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

August 28, 2012

Mr. Kevin D. Richards
President and Chief Executive Officer/
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 – REQUEST FOR RELIEF RR-ENG-3-06 FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE SECTION XI TABLE 1WB-2500-1 LEAK TESTING BOUNDARIES FOR CLASS 1 PRESSURE-RETAINING COMPONENTS (TAC NOS. ME7053 AND ME7054)

Dear Mr. Richards:

By letter dated August 31, 2011 (Agencywide Document Access and Management System (ADAMS) Accession No. ML11250A169), as supplemented by letters dated April 10 and May 2, 2012 (ADAMS Accession Nos. ML12108A007 and ML121350102, respectively), STP Nuclear Operating Company (the licensee) submitted for U.S. Nuclear Regulatory Commission (NRC) review and approval Relief Request RR-ENG-3-06 for South Texas Project (STP), Units 1 and 2. The licensee requested relief from the requirements of Table IWB-2500-1 of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for examination of Class 1 pressure-retaining components for the third 10-year inspection interval pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(i) for Component Group 2 and 10 CFR 50.50.55a(a)(3)(ii) for Component Groups 1, 3, 4, and 5. Approval of the relief request will exempt Class 1 components from being tested at full reactor coolant pressure, if they are normally isolated from the full reactor coolant system (RCS) pressure.

The NRC staff has completed the review and concluded that the proposed alternatives provide reasonable assurance of structural integrity and leak tightness, and that complying with the specified ASME Code, Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii).

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

If you have any questions, please contact Balwant K. Singal at 301-415-3016 or by e-mail at Balwant.Singal@nrc.gov.

Sincerely,

CFlynn for

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure:
As stated

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF NO. RR-ENG-3-06

RELIEF FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESEEL CODE, SECTION XI REQUIREMENTS

FOR LEAK TESTING BOUNDARIES OF CLASS 1 PRESSURE RETAINING COMPONENTS

STP NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

By letter dated August 31, 2011 (Agencywide Document Access and Management System (ADAMS) Accession No. ML11250A169), as supplemented by letters dated April 10 and May 2, 2012 (ADAMS Accession Nos. ML12108A007 and ML121350102, respectively), STP Nuclear Operating Company (the licensee) submitted for U.S. Nuclear Regulatory Commission (NRC) review and approval Relief Request RR-ENG-3-06 for South Texas Project (STP), Units 1 and 2. Letter dated May 2, 2012 re-transmitted the letter dated April 10, 2012, to correct the distribution, but there was no change to the information provided by letter dated April 10, 2012. The licensee requested relief from the requirements of Table IWB-2500-1 of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for examination of Class 1 pressure-retaining components for the third 10-year inservice inspection (ISI) interval pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(i) for Component Group 2 and 10 CFR 50.50.55a(a)(3)(ii) for Component Groups 1, 3, 4, and 5. Approval of the relief request will exempt Class 1 components from being tested at full reactor coolant pressure if they are normally isolated from the full reactor coolant system (RCS) pressure.

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 design and access provisions and 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 inspection (ISI) 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) 12-months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

It states, in part, in 10 CFR 50.55a(a)(3), that alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the Director, Office of the Nuclear Reactor Regulation, if an applicant or 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.

Based on the above analysis, the NRC staff finds that regulatory authority exists to authorize an alternative to the ASME Code requirements, as requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Applicable Code Edition and Addenda

The ISI Code of Record for the third 10-year inspection interval of STP, Units 1 and 2 is the 2004 Edition of the ASME Code, Section XI, no addenda. The third 10-year ISI interval for Unit 1 began on September 25, 2010 and ends on September 24, 2020, and for Unit 2 it began on October 19, 2010, and ends on October 18, 2020.

3.2 System/Components(s) for Which Relief is Requested

ASME Code Section XI, Table IWB-2500-1, Examination Category B-P, Item Number B15.10, Class 1 pressure-retaining components.

3.3 Applicable Code Requirement

The 2004 Edition of ASME Code Section XI, Table IWB-2500-1, Examination Category B-P, Item Number B15.10 requires performance of visual examination, VT-2, for Class 1 pressure-retaining components prior to plant startup following each reactor refueling outage. The required system pressure test may be a system leakage test. Pursuant to IWB-5221(a), a system leakage test is performed at a pressure not less than the pressure corresponding to 100% rated reactor power.

Per IWB-5222(a), the pressure-retaining boundary during the system leakage test shall correspond to the reactor coolant boundary, with all valves in the position required for normal reactor operation startup. The visual examination shall, however, extend to and include the second closed valve at the boundary extremity.

Per IWB-5222(b), the pressure-retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure-retaining components within the system boundary. Hence, IWB-5222(b) requires that portions of the

Class 1 system not normally pressurized to the RCS pressure associated with 100% rated reactor power be pressurized to that pressure for the purposes of the test.

3.4 Basis for Relief (as stated)

Component Group 1: Small bore (≤ 2" NPS [nominal pipe size]) piping vents, drains, and branch lines and connections in the Reactor Coolant and Reactor Head Vent Systems

These lines and connections are equipped with manual valves (or manually actuated motor-operated valves) providing double isolation of the reactor coolant pressure boundary. These valves are generally maintained closed during normal operation. Piping outboard of the first isolation valve is not normally pressurized to the RCS pressure (2235 psig [pounds per square inch gauge]) associated with 100% rated reactor power. Under normal operating conditions, these lines and connections are subject to RCS pressure and temperature only if there is leakage past the inboard isolation valves.

Because these lines and connections typically do not have test connections that would allow them to be individually pressure-tested without design modifications, the inboard valves must be opened to pressurize these lines and connections to full RCS operating pressure to perform the IWB-5222(b) system pressure test. Pressurization by this method defeats the double isolation feature and presents significant personnel safety concerns for personnel performing the test.

Performing this test with the inboard isolation valve open requires several man-hours to position and cycle these valves for the test and restore the valves after the test is complete. Most of these valves are located in close proximity to RCS loop piping; pressure-testing requires personnel entry into high radiation areas. Based on previous outage dose rate data, estimated radiation exposure associated with scaffold erection and valve alignment and realignment would result in an additional 16 person-rem. Typical personnel dose during a refueling outage at STP is 70 person-rem. An additional 16 person-rem would be a substantial increase.

Component Group 2: Accumulator Injection to RCS Cold Legs A, B and C

The pipe segments of Group 2 are part of the Safety Injection System and Residual Heat Removal System and are continuously pressurized to 650 psig because they are in the injection flow path from the safety injection accumulator tanks. Under normal operating conditions, these lines and connections are subject to RCS operating pressure and temperature only if there is leakage past the inboard check valves.

Performing the IWB-5222(b) system pressure test on these segments requires installation of a pump to pressurize the pipe segment between inboard and outboard check valves to RCS operating pressure. Such pressurization may result in over-pressurization of the adjoining systems. Use of a hydrostatic pump for pressurization creates personnel safety hazards and is expected to result in an estimated additional 0.2 person-rem.

Component Group 3: RCS Hot Leg Safety Injection Flowpath

The pipe segments of Group 3 are in Safety Injection System and Residual Heat Removal System piping between check valves and are not normally pressurized to RCS operating pressure (2235 psig). Under normal operating conditions, these lines and connections are subject to RCS operating pressure and temperature only if there is leakage past the inboard check valves.

Pressurizing these segments to perform the IWB-5222(b) system pressure test requires connecting jumpers from the RCS to circumvent the inboard check valves. Such pressurization may over-pressurize the adjoining systems. This activity represents a significant personnel safety hazard and is expected to result in an estimated additional 0.2 person-rem.

Component Group 4: Residual Heat Removal (RHR) Suction

The pipe segments in Group 4 are part of the RHR system. Pressurizing these segments to full plant operating pressure to perform the IWB-5222(b) system pressure test requires opening isolation valves XRH0060A ("A" train), XRH0060B ("B" train), and XRH0060C ("C" train). These isolation valves are required to be closed when the plant is in Mode 1, 2, or 3, and are interlocked to prevent opening when the RHR system could be exposed to RCS pressure exceeding its design pressure. Under normal operating conditions, these lines and connections are subject to RCS operating pressure and temperature only if there is leakage past the inboard isolation valves. In addition, this test would leave only one isolation valve (XRH0061) as protection for the Residual Heat Removal system from damage that would result from exposure to the equivalent of RCS operating pressure.

To test when not in Mode 1, 2, or 3, temporary high pressure hoses with a hydrostatic pump would have to be installed to pressurize these segments, introducing a personnel safety hazard if the connection or hose fails, and could over-pressurize the RHR system if the outboard valve does not provide isolation.

Component Group 5:

Charging and Alternate Charging

Charging and alternate charging are provided from a common header. Service alternates between them annually.

Charging pipe segments (between upstream check valves) are pressurized when the piping is in service, which is required when reactor coolant system letdown is required. If letdown is in service, charging must continue for removal of letdown flow heat. Isolation check valves (XCV0001 / XCV0004) open when the differential pressure between the charging system and the operating reactor coolant system exceeds 200 psi. The IWB-5222(b) system pressure test requires that charging be made unavailable so that RCS equivalent pressure can be sustained for the test. Letdown would not be available during the test so that RCS pressure remains high enough to ensure that the isolation check valve does not open and initiate charging.

Alternate charging pipe segments are isolated from the operating side by a motor-operated isolation valve (MOV0003 / MOV0026). Pressurizing a segment to perform the IWB-5222(b) system pressure test requires draining the pipe segment between the outboard check valve (XCV0002 / XCV0005) and the closed upstream isolation valve. Under normal operating conditions, a segment is subject to RCS operating pressure and temperature only if there is leakage past the inboard check valve.

Auxiliary Pressurizer Spray

These pipe segments are part of the auxiliary pressurizer spray system, which is not normally pressurized. Pressurizing a segment to perform the IWB-5222(b) system pressure test requires opening normally closed upstream isolation valve CV3119. Under normal operating conditions, a segment is subject to RCS operating pressure and temperature only if there is leakage past inboard check valve CV0009.

Water in this line is supplied from the charging system with an operating pressure greater than the RCS normal operating pressure. Opening LV3119 allows water in the auxiliary pressurizer spray line, which is at containment ambient temperature, to pass through check valve CV0009 into the main spray header and through the spray nozzle to cool the pressurizer. Performing the test with the RCS at normal operating temperature would create a thermal shock transient to the spray nozzle.

3.5 Proposed Alternative (as stated)

Pressurization of components above their normal operating temperature and pressure during the VT-2 visual examination to detect leakage is not necessary. Where piping is provided with two isolation valves, the plant is intended to operate with the first isolation valve closed and the second isolation valve utilized only for draining or venting. Piping between two isolation valves during normal operating pressure and temperature is normally pressurized, but at a pressure lower than that of the RCS.

IWB-5222(b) requires that the pressure-retaining boundary during the system leakage test conducted at or near the end of the interval extend to all Class 1 pressure-retaining components within the system boundary. Normal operating temperature and pressure conditions are used during VT-2 examinations to detect leaks during a system leakage test. The pressure boundary integrity of these components is validated and documented using identical VT-2 visual examination requirements each refueling outage. The requested relief will apply VT-2 inspections of the Class 1 boundary beyond the first isolation valves while it is at a stabilized pressure achieved while at normal operating conditions.

STPNOC [STP Nuclear Operating Company] performs other surveillance procedures (i.e., Local Leakage Rate Tests) to determine leakage for these components. Examination for leakage is performed while under normal operating temperature and pressure conditions. In addition to leakage testing, boric acid inspections performed during refueling outages will also identify leakage from these components. The system leakage test as an alternative to the hydrostatic test is in addition to these surveillances.

Under this relief, the pressure-retaining boundary during the leakage test conducted at or near the end of the interval corresponds to the reactor coolant system boundary, with all valves in the normal position required for normal reactor startup and operation.

Component Group 1: Small bore (≤ 2" NPS) piping vents, drains, and branch lines and connections in the Reactor Coolant and Reactor Head Vent Systems

As an alternative to the IWB-5222(b) system pressure test requirements, this request proposes an ASME Code Section XI, Table IWB-2500-1 and IWB-5221 system leakage test with isolation valves in the normally closed position. This examination will be performed at the nominal operating pressure associated with 100% reactor power after the ASME Code required hold time is satisfied.

Component Group 2: Accumulator Injection to RCS Cold Legs A, B and C

As an alternative to the pressure test requirements of IWB-5222(b) for these pipe segments, STPNOC will use the pressure associated with the statically pressurized Safety Injection system.

ASME Code Case N-731, "Alternative Class 1 System Leakage Test Pressure Requirements Section XI, Division 1," addresses use of alternative Class 1 system leakage test pressure requirements in lieu of IWB-5221(a) for portions of Class 1 systems that are continuously pressurized during an operating cycle by a statically pressurized passive safety injection system. ASME approved Code Case N-731 on February 22, 2005. The NRC approved Code Case N-731 for use in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 16 (July 2010).

Component Group 3: RCS Hot Leg Safety Injection Flowpath

As an alternative to the IWB-5222(b) system pressure test for these pipe segments, STPNOC proposes to perform this test using a reduced test pressure during the full flow check valve tests of these segments with the RCS depressurized during a refueling outage.

Component Group 4: Residual Heat Removal Suction

As an alternative to the IWB-5222(b) system pressure test requirements for these pipe segments, STPNOC proposes to perform this test using a reduced test pressure prior to valve closure, isolating these segments in the normal preparation for mode change during startup.

Component Group 5: Charging and Alternate Charging and Auxiliary Pressurizer Spray

The temperatures and pressures present in Class 1 components during 100% reactor power are sufficient to qualify as a System Pressure Test alternative to the 10-year Hydrostatic Test to satisfy Code Case N-498-4. Normal operating temperature and pressure are used to detect leaks under the Alternative Rules for 10-year Hydrostatic Pressure Testing.

STPNOC performs other surveillance procedures (i.e., Local Leakage Rate Tests, Contaminated Leakage Rate Tests, Isolation Check Valve Leak Tests, and Inservice Leak Rate Tests) to monitor these components for leakage. Leakage is identified using normal operating temperature and pressure conditions. In addition to leakage testing, boric acid inspections performed during refueling outages will also identify leakage from these components. The system leakage test as an alternative to the hydrostatic test of the components identified by this request is in addition to these surveillances.

As an alternative to the IWB-5222(b) system pressure test requirements, STPNOC proposes to perform the test of the auxiliary pressurizer spray at a reduced pressure when pressurizer spray is initiated for normal plant cool down in accordance with plant operating procedures. Similarly, the alternate charging line segments will be pressure-tested in conjunction with plant procedures when alternate charging is placed in service.

3.2 NRC Staff Evaluation

Component Group 1: Small bore (≤ 2" NPS) piping vents, drains, and branch lines and connections in the Reactor Coolant and Reactor Head Vent Systems

Group 1 segments are lines and connections equipped with either manual valves or manually actuated motor-operated valves providing double isolation of the RCS. The licensee has stated that the Component Group 1 lines and connections do not have test connections, they cannot be individually pressure-tested without plant modifications and pressurization of these lines and connections would require an inboard valve to be opened, removing the double isolation feature, which will be a safety hazard for plant personnel.

However, the non-isolable portion of the RCS boundary lines and connections will be pressurized and visual VT-2 examination will be performed, as required. While isolable small diameter lines and connections will not be pressurized to full RCS pressure, a visual VT-2 examination will still be performed on these components.

The licensee has further stated that these lines and connections are typically socket welded followed by a surface examination and are normally heavy walled by design. Also, these lines and connections are not subject to high or cyclic loads and no known degradation of the subject welds has been experienced at STP, Units 1 and 2. Also, the plant personnel will potentially be exposed to significant radiation exposure, if the test is performed by opening and restoring the inboard isolation valves. Based on the proposed alternative and considering the hazards to personnel safety and radiation exposure, the NRC staff concludes that the licensee has provided justification of hardship without a sufficient compensating increase in quality and safety and the proposed alternative is acceptable.

Component Group 2: Accumulator Injection to RCS Cold Legs A, B and C

The licensee is requesting the use of ASME Code Case N-731, "Alternative Class 1 System Leakage Test Pressure Requirements Section, XI, Division 1," dated February 22, 2005, which addresses use of alternative Class 1 system leakage test pressures for Class 1 systems that are continuously pressurized, in lieu of requirements of IWB-5221(a). The pressure test requires installation of a pump to pressurize the segment to be tested to RCS operating pressure and has the potential of overpressurizing adjoining components. It will also be a personnel safety hazard and can potentially result in increased personnel radiation exposure.

The NRC approved the use of Code Case N-731 in Regulatory Guide 1.147, Revision 16 (ADAMS Accession No. ML101800536).

The NRC staff concludes that the licensee has provided justification of hardship without a sufficient compensating increase in quality and safety and the proposed alternative for use of Code Case N-731 is acceptable.

Component Group 3: RCS Hot Leg Safety Injection Flowpath

As stated by the licensee, pressurizing a Group 3 segments to meet the IWB-5222(b) system pressure test requirements requires connecting a high pressure hose circumventing the inboard check valve boundaries from the RCS. This will also be a personnel safety hazard and could potentially result in increased personnel radiation exposure. In addition, such a test would leave only one check valve as protection for the RHR system from damage that would result from over pressurization of RCS operating pressure. As an alternative to the IWB-5222(b) system pressure test for these pipe segments, the licensee proposes to perform this test using a reduced test pressure during the full flow check valve tests of these segments with the RCS depressurized during a refueling outage. No known degradation of the subject piping has been experienced at STP, Units 1 and 2. Based on the proposed alternative and considering the hazards to personnel safety and radiation exposure, the NRC staff concludes that the licensee has provided justification of hardship without a sufficient compensating increase in quality and safety and the proposed alternative is acceptable.

Component Group 4: RHR Suction

Group 4 piping segments are in the RHR system and are not pressurized to RCS pressure during normal plant operation. Pressurizing these segments to meet system pressure test requirements requires that an isolation valve be opened. These isolation valves are required to be closed when a plant is in operation. An alternative of installing temporary high pressure hoses with a hydrostatic pump to pressurize these segments would result in an increased personnel safety risk if the connection or hose were to fail and potential for increase radiation exposure. As an alternative to the IWB-5222(b) system pressure test requirements for these pipe segments, the licensee proposes to perform this test using a reduced test pressure prior to valve closure, isolating these segments in the normal preparation for mode change during startup. Also, no known degradation of the subject welds has been experienced at STP, Units 1 and 2. Based on the proposed alternative and considering the hazards to personnel safety, the NRC staff concludes that the licensee has provided justification of hardship without a sufficient compensating increase in quality and safety and the proposed alternative is acceptable.

Component Group 5: Charging and Alternate Charging and Auxiliary Pressurizer Spray

As described by the licensee, charging pipe segments are pressurized when the piping is in service, which is required when reactor coolant letdown is required. If letdown is in service, charging must continue to remove letdown flow heat. Isolation check valves open when the charging system differential pressure exceeds 200 psi above the RCS operating pressure. Performing the IWB-5222(b) pressure test would, therefore, make charging and letdown unavailable. Under normal operating conditions, a segment is subject to RCS operating pressure and temperature only if there is leakage past the inboard check valve.

For the auxiliary pressurizer spray, pressurizing these segments to system pressure test would require that a normally closed upstream isolation valve be opened, allowing water in the

auxiliary pressurizer spray line and to pass through a check valve into the main spray header and through the spray nozzle into the pressurizer. With the RCS at normal operating temperature, this would create a thermal shock transient to the spray nozzle. Similarly, pressurizing the alternative charging line would result in unnecessary thermal shock to piping downstream.

To monitor these components for leakage, the licensee performs one or more of the following surveillance procedures:

- Local Leakage Rate Tests
- Contaminated Leakage Rate Tests
- Isolation Check Valve Leak Tests
- Inservice Leak Rate Tests

Also, the leakage is identified using normal operating temperature and pressure conditions. In addition to leakage testing, boric acid inspections performed during refueling outages will also identify leakage from these components. The system leakage test as an alternative to the hydrostatic test of the components identified by this request is in addition to these surveillances.

As an alternative to the IWB-5222(b) system pressure test, the licensee proposes to perform the test of the auxiliary pressurizer spray at a reduced pressure when pressurizer spray is initiated for normal plant cooldown in accordance with plant operating procedures. Similarly, the alternate charging line segments will be pressure-tested in conjunction with plant procedures when alternate charging is placed in service.

No known degradation of the subject components has been experienced at STP, Units 1 and 2. Based on this and the hazards to personnel safety, the NRC staff concludes that the licensee has provided justification of hardship without a sufficient compensating increase in quality and safety and the proposed alternative is acceptable.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the proposed alternatives provide reasonable assurance of structural integrity and leak tightness, and that complying with the specified ASME Code, Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the NRC staff authorizes the proposed alternatives for South Texas Project, Units 1 and 2 for the duration of the third 10-year ISI interval.

All other requirements of the ASME Code for which relief has not been specifically requested and authorized remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Margaret Audrain

Date: August 28, 2012

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

If you have any questions, please contact Balwant K. Singal at 301-415-3016 or by e-mail at Balwant.Singal@nrc.gov.

Sincerely,

/RA by FLyon for/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

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