



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

July 13, 2012

Mr. William R. Gideon, Vice President  
Carolina Power & Light Company  
H. B. Robinson Steam Electric Plant,  
3581 West Entrance Road  
Hartsville, South Carolina 29550

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 – RELIEF  
REQUEST-4 FOR THE FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION  
PROGRAM PLAN (TAC NO. ME8255)

Dear Mr. Gideon:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 14, 2012 (Agencywide Documents Access and Management System Accession No. ML12082A009), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, Inc., submitted Relief Request-4, for the Inservice Inspection (ISI) Program Plan for the fifth 10-year interval for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP).

The licensee requested approval to use a proposed alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," for Class 1 pressure test boundaries subject to system pressurization at HBRSEP. Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(ii), the licensee requested to use proposed alternatives on the basis that the alternatives provide an acceptable level of quality and safety.

The fourth 10-year interval in HBRSEP began on February 19, 2002, and was scheduled to end on February 18, 2012. As allowed by ASME Section XI, IWA-2430(d)1 the licensee extended the fourth 10-year interval through July 20, 2012, to complete the refueling outage-27 which was postponed to January 18, 2012. The duration of proposed alternative is for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

As discussed with the licensee on July 9, 2012, the NRC staff is concerned with the amount of information provided in the submittal that required revision after review by and questions from the NRC staff, and your request for multiple concurrent reviews with a short review timeframe. The uncharacteristic inattention to detail observed in the submittal resulted in the need to focus limited resources to address mostly administrative issues. Additional attention to ensure a high quality submittal would allow for a more efficient use of review resources, and better ability of the NRC staff to accommodate requests for a shortened review timeframe.

The details of the NRC staff review are included in the enclosed safety evaluation. The NRC staff determines that complying with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The NRC staff concludes that the licensee proposed alternative provides reasonable assurance of structural integrity or leak tightness of the subject components and is in compliance with the ASME Code requirements.

W. Gideon

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Therefore, the licensee's proposed alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(ii) for the fifth 10-year ISI interval at HBRSEP, which begins on July 21, 2012, and ends on February 18, 2022.

Sincerely,

***/RA by Eva Brown for/***

Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON THE FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

RELIEF REQUEST-4

CAROLINA POWER & LIGHT COMPANY

H.B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 14, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12082A009), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, Inc., submitted Relief Request (RR)-4, for the Inservice Inspection (ISI) Program Plan for the fifth 10-year interval for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP).

The licensee requested approval to use a proposed alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Category B-P, Item Number B15.20 and IWB-5222(b) for Class 1 pressure test boundaries subject to system pressurization at HBRSEP.

The fourth 10-year interval in HBRSEP began on February 19, 2002, and was scheduled to end on February 18, 2012. As allowed by ASME Section XI, IWA-2430(d)1 the licensee extended the fourth 10-year interval through July 20, 2012, to complete the refueling outage-27 which was postponed to January 18, 2012. The ASME Code of record for the fifth 10-year ISI interval at HBRSEP is the ASME Code, Section XI, 2007 Edition with 2008 Addenda. The duration of proposed alternative is for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(4), specifies that ASME Code Class 1, 2, and 3, components (including supports) must meet the requirements, except for 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, 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.

Paragraph 50.55a(a)(3) of 10 CFR Part 50 states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if the licensee demonstrates (i) the proposed alternatives would provide an acceptable level of quality and safety or if (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee requested authorization of an alternative to the requirements of the ASME Code, Section XI, Category B-P, Item Number B15.20 and IWB-5222(b) pursuant to 10 CFR 50.55a(a)(3)(ii).

The NRC staff has previously authorized this alternative for HBRSEP for the fourth ISI 10-year interval on September 26, 2002, (ADAMS Accession No. ML022700601).

### 3.0 TECHNICAL EVALUATION

The NRC staff has evaluated the information provided by the licensee in support of the request for relief from, or alternative to, the ASME Code requirements and the bases for disposition are documented below.

#### 3.1 ASME Code Requirements

The ASME Code, Section XI, 2007 Edition with 2008 Addenda, Category B-P, Item Number B15.20 and IWB-5222(b), states "the Class 1 pressure retaining boundary which is not pressurized when the system valves are in the position required for normal reactor startup shall be pressurized and examined at or near the end of the inspection interval. This boundary may be tested in its entirety or in portions and testing may be performed during the testing of boundary of IWB-5222(a)."

#### 3.2 Component for which Relief is Requested

The components in this relief request are detailed in Table 1.

Table 1: Components for which Relief is Requested

Affected Line or Component	Pipe Diameter inches (In)	Pipe Schedule	Approx Length feet (ft) or in.	Boundary Exception(s)
Drain Line below pressurizer (PZR) safety valve RC-551A (pipe piece between RC-545 and RC-545A)	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve RC-545 remains closed to avoid pressurizing downstream Class 1 pipe piece and valve RC-545A
Drain Line below PZR safety valve RC-551B (pipe piece between RC-546 and RC-546A)	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve RC-546 remains closed to avoid pressurizing downstream Class 1 pipe piece and valve RC-546A
Drain Line below PRZ safety valve RC-551C (pipe piece between RC-547 and RC-547A)	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve RC-547 remains closed to avoid pressurizing downstream Class 1 pipe piece and valve RC-547A

Affected Line or Component	Pipe Diameter inches (In)	Pipe Schedule	Approx Length feet (ft) or in.	Boundary Exception(s)
Vent valve and blind flange on PZR spray line	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve RC-527C remains closed to avoid pressurizing downstream Class 1 pipe piece and blind flange
Reactor coolant system (RCS) loop intermediate loop "A" drain valve and liquid waste disposal piping	2	A376 TP316 SMLS Sch. 160	1 ft	Valve RC-505A remains closed to avoid pressurizing downstream Class 1 piping and valve RC-505B
RCS loop intermediate loop "B" drain valve and liquid waste disposal piping	2	A376 TP316 SMLS Sch. 160	7 in	Valve RC-508A remains closed to avoid pressurizing downstream Class 1 piping and valves RC-508B and RC-542
	0.75	A376 TP316 SMLS Sch. 160	≤ 1 in	
RCS loop intermediate loop "C" drain valve and liquid waste disposal piping	2	A376 TP316 SMLS Sch. 160	8 in	Valve RC-515A remains closed to avoid pressurizing downstream Class 1 piping and valves RC-515B and RC-601
	0.75	A376 TP316 SMLS Sch. 160	1 ft	
Reactor pressure vessel (RPV) head vent valves and piping	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve RC-567 remains closed to avoid pressurizing downstream Class 1 piping and valves RC-572, RC-571, RC-569, and RC-570
	1	A376 TP316 SMLS Sch. 160	≤ 1 ft	
Reactor coolant pump (RCP) "A" seal injection drain valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-300A remains closed to avoid pressurizing downstream pipe piece and flange
RCP "A" seal leakoff vent valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-300C remains closed to avoid pressurizing downstream pipe piece and flange
RCP "A" seal water bypass drain valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft.	Valve CVC-307C remains closed to avoid pressurizing downstream pipe piece and cap
RCP "B" seal injection drain valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-300D remains closed to avoid pressurizing downstream pipe piece and flange
RCP "B" seal leakoff vent valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft.	Valve CVC-300F remains closed to avoid pressurizing downstream pipe piece and flange
RCP "B" seal water bypass drain valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-307E remains closed to avoid pressurizing downstream pipe piece and cap
RCP "B" seal water bypass drain valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-307F remains closed to avoid pressurizing downstream pipe piece and cap
RCP "C" seal injection drain valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-300G remains closed to avoid pressurizing downstream pipe piece and flange
RCP "C" seal leakoff vent valve and blind flange	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-300J remains closed to avoid pressurizing downstream pipe piece and flange

Affected Line or Component	Pipe Diameter inches (In)	Pipe Schedule	Approx Length feet (ft) or in.	Boundary Exception(s)
RCP "C" seal water bypass drain valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-307C remains closed to avoid pressurizing downstream pipe piece and cap
Auxiliary spray valve and downstream piping	2	A376 TP316 SMLS Sch. 160	500 ft	Valve CVC-311 remains closed to avoid pressurizing downstream piping to check valve CVC-313
Chemical and volume control system (CVCS) letdown drain valve and downstream cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-460H remains closed to avoid pressurizing downstream pipe piece and cap
CVCS letdown drain valve and downstream cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-460G remains closed to avoid pressurizing downstream pipe piece and cap
CVCS letdown drain valve and downstream cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve CVC-475 remains closed to avoid pressurizing downstream pipe piece and cap
Safety injection loop "1" cold leg injection vent valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve SI-875N remains closed to avoid pressurizing downstream pipe piece and cap
Safety injection loop "2" cold leg injection vent valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve SI-875P remains closed to avoid pressurizing downstream pipe piece and cap
Safety injection loop "3" cold leg injection vent valve and cap	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Valve SI-875T remains closed to avoid pressurizing downstream pipe piece and cap
Safety injection loop "1" cold leg injection check valve SI-875A and upstream piping	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves SI-873F, SI-850B, SI-876A, SI-875H, SI-875D, and SI-875M
	8	A376 TP316 SMLS Sch. 120	3 ft	
	10	A376 TP316 SMLS Sch. 140	62 ft	
Safety injection loop "2" cold leg injection check valve SI-875B and upstream piping	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves SI-875S, SI-873E, SI-876E, SI-876B, SI-875J, SI-850D, and SI-875E
	8	A376 TP316 SMLS Sch. 120	5 ft	
	10	A376 TP316 SMLS Sch. 140	52 ft	
Safety injection loop "3" cold leg injection check valve SI-875C and upstream piping	0.75	A376 TP316 SMLS Sch. 160	≤ 1 ft	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves SI-875R, SI-873D, SI-875L, SI-850F, SI-876C, and SI-875F
	8	A376 TP316 SMLS Sch. 120	8 ft	
	10	A376 TP316 SMLS Sch. 140	63 ft	

Affected Line or Component	Pipe Diameter inches (In)	Pipe Schedule	Approx Length feet (ft) or in.	Boundary Exception(s)
Safety injection loop "2" hot leg injection check valve SI-874B and upstream piping	2	A376 TP316 SMLS Sch. 160	92 ft	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves SI-874C and SI-866B
Safety injection loop "3" hot leg injection check valve SI-874A and upstream piping	2	A376 TP316 SMLS Sch. 160	44 ft	Check valve to remain closed to avoid disassembly or other temporary configurations required to achieve test pressures at upstream piping and valves SI-874D and SI-866A
Residual heat removal (RHR) motor-operated valve RHR-750 and common suction piping	14	A376 TP316 SMLS Sch. 140	42 ft	Valve RHR-750 to remain closed to avoid pressurizing downstream piping and valve RHR-751, which would result in single valve isolation between hydrostatic test boundary and decay heat removal system

### 3.3 Licensee's Basis for Relief Request

The licensee requested relief for HBRSEP in accordance to 10 CFR 50.55a(a)(ii) on the basis that hardship and unusual difficulty exists, without a compensating increase in the level of quality and safety. ISI-RR-4 covers the pressurization of all Class 1 pressure retaining components listed in Table 1 within the boundary system.

The Class 1 vents and drains listed in Table 1 typically consist of a single isolation valve with a capped end that constitutes the Class 1 system boundary. Pressurization of these locations for testing would be performed in Mode 3 and would involve opening these valves to pressurize to the extended Class 1 system pressure test boundary. After performance of the required visual testing (VT)-2 examination, these valves would be closed, isolating a high temperature, pressurized volume of water between the isolation valve and the capped end. This would result in an undesirable configuration that could result in a pressure lock or possible leakage from valve packing or capped ends. The valve would need to be opened prior to cap removal during the next outage in order to release the pressurized reactor coolant between the valve and cap.

### 3.4 Licensee's Proposed Alternative Examination

The licensee stated that the Class 1 system boundary during leakage tests will be maintained in a normal, operational alignment with items identified within Table 1 constituting exceptions to the Code-required boundary of B-P, B15.20. The VT-2 examination will extend to the Class 1 boundary during the performance of each system leakage test required by Table B-P. Items within Table 1 will be visually examined for evidence of leakage during system leakage testing without being pressurized.

### 3.5 NRC Staff Evaluation

The NRC staff reviewed and evaluated the licensee's request pursuant to 10 CFR 50.55a(a)(3)(ii). The ASME Code requires that the pressure retaining boundary during the

system leakage test conducted at or near the end of each inspection interval be extended to all Class 1 pressure-retaining components within the system boundary. Additionally, there is no known degradation mechanism or operating experience for these components.

#### Small Size Class 1 System Vent, Drain, Test and Fill Lines

ISI-RR-4 covers test and fill lines that are less than or equal to 1-ft long in the RCS. These lines range in diameter from 3/4-in to 2-in. The configurations of these components consist of either two small isolation valves in series, a valve and blind flange, or a valve and cap. In some configurations, the piping between the two vent lines and drain lines connects to a third valve that is also the second isolation boundary. The piping segments provide the design-required double isolation barrier for the reactor coolant pressure boundary. The Code-required leakage test would be performed in MODE 3 at the normal operating pressure of 2235 pound-force per square inch gauge and at a nominal temperature of about 547 degrees Fahrenheit.

Leakage testing of these piping segments at nominal operating pressure in MODE 3 would require the opening of the inboard isolation valve at the normal operating RCS temperature and pressure conditions. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. Additionally, opening of these valves introduces the potential risk for spills and personnel contamination. For configurations where blind flanges or caps are installed as the isolation device, opening of the inboard valve introduces the possibility of a personnel safety hazard if a flange or cap fails in the presence of inspection personnel.

These piping segments are VT-2 inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The leakage test will not specifically pressurize past the first isolation valve for this inspection. No external or visible leakage will be allowed for a test to be successful. Since this type of test will assure that the combined first and second isolation devices are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure, the increase in safety achieved from the ASME Code required leakage test is not commensurate with the hardship of performing such testing.

Based on the above evaluation, the NRC staff determined that imposition of the ASME Code requirements on the licensee would cause a hardship. The licensee's proposed alternative to perform VT-2 examination of the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage provides reasonable assurance that the subject line segments' leakage integrity will be maintained.

#### Fourteen-Inch Piping - RHR Motor Operated Valves

The subject piping segment consists of 42 ft of 14-in piping between RHR inlet valves RHR-750 and RHR-751. These valves are interlocked, and the interlock prevents manual opening of the valves from the control room with RCS pressure above the setpoint, and there are no test connection points in this segment of the line. There are no test connection points in this segment of the line. This segment was last tested during the second 10-year ISI interval successfully as part of the RCS hydrostatic test.

The piping segment is VT-2 inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The proposed system pressure test will



not specifically pressurize past the first isolation valve for this inspection. It is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. No external or visible leakage will be allowed for the test to be successful. This test will provide assurance that the combined first and second isolation valves are effective in maintaining the reactor coolant pressure boundary at normal operating temperature and pressure.

Based on the above evaluation, the NRC staff finds that imposition of the ASME Code requirements on the licensee would cause a significant burden that would not be compensated by an increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance that the subject line segments' leakage integrity will be maintained.

#### Safety Injection Loops Low Head Check Valves SI-875A, B, and C, and Upstream Piping

These three piping segments consist of 8-in piping spans connected to a tee to a 10-in piping span along with a short 0.75-in connection. Pressure testing in Mode 3 would require a pressure source be connected at each segment location. In so doing, the design requirement for two primary coolant pressure boundary isolation devices would be violated. For test locations located overhead and away from normal personnel access areas, ladders or scaffolding would have to be installed to provide access to the piping segment and to open the valve.

The piping segments are inspected using VT-2 as part of the Class 1 system inspection at the conclusion of each refueling outage. The proposed system pressure test will not specifically pressurize past the first isolation valve for this inspection. The licensee noted in the March 14, 2012, submittal that it is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. However, the pressure in the segment will be at least at the operating pressure of the emergency core cooling system accumulators, which are pressurized to between 600 psig and 660 psig.

The licensee further stated in the March 14, 2012, submittal that no external or visible leakage will be allowed for the test to be successful. Based on the above evaluation, the NRC staff finds that imposition of the ASME Code requirements on the licensee would cause a significant burden that would not be compensated by an increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance that the subject line segments' leakage integrity will be maintained.

#### Safety Injection Loops "B" and "C" High Head Check Valves SI-874A and B, and Upstream Piping

These two piping segments consist of a 2-in piping span between two check valves oriented toward the RCS. Pressure testing of these piping segments at nominal operating pressure in MODE 3 would require a modification to allow pressurizing to the normal operating RCS temperature and pressure conditions.

The piping segments are VT-2 inspected through the entire length as part of the Class 1 system inspection at the conclusion of each refueling outage. The licensee's proposed system pressure test will not specifically pressurize past the first isolation valve for this inspection. The licensee noted in the March 14, 2012, submittal that it is possible that the piping becomes pressurized due to minor leakage past the first isolation valve. The licensee also stated that no external or visible leakage will be allowed for the test to be successful.

Based on the above evaluation, the NRC staff finds that compliance with the ASME Code requirement to perform the system pressure test on the subject line segments would result in a hardship for the licensee that would not be compensated by an increase in quality and safety. The licensee's proposed alternative provides reasonable assurance that the subject line segments' leakage integrity will be maintained.

#### 4.0 CONCLUSION

The NRC staff determines that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity or leak tightness 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(a)(3)(ii). Therefore, the NRC staff authorizes the licensee's proposed alternative for ISI-RR-04 at HBRSEP, for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

All other ASME Section XI requirements for which relief was not specifically requested and authorized by the NRC staff will remain applicable including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Stephen Cumblidge

Date of issuance: July 13, 2012

W. Gideon

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Therefore, the licensee's proposed alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(ii) for the fifth 10-year ISI interval at HBRSEP, which begins on July 21, 2012, and ends on February 18, 2022.

Sincerely,

**/RA by Eva Brown for/**

Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosure:  
Safety Evaluation

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