ≥ 0.1 gpm and a 500 CPM change being indicative of a 0.01 gpm change in primary-to-secondary leakage at 100% power.

ANO-1 installed high sensitivity N-16 detectors in January of 1997 to enhance detection of small changes in primary-to-secondary tube leakage at various power levels. A modification was made to the plant computer to allow monitoring of both the original and newly installed N-16 monitors to provide a readily visible indication of changes in count rate due to changes in leakage. The plant computer input has an alarm that can be used to actuate a control room annunciator panel to alarm at a value set by operators. Guidance for the use of the new N-16 detectors for monitoring primary-to-secondary leakage is given in Operations Information Notice (OIN) #44. The OIN provides shut down guidance for a step change in N-16 count rate of greater than 500 cpm in the "B" OTSG in less than one hour. This corresponds to a 60 gpd leak that might be indicative of a tube beginning to fail. However, this correlation has not been done for the "A" OTSG since there has been no leakage to trend.

The condenser off-gas monitor is an in-line detector on the combined suction line of the condenser vacuum pumps. It is a gamma sensitive scintillation detector that provides a means to measure the gaseous activity levels released to the system vent. The monitor provides displays and an alarm in the control room to alert operators of a possible OTSG tube leak.

The main steam high range radiation monitors are Geiger-Mueller type detectors. These detectors provide input to the Safety Parameter Display System (SPDS) for display in the front of the control room.

The plant computer leak rate program provides operators the ability to validate indications of primary-to-secondary leakage by observing changes in the Reactor Coolant System (RCS) mass inventory. This program allows detection of changes in the make up tank level and determination of leak rate changes based on the time interval selected.

The SPDS is also available for use by operators. This system has a screen dedicated for use during suspected or actual primary-to-secondary leakage events. The "Steam Generator Tube Rupture" screen contains N-16 readings (from the original detectors), condenser off gas, RCS Avg. Temp (Loop A/B), OTSG Tube-to-Shell delta T (OTSG A/B) and T-Sat for the OTSGs. In addition, the SPDS graphics display is outlined in red and flashing when a parameter on the graphics display is in alarm.

The Chemistry Department routinely analyzes and trends samples from the RCS and secondary water systems to identify and quantify primary-to-secondary leakage. Off-gas samples taken from the condenser vacuum pump discharge are analyzed for Argon-41 activity. Liquid condensate

samples are analyzed for tritium to quantify activity levels in the secondary system. Argon-41 levels yield a better measure of instantaneous levels of primary-to-secondary leakage. Tritium levels in the secondary system increase linearly over time during a primary-to-secondary leak. A primary to secondary leak rate can also be determined from the tritium analysis. Secondary liquid samples are also routinely analyzed for fission product activity using gamma spectroscopy. An AOP directs special sampling by the Chemistry Department until primary-to-secondary leakage is reduced below 0.1 gpm or the reactor is tripped.

The Operations and Chemistry Departments utilize available information to detect changes in primary-to-secondary leakage and to initiate actions to place the unit in a safe condition. Procedures are provided such as Emergency Operating Procedure (EOP) 1202.06, "Steam Generator Tube Rupture," AOP 1203.023, "Small Steam Generator Tube Leaks," and the 1203.012 series for annunciator corrective actions are utilized when the monitors, indicators, trends, or annunciators exhibit changes indicative of the development of, or change in, primary-to-secondary leakage. The Operations department uses these procedures to place the plant in a stable condition and to mitigate the consequences of an OTSG tube leak.

Finally, ANO maintains thorough training of licensed operators by using the plant simulator for primary-to-secondary tube leaks and ruptures. This insures familiarity with the symptoms and indications of this event to enable timely diagnosis and action for placing the unit in a safe condition.

Evaluation of Safety Significance

The subject eddy current sizing technique was employed for IGA defects within the UTS. All UTS IGA indications with a depth size of $\geq$ 40% TW were removed from service by plugging the affected tubes.

The three UTS IGA tube samples removed during 1R13 were subjected to room temperature burst testing. Burst testing was performed separately within the flawed and unflawed regions of the tube samples. No simulated tubesheet was employed during the tests. The tests were performed using bladders in the flawed region. No foils or lateral restraint systems were used. The burst pressures for the flawed regions were between 10,000 and 11,000 psig. The unflawed regions burst at pressures between 10,700 and 11,200 psig. For ANO-1 OTSGs, structural integrity is conservatively demonstrated by pressurizing the steam generator tubing to three times normal operating differential pressure. This pressure for ANO-1 is 3765 psig. The burst testing results indicate that substantial structural margin exists.

In 1996, to support ANO's study of IGA, burst testing of pre-defected tubes was completed by Framatome Technologies Inc. (FTI). The burst testing consisted of nine tubes containing through-wall drilled holes up to 0.5 inches in diameter and one tube containing no defects placed within a simulated tubesheet. Nine of the specimens burst at pressures $\geq$ 10,941 psig. Each tube burst outside the tubesheet within the non-defected portion of the tubes. One tube reached a

pressure of 9,577 psig but did not burst due to bladder leakage. These test results indicate that the tubesheet provides sufficient support to preclude tube rupture within the tubesheet.

The tube samples removed from ANO-1 in 1996 included eleven IGA indications in the UTS. Since it was confirmed that the inservice IGA indications are volumetric, bobbin amplitude (voltage) was used as a bounding parameter. The eddy current responses from these flaws were compared with the population of inservice IGA indications to determine how representative the flaws were of those remaining in service. The 600 KHz bobbin coil signal amplitude of flaws in tubes that were pulled during 1996 ranged from 0.46 to 2.69 volts. Of the 470 inservice IGA indications, all are bounded by the 2.69 value.

Additionally, a comparison of RPC data was performed to further substantiate that the pulled tube flaws bound those indications remaining in service. The RPC data collected for the tube pull samples resulted in a maximum flaw extent of 0.16 inches. RPC signal information was collected on 118 indications within the UTS. Ten of the largest RPC voltage indications were examined to determine the length-by-width extent by RPC. The largest RPC extent for those IGA indications left in service was 0.14 inches. Therefore, it is concluded that the inservice IGA indications are bounded by those tube samples that were destructively examined.

Structural integrity of the tubing within the tubesheet is assured based upon demonstration of the following:

A. The actual tube samples removed from ANO-1 during 1R13 exhibited burst pressures that substantially exceeded the required structural limit.

B. The structural support provided by the tubesheet precludes tube rupture.

C. The inservice IGA indications are bounded by those flaws contained in the tube samples that were pulled.

The IGA patches destructively examined were not through-wall; therefore, normal operating pressures did not result in through-wall leakage. This was evident during inservice inspection of the tubing in which no indications of residual leakage was noted. A comparison of 1R12 and 1R13 refueling outage ECT signatures indicates that the IGA exhibits little or no growth. Also, comparison of inspection data prior to the 1R12 refueling outage supports this conclusion. Additionally, during May 1996, "B" OTSG tubing was subjected to a differential pressure of approximately 2100 psid for several hours as a result of a feedwater transient. No immediate increase in primary-to-secondary leakrate was noted during the event or following startup. The primary-to-secondary leakrate did increase by approximately 18 gpd three days following startup; however, none of the leakage detected during the 1R13 refueling outage was from IGA flaws. It is concluded that leakage through IGA flaws in the UTS is highly unlikely at Main Steam Line Break (MSLB) pressures due to the flaw morphology and the near MSLB differential pressure that occurred in May 1996 with no resultant leakage.

Conditional core damage probability is the increase in core damage frequency due to a given condition other than that assumed for the base PRA. The PRA assumed that the tube integrity is such that no steam generator tube rupture would be induced due to transient conditions. The limiting licensing basis transient which could most adversely affect the tubes by creating a high differential pressure across the tubes is a MSLB Accident. This accident could produce a tube differential pressure of up to 2500 psid. The tube sample burst pressures were well above pressures which would be seen in a limiting MSLB accident. Thus, the likelihood of tubes rupturing is not increased because of the larger than expected flaw sizes due to IGA in the UTS. This situation has been qualitatively assessed and the conditional core damage probability for this condition is estimated to be inconsequential.

The limiting licensing basis accident with respect to dose consequences from induced tube leakage is the MSLB accident. This accident assumes a total leakage of 1 gpm with 1% failed fuel in the core. However, steam generator tube leakage is procedurally limited to 0.1 gpm during normal operation. Even though leakage is not expected to occur, MSLB induced tube leakage has been conservatively estimated to be 0.53 gpm on the affected steam generator. The following assumptions are made concerning the number of flaws and associated leakage:

1) Since steam generator A has the largest number of IGA patch indications (285) it was chosen as the affected generator bounding steam generator B with only (185) indications.

2) Half of the indications are assumed to leak under MSLB conditions.

3) Representative leakage values for axial flaw lengths were utilized to bound the leakage expected from IGA patches.

4) Applied the longest IGA length calculated from RPC data to the 50% population assumed to leak.

5) Assumed the flaws grew in length an additional 25% over the cycle.

6) 50% of the flaw length will be 100% TW in depth.

Since there are 285 indications, half of this value will be 143. The longest length in the axial plane was 0.14 inches. When increased by 25% this yields a flaw length of:

0.14 inches * (1.25) = 0.175 inches

If 50% of the length is assumed to be 100% TW:

0.175 inches * (0.5) = 0.0875 inches

Using leakage curves developed for OTSG's for axial flaws, the leakage from a single flaw (0.0875 inch, 100% TW) is determined to be 0.0025 gpm. To compensate for normal operating temperature the value is multiplied by 1.47 to yield a final leakage of 0.003675 gpm per flaw.

This value is then multiplied by the number of potential leaking flaws to give a total leakage of:

143 flaws * 0.003675 gpm/flaw = 0.53 gpm

When the estimated leakage in the affected steam generator is added to that which is allowed by procedure, the total leakage rate is expected to be no greater than 0.63 gpm. Since the assumed leakage rate is greater than the conservative calculation, the current licensing basis assumption of 1 gpm remains bounding.

The subject flaws do not represent a structural or leakage concern. Therefore, the presence of inservice upper tubesheet IGA defects with through-wall extents that may exceed the technical specification plugging limit does not pose a concern relative to the health and safety of the public.

Engineering Evaluation and Basis For No Significant Hazard Consideration

An evaluation of the proposed NOED request has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards consideration using the standards in 10CFR50.92(c). A discussion of those standards as they relate to this request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The steam generators are used to remove heat from the reactor coolant system during normal operation and during accident conditions. The steam generator tubing forms a substantial portion of the reactor coolant pressure boundary. A steam generator tube failure is a violation of the reactor coolant pressure boundary and is a specific accident analyzed in the ANO-1 Safety Analysis Report.

The purpose of the periodic surveillance performed on the steam generators in accordance with ANO-1 Technical Specification 4.18 is to ensure that the structural integrity of this portion of the RCS will be maintained. The technical specification plugging limit of 40% of the nominal tube wall thickness requires tubes to be repaired or removed from service because the tube may become unserviceable prior to the next inspection. Unserviceable is defined in the technical specifications as the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an operating basis earthquake, a loss-of-coolant accident, or a steam line break. Of these accidents, the most severe condition with respect to IGA degradation within the UTS is the MSLB. During this event the differential pressure across the tube could be as high as 2500 psid. The rupture of a tube during this event could permit the flow of reactor coolant into the secondary system thus bypassing the containment.

From testing performed on simulated flaws within the tubesheet it has been shown that the patch IGA indications within the upper tubesheet left in service during 1R13 with potential depths greater than 40% do not represent structurally significant flaws which would increase

the probability of a tube failure beyond that currently assumed in the ANO-1 Safety Analysis Report.

Burst tests were conducted on tubing with simulated flaws within the tubesheet. In these tests, through-wall holes of varying sizes up to 0.5 inch in diameter were drilled in test specimens. The flawed specimen tubes were then inserted into a simulated tubesheet and pressurized. In all cases the tube burst away from the flaw in that portion of tube that was outside the tubesheet. The size of these simulated flaws bound the indications left in service within the upper tubesheet during 1R13. These tests demonstrate for flaws similar to the patch IGA found in the ANO-1 upper tubesheet that the tubes will not fail at this location under accident conditions.

The dose consequences of a MSLB accident are analyzed in the ANO-1 accident analysis. This analysis assumes the unit is operating with a 1 gpm steam generator tube leak and that the unit has been operating with 1% defective fuel.

Increased leakage during a postulated MSLB accident resulting from the patch IGA left in service in the upper tubesheet is not expected. IGA has been present in the ANO-1 steam generators for many years with no known leakage attributed to this damage mechanism. Because of its localized nature and morphology, the flaw does not open under accident pressure conditions.

Therefore, the NOED which allows continued operation with IGA flaws within the UTS with potential through-wall extents greater than the technical specifications plugging limit does not result in a significant increase in the probability or consequences of an accident previously evaluated for ANO-1.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

The steam generators are passive components. The intent of the technical specification surveillance requirements is being met by this change in that adequate structural and leakage integrity will be maintained. The proposed change introduces no new modes of plant operation.

Therefore, the NOED does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.

The ANO-1 Technical Specification Bases specify that the surveillance requirements (which includes the plugging limits) are to ensure the structural integrity of this portion of the RCS pressure boundary. The technical specification plugging limit of 40% of the nominal tube wall thickness requires tubes to be repaired or removed from service because the tube may become unserviceable prior to the next inspection. Unserviceable is defined in the technical

specifications as the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an operating basis earthquake, a loss-of-coolant accident, or a MSLB. Of these accidents the most severe condition with respect to IGA within the UTS is the MSLB.

Tests of tubes with representative IGA flaws removed from ANO-1 OTSGs during 1R13 showed that flawed tubes are capable of withstanding differential pressure in excess of 10,000 psid without the presence of the tubesheet. Testing of simulated through-wall flaws of up to 0.5 inch in diameter within a tubesheet showed that the tubes always failed outside of the tubesheet. Thus the structural requirement of the bases of the surveillance specification is satisfied considering this NOED.

Leakage under accident conditions would be limited due to the small size and morphology of the flaws and would be low enough to ensure offsite dose limits are not exceeded.

Therefore, the NOED does not involve a significant reduction in the margin of safety.

This condition was also evaluated in accordance with 10CFR50.59. The evaluation concluded that the condition did not represent an Unreviewed Safety Question.

Basis for No Environmental Consequences

This request for enforcement discretion does not have a significant effect, impact, or change to the quality of the human environment at ANO. This request, when implemented, does not impact the ANO Environmental Report-Operating License. Therefore, it does not involve any environmental consequences.

Improved Technical Specifications Implications

The condition for which enforcement discretion is being requested would not have been prevented if Improved Technical Specifications were implemented for ANO-1.

MARKUP OF ANO-1 TECHNICAL SPECIFICATION 4.18.5.b

8. Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in Specification 4.18.4.c.

9. Tube Inspection means an inspection of the steam generator tube from the point of entry completely to the point of exit.

b. The steam generator shall be determined operable after completing the corresponding actions (plug or sleeve all tubes exceeding the plugging limit and all tubes containing through-wall cracks) required by Table 4.18-2~~.~~ with the following exception:

Tubes with intergranular attack indications within the upper tube sheet with the potential of through-wall depths greater than the plugging limit may remain in service for the remainder of cycle 14.

Apr 09 ~ Apr 09

Transmit Journal

No.	Remote Location	Mode	Start	Time	Pages	Result	Note
003	914147556233	Norm	09,08:15	12'34	19	* OK	Tx
004	918477463337	Norm	09,09:49	04'13	05	* OK	Tx
005	916103375324	Norm	09,11:57	11'35	20	* OK	Tx
006	4156359	Norm	09,12:23	06'32	09	* OK	Tx
007	913607531496	Norm	09,14:13	04'04	07	* OK	Tx
008	916023935442	Norm	09,15:42	09'41	23	* OK	Tx

Receive Journal

No.	Remote Location	Mode	Start	Time	Pages	Result	Note
005	604 832 3663	Norm	09,08:31	04'03	07	OK	
006	610 337 5349	Norm	09,08:37	02'07	03	OK	
007	6107747540	Norm	09,08:56	02'02	03	* OK	
008	G3	Norm	09,09:35	01'23	02	OK	
009	5018584685	Norm	09,09:55	01'53	04	* OK	
010	2077984220	Norm	09,10:00	02'54	03	OK	
011	14711105	Norm	09,11:27	01'36	02	OK	
012	5018584685	Norm	09,12:37	08'55	15	* OK	
013	203 443 5893	Norm	09,12:52	03'16	04	* OK	
014	6093395435	Norm	09,12:56	03'55	08	* OK	
015	508 830 8575	Norm	09,13:55	01'54	03	* OK	
016	402 533 7291	Norm	09,14:18	05'34	10	* OK	
017	402 533 7291	Norm	09,14:34	16'27	26	* OK	
018	615 365 8000	Norm	09,14:53	01'47	03	* OK	
019	402 533 7291	Norm	09,15:05	19'17	29	* OK	
020	860 440 2091	Norm	09,15:27	01'39	03	* OK	
021	G3	Norm	09,16:02	01'53	03	OK	
022	6107747540	Norm	09,17:19	05'15	09	* OK	
023	5018584685	Norm	09,19:13	09'12	15	* OK	

DRAFT

April 9, 1997

1CAN049702

U. S. Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1
Docket No. 50-313
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Request For Enforcement Discretion

Gentlemen:

This letter documents the Arkansas Nuclear One, Unit-1 (ANO-1) position (enclosed) discussed on April 9, 1997, with members of the Nuclear Regulatory Commission staff and formally requests enforcement discretion from the requirements of Technical Specification 4.18 regarding surveillance of Once Through Steam Generator tubes. This enforcement discretion is requested in order to allow sufficient time for the submittal and NRC review and approval of a proposed change request for a one time exception to the requirements of Section 4.18.5.b which will allow tubes with Intergranular Attack indications within the upper tube sheet with potential through-wall depths of greater than the plugging limit to remain in service for the remainder of cycle 14. A markup of the proposed change is attached.

The attached request was reviewed and approved by the ANO Plant Safety Committee at xxxx on April 9, 1997. Verbal approval of this enforcement discretion request was received at xxxx on April 9, 1997.

Very truly yours,

Dwight C. Mims
Director, Nuclear Safety

DCM/rhs

DRAFT

ATTACHMENT 2

cc: Mr. Ellis W. Merschoff
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REQUEST FOR ENFORCEMENT DISCRETION REGARDING ONCE THROUGH STEAM GENERATOR TUBE SURVEILLANCE

Description of Condition/Requirements for which Enforcement Discretion is Requested

Intergranular Attack (IGA) is known to be present above the 15th Tube Support Plate (TSP) within the ANO-1 Once Through Steam Generators (OTSGs) as verified by destructive examination (DE) from previous tube pulls. IGA is a damage mechanism caused by corrosion of the material grain boundaries. The corrosion resulted from contaminants introduced on the tubing during the early years of plant operation. The contaminant causing IGA of the ANO-1 tubing is sulfur as a result of thermal decomposition of ion exchange resins. The ANO-1 IGA can be categorized as volumetric, or "patch-like", with no specific orientation. Since discovery, there has been no evidence of leakage from IGA flaws at ANO-1.

During the 1R13 refueling outage, an eddy current (EC) technique was employed to depth size the IGA. This technique had been qualified per Appendix "H" of the EPRI "PWR Steam Generator Tube Examination Guidelines." This technique was used to depth size all IGA flaws within the upper tubesheet (UTS). During this inspection, 20% of all indications detected within the UTS region by bobbin coil were examined using Rotating Pancake Coil (RPC) to characterize these flaws. All IGA indications between the 15th TSP and the secondary face of the UTS were removed from service by plugging. All UTS IGA indications with a depth size of $\geq$ 40% through-wall (TW), as determined by the qualified sizing technique, were also removed from service by plugging.

Three tube samples containing IGA flaws were removed from the "B" OTSG for future development of an Alternate Repair Criteria (ARC) and to further support the qualified EC sizing technique employed during the 1R13 refueling outage.

Preliminary DE results of IGA flaws contained within tube samples removed from "B" OTSG indicate that the flaw depths do not correlate well with the depths sized using the qualified EC technique. The entire data set, including the results of the most recent outage, still satisfies the qualification requirements of Appendix H.

The inservice inspection of the ANO-1 steam generators is conducted in accordance with ANO-1 Technical Specifications 4.18. Specification 4.18.2 states: *"Inservice inspection of steam generator tubing shall include non-destructive examination by eddy-current testing or other equivalent techniques."* Specification 4.18.3 requires that a minimum sample size be examined in accordance with specification 4.18.5. Specification 4.18.5.b. notes: *"The steam generator shall be determined operable after completing the corresponding actions (plug or sleeve all tubes exceeding the plugging limit and all tubes containing through-wall cracks) required by Table 4.18-2."* Table 4.18-2 specifies the expansion criteria for sampling of the steam generator tubes and requires "*defective*" tubes to be plugged or sleeved. Specification 4.18.5 defines *Defect* as follows: *"an imperfection of such severity that it exceeds the plugging limit except where the*

imperfection has been spanned by the installation of a sleeve. A tube containing a defect in its pressure boundary is defective." Plugging Limit is defined in the same specification as follows: *"the imperfection depth at or beyond which the tube shall be restored to serviceability by the installation of a sleeve or removed from service because it may become unserviceable prior to the next inspection; it is equal to 40% of the nominal tube wall thickness."*

The Bases for Specification 4.18 states: *"The surveillance requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1."*

Criterion IX, "Control of Special Processes," contained in Appendix B to 10 CFR Part 50 states, in part, that "Measures shall be established to assure that special processes, including nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures."

Criterion XI, "Test Control," requires, in part, that a test program be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

To demonstrate the eddy current bobbin coil's ability to adequately depth size IGA patches within the upper tubesheet, ANO qualified a technique in accordance with Appendix "H" of EPRI "PWR Steam Generator Tube Examination Guidelines," Revision 4 dated June 1996. Compliance with the EPRI guideline was considered an acceptable method to qualify non-destructive examination (NDE) techniques for the detection and sizing of damage mechanisms. This was the only qualification technique available at that time.

The qualification data set demonstrating the capability of the inspection process consisted of service-degraded tube specimens (i.e., tube samples removed from the ANO-1 and Crystal River steam generators). The nondestructive examination parameter responses for the Crystal River tubes were fully consistent with the nondestructive examination parameter responses of the ANO-1 flaws.

During 1R13, three tubes with bobbin indications within the upper tubesheet were removed from the steam generator. Two of the three tubes contained flaws that would have required repair. The third tube was near the repair limit and may have been preventively repaired. The tubes were selected on the basis of their containing multiple indications with depths representative of the average indication depths as sized by EC. After bursting the tubes in the laboratory, the flaws were examined and sized. If a flaw was not opened by the burst of the tube it was bent open for destructive examination. The DE results are not consistent with the previous qualification data of the bobbin coil for sizing IGA flaws in the upper tubesheet. The reason for the inconsistency in sizing IGA in the upper tubesheet is still under review. As a result of this condition, it is possible

that tubes were left in service with through-wall defects greater than the technical specifications plugging limit.

Therefore, ANO is requesting enforcement discretion regarding technical specification 4.18 to allow sufficient time for submittal and NRC review and approval of a proposed technical specification change request for a one-time exception to the requirements of Section 4.18.5.b which will allow tubes with IGA defects within the upper tube sheet with potential through-wall depths greater than the plugging limit to remain in service for the remainder of cycle 14. This request satisfies Criterion B.1.(b) of the NOED guidance.

Compensatory Measures

The methodology for monitoring the secondary system for leakage includes the use of process monitors to check radiation levels in the condenser off gas, N-16 gamma levels from the OTSGs, chemistry samples, and RCS mass balances to calculate leakage. Additionally ANO-1 has a procedural limit of 0.1 gpm (144 gpd) that is more conservative than the 0.347 gpm (500 gpd) limit allowed by Technical Specification (TS) 3.1.6.3.b. Management has previously established a conservative administrative limit of 0.069 gpm (100 gpd) at which, upon confirmation, a plant shut down is to be initiated.

Operations personnel trend information from the steam, condenser off-gas and OTSG process monitor systems to determine indication of an OTSG tube leak. Steam lines are monitored by radiation monitors and N-16 gamma detectors that provide chemists and operators with the capability of promptly detecting primary-to-secondary leakage.

The amount of N-16 present in the secondary system is influenced by the size of the leak, location, and the power level. ANO-1 utilizes Geiger-Mueller type detectors as N-16 monitors. These monitors are normally selected to measure gross activity from the OTSG but are selected to monitor N-16 in accordance with Abnormal Operating Procedure (AOP) guidance for small OTSG tube leaks. The monitors provide input to control room annunciators associated with OTSG tube leakage. These N-16 monitors have only a single point correlation of leakage to an N-16 reading based on 100% power level. Guidance is given in AOP 1203.023, "Small Steam Generator Tube Leaks", to correlate an N-16 reading of 1x10E4 CPM as being indicative of tube leakage of ≥ 0.1 gpm and a 500 CPM change being indicative of a 0.01 gpm change in primary-to-secondary leakage at 100% power.

ANO-1 installed high sensitivity N-16 detectors in January of 1997 to enhance detection of small changes in primary-to-secondary tube leakage at various power levels. A modification was made to the plant computer to allow monitoring of both the original and newly installed N-16 monitors to provide a readily visible indication of changes in count rate due to changes in leakage. The plant computer input has an alarm that can be used to actuate a control room annunciator panel to alarm at a value set by operators. Guidance for the use of the new N-16 detectors for monitoring primary-to-secondary leakage is given in Operations Information Notice (OIN) #44. This document provides a correlation of count rate versus leakage. The OIN provides shut down

guidance for a step change in N-16 count rate of greater than 500 cpm in less than one hour. This corresponds to a 60 gpd leak that might be indicative of a tube beginning to fail.

The condenser off-gas monitor is an in-line detector on the combined suction line of the condenser vacuum pumps. It is a gamma sensitive scintillation detector that provides a means to measure the gaseous activity levels released to the system vent. The monitor provides displays and an alarm in the control room to alert operators of a possible OTSG tube leak.

The main steam high range radiation monitors are Geiger-Mueller type detectors. These detectors provide input to the Safety Parameter Display System (SPDS) for display in the front of the control room.

The plant computer leak rate program provides operators the ability to validate indications of primary-to-secondary leakage by observing changes in the Reactor Coolant System (RCS) mass inventory. This program allows detection of changes in the make up tank level and determination of leak rate changes based on the time interval selected.

The SPDS is also available for use by operators. This system has a screen dedicated for use during suspected or actual primary-to-secondary leakage events. The "Steam Generator Tube Rupture" screen contains N-16 readings (from the original detectors), condenser off gas, RCS Avg. Temp (Loop A/B), OTSG Tube-to-Shell delta T (OTSG A/B) and T-Sat for the OTSGs. In addition, the SPDS graphics display is outlined in red and flashing when a parameter on the graphics display is in alarm.

The Chemistry Department routinely analyzes and trends samples from the RCS and secondary water systems to identify and quantify primary-to-secondary leakage. Off-gas samples taken from the condenser vacuum pump discharge are analyzed for Argon-41 activity. Liquid condensate samples are analyzed for tritium to quantify activity levels in the secondary system. Argon-41 levels yield a better measure of instantaneous levels of primary-to-secondary leakage. Tritium levels in the secondary system increase linearly over time during a primary-to-secondary leak. A primary to secondary leak rate can also be determined from the tritium analysis. Secondary liquid samples are also routinely analyzed for fission product activity using gamma spectroscopy. An AOP directs special sampling by the Chemistry Department until primary-to-secondary leakage is reduced below 0.1 gpm or the reactor is tripped.

The Operations and Chemistry Departments utilize available information to detect changes in primary-to-secondary leakage and to initiate actions to place the unit in a safe condition. Procedures are provided such as Emergency Operating Procedure (EOP) 1202.06, "Steam Generator Tube Rupture," AOP 1203.023, "Small Steam Generator Tube Leaks," and the 1203.012 series for annunciator corrective actions are utilized when the monitors, indicators, trends, or annunciators exhibit changes indicative of the development of, or change in, primary-to-secondary leakage. The Operations department uses these procedures to place the plant in a stable condition and to mitigate the consequences of an OTSG tube leak.

Finally, ANO maintains thorough training of licensed operators by using the plant simulator for primary-to-secondary tube leaks and ruptures. This insures familiarity with the symptoms and indications of this event to enable timely diagnosis and action for placing the unit in a safe condition.

Evaluation of Safety Significance

The subject eddy current sizing technique was employed for IGA defects within the UTS. All UTS IGA indications with a depth size of $\geq$ 40% TW were removed from service by plugging the affected tubes.

The three UTS IGA tube samples removed during 1R13 were subjected to room temperature burst testing. Burst testing was performed separately within the flawed and unflawed regions of the tube samples. No simulated tubesheet was employed during the tests. The tests were performed using bladders in the flawed region. No foils or lateral restraint systems were used. The burst pressures for the flawed regions were between 10,000 and 11,000 psig. The unflawed regions burst at pressures between 10,700 and 11,200 psig. For ANO-1 OTSGs, structural integrity is conservatively demonstrated by pressurizing the steam generator tubing to three times normal operating differential pressure. This pressure for ANO-1 is 3765 psig. The burst testing results indicate that substantial structural margin exists.

In 1996, to support ANO's study of IGA, burst testing of pre-defected tubes was completed by Framatome Technologies Inc. (FTI). The burst testing consisted of nine tubes containing through-wall drilled holes up to 0.5 inches in diameter and one tube containing no defects placed within a simulated tubesheet. Nine of the specimens burst at pressures $\geq$ 10,941 psig. Each tube burst outside the tubesheet within the non-defected portion of the tubes. One tube reached a pressure of 9,577 psig but did not burst due to bladder leakage. These test results indicate that the tubesheet provides sufficient support to preclude tube rupture within the tubesheet.

The tube samples removed from ANO-1 in 1996 included eleven IGA indications in the UTS. Since it was confirmed that the inservice IGA indications are volumetric, bobbin amplitude (voltage) was used as a bounding parameter. The eddy current responses from these flaws were compared with the population of inservice IGA indications to determine how representative the flaws were of those remaining in service. The 600 KHz bobbin coil signal amplitude of flaws in tubes that were pulled during 1996 ranged from 0.46 to 2.69 volts. Of the 470 inservice IGA indications, all are bounded by the 2.69 value.

Additionally, a comparison of RPC data was performed to further substantiate that the pulled tube flaws bound those indications remaining in service. The RPC data collected for the tube pull samples resulted in a maximum flaw extent of 0.16 inches. RPC signal information was collected on 118 indications within the UTS. Ten of the largest RPC voltage indications were examined to determine the length-by-width extent by RPC. The largest RPC extent for those IGA indications left in service was 0.16 inches. Therefore, it is concluded that the inservice IGA indications are bounded by those tube samples that were destructively examined.

Structural integrity of the tubing within the tubesheet is assured based upon demonstration of the following:

A. The actual tube samples removed from ANO-1 during 1R13 exhibited burst pressures that substantially exceeded the required structural limit.

B. The structural support provided by the tubesheet precludes tube rupture.

C. The inservice IGA indications are bounded by those flaws contained in the tube samples that were pulled.

The IGA patches destructively examined were not through-wall; therefore, normal operating pressures did not result in through-wall leakage. This was evident during inservice inspection of the tubing in which no indications of residual leakage was noted. A comparison of 1R12 and 1R13 refueling outage EC signatures indicates that the IGA exhibits little or no growth. Also, comparison of inspection data prior to the 1R12 refueling outage supports this conclusion. Additionally, during May 1996, "B" OTSG tubing was subjected to a differential pressure of approximately 2100 psid for several hours as a result of a feedwater transient. No immediate increase in primary-to-secondary leakrate was noted during the event or following startup. The primary-to-secondary leakrate did increase by approximately 18 gpd three days following startup; however, none of the leakage detected during the 1R13 refueling outage was from IGA flaws. It is concluded that leakage through IGA flaws in the UTS is highly unlikely at Main Steam Line Break (MSLB) pressures due to the flaw morphology and the near MSLB differential pressure that occurred in May 1996 with no resultant leakage.

Conditional core damage probability is the increase in core damage frequency due to a given condition other than that assumed for the base PRA. The PRA assumed that the tube integrity is such that no steam generator tube rupture would be induced due to transient conditions. The limiting licensing basis transient which could most adversely affect the tubes by creating a high differential pressure across the tubes is a MSLB Accident. This accident could produce a tube differential pressure of up to 2500 psid. The tube sample burst pressures were well above pressures which would be seen in a limiting MSLB accident. Since the likelihood of tubes rupturing is not increased because of the larger than expected flaw sizes due to IGA in the UTS, the conditional core damage probability for this condition is zero.

The limiting licensing basis accident with respect to dose consequences from induced tube leakage is the MSLB accident. This accident assumes a total leakage of 1 gpm with 1% failed fuel in the core. However, steam generator tube leakage is procedurally limited to 0.1 gpm during normal operation. Even though leakage is not expected to occur, MSLB induced tube leakage has been conservatively estimated to be 0.53 gpm on the affected steam generator. The following assumptions are made concerning the number of flaws and associated leakage:

1) Since steam generator A has the largest number of IGA patch indications (285) it was chosen as the affected generator bounding steam generator B with only (185) indications.

2) Half of the indications are assumed to leak under MSLB conditions.

3) Representative leakage values for axial flaw lengths were utilized to bound the leakage expected from IGA patches.

4) Applied the longest IGA length calculated from RPC data to the 50% population assumed to leak.

5) Assumed the flaws grew in length an additional 25% over the cycle.

6) 50% of the flaw length will be 100% TW in depth.

Since there are 285 indications, half of this value will be 143. The longest length in the axial plane was 0.14 inches. When increased by 25% this yields a flaw length of:

0.14 inches * (.25) = 0.175 inches

If 50% of the length is assumed to be 100% TW:

0.175 inches * (0.5) = 0.0875 inches

Using leakage curves developed for OTSG's for axial flaws, the leakage from a single flaw (0.0875 inch, 100% TW) is determined to be 0.0025 gpm. To compensate for normal operating temperature the value is multiplied by 1.47 to yield a final leakage of 0.003675 gpm per flaw. This value is then multiplied by the number of potential leaking flaws to give a total leakage of:

143 flaws * 0.003675 gpm/flaw = 0.53 gpm

When the estimated leakage in the affected steam generator is added to that which is allowed by procedure, the total leakage rate is expected to be no greater than 0.63 gpm. Since the assumed leakage rate is greater than the conservative calculation, the current licensing basis assumption of 1 gpm remains bounding.

The subject flaws do not represent a structural or leakage concern. Therefore, the presence of inservice upper tubesheet IGA defects with through-wall extents that may exceed the technical specification plugging limit does not pose a concern relative to the health and safety of the public.

Engineering Evaluation and Basis For No Significant Hazard Consideration

An evaluation of the proposed NOED request has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards consideration using the standards in 10CFR50.92(c). A discussion of those standards as they relate to this request follows:

Criterion 1 - Does Not Involve a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated.

The steam generators are used to remove heat from the reactor coolant system during normal operation and during accident conditions. The steam generator tubing forms a substantial portion of the reactor coolant pressure boundary. A steam generator tube failure is a violation of the reactor coolant pressure boundary and is a specific accident analyzed in the ANO-1 Safety Analysis Report.

The purpose of the periodic surveillance performed on the steam generators in accordance with ANO-1 Technical Specification 4.18 is to ensure that the structural integrity of this portion of the RCS will be maintained. The technical specification plugging limit of 40% of the nominal tube wall thickness requires tubes to be repaired or removed from service because the tube may become unserviceable prior to the next inspection. Unserviceable is defined in the technical specifications as the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an operating basis earthquake, a loss-of-coolant accident, or a steam line break. Of these accidents, the most severe condition with respect to IGA degradation within the UTS is the MSLB. During this event the differential pressure across the tube could be as high as 2500 psid. The rupture of a tube during this event could permit the flow of reactor coolant into the secondary system thus bypassing the containment.

From testing performed on simulated flaws within the tubesheet it has been shown that the patch IGA indications within the upper tubesheet left in service during 1R13 with potential depths greater than 40% do not represent structurally significant flaws which would increase the probability of a tube failure beyond that currently assumed in the ANO-1 Safety Analysis Report.

Burst tests were conducted on tubing with simulated flaws within the tubesheet. In these tests, through-wall holes of varying sizes up to 0.5 inch in diameter were drilled in test specimens. The flawed specimen tubes were then inserted into a simulated tubesheet and pressurized. In all cases the tube burst away from the flaw in that portion of tube that was outside the tubesheet. The size of these simulated flaws bound the indications left in service within the upper tubesheet during 1R13. These tests demonstrate for flaws similar to the patch IGA found in the ANO-1 upper tubesheet that the tubes will not fail at this location under accident conditions.

The dose consequences of a MSLB accident are analyzed in the ANO-1 accident analysis. This analysis assumes the unit is operating with a 1 gpm steam generator tube leak and that the unit has been operating with 1% defective fuel.

Increased leakage during a postulated MSLB accident resulting from the patch IGA left in service in the upper tubesheet is not expected. IGA has been present in the ANO-1 steam generators for many years with no known leakage attributed to this damage mechanism. Because of its localized nature and morphology, the flaw does not open under accident pressure conditions.

Therefore, the NOED which allows continued operation with IGA flaws within the UTS with potential through-wall extents greater than the technical specifications plugging limit does not result in a significant increase in the probability or consequences of an accident previously evaluated for ANO-1.

Criterion 2 - Does Not Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated.

The steam generators are passive components. The intent of the technical specification surveillance requirements is being met by this change in that adequate structural and leakage integrity will be maintained. The proposed change introduces no new modes of plant operation.

Therefore, the NOED does not create the possibility of a new or different kind of accident from any previously evaluated.

Criterion 3 - Does Not Involve a Significant Reduction in the Margin of Safety.

The ANO-1 Technical Specification Bases specify that the surveillance requirements (which includes the plugging limits) are to ensure the structural integrity of this portion of the RCS pressure boundary. The technical specification plugging limit of 40% of the nominal tube wall thickness requires tubes to be repaired or removed from service because the tube may become unserviceable prior to the next inspection. Unserviceable is defined in the technical specifications as the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an operating basis earthquake, a loss-of-coolant accident, or a MSLB. Of these accidents the most severe condition with respect to IGA within the UTS is the MSLB.

Tests of tubes with representative IGA flaws removed from ANO-1 OTSGs during 1R13 showed that flawed tubes are capable of withstanding differential pressure in excess of 10,000 psid without the presence of the tubesheet. Testing of simulated through-wall flaws of up to 0.5 inch in diameter within a tubesheet showed that the tubes always failed outside of the tubesheet. Thus the structural requirement of the bases of the surveillance specification is satisfied considering this NOED.

Leakage under accident conditions would be limited due to the small size and morphology of the flaws and would be low enough to ensure offsite dose limits are not exceeded.

Therefore, the NOED does not involve a significant reduction in the margin of safety.

This condition was also evaluated in accordance with 10CFR50.59. The evaluation concluded that the condition did not represent an Unreviewed Safety Question.

Basis for No Environmental Consequences

This request for enforcement discretion does not have a significant effect, impact, or change to the quality of the human environment at ANO. This request, when implemented, does not impact the ANO Environmental Report-Operating License. Therefore, it does not involve any environmental consequences.

Improved Technical Specifications Implications

The condition for which enforcement discretion is being requested would not have been prevented if Improved Technical Specifications were implemented for ANO-1.