



May 6, 2014

L-2014-125
10 CFR 50.59(d)

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Report of 10 CFR 50.59 Plant Changes

Pursuant to 10 CFR 50.59(d)(2), the enclosed report contains a brief description of any changes, tests, and experiments, including a summary of the 50.59 evaluation of each which were made on Unit 1 during the period of April 22, 2012 through November 9, 2013. This submittal correlates with the information included in Amendment 26 of the Updated Final Safety Analysis Report to be submitted under separate cover.

Please contact us should there be any questions regarding this information.

Sincerely,

A handwritten signature in black ink that reads "ES Katzman".

Eric S. Katzman
Licensing Manager
St. Lucie Plant

ESK/tlt

Enclosure

Handwritten initials "JE47" in a large, bold font, with "nll" written below it in a smaller, cursive script.

ST. LUCIE UNIT 1
DOCKET NUMBER 50-335
CHANGES, TESTS AND EXPERIMENTS
MADE AS ALLOWED BY 10 CFR 50.59
FOR THE PERIOD OF
APRIL 22, 2012 THROUGH NOVEMBER 9, 2013
(13 PAGES INCLUDING COVER)

INTRODUCTION

This report is submitted in accordance with 10 CFR 50.59 (d)(2), which requires that:

- i) changes in the facility as described in the SAR;
- ii) changes in procedures as described in the SAR; and
- iii) tests and experiments not described in the SAR

that are conducted without prior Commission approval be reported to the Commission in accordance with 10 CFR 50.90 and 50.4. This report is intended to meet these requirements for the period of April 22, 2012 through November 9, 2013.

This report is typically divided into three (3) sections. First, changes to the facility as described in the Updated Final Safety Analysis Report (UFSAR) performed by a Permanent Modification. Second, changes to the facility/procedures as described in the UFSAR, or tests/experiments not described in the UFSAR, which are not performed by a Permanent Modification. And third, a summary of any Fuel Reload 10 CFR 50.59 evaluation.

Sections 1, 2 and 3 summarize specific 10 CFR 50.59 evaluations that evaluated the specific change(s). Each of these 10 CFR 50.59 evaluations concluded that the change does not require a change to the plant technical specifications, and prior NRC approval is not required.

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SECTION 1

PLANT CHANGE / MODIFICATIONS

EC 277049, REVISION 0

PERMANENT REMOVAL OF ST. LUCIE
UNIT 1 RCP 1A1 WHIP (CABLE) RESTRAINTS

SUMMARY:

To allow for future maintenance of the reactor coolant pump the RCP 1A1, whip (cable) restraints shall be permanently removed. In addition to removing an interference that impedes the disassembly of the pump it will also reduce the radiological dose required to reinstall the 4-inch cables.

The St. Lucie Unit 1 Construction Permit was issued on July 1, 1970 and an Operating Licensing was licensed in March 1976. Prior to 1986, General Design Criterion (GDC) 4, "Environmental and Missile Design Bases," required that systems and components important to safety be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharge fluids, which may result in equipment failures. In accordance with NRC Branch Technical Position ASB 3-1, plants for which construction permits were tendered before July 1, 1993, and operating licenses were issued after July 1, 1975, should follow the guidance of Appendix B of ASB 3-1 (letter by A Giambusso, December 1972, General Information Required for Consideration of the Effects of a Piping System Break Outside Containment") and also provide moderate energy piping failure analyses in accordance with Branch Technical Position ASB 3-1. Accordingly, the original St. Lucie Unit 1 design bases considered all dynamic effects (missile generation, pipe whipping, pipe break reaction forces, jet impingement forces, compartment, sub-compartment and cavity pressurizations and decompression waves with the ruptured pipe) and all environmental effects (pressure, temperature, humidity, and flooding) resulting from arbitrary intermediate pipe ruptures.

Circa ~ 1986, GDC 4 was revised to read:

"Environmental and dynamic effects design bases. Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accident. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping."

Consistent with the revision to GDC 4, on June 19, 1987, the NRC issued Generic Letter 87-11, Relaxation in Arbitrary Intermediate Pipe Rupture Requirements which finalized a revision to Branch Technical Position (BTP) MEB 3-1 of Standard Review Plan (SRP)

Section 3.6.2 in NUREG-0800. The revisions to BTP MEB 3-1 and SRP 3.6.2 eliminated all dynamic effects and all environmental effects resulting from arbitrary intermediate pipe ruptures. This action allows the elimination of pipe whip restraints and jet impingement shields placed to mitigate the effects of arbitrary intermediate pipe ruptures, and other related changes.

On October 30, 1990, the NRC accepted Topical Report CEN-367, "Leak-Before-Break Evaluation of Primary Loop Piping in Combustion Engineering Designed Nuclear Steam Supply Systems, which was submitted for staff review by Combustion Engineering Owners Group (CEOG) letter dated November 20, 1987. FPL was a participating CEOG member and St. Lucie Units 1 and 2 were included in the bounding analyses submitted.

By letter to the NRC dated August 26, 1992, FPL proposed to eliminate the dynamic effects associated with high energy pipe rupture in the reactor coolant system piping from the licensing and design bases of St. Lucie Units 1 and 2 by the application of leak-before-break (LBB) technology. This change to the licensing and design bases is permitted by revised GDC-4 of Appendix A to 10 CFR 50.

By NRC letter dated March 5, 1993, the staff concluded that since the St. Lucie Units are bounded by the CEOG analyses and the leakage detection systems are capable of detecting the specified leakage rate, the dynamic effects associated with postulated pipe breaks in the primary coolant system piping can be excluded from the licensing and design bases of the St. Lucie Units.

The Unit 1 UFSAR was updated to incorporate the effects of the staff's approval. Section 3.1.4 was revised to read:

Due to the application of leak before break methodology to the RCS hot and cold leg piping, the dynamic effects of a loss of coolant accident do not have to be considered. A technical evaluation was performed to demonstrate that the probability or likelihood of large pipe breaks occurring in the primary coolant loops is sufficiently low that they need not be a design basis.

UFSAR Section 3.6.2 was revised to include the following acceptance criteria:

It should be noted that circumferential (guillotine) and longitudinal (slot) breaks in RCS hot and cold leg piping are no longer considered a design basis for GDC 4 (NRC acceptance letter for leak-before-break). The primary loop piping is not susceptible to failure from the effects of corrosion, water hammer, fatigue, brittle fracture or indirect causes such as missiles or failure of nearby components. As a result, the mechanical/structural loadings associated with the dynamic effects of a large hot or cold leg break need not be considered.

The proposed permanent removal of the upper two 4-inch reactor coolant pump RCP 1A1 whip (cable) restraints meets the acceptance criteria found in Generic Letter 87-11. Also as documented in NRC letter dated March 5, 1993, the NRC staff has concluded that since the St. Lucie Units are bounded by the CEOG analyses and the leakage detection systems are

capable of detecting the specified leakage rate, the dynamic effects associated with postulated pipe breaks in the primary coolant system piping can be excluded from the licensing and design bases of the St. Lucie Units. The permanent removal of the upper RCP 1A1 whip restraints meets the acceptance criteria of BTP 3-1, as contained in SRP Section 3.6.2, in that absent the whip restraints the primary coolant system piping continues to meet the applicable ASME Code design requirements.

There are no Technical Specifications that address the restraints. However, as discussed in the Safety Evaluation by the NRC on Leak-Before-Break (LBB) Technology, the acceptance of LBB is based on a leakage detection system consistent with Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems." Technical Specification Section 3/4.4.6.1 addresses the RCS leakage detection system and no changes to this section or any other section is required as a result of the removal of the cable restraints.

A License Amendment Request is not required. The RCS whip restraints were installed during initial construction of St. Lucie Unit 1 to mitigate the dynamic effects associated with postulated RCS hot and cold leg piping breaks. In 1993 the dynamic effects associated with postulated pipe ruptures in RCS hot and cold leg piping were excluded from the design and licensing bases of St. Lucie Unit 1, as described in UFSAR Section 3.6. Because the proposed change does not require a change to the technical specifications and does not meet any of the criteria in 10 CFR 50.59(c)(2), the change can be made without obtaining a license amendment pursuant to 10 CFR 50.90.

EC 275043, REVISION 0

PERMANENT REMOVAL OF ST. LUCIE
UNIT 1 RCP 1A2 WHIP (CABLE) RESTRAINTS

SUMMARY:

To allow for future maintenance of the reactor coolant pump the RCP 1A2 whip (cable) restraints shall be permanently removed. In addition to removing an interference that impedes the disassembly of the pump it will also reduce the radiological dose required to reinstall the 4-inch cables.

The St. Lucie Unit 1 Construction Permit was issued on July 1, 1970 and an Operating Licensing was licensed in March 1976. Prior to 1986, General Design Criterion (GDC) 4, "Environmental and Missile Design Bases," required that systems and components important to safety be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharge fluids, which may result in equipment failures. In accordance with NRC Branch Technical Position ASB 3-1, plants for which construction permits were tendered before July 1, 1993, and operating licenses were issued after July 1, 1975, should follow the guidance of Appendix B of ASB 3-1 (letter by A Giambusso, December 1972, General Information Required for Consideration of the Effects of a Piping System Break Outside Containment") and also provide moderate energy piping failure analyses in accordance with Branch Technical Position ASB 3-1. Accordingly, the original St. Lucie Unit 1 design bases considered all dynamic effects (missile generation, pipe whipping, pipe break reaction forces, jet impingement forces, compartment, sub-compartment and cavity pressurizations and decompression waves with the ruptured pipe) and all environmental effects (pressure, temperature, humidity, and flooding) resulting from arbitrary intermediate pipe ruptures.

Circa ~ 1986, GDC 4 was revised to read:

"Environmental and dynamic effects design bases". Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accident. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping."

Consistent with the revision to GDC 4, on June 19, 1987, the NRC issued Generic Letter 87-11, Relaxation in Arbitrary Intermediate Pipe Rupture Requirements which finalized a revision to Branch Technical Position (BTP) MEB 3-1 of Standard Review Plan (SRP) Section 3.6.2 in

NUREG-0800. The revisions to BTP MEB 3-1 and SRP 3.6.2 eliminated all dynamic effects and all environmental effects resulting from arbitrary intermediate pipe ruptures. This action allows the elimination of pipe whip restraints and jet impingement shields placed to mitigate the effects of arbitrary intermediate pipe ruptures, and other related changes.

On October 30, 1990, the NRC accepted Topical Report CEN-367, "Leak-Before-Break Evaluation of Primary Loop Piping in Combustion Engineering Designed Nuclear Steam Supply Systems, which was submitted for staff review by Combustion Engineering Owners Group (CEOG) letter dated November 20, 1987. FPL was a participating CEOG member and St. Lucie Units 1 and 2 were included in the bounding analyses submitted.

By letter to the NRC dated August 26, 1992, FPL proposed to eliminate the dynamic effects associated with high energy pipe rupture in the reactor coolant system piping from the licensing and design bases of St. Lucie Units 1 and 2 by the application of leak-before-break (LBB) technology. This change to the licensing and design bases is permitted by revised GDC-4 of Appendix A to 10 CFR 50.

By NRC letter dated March 5, 1993, the staff concluded that since the St. Lucie Units are bounded by the CEOG analyses and the leakage detection systems are capable of detecting the specified leakage rate, the dynamic effects associated with postulated pipe breaks in the primary coolant system piping can be excluded from the licensing and design bases of the St. Lucie Units. Furthermore by NRC letter dated July 9, 2012, NRC staff concludes that Leak Before Break remains valid for SL-1 under EPU conditions.

The Unit 1 UFSAR was updated to incorporate the effects of the staff's approval. Section 3.1.4 was revised to read:

Due to the application of leak before break methodology to the RCS hot and cold leg piping, the dynamic effects of a loss of coolant accident do not have to be considered. A technical evaluation was performed to demonstrate that the probability or likelihood of large pipe breaks occurring in the primary coolant loops is sufficiently low that they need not be a design basis.

UFSAR Section 3.6.2 was revised to include the following acceptance criteria:

It should be noted that circumferential (guillotine) and longitudinal (slot) breaks in RCS hot and cold leg piping are no longer considered a design basis for GDC 4 (NRC acceptance letter for leak-before-break). The primary loop piping is not susceptible to failure from the effects of corrosion, water hammer, fatigue, brittle fracture or indirect causes such as missiles or failure of nearby components. As a result, the mechanical/structural loadings associated with the dynamic effects of a large hot or cold leg break need not be considered.

The proposed permanent removal of the upper two 4-inch reactor coolant pump RCP 1A2 whip (cable) restraints meets the acceptance criteria found in Generic Letter 87-11. Also as documented in NRC letter dated March 5, 1993, the NRC staff has concluded that since the St. Lucie Units are bounded by the CEOG analyses and the leakage detection systems are capable of detecting the specified leakage rate, the dynamic effects associated with postulated pipe breaks in

the primary coolant system piping can be excluded from the licensing and design bases of the St. Lucie Units. The EPU leak-before-break evaluation is based on evaluation CEN-367-A. The primary loop piping normal operating, SSE and pressure loads due to the EPU conditions were used in the EPU evaluation. The results of the evaluation demonstrated that leak-before-break recommended margins for the primary loop piping continue to be satisfied for the EPU conditions. Calculation CN-MRCDA-09-68 provides an analysis of the RCP and surrounding components to demonstrate the RCP HELB cable restraints for pumps 1A1, 1A2, 1B1 and 1B2 can be permanently removed. In addition, calculation CN-MRCDA-09-06 documents that sufficient leak-before-break margin on crack stability is maintained on the main coolant loop hot and cold leg pipes under EPU conditions. NRC letter dated July 9, 2012, concludes that Leak Before Break remains valid for SL-1 under EPU conditions. The permanent removal of the upper RCP 1A2 whip restraints meets the acceptance criteria of BTP 3-1, as contained in SRP Section 3.6.2, in that absent the whip restraints the primary coolant system piping continues to meet the applicable ASME Code design requirements.

There are no Technical Specifications that address the restraints. However, as discussed in the Safety Evaluation by the NRC on Leak-Before-Break (LBB) Technology, the acceptance of LBB is based on a leakage detection system consistent with Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems." Technical Specification Section 3/4.4.6.1 addresses the RCS leakage detection system and no changes to this section or any other section is required as a result of the removal of the cable restraints.

A License Amendment Request is not required. The RCS whip restraints were installed during initial construction of St. Lucie Unit 1 to mitigate the dynamic effects associated with postulated RCS hot and cold leg piping breaks. In 1993 the dynamic effects associated with postulated pipe ruptures in RCS hot and cold leg piping were excluded from the design and licensing bases of St. Lucie Unit 1, as described in UFSAR Section 3.6. In 2012, it was concluded that the leak before break analysis remains valid for EPU conditions. Because the proposed change does not require a change to the technical specifications and does not meet any of the criteria in 10 CFR 50.59(c)(2), the change can be made without obtaining a license amendment pursuant to 10 CFR 50.90.

SECTION 2

50.59 EVALUATIONS

For the time period of this report, there were no changes to the facility (outside of the plant design modifications discussed in Section 1) as described in the Updated Final Safety Analysis Report (UFSAR) performed by a 10 CFR 50.59 Evaluation.

SECTION 3

CORE RELOAD EVALUATION

EC 277290, REVISION 0
ST. LUCIE UNIT 1 CYCLE 25 RELOAD

SUMMARY

The 10CFR50.59 Applicability/Screening performed for the St. Lucie Unit 1 Cycle 25 Core Reload concluded, based upon the changes provided in the reload EC [i.e., the new fuel batch Region GG (88 fresh assemblies), implementation of a Zircaloy-4 MONOBLOC corner guide tube design, reduction in AFW flow and increased AFW temperature in accident analyses, SIT line MOVs position to be less than 100% open ($\geq 90\%$), SG blowdown flow isolation in 30 minutes instead of 20 minutes, and tripping of all four RCPs instead of two at 30 minutes], some items could not screen out and had to be evaluated further in this document. The items to be covered in this 10CFR50.59 evaluation are the analytical parameter value changes to the AFW pressure/flow conditions, increased AFW temperature, and SG blowdown isolation timing in the accident analyses, which constitute a change that adversely affects the UFSAR described functions of the systems relied upon to mitigate the consequences of the loss of feedwater (LOFW) and feedwater (FW) line break events.

The actual AFW operating point has been observed to be at pressures up to 1030 psia, whereas the accident analyses had only considered conditions up to 1000 psia. Also, pump heat added to the fluid had not been considered in the analyses. As a result, the input parameters for the AFW pumps was revised to add an operating point at 1030 psia, with a minimum degraded AFW flow rate of 276 gpm, and a maximum uncertainty adjusted AFW fluid temperature of 111.5°F (previous value being used was 104°F). At the same time, the analyses were run with the time assumed for the operator to isolate the SG blowdown flow to be 30 minutes instead of the previously assumed timing in the Chapter 10 LOFW analysis of 20 minutes. These items were considered adverse, as these changes could adversely affect the AFW system capability to remove heat from the primary system via the steam generators to cool down the RCS during post-accident conditions, and because of the delay in SG blowdown isolation which could affect SG inventory and challenge the heat removal to maintain RCS subcooling. These parameters required the re-analyses to be performed for three UFSAR events: the loss of normal feedwater (UFSAR Section 15.2.8), the loss of normal feedwater concurrent with Auxiliary Feedwater pipe break (UFSAR Chapter 10), and the feedwater line break (UFSAR Section 10.5.3). The new results of these three analyses provided in Reference 1 and discussed in the reload EC show that the analyses meet the same acceptance criteria as before and the consequences of these analyses remain unchanged from those presented in the UFSAR. These analyses are being incorporated into the UFSAR with a change package provided in Attachment 2 of the EC.

The discussions within this EC, along with the 10 CFR 50.59 Screening and Evaluation justify that the design and operation of the Cycle 25 reload core will meet the 10 CFR 50.59 (c)(2) criteria. The core reload activities can be implemented with no changes to the St. Lucie Unit 1 Technical Specifications. The safety analyses results are within the acceptance limits provided by the USNRC regulatory criteria and within the criteria provided by 10 CFR 50.59. Therefore, prior NRC approval is not required for implementation of this EC-DCP for operation in all Modes.