May 4, 2004

Mr. George Vanderheyden, Vice President
Calvert Cliffs Nuclear Power Plant, Inc.
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, MD 20657-4702

SUBJECT: CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1 - RELAXATION OF THE REQUIREMENTS OF FIRST REVISED ORDER MODIFYING LICENSE (EA-03-009), REGARDING REACTOR PRESSURE VESSEL HEAD INSPECTIONS (TAC NO. MC1921)

Dear Mr. Vanderheyden:

By letter dated January 30, 2004 (ADAMS Accession No. ML040370331), Calvert Cliffs Nuclear Power Plant, Inc. (CCNPPI) requested relaxation from certain inspection requirements in the Nuclear Regulatory Commission (NRC) Order Modifying License EA-03-009 (Order) for Reactor Pressure Vessel Head Penetration Nozzles for CCNPP, Unit No. 1. Additional information supporting your request was provided in letters dated April 13, 2004 (ADAMS Accession No. ML041130293), and April 27, 2004 (ADAMS Accession No. ML041240028).

The NRC staff concludes that your proposed alternative examination of the 17 control element drive mechanism (CEDM) nozzles with a minimum coverage of 1.67 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) provides reasonable assurance of the structural integrity of the reactor pressure vessel (RPV) head, vessel head penetration nozzles and welds. Further inspections of these CEDM nozzles in accordance with Section IV, paragraph C.(5)(b), of the Order EA-03-009, dated February 20, 2004,(ADAMS Accession No. ML040220181) would result in hardship without a compensating increase in the level of quality and safety. Therefore, pursuant to Section IV, paragraph F, of the Order, the staff authorizes the proposed alternative inspection for 17 CEDMs at CCNPP, Unit No. 1, subject to the following condition:

> If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, the licensee shall revise its analysis that justifies relaxation of the First Revised Order within 30 days after the NRC informs the licensee of an NRC-approved crack growth formula. If the licensee's revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and the licensee shall, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, the licensee shall, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, the licensee shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any

future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

The details of the staff's review are contained in the enclosed Safety Evaluation. If you have questions regarding this matter, please contact Guy Vissing at 301-415-1441.

Sincerely,

/RA/

Cornelius F. Holden, Jr, Director
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-317

Enclosure: As stated

cc w/encl: See next page

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OFFICIAL RECORD

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FIRST REVISED ORDER MODIFYING LICENSE (EA-03-009) RELAXATION REQUEST,

EXAMINATION COVERAGE

FOR REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES

CALVERT CLIFFS NUCLEAR POWER PLANT, UNIT NO. 1

CALVERT CLIFFS NUCLEAR POWER PLANT, INC.

DOCKET NUMBER 50-317

1.0 INTRODUCTION

The NRC First Revised Order Modifying License EA-03-009 (Order), issued on February 20, 2004 (ADAMS Accession No. 040220181), requires specific examinations of the reactor pressure vessel (RPV) head and vessel head penetration (VHP) nozzles of all pressurized-water reactor (PWR) plants. Section IV, paragraph F, of the Order states that requests for relaxation of the Order associated with specific penetration nozzles will be evaluated by the NRC staff using the procedure for evaluating proposed alternatives to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) in accordance with 10 CFR 50.55a(a)(3). Section IV, paragraph F, of the Order states that a request for relaxation regarding inspection of specific nozzles shall address the following criteria: (1) the proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or (2) compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

For Calvert Cliffs Nuclear Power Plant (CCNPP), Unit No. 1, and similar plants determined to have a high susceptibility to primary water stress-corrosion cracking (PWSCC) in accordance with Section IV, paragraph A and B, of the Order, the following inspections are required to be performed every refueling outage in accordance with Section IV, paragraph C.(5)(a) and paragraph C.(5)(b) of the Order:

(a) Bare metal visual (BMV) examination of 100% of the RPV head surface (including 360° around each RPV head penetration nozzle). For RPV heads with the surface obscured by support structure interferences which are located at RPV head elevations downslope from the outermost RPV head penetration, a bare metal visual inspection of no less than 95 percent of the RPV head surface may be performed provided that the examination shall include those areas of the RPV head upslope and downslope from the support structure interference to identify any evidence of boron or corrosive product. Should any evidence of boron or corrosive product be identified, the licensee shall examine the RPV

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head surface under the support structure to ensure that the RPV head is not degraded.

(b) For each penetration, perform a nonvisual NDE [nondestructive examination] in accordance with either (i), (ii), or (iii):

(i) Ultrasonic testing of the RPV head penetration nozzle volume (i.e., nozzle base material) from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or bottom of the nozzle if less than 2 inches [See Figure IV-1]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld that have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-2). In addition, an assessment shall be made to determine if leakage has occurred into the annulus between the RPV head penetration nozzle and the RPV head low-alloy steel.

(ii) Eddy current testing or dye penetrant testing of the entire wetted surface of the J-groove weld and the wetted surface of the RPV head penetration nozzle base material from at least 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 2 inches below the lowest point at the toe of the J-groove weld on a horizontal plane perpendicular to the nozzle axis (or the bottom of the nozzle if less than 2 inches [see Figure IV-3]); OR from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) to 1.0-inch below the lowest point at the toe of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) and including all RPV head penetration nozzle surfaces below the J-groove weld have an operating stress level (including all residual and normal operation stresses) of 20 ksi tension and greater (see Figure IV-4).

(iii) A combination of (i) and (ii) to cover equivalent volumes, surfaces, and leak paths of the RPV head penetration nozzle base material and J-groove weld as described in (i) and (ii). Substitution of a portion of a volumetric exam on a nozzle with a surface examination may be performed with the following requirements:

1. On nozzle material below the J-groove weld, both the outside diameter and inside diameter surfaces of the nozzle must be examined.

2. On nozzle material above the J-groove weld, surface examination of the inside diameter surface of the nozzle is permitted provided a surface examination of the J-groove weld is also performed.

Footnote 3 of the Order provides specific criteria for examination of repaired VHP nozzles.

By letter dated January 30, 2004 (ADAMS Accession No. ML040370331), as supplemented by letters dated April 13, 2004 (ADAMS Accession No. ML0411302930), and April 27, 2004 (Accession No. ML041240028), Calvert Cliffs Nuclear Power Plant, Inc. (the licensee), requested relaxation to implement an alternative to the requirements of Section IV, paragraph C.(5)(b)(i), of the First Revised Order for RPV head penetration nozzles at CCNPP, Unit No. 1.

2.0 FIRST REVISED ORDER MODIFYING LICENSE EA-03-009 RELAXATION REQUEST FOR EXAMINATION COVERAGE FOR REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES

2.1 First Revised Order Requirements for Which Relaxation is Requested

The licensee has requested relaxation from Section IV, paragraph C.(5)(b)(i) of the First Revised NRC Order. The specific relaxation requested is identified below.

2.2 Licensee's Proposed Alternative

The licensee seeks relaxation from the Order where inspection coverage is limited by inaccessible areas of 17 CEDM penetration nozzles for CCNPP, Unit No. 1, with respect to NDE, specifically ultrasonic testing (UT). The licensee stated that relaxation is requested from Section IV, paragraph IV.C.(5)(b)(i) of the Order from 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis).

The licensee proposes to meet the Order requirements, or to examine each CEDM nozzle above the J-groove weld to the maximum extent possible. The licensee stated the least UT examination coverage expected above the J-groove weld will be approximately 0.75 inch on the outside diameter of the nozzle and 1.18 inches on the inside diameter.

2.3 Licensee's Basis for Proposed Alternative

The licensee stated that the Unit 1 CEDM penetrations have guide/thermal sleeves with a funneled-end installed inside the CEDM penetration to position the CEDM shaft. The licensee stated that there is a counterbore step above the J-groove weld which results in an annular gap of approximately 0.175 inch that reduces to 0.123 inch. Because of this, the licensee stated the thin "gap scanning" (blade) UT probe does not fit into the region where the gap width decreases.

In its April 27, 2004, response to a request for additional information (RAI) the licensee stated that it is possible to permanently remove the guide/thermal sleeves, allowing the insertion of a rotating ultrasonic probe, instead of a blade probe, and attach a new guide funnel to the CEDM nozzle, to improve the scan of the nozzle. However, the licensee stated that the additional work associated with this modification for the 17 CEDM nozzle penetrations would result in a hardship by extending the outage 8.5 days, and exposing personnel to an estimated radiological dose of 28.376 Rem using semi-remote welding to re-install the guide funnels. Personnel would be exposed to manual cleanup (flapping) and machining, and welding set-ups and breakdowns under the head using scaffold platforms or ladders while wearing respirators and double anti-contamination clothing. The licensee stated that this would increase the industrial safety risks due to heat stress, fatigue, and potential injury to personnel operating rotating equipment under the reactor head without providing enough relevant inspection information to constitute a commensurate increase in quality and safety.

The licensee stated that the in-core instrument nozzles and the RPV head vent nozzle will be ultrasonically tested 2 inches above the J-groove weld in accordance with the requirements of the Order. The licensee stated that where limitations exist that preclude the full examination coverage, the limitations will be noted and reported as required by Section IV.E of the Order.

The licensee stated that experience with the inspection of the CCNPP, Unit No. 2 RPV head, which is similar to the RPV head on Unit 1, confirms the inability to examine a full 2 inches above the J-groove weld for all scans of the CEDM nozzles using a blade probe. Therefore, the licensee concluded that compliance with the requirements specified in the First Revised Order would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.4 Evaluation

The NRC staff's review of this request was based on criterion (2) of paragraph F of Section IV of the Order, which states:

> Compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Within the context of the licensee's proposed alternative examination of the RPV head penetration nozzles, the licensee has demonstrated the hardship that would result from implementing examinations to 2 inches above the highest point of the root of the J-groove weld of these nozzles.

The phenomenon of concern is PWSCC, which typically initiates in the areas of highest stress. The area of CEDM penetrations that has the highest residual stress is the area adjacent to the J-groove attachment weld. Therefore, it is most likely that PWSCC will initiate in an area adjacent to the J-groove attachment weld.

The licensee proposed to examine the CEDM penetration nozzles to a minimum of 0.75 inch above the highest point of the root of the J-groove weld including 1.18 inches on the inside diameter (ID) surface. In its April 13, 2004, response to an RAI, the licensee's proposed minimum inspection distance of the nozzle base material above the J-groove weld is supported by the licensee's residual stress analysis of the CEDM nozzles at 0°, 11°, 29°, and 43°. The results are tabulated below:

0° Nozzle

	Hoop (ksi)	Axial (ksi)
ID surface + 1.18"	17.3	16.5
OD surface + 0.75"	6.3	-20.8

11° Nozzle

	Hoop (ksi)	Axial (ksi)
ID surface + 1.18"	19.9	13.8
OD surface + 0.75"	2.5	-22.7

29° Nozzle

	Hoop (ksi)	Axial (ksi)
ID surface + 1.18"	16.5	4.5
OD surface + 0.75"	-1.1	-21.1

43° Nozzle

	Hoop (ksi)	Axial (ksi)
ID surface + 1.18"	16.2	-0.1
OD surface + 0.75"	-7.8	-20.4

The licensee concluded that for all penetrations, the highest bounding, residual stress on the ID surfaces at 1.18 inches above the highest point of the root of the J-groove weld is 19.9 ksi and occurs on the uphill side of the 11 degree nozzle. On the outside diameter (OD), the licensee stated that both hoop and axial stresses at 0.75 inch above the highest point of the root of the J-groove weld are below 7 ksi in all cases.

The licensee stated that the stress values presented above are lower than those originally provided in the Unit 2 relaxation request dated April 9, 2003. The stress values were based on finite element analyses specific to Calvert Cliffs and were performed in December 2001 to determine the operating stresses in the CEDM nozzles. Results from this finite element (FEA) model were used to support the Unit 2 and Unit 1 submittals. In its April 27, 2004, response to an RAI, the licensee explained that the original post-processing was based on model node numbering, and effectively treated a row of nodes running from the nozzle OD to the nozzle ID as being the same elevation. However, the FEA model's nodal mesh is such that nozzle nodes are “swept” at the nozzle set-up angle. Consequently, for a given row of nozzle nodes, the ID and OD nodal elevations are offset vertically. Therefore, in the April 9, 2003, submittal, the licensee stated the stresses were conservatively indexed to the ID node along the same mesh line that intersected the weld root. The stresses reported at different elevations above the weld were actually at lower elevations and consequently, higher stress values were used.

The licensee stated that the stress values for the Unit 1, 2004 relaxation request, are based solely on the absolute elevation of each nozzle node and eliminates the effects of nodal mesh on reported results. The stresses were indexed to the actual weld root elevation. In summary, the licensee concludes that the current Unit 1 relaxation request presents more accurately reported results from the same FEA model.

The licensee also had crack growth calculations performed for two different locations. The crack growth calculations were performed in accordance with the crack growth formula in Electric Power Research Institute (EPRI) Report Material Reliability Program (MRP) Report, MRP-55, “Material Reliability Program (MRP Crack Growth Rates for Evaluation Primary Water Stress Corrosion Cracking (PWSCC) of Thick Wall Alloy 600 Material (MRP-55), Revision 1.” The NRC staff has made a preliminary assessment of the crack growth formula, but has not yet made a final determination on the acceptability of the subject industry report. Should the NRC staff determine the crack growth formula used by the licensee to be unacceptable, the licensee will be required to revise its analysis to incorporate an acceptable crack growth formula as described below.

> If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, the licensee shall revise its analysis that justifies relaxation of the First Revised Order within 30 days after the NRC informs the licensee of an NRC-approved crack growth formula. If the licensee’s revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and the licensee shall, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, the licensee shall, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, the licensee shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

The licensee concurred with the above statement in its April 27, 2004, response to an RAI.

For the first calculation, the lower end of the crack was located 1.18 inches above the root of the J-groove weld. For the second calculation, the lower end of the flaw was placed at an elevation 2 inches above the root of the J-groove weld. The licensee concluded the results indicated there is little difference in the crack growths for flaws located at 1.18 inches above the weld or at 2 inches above the weld. A table of results is provided below:

Location	Initial Flaw Depth	Flaw Depth After 2 Years
1.18" Above the Weld	24.15%	24.24%
2.00" Above the Weld	24.15%	24.15%

Flaw depths are in terms of wall thickness.

The licensee stated that for circumferential flaws, the axial residual stresses decline very quickly with distances above the J-groove weld. The licensee stated that in the region above 0.75 inch above the highest point of the root of the J-groove weld (1.18 inches for the ID), residual stresses are very low or are negative, so initiation and growth of circumferential flaws are not predicted for this region.

The licensee stated that the yield strength of the CEDM nozzle penetration material for CCNPP, Unit No. 1 is 42 ksi. The highest residual stresses at 1.18 inch-elevation are less than 48% of the base material yield strength. The licensee concluded that based on the information above, PWSCC is not expected to initiate in the region for which relaxation is requested.

In its April 13, 2004, response to an RAI, the licensee identified efforts that were performed to enhance inspection coverage with the UT blade probe modifications, operator and field technician procedures and training enhancements. The licensee stated that mock-ups of CCNPP's specific CEDM configurations were manufactured and the tooling, procedures and probe improvements were tested and verified.

The licensee stated that the effort to construct an eddy current testing (ET) blade probe for an alternative inspection could not be field tested until it was deployed under a vessel head. The licensee stated that the Unit 1 outage is projected for approximately 30 days and additional time to test and modify, if needed, the inspection equipment is not practical.

The licensee also pursued an alternate UT inspection technique using a Normal Beam Ultrasonic Technique from the bottom of the penetration that would meet the requirements of the Order. A series of tests were performed on a Calvert Cliffs mockup and a nozzle contained in a reactor vessel upper head mockup (from the cancelled Midland reactor). A procedure was written and an evaluation conducted at the EPRI on two blind mockups. The licensee stated the results of the blind demonstration showed limitations in defect detection, and therefore the technique did not prove deployable based on the EPRI MRP demonstration.

The licensee provided inspection data results of the 65 CEDM nozzle penetrations, 8 in-core instrumentation (ICI) nozzles and 1 vent-line penetration nozzle. Based on the inspection results, 48 of the CEDM nozzles were UT and inspected at least 2 inches above the highest point of the root of the J-groove weld in accordance with the requirements of the First Revised Order. All 8 ICI penetration nozzles and 1 vent-line penetration nozzle were UT examined in accordance with the requirements of the First Revised Order. Seventeen CEDM penetration nozzles which were UT examined did not meet the requirements of 2 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) as required by the First Revised Order EA-03-009, dated February 20, 2004. CEDM nozzle penetration #60 received the most limiting coverage of 1.67 inches above the root of the J-groove weld. A table is provided below:

CEDM Number	Nozzle Angle	Minimum Axial Distance Achieved Above Uphill Weld Root (inches)	Stress Level Above the Uphill Weld Root at the Axial Distance for Nozzles Without Complete Coverage (ksi)	Minimum Axial Distance Achieved Above Downhill Weld Root for Nozzles with Coverage < 2" above Uphill Weld Root (inches)	Stress Level Above the Downhill Weld Root at the Axial Distance for Nozzles without Complete Coverage (ksi)
35	34.9	1.880	ID: 7.2 OD: -3.5	4.760	ID: 10.1 OD: 3.2
36	34.9	1.960	ID: 6.7 OD: -2.5	4.400	ID: 9.9 OD: 3.5
37	34.9	1.970	ID: 6.6 OD: -2.4	5.040	ID: 10.3 OD: 3.0
43	38.5	1.900	ID: 10.3 OD: -4.5	5.130	ID: 14.3 OD: 2.0
45	38.5	1.950	ID: 10.2 OD: -4.1	5.070	ID: 13.8 OD: 2.1
46	41.8	1.862	ID: 10.3 OD: -4.9	5.240	ID: 15.3 OD: 1.8
47	41.8	1.960	ID: 10.0 OD: -4.0	5.610	ID: 16.1 OD: 1.4
49	41.8	1.956	ID: 10.1 OD: -4.0	5.450	ID: 10.1 OD: -4.0
50	41.8	1.950	ID: 10.2 OD: -4.1	5.390	ID: 16.4 OD: 1.6
52	41.8	1.950	ID: 10.2 OD: -4.1	5.630	ID: 16.1 OD: 1.3
53	41.8	1.730	ID: 10.6 OD: -6.1	5.490	ID: 16.3 OD: 1.5
55	42.5	1.700	ID: 10.7 OD: -6.4	5.470	ID: 16.3 OD: 1.5
56	42.5	1.860	ID: 10.3 OD: -4.9	5.340	ID: 16.1 OD: 1.7

CEDM Number	Nozzle Angle	Minimum Axial Distance Achieved Above Uphill Weld Root (inches)	Stress Level Above the Uphill Weld Root at the Axial Distance for Nozzles Without Complete Coverage (ksi)	Minimum Axial Distance Achieved Above Downhill Weld Root for Nozzles with Coverage < 2" above Uphill Weld Root (inches)	Stress Level Above the Downhill Weld Root at the Axial Distance for Nozzles without Complete Coverage (ksi)
60	42.5	1.670	ID: 10.7 OD: -6.7	5.320	ID: 16.0 OD: 1.7
61	42.5	1.850	ID: 10.4 OD: -5.0	5.450	ID: 16.4 OD: 1.6
65	42.5	1.910	ID: 10.2 OD: -4.5	5.410	ID: 16.4 OD: 1.6

Based on the inspection results provided, most nozzle penetrations received considerable UT coverage, from the weld portion where stresses are high to locations away from the weld where stresses decrease considerably. The licensee shows from the table above, the nozzles that did not have complete UT coverage are in a low stress area. The staff has determined that the likelihood of crack initiation and growth in these low stress areas is low.

The safety issues that are addressed by the inspections mandated by the Order are degradation (corrosion) of the low-alloy steel RPV head, and reactor coolant pressure boundary integrity. Based on the above information, the inspection performed by the licensee on the 17 CEDM nozzles, with a minimum coverage of 1.67 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis), provides reasonable assurance of the structural integrity of the RPV head, CEDM penetration nozzles, and welds.

3.0 CONCLUSION

The NRC staff concludes that the licensee's proposed alternative examination of the 17 CEDM nozzles, with a minimum coverage of 1.67 inches above the highest point of the root of the J-groove weld (on a horizontal plane perpendicular to the nozzle axis) provides reasonable assurance of the structural integrity of the RPV head, VHP nozzles and welds. Further inspections of these CEDM nozzles in accordance with Section IV, paragraph C.(5)(b), of the First Revised Order Modifying License EA-03-009, dated February 20, 2004, would result in hardship without a compensating increase in the level of quality and safety. Therefore, pursuant to Section IV, paragraph F, of the Order, the staff authorizes the proposed alternative inspection for the 17 CEDMs at CCNPP, Unit No. 1, subject to the following condition:

> If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, the licensee shall revise its analysis that justifies relaxation of the Frist Revised Order within 30 days after the NRC informs the licensee of an NRC-approved

crack growth formula. If the licensee's revised analysis shows that the crack growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation is rescinded and the licensee shall, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack growth acceptance criteria are exceeded during the subsequent operating cycle, the licensee shall, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, the licensee shall, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack growth rate formula.

Principal Contributors: E. Reichart
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Date: May 4, 2004