

UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555-0001

April 17, 2015

Mr. Mano Nazar President and Chief Nuclear Officer Nuclear Division NextEra Energy P.O. Box 14000 Juno Beach, FL 33408-0420

SUBJECT: ST. LUCIE PLANT, UNIT NO. 2 – RELIEF REQUEST NO. 17 – REQUEST FOR RELIEF FROM PERFORMING INSERVICE INSPECTION VOLUMETRIC EXAMINATIONS OF ASME CATEGORY B-A WELDS (TAC NO. MF4339)

Dear Mr. Nazar:

By letter dated June 30, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14203A047), as supplemented by letters dated August 28, 2014 (ADAMS Accession No. ML14253A182), and October 30, 2014 (ADAMS Accession No. ML14325A690), Florida Power & Light Company (the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at the St. Lucie Plant, Unit No. 2 (SL-2).

Specifically, the licensee requested relief from the examination coverage requirements of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A welds due to the configuration of the welds and/or the presence of permanent attachments. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(5)(iii), the licensee requested relief and to use alternative requirements, if necessary, for inservice inspection items on the basis that the code requirement is impractical.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concluded that the examinations performed, to the extent practical, provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants relief for the subject examinations of reactor pressure vessel (RPV) Intermediate Shell-to-Lower Shell Circumferential Weld (101-171), ASME Code, Section XI, Examination Category B-A, Item B1.11, and RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (101-122A), ASME Code, Section XI, Examination Category B-A, Item B1.12, contained in Relief Request No. 17 for SL-2. This relief applies to the third 10-year interval inservice inspection program, which started on August 8, 2003, and ended on August 7, 2013.

M. Nazar

For ASME Code, Section XI, Item B1.21, for RPV Bottom Head-to-Lower Shell Weld (201-141) and RPV Lower Head Peel Segment Welds (101-154-A through F), Item B1.22, the licensee stated that it did examine essentially 100 percent of the "accessible length" to the extent practical of the subject welds as required by the ASME Code. Therefore, the staff concluded that the licensee met the ASME Code requirements and does not require relief.

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

If you have any questions, please contact Farideh Saba at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

Mare R. Helton

Shana R. Helton, Chief Plant Licensing Branch II-2 Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-389

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via Listserv



UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NO. 17 REGARDING

REACTOR PRESSURE VESSEL SHELL WELDS

FLORIDA POWER AND LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 2

DOCKET NO. 50-389

1.0 INTRODUCTION

By letter dated June 30, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14203A047), as supplemented by letters dated August 28, 2014 (ADAMS Accession No. ML14253A182), and October 30, 2014 (ADAMS Accession No. ML14325A690), Florida Power & Light Company (the licensee) requested relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for the St. Lucie Plant, Unit No. 2 (SL-2) in Relief Request (RR) No. 17, Revision 0 Reactor Pressure Vessel (RPV) Shell Welds, ASME Code Class 1.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(5)(iii), the licensee requested relief and to use alternative requirements (if necessary), for in-service inspection items on the basis that the code requirement is impractical. The licensee requested relief from the examination coverage requirements of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A welds due to the configuration of the welds and/or the presence of permanent attachments.

2.0 REGULATORY EVALUATION

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, 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, which was incorporated by reference in 10 CFR 50.55a(b), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. Title 10 of the *Code of Federal Regulations* Section 50.55a(b), was renumbered Section 50.55a(a)(1)(ii) on November 5, 2014 (*Federal Register* Notice 79 FR 65776). This change was administrative in nature and did not change the requirements of the CFR.

It states in 10 CFR 50.55a(g)(5)(iii), in part, that licensees may determine that conformance with certain code requirements is impractical and that the licensee shall notify the U.S. Nuclear Regulatory Commission (NRC or Commission) and submit information in support of the determination. Determination of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial 120-month inspection interval or subsequent 120-month inspection interval for which relief is sought.

It states in 10 CFR 50.55a(g)(6)(i) that the Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Regulatory Guide (RG) 1.147 lists the ASME Section XI Code Cases that have been determined by the NRC to be acceptable alternatives to applicable parts of Section XI of the ASME Code. This RG has been incorporated by reference into 10 CFR 50.55a, *Codes and Standards*. Licensees may use these Code Cases without requesting authorization from the NRC, provided that they are used with any identified conditions.

ASME Code Case N-648-1, "Alternative Requirements for Inner Radius Examinations of Class 1 Reactor Vessel Nozzles, Section XI, Division 1," was approved for general use in RG 1.147, Revision 16, with conditions. ASME Code Case N-648-1 allows for a VT-1 visual examination of the surface M-N shown in ASME Code, Section XI, Figures IWB-2500-7 (a) through (d) in the 1998 Edition that may be performed in lieu of volumetric examination required by Table IWB-2500-1, Examination Category B-D, Item No. B3.100, for inservice examination of reactor vessel nozzles, other than boiling water reactor feedwater nozzles and operational control rod drive return line nozzles.

The RG 1.147, Revision 16, Conditions for Use for ASME Code Case N-648-1 state:

In place of a UT [ultrasonic] examination, licensees may perform a visual examination with enhanced magnification that has a resolution sensitivity to detect a 1-mil width wire or crack, utilizing the allowable flaw length criteria of Table IWB-3512-1 with limiting assumptions on the flaw aspect ratio. The provisions of Table IWB-2500-1, Examination Category B-D, continue to apply except that, in place of examination volumes, the surfaces to be examined are the external surfaces shown in the figures applicable to this table (the external surface is from point M to point N in the figure).

Title 10 of CFR 50.55a(b)(2)(ix)(F) states that VT-1 and VT-3 examinations must be conducted in accordance with IWA–2200. Personnel conducting examinations in accordance with the VT-1 or VT-3 examination methods shall be qualified in accordance with IWA–2300. The

"owner-defined" personnel qualification provisions in IWE–2330(a) for personnel that conduct VT-1 and VT-3 examinations are not approved for use.

The licensee has requested relief from ASME Code requirements pursuant to 10 CFR 50.55a(g)(5)(iii). The ASME Code of record for the third 10-year interval inservice inspection program, which started on August 8, 2003, and ended on August 7, 2013, is the 1998 Edition, through the 2000 Addenda, of Section XI of the ASME Code. Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request, and the Commission to grant, the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the requests for relief from ASME Code requirements has been evaluated, and the bases for disposition are documented below.

3.1 Relief Request No. 17, Revision 0, ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A, Items B.1.10, B1.11, B1.12, B1.20, B1.21, and B1.22, Figures IWB-2500-1, IWB-2500-2, and IWB-2500-3

ASME Code Components Affected

- 1. RPV Intermediate Shell-to-Lower Shell Circumferential Weld (101-171) ASME Code, Section XI, Examination Category B-A, Item B1.11.
- 2. RPV Circumferential Bottom Head-to-Lower Shell Weld (201-141) ASME Code, Section XI, Examination Category B-A, Item B1.21.
- 3. RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (101-122A) ASME Code, Section XI, Examination Category B-A, Item B1.12.
- 4. RPV Lower Head Peel Segment Welds (101-154-A through F) ASME Code, Section XI, Examination Category B-A, Item B1.22.

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ASME Code, Section XI, Category B-A							
SME Code Component	Component ID	Applicable Code Requirement and Weld Volume Coverage Obtained	Angle(s)/Wave Mode		Impracticality of Compliance		
			Inner 15% T	Outer 85% T			
RPV Intermediate Shell-to- Lower Shell Circumferential Weld	101- 171	Exam Category B-A Item No. B1.11 83% volume coverage	45L 70L	45L 45S	Inservice examination limited due to six surveillance capsule holders.		
RPV Circumferential Bottom Head-to-Lower Shell Weld	201-141	Exam Category B-A Item No. B1.21 71% volume coverage	45L 70L	45L 45S	Inservice examination limited due to the proximity of the core barrel stabilizers and core lugs.		
RPV Upper Shell Longitudinal Seam Weld at 15 Degrees	101-1 22A	Exam Category B-A Item No. B1.12 63% volume coverage	45L 70L	45L 45S	Inservice examination limited due to the outlet nozzle at zero degrees integral extension		
RPV Lower Head Peel Segment Welds	101-154- A,C,E	Exam Category B-A Item No. B1.22 53% volume coverage	45L 70L	45L 45S	Inservice examination limited due to the proximity of the flow baffle.		
RPV Lower Head Peel Segment Welds	101-154- B,D,F	Exam Category B-A Item No. B1.22 43% volume coverage	45L 70L	45L 45S	Inservice examination limited due to the proximity of the flow baffle & core lug.		

ASME Code Requirement

The ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A, Items B.1.10, B1.11, B1.12, B1.20, B1.21, and B1.22, Figures IWB-2500-1, IWB-2500-2, and IWB-2500-3 require a volumetric examination of essentially 100 percent of the pressure retaining welds in the RPV. ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," was approved for use by the NRC in RG 1.147, Revision 16, "Inservice Inspection Code Case Acceptability." This RG states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable, provided that the reduction is less than 10 percent (i.e., greater than 90 percent examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the ASME Code-required volumetric examination of the SL-2 welds listed in Table 1 above.

Licensee's Basis for Relief Request

The licensee's basis for requesting relief is due to the configuration of the reactor vessel, which makes it impractical to meet the examination coverage requirements of the ASME Code, Section XI, 1998 Edition with Addenda through 2000, as clarified by Code Case N-460. The licensee requested relief for the third 10-year inservice inspection interval in accordance with 10 CFR 50.55a(g)(5)(iii).

The licensee stated that the welds listed above did not receive the required code volumetric coverage due to the configuration of the weld and/or the presence of permanent attachments. These limitations prohibit the essentially 100 percent ultrasonic examination coverage of the required examination volume.

The licensee stated that for the RPV Intermediate Shell-to-Lower Shell Circumferential Weld (101-171), Examination Category B-A, Item B1.11, RPV Circumferential Bottom Head-to-Lower Shell Weld (201-141), Examination Category B-A, Item B1.21, RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (101-122A), Examination Category B-A, Item B1.12, and RPV Lower Head Peel Segment Welds (101-154-A through F), Examination Category B-A, Item B1.22, the examination of the Figure IWB-2500-2 A-B-C-D volume was limited. These weld volumes were limited due to factors such as the location of surveillance capsule holders, proximity to the Core Barrel Stabilizers and the Core Lugs, the outlet nozzle at zero degrees integral extension, and the limited access behind the flow baffle. The examination volumes for the welds were restricted by between approximately 17-57 percent.

The licensee stated that for each weld listed above, the remaining volume was examined with techniques that have been qualified by demonstration in accordance with Supplements 4 and 6 of the 1998 Edition with Addenda through 2000 of the ASME Code, Section XI, Appendix VIII, using the Performance Demonstration Initiative (PDI) Protocol. The welds were examined from both sides of the weld, scanning both parallel and perpendicular to the weld. The ultrasonic examinations did not reveal any recordable or reportable flaws in accordance with the ASME Code, Section XI, 1998 Edition with Addenda through 2000.

As noted above, the licensee stated that the welds were examined to the maximum extent possible. The licensee also stated that it would not be possible to remove the permanent obstructions in order to increase weld examination coverage without significant work, increased radiation exposure, and/or damage to the plant.

The licensee has proposed the following alternatives (as stated in part) as well as the basis for their use:

- Periodic system pressure tests in accordance with ASME Code, Section XI, Category B-P, Table IWB-2500-1.
- 2. Conduct ultrasonic examinations to the maximum extent possible.

Licensee's Basis for Use of Proposed Alternatives

The licensee stated that mechanized ultrasonic examinations of the RPV were performed during the 2012 (SL-2-20) refueling outage. The mechanized techniques used to examine the RPV have been demonstrated in accordance with Supplements 4 and 6 of the 1998 Edition with Addenda through 2000 of the ASME Code, Section XI, Appendix VIII, using the PDI Protocol. The ultrasonic techniques for each weld have been reviewed to determine if additional coverage of the weld could be achieved. It was determined that additional access was not possible.

The licensee also stated that visual examinations were performed on the interior of the RPV in accordance with Table IWB-2500-1, Examination Categories B-N-1, B-N-2, and B-N-3. Examination Category B-D nozzle inner radius examinations were also performed in accordance with ASME Code Case N-648-1, as amended by 10 CFR 50.55a. The visual examinations revealed no indications except for acceptable visual indications at the top of the material surveillance capsule holders at the 83 and 97 degree azimuths.

The licensee stated that no reportable flaws were identified during the second interval examination. The extent of examination volume achieved ultrasonically, the alternate scans performed, and the system pressure tests provide additional assurance of an acceptable level of quality and safety.

3.2 NRC Staff Evaluation

<u>RPV Intermediate Shell-to-Lower Shell Circumferential Weld (101-171) ASME Code, Section XI,</u> Examination Category B-A, Item B1.11

The ASME Code requires essentially 100 percent volumetric examination of the entire length of RPV circumferential and longitudinal shell welds. However, for the subject welds at SL-2, complete examinations are restricted due to the six surveillance capsule holders. The RPV would require design modifications to increase the amount of weld volume that can be inspected. Imposing this requirement would place a burden on the licensee.

The licensee noted that access is restricted by 17 percent and that the remaining examination volume was examined with techniques that have been qualified by demonstration in accordance with Supplements 4 and 6 of the 1998 Edition with Addenda through 2000 of the ASME Code, Section XI, Appendix VIII, using the PDI Protocol. The subject weld was examined from both sides, scanning both parallel and perpendicular with the inner 15 percent of the thickness of the subject weld being examined using 45 degree longitudinal and 70 degree longitudinal scans and the outer 85 percent of the thickness using 45 degree longitudinal and 45 shear scans. The licensee obtained 83 percent coverage of the weld. The licensee's examinations did not reveal any recordable or reportable flaws in accordance with the ASME Code, Section XI.

The staff has determined that based on the information and figures provided by the licensee that it is impractical for the licensee to meet the ASME Code-required volumetric examination coverage for the RPV Intermediate Shell-to-Lower Shell Circumferential Weld (101-171) due to the design and proximity of RPV internal fixtures. However, based on the examination volumes that were obtained, along with the full examination of other pressure-retaining RPV welds, the

staff concludes that if significant service-induced degradation had occurred, evidence of it would have been detected by the other examinations that the licensee performed.

The staff notes that in addition to the required ultrasonic examinations above, the licensee performed VT-1 and VT-3 visual examinations of the interior of the reactor vessel, including welded attachments, in accordance with ASME Code, Section XI, Table IWB-2500-1, Examination Categories B-N-1, B-N-2, and B-N-3. The licensee also performed VT-1 visual examinations for ASME Code, Section XI, Examination Category B-D nozzle inner radius examinations, in accordance with ASME Code Case N-648-1, as amended by 10 CFR 50.55a. The licensee, with the exception of acceptable visual indications identified at the top of the material surveillance capsule holders at the 83 and 97 degree azimuths, found no indications. The staff determined that, based on the volumetric and visual examinations performed to the extent practical on the subject RPV welds, reasonable assurance of structural integrity of the subject welds is provided.

<u>RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (Weld 101-122A) Examination</u> Category B-A, Item B1.12

The ASME Code, Section XI for the RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (Weld 101-122A) Examination Category B-A, Item B1.12 requires a volumetric examination of essentially 100 percent of the weld length for Weld 101-122A. The examination of the subject weld was limited due to the outlet nozzle at zero degrees integral extension. The licensee noted that access to approximately 37 percent of the examination volume was restricted. The accessible volume was examined with techniques that have been qualified by demonstration in accordance with Supplements 4 and 6 of the 1998 Edition with Addenda through 2000 of the ASME Code Section XI, Appendix VIII, using the PDI methodology. The subject weld was examined from both sides of the subject weld being examined using 45 degree longitudinal and 70 degree longitudinal scans and the outer 85 percent of the thickness using 45 degree longitudinal and 45 shear scans. The licensee obtained 63 percent coverage of the weld. The licensee's examinations did not reveal any recordable or reportable flaws in accordance with the ASME Code, Section XI.

The staff has determined based on the information and figures provided by the licensee, that the licensee has shown for Upper Shell Longitudinal Seam Weld 101-122A it is impractical to meet the ASME Code-required volumetric examination coverage for the subject welds due to the design and an outlet nozzle at zero degrees integral extension. However, based on the examination volumes that were obtained, along with the full examination of other pressure retaining RPV welds, the staff concludes that if significant service-induced degradation had occurred, evidence of it would have been detected by the examinations that were performed.

The staff notes that in addition to the required ultrasonic examinations above, the licensee performed VT-1 and VT-3 visual examinations of the interior of the reactor vessel, including welded attachments, in accordance with ASME Code, Section XI, Table IWB-2500-1, Examination Categories B-N-1, B-N-2, and B-N-3. The licensee also performed VT-1 visual examinations for ASME Code, Section XI, Examination Category B-D nozzle inner radius, in accordance with ASME Code Case N-648-1, as amended by 10 CFR 50.55a. With the exception of acceptable visual indications identified at the top of the material surveillance

capsule holders at the 83 and 97 degree azimuths, the licensee found no indications. The staff determined that based on the volumetric and visual examinations performed to the extent practical on the subject RPV welds, reasonable assurance of structural integrity of the subject welds is provided.

<u>RPV Circumferential Bottom Head-to-Lower Shell Weld (201-141) ASME Code Section XI,</u> <u>Examination Category B-A, Item B1.21 and RPV Lower Head Peel Segment Welds</u> (101-154-A through F) Examination Category B-A, Item B1.22

ASME Code, Section XI, Item B1.21, for RPV Bottom Head-to-Lower Shell Weld (201-141) and RPV Lower Head Peel Segment Welds (101-154-A through F), Item B1.22, requires that these welds are subject to essentially 100 percent volumetric examination of the "accessible length" of the welds. The ASME Code Committees recognize the limitations of examining these welds and specifically stated in this particular ASME Code requirement to examine the "accessible length" of the welds. The licensee stated in its request for additional information response dated October 30, 2014, that it did examine the "accessible length" of the subject welds to the extent practical. Therefore, the staff concluded that the licensee met the ASME Code requirements and does not require relief from the ASME Code requirements.

4.0 <u>CONCLUSION</u>

As set forth above, the staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law, and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concluded that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants relief for the subject examinations of RPV Intermediate Shell-to-Lower Shell Circumferential Weld (101-171), ASME Code, Section XI, Examination Category B-A, Item B1.11, and RPV Upper Shell Longitudinal Seam Weld at 15 Degrees (101-122A) ASME Code, Section XI, Examination Category B-A, Item B1.12, contained in RR No. 17 for SL-2. This relief applies to the third 10-year interval inservice inspection program, which started on August 8, 2003, and ended on August 7, 2013.

For ASME Code, Section XI, Item B1.21, for RPV Bottom Head-to-Lower Shell Weld (201-141) and RPV Lower Head Peel Segment Welds (101-154-A through F), Item B1.22, the licensee stated that it did examine essentially 100 percent of the "accessible length" to the extent practical of the subject welds as required by the ASME Code. Therefore, the staff concluded that the licensee met the ASME Code requirements and does not require relief.

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

Principal Contributor: Thomas McLellan

Date: April 17, 2015

M. Nazar

For ASME Code, Section XI, Item B1.21, for RPV Bottom Head-to-Lower Shell Weld (201-141) and RPV Lower Head Peel Segment Welds (101-154-A through F), Item B1.22, the licensee stated that it did examine essentially 100 percent of the "accessible length" to the extent practical of the subject welds as required by the ASME Code. Therefore, the staff concluded that the licensee met the ASME Code requirements and does not require relief.

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

If you have any questions, please contact Farideh Saba at 301-415-1447 or Farideh.Saba@nrc.gov.

Sincerely,

/RA/

Shana R. Helton, Chief Plant Licensing Branch II-2 Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Docket No. 50-389

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