December 8, 2004

Mr. David A. Christian
Sr. Vice President and Chief Nuclear Officer
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Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, Virginia 23060-6711

SUBJECT: SURRY POWER STATION, UNIT 2 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS INSERVICE INSPECTION PROGRAM THIRD 10-YEAR INTERVAL REQUESTS FOR RELIEF (TAC NOS. MC3140 AND MC3141)

Dear Mr. Christian:

By letter dated May 13, 2004, as supplemented by letter dated August 10, 2004, Virginia Electric and Power Company (VEPCO) requested relief from certain American Society of Mechanical Engineers requirements for the third 10-year Inservice Inspection (ISI) Interval at Surry Power Station, Unit 2. In its submittals, VEPCO requested approval of Relief Requests SR-034, SR-035, SR-036, and SR-037 for Surry, Unit 2. The Nuclear Regulatory Commission (NRC) staff has completed its review of Relief Requests SR-034 and SR-035, and our evaluations and conclusions are contained in the enclosed Safety Evaluation.

The NRC staff has reviewed Relief Requests SR-034 and SR-035 and has concluded that VEPCO's proposed alternatives provide an acceptable level of quality and safety. Therefore, Relief Requests SR-034 and SR-035 are authorized pursuant to Title 10 of the *Code of Federal Regulations* Section 50.55a(a)(3)(i) for the third 10-year ISI interval at Surry, Unit 2.

The NRC staff is continuing its review of Relief Requests SR-036 and SR-037 for Surry, Unit 2.

Sincerely,

/RA/

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-281

Enclosure: As stated

cc w/encl: See next page

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By letter dated May 13, 2004, as supplemented by letter dated August 10, 2004, Virginia Electric and Power Company (VEPCO) requested relief from certain American Society of Mechanical Engineers requirements for the third 10-year Inservice Inspection (ISI) Interval at Surry Power Station, Unit 2. In its submittals, VEPCO requested approval of Relief Requests SR-034, SR-035, SR-036, and SR-037 for Surry, Unit 2. The Nuclear Regulatory Commission (NRC) staff has completed its review of Relief Requests SR-034 and SR-035, and our evaluations and conclusions are contained in the enclosed Safety Evaluation.

The NRC staff has reviewed Relief Requests SR-034 and SR-035 and has concluded that VEPCO's proposed alternatives provide an acceptable level of quality and safety. Therefore, Relief Requests SR-034 and SR-035 are authorized pursuant to Title 10 of the *Code of Federal Regulations* Section 50.55a(a)(3)(i) for the third 10-year ISI interval at Surry, Unit 2.

The NRC staff is continuing its review of Relief Requests SR-036 and SR-037 for Surry, Unit 2.

Sincerely,
/RA/

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

SURRY POWER STATION, UNIT 2

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

1.0 INTRODUCTION

By letter dated May 13, 2004, as supplemented by letter dated August 10, 2004, Virginia Electric and Power Company (the licensee, Dominion) requested relief from the requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI for the third 10-year Inservice Inspection (ISI) Interval at Surry Power Station, Unit 2. Specifically, the licensee requested approval of Relief Requests SR-034, SR-035, SR-036, and SR-037 for Surry, Unit 2.

The NRC staff has completed its review of Relief Requests SR-034 and SR-035, and our evaluations and conclusions are discussed below. The NRC staff is continuing its review of Relief Requests SR-036 and SR-037.

2.0 REGULATORY REQUIREMENTS

The ISI of ASME Code Class 1, Class 2, and Class 3 components shall be performed in accordance with Section XI of the ASME Code and applicable editions and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The components (including

supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval. The applicable ASME Code of record for the third 10-year ISI at Surry, Unit 2 is the 1989 Edition of the ASME Section XI Code. The third 10-year ISI interval ended on May 9, 2004.

3.0 SAFETY EVALUATION - Relief Request SR-034

3.1 Components for which Relief Is Requested

ASME Section XI, Class 1, Examination Category B-D, Item B3.90, Reactor Pressure Retaining Nozzle-to-Vessel Welds

Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested to implement an alternative to the requirements of ASME Section XI Figures IWB-2500-7(a) and IWB-2500-7(b).

3.2 Code Requirements

1989 Edition of ASME Code, Section XI, Examination Category B-D Full Penetration Welds of Nozzles in Vessels, Code Item B3.90, Figures IWB-2500-7 (a) and (b).

ASME Section V, 1989 Code Edition, Article 4, Paragraphs T-441.3.2.5 Angle Beam Scanning, T-3.2.6 Scanning for Reflectors Oriented Parallel to the Weld, and T-441.3.2.7 Scanning for Reflectors Oriented Transverse to the Weld.

3.3 Licensee's Proposed Alternative

1. Perform examinations in accordance with the examination volumes defined in Figures 1 and 2 [See attached Figures 1 and 2].

2. Conduct Mechanized Ultrasonic Examinations of essentially 100% of all welds using PDI [Performance Demonstration Initiative] ASME Section XI, Appendix VIII qualified procedures and personnel. This will be accomplished in accordance with ASME Section XI, Division 1, 1995 Edition, 1996 Addenda, Appendix VIII, Supplements 4, 5, 6, and 7 as modified by 10 CFR 50.55a.

3. Periodic System Pressure Tests as per Category B-P, Table IWB-2500-1.

3.4 Licensee's Basis for Relief

Dominion is currently required to perform inservice examinations of selected welds in accordance with the requirements of 10 CFR 50.55a, plant Technical Specifications, and the 1989 edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components. The Code edition invokes the examination volume requirements of IWB Figures-2500-7(a) and IWB-2500-7(b). The Code edition also invokes the examination requirements of Appendix I, Article I-2000. This Article references ASME Section V, Article 4, which invokes twenty-year-old examination methodology. The use of more current examination methodologies would allow a reduction in the existing

examination volume requirement of the weld and a volume of base metal equal to one half the thickness of the reactor vessel shell either side of the weld to the weld plus one half (½) inch of base metal either side of the weld.

The ultrasonic examination techniques proposed for this examination have been qualified by demonstration for Appendix VIII, Supplements 4, 5, 6, and 7 of the 1995 Edition, 1996 Addenda, of ASME Section XI by the Performance Demonstration Initiative (PDI) as amended by the September 1999 revision of 10 CFR 50.55a. The use of these qualified techniques further assures that the reactor vessel welds are free of service related flaws thus enhancing quality and ensuring plant safety and reliability.

The required examination volume for the reactor pressure vessel nozzle to vessel welds included in the documents cited above extends far beyond the weld into the base metal. It is unnecessarily large, excessively extends the examination time, and results in no increase in safety. The area being examined in the base metal is a region which is not prone to inservice cracking and has been extensively examined during the First and Second Inservice Inspection Intervals.

The attached Figures 1 and 2 provide an examination volume next to the widest part of the weld, which is reduced from one half of the vessel wall thickness to one-half (½) inch. This eliminates examination of vessel base material that was extensively examined during construction and pre-service inspections. Furthermore, the material is not in the high residual stress regions associated with the weld. The regions of high stress are located in the examination volumes that are defined in the attached figures and would be subject to examination by the proposed alternative. Note that the examination volumes depicted in the figures are the same as those included in ASME Code Case N-613-1, which was approved by ASME on July 30, 1998.

3.5 NRC Staff Evaluation

The Code requires 100-percent ultrasonic examination of the weld length of the Reactor Vessel Nozzle-to-Vessel Welds. The licensee has proposed to perform mechanized ultrasonic examinations of essentially 100 percent of all welds using PDI ASME Section XI, Appendix VIII qualified procedures and personnel. Additionally, the licensee will perform the subject exams in accordance with ASME Code, Section XI, Division 1, 1995 Edition, 1996 Addenda, Appendix VIII, Supplement 7.

The licensee's proposed alternative addresses the area next to the weld that must be volumetrically examined. This alternative reduces the examination volume adjacent to the widest part of the weld from half of the vessel wall thickness to one-half inch. The thickness of the reactor wall near the nozzle is 9 inches, and the Code-required volume adjacent to the widest part of the weld from half of the vessel wall thickness would be 4½ inches. The acceptability of reduced volume examinations is based on prior examinations of the base metal and the expected internal stress distribution near the weld. Although the alternative does not specifically impose prior examination results of the excluded volume area as a condition for allowing a reduced examination volume, the base metal was extensively examined during construction, preservice inspection, and inservice inspections. The licensee, in its letter dated May 13, 2004, indicated that these examinations showed that the ASME Code volume was free of reportable flaws.

The initiation of flaws during plant service in the volume excluded from examination by the licensee's proposed alternative is unlikely because of the low stress in the base metal away from the weld. The stresses caused by welding are concentrated at and near the weld. Cracks, should they initiate, will most likely occur in the high-stressed areas of the weld. The high-stressed areas are within the volume included in the licensee's alternative for examination. The licensee has performed prior examinations of the subject welds that support this aspect of its alternative. In addition, periodic system pressure tests per Category B-P, Table IWB-2500-1 will be performed that will provide assurance of leakage integrity of the components.

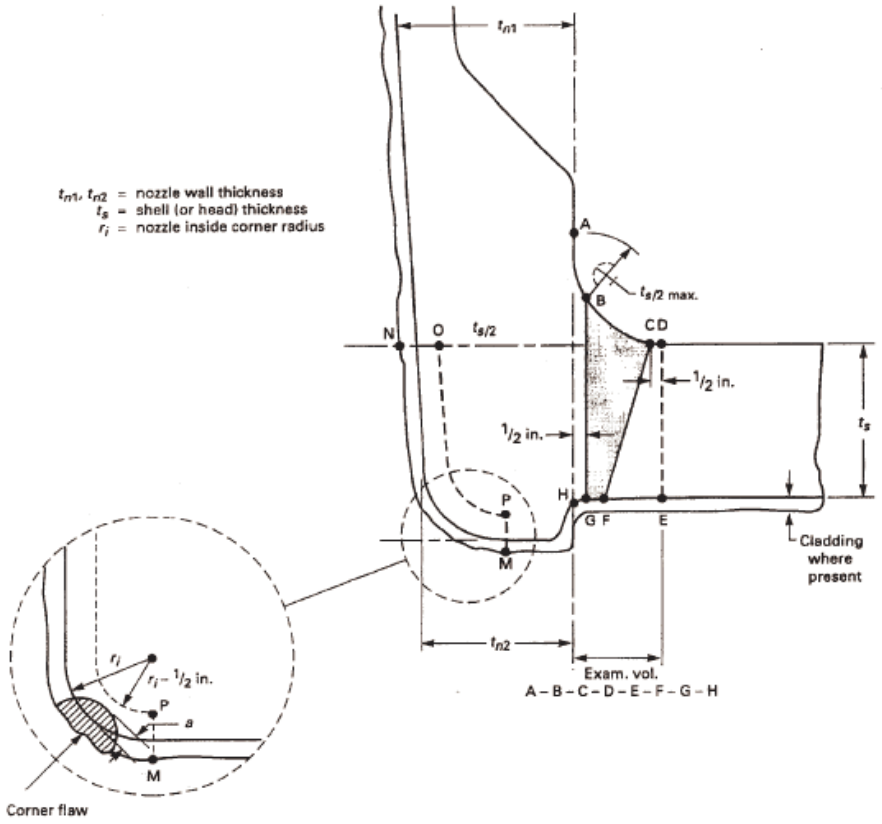
The licensee proposed to use PDI's performance demonstration program for ASME Section XI, Appendix VIII, Supplement 7. This has been required by 10 CFR 50.55a, and will provide enhanced volumetric examinations and reasonable assurance that any flaws that exist would be found by these examinations. The coverage requirements emphasize ultrasonic examination of the weld volume at the weld root for circumferential and radial flaws by scanning in four orthogonal directions and de-emphasize ultrasonic examination of the remaining weld. Appendix VIII, Supplement 7 requirements are specifically designed for nozzle-to-vessel weld configurations, and the ASME Code, Section XI, Division 1, 1995 Edition, 1996 Addenda has been approved for use in 10 CFR 50.55a.

Based on the above discussion, the NRC staff has determined that the licensee's proposed alternative provides an acceptable level of quality and safety.

3.6 Conclusion

The NRC staff concludes that the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the remainder of the third 10-year ISI interval at Surry, Unit 2.

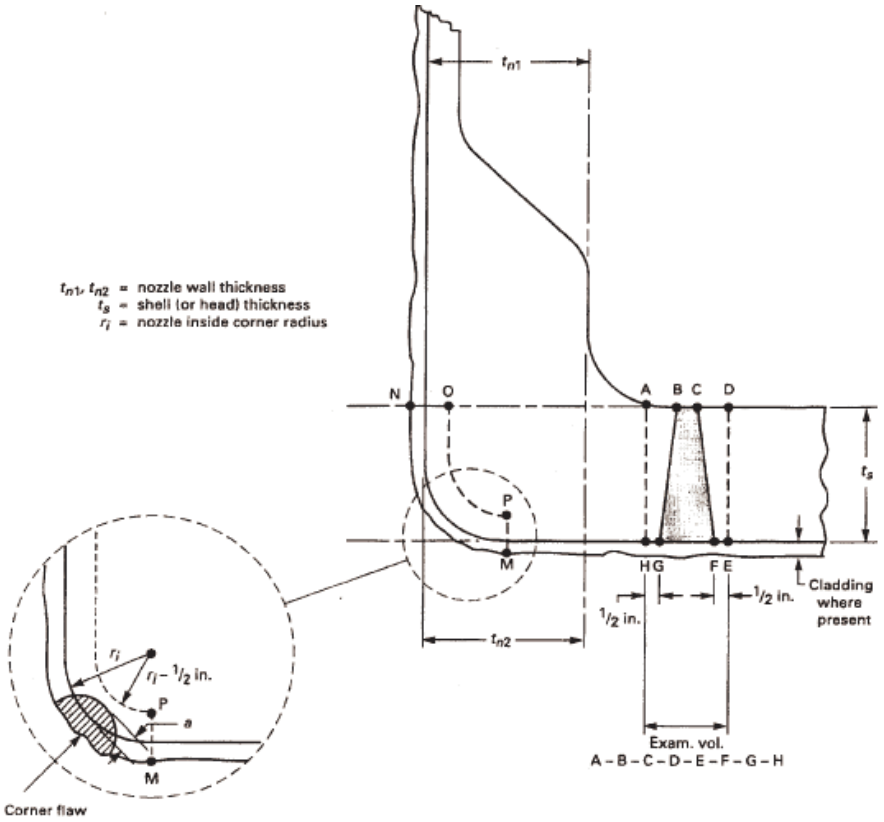
All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the authorized Nuclear Inservice Inspector.



EXAMINATION REGION [Note (1)]	EXAMINATION VOLUME [Note (2)]
Shell (or head) adjoining region	C – D – E – F
Attachment weld region	B – C – F – G
Nozzle cylinder region	A – B – G – H
Nozzle inside corner region	M – N – O – P

NOTES:
(1) Examination regions are identified for the purpose of differentiating the acceptance standards in IWB-3512.
(2) Examination volumes may be determined either by direct measurements on the component or by measurements based on design drawings.

FIG. 1 NOZZLE IN SHELL OR HEAD
(Examination Zones in Barrel Type Nozzles Joined by Full Penetration Corner Welds)



EXAMINATION REGION [Note (1)]	EXAMINATION VOLUME [Note (2)]
Shell (or head) adjoining region	C – D – E – F
Attachment weld region	B – C – F – G
Nozzle cylinder region	A – B – G – H
Nozzle inside corner region	M – N – O – P

NOTES:
(1) Examination regions are identified for the purpose of differentiating the acceptance standards in IWB-3512.
(2) Examination volumes may be determined either by direct measurements on the component or by measurements based on design drawings.

FIG. 2 NOZZLE IN SHELL OR HEAD
(Examination Zones in Flange Type Nozzles Joined by Full Penetration Butt Welds)

4.0 SAFETY EVALUATION - Relief Request SR-035

4.1 Components for which Relief Is Requested

1989 ASME Code Edition, Section XI, Class 1, Examination Category B-A, Code Item No. B1.30, reactor vessel shell-to-flange weld.

4.2 Code Requirements

The 1989 ASME Code Edition, Section XI, Appendix I, Subparagraph I-2110 requires that ultrasonic examination (UT) of reactor vessel shell-to-flange welds be conducted in accordance with Article 4 of ASME Section V, supplemented by the requirements of Table I-2000-1. In addition, Regulatory Guide (RG) 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations," serves as regulatory guidance for the UT examination of reactor pressure vessel (RPV) welds.

4.3 Licensee's Proposed Alternative

The licensee proposed using PDI qualified personnel and procedures to complete the UT of the RPV shell-to-flange weld in accordance with the ASME Code, Section XI, 1995 Edition with the 1996 Addenda, Appendix VIII Supplements 4 and 6 as required by 10 CFR 50.55a(g)(6)(ii)(C), in lieu of Section V, Article 4 requirements.

1. For ultrasonic examination of the reactor vessel shell-to-flange weld conducted from the surface of the vessel shell, the examination procedure(s) shall have been qualified in accordance with the requirements of the 1995 Edition and 1996 Addendum of ASME Section XI, Appendix VIII, Supplements 4 and 6, as amended by the September 1999 revision of 10 CFR 50.55a.

2. For ultrasonic examination of the reactor vessel shell-to-flange weld conducted from the face of the flange, the examination procedure(s) shall meet the requirements of the 1989 edition of ASME Section XI, Examination Category B-A, Pressure-Retaining Welds in Reactor Vessel, Shell-to-Flange Welds, Code Item B1.30, Figure IWB-2500-4 and ASME Section V, 1989 Edition, Article 4, as modified by the requirements of RG 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice inspections."

4.4 Licensee's Basis for Relief

Dominion is currently required to perform inservice examinations of the reactor vessel shell-to-flange weld in accordance with the requirements of 10 CFR 50.55a, plant Technical Specifications, and the 1989 edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components. The Code edition invokes the requirements of Article I of the Section, which in turn invokes the requirements of Section V, Article 4. These requirements are supplemented and modified by the requirements of RG 1.150, Revision 1, dated February 1983. The requirements of the referenced codes and the regulatory guide relative to instrument system performance checks, calibration, near surface examination and surface resolution, beam profiles, scanning-weld metal

interface, sizing, and reporting of results invoke twenty year-old examination methodology.

The ultrasonic examination techniques proposed for this examination have been qualified by demonstration for Appendix VIII, Supplements 4 and 6, of the 1995 Edition, 1996 Addenda, of ASME Section XI by the Performance Demonstration Initiative (PDI) as amended by the September 1999 revision of 10 CFR 50.55a. These requirements of Appendix VIll are performance-based, and the resulting qualified procedures and personnel are more accurate, reliable, and repeatable than the techniques previously used. The use of these qualified techniques further assures that the reactor vessel welds are free of service-related flaws thus enhancing quality and ensuring plant safety and reliability.

4.5 NRC Staff Evaluation

The 1995 Edition with the 1996 Addenda of the ASME Code, Section XI IWA-2232 states, "Ultrasonic examination shall be conducted in accordance with Appendix I." Paragraph I-2110(b) of Appendix I requires that ultrasonic examination of head-to-flange welds in vessels of greater than 2 inches in thickness shall be conducted in accordance with Article 4 of Section V, as supplemented by Table I-2000-1 of this Appendix. In addition, supplements identified in Table I-2000-1 shall be applied. Section V, Article 4 as supplemented by Appendix I provides a prescriptive-based process for qualifying UT procedures. Instead of the ASME Code, Section XI requirements, the licensee proposed to use procedures and personnel qualified in accordance with the performance-based criteria as implemented by the PDI program for the examination of RPVs, Section XI, Appendix VIII, Supplements 4 and 6, when scanning from the vessel shell surface. As for scanning from the flange side, the licensee will still follow the requirements of its current ISI Code of record.

When qualified prescriptive-based UT procedures are applied in a controlled setting containing real flaws in mockups of reactor vessels, and the results are statistically analyzed according to the screening criteria of ASME Code, Section XI, Appendix VIII, the procedures are equal to or less effective than UT that utilizes Appendix VIII, Supplement 4 and 6 qualified procedures. The performance-based UT is performed with higher sensitivity, which increases the chances of detecting a flaw when compared to prescriptive-based Section V, Article 4 requirements. Also, flaw sizing is more accurately determined with the echo-dynamic motion and tip diffraction criteria used by performance-based UT than with the less accurate amplitude criteria for prescriptive-based Section V, Article 4 requirements. Procedures, equipment, and personnel qualified through the PDI program have demonstrated their skill level to detect flaws common to nuclear power plants and have shown high probability of detection levels. This has resulted in an increased reliability of inspections for weld configurations subjected to Appendix VIII.

4.6 Conclusion

The licensee proposed an alternative to use UT procedures and personnel qualified to the 1995 Edition to 1996 Addendum of Section XI of the ASME Code, Appendix VIII, Supplements 4 and 6. Based on its review of the licensee's proposed alternative, as modified by 10 CFR 50.55a(b)(2)(xv) for the RPV shell-to-flange weld, the NRC staff has determined that the proposed alternative examination with PDI-qualified procedures and personnel from the vessel shell surface will provide for a better examination than one using the current ASME Code

requirements or the RG 1.150 recommendations. As such, the NRC staff concludes that the licensee's proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for the subject flange-to-vessel weld at Surry, Unit 2 for the last period of the third 10-year ISI interval.

Principal Contributor: S. Monarque

Date: December 8, 2004

Surry Power Station, Units 1 & 2

cc:

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