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

July 7, 2022

Mr. Bob Coffey
Executive Vice President,
and Chief Nuclear Officer
Florida Power & Light Company
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Juno Beach, FL 33408

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 – REPORT FOR THE AGING MANAGEMENT AUDIT REGARDING THE SUBSEQUENT LICENSE RENEWAL APPLICATION REVIEW (EPID NO. L-2021-SLR-0002)

Dear Mr. Coffey:

By letter dated August 3, 2021 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML21215A314), as revised by letter dated October 12, 2021 (ML21285A107) and supplemented by letters dated April 7, 2022 (ADAMS Accession No. ML22097A202), April 13, 2022 (ADAMS Accession No. ML22103A014) and May 12, 2022 (ADAMS Accession No. ML22139A083), Florida Power & Light Company (FPL or the applicant) submitted an application for the subsequent license renewal of Renewed Facility Operating License Nos. DPR-67 and NPF-16 for the St. Lucie Plant, Units. 1 and 2 (St. Lucie), to the U.S. Nuclear Regulatory Commission (NRC). FPL submitted the application pursuant to Title 10 of the *Code of Federal Regulations* part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," for subsequent license renewal.

The NRC staff completed its aging management audit from October 4, 2021 – February 25, 2022, in accordance with the audit plan (ADAMS Accession No. ML21245A305). The audit report is enclosed.

If you have any questions, please contact me by e-mail at Brian.Harris2@nrc.gov.

Sincerely,

/RA/

Brian Harris, Senior Project Manager
License Renewal Projects Branch
Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosure:
Audit Report

cc w/encl: Listserv

SUBJECT: ST. LUCIE PLANT, UNITS 1 AND 2 – REPORT FOR THE AGING MANAGEMENT AUDIT REGARDING THE SUBSEQUENT LICENSE RENEWAL APPLICATION REVIEW (EPID NO. L-2021-SLR-0002) DATED: JULY 7, 2022

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AUDIT REPORT

Aging Management Audit

St. Lucie Plant, Units 1 and 2
Subsequent License Renewal Application

October 4, 2021 – February 25, 2022

Division of New and Renewed Licenses
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Enclosure

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
DIVISION OF NEW AND RENEWED LICENSES

Docket Nos: 50-335 and 50-389

License No: DPR-67 and NPF-16

Licensee: Florida Power & Light Company (FPL)

Facility: St. Lucie Plant (SLP), Units 1 and 2

Location: Rockville, Maryland

Dates: October 4, 2021 – February 25, 2022

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ACRONYMS

ALE	adverse localized environment
ADAMS	Agencywide Documents Access and Management System
AFW	auxiliary feedwater
AMP	aging management program
AMR	aging management review
ASME	American Society of Mechanical Engineers
BA	boric acid
BACC	boric acid corrosion control
BFB	baffle-former-bolts
BB	baffle-to-baffle
CASS	Cast Austenitic Stainless Steel
CFR	Code of Federal Regulations
CLB	current licensing basis
CB	core barrel
CB-F	core barrel-to-former
CID	changes in dimension
CRGT	control rod guide tube
CSS	core support shield
CR	condition report
CRDM	control rod drive mechanism
CRGT	control rod guide tube
CUF	cumulative usage factor
CUF_{en}	environmentally-adjusted cumulative usage factor
DM	dissimilar metal
Dpm	drops per minute
EAF	Environmentally-Assisted Fatigue
EFPY	effective full-power years
EPRI	Electric Power Research Institute
FAC	Flow-Accelerated Corrosion
FE	Further Evaluation
FERC	Federal Energy Regulatory Commission
FD	flow distributor
FMP	fatigue monitoring program
ft-lb	foot-pound

GALL-SLR	NUREG-2191, “Generic Aging Lessons Learned for Subsequent License Renewal”
HELB	high energy line break
I&E	inspection and evaluation
IA	instrument air
IASCC	irradiation-assisted stress corrosion cracking
IMI	incore monitoring instrumentation
ISR/IC	irradiation-enhanced stress relaxation or creep
IE	irradiation embrittlement
ISG	Interim Staff Guidance
ISI	inservice inspection
LAR	license amendment request
LBB	leak-before-break
LDs	locking devices
LWs	locking welds
LOFT	loss of fracture toughness
LOM	loss of material
LOP	loss of preload
LCB	lower core barrel
LGA	lower grid assembly
LTS	lower thermal shield
LR	license renewal
LTOP	low temperature overpressure protection
MLDs	modified locking devices
MOV	motor operated valve
MRP	materials reliability program
mV	milliVolt
NAM	no additional measures
NDE	nondestructive examination
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NSSS	nuclear steam supply system
OBE	operating basis earthquake
OLDs	original locking devices
OpE	operating experience
P-T	pressure-temperature
PTS	Pressurized Thermal Shock

PWR	pressurized water reactor
PWSCC	primary water stress corrosion cracking
RAI	request for additional information
RCI	request for confirmation of information
RCP	reactor coolant pump
RIS	regulatory issue summary
RPV	reactor pressure vessel
RT_{NDT}	reference temperature nil ductility
RT_{PTS}	reference temperature for pressurized thermal shock
RV	reactor vessel
RVI	reactor vessel internal
SCC	stress corrosion cracking
SE	safety evaluation
SER	safety evaluation report
SG	steam generator
SLR	Subsequent License Renewal
SLRA	subsequent license renewal application
SRP-SLR	NUREG-2192, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants”
SWGR	switchgear
TE	thermal aging embrittlement
TLAA	Time-Limited Aging Analyses
UFSAR	Updated Final Safety Analysis Report
UCB	upper core barrel
UGA	Upper Grid Assembly
USE	upper-shelf energy
UT	ultrasonic testing
UTS	upper thermal shield
VS	void swelling
VT	visual examination
VV	vent valve
WO	work order
WOL	weld overlay

Report for the Aging Management Audit
St. Lucie Plant, Units 1 and 2
Subsequent License Renewal Application

1. Introduction

The U.S. Nuclear Regulatory Commission (NRC) staff conducted an aging management audit of Florida Power & Light Company (FPL, applicant) of (1) plant-specific operating experience (OpE), (2) methodology to identify the systems, structures, and components (SSCs) to be included within the scope of license renewal and subject to an aging management review (AMR) (Scoping and Screening Portion), and (3) aging management programs (AMPs), AMR items, Time-Limited Aging Analyses (TLAA) and associated bases and documentation as applicable (AMP and TLAA Portion) for the subsequent license renewal (SLR) of Renewed Facility Operating License Nos. DPR-67 and NPF-16 for St. Lucie Plant (SLP), Units 1 and 2.

The purpose of the plant-specific OpE portion of the audit is to identify examples of age-related degradation, as documented in the applicant's corrective action program database. FPL searched their OpE database and provided the results for the associated AMPs and TLAAs for NRC staff review. Additional word searches were performed by FPL upon NRC staff's request, and the results were provided to the NRC staff for review.

The purpose of the Scoping and Screening portion of the audit is to evaluate the scoping and screening process as documented in the license renewal application, implementing procedures, reports, and drawings, such that the NRC staff:

- Obtains an understanding of the process used to identify the SSCs within the scope of license renewal and to identify the structures and components subject to an AMR.

- Has sufficient docketed information to allow the staff to reach a conclusion on the adequacy of the scoping and screening methodology as documented and applied.

The purpose of the AMP and TLAA Portion of the audit is to:

- Examine FPL's AMPs, AMR items, and TLAAs for SLP;

- Verify FPL's claims of consistency with the corresponding NUREG-2191, "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," issued in July 2017, AMPs, and AMR items; and

- Assess the adequacy of the TLAAs.

Enhancements and exceptions will be evaluated on a case-by-case basis. The NRC staff's review of enhancements and exceptions will be documented in the safety evaluation report (SER).

The regulatory bases for the audit was Title 10 of the *Code of Federal Regulations (*10 CFR) part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The staff also considered the guidance contained in NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR), dated July 2017, and NUREG-2191. The SRP-SLR allows an applicant to reference in its license renewal application the AMPs described in GALL-SLR Report. By referencing the GALL-SLR

Report AMPs, the applicant concludes that its AMPs correspond to those AMPs reviewed and approved in the GALL-SLR Report and that no further staff review is required. If an applicant credits an AMP for being consistent with a GALL-SLR Report program, it is incumbent on the applicant to ensure that the plant program contains all of the elements of the referenced GALL-SLR Report program. The applicant should document this determination in an auditable form and maintain the documentation onsite.

2. Audit Activities

A regulatory audit is a planned, license-related activity that includes the examination and evaluation of primarily non-docketed information. A regulatory audit is conducted with the intent to gain greater understanding of an application, to verify information, and, if applicable, to identify information that will require docketing to support the staff's conclusions that form the basis of the licensing or regulatory decision.

Licensing conclusions or staff findings are not made in the audit reports since licensing and regulatory decisions cannot be made solely based on an audit. Therefore, items identified but not resolved within the scope of the audit will be followed up using other NRC processes, such as requests for additional information (RAIs), requests for confirmation of information (RCIs), and public meetings. Licensing conclusions, staff findings, and resolution of audit items will be documented in the staff's SER.

The following sections discuss the subsequent license renewal application (SLRA) areas reviewed by the staff.

SLRA AMP B2.2.1, Fatigue Monitoring

Summary of Information in the Application. The SLRA states that AMP B2.2.1, "Fatigue Monitoring," is an existing program with enhancements that is consistent with the program elements in GALL-SLR Report AMP X.M1, "Fatigue Monitoring." To verify this claim of consistency, the staff audited the SLRA AMP. Issues identified but not resolved in this report will be addressed in the SER. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this enhanced program, and the staff's audit addressed only the program elements described in the applicant's basis document.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant's Corrective Action Program (CAP) database.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-039	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Fatigue Monitoring	Revision 0
ADM-17.43	Component Cycles and Transients	Revision 2
PSL-ENG-SEMJ-18-001	Changes to Component Cyclic or Transient Limits on Fatigue Re-evaluation of 2B RSG Primary Side Components	Revision 0
Action Request (AR) 2374153	License Renewal Effectiveness and SLR Interview Track	11/2/2020
AR 2115822	Self-Assessment for Unit 2 IP-71003 Phase I and II License Renewal Inspection	2/2/2017
SIR-01-102	Thermal Cycle Evaluation for St. Lucie Units 1 and 2	Revision 3
Westinghouse LTR-SDA-II-20-31-NP	St. Lucie Units 1 and 2 SLR: Primary Equipment and Piping Environmentally-Assisted Fatigue Evaluations	Revision 2
SIA Calculation Package 1301103.304	Appendix L Flaw Tolerance Evaluation of Surge Line PSL Units 1 and 2	Revision 2
SIA 2001262.401	Flaw Tolerance Evaluation of St. Lucie Units 1 and 2 Surge Line Using ASME Code, Section XI, Appendix L for SLR	Revision 1
CEN-387-P	Pressurizer Surge Line Flow Stratification	Revision 1-P-A
CE Specification Number 19367-31-5	Engineering Specification for Reactor Coolant Pipe and Fittings for Florida Power and Light St. Lucie Plant Unit No. 1	Revision 14

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "detection of aging effects," and "parameters monitored or inspected" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

The staff found that, for the "monitoring and trending," "acceptance criteria," and "corrective actions" program elements, sufficient information was not available to verify whether they were consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether these

program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observations.

- The “monitoring and trending” program element of GALL-SLR Report AMP X.M1, Fatigue Monitoring Program indicates that the program provides for revisions to the fatigue analyses or other corrective actions (e.g., revising augmented inspection frequencies) on an as-needed basis if the values assumed for fatigue parameters are approached or the transient counts exceed the design or assumed quantities. In comparison, SLRA Section B.2.3.44 addresses the ASME Code, section XI, appendix L flaw tolerance analysis for the pressurizer surge line. However, SLRA section B.2.2.1 for the Fatigue Monitoring Program does not clearly describe whether the program will monitor the transient cycles, which are assumed in the appendix L analysis, to ensure the validity of the assumed transient cycles.

- In relation to the “acceptance criteria” and “corrective actions” program elements, Enhancement 5 of the Fatigue Monitoring Program is to update the program governing procedure to add an additional acceptance criterion associated with high energy line break (HELB) cumulative usage factor (CUF) criteria. This enhancement is applied only to St. Lucie Unit 2 and is related to the HELB analyses addressed in SLRA Section 4.3.4. The enhancement does not clearly define the additional acceptance criterion associated with the HELB CUF. In addition, the enhancement does not clearly address any additional corrective actions that may need to be performed beyond the actions specified in the “corrective actions” program element if the additional criterion associated with the HELB CUF is not met.

The staff also audited the description of the SLRA Fatigue Monitoring Program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.2.2, Neutron Fluence Monitoring Program

Summary of Information in the Application. The SLRA states that AMP B.2.2.2, “Neutron Fluence Monitoring,” is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP X.M2, “Neutron Fluence Monitoring,” as modified by SLR-ISG-MECHANICAL-2021-02-MECHANICAL, “Updated Aging Management Criteria for Mechanical Portions of Subsequent License Renewal Guidance,” (ADAMS Accession Number ML20181A434). To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During its audit, the staff reviewed documentation contained in the SLRA and provided by FPL via the ePortal. The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date

TR-F-MCM-004	St. Lucie, Unit 1, Post-Irradiation Evaluation of Reactor Vessel Surveillance Capsule W-97	12/1983
WCAP-12751	Analysis of the Capsule at 104° from the Florida Power and Light St. Lucie Unit No. 1 Reactor Vessel Radiation Surveillance Program	11/1990
WCAP-15446	Analysis of the Capsule at 284° from the Florida Power and Light St. Lucie Unit No. 1 Reactor Vessel Radiation Surveillance Program	05/2002 Revision 1
BAW-1880	Analysis of Capsule W-83, Florida Power and Light, St. Lucie Unit No. 2, Reactor Vessel Materials Surveillance Program	09/ 1985
WCAP-15040,	Analysis of the Capsule at 263° from the Florida Power and Light St. Lucie Unit No. 2 Reactor Vessel Radiation Surveillance Program	02/2010 Revision 1
WCAP-17939-NP	Analysis of the Capsule at 97° from the Florida Power and Light St. Lucie Unit No. 2 Reactor Vessel Radiation Surveillance Program	05/2015 Revision 0

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program element(s) of the SLRA AMP will be consistent after implementation of the identified enhancements.

SLRA AMP B2.2.3, Environmental Qualification (EQ) of Electric Equipment

Summary of Information in the Application. The SLRA notes that AMP B2.2.3, "Environmental Qualification of Electric Equipment," is an existing program with an enhancement that will be consistent with the program elements in GALL-SLR report X.E1, "Environmental Qualification of Electric Equipment." To verify this claim of consistency, the staff audited the AMP. During the audit, the staff also reviewed the enhancement associated with this AMP. The staff will document its review of the enhancement in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
AR 02013850	U1: MSIV Solenoid Valve Coil Thermal Life (EQ)	12/17/2014

Document	Title	Revision / Date
AR 02128663	EQ CDBI Identified CHRRM Indication Error During DBA	04/28/2016
AR 02137338	ACE to Address Green NCV from NRC EQ CDBI	06/10/2016
AR 02128751	EQ CDBI Identified Issue Related to Program Documentation	04/29/2016
AR 02388818	OpE from PB EQ SLR NRC Review Regarding Use of EPRI NP-1558	04/05/2021
AR 02214276	U2: EQ/HCV-09-2B Replace Limit Switch	07/10/2017
AR 02347464	Rosemount Interim Eval of Deviation	03/06/2020
AR 02376733	EQ LR Effectiveness Review	11/26/2020
AR 02128612	EQ Doc Pac Did Not Specify Limiting Component	04/28/2016
N/A	EQ Program Health Report	11/24/2020
NEESL-00010 CALC-001	PSL SLR 80-Year Doses for Equipment Qualification	Revision 0
PSL-ENG-LRAM-00-099	EQ Program–License Renewal Basis Document	Revision 8
St. Lucie Plant Unit No. 2 Equipment Qualification Documentation Package Drawing No. 2998-A-451-1000	Equipment Qualification Report and Guidebook	Revision 12
St. Lucie Plant Unit No. 1 Equipment Qualification Documentation Package Drawing No. 8770-A-451-1000	Equipment Qualification Report and Guidebook	Revision 14
ER-AA-112	EQ Program	Revision 5
QI-2-PSL-6	EQ of Electric Equipment	Revision 9
N/A	PSL SLR EQ Program Update Review	N/A

Document	Title	Revision / Date
Doc Pac No. 41.0	Automatic Valve Company (AVCO) Solenoid Valves	NEW & Revision 5
Doc Pac No. 5.0	Brand-Rex Cable Company Electric Cable	NEW & Revision 9

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancement.

The staff also audited the descriptions of SLRA sections 19.2.1.3, "Environmental Qualification of Electric Equipment," and 19.3.4, "Environmental Qualification of Electric Equipment," of appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the descriptions provided in the SRP-SLR Report.

SLRA AMP B2.3.1, American Society of Mechanical Engineers (ASME) Section XI Inservice Inspection (ISI), Subsections IWB, IWC, and IWD

Summary of Information in the Application. The SLRA states that AMP B2.3.1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," is an existing program that is consistent with the program elements in GALL-SLR Report AMP XI.M1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD." To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-041	St Lucie Units 1 and 2 SLR Aging Management Program Basis Document - ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD	Revision 0: 07/27/2021
NEESL00008-REPT-005	St. Lucie Units 1 and 2 SLR Screening and Aging Management Review Results - Reactor Coolant Piping	Revision 0 07/27/2021

Document	Title	Revision / Date
NEESL00008-REPT-003	St. Lucie Units 1 and 2 Subsequent License Renewal - Review of Plant Modifications That Impact SLRA	Revision 8 07/22/2020
4th-ISI-PSL-2-Program Plan	St. Lucie Nuclear Power Plant Unit 2 Fourth Inservice Inspection Interval Program Plan	Revision 3 08/25/2020
5th Interval -ISI-PSL-1-Program Plan	Fifth Inservice Inspection Interval Program Plan for St. Lucie Nuclear Power Plant Unit 1	Revision 0 02/10/2018
PSL-ENG-SESJ-15-003	St. Lucie Unit 1, SL1-26 Outage, Owner's Activity Report, Form OAR-1	07/22/2015
PSL-ENG-SESJ-17-001	St. Lucie Unit 1, SL1-27 Outage, Owner's Activity Report, Form OAR-1	02/01/2017
PSL-ENG-SESJ-18-005	St. Lucie Unit 1, SL1-28 Outage, Owner's Activity Report, Form OAR-1	07/06/2018
ISI-PSL-1-2019	St. Lucie Unit 1, SL1-29 Outage, Owner's Activity Report, Form OAR-1	02/14/2020
PSL-ENG-SESJ-16-001	St. Lucie Unit 2, SL2-22 Outage, Owner's Activity Report, Form OAR-1	01/14/2016
PSL-ENG-SESJ-17-004	St. Lucie Unit 2, SL2-23 Outage, Owner's Activity Report, Form OAR-1	06/15/2017
PSL-ENG-SESJ-18-006	St. Lucie Unit 2, SL2-24 Outage, Owner's Activity Report, Form OAR-1	12/10/2018
PLS-ENG-SESJ-20-002	St. Lucie Unit 2, SL2-25 Outage, Owner's Activity Report, Form OAR-1	06/10/2020
STD-M-027	Engineering Program for ASME Section XI Repair and Replacement	Revision 6 05/13/2014
0005760	St. Lucie Plant Implementation Guidelines of the ASME Section XI Repair and Replacement Program	Revision 22 01/25/2019
CR-02323559-02	Boric Acid Make-up Pump 2A Active Leakage at Pump Casing (St Lucie Unit 2)	08/06/2019
AR 02279817	Boric Acid Leak at Pressurizer to Instrument Nozzle During the ISI Bare Metal Visual Inspection of the Pressurizer Level Nozzle (St Lucie Unit 2)	09/11/2018

Document	Title	Revision / Date
AR 02279817-01	Engineering Final Disposition: Boric Acid Leak at Pressurizer to Instrument Nozzle	Revision 2 09/17/2018
ADAMS Accession No. ML18351A242	LER 2018-001-01 for St. Lucie, Unit 2, Pressurizer Instrument Nozzle Leak Due to Primary Water Stress Corrosion Cracking	12/17/2018

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA AMPB2.3.1, "ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD," provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report/SRP-SLR.

SLRA AMP B2.3.2, Water Chemistry

Summary of Information in the Application. The SLRA states that AMP B2.3.2, "Water Chemistry" is an existing program with enhancements that is consistent with the program elements in GALL-SLR Report AMP XI.M2, "Water Chemistry," as modified by SLR-ISG-2021-02-MECHANICAL, "Updated Aging Management Criteria for Mechanical Portions of SLR Guidance," dated February 2021 (ML20181A434). To verify this claim of consistency, the staff audited the SLRA AMP. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
Report No. NEESL0008-REPT-042	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document Water Chemistry	Revision 0
ER-AA-110-005	Reactor Vessel Integrity Program	Revision 05
ADM – 17.38	St. Lucie Reactor Vessel Integrity Program	Revision 02
EC-00287790	St. Lucie Reactor Vessel Integrity Program – License Renewal Basis Document	Revision 00

WCAP-15446	Analysis of Capsule 284 from the Florida Power Light Company St. Lucie Unit 1 Reactor Vessel Radiation Surveillance Program	Revision 01
PSL-ENG-SESJ-07-016	License Amendment Request Evaluation for RCS Pressure/Temperature Limits and LTOP applicable for 55 Effective Full-Power Years	Revision 01
EC-289817	St Lucie Unit 2 Input Parameters EFPY Pressure-Temperature (P-T) Limits and LTOP Requirements	Revision 00
L-2015-160	St Lucie Unit 2 Reactor Vessel Surveillance Capsule 97 Degree Report Submittal Docket No. 50-389	05/21/2015
EC-294196	Florida Power and Light St Lucie Unit 2	Revision 01
CRTD	Consensus on Operating Practices For the Control of Feed Water Chemistry in Modern Industrial Boilers	Volume 34
SRL	Document Changes: X1.M2 “Water Chemistry”	Table 2-29
SRL-Mechanical-2020-XX	Updated Aging Management Criteria for Mechanical Portions of SLR Guidance Interim Staff Guidance	06/2020
Assessment AR 402040	License Renewal Focused Self-Assessment	09/16/2010
AR # 02229642	Revision 8 Gap Analysis	October 11, 2017
EPRI Primary 3002000505	Pressurized Water Reactor Primary Water Chemistry Guidelines	Volume 1 Revision 7 04/2014
EPRI Secondary	Pressurized Water Reactor Secondary Water Chemistry Guidelines	Revision 7 02/2009

During the audit, the staff verified the applicant’s claim that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA Water Chemistry program provided in the UFSAR supplement in Appendix A of the SLRA. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.3, Reactor Head Closure Stud Bolting

Summary of Information in the Application. The SLRA states that AMPB2.3.3, “Reactor Head Closure Stud Bolting,” is an existing program with enhancements and exceptions that will be consistent with the program elements in GALL-SLR Report AMP XI.M3, “Reactor Head Closure

Stud Bolting." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the exceptions and enhancements associated with this AMP. The staff will document its review of the exceptions to the GALL-SLR Report AMP and the enhancements in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
NEESL00008-REPT-062	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Reactor Head Closure Stud Bolting	Revision 0
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
NRC Regulatory Guide 1.65	Materials and Inspections for Reactor Vessel Closure Studs	Revision 1
AR 01774125	Corrosion and nicks on RPV nuts	12/17/2020 (AR date) 06/7/2012 (event date)
AR 01915467	Reactor vessel closure head stud #49 did not thread in flange	11/30/2020 (AR date) 10/26/2013 (event date)
NRC Safety Evaluation (ADAMS Accession No. ML21027A226)	St. Lucie Plant, Units. 1 and 2 – Approval of Alternative to ASME Code, Section XI to Use an Alternative Inservice Inspection Schedule for the Reactor Vessel Closure Head Bolting (EPID L-2020-LLR-0020)	02/17/2021
Volumetric examination records	Documented results of volumetric examinations performed for the 54 reactor head closure studs and 54 threads-in-flange	various

During the audit, the staff verified the applicant's claim that the "scope of program," "parameters monitored or inspected," and "acceptance criteria" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff noted the exceptions to the "preventive actions," "detection of aging effects" and "corrective actions" program elements and verified the applicant's claim that the aspects of these three program elements not associated with the exceptions identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR Report AMP or will be consistent after implementation of the enhancements (in the "preventive actions" and "corrective actions" program elements) stated in the SLRA. During the audit, the staff identified an exception associated with the "monitoring and trending" program element.

In addition, the staff determined that for the "detection of aging effects" and "monitoring and trending" program elements, the staff will consider issuing an RAI in order to obtain the information necessary to verify whether the exception to the program elements is acceptable.

During the audit, the staff made the following observations:

- In NEESL00008-REPT-062, Revision 0, the applicant referred to the ASME Code, section XI, Table IWB-2500-1 for examination of the reactor head closure studs for the "detection of aging effects" and "monitoring and trending" program elements. The applicant is taking exception to the "detection of aging effects" program element because of an alternative inspection schedule in lieu of that specified in ASME Code, section XI, table IWB-2500-1. The NRC-approved this alternative in the safety evaluation dated February 17, 2021, listed in the documents the staff reviewed.

  The staff noted that, per the safety evaluation dated February 17, 2021, the alternative is authorized only through the fifth 10-year inservice inspection interval of Unit 1 and only through the fourth 10-year inservice inspection interval of Unit 2.
- In AR 01915467, the applicant documented the OpE on the Unit 1 reactor vessel closure head stud #49 not threading into the flange. The applicant stated that the stud was eventually threaded into the flange after repeated cleaning of the stud.

The staff also audited the description of the SLRA Reactor Head Closure Stud Bolting AMP provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.4, Boric Acid Corrosion

Summary of Information in the Application. The SLRA states that AMP B2.3.4, "Boric Acid Corrosion" is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M10, "Boric Acid Corrosion." To verify this claim of consistency, the staff audited the SLRA AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the Boric Acid Corrosion program. These documents were provided by the applicant or were identified by the staff to be relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision/Date
NEESL00008-REPT-043	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Boric Acid Corrosion	Revision. 0
ER-AP-116-1000-10000	Boric Acid Corrosion Control Desk-top Instruction, “Boric Acid Corrosion Control Program Implementation”	Revision. 0
ER-AP-116-1000	Boric Acid Corrosion Control Program	Revision 5
ER-AP-116	Boric Acid Corrosion Control	Revision 3
PSL-ENG-LRAM-00-090	Boric Acid Wastage Surveillance Program – License Renewal Basis Document	Revision 7 Revision 8
ER-AP-116-1000-F01	Boric Acid Leak Screening	Revision 3
NEESL00008-REPT-038	SLR Aging Effects OpE	Revision 0
AR 02115822	Self-Assessment for Unit 2 IP-71003 Phase I & II License Renewal Inspection	1/30/2017
AR 02140203	Majority of Boric Acid Leaks Identified by Engineering	7/5/2016
AR 02263431-01	Cognitive Trend Identified by MRC for Boric Acid WOs Closure	None
AR 02310112-08	AMP Effectiveness Review and Assessment Worksheet	9/12/2019
AR 02323757	Adverse Trend in Through-Wall Boric Acid Leaks	8/7/2019
AR 02325987	Inadequate Initial Assessment and Response to Boric Acid Identification	6/11/2020
AR 02181945	SL1-28 1B2 RCP Boric Acid Cleanup	1/26/2017
AR 02381822	License Renewal Aging Management Program Effectiveness Review Roll Up	11/2/2020
None	PSL Program Owner Interview Form, Boric Acid Corrosion	None
None	Master System Health Report, PSL, Boric Acid Corrosion (2015-2020)	11/24/2020

During the audit, the staff verified the applicant’s claim that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA AMP are or will be consistent, after implementation of the identified enhancements, with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA Boric Acid Corrosion program provided in the UFSAR supplement in appendix A of the SLRA. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.5, Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components

Summary of Information in the Application. The SLRA states that AMPB2.3.5, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-Induced Corrosion in Reactor Coolant Pressure Boundary Components," is an existing program with an enhancement that will be consistent with the program elements in GALL-SLR Report AMP XI.M11B, "Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-induced Corrosion in Reactor Coolant Pressure Boundary Components." To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
NEESL00008-REPT- 044	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document - Cracking of Nickel- Alloy Components and Loss of Material Due to Boric Acid-induced Corrosion in Reactor Coolant Pressure Boundary Components	Revision 0 07/28/2021
ER-SR-107	Alloy 600 Management Program – The applicant has maintained a fleetwide program based on MRP-126, "Materials Reliability Program Generic Guidance for Alloy 600 Management," and updated on a periodic basis	Revision 5 09/24/2019
AR02279817	Bare metal visual examination performed on the Unit 2 pressurizer level nozzle identified boric acid leak at the piping-to- pressurizer interface. Engineering evaluation determined a through-wall flaw in Alloy 600 weld pad. The weld pad was replaced with Alloy 690 material.	09/11/2018
AR02303281	Regulatory Issue Summary (RIS) 2018-06, "Clarification of the Requirements for Reactor Pressure Vessel Upper Head Bare Metal Visual Examinations," has been incorporated into St. Lucie's ISI program.	02/25/2019

NEESL00008-REPT- 044	Electric Power Research Institute (EPRI) Technical Report (TR) 3002017288, "Materials Reliability Program: Guideline for Nondestructive Examination of Reactor Vessel Upper Head Penetrations, Revision 1 (MRP-384)," dated 2019 has been incorporated into St. Lucie's ISI program.	Revision 0 07/28/2021
AR00381980	EPRI TR 1018181, "Nondestructive Evaluation: Guideline for Conducting Ultrasonic Examinations of Dissimilar Metal Welds," dated 2009 has been incorporated into St. Lucie's ISI program.	12/07/2009
AR02061596	RIS 2015-10, "Applicability of ASME Code Case N-770-1 as Conditioned in 10 CFR 50.55a, "Codes and Standards," to Branch Connection Butt Welds," has been reviewed and determined that it is not appliable because St. Lucie has no Alloy 600 branch connections.	07/21/2015
LTR-SDA-20-097-NP	St. Lucie, Units 1 and 2 SLR: Alloy 600 Half-Nozzle Repair Flaw Evaluation.	Revision 1 03/2021

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP.

During the audit, the staff made the following observations:

- The staff verified that the program basis document provides supporting evidence that a mitigation by component replacement with Alloy 690/52/152 materials accompanied with an augmented inservice inspection (ISI) performed as part of this AMP has been effective in detecting the PWSCC in the nickel-alloy welds and components as well as in identifying the presence of boric acid residues. As an example:

    - The applicant has incorporated Regulatory Issue Summary (RIS) 2018-06, "Clarification of the Requirements for Reactor Pressure Vessel Upper Head Bare Metal Visual Examinations," into its ISI program.
    - The applicant has incorporated EPRI technical report (TR) 3002017288, "Materials Reliability Program: Guideline for Nondestructive Examination of Reactor Vessel Upper Head Penetrations, Revision 1 (MRP-384)," as an industry initiative under Nuclear Energy Institute (NEI) 03-08 implementation criteria, into its ISI program.

- The staff interviewed the applicant's staff to verify (a) the applicant's review of the recent industry OpE documented in EPRI TR 3002012244, Revision 3, "Nondestructive Evaluation: Guideline for Conducting Ultrasonic Examinations of Dissimilar Metal Welds," for applicability and implementation into its ISI program, and (b) if the applicable guidance has not been implemented, when would the applicant be planning on implementing the guidance. The applicant stated that it will provide response to the requested information by supplementing its submittal.

- The staff interviewed the applicant's staff and verified that the applicant has reviewed RIS 2015-10 for applicability to St. Lucie.

The staff also audited the description of the SLRA Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-induced Corrosion in Reactor Coolant Pressure Boundary Components provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA AMP B2.3.6, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)

Summary of Information in the Application. The SLRA states that AMP B2.3.6, "Thermal Aging Embrittlement of Cast Austenitic Stainless Steel," is an existing program that is consistent with the program elements in GALL-SLR report AMP XI.M12, "Thermal Aging Embrittlement of CASS." To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
NEESL00008-REPT-078	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document - Thermal Aging Embrittlement of Cast Austenitic Stainless Steel	Revision 0, 07/28/2021
Structural Integrity Report No. 2001262.402	Flaw Tolerance Evaluation of St. Lucie, Units 1 and 2 CASS Components for SLR	Revision 1, 07/15/2021
Westinghouse Report (WCAP)-18617-P	St. Lucie Units 1 and 2 SLR: Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis	Revision 1, 06/03/2021
Report No. 1301079.402	Development of a CASS Aging Management Program for St. Lucie, Units 1 and 2 Task 5 Report	Revision 0, 09/2015

During the audit, the staff verified applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observations:

- The staff noted that St. Lucie, Units 1 and 2 primary loop coolant systems have elbows and straight piping made of centrifugally cast A-351 grade CF8A material that are thermally aged during service. The applicant used GALL-SLR screening criteria based on the molybdenum content, casting method, and ferrite content to assess the susceptibility of cast elbow and pipe components at St. Lucie to thermal aging embrittlement. The applicant has chosen a plant-specific flaw tolerance evaluation to demonstrate that the thermally-embrittled CASS material has tolerance for large flaws.
- As part of the original license renewal application, the applicant performed a baseline ultrasonic examination of the CASS components (i.e., surge line, safety injection nozzle safe-end, reactor coolant pump suction and discharge safe-end locations) susceptible to thermal aging embrittlement. The result of the applicant's baseline volumetric examinations completed for Unit 1 in 2015 and Unit 2 in 2017 revealed no crack like indications that exceed the initial postulated flaw size of 25 percent through-wall thickness assumed in the flaw tolerance evaluation.
- The staff noted that the applicant utilized NUREG-4513, revisions 1 and 2 for the fracture toughness correlation, and the results were compared. During the staff's interview of the applicant's staff, the applicant confirmed that (a) it is aware of the errata issued by the NRC in 2021 for NUREG-4513, revision 2 (ML16145A082), and (b) it used the correct symbols (i.e., the errata corrected the symbols from ≥ 15 effective full-power years (EFPY) to read ≤ 15 EFPY for CF8M materials) in its flaw tolerance evaluation.

The staff also audited the description of the SLRA Thermal Aging Embrittlement of CASS provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

If further information is needed to complete the staff's SE input, the staff will consider issuing RAIs.

SLRA AMP B2.3.7, Reactor Vessel Internals

Summary of Technical Information in the Application. The SLRA states that the AMP in SLRA appendix B, section B2.3.7, "Reactor Vessel Internals" (SLRA pages B-65 – B-74) is an existing program that, with enhancements, will be consistent with the program elements in GALL-SLR report AMP XI.M16A, "PWR Vessel Internals," as updated in NRC Interim Staff Guidance (ISG) No. SLR-ISG-2021-01-PWRVI. To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancement in the SER. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this enhanced program. The staff's audit only addressed the status of the applicant's AMP (as modified by the results of applicant's gap analysis defined in SLRA appendix C) prior to incorporation of the program elements of the AMP into the implementation procedures for the AMP. The staff will address issues identified but not resolved in this audit report or more complex RVI management issues (including the gap analysis result impacts on the inspection and evaluation [I&E] protocols of the AMP) in the SER.

Appropriate Background Information. The applicant's AMP is defined as a living, risk-informed, sampling-based condition monitoring program (i.e., augmented I&E program) that is based on the latest staff-approved version of EPRI Materials Reliability Program (MRP) report MRP-227, Revision 1-A, and any industry supplemental guidelines issued and used to supersede or supplement the I&E guidelines in MRP-227. The applicant implements the program in accordance with the industry initiative protocols in the applicable version of NEI Report No. NEI

03-08, “Guideline for the Management of Materials Issues,” used for the CLB and the implementation of the guidance in chapter 7 of the current version of MRP-227, Revision 1-A, being used for the AMP.

For Combustion Engineering Company (CE)-designed reactors like the units at St. Lucie Station, the program places each RVI component into one of the four EPRI MRP-defined inspection categories (as defined in Section 1) [page 1-2] of the applicable MRR-227 version used for the AMP. The programmatic inspection-categorization of each component is based on a number of risk-informed assessment factors including (but not necessarily limited to): (1) failure modes, effects, and criticality analysis of the component, (2) a component-specific susceptibility assessment of the component’s material of fabrication to those aging mechanisms that are defined in section 3.2 of the applicable MRP-227 version used for the AMP; and (3) a functionality assessment of the intended function(s) of the component, and whether failure of component would impact those intended function(s) or the intended function(s) of another component that serves a safety related function for the facility, as defined in 10 CFR 54.4.

The guidelines in chapter 2 and the flowcharts in figures 2-1 and 2-2 of the applicable MRP-227 version define how these assessments interact with one another and factor in the final EPRI MRP risk-informed inspection-categorization for a specified RVI component in the St. Lucie reactor unit designs. The result of this four-step sample selection process is a set of “Primary” category RVI components in the units that are inspected because they are expected to be the leading component locations for potential initiation and growth of the age-related degradation effects, with another set of “Expansion” category internals component locations that are specified for either inspections or evaluations should the indications of aging in the linked Primary component type be more severe than anticipated. The degradation effects in a third set of internals locations are deemed to be adequately managed by “Existing Programs,” such as American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), section XI, Examination Category B-N-3, examinations of core support structures. A fourth set of internals locations are deemed to require no aging management activities for the subsequent period of extended operation and are placed “No Additional Measures” category for the program.

The applicant addresses its component-specific categorization bases in the AMP, where the bases for the categorizations and the results of the categorizations are defined in either MRP-227, revision 1-A, or else as updated in the RVI gap analysis for AMP (as provided in SLRA appendix C) for components with programmatic I&E criteria that required adjustments from those defined for the component type in MRP-227, revision 1-A based on 80-year assessment considerations.

Audit Activities. During the audit, the staff reviewed the applicant’s AMP and the SLRA’s gap analysis basis for categorizing placing each of the RVI components into the Primary, Expansion, Existing Programs, or NAM category of the AMP. The staff interviewed the applicant’s personnel and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
Updated Final Safety Analysis Reports Sections		
St. Lucie Updated Final Safety Analysis Report (Unit 1)	section 4.2.2, “Reactor Vessel Internals”	12/31/2019
St. Lucie Updated Final Safety Analysis Report (Unit 1)	section 4.2.3, “Reactivity Control System”	12/31/2019
Applicable SLRA Sections		
SLRA appendix A, UFSAR Supplement section 19.2.2.7	Reactor Vessel Internals	Revision 0
SLRA appendix B, AMP section B.2.3.7	Reactor Vessel Internals	Revision 0
SLRA appendix C	Licensee Specific Activities Relative to RVI (i.e., RVI AMP Gap Analysis Basis)	Revision 0
SLRA section 3.1.2.2.9	Aging Management of Pressurized Water Reactor Vessel Internals (Applicable to Subsequent License Renewal Periods Only)	Revision 0
Basis Document Records and Relevant NRC, NEI, EPRI MRP, Vendor, or PWROG Documents		
NRC NUREG-2191, Volumes 1 and 2	Generic Aging Lessons Learned for GALL-SLR	07/2017
Enercon Report No. NEESL00008-REPT-045	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Reactor Vessel Internals	Revision 0
NextEra Energy Engineering Evaluation No. PSL-ENG-LRAM-15-002	Reactor Vessel Internals Inspection Program – License Renewal Basis Document	Revision 6
EPRI Non-Proprietary Report No. 3002017168	Material Reliability Program: Pressurized Water Reactor Internals I&E Guidelines (MRP-227, Revision 1-A	12/2019 (ML20175A112)
NEI Report No. 03-08	Guideline for the Management of Materials Issues	Revision 3, 12/2017 (ML19079A253)
NEI Report No. 14-12	NEI, Aging Management Program Effectiveness	Revision 1, 09/2020 (ML15090A665)
NRC ISG No. SLR-ISG-2021-01-PWRVI	Updated Aging Management Criteria for Reactor Vessel Internal Components for Pressurized Water Reactors	01/2021 (ML20217L203)
NRC SE for MRP-227, Rev. 1-A	Final SE for EPRI Topical Report MRP-227, Revision 1, “Materials Reliability Program: Pressurized Water Reactor Internals I&E Guideline”	04/25/2019 (ML19081A001)
NRC Verification Letter to EPRI MRP	U.S. Nuclear Regulatory Commission Verification Letter for Electric Power Research Institute Report MRP-227, Revision 1,	02/19/2020 (ML20006D152)

Document	Title	Revision / Date
	"Materials Reliability Program: Pressurized Water Reactor Internals I&E Guideline"	
EPRI Proprietary Report No. 3002010399	Materials Reliability Program: Inspection Standard for PWR Internals (MRP-228, Rev. 3)	11/2018 (Non-publicly available; ML19081A064; a redacted, publicly available version of the report is available. ML19081A058)
EPRI report No. MRP 2018-022	Interim Guidance for the Pressurized Water Internals I&E Guidelines, MRP-227-A, For SLR – Westinghouse and Combustion Engineering-Designed Reactor Vessel Internals	Revision 0 (ML19081A061)
EPRI e-Mail to NextEra Energy	FW: Interim Guidance to MRP-227-A NEI 03-08 Needed Requirements for U.S. Domestic PWR Plants Implementing "Flexible Power Operations" (MRP 2019-002)	03/07/2019
EPRI MRP Interim Guidance No. MRP 2019-002	Interim Guidance to MRP-227-A NEI 03-08 Needed Requirements for U.S. Domestic PWR Plants Implementing "Flexible Power Operations"	03/06/2019
EPRI MRP Interim Guidance No. MRP 2019-001	Materials Reliability Program: Inspection Standard for PWR Internals – 2017 Update (MRP-228, Rev. 3)	01/21/2019
EPRI Report No. MRP 2020-015	Biennial report of Recent MRP-227-A Reactor Internals Inspection Results	08/14/2020 (ML20229A000)
NRC SE to Mr. M. Nazar, President and Chief Nuclear Officer, Nuclear Division, Florida Power and Light Company	St. Lucie Plant, Unit Nos. 1 and 2 – Review of License Renewal Commitment for Reactor Vessel Internals Aging Management Plan	05/02/2018 (ML18071A002)
EPRI Proprietary report No. 3002010268	Materials Reliability Program: PWR Internals Material Aging Degradation Mechanism Screening and Threshold Values (MRP-175, Revision 1)	10/2017 (ML21215A318)
PWROG Non-Proprietary Report No. PWROG-15032-NP	PA-MSC-1288, Statistical Assessment of PWR RV Internals CASS Materials	Revision 0 (ML16068A245 and ML16068A246)
Westinghouse Proprietary Report No. WCAP-18452-P	St. Lucie Unit 1 Core Support Barrel and Core Shroud Flaw Analysis	Revision 1, 03/2020

Document	Title	Revision / Date
(Included as a Proprietary Enclosure in NextEra Energy AR QA No. 02333990)		
Westinghouse Proprietary Letter and Analysis Summary No. LTR-AMLR-18-22 (Included as a Proprietary Enclosure in both NextEra Energy AR QA Nos. 02255865 and 0000290891)	Disposition of Indications Observed in the Core Support Barrel and St. Lucie Unit 1	Revision 0, 03/30/2018
NextEra Energy Procedures		
St. Lucie Plant Administrative Procedure No. ADM-17.29	Reactor Vessel Internals Aging Management Procedure	Revision 9
NextEra Energy ARs		
NextEra Energy AR QA Record No. 02278961	Responses to PTN and PSL INPO MRV Recommendations	11/07/2018
NextEra Energy AR No. 02262124-04 (PSL)	Perform Level 1 Assessment for Reactor Vessel Internals (RVI) Program, Supports INPO Material Review Visit	Revision 04
NextEra Energy AR QA Record No. 02256078	Wear Identified in Core Stabilizer Lug (RSVB-1)	04/02/2018
NextEra Energy AR QA Record No. 02256266	Wear and/or Locking Pin Protrusion on Core Stabilizer Lugs 5&6	04/02/2018
NextEra Energy AR No. 02299052	Fleet Review of MRP 2019011 Industry Letter, Communicates MRP-228, Rev. 3 Issuance, RVI Program	03/01/2019
NextEra Energy AR QA Record No. 02333990	Summary of RVI Program, MRP-227 Core Barrel Exam Results	05/05/2020
NextEra Energy AR QA Record No. 02255865	Linear Indications on Core Support Barrel – MRP-227-A Exams	11/20/2019
NextEra Energy AR QA Record No. 0000290891	Westinghouse Evaluation of Indications in U1 Core Support Barrel	Revision 0 03/31/2018
NextEra Energy AR No. 02308972	Fleet Review of MRP -2019-002 Industry Letter, NEI 03-08 Needed Requirements for U.S. Domestic Plants Implementing “Flexible Power Operations”, RVI Program	05/01/2019
NextEra Energy AR No. 02321810	Fleet Review of MRP 2019-009, RVI Program, NEI 03-08 “Good Practice” Interim Guidance Regarding PWR Core Barrel and Core Support Barrel Inspection Requirements	07/19/2019
NextEra Energy AR No. 02350217	Fleet Review of MRP 2020-007, RVI Program, NRC Acceptance of MRP-227, Rev. 1-A	03/26/2020

Document	Title	Revision / Date
NextEra Energy AR No. 02357503	Fleet Review of MRP 2020-011, RVI Program, Notification of Recent OpE Related to Displaced PWR Clevis Insert Assembly	05/22/2020
NextEra Energy AR No. 02235785	Fleet Review of MRP 2017-024 Clevis Insert Bolt OpE, ICES # 416600	11/09 and 10/2017

During the audit, the staff verified that applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," and "corrective actions" program elements are consistent with the corresponding program elements in GALL-SLR AMP XI.M16A, "PWR Vessel Internals," as updated appendix D in NRC ISG Document No. SLR-ISG-2021-01-PWRVI.

During the audit, the staff made the following observations ("StaffOb – Topic" in the bullet title) or the applicant made the following clarifications ("AppCl – Topic" in the bullet title) in regard to program element aspects of the AMP:

- AppCl – Plant Record Containing the Formal Gap Analysis. The applicant clarified that the formal RVI gap analysis used for the AMP is given in EPRI Letter No. MRP 2018-022.

- StaffOb – Version of NEI 03-08 Applied to the AMP. The staff observed that the applicant uses NEI 03-08, Revision 3 as the applicable NEI 03-08 version for implementing its RVIs Program. The staff observed that the NRC does not have any restrictions of the version of NEI 03-08 being applied for the program.

- StaffOb – NextEra Energy AR No. 02299052; Version of MRP-228 Inspection Standard Applied to the AMP. The staff observed that, consistent with EPRI MRP Interim Guidance No. MRP 2019-001 and NextEra Energy AR No. 02299052, the applicant is applying the methodology in EPRI Proprietary report no. 3002010399 (MRP-228, Revision 3) as the nondestructive examination (NDE) standard for visual or volumetric inspections performed in accordance with the program; a publicly available, redacted version of this EPRI report is available at. ML19081A058.

- StaffOb – Confirmation of SLRA Appendix C Gap Analysis Adjustments to the AMP. The staff observed that SLRA Appendix C makes the following adjustments of the MRP-227, Rev. 1-A programmatic bases for the AMP:

  - Core support barrel (CSB) assembly tie rod criteria; core stabilizing lug and lug shim bolt criteria. The gap analysis adjusts the AMP to establish the CSB assembly tie rods and the core stabilizing lugs and lug shim bolts as Primary category components for the program that will be implemented during the subsequent period of extended operation; Primary category basis calls for baseline VT-3 visual inspections of the components "no later than 2 refueling outages from the beginning of the subsequent period of extended operation, with subsequent VT-3 examinations of the tie rods during every refueling outage." The staff observed that, for the adjusted 80-year basis, the CSB tie rods screen in for mechanisms of irradiation-assisted stress corrosion cracking (IASCC), fatigue, wear, void swelling (VS; distortion), irradiation embrittlement (IE), and irradiation-enhanced stress relaxation or creep (ISR/IC); the staff observed that the referenced lugs and lug shim bolts screen in for the mechanisms of stress corrosion cracking (SCC) and wear. The staff

did not identify any potential issues with the SLRA gap analysis programmatic bases for the CSB tie rods or the core stabilizing lugs and lug shim bolts.

- CSB middle girth weld (MGW), middle axial weld (MAW), lower axial weld (LAW) criteria and lower support structure (LSS) core support column criteria. The gap analysis adjusts the AMP to elevate the CSB MGW in each unit from an Expansion category for the 60-year version of the program to a Primary category component upon entry into the subsequent period of expended operation for the 80-year version of the program. When triggered, the updated basis for the program calls for the applicant to perform visual EVT-1 inspections of the CSB MAWs and LAWs and the core support plates no later than two refueling outages from the beginning of the first license renewal period, with subsequent EVT-1 visual inspections of the CSB MAWs and LAWs (and the core support columns) to be performed on an augmented, 10-year re-inspection interval basis. For the adjusted 80-year basis, the CSB LAWs screen in the aging mechanisms of SCC, IASCC, and IE. The staff did not identify any potential issues with the SLRA gap analysis programmatic bases for the CSB MGWs, MAWs, and LAWS or the LSS core support columns.

- Core shroud assembly criteria. The gap analysis adjusts the AMP to establish that the core shroud assembly (for the applicable welded shroud design in two vertical sections) is a Primary category component for the AMP that will be implemented during the subsequent period of extended operation. The staff noted that the updated basis for the program calls for the applicant to perform visual VT-1 inspections of 100 percent of the horizontal weld seam between the upper and lower shroud segments no later than two refueling outages from the beginning of the first license renewal period, with subsequent VT-1 visual inspections of the seam welds to be performed on an augmented, 10-year re-inspection interval basis. For the adjusted 80-year basis, the core shroud assembly screens in for the aging mechanisms of void swelling/distortion and IE; there are no linked Expansion category components for the Primary category core shroud assembly seam welds. The staff noted that gap analysis-adjusted program does not include any linked Expansion category components for the core shroud assembly horizontal seam weld examinations. The staff did not identify any potential issues with the SLRA gap analysis programmatic bases for the core shroud assembly. The staff will summarize this gap analysis basis in the SER section for this AMP.

- StaffOb – Augmented Inspection Criteria for CSB flexure weld. Observed that in items C7 of table 4-2 in the MRP-227, Rev. 1-A, the EPRI MRP identifies that the CSB flexure welds are to be designated as Primary category components for the program if screening of fatigue and SCC cannot be satisfied by plant-specific evaluation. If fatigue or SCC cannot be screened out by plant-specific evaluation, the EPRI calls for the CSB flexure weld to be inspected using a EVT-1 visual examination no later than two refueling outages from the license renewal period, with subsequent EVT-1 examinations to be performed on a 10-year augmented re-inspection basis. The EPRI MRP does not designate any linked Expansion category components for CSB flexure welds.

  The staff observed that the information in MRP-2018 022 and the program basis document in Enercon report no. NEESL00008-REPT-045, Revision 0 did not provide sufficient supporting information to support whether the CSB flexure weld in each unit

was being established as a Primary category component for the 80-year version of the program. The staff may address this informational gap through consideration of an RAI.

- StaffOb – Augmented Inspection Criteria for core support plate in the LSS. The staff observed that in item C9 of table 4-2 in MRP-227, Revision 1-A, the EPRI MRP identifies that the LSS core support plate in each unit is to be designated as a Primary category component for the program if screening of fatigue cannot be satisfied by plant-specific evaluation. If consideration of fatigue cannot be screened out by plant-specific evaluation, the EPRI calls for the LSS core support plate to be inspected using a EVT-1 visual examination no later than two refueling outages from the license renewal period, with subsequent EVT-1 examinations to be performed on a 10-year augmented re-inspection basis. The EPRI MRP does not designate any linked Expansion category components for LSS core support plates.

  The staff observed that the information in MRP-2018 022 and the program basis document in Enercon report no. NEESL00008-REPT-045, revision 0 did not provide sufficient supporting information to support whether the LSS core support plate in each unit was being established as a Primary category component for the 80-year version of the program. The staff may address this informational gap through consideration of an RAI.

- StaffOb – Augmented Inspection Criteria for the upper internals assembly (UIA) fuel alignment plates. The gap analysis for the AMP establishes the UIA fuel alignment plates of the units as a linked Expansion category components (i.e., in addition to the CSB lower axial welds [LAWs]) for the programmatic inspections that will be performed on the Primary category CSB MGWs during the subsequent period of extended operation. The staff noted that, upon entry into the subsequent period of extended operation, the revised Expansion category basis calls for “expansion-based” visual EVT-1 inspections of the UIA fuel alignment if evidence of a confirmed crack exceeding two inches in length is detected in the CSB MGW. The staff also noted that, in item C10 of Table 4-2 in MRP-227, Rev. 1-A report, the EPRI MRP designates the UIA fuel alignment plate as a Primary category component for the program “if component-specific screening for fatigue cannot be satisfied by a plant-specific evaluation.” Thus, the staff determined the staff would need further reconciliation on the inspection category and potential inspection criteria for the UIA fuel alignment plate in each of the units. The staff may address this informational gap through consideration of an RAI.

During the audit of program, the staff audited relevant plant-specific, and generic OpE related to program. The staff did not identify any aging effects or mechanisms outside of the those already identified for the AMP in the “parameters monitored or inspected” program element for the AMP. During the audit, the staff made the following observations (“StaffOb(s) – Topic” in the bullet title) or the applicant made the following clarifications (“AppCI – Topic” in the bullet title) in regard to OpE that applies to the program:

- StaffOb – NextEra Energy AR QA Record Nos. 02255865, 0000290891, 02320810, and 02333990; EPRI MRP Biennial Reports. The staff observed that EPRI Biennial Report No. MRP 2020-015 (ML20229A000) provides a summary of the applicant’s base line inspections that were applied to the Primary Category RVI components (including the

core shroud plate-to-former plate weld with noted flaw indications) and to the Expansion Category CSB MAWs with noted flaw indications) in year 2018. The staff noted that, collectively, the referenced AR QA records address the applicant's activities to record and evaluate relevant flaw indications detected in some of the CSB MAWs, LAWs and lower girth weld, and the core shroud upper flange weld of St. Lucie Unit 1 and in 2018, and that the analyses in Westinghouse Proprietary Letter and Analysis No. LTR-AMLR-18-22 and Westinghouse Proprietary Report No. WCAP-18452, Revision 1 provide the supporting evaluations of degradation detected in the components.

The staff also observed that, collectively, these records support re-inspections of the Unit 1 CSB assembly welds and core shroud welds contained in these indications on a 10-Year augmented re-inspection basis and that the applicant's treatment and basis for managing age-related degradation in the structural welds is conservative. The staff noted that the application provides sufficient explanations and justifications on the inspection categories and future inspection needs for the welds in the gap analysis for the AMP in SLRA appendix C. The staff will provide its evaluation of the OpE associated with the Unit 1 CSB welds and core shroud welds in the SER section for this AMP.

- StaffOb – NextEra Energy AR No. 02321810. The staff observed that this AR provides the applicant's bases for implementing the EPRI MRP good practices in MRP 2019-009 for a one-time inspection of the Unit 1 CSB assembly; the staff noted that this is in addition to the applicant's basis for reinspecting known CSB welds and core shroud welds with known flaw indications, as summarized in the observations for the previous CSB and core shroud weld experience. The staff will provide its evaluation of the OpE associated with the CSB welds and core shroud welds in the SER section for this AMP.

- StaffOb – NextEra Energy AR QA record nos. 02256078 and 02256266 and AR record no 02357503. The staff observed that, per these records, the applicant conservatively addresses wear-type OpE indications that were detected in some of the core stabilizer lugs. The staff noted that the record shows that the wear in the lugs appears to be a result of surface damage. However, under the gap analysis of the program, the applicant is conservatively elevating the core stabilizer lugs as new Primary category components for VT-3 type visual inspections during the subsequent period of extended operation, with inspections to be performed on a 10-year basis. The staff did not identify any issues or information gaps in regard to the records or with the applicant's treatment and assessment of the relevant OpE. The staff will evaluate the core stabilizing lug experience in the SER section for this AMP.

- StaffOb – Applicability of EPRI Interim Guidance MRP 2019-002. The staff observed that the interim guidance in MRP 2019-002 for applying the EPRI MRP-227, Revision 1-A I&E protocols under flexible plant operations do not need to be applied to the St. Lucie design basis for the program. The staff noted that the information in NextEra Energy AR No. 02308972 provides confirmation that the St. Lucie units operate under base-load operations, which is consistent with the plant operating assumptions in chapter 1 of MRP-227, Revision 1-A. The staff did not identify any issues or information gaps in regard to the contents of this record or with the applicant's treatment and application of this record. The staff will note the unit-specific base load operations as part of the OpE evaluation in the SER section for this AMP.

- StaffOb – NextEra Energy AR No. 02350217. The staff observed that this record provides the applicant's basis updating the I&E criteria of the program to those that are defined in EPRI report MRP-227, Revision1-A. The staff did not identify any issues or information gaps in regard to the contents of this record or with the applicant's treatment and application of this record.

The staff will evaluate the identified plant-specific OpE in the SER section for the AMP.

The staff also audited the UFSAR supplement summary description of the SLR AMP provided in SLRA section 19.2.2.7, "RVIs." The staff verified this description is consistent with the description provided in the GALL-SLR table XI-01 for PWR vessel internals programs.

During the audit, the staff noted that, in the May 2, 2018, SE for the 60-year inspection plan (as defined in Engineering Evaluation No. PSL-ENG-LRAM-15-002, Revision 6), the staff included the following statement in the conclusion section of the SE:

> "*The licensee must follow the implementation requirements as defined in Section 7.0 of MRP-227-A, which require that the NRC be notified of any deviations from the "Needed" requirements.*"

StaffOb. The staff observed that this SE statement was in conflict with License Condition Clause 3.C in Renewed Operating License Nos. DPR-67 and NPF-16 (for St. Lucie Units 1 and 2, respectively). The staff will address this matter in the UFSAR supplement subsection of SER section for this AMP.

SLRA AMP B2.3.8, Flow-Accelerated Corrosion

Summary of Information in the Application. Section B2.3.8 of the SLRA states that the Flow-Accelerated Corrosion AMP is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M17, "Flow-Accelerated Corrosion." To verify the program's consistency, the staff audited the SLRA AMP and reviewed the associated enhancements. The staff will document its review of the applicant's enhancements to the program in the SER. At the time of the audit, the applicant had not yet revised the procedures to implement the program's enhancements. Consequently, the staff's audit only included the applicant's program basis document, available procedures, and referenced documents. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant through its ePortal. For the OpE review, the applicant explained the process used to identify and evaluate pertinent OpE. The staff evaluated the applicant's methodology and reviewed the OpE documentation contained in the SLRA and ePortal. In addition, the applicant provided the results of separate OpE searches of the plant-specific database using keywords of "cavitation," "erode," "erosion," and "impinge."

The table below lists documents reviewed by the staff and found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
NEESL00008-REPT-046	Aging Management Program Basis Document – Flow-Accelerated Corrosion	Revision 0
NEESL00008-REPT-038	Aging Effects OpE	Revision 0
AR 2216036	Unit 2 B Component Cooling Water (CCW) heat exchanger tube failure is erosion/corrosion on inside of aluminum brass tube	NA
AR 586875	Unit 2 B Intake Cooling Water (ICW) discharge line downstream of orifice identified degradation to wall thickness	NA
AR 1611439	Through-wall leak on Unit 2 5B air vent and nozzle due to erosion from steam bypass around orifice	NA
AR 1840213	ICW discharge line downstream of flow orifices has recurring leaks due to flow-induced erosion	NA
AR 598640	Significant FAC wear in 1.5 ES 11-P-1-12. Elbow did not meet minimum wall and was replaced	NA
AR 2096105	ICW piping from Unit 2 CCW heat exchanger has cement liner degradation from erosion	NA
PSL-ENG-LRAM-00-091	Flow-Accelerated Corrosion Program – [Initial] License Renewal Basis Document	Revision 7
PSL-ENG-LRAM-00-114	Pipe Wall Thinning Inspection Program – [Initial] License Renewal Basis Document	Revision 7
15-0210-TR-001	System Susceptibility Evaluation (December 2016)	Revision 0
15-0210-TR-002	Flow-Accelerated Corrosion Program – Susceptible Non-Modeled Program (Dec-2016)	Revision 0
19-0152-TR-001	Erosion Inspection Plan for Five Outages (Feb-2021)	Revision 0
ER-AA-111	Flow-Accelerated Corrosion Program	Revision 3
ER-AA-111-1000	Flow-Accelerated Corrosion Program Activities	Revision 4
ER-AA-111-1001	Feedwater Heater Shell Inspection for Detection of Flow-Accelerated Corrosion	Revision 2
L2R26 -FAC	FAC Outage Final Summary Report – Refueling Outage 26	NA
L1R29-FAC	FAC Outage Summary Report – Refueling Outage 29	NA
L1R30-FAC	FAC Outage Summary Report – Refueling Outage 30	NA

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are or will be consistent with the corresponding elements of the GALL-SLR Report AMP, after completing the identified enhancements.

During the audit of the "OpE" program element, the staff reviewed the results of the plant-specific database searches to identify examples of age-related degradation and to support the staff's determination of the ability of the applicant's program to manage the effects of aging. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA Flow-Accelerated Corrosion program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.9, Bolting Integrity

Summary of Information in the Application. The SLRA states that AMP B2.3.9, "Bolting Integrity," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M18, "Bolting Integrity." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REP-047	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Bolting Integrity	Revision 0
NEESL00008-REP-041	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD	Revision 0
0005760_022	St. Lucie Plant Implementation Guidelines of the ASME Section XI Repair and Replacement Program	Revision 22
0-GMM-99.17	Threaded Fasteners on Pressure Boundaries, Structural Steel and Plant Equipment	Revision 9
4th-ISI-PSL-2-Program Plan	St. Lucie Nuclear Power Plant Unit 2 Fourth Inservice Inspection Interval Program Plan	Revision 3
5th Interval-ISI-PSL-1-Program Plan	Fifth Inservice Inspection Program Plan for St. Lucie Nuclear Power Plant Unit 1	Revision 0
AMD-02.01	Control of Chemicals and Materials for the Maintenance of Plant Systems	Revision 8
AMD-17.33	License Renewal Systems / Programs Monitoring	Revision 15
GMP-22	Plant Lubrication Manual	Revision 101

NES 4.5	Visual Examination Non-Section XI	Revision 4
SPEC-M-004	Maintenance Bolting Specification for St. Lucie Units 1 & 2	Revision 15
AR01912011	SL1-25 Condenser Dogbone Expansion Joint Seat Issue	10/29/2013
AR02211378	Degraded Bolt on Motor Shroud	06/27/2017
AR02321300	U1 License Renewal Walkdown-Corroded Flange Bolts 1A AFW PP	07/22/2019
AR02323021	U2 License Renewal Walkdown-Surface Corrosion on Flange Bolt	08/06/2019
AR02323023	U2 License Renewal Walkdown-Corroded Flange & Bolts (C-90)	08/06/2019
AR02332311	1B CCW HX Multiple Channel Head Nuts Need Replacing- LRI	10/24/2019
AR02337914	U2 License Renewal Walkdown-Corroded Flange Surfaces & Bolts	12/16/2019
AR02345988	U2 PX-21-8B Blind Flange to CW-72 Has Corroded Bolts	02/27/2020
AR02355477	License Renewal Walkdown – Corrosion on the Packing Gland for Valve	05/26/2020
AR02374153	License Renewal Effectiveness Review & SLR Interview Track	01/25/2021
AR02381822	License Renewal Aging Management Effectiveness Review Rollup	01/26/2021
WO40762995-02	U1 Trestle “A” Train SSC- Upgrade Protective Coatings	05/06/2021
WO4019393701	U2 AFW PP 2A Suction Pipe C-54 Corroded, Clean & Coat	11/06/2012
WO4054634801	HPSI PP 1B: Degraded Bolts on Motor Shroud	10/02/2017
WO4060828907	U1 CCW HX 1B: HX OPS PMT VT-2	02/04/2020
WR94084376	Inspect and/or Retorque All 1A/1B Cond Seal Boot Fasteners	10/15/2013
WR94196688	U1: C-54 – License Renewal Walkdown -Corroded Flange Bolts 1A AFW PP	07/17/2019
WR94196689	U1: PT-09-8A – License Renewal Walkdown - Corroded Bolts in Support	07/17/2019
WR94197282	U2 License Renewal Walkdown-Surface Corrosion on Flange Bolt	07/31/2019
WR94197283	U2 License Renewal Walkdown-Corroded Flange & Bolts (C-90)	07/31/2019
WR94200452	U1: CCW HX 1B – Multiple Channel HD Nuts Need Replacing; LRI	10/21/2019
WR94202545	U2: C-54 – Corroded Flange Surfaces & Bolts	12/10/2019

WR94205446	U2: PX-21-8B – Bling Flange to CW-72 Has Corroded Bolts	02/25/2020
WR94209291	U0: V15236 – Corrosion on the Packing Gland	05/04/2020

During the audit, the staff verified the applicant's claim that the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements. In addition, the staff found that for the "preventive actions" program element, sufficient information was not available to determine whether it was consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing an RAI in order to obtain the information necessary to verify whether this program element is consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observation:

- The staff noted that the current program does not clearly specify if lubricants containing MoS_2 or other lubricants containing sulfur have ever been used at PSL.

The staff also audited the description of the SLRA Bolting Integrity program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.10, Steam Generators

Summary of Information in the Application. The SLRA states that AMP B2.3.10, "Steam Generators," is an existing program that is consistent with the program elements in GALL-SLR Report AMP XI.M19, "Steam Generators." To verify this claim of consistency, the staff audited the SLRA AMP. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant through its ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
Action Request (AR) 02076132	SL2-22 Steam Generator Feedring Inspection Results	09/23/2015

Document	Title	Revision / Date
AR 02185403	Unit 2 Loose Parts System in Alarm for 2B Steam Generator	02/14/2017
AR 02256420	SL1-28 Steam Generator Secondary Side Inspection Summary Results	03/27/2018
AR 02278480	SL2-24 Steam Generator Feedring Inspection Results	09/28/2018
Intertek AIM report AES 170610264-2-1	Review of Degradation and Operational Assessments for St. Lucie Unit 1 Steam Generators for Cycle 27	Revision 0
report AIM 200110733-2-1	Intertek AIM Report for the Review of Degradation and Operational Assessments for St. Lucie Unit 2 Steam Generators for Cycle 24	Revision 0
NEESL00008-REPT-048	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Steam Generators	Revision 0
CSI-NDE-00-07	Steam Generator Secondary Side Integrity Plan	Revision 15
CSI-NDE-00-081	Strategic Plan for Steam Generator Integrity	Revision 6
ER-AP-121	Steam Generator Integrity	Revision 8
	Steam Generator Program Owner Interview Form (Applicant Form)	N/A
	Master System Health Report – Steam Generators	11/24/2020
ML17117A334	St. Lucie, Unit 1 – Refueling Outage SL1-27 Steam Generator Tube Inspection Report	04/17/2017
ML17331A685	St. Lucie Nuclear Plant, Unit 1 – Review of the Fall 2016 Steam Generator Tube Inservice Inspection Report for Refueling Outage 27	12/21/2017
ML19081A146	St. Lucie, Unit 2 – Refueling Outage SL2-24 Steam Generator Tube Inspection Report	03/22/2019
ML19233A273	St. Lucie, Unit 2 – Refueling Outage SL2-24 Steam Generator Tube Inspection Report RAI Response	08/21/2019
ML19242D608	St. Lucie Nuclear Plant, Unit 2 – Review of Steam Generator Tube Inspection Report for Refueling Outage 24	09/16/2019
AES 14028596-2Q-2	Probabilistic Operational Assessment for Fan Bar Support Wear in St. Lucie Unit 1 Steam Generators at End of Cycle 24	10/2014
ML21305A868	St. Lucie Nuclear Plant, Unit 1 – Refueling Outage SL1-30 Steam Generator Tube Inspection Report	11/01/2021
1-PMM-01.05	Unit 1 Steam Generator Primary Side Maintenance	Revision 2

During the audit, the staff verified the applicant's declaration that the program elements: "preventive actions," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

In addition, the staff found that for the “scope of the program” and “parameters monitored or inspected” program elements, sufficient information was not available to determine whether they are consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether the program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit of the “OpE” program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA SGs program provided in the UFSAR supplement. During the audit, the staff communicated areas where the UFSAR supplement is not consistent with the description provided in the GALL-SLR Report. Specifically, the revision of NEI 97-06 that the SGs program is based on was not cited, no discussion of tube-to-tubesheet welds being managed by the SGs program was included, statements related to tube repair were made even though St. Lucie is not approved for alternate repair criteria or alternate repair methods, the implementation schedule did not match Table XI-01 in the GALL-SLR Report, and no discussion of operational assessments as part of the SGs program was included.

SLRA AMP B2.3.11, Open-Cycle Cooling Water System

Summary of Information in the Application. The SLRA states that AMP B2.3.11, “Open-Cycle Cooling Water System,” is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M20, “Open-Cycle Cooling Water System.” To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements to the GALL-SLR Report AMP in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-049	SLR Program Basis Document – Open-Cycle Cooling Water System	Revision 0
ER-AA-123	NRC GL 89-13 Service Water Program - Fleet Procedure	Revision 2
ER-SL-123-1000	NRC GL 89-13 Program – St. Lucie Plant	Revision 1
LTAM PSL-15-0139	ICW Pipe Replacement	07/01/2015

SLR-8770-G-082_Sh2	Flow Diagram – Circulating & ICW System	Revision 33
SLR-2998-G-082_Sh2	Flow Diagram – Circulating & ICW System	Revision 61
AR 00585332	2A ICW Discharge Line I-30-CW-30 Downstream of Orifice SO-21	10/06/2010
AR 1740921	1A & 1B ICW Discharge Header Root Cause Determination	03/04/2012
Q1-2015	PSL Health Report – Intake Cooling Water	11/30/2020

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

The staff also audited the description of the SLRA Open-Cycle Cooling Water System provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.12, Closed Treated Water Systems

Summary of Information in the Application. The SLRA states that AMP B2.3.12, "Closed Treated Water Systems," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M21A, "Closed Treated Water Systems." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-050	St. Lucie Units 1 and 2 SLR AMP Program Basis Document – Closed Treated Water Systems	Revision 0
AR 02180710	Discontinued sodium nitrite addition to CCW and CTW systems in January 2017	01/20/2017
AR 02311687	Level 1 Assessment of CCW Molybdate Program	04/22/2019
AR 00406430	Apparent Cause Evaluation: PSL 2B CCW HX Inlet Line Pipe Stub Failure	03/10/2010
AR 02270544	CCW MIC Testing	06/29/2018

AR 01822401_000	2B CCW HX Outlet Piping Socket Weld Leak	11/11/2012
AR 01892787_000	Biocide Treatment to U1 CCW System	07/29/2013

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

The staff also audited the description of the SLRA AMP for the Closed Treated Water Systems provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.13, Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

Summary of Information in the Application. SLRA states that AMP B2.3.13 "Inspection of Overhead Heavy Load and Light Loads (Related to Refueling) Handling Systems," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M23, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEEDL00008-REPT-063	St. Lucie Units 1 and 2 SLR AMP Basis Document – Inspection of Overhead Heavy Load and Light Loads (Related to Refueling) Handling Systems	Revision 0
NEEDL00008-REPT-059	St. Lucie Units 1 and 2 SLR AMP Basis Document – Structures Monitoring	Revision 0
ADM-17.32	Structures Monitoring Program	Revision 7
1-PMM-74.03	Polar Crane Pre, Post, and Daily Inspections and Lubrications	Revision 4
2-PMM-74.03	Polar Crane Pre, Post, and Daily Inspections and Lubrications	Revision 4
1-PMM-67.10	New Fuel Handling Crane Lubrication	Revision 0

2-PMM-67.06	Refueling Machine Lubrication & Inspection	Revision 06
0-MMP-74.02	Spent Fuel Cast Handling Crane Inspection	Revision 1C
-PMM-74.05	Overhead Crane and Hoist Inspections	Revision 6
UFSAR, U1	Section 9.6, Cranes - Overhead Heavy Loads Handling Systems	Amendment No. 28
UFSAR, U2	Section 9.6, Cranes - Overhead Heavy Loads Handling Systems	Amendment No. 24
System Health Report 01981836	U1 Fuel Handling Building roof. Cask Crane structure is rusting mainly at the bolted connections in the concrete. If delayed, bolts and nuts must be replaced. Safety Related structure	Q3-2015
System Health Report 01981836	To be scheduled by 12/29/2015. U1 Fuel Handling Building roof. Cask Crane structure is rusting mainly at the bolted connections in the concrete. If delayed, bolts and nuts must be replaced. Safety Related structure	Q4-2020
WO #: 40422582-01	U1 Spent Fuel Cask Handling Crane- Misc. Steel Corrosion	10/29/2015
AR 02420193	Degraded bolting on U1 FHB Cask Crane Structural Attachment	03/01/2022
AR 02420776	U1 CHF Cask Crane Acceptance with Deficiency	03/07/2022
WO #: 40608112-06 LR Report: U1-FH-041 -FU1	Structural Deficiency Report – Follow-up Inspection Deficiency Location: Reinforced Concrete	12/04/2014
WO #: 40608112-06 LR Report: U1-FH-041 -FU1	Structural Deficiency Report – Follow-Up Inspection Deficiency Location: Spent Fuel Cask Handling Crane	09/18/2014

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

The staff also audited the description of the Inspection of Overhead Heavy Load and Light Loads (Related to Refueling) Handling Systems AMP provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.14, Compressed Air Monitoring

Summary of Information in the Application. The SLRA states that AMP B2.3.14, "Compressed Air Monitoring," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M29, "Compressed Air Monitoring." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant through its ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-064	Aging Management Program Basis Document – Compressed Air Monitoring	Revision 0
PSL- Instrument & Service Air	Master System Health Report	11/30/2020
AR-00549399	Instrument Air Self-Assessment	08/28/2007
AR-00455450	Instrument Air Self-Assessment	11/18/2008
AR- 02131721	IA Samples Have Particulate Larger Than 40 Microns	05/13/2016

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also verified the applicant's claim that aspects of the "acceptance criteria," and "corrective actions" program elements not associated with the enhancement identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR Report AMP.

During the audit of the "OpE" program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA Compressed Air Monitoring program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.15, Fire Protection

Summary of Information in the Application. The SLRA states that AMP B2.3.15, "Fire Protection," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M26, "Fire Protection." To verify this claim of consistency, the staff audited the SLRA AMP. Issues identified but not resolved in this report will be addressed in the SER. During the audit, the staff reviewed the enhancements associated with this AMP and will document its review in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant through its ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
AR 02154894	FDPR-25-109 Has Broken Springs	09/09/2016
AR 02255473	Distortion to Radiant Energy Shield on Conduit 10375X	03/21/2018
AR 02260065	Penetration FS20 in SW [Southwest] Corner of Unit 2 2A Switch Gear Room Degraded	04/17/2018
AR 02260602	Door RA36 Does Not Close Automatically	04/20/2018
AR 02274895	Loose Door Seal/Gasket on Door 152/RA-41	08/06/2018
AR 02306375	Degraded Pipe Penetration	03/19/2019
AR 02308438	RA-88 Fire Door Failed 6 Month PM [Periodic Maintenance]	04/01/2019
NEESL00008-REPT-020	St. Lucie Units 1 and 2 SLR Screening and Aging Management Review Results – Fire Protection and Service Water System	Revision 0
NEESL00008-REPT-051	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Fire Protection	Revision 0
FP-AA-104-1001	Fire Protection Performance and Trending	Revision 4
ADM-19.00	Fire Protection Plan	Revision 18
1-FMM-99.11	Fire Damper Inspection	Revision 2
1-FMM-99.12	Unit 1 Fire Door Inspection	Revision 5
2-FMM-99.12	Unit 2 Fire Door Inspection	Revision 6
1-FMM-99.29	Halon Fire Extinguishing System Inspection	Revision 4
1-FPSP-15.01	Unit 1 Fire Barrier Inspection	Revision 4
2-FPSP-15.01	Fire Barrier Inspection	Revision 2
	Fire Protection Program Interview Form	12/01/2020
	Master System Health Report – Fire Protection	11/24/2020

During the audit, the staff verified that for the program element that the applicant declared was consistent, the "preventive actions" program element of the SLRA AMP is consistent with the corresponding element of the GALL-SLR Report AMP.

The staff also verified the applicant's claim that aspects of the "parameters monitored or inspected," "detection of aging effects," and "monitoring and trending" program elements not associated with the enhancements identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR Report AMP.

In addition, the staff found that for the "scope of the program," "acceptance criteria," and "corrective actions" program elements, sufficient information was not available to determine whether they are consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether the program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit of the "OpE" program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA Fire Protection program provided in the UFSAR supplement. During the audit, the staff communicated areas where the UFSAR supplement is not consistent with the description provided in the GALL-SLR Report. Specifically, the enhancement related to the aging effects that subliming, cementitious, and silicate materials used in fireproofing and fire barriers will be inspected for, and the use of the phrase "abnormal degradation."

SLRA AMP B2.3.16, Fire Water System

Summary of Information in the Application. The SLRA states that AMP B2.3.16, "Fire Water System," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR report AMP XI.M27, "Fire Water System." To verify this claim of consistency, the staff audited the SLRA AMP. Issues identified but not resolved in this report will be addressed in the SER. During the audit, the staff reviewed the enhancements associated with this AMP and will document its review in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant through its ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
Action Request (AR) 01613603	Fire Protection Deluge Piping is Contacting Lube Oil Piping	01/28/2011

Document	Title	Revision / Date
AR 01702899	Corroded Fire Suppression Piping	11/03/2011
AR 01765560	Need to Replace Deluge Piping Due to Internal Corrosion	05/09/2012
AR 01864516	Pipe Support for Hydrogen Seal Oil Deluge System Degraded	04/09/2013
AR 01879932	Small-Bore Piping and Hardware Needs Re-Coated	06/06/2013
AR 01924324	NRC IN [Information Notice] 13-06, Corrosion in Fire Protection Piping Due to Air	12/03/2012
AR 01963361	Corrosion on Fire Lines FP-84, -45, -46 & -92 in CWST [City Water Storage Tank] Area	05/02/2014
AR 02001233	Leak from Pipe Elbow Downstream of V15874	10/22/2014
AR 02002946	Fire Protection Line Corrosion	10/28/2014
AR 02106171	CR [Condition Report] 02105853 Identified a Failure of a Fire Protection Pope	01/29/2016
AR 02113578	Supply to A and B City Water Storage Tanks Degraded	02/28/2016
AR 02130089	Through-Wall Leak on Piping for Sprinkler Actuation Bell	05/05/2016
AR 02158300	40392080-01 Turbine Lube Oil Deluge Test (three through-wall leaks)	09/26/2016
AR 02189738	U2 [Unit 2]: Coatings on Fire Protection Piping in the Turbine Building	03/06/2017
AR 02189751	U2: Coatings on Fire Protection Piping on the RAB [Reactor Auxiliary Building] Roof	03/06/2017
AR 02190938	Fire System SS15956 has Uniform Corrosion Pitting Interior	03/12/2017
AR 02221689	U-2 [Unit 2] Fire Header Corrosion Cell Required UT Thickness Eval	08/23/2017
AR 02222778	SB15204 Piping Degraded Soft Patch Leaking	08/30/2017
AR 02226103	CWST 1A External Coatings and Repairs	09/21/2017
AR 0226107	CWST 1B Need External Coatings and Repair	09/21/2017
AR 02296268	Degraded Pipe Downstream of Orifice	01/02/2019
AR 02319588	Severely Corroded Piping Downstream of SH152053	06/28/2019
AR 02323637	Severe Corrosion and Degradation on V15630	08/07/2019
AR 02323118	1A Fire Pump Recirculation Line is Extremely Degraded	09/17/2019
AR 02335426	Leak on 1B Fire Pump Recirculation Line	11/13/2019

Document	Title	Revision / Date
AR 02347937	TLO [Turbine Lube Oil] Reservoir Deluge Piping Through-wall Leak	03/10/2020
AR 02356642	Fire Sprinkler Valve V15846 Leaking at Approximate Rate of 1 GPM [Gallon Per Minute]	05/14/2020
AR 02359859	Coat Recirculation Piping Fittings on 1A Fire Pump	06/15/2020
AR 02369857	CWST 1A Internal Tank Corrosion	09/30/2020
AR 02411146	Replace fire Protection Test Loop Spool Piping	11/12/2021
	Project Summary Report, 1A CWST Inspection, September, 2020	09/08/2020
	Project Summary Report, 1B CWST Inspection, September, 2020	09/10/2020
PCR 02217561	2-FME-15.02, 12 Month Operability Test of the Fire Protection	07/28/2017
PMCR 2162545	U2: RAB: Sprinkler System Test; Frequency Change	10/14/2016
NEESL00008-REPT-065	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Fire Water System	Revision 0
0-FME-15.01	Deluge and Sprinkler System Testing	Revision 19
0-OSP-15.13A	1A Fire Pump Monthly Operability Test	Revision 9
0-OSP-15.16	Fire Protection System Annual Flush	Revision 4
0-OSP-15.18	RAB Fire Hose Station 5 Year Flush	Revision 1
1-FME-15.01	12 Month Operability Test of the Diesel Generator Fire Protection System	Revision 9
2-FMM-99.09	Fire Hose House Inspection (Required)	Revision 3
1-FMM-99.15	Fire Hydrant/Fire Hydrant Hose Lubrication/Inspection (Required and Other)	Revision 3
2-FMM-99.14C	Unit 2 Fire Hose Stations Inspections (Required)	Revision 4
1-FMM-99.13	Fire Hose Hydro Test	Revision 2
2-FME-15.02	18 Month Operability Test of the Fire Protection Sprinkler System for the Unit 2 RAB	Revision 8
	Fire Water System Program Interview Form	N/A

During the audit, the staff verified that for the program element that the applicant declared was consistent, the “preventive actions” program element of the SLRA AMP is consistent with the corresponding elements of the GALL-SLR report AMP.

The staff also verified the applicant's claim that aspects of the "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements not associated with the enhancements identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR report AMP.

In addition, the staff found that for the "scope of the program" and "parameters monitored or inspected" program elements, sufficient information was not available to determine whether they are consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether the program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit of the "OpE" program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA Fire Water System program provided in the UFSAR supplement. During the audit, the staff communicated areas where the UFSAR supplement is not consistent with the description provided in the GALL-SLR Report. Specifically, these are the statement that the program "generally follows" NFPA Codes and Standards and the implementation schedule not matching Table XI-01 in the GALL-SLR report.

SLRA AMP B2.3.17, Outdoor and Large Atmospheric Metallic Storage Tanks

Summary of Information in the Application. The SLRA states that, "AMP XI.M29," "Outdoor and Large Atmospheric Metallic Storage Tanks," is an existing program with enhancements and an exception that will be consistent with the program elements in GALL-SLR Report AMP XI.M29, "Outdoor and Large Atmospheric Metallic Storage Tanks." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the exception and enhancements associated with this AMP. The staff will document its review of the exception to the GALL-SLR Report AMP and the enhancements in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-052	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Outdoor and Large Atmospheric Metallic Storage Tanks	Revision 0
Plant Drawing – 8770-4769	Condensate Storage Tank	Revision 9

Plant Drawing – 8770-4770	Details For Cond. Storage & Diesel Oil Storage Tank	Revision 6
Plant Drawing – 8770-6009	Primary Water Storage Tank	Revision 0
Plant Drawing – 8770-4510	Refueling Water Tank Bottom Details	Revision 5
AR - 02412597	Corrosion at Base of Unit 1 Condensate Storage Tank (CST) – SLR NRC Audit	11/30/2021
Work Order – 40356058	U1 CST Restore Protective Coating – Lic RNEW AR 2010915	04/08/2019
AR - 02412714	NRC SLR Audit – 2A DOST Base Caulking	12/01/2021
Work Order - 40743945	U0 CSST 1B-Internal Tank Weld Repair Per Eng Insp-AR 2369859	11/22/2021
Work Order – 40740914	U0 CWST 1A-Weld Buildup Corrosion Cell-West Side AR-2367375	12/06/2021

During the audit, the staff verified the applicant's claim that the "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP or will be consistent after implementation of the identified enhancements.

The staff also verified the applicant's claim that aspects of the "detection of aging effects," program element not associated with the exception identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR report AMP.

The staff also audited the description of the SLRA AMP provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

The staff made the following observations during walkdowns:

- During the walkdown of the Unit 1 and Unit 2, CST, the staff noted that there is caulking installed at the interface joint between the tank bottom and the concrete foundation.

- During the walkdown of the Unit 1, CST, the staff noted surface corrosion at the base of the tank. The licensee has since entered this issue into the CAP.

- During the walkdown of the 2A Diesel Oil Storage Tank, the staff noted that caulking at the interface of the tank bottom and concrete was damaged. The licensee has since entered this issue into the CAP.

SLRA AMP B2.3.18, Fuel Oil Chemistry

Summary of Information in the Application. The SLRA states that AMP B2.3.18, "Fuel Oil Chemistry," is an existing program with enhancements that is consistent with the program elements in GALL-SLR Report AMP XI.M30, "Fuel Oil Chemistry." To verify this claim of consistency, the staff audited the SLRA AMP. Issues identified but not resolved in this report will be addressed in the SER. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the Fuel Oil Chemistry program. These documents were provided by St Lucie. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
Procedure No. CYS–SL–107 0001	Receiving Processing and Periodic Sampling of Diesel Fuel Oil	Revision 10
Material Safety Data Sheet (MSDS)	LTSA – 35A (PER MIL – S 53021A) Fuel Quality Services, Inc. 240-967-9790	05/18/2015
NEESL00008 – REPT - 052	St Lucie Units 1 and 2 SLR Aging Management Program Basis Document Outdoor and Large Atmospheric Metallic Storage Tanks	Revision 0
NEESL00008 – REPT - 053	St Lucie Units 1 and 2 SLR Aging Management Program Basis Document Fuel Oil Chemistry	Revision 0
Material Safety Data Sheet (MSDS)	FQS 1.5 Microbicide® Fuel Quality Services, Inc. 240-967-9790	04/08/2021
Procedure No. CY-SL-102-0205	Determination of Particulate Contamination in Diesel Fuel Oil	Revision 6
Procedure No. CYSL–SL–100 – 0013	Diesel fuel Oil Program	Revision 1 06/30/2021
Picture	20211025_1A_DOST 2	10/29/2021
Picture	20211025_1A_DOST	10/29/2021
Picture	20211025_1B_DOST 2	10/29/2021
Picture	20211025_1B_DOST	10/29/2021

Picture	20211025_1A1 Day Tank	10/29/2021
Picture	20211025_1A2 Day Tank	10/29/2021
Picture	20211025_1B1 Day Tank	10/29/2021
Picture	20211025_1B2 Day Tank	10/29/2021
Picture	2A DOST 20211028_133958	10/29/2021
Picture	2A DOST 20211028_134001	10/29/2021
Picture	2A1 Day Tank 20211028_133105	10/29/2021
Picture	2A2 Day Tank 20211028_133017	10/29/2021
Picture	2B DOST 20211028_133510	10/29/2021
Picture	2B1 Day Tank 20211028_132513	10/29/2021

During the audit, the staff verified St. Lucie's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

During the audit of the "OpE" program element, the staff independently searched the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate the identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA AMP provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.19, Reactor Vessel Material Surveillance

Summary of Information in the Application. The SLRA states that AMP B.2.3.19, "Reactor Vessel Material Surveillance," is an existing program with an exception to the ten program elements in GALL-SLR Report AMP XI.M31, "Reactor Vessel Material Surveillance." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the exception associated with this AMP. The staff will document its review of the exception to the GALL-SLR Report AMP in the SER.

Audit Activities. The table below lists the documents that were reviewed by the staff and were found relevant to the reactor pressure vessel material surveillance described in SLRA Section B.2.3.19. These documents were provided by FPL or were identified in the staff's search of St. Lucie's operating experience database. The staff acknowledges that operating experience related to the reactor vessel material surveillance program (which is based on the requirements 10 CFR Part 50, Appendix H) is also summarized in reactor vessel material surveillance program summary technical reports that are generated in accordance with the reporting

requirements in 10 CFR Part 50, Appendix H. These summary technical reports were included in the review and are included in the table below.

Document	Title	Revision / Date
TR-F-MCM-004	St. Lucie, Unit 1, Post-Irradiation Evaluation of Reactor Vessel Surveillance Capsule W-97	12/1983
WCAP-12751	Analysis of the Capsule at 104° from the Florida Power and Light St. Lucie Unit No. 1 Reactor Vessel Radiation Surveillance Program	11/1990
WCAP-15446	Analysis of the Capsule at 284° from the Florida Power and Light St. Lucie Unit No. 1 Reactor Vessel Radiation Surveillance Program	05/2002 Revision 1
BAW-1880	Analysis of Capsule W-83, Florida Power and Light, St. Lucie Unit No. 2, Reactor Vessel Materials Surveillance Program	09/ 1985
WCAP-15040,	Analysis of the Capsule at 263° from the Florida Power and Light St. Lucie Unit No. 2 Reactor Vessel Radiation Surveillance Program	02/2010 Revision 1
WCAP-17939-NP	Analysis of the Capsule at 97° from the Florida Power and Light St. Lucie Unit No. 2 Reactor Vessel Radiation Surveillance Program	05/2015 Revision 0

The staff also verified the applicant's claim that aspects of the "scope of program," "preventive actions," "detection of aging effects," "acceptance criteria," and "corrective actions" program elements not associated with the exceptions identified in the SLRA are consistent with the corresponding program elements in the GALL-SLR Report AMP.

The staff also audited the description of the SLRA B.2.3.19, "Reactor Vessel Material Surveillance," provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

The staff further noted that Table 19-3 to Attachment A1 and Table 19-3 to Attachment A-2 to the St. Lucie SLRA for units 1 and 2, respectively, list subsequent license renewal commitments. Reactor Vessel Material Surveillance is listed as commitment #22 in each table.

SLRA AMP B2.3.20, One-Time Inspection

Summary of Information in the Application. The SLRA states that AMP B2.3.20, One-Time Inspection," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.M32, "One-Time Inspection." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed

the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-055	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – One-Time Inspection	Revision 0

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA AMP. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.21, Selective Leaching

Summary of Information in the Application. The SLRA states that AMP B2.3.21, "Selective Leaching," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.M33, "Selective Leaching". To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL0008-REPT-079	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Selective Leaching	Revision 0

AR 02048790	NUREG 1801 Rev 2 GALL Gap Selective Leaching	05/19/2015
AR 02069522	License Renewal Destructive Examination Selective Leaching	08/26/2015
AR 02105853	Fire System Sprinkler Riser Rupture	01/27/2016
AR 02106171	CR 02105853 Identified a Failure of a Fire Protection Pipe	01/29/2016

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

In addition, the staff found that for the "detection of aging effects" program element, sufficient information was not available to verify whether it was consistent with the corresponding program element of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL-SLR Report AMP.

During the audit, the staff made the following observation:

- The staff reviewed NEESL0008-REPT-079 and noted the Selective Leaching program does not include an exclusion for externally coated buried components.

The staff also audited the description of the SLRA Selective Leaching program provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA Selective Leaching program. The staff will consider issuing RAIs in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.22, ASME Code Class 1 Small-Bore Piping

Summary of Information in the Application. The SLRA states that AMP B2.3.22, "ASME Code Class 1 Small-Bore Piping" is an existing AMP for detecting cracking in small-bore, ASME Code Class 1 piping. It also states that the program is consistent with the 10 elements in GALL-SLR Report AMP XI.M35, "ASME Code Class 1 Small-Bore Piping." To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and documentation provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff requested additional OpE searches on the applicant's CAP database, and the applicant provided results and additional relevant files to the ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
13-0334-TR-0002	Metallurgical Evaluation of Small-Bore Socket Welds from St. Lucie Unit 2 CVS and SI Systems	Revision 1 06/2017
AR02211110	Unit 2 License Renewal Class 1 Small-Bore Piping Inspection Results	06/19/2017
CE#02211110	Unit 2 License Renewal Class 1 Small-Bore Piping Inspection related to NRC Commitment #6 of NUREG-1779	06/20/2017
L-2015-126	License Renewal One-Time Inspection of Class 1 Small-Bore Piping Revised Commitments and Revised Inspection Plan	05/11/2015
UT report 5.4-001 Weld RC-141G-SW-8-2	Volumetric Examination of Weld RC-141G-SW-8-2	02/24/2017
UT report 5.4-002 Weld SI-191-FW-904-2	Volumetric Examination of Weld SI-191-FW-904-2	03/01/2017
NEESL0008-REPT-066	St. Lucie Units 1 and 2 SLR Small-Bore Piping	07/26/2021
AR01959057	Self-Assessment St. Lucie License Renewal Implementation	09/16/2015
AR01980340	Weld Leak on Pipe SI-237 between 2B1 SIT and V3811	03/25/2015
AR2182938	1B2 RCP Seal Cooler Leakage	02/06/2019

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

For the audit of the "OpE" program element, the staff reviewed the OpE provided by the applicant in the AMP basis document and on the ePortal. The staff requested multiple searches and obtained results of the OpE database using keywords: "small-bore," "socket weld," "small-bore examination," "fatigue," "fatigue cracking," "thermal fatigue," "stress corrosion," "PWSCC," "SCC," "crack," "weld," and "leak." The staff will document its review of relevant OpE in the SER.

The staff also audited the description of the SLRA AMP provided in the UFSAR supplement. The staff verified that this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.23, External Surfaces Monitoring of Mechanical Components

Summary of Information in the Application. The SLRA states that AMP B2.3.23, "External Surfaces Monitoring of Mechanical Components," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated

with this AMP. The staff will document its review of the enhancements in the SER. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this enhanced program, and the staff's audit included only the program basis document, available procedures, and referenced documents. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-067	St. Lucie Units 1 and 2 SLR AMP Program Basis Document – External Surfaces Monitoring of Mechanical Components	Revision 0
PSL-ED1-008	External Corrosion Monitoring	Revision 8
ADM-17.28	External Corrosion Program for Insulated Piping – Inspection Implementation	Revision 5
ADM-17.33	License Renewal Systems / Programs Monitoring	Revision 15
MSP-100.01	Protective Coating Surveillance Program	Revision 12
SPEC-M-006	Maintenance Specification for Evaluation and Acceptance of Pipe Surface Imperfections for St. Lucie 1 and 2 and Turkey Point 3 and 4	Revision 5
AR 01879932	Small-Bore Piping and Hardware Needs Re-Coated	06/06/2013
AR 02245978	Revise Walkdown Frequency for Outside Portions of CCW, AFW, and Condensate Systems from 5-years to 18-months	01/24/2018
AR 01959057	Focused Self-Assessment – St. Lucie License Renewal Implementation	04/17/2014
AR 02354805	Through-wall Leak on B ICW Header Line CW-13	04/29/2020

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

The staff also audited the description of the SLRA AMP "External Surfaces Monitoring of Mechanical Components" provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.24, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components

Summary of Information in the Application. The SLRA states that AMP B2.3.24, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL0008-REPT-080	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	Revision 0
AR 01621761	SL2-19 Internal Pipe Degradation on 18-CW-24 and 16-CW-150	02/19/2011
AR 01714622	1A EDG Generator Ventilation Screen Corrosion	12/09/2011
AR 02040220	U1 HVE-6B Outside Air Duct Corrosion	04/13/2015
AR 02071667	1B IAC [Instrument Air Compressor] Discharge Elbow Has Severe Internal Corrosion	09/03/2015
AR 02312636	Debris in Unit 1 Instrument Air Emergency Cooling Head Tank	04/30/2019

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.25, Lubricating Oil Analysis

Summary of Information in the Application. The SLRA states that AMP B2.3.25, "Lubricating Oil Analysis," is an existing program that is consistent with the program elements in GALL-SLR

Report AMP XI.M39, “Lubricating Oil Analysis.” To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. The table below lists the documents that were reviewed by the staff and were found relevant to the Lubricating Oil Analysis. These documents were provided by the applicant’s ePortal. The staff will document its review of relevant OpE in the SER.

Document	Title	Revision / Date
NEESL00008–REPT-068	St Lucie Units 1 and 2 SLR Aging Management Program Basis Document Lubricating Oil Analysis	Revision 0
O-PDM-99.03	Protective Maintenance Preparation and Analysis of Oil Samples	Revision 3
Procedure No. MA-AA-204-1000	Preventive Maintenance and Surveillance Procedure	Revision 18

During the audit, the staff verified St Lucie’s claim that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

During the audit of the “OpE” program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate any identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA AMP Lubricating Oil Analysis program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.26, Monitoring of Neutron-Absorbing Materials Other Than Boraflex

Summary of Information in the Application. The SLRA states that AMP B2.3.26, “Monitoring of Neutron-Absorbing Materials Other Than Boraflex,” is an existing program that is consistent with the program elements in GALL-SLR Report AMP XI.M40, “Monitoring of Neutron-Absorbing Materials Other Than Boraflex.” To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and operating experience by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
(TAC NO. MB6864)	St Lucie Unit 1 Issuance of Amendment Regarding Spent Fuel Soluble Boron Credit	09/23/2004 (ML042670562)
Holtec International HI-2104753	St Lucie Unit 2 Criticality Analysis for EDU and Non EPU - Fuel	09/19/2011 Revision 2
Holtec International HI-2104714	St Lucie Unit 1 Criticality Analysis for EDU and Non EPU - Fuel	09/14/2011 Revision 2
Procedure 0-OSP-67.01	St Lucie Plant Operating Surveillance Procedure Metamic Insert Surveillance	Revision 7
EC-287900	St Lucie Units 1 & 2 Metamic Insert Surveillance Program License Renewal Program Basis Document	Revision 0
PSL Program Owner Interview	X1.M40 Monitoring of Neutron Absorbing Materials other than Boraflex	Revision 0
PSL Program Owner Interview	Metamic Inserts X1.M40 Monitoring of Neutron Absorbing Materials other than Boraflex	04/16/2014

During the audit, the staff verified Applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA AMP Monitoring of Neutron-Absorbing Materials Other Than Boraflex program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.27, Buried and Underground Piping and Tanks

Summary of Information in the Application. The SLRA states that AMP B2.3.27, "Buried and Underground Piping and Tanks," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.M41, "Buried and Underground Piping and Tanks." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the program elements described in the applicant's basis document. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-057	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Buried and Underground Piping and Tanks	Revision 0
PSL-ENG-SERS-16-001	PSL Asset Management Plan for the Underground Piping and Tanks Integrity Program (UPTIP)	Revision 1
ER-AA-102	Underground Piping and Tanks Integrity Program	Revision 15
ER-AA-102-1000	Underground Piping and Tanks Integrity Examination Procedure	Revision 6
AR 01909787	Corrosion Cells on U1 Pipe in CST Trenches (Buried Piping)	10/05/2013
AR 01910285	1A, 1B and 1C AFW [Auxiliary Feedwater] Pump Suction Piping Material Loss	10/07/2013
AR 01912046	Common AFW Discharge Recirc Line is Below Min Wall	10/14/2013
NEESL00008-REPT-018	St. Lucie Units 1 and 2 SLR Screening and Aging Management Review Results – Diesel Generators and Support Systems	Revision 0
WO 40361418 01	U2 DO-65: Pressure Test Guard Pipe	12/14/2019
AR 02313688	Hydrant 27 Leaking From Underground When Opened	05/08/2019
WO 40559194 01	Pressure Test DO-64 Diesel Oil Guard Piping	02/14/2020

During the audit, the staff verified the applicant's claim that the "scope of program," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

In addition, the staff found that for the "preventive actions" program element, sufficient information was not available to verify whether it was consistent with the corresponding program element of the GALL-SLR Report AMP. The staff will consider issuing an RAI in order to obtain the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL-SLR Report AMP.

During the audit, the staff made the following observations:

- The staff reviewed NEESL00008-REPT-057 and noted the following: (a) all stainless steel piping is encased in concrete at PSL; (b) engineered class 1 backfill at St. Lucie is alkaline with a pH of approximately 9.0; (c) the soil contains dissolved salts, has low

resistivity, and is corrosive to cast iron; (d) for steel components, the cathodic protection acceptance criteria is -850 mV relative to a copper/copper sulfate reference electrode, instant-off; and (e) there is no underground stainless steel piping in the scope of license renewal at PSL.

- The staff reviewed PSL-ENG-SERS-16-001 and noted the following: (a) safety-related stainless steel and carbon steel piping in the diesel fuel oil sub-system has “none” as the coating material; (b) safety-related stainless-steel piping in the auxiliary feedwater sub-system has “none” as the coating material; and (c) auxiliary feedwater piping within the scope of the UPTIP program is located in covered trenches that is not accessible without removal of heavy concrete covers.

The staff also audited the description of the SLRA Buried and Underground Piping and Tanks program provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA Buried and Underground Piping and Tanks program. The staff will consider issuing RAIs in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.28, Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks

Summary of Information in the Application. The SLRA states that AMP B2.3.28, “Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks,” is a new program that will be consistent with the program elements in GALL-SLR report AMP XI.M42, “Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks,” as modified by SLR-ISG-2021-02-Mechanical, “Updated Aging Management Criteria for Mechanical Portions of SLR Guidance.” To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed the documents necessary to implement this new program, and the staff’s audit addressed only the program elements described in the applicant’s basis document. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL0008-REPT-081	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document – Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks	Revision 0
AR 02255986	Coatings Stress Cracks at Unit 1 RWT [Refueling Water Tank] Bottom	03/24/2018
AR 01712438	Thru-Wall Hole in U1 ICW Line	12/04/2011

AR 01718476	1A ICW Discharge Header 30”-CW-30 Internal Dive Inspection	12/21/2011
AR 01723138	1B ICW Discharge Header CW-29 Internal Dive Inspection	01/10/2012
AR 01661397	Tank [Instrument Air Emergency Cooling Head Tank] is in Degraded Condition	06/16/2011
AR 01677951	Corrosion Identified During U2 PWST [Primary Water Storage Tank] Internals Inspection	08/15/2011
AR 01711852	1A CCW HX [Heat Exchanger] Exceeded 20 Tubes Block Criteria, Eval. Required	12/02/2011
AR 01723138	1B ICW Discharge Header CW-29 Internal Dive Inspection	01/10/2012
AR 01910617	SL1-25 Internal Pipe Inspection of 1B ICW CW-11 Discovery	10/08/2013
AR 01946359	2B CCW Heat Exchanger – SL2-21 Inspection Results	03/07/2014
AR 01950802	SL2-21 Dive Inspection 2B ICW Discharge CW-29 Satisfactory	03/22/2014
AR 02038983	1B CCW Heat Exchanger – SL 1-26 Inspection Results	04/08/2015
AR 02369857	CWST 1A Internal Tank Corrosion	09/30/2020
AR 02369859	CWST 1B Internal Tank Corrosion	09/30/2020
0-CMM-21.06	ICW System Piping Inspection and Repair	Revision 10
0-PMM-14.01	CCW Heat Exchanger Clean/Repair	Revision 15
0-OSP-15.16	Fire Protection System Annual Flush	Revision 4
WO 40750371 01	Fire Protection System Annual Flush	12/06/2021
WO 40678939 01	Fire Protection System Annual Flush	09/08/2020
WO 40677506 01	Fire Protection System Triennial Flow Test	07/15/2020
WO 40616106 01	Fire Protection System Annual Flush	09/26/2019
NEESL00008-REPT-031	St. Lucie Units 1 and 2 SLR Screening and Aging Management Review Results – Main Feedwater and Steam Generator Blowdown System	Revision 0

During the audit, the staff verified the applicant’s claim that the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

In addition, the staff found that for the “detection of aging effects” program element, sufficient information was not available to verify whether it was consistent with the corresponding program element of the GALL-SLR Report AMP. The staff will consider issuing an RAI in order to obtain

the information necessary to verify whether this program element is consistent with the corresponding program element of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks program. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.29, ASME Section XI, Subsection IWE

The SLRA states that AMP B2.3.29, "ASME Section XI, Subsection IWE," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report AMP XI.S1, "ASME Section XI, Subsection IWE." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-069	St. Lucie Units 1 and 2 SLR Aging Management program basis document – ASME Section XI, Subsection IWE	Revision 0
0005760	St. Lucie Plant Implementation Guidelines of the ASME Section XI Repair and Replacement Program	Revision 22
0-GMM-99.17	Threaded Fasteners on Pressure Boundaries, Structural Steel and Plant Equipment	Revision 9
NDE-4.7	NDE Manual Examination Procedure – Component, Support & Inspection: Visual Examination of Reactor Building Containment Vessel General Visual/Visual VT-1/VT-3	Revision 5
Q1-10-PR/PSL-8	St. Lucie Plant Quality Instruction Procedure: Control of Repairs and Replacements	Revision 21
3rd Interval-IWE-PSL-1/2-Program Plan	St. Lucie Nuclear Power Plant Units 1 and 2 3rd IWE Inspection Interval Program Plan	Revision 0
AR 01608576	Containment Vessel Coatings and Moisture Barrier Deficiencies	01/13/2011

AR 01612578	Light Rust, Chipped and Blistered Paint in Escape Hatch	01/26/2011
AR 01616330	Corrosion on Containment Shell Plate 23' Elevation	02/03/2011
AR 01713469	Deficiencies in the Containment and Annulus Moisture Barrier	12/07/2011
AR 01714057	Degraded Coatings on the 23' – 45' Elevation	12/08/2011
AR 01715452	Rust and Blistering on Outer Personnel Hatch	12/13/2011
AR 01717167	Areas of Degraded Paint on Containment Dome	12/17/2011
AR 02280041	Loose Nuts on Two Studs for Penetration 67 Inside Containment	09/12/2018
AR 02333564	Chipped Coatings and Gauges Identified in Containment Liner	10/30/2019
AR 02333904	Containment Maintenance Hatch Missing Cotter Pins	11/01/2019
WO 40628038-04	U2 RCB SL2-25 Protective Coatings: Inspect/Repair	02/17/2020
WO 40690306-01	U1: Containment Maintenance Hatch Missing Cotter	11/08/2019

During the audit, the staff verified the applicant's claim that the "scope of program," "parameters monitored or inspected," "monitoring and trending," and "acceptance criteria" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP.

In addition, the staff found that for the "preventative actions," "detection of aging effects," and "corrective actions" program elements, sufficient information was not available to verify whether they were consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observations:

- The staff noted that the ASME XI, Subsection IWE program provides an enhancement to preventative actions of the storage and lubricants discussed in Section 2 of the Research Council for Structural Connections (RCSC) publication for structural bolting consisting of ASTM A325, ASTM A490, and equivalent materials. However, it does not appear that AMP includes an enhancement of preventative actions for bolting and coating material selection discussed in section 2 of RCSC publication.
- The staff noted a discrepancy between AMR item 3.5.1-027 and SLRA section B.2.3.29 regarding which AMP will manage cyclic loading in metal plates and penetrations that have no current licensing basis fatigue analysis.
- The staff noted in the SLRA section B.2.3.29 enhancement to Element 4 "detection of aging effects" that there is not sufficient information for methods used for detecting cracking and how they can detect cracking in steel, SS, and dissimilar metal weld pressure-retaining components that are subject to cyclic loading but have no CLB fatigue analysis.

- The staff noted in SLRA section B.2.3.29 enhancement to Element 4 “detection of aging effects” that procedures will be revised to specify a one-time volumetric examination of metal shell surfaces that are inaccessible from one side if triggered by plant-specific OpE identified after the date of issuance of the first renewed license for each unit. However, it is unclear whether each unit will be subject to the volumetric examination if the triggering OpE occurs in any one unit, or if the examination will be conducted only in the unit in which the triggering OpE occurred, or some other treatment.
- The staff noted in SLRA section B.2.3.29 that acceptability of inaccessible areas of steel containment vessel is evaluated when conditions found in accessible areas indicate the presence of, or could result in, flaws or degradation in inaccessible areas. However, the staff could not locate acceptability of inaccessible areas of steel containment vessel in the procedure NDE-4.7, revision 5.
- The staff noted that SLRA section 3.5.2.2.1.3 does not have information whether the concrete meets the requirements of ACI 318 or ACI 349 as cited in NUREG-1557 and guidance of ACI 201.2R, as applicable; how the concrete is monitored to ensure that it is free of penetration cracks that provide a path for water seepage to the surface of the containment shell or liner; and how OpE (the borated water spills and water ponding on the concrete floor) is addressed.
- The staff noted a discrepancy between AMR item 3.5.1-010 and SLRA section 3.5.2.2.1.6 regarding which AMP will manage cracking due to SCC.

The staff also audited the description of the ASME section XI, subsection IWE program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.30, ASME Section XI, Subsection IWF

Summary of Information in the Application. The SLRA states that AMP B2.3.30, “ASME Section XI, Subsection IWF,” is an existing program with enhancements and exceptions that will be consistent with the program elements in GALL-SLR Report AMP XI.S3, “ASME Section XI, Subsection IWF.” To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the exceptions and enhancements associated with this AMP. The staff will document its review of the exceptions to the GALL-SLR report AMP and the enhancements in the SER. The staff will address issues identified in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St Lucie Units 1 and 2 SLR Aging Effects OpE; Attachment 4 – Aging Effect OpE for Structures, Structural Components and Commodities	Revision 0
AR 1681462	Reactor Vessel Supports were not included in the Inservice Inspection Program (Cook Nuclear Plant) –	01/13/2012

	Industry OpE that was applicable to PSL Units 1 and 2; ISI program updated to include RV supports in examination population	
AR 1716657	PSL-1 Reactor Vessel Supports Not in the ISI Program	01/30/2013
AR 01991883	OpE 312397 Seismic Support ISI for CRDM (Industry OpE from Sequoyah where CRDM support was not included in ISI program)	10/08/2014
AR 2333705	Unit 1 AFW piping and pipe support BF-5-H1 experiencing moderate surface corrosion and rusting in indoor air	10/31/2019
AR 2333706	Pipe support CH-137 on AFW line (loss of material due to general corrosion and rusting of CS AFW pipe support in indoor air and treated water leakage)	10/31/2019
AR 2269265	Unit 2 MS line pipe support 2998-MS-3023-13 – loss of material due to wear/fretting of CS pipe supports in indoor air	06/20/2018
AR 2035611	1A CCW Supply Header to CCW pump CC-16; loss of material due to general corrosion and rusting of cs piping and pipe supports in indoor air and treated water leakage	03/26/2015
AR 2162073	Corrosion Condition of Unit 1 CCW north header supply at supports CC-26-7, -7A and -7B; general corrosion of CS pipe supports in indoor air and possible treated or saline raw water leakage	10/12/2016
AR 2269268	Severely Degraded Support ms-4102B-1934: General and Pitting corrosion of Unit 2 MS dump valve CS pipe support in indoor air	06/20/2018
AR 2121622	Unit 2 SW piping SW-106 – loss of material due to general and crevice corrosion, rusting, and flaking of insulated SW Carbon Steel piping and pipe support in indoor air	03/30/2016
AR 2255978	CC-998-11 Was Identified as Degraded during ASME Section XI [Inspection] VT-3 identified corrosion of Unit 1 cs pipe support restraining supply header to the 1B CCW HX	04/26/2018
AR 2255979	Support CC-28-11 Was Identified with Corrosion and Incomplete	03/30/2018
AR 2333951	Spring Hanger Setting Out of Tolerance, RC-005-55A, Unit 1	11/07/2019
AR 2345514	Corrosion on Items 2 and 3 of Support C-2200-12, Unit 2	02/24/2020
AR 2347627	Support C-2200-12 Follow-up Exam Results, Unit 2	03/19/2020
WO 40495487 01	Task Title: SL1-29: Repair Support CC-998-11; AR2255978 DISPO EC292697	06/10/2020

	W/O Title: 1B CCW SR I-24-CC-12 Corrosion on Pipe & Support	
WO 40495487 02	Task Title: SL1-29: Support CC-998-11; Shop Coatings W/O Title: 1B CCW SR I-24-CC-12 Corrosion on Pipe & Support	10/23/2019
WO 40516960 04	Task Title: U1- CC-27: Replace Struct CC-28-11; AR 2255979 W/O Title: L1R28 ISI ZONE 1-105 LINE CC-26	09//04/2018
WO 40690308 01	Task Title: U1: RC-005-55A – Adjust Spring Hanger W/O Title: U1: RC-005-55A – Spring Hanger Setting Out of	11//16/2019
WO 40706373 02	Task Title: U2: C-2200-12-Clean/Remove Corrosion to Allow Inspection W/O Title: U2: C-2200-12 – Corrosion on Items 2 & 3 of Support	03//17/2020
NEESL00008-REPT-058	SLR Aging Management Program Basis Document - ASME Section XI, Subsection IWF AMP Evaluation report, St Lucie Units 1 and 2	Revision 0
STD-C-011	Acceptance Criteria for As-Built Safety Related Piping and Pipe Supports, Discipline Standard, Civil	Revision 4
5th Interval-ISI-PSL-1 Program Plan	Fifth Inservice Inspection Program Plan for St. Lucie Nuclear Power Plant Unit 1	Revision 0
4th-ISI-PSL-2 Program Plan	Fourth Inservice Inspection Program Plan. St. Lucie Nuclear Power Plant Unit 2	Revision 0
QI-10-PR/PSL-4	Plant Inservice Inspection, Quality Instruction Procedure, St. Lucie Plant	Revision 14
QI-10-PR/PSL-8	Control of Repairs and Replacements, Quality Instruction Procedure, St. Lucie Plant	Revision 21
0005760	St. Lucie Plant Implementation Guidelines of the ASME Section XI Repair and Replacement Program, Administrative Procedure	Revision 22
NDE 4.3	Visual Examination VT-3, NDE Manual Examination Procedure, Component, Support and Inspection, FPL	Revision 12
SPEC-C-007	Specification, Erection of Structural and Miscellaneous Steel for Turkey Point Units 3 & 4 and St. Lucie Units 1 & 2	Revision 3
FLO-8770-761	Structural Steel, EBASCO Specification	02/151970
SPEC-M-004	Maintenance Bolting Specification for St. Lucie Units 1 & 2 and Turkey Point Units 3 & 4	Revision 15
M-3.6	Bolting Material Selection Standard, FPL Company	01/18/1977
0-GMM-99.17	Threaded Fasteners on Pressure Boundaries, Structural Steel and Plant Equipment	Revision 9
PSL-ENG-LRAM-00-119	ASME Section XI, Subsection IWF Inservice Inspection Program – Program Basis Document	Revision 3
LTR-SDA-21-021-NP	St. Lucie Units 1 & 2 SLR: Reactor Pressure Vessel Supports Assessment, June 2021	Revision 1

PSL1-VT-21-037-010930	Reactor Vessel Support @ 60 Degree (A1 Cold-Leg upper half) VT-3 Examination (1RO30), with photos, PSL 1	04/26/2021
PSL1-VT-21-038-010950	Reactor Vessel Support @ 300 Degree (A2 Cold-Leg upper half) VT-3 Examination (1RO30), with photos, PSL 1	04/26/2021
PSL1-VT-21-046-010930	Reactor Vessel Support @ 60 Degree (A1 Cold-Leg lower half) VT-3 Examination (1RO30), with photos, PSL 1	04/26/2021
PSL1-VT-21-047-010950	Reactor Vessel Support @ 300 Degree (A2 Cold-Leg lower half) VT-3 Examination (1RO30), with photos, PSL 1	04/26/2021
PSL1-VT-21-038-010950	Reactor Vessel Support @ 300 Degree (A2 Cold-Leg upper half) VT-3 Examination (1RO30), with photos, PSL 1	04/26/2021
PSL1-VT-18-001-010910	Reactor Vessel Support @ 180 Degree (B Hot-Leg upper half) VT-3 Examination (1RO-28), with photos, PSL 1	03/31/2018
1-001/01-001-A/01-001-B/010910	Reactor Vessel Support VT-3 Examination @ 180 Degree (B Hot-Leg) with photos, PSL 1	02/01/2012
1-001/01-001-A/01-001-B/010920	Reactor Vessel Support Magnetic Particle Examination @ 180 Degree (B Hot-Leg) with photos, PSL 1	02/01/2012
1-001/01-001-A/01-001-B/010930	Reactor Vessel Support VT-3 Examination @ 60 Degree (A1 Cold-Leg) with photos, PSL 1	02/01/2012
1-001/01-001-A/01-001-B/010950	Reactor Vessel Support VT-3 Examination @ 300 Degree (A2 Cold-Leg) with photos, PSL 1	02/01/2012
PSL2-VT-21-068-010560	Reactor Vessel Support @ 180 Degree (B Hot-Leg) VT-3 Examination (2RO26), with photos, PSL 2	09/16/2021
PSL2-VT-21-069-010580	Reactor Vessel Support @ 60 Degree (A1 Cold-Leg) VT-3 Examination (2RO26), with photos, PSL 2	09/16/2021
2-001/02-001-A/02-001-B/010593	Reactor Vessel Support @ 300 Degree (A2 Cold-Leg) VT-3 Examination (2RO26), with photos, PSL 2	09/21/2012

During the audit, the staff verified the applicant's claim that the "monitoring and trending," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP or will be consistent after implementation of the identified enhancements.

In addition, the staff found that for the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL-SLR report AMP. The staff will consider issuing RAIs, RCIs or use a voluntary supplement to obtain the information necessary to verify whether these program elements, or aspects of these program elements not associated with the exceptions identified in the SLRA, are consistent with the corresponding program elements of the GALL-SLR report AMP.

During the audit, the staff made the following observations:

- The staff reviewed Maintenance Procedure 0-GMM-99.17, revision 9, and noted that the approved lubricants for threaded fasteners at PSL are Neolube for stainless steel and Fel Pro N-5000 for carbon and alloy steel.
- The staff reviewed section 4.10 “Operating Experience” of the program basis document (PBD) NEESL00008-REPT-058 and noted that it included discussion of more specific examples (than in SLRA) of plant-specific OpE (action requests or ARs) of component supports from the applicant’s CAP. The staff verified during the OpE audit that these examples provided objective evidence of the program adequately managing the identified effects of aging.
- The staff noted a lack of clarity in the justification provided in the SLRA with regard to inspection of Class MC component supports not being included in the scope of the IWF AMP.
- The staff noted a lack of clarity on the adequacy of SLRAB2.3.30 enhancement 3 to make the “preventive actions” program element of the SLRA AMP consistent, as claimed, with the corresponding program element of GALL-SLR AMP XI.S3 specifically with regard to preventive actions for lubricant selection, and bolting and coating material selection for ASTM A325, A490, and equivalent bolts.
- The staff reviewed the PBD and noted that there was a lack of clarity on why vibration isolation elements are not included with the scope of the SLRA IWF AMP; therefore, the staff needs additional information to verify consistency of associated SLRA AMP program elements regarding aging management of vibration isolation elements.
- The staff noted a lack of clarity how PSL procedures prohibits the use of molybdenum disulfide and other lubricants containing sulfur as a preventive measure to reduce SCC of high strength bolting during the subsequent period of extended operation, as claimed in the SLRA.
- The staff noted that the SLRA IWF AMP was credited for identifying visible indications of loss of fracture toughness due to IE of the reactor vessel supports. However, while SLRA table 3.5.2-1 included an AMR line item for the above, it is not clear to the staff whether the existing procedures or program elements would be sufficient to identify visible indications of loss of fracture toughness in the field.
- The staff noted discrepancies in SLRA table 3.5-1 regarding AMR items 3.5-1, 085 and 3.5-1, 090 which were indicated as “not used” instead of “not applicable” since the environment (treated borated water) for these line items in the GALL-SLR Report does not exist at PSL.
- The staff noted a discrepancy in SLRA table 3.5-1 regarding AMR item 3.5-1, 081 which should have stated that item 3.5-1, 081 is “not used” and item 3.5-1, 091 is used instead.

The staff also audited the description of the SLRA ASME Section XI, Subsection IWF AMP provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate summary description of the SLRA AMP “ASME Section XI, Subsection IWF.” The staff will consider issuing an RAI, or use a voluntary supplement by the applicant, in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.31, 10 CFR Part 50, Appendix J

Summary of Information in the Application. The SLRA states that AMP B2.3.31, “10 CFR Part 50, Appendix J,” is an existing program that is consistent with the program elements in GALL-SLR Report AMP XI.S4, “10 CFR Part 50, appendix J.” To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-071	St. Lucie Units 1 and 2 SLR Aging Management PBD – 10 CFR Part 50, Appendix J	Revision 0
AMD-68.01	St. Lucie Plant Administrative Procedure: Containment Leakage Rate Testing Program	Revision 30
ER-AA-114	Nuclear Fleet Program Description: Appendix J Testing Program	Revision 6
1-OSP-68.01	St. Lucie Unit 1 Operations Surveillance Procedure: Integrated Leak Rate Test	Revision 38
1-OSP-68.02	St. Lucie Unit 1 Operations Surveillance Procedure: Local Leak Rate Test	Revision 49
1-OSP-68.03	St. Lucie Unit 1 Operations Surveillance Procedure: Airlock Periodic Leak Testing	Revision 8
2-OSP-68.01	St. Lucie Unit 2 Operations Surveillance Procedure: Integrated Leak Rate Test	Revision 23
2-OSP-68.02	St. Lucie Unit 2 Operations Surveillance Procedure: Local Leak Rate Test	Revision 43
2-OSP-68.03	St. Lucie Unit 2 Operations Surveillance Procedure: Airlock Periodic Leak Testing	Revision 12
2-OSP-68.04	St. Lucie Unit 2 Operations Surveillance Procedure: Purge Valve Leak Rate Test	Revision 12
Q1-10-PR/PSL-5	St. Lucie Plant Quality Instruction Procedure: Technical Specification Surveillance Inspection of Reactor Building	Revision 19
AR 01712224	FCV-26-3 (P-52B) Containment Atmosphere Radiation Monitor Failed LLRT	01/31/2012
AR 01794724	P-41 (SE-03-2A/B) Failed LLRT	09/05/2012
AR 01817385	P-56 (FCV-25-36) Failed LLRT	11/02/2012
AR 01825722	Unit 2 Personal Airlock Inner Door Seals Excessive Leakage	11/26/2012
AR 01916343	Unit 1 Personal Airlock Inner Door Seal Failed LLRT	10/30/2013
AR 01947012	P-41 (SE-)3-2A/B) Failed LLRT	04/18/2014

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the description of the SLRA 10 CFR Part 50, appendix J program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.32, Masonry Walls

Summary of Information in the Application. The SLRA states that AMP B2.3.32, "Masonry Walls," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR report AMP XI.S5, "Masonry Walls." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-072	St. Lucie Units 1 and 2 SLR Aging Management PBD – Masonry Walls	Revision 0
PSL-ENG-LRAM-00-095	Engineering Evaluation Form	Revision 14
AMD-17.32	Structures Monitoring Program	Revision 7
AR 01752739	U1 Trestle Door 114 Support Degradation	09/17/2012
AR 02082632	Reinforced Concrete and Masonry Block Walls	10/21/2015
AR 02117242	U1 Equip Ramp to RCB is Degraded	03/21/2016
AR 02145990	Cracking on Masonry Block Walls	07/28/2016
WO 40158634-01	Spalled Concrete Around Alarm Door 114 (AR 01752739)	09/13/2013

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP or will be consistent after implementation of the identified enhancements.

The staff also audited the description of the SLRA Masonry Walls program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.2.33, Structures Monitoring

Summary of Information in the Application. The SLRA states that AMP B2.3.33, "Structures Monitoring," is an existing program with enhancements and an exception that will be consistent with the program elements in GALL-SLR report AMP XI.S6, "Structures Monitoring." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the exception and enhancements associated with this AMP. The staff will document its review of the exception to the GALL--SLR Report AMP and the enhancements in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. On November 30 - December 1, 2021, the staff participated in an onsite audit at PSL to gain a general overview of current conditions of the structures compared to the provided OpE, an understanding of the pattern cracking or crazed concrete cracking identified in Turbine Building and RAB, and corrosion degradation for structural and mechanical components and supports exposed to an outdoor-air environment. While onsite, the staff engaged with the applicant staff, conducted walkdowns, and reviewed additional documentation provided by the applicant. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
NEEDL00008-REPT-059	St. Lucie Units 1 and 2 SLR Aging Management PBD – Structures Monitoring	Revision 0
ADM-17.32	Structures Monitoring Program	Revision 9
MSP-100.01	Protective Coating Surveillance Program	Revision 12
0-GMM-99.17	Threaded Fasteners on Pressure Boundaries, Structural Steel and Plant Equipment	Revision 9
M-3.6	Bolting Material Selection	01/18/1977
SPEC-C-007	Erection of Structural and Miscellaneous Steel for Turkey Point Units 3 & 4 and St. Lucie Units 1 & 2	Revision 3
SPEC-M-004	Maintenance Specification Bolting for St. Lucie Units 1 & 2 and Turkey Points Units 1 &2	Revision 15
QI-7-NSC-1	Warehouse Receipt, Storage, Issuance and Maintenance	Revision 24
AR 01693560	OE34348 – Preliminary – Reduction in Concrete Properties Due to Distress from Alkali-Silica Reaction (ASR) – (Seabrook 1)	10/06/2011

AR 01725652	U1 RAB Rood Degradation (WR 94040771)	01/18/2012
AR 02124010	Corroded Pipe Support Spring Cans	04/08/2016
AR 02373360	U0 UHS Dam Spalling to Rebar Big Mud Creek Side 4th Bay	10/27/2020
AR 02271498	U2 FHB Ceiling Falling Concrete – Inspection results	07/10/2018
PSL-ENG-SENS-21-001	Structures Monitoring Program Generic Condition Evaluation	Revision 0
ADM-17.32-2015-RPT-PSL-1-CANAL	10 CFR 54.37(A) Structural Monitoring Program, Intake and Discharge Canals	6/26/2015
ADM-17.32-2015-RPT-PSL-1-CCW	10 CFR 54.37(A) Structural Monitoring Program, CCW	8/6/2014
ADM-17.32-2015-RPT-PSL-1-CST	10 CFR 54.37(A) Structural Monitoring Program, Condensate Storage Enclosure	6/6/2014
ADM-17.32-2015-RPT-PSL-1-DOEC	10 CFR54.37(A) Structural Monitoring Program, Diesel Oil Enclosure	8/28/2014
ADM-17.32-2015-RPT-PSL-1-EDG	10 CFR 54.37(A) Structural Monitoring Program, Emergency Diesel Generator (EDG)	8/21/2014
ADM-17.32-2015-RPT-PSL-1-FHB	10 CFR 54.37(A) Structural Monitoring Program, Fuel Handling Building	11/13/2014
ADM-17.32-2015-RPT-PSL1-CPFD	10 CFR 54.37(A) Structural Monitoring Program, Condensate Polisher Filter Demineralizer	6/11/2015
ADM-17.32-2015-RPT-PSL1-INTAKE	10 CFR 54.37(A) Structural Monitoring Program Intake Structure	4/6/2015
ADM-17.32-2015-RPT-PSL1-RAB	10 CFR 54.37(A) Structural Monitoring Program, Reactor Auxiliary Building	4/13/2015
ADM-17.32-2015-RPT-PSL1-RCB	10 CFR 54.37(A) Structural Monitoring Program, Reactor Containment Building	6/3/2015
ADM-17.32-2015-RPT-PSL1-SWYD	10 CFR 54.37(A) Structural Monitoring Program, Switchyard	5/18/2015
ADM-17.32-2015-RPT-PSL1-UHS	10 CFR 54.37(A) Structural Monitoring Program, Ultimate Heat Sink / Emergency Cooling Canal	6/18/2015
ADM-17.32-2015-RPT-PSL1-YARD	10 CFR 54.37(A) Structural Monitoring Program, Yard Structures Unit 1 and Common	6/18/2015
ADM-17.32-2015-RPTPSL1-TURBINE	10 CFR 54.37(A) Structural Monitoring Program, Turbine Building	6/11/2015
ADM-17.32-2015RPT-PSL1-TRESTLE	10 CFR 54.37(A) Structural Monitoring Program, Steam Trestle	6/4/2015

ADM-17.32-2016-RPT-PSL-2-CCW	10 CFR 54.37(A) Structural Monitoring Program, Component Cooling Water	4/28/2016
ADM-17.32-2016-RPT-PSL-2-CST	10 CFR 54.37(A) Structural Monitoring Program, Condensate Storage Enclosure	4/26/2016
ADM-17.32-2016-RPT-PSL-2-DOEC	10 CFR 54.37(A) Structural Monitoring Program, Diesel Oil Enclosure	4/26/2016
ADM-17.32-2016-RPT-PSL-2-EDG	10 CFR 54.37(A) Structural Monitoring Program, Emergency Diesel Generator Building	3/31/2016
ADM-17.32-2016-RPT-PSL-2-FHB	10 CFR 54.37(A) Structural Monitoring Program, Fuel Handling Building	1/29/2016
ADM-17.32-2016-RPT-PSL-2-RAB	10 CFR 54.37(A) Structural Monitoring Program, Reactor Auxiliary Building	12/2/2015
ADM-17.32-2016-RPT-PSL-2-RCB	10 CFR 54.37(A) Structural Monitoring Program, Reactor Containment Building	9/14/2015
ADM-17.32-2016-RPT-PSL-2-SWYD	10 CFR 54.37(A) Structural Monitoring Program, Switchyard	3/23/2016
ADM-17.32-2016-RPT-PSL-2-YARD	10 CFR 54.37(A) Structural Monitoring Program, Yard	3/23/2016
ADM-17.32-2016-RPT-PSL2-INTAKE	10 CFR 54.37(A) Structural Monitoring Program, Intake Structure	8/19/2015
ADM-17.32-2016-RPTPSL2-TRESTLE	10 CFR 54.37(A) Structural Monitoring Program, Steam Trestle	5/5/2016
ADM-17.32-2016-RPTPSL2-TURBINE	10 CFR 54.37(A) Structural Monitoring Program, Turbine Building	5/24/2016

During the audit, the staff verified the applicant's claim that the "corrective actions" program element of the SLRA AMP is consistent with the corresponding element of the GALL-SLR report AMP. In addition, the staff found that for the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements, sufficient information was not available to determine whether they were consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observations:

- During the review of procedure ADM-17.32, the staff noted that the current procedure does not include some of the structures and components credited in SLRA section 2.1.4.2.1 as within the scope of the Structures Monitoring program.

- The staff noted that procedure ADM-17.32 does not address cracking as a parameter to be monitored or inspected for elastomeric material.

- During the review of procedure ADM-17.32, the staff noted that the current program does not clearly define the parameters to be monitored or inspected for structural bolting.

- During the review of procedure ADM-17.32, the staff noted that the current procedure does not include the parameters to be monitored or inspected for concrete degradations due to ASR. The staff also noted that SLRA sections 3.5.2.2.1.8, 3.5.2.2.2.1.2, and 3.5.2.2.2.3.2 stated that this was already addressed within Structures Monitoring program.

- During the review of the structural deficiency reports for the Structures Monitoring program, the staff noted that several structures were identified as having a cracking/craze patterns that were dispositioned as acceptable without further details.

- During the review of the structural deficiency reports for the Structures Monitoring program, the staff noted that several structures and components were identified as having corrosion related degradations at different levels.

During its audit, the staff also performed walkdowns of yard structures, turbine building, CST enclosure, fuel handling building (exterior), reactor building (exterior), RAB (exterior), and emergency diesel generator building (exterior), and shoreline embankment.

The staff made the following observations during walkdowns:

- During the walkdown of the structures from the outside, the staff noted the ongoing corrosion, at different levels, of several structural and mechanical components and supports exposed to an outdoor-air environment.

- During the walkdown of the Turbine Building and RAB, the staff noted the pattern cracking or crazed concrete cracking on the top of concrete roof slab.

- During the walkdown of the structures and components within the scope of subsequent license renewal, the staff noted the degradations observed during the walkdowns were found to be consistent with the OpE for which the GALL-SLR report program was evaluated.

The staff also audited the description of the SLRA Structures Monitoring program provided in the UFSAR supplement. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA Structures Monitoring Program. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.34, Inspection of Water-Control Structures Associated With Nuclear Power Plants

Summary of Information in the Application. The SLRA states that AMP B2.3.34, “Inspection of Water-Control Structures Associated with Nuclear Power Plants,” is an existing program with enhancements that will be consistent with the program elements in GALL-SLR report

AMP XI.S7, “Inspection of Water-Control Structures Associated with Nuclear Power Plants.” To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. On November 30 - December 1, 2021, two members of the staff participated in an onsite audit at PSL in Jensen, Florida to gain a general overview of current conditions of the water-control structures as it compares to what was provided OpE. While onsite, the staff engaged with the applicant staff, conducted walkdowns, and reviewed additional documentation provided by the applicant. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-073	St. Lucie Units 1 and 2 SLR Aging Management PBD – Inspection of Water-Control Structure Associated with Nuclear Power Plants	Revision 0
NEESL00008-REPT-035	St. Lucie Units 1 and 2 SLR Screening and Aging Management Review Results – Plant Structures	Revision 2
ADM-17.32	Structures Monitoring Program	Revision 7
AR 02033148	Unit 1 Intake Bay 1A2 SL1-26 Inspection	03/17/2015
AR 02038640	Unit 1 Intake Bay 1B2 North Concrete Wall Delamination	04/07/2015
AR 02038775	Unit 1 Intake Bay 1B2 – Delamination at Stop LOG Guide	04/07/2015
AR 02081350	Concrete Erosion Protection with Cracks, Erosion on East and West Shoreline Embankment South of UHS Dam	10/12/2015
AR 02081674	Structural & MISC Steel Corrosion in Unit 1 Intake Structure	10/13/2015
AR 02081982	Various Concrete Components with Degradation in Ultimate Heat Sink Dam	10/14/2015
AR 02122774	Concrete Pop-outs, Corroded Embedded Steel, Cracks in Unit 2 Intake Structures	04/04/2016
WO 40458782	Unit 2 Intake Structure, Repair Concrete Pop-outs & Cracks for AR 02122774	12/11/2017
AR 02348477	Cracking and Delamination in the Wall of Unit 2 Intake Structure	03/15/2020
AR 02081678	Various Concrete Locations with Cracks, Spalls, Pop-outs	10/13/2015

WO 40428443	Various Concrete Locations with Cracks, Spalls, Pop-outs for AR 02081678	11/18/2015

During the audit, the staff verified the applicant's claim that the "monitoring and trending," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP.

During the audit, the staff identified exceptions associated with the "detection of aging effects" program element.

In addition, the staff found that for the "scope of program," "preventative actions," "parameters monitored or inspected," "detection of aging effects," and "acceptance criteria" program elements, sufficient information was not available to verify whether they were consistent with the corresponding program elements of the GALL-SLR Report AMP. The staff will consider issuing RAIs in order to obtain the information necessary to verify whether these program elements are consistent with the corresponding program elements of the GALL-SLR Report AMP.

During the audit, the staff made the following observations:

- The staff noted in plant procedure ADM-17.32, "Structures Monitoring Program," Revision 7 that normally submerged areas of the intake wells will be completed once every fourth refueling outage (approximately six years) when individual wells are dewatered for maintenance. It appears to be an exception associated with the "detection of aging effects" program element in the Inspection of Water-Control Structures Associated with Nuclear Power Plants program.
- The staff noted that the Inspection of Water-Control Structures Associated with Nuclear Power Plants program provides an enhancement to preventative actions for the use of high strength bolt storage requirements. However, it does not appear that AMP includes an enhancement of preventative actions for proper selection of bolting material and lubricants, and appropriate installation torque or tension to prevent or minimize loss of ASTM A325 and/or ASTM A490 bolts, lubricant selection, and bolting and coating material selection discussed in section 2 of Research Council for Structural Connections.
- The staff also noted that AMP basis document and plant procedure ADM-17.32 lack the information of "parameter monitored or inspected" and "acceptance criteria" for the cooling canals, earthen canal dikes, and steel sheet piles.
- The staff noted that the AMP does not address the aggressive groundwater/soil environment and does not describe what plant-specific actions will be implemented within the AMP to ensure and demonstrate that the AMP will adequately manage degradations for inaccessible areas exposed to an aggressive water/soil environment.
- The staff further noted that SLRA sections B.2.3.34, 2.4.8, 2.4.9, and 2.4.14 call out different names for water-control structures within the scope of SLR, which require the applicant to clarify the scope of program.

The staff made the following observations during walkdowns:

- During the walkdown of Unit 1 and Unit 2 intake structures and ultimate heat sink dam, the staff noted that the degradations observed during the walkdowns were found to be consistent with the OpE for which the GALL-SLR report program was evaluated.

The staff also audited the description of the SLRA Inspection of Water-Control Structures Associated with Nuclear Power Plants program provided in the UFSAR supplement. The staff

found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA Inspection of Water-Control Structures Associated with Nuclear Power Plants program. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement program description.

SLRA AMP B2.3.35, Protective Coating Monitoring and Maintenance

Summary of Information in the Application. The SLRA states that AMP B2.3.35, "Protective Coating Monitoring and Maintenance," is an existing program that, with enhancements, will be consistent with NUREG-2191, Section XI.S8, Protective Coating Monitoring and Maintenance as modified by SLR-ISG-2021-03-STRUCTURES, "Updated Aging Management Criteria for Structures Portions of SLR Guidance" (. ML20181A381). To verify this claim of consistency, the staff audited the SLRA AMP.

Audit Activities. The table below lists the documents that were reviewed by the staff and were found relevant to the Protective Coating Monitoring and Maintenance Program. These documents were provided by the applicant and identified in the staff's search of the applicant's OpE database. The staff will document its review of relevant OpE in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
NEESL00008-REPT-074	AMP Basis Document Protective Coating Monitoring and Maintenance	Rev 0
AR 02281402	U2 Containment Coatings Closeout Inspection	9/27/19
AR 02334904	Containment Coatings Closeout Inspection Unit 1	11/05/19
AR 2166164	Containment Coatings Closeout Inspection Unit 1	10/28/16
AR 2187164	U2 Containment Coatings "As Found" Walkdown	12/15/17
AR 2257751	U1 Containment Coatings Closeout Inspection	10/31/18
AR 2347772	Containment Coatings Closeout Inspection Unit 2	03/05/20
2006-09800.R3Pt 1 of 5	Debris Generation Due to LOCA within Containment for Resolution of GL2004-02	Revision 3
2006-09800.R3Pt 2 of 5	Debris Generation Due to LOCA within Containment for Resolution of GL2004-02	Revision 3
2006-09800.R3Pt 3 of 5	Debris Generation Due to LOCA within Containment for Resolution of GL2004-02	Revision 3
2006-09800.R3Pt 4 of 5	Debris Generation Due to LOCA within Containment for Resolution of GL2004-02	Revision 3

Document	Title	Revision / Date
2006-09800.R3Pt 5 of 5	Debris Generation Due to LOCA within Containment for Resolution of GL2004-02	Revision 3
Calc No 2006-158981	Debris Generation Due to a LOCA within Containment for Resolution of GL 2004-02	Revision 2
Procedure No. ADM-27.10	Implementation Controls for the Application of Protective Coatings	Revision 16
Program No. EN-AA-104	Conduct of Engineering	Revision 16
Program No. ER-AA-109	Nuclear Fleet Protective Coatings	Revision 4
SPEC-C-034	Specification: Protective Coatings for Service Level I Applications Inside the Reactor Containment Building	Revision 9

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP. During the audit of the "OpE" program element, the staff reviewed a search of results of the plant-specific database to identify any previously unknown or recurring aging effects. The staff will evaluate any identified plant-specific OpE in the SER.

The staff also audited the description of the SLRA AMP Protective Coating Monitoring and Maintenance program provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.36, Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The SLRA notes that AMP B2.3.36 "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification (EQ) Requirements," is an existing program with enhancements that will be consistent with the program elements in GALL-SLR Report XI.E1, "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements." To verify this claim of consistency, the staff audited the SLRA AMP. During the audit, the staff also reviewed the enhancements associated with this AMP. The staff will document its review of the enhancements in the SER.

Audit Activities: During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the

pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program.

Document	Title	Revision / Date
AR 00581873	Cable Connecting Rows on Battery Require Replacement	09/20/2010
AR 01815200	Degraded Insulation on 2 A Condensate Pump Feeders	11/19/2012
AR 01905927-20	PSL -1 Spec-E-022 Containment Cable Inspections U1 and U2	03/2005
SPEC-E-022	Containment – Cable Inspection Program St Lucie Units 1 and 2	10/2017
NEESL00008-REPT-075	St. Lucie Units 1 and 2 SLR Aging Management PBD – Electrical Insulation For Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Revision 0
Inspection Report 05000335/2015010	St Lucie Plant, Unit 1 – U.S. Nuclear Regulatory Commission Post-Approval Site Inspection for License Renewal, Inspection report 05000335/2015010	01/4/2016
ER-AA-106	Cable Condition Monitoring Program	Revision 5
EN-AA-206	Nuclear Fleet Process Description, Non-safety Related	Revision 12
UFSAR	Unit 1 UFSAR	02/26/2021
AR 1815200 U2	Repair Cond 2A Pump Cable Repair WO 40119245	10/25/2012

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP or will be consistent after implementation of the identified enhancements.

During the onsite portion of the audit the staff performed interviews and walkdowns of the facility. Specifically, the staff conducted onsite walkdowns of the 230 kV switchyard and cable raceways and examined an open electrical manhole.

The staff also audited the descriptions of SLRA section 19.2.2.36, “Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” provided in appendixes A1, “Unit 1 Updated Final Safety Analysis Report Supplement,” and A2, “Unit 2 Updated Final Safety Analysis Report Supplement.” The staff verified that the descriptions are consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3 37, Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

Summary of Information in the Application. The SLRA notes that AMP B2.3.37 “Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification (EQ) Requirements used in instrumentation circuits,” is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.E2, “Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements used in instrumentation circuits.” To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant has not yet fully developed all the documents necessary to implement this program, and the staff’s audit addressed only the applicant’s basis document as well as the available current relevant maintenance procedures.

Audit Activities: During the audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision/Date
AR 415263	2005-3048-Area Radiation Monitor RIS 26-24-2	3/17/2005
AR 01627407	Found Degraded cable and Insulation brittle for TE-1121Y	11/19/2012
AR 01904161	Int Range-Wide Range Power Recorder Reading	9/18/2013
AR 02272292	RIM-26-29Ch 1 cable was broken	08/20/2018
AR 02280431	Power Range Detector #8	09/17/2018
AR 02076275	Radiation degraded connector and brittle cable RIM -26-72-001. Pre-Service Test Fail	12/14/2015

NEESL00008-REPT-076	ST. Lucie Units 1 and 2 SLR Aging Management PBD – Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits	Revision 0
Inspection Report 05000389/2017009	St Lucie Plant, Unit 2 – U.S. Nuclear regulatory Commission Post-Approval Site inspection for License Renewal, Inspection Report 05000389/2017009	11/30/2017
SPEC-E-022	Containment – Cable Inspection Program St Lucie Units 1 and 2	10/2017
EC-289491	Containment Cable Inspection Program – License Renewal Basis Document	Revision 0
UFSAR	Unit 1 UFSAR	02/26/2021
AR 01965957	Batch (P) -1-SMI-64.05A-D-Nuc Instr. Channel Calibration	07/23/2014
AR 01797219	Support testing of Detectors That were Affected by CSR Leak	08/29/2012

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP. The staff also audited the descriptions of SLRA section 19.2.2.37, "Electrical Insulation for Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.38, Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The SLRA notes that AMP B2.3.38, "Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that will be consistent with the program elements in GALL-SLR report AMP XI.E3A, "Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the SLR Guidance." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed all the

documents necessary to implement this program, and the staff's audit addressed only the applicant's basis document, available procedures, and referenced documents.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and documents provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Tittle	Revision/Date
NEESL00008-REPT-077	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document– Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 EQ Requirements	11/17/2020
AR01729388	Megger Submerged Cables in Manhole M299V	03/13/2013
AR01854721	Unit 1 Manhole M156 Degraded Drain	03/14/2013
AR01862103	MII-143 Standing Water	04/28/2014
AR01892123	Degraded Cable Supports in Security Manhole M291	07/30/2013
AR02330577	U2 Manhole Program Cannot be Established PMID 48516-01	02/19/20
WO 40504693-01	U1: Safety Related/Non-Safety Related Manhole	09/25/17
WO 40609577	U2: RCA Area Security Manhole Inspections	06/03/2019
WO 40705711-01	U1; Sec Manhole M143 Inspection	02/12/21
	PSL Health Report Cable Health 2019 Q4	11/25/2020
	PSL Health Report Cable Health 2020 Q4	11/25/2020
ER-AA-106	Cable Condition Monitoring Program	Revision 5
SPEC-E-022	Containment Cable Inspection Program St. Lucie Units 1 and 2	Revision 4
SCEG-032	Cable Condition Monitoring Program (CCMP)	Revision 3

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP as modified by SLR-ISG-2021-04-ELECTRICAL.

As indicated above, the applicant noted in the SLRA that AMP B2.3.38 will be consistent with the program elements in GALL-SLR Report AMP XI.E3A as modified by SLR-ISG-2021-04-ELECTRICAL. However, based on its review of the SLRA, the staff found that the language in AMP B2.3.38 is not consistent with SLR-ISG-2021-04-ELECTRICAL as certain terms such as 'potentially' are not included within SLRA AMPB2.3.38. Based on this, during a breakout discussion the staff requested the applicant to explain the apparent deviations from SLR-

ISG-2021-04-ELECTRICAL. In response to the staff's request, the applicant noted that it would review SLRA AMP B2.3.38 to ensure consistency with SLR-ISG-2021-04-ELECTRICAL and provide a supplement to the SLRA if necessary. The staff will document its review of any supplemental information provided by the applicant in the SER.

During the onsite portion of the audit the staff performed interviews and walkdowns of the facility. Specifically, the staff examined cables, connections, and manholes that are in the scope of SLR. During a walkdown, the staff examined an open electrical manhole associated with this AMP. The staff did not observe any signs of cable submergence or degradation of cables in this manhole.

The staff also audited the descriptions of SLRA section 19.2.2.38, "Electrical Insulation for Inaccessible Medium-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." With the exceptions noted above regarding inconsistencies with SLR-ISG-2021-04-ELECTRICAL, the staff verified that the descriptions are consistent with the description provided in the GALL-SLR report as modified by SLR-ISG-2021-04-ELECTRICAL.

SLRA AMP B2.3.39, Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The SLRA notes that AMP B2.3.39, "Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.E3B, "Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the SLR Guidance." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant had not yet fully developed all the documents necessary to implement this program, and the staff's audit addressed only the applicant's basis document, available procedures, and referenced documents.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Tittle	Revision/Date
AR02331603	MH Drainage Flow Path to ECB#1 does not Exist-MHS Can Drain	01/23/2020
WO 40665085 01	U1: Clean/Inspect RCA Security Manholes	05/16/2020
AR02144946	MHole 291, Cable Supports are Degraded	07/25/2016
AR01892123	Degraded Cable Supports in Security Manhole M291	07/30/2013

AR02330577	U2 Manhole Program Cannot be Established PMID 48516	02/19/2020
AR02388893	GL 2007-1 Cable Manhole Inspection Program	Revision 1
NEESL00008-REPT-082	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document–Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Revision 0
GL2007-01 ML071290529	Response to NRC Generic Letter 2007-01 Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients	05/06/2007

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP as modified by SLR-ISG-2021-04-ELECTRICAL.

During the onsite portion of the audit, the staff performed interviews and walkdowns of the facility. Specifically, the staff examined cables, connections, and manholes that were in the scope of SLR. During a walkdown, the staff examined an open electrical manhole associated with this AMP. The staff did not observe any signs of cable submergence or degradation of cables in this manhole.

The staff also audited the descriptions of SLRA section 19.2.2.39, "Electrical Insulation for Inaccessible Instrument and Control Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the GALL-SLR report as modified by SLR-ISG-2021-04-ELECTRICAL.

SLRA AMP B2.3.40, Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The SLRA notes that AMP B2.3.40, "Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that will be consistent with the program elements in GALL-SLR report AMP XI.E3C, "Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of SLR Guidance specified in NUREG-2191 (GALL-SLR)." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant has not yet fully developed all the documents necessary to implement this program, and the staff's audit addressed only the applicant's basis document, available procedures, and referenced documents.

Audit Activities. During audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of the relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the

pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision/Date
NEESL0008-REPT 83	St. Lucie Units 1 and 2 SLR Aging Management Program Basis Document–Electrical Insulation for Inaccessible Low-Voltage Power Cables not subject to 10CFR50.49 Environmental Qualification Requirements	Revision 0
ADM-09.01	Severe Weather Preparations	Revision 2
SCEG-032	Cable Condition Monitoring Program (CCMP)	Revision 3
SPEC-E-022	Containment Cable Inspection Program St. Lucie Units 1 &2	Revision 4
AR23388893	GL2007-01 Cable Manhole Inspection Program	02/08/2022
AR02330577	U2 Manhole Program cannot be established PMID 4816-01	02/19/2020
AR02333241	Medium Volt Cable Program not implemented as required at PSL	02/27/2020
AR02038272	PSL Health Report Cable Health 2015_2020	11/25/2020
AR02331603	MH Drainage Flow Path to ECB#1 does not exist-MHS cannot drain	01/23/2020
AR02363654	U1: Manhole 110 sump pump not working	07/28/2020
AR02144946	MHole 291 cable supports are degraded	07/25/2016
EC273408	PSL health report cable health 2019 Q4	11/25/2020
WO40045415-02	Repair ECB#1 Pipe entry from other manhole locations	03/09/2022

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR report AMP as modified by SLR-ISG-2021-04-ELECTRICAL.

During the onsite portion of the audit the staff performed interviews and walkdowns of the facility. Specifically, the staff examined cables, connections, and manholes that were in the scope of SLR. During a walkdown, the staff examined an open electrical manhole associated with this AMP. The staff did not observe any signs of cable submergence or degradation of cables in this manhole.

The staff also audited the descriptions of SLRA section 19.2.2.40, "Electrical Insulation for Inaccessible Low-Voltage Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the SRP-SLR report as modified by SLR-ISG-2021-04-ELECTRICAL.

SLRA AMP B2.3.41, Metal Enclosed Bus

Summary of Information in the Application. The SLRA notes that AMP B2.3.41, "Metal Enclosed Bus," is a new program (portions of which were previously conducted as part of the Periodic Surveillance and Preventative Maintenance Program [PSPM]) that will be consistent with the program elements in GALL-SLR Report AMP XI.E4, "Metal Enclosed Bus." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant has not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the information provided by the applicant, available procedures, and referenced documents.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of the relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The table below lists the documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

Document	Tittle	Revision/Date
0-GME-100.13	Cable, Motor and Bus Hi-Pot/Surge Testing Instructions Rev.1	08/2016
0-PME-53.11	Non-Segregated Bus Inspections Rev.2	05/2020
AR02103279	Degraded Section of Bus at 1B SUT 6.9kV NSB Riser	01/2016
AR02324951	License Renewal PSPM AMP Effectiveness Review	08/2019
EC 294393 EVALI-PSL-ENG-LRAM-00-096 Rev. 14	Periodic Surveillance and Preventive Maintenance Program -License Renewal Basis Document	Revision 0
NEESL00008-REPT-084	SLR Aging Management PBD - Metal Enclosed Bus	Revision 0

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

During the onsite portion of the audit, the staff performed interviews and walkdowns of the facility. Specifically, the staff looked at exposed metal enclosed buses, cables, connections, and electrical manholes associated with SLR. The staff was unable to walkdown and observe internal elements of metal enclosed buses associated with this AMP since the PSL units were online and access to enclosed buses was not available. No adverse or abnormal conditions with equipment associated with metal enclosed buses were observed during the walkdowns.

The staff also audited the descriptions of SLRA sections 19.2.2.41, "Metal Enclosed Bus," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2,

"Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the GALL-SLR Report.

SLRA AMP B2.3.42, Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Summary of Information in the Application. The SLRA notes that AMP B2.3.42, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant has not yet fully developed the documents necessary to implement this new program, and the staff's audit addressed only the applicant's basis document, available procedures, and referenced documents.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
NEESL00008-REPT-038	St Lucie Units 1 and 2, SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-086	St. Lucie Units 1 and 2 SLR Aging Management PBD – Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification	Revision 0
AR 01755959	1A Transformer Cooler Relay Failed	04/2012
AR 01790101	PSL 3832 - 1C Static Inverter Capacitor Terminal Increased Temp.	08/2012
AR 01807910	Broken Connector J3 on "A" Channel NI Safety Drawer	09/2012
AR 01827489	PSL 3832 – Battery/Hydraulic Crimper failed Calibration	11/2012
AR 01845949	PSL 3832 – Battery Charger Thermal Anomaly During Load Test	02/2013
AR 02076275	1B2 Degraded Connector and Brittle Cable RIM-26-72	09/2015

Document	Title	Revision / Date
0-PDM-99.02	Thermography Acquisition / Analysis/Trending	Revision 1
SCEG-32	Cable Condition Monitoring Program (CCMP)	Revision 3

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP.

The staff also audited the descriptions of SLRA section 19.2.2.42, "Electrical Cable Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," provided in appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the GALL-SLR report.

SLRA AMP B2.3.43, High-Voltage Insulators

Summary of Information in the Application. The SLRA notes that AMP B2.3.43, "High-Voltage Insulators," is a new program that will be consistent with the program elements in GALL-SLR Report AMP XI.E7, "High-Voltage Insulators," as modified by SLR-ISG-2021-04-ELECTRICAL, "Updated Aging Management Criteria for Electrical Portions of the SLR Guidance." To verify this claim of consistency, the staff audited the SLRA AMP. At the time of the audit, the applicant has not yet fully developed all the documents necessary to implement this program, and the staff's audit addressed only the applicant's basis document, available procedures, and referenced documents.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and documents provided by the applicant via the ePortal. The staff also conducted an onsite audit to perform plant walkdowns of relevant areas. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
PSL Program Owner Interview	St. Lucie High-Voltage Insulators	N/A
NEESL00008-REPT-038	St Lucie Units 1 and 2, SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-087	St. Lucie Units 1 and 2 SLR Aging Management PBD – High-Voltage Insulators	Revision 0

Document	Title	Revision / Date
AR02224588	Unit 1 shutdown due to degraded PSL switchyard conditions	09/2017

During the audit, the staff verified the applicant's claim that the "scope of program," "preventive actions," "parameters monitored or inspected," "detection of aging effects," "monitoring and trending," "acceptance criteria," and "corrective actions" program elements of the SLRA AMP are consistent with the corresponding elements of the GALL-SLR Report AMP as modified by the SLR-ISG-2021-04-ELECTRICAL.

During the onsite portion of the audit, the staff performed interviews and walkdowns of the facility. Specifically, the staff examined exposed metal enclosed buses, cables, insulators, overhead lines, control cabinets, high-voltage (HV) switchgear, connections, and electrical manholes associated with SLR. The staff discussed the preventive maintenance program for HV insulators and the salt laden environment at PSL. The applicant explained their preventive maintenance program and specific actions taken after a severe weather event, such as a hurricane, and an 'in-situ' sample insulator installed in the switchyard that can be laboratory tested to detect adverse impacts of the environment on a generic basis. The staff noted that maintenance performed on the HV insulators is condition-based. The switchyard has a weather station that monitors contamination levels and based on summary reports, appropriate actions can be taken to replace or clean contaminated insulators. During the switchyard walkdown, the staff did not observe any adverse or abnormal conditions with HV insulators and associated equipment.

The staff also audited the descriptions of SLRA Section 19.2.2.43, "High-Voltage Insulators," provided in the appendixes A1, "Unit 1 Updated Final Safety Analysis Report Supplement," and A2, "Unit 2 Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the description provided in the GALL-SLR Report as modified by SLR-ISG-2021-04-ELECTRICAL.

SLRA AMP B2.3.44, Pressurizer Surge Line

Summary of Information in the Application. The SLRA states that AMP B2.3.44, "Pressurizer Surge Line," is an existing plant-specific aging management program. The staff audited the SLRA AMP to determine consistency with SRP-SLR Section A.1.2.3, "Aging Management Program Elements." The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant's CAP database.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-023	St. Lucie Units 1 and 2 SLR Aging Management PBD – Pressurizer Surge Line	Revision 0
AR 2061624	Implementation of the Pressurizer Surge Line Inspection Program - AMP	7/21/2015
AR 2374153	License Renewal Effectiveness Review and SLR Interview Track	11/2/2020
SIA 1301103.401-NP	Flaw Tolerance Evaluation of St. Lucie Surge Line Welds Using ASME Code Section XI, Appendix L	Revision 0
SIA 2001262.401	Flaw Tolerance Evaluation of St. Lucie Units 1 and 2 Surge Line Using ASME Code, Section XI, Appendix L for SLR	Revision 1
SIA 2001262.320 (redacted)	Flaw Tolerance Evaluation for St. Lucie Nuclear Plant, Units 1 and 2	Revision 1
SIA 1301103.304	appendix L Flaw Tolerance Evaluation of Surge Line PSL Units 1 and 2	Revision 2
CE Specification Number 19367-31-5	Engineering Specification for Reactor Coolant Pipe and Fittings for Florida Power and Light St. Lucie Plant Unit No. 1	Revision 14
CEN-387-P	Pressurizer Surge Line Flow Stratification	Revision 1-P-A
L-2019-134	NextEra Energy Quality Assurance Topical Report (FPL-1) Revision 22 Annual Submittal	7/12/2019
L-2015-272	Submittal of Pressurizer Surge Line Welds Inspection Program	10/29/2015

During the audit, the staff reviewed SLRA section B2.3.44 to verify that the applicant followed the guidance in SRP-SLR section A.1.2.3 for the “scope of program,” “preventive actions,” “parameters monitored or inspected,” “detection of aging effects,” “monitoring and trending,” “acceptance criteria,” and “corrective actions” program element of the SLRA AMP.

SLRA section B.2.3.44 provides the overall program description and “OpE” program element of the Pressurizer Surge Line Program. However, SLRA section B.2.3.44 does not clearly describe the other program elements of the Pressurizer Surge Line Program even though this program is a plant-specific program that is not generically described in the GALL-SLR Report. Therefore,

the staff found that additional information may be needed in relation to the program elements that are clearly described in SLRA section B.2.3.44.

The staff also audited the description of the SLRA Pressurizer Surge Line Program provided in the UFSAR supplement. The staff verified this description is an adequate summary description of the program, consistent with the guidance in the SRP-SLR.

SLRA TLAA Section 4.1, Identification of Time-Limited Aging Analyses

Summary of Information in the Application. SLRA section 4.1, "Identification of Time-Limited Aging Analyses," discusses the methodology for the identifying of TLAAs in the SLRA. To verify the implementation of the applicant's methodology to identify TLAAs in accordance with 10 CFR Part 54, the staff performed an audit. Issues identified but not resolved in this report will be addressed in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The table below lists a document that was reviewed by the staff and was found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-037	ST. Lucie Units 1 and 2 SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1

During the audit, the staff verified that the applicant has provided its basis and methodology for identifying TLAAs in accordance with disposition of 10 CFR 54.21(c).

During the audit, the staff made the following observations:

- The staff reviewed NEESL00008-REPT-037 and confirmed that current licensing basis and design basis documentation were searched to identify potential TLAAs. The staff noted that specific key words were used during this search that would identify potential TLAAs.
- The staff reviewed NEESL00008-REPT-037 and confirmed that each potential TLAA was reviewed against the six criteria of 10 CFR 54.3(a) and that those that met all six criteria were identified as TLAAs, which require evaluation for the subsequent period of extended operation.
- The staff reviewed NEESL00008-REPT-037 and confirmed that a search of docketed licensing correspondence, the operating license, and the UFSAR identified the active exemptions currently in effect pursuant to 10 CFR 50.12.
- The staff reviewed NEESL00008-REPT-037 and confirmed that these exemptions were then reviewed to determine whether the exemption was based on a TLAA and that two applicable 10 CFR 50.12 exemption that involves a TLAA was included in the SLRA.

SLRA TLAA Section 4.2.1, Neutron Fluence Projections

Summary of Information in the Application. The SLRA states that AMP B2.2.2, "Neutron Fluence Monitoring," and AMP B2.3.19, "Reactor Vessel Material Surveillance," are part of the St. Lucie Units 1 & 2 AMP. The staff audited the SLRA AMP. During the audit, the staff also reviewed the exceptions and enhancements associated with this AMP and provided in GALL-SLR Report AMP X.M2, "Neutron Fluence Monitoring." The staff will address issues identified in this audit report in the SER.

Neutron irradiation embrittlement is a TLAA to be evaluated for the subsequent period of extended operation for all ferritic materials that have a neutron fluence greater than 10^17 n/cm^2 (E >1 MeV) at the end of the subsequent period of extended operation. Certain aspects of neutron irradiation embrittlement are TLAAs as defined in 10 CFR 54.3. TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c)(1). This TLAA is addressed separately in Section 4.2, "Reactor Pressure Vessel Neutron Embrittlement Analysis," of the SRP-SLR.

Audit Activities. During its audit, the staff interviewed the applicant's documentation contained in the SLRA and provided by the applicant via the ePortal. This information was reviewed in conjunction with the "Irradiation Effects on Concrete and RV Steel Supports," documented in Section 2, "AMR Items Not Associated with an AMP," of this report.

The relevant sections of SRLA are:

- 3.1.2.2.3, Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement
- 3.5.2.2.2.6, Reduction of Strength and Mechanical Properties of Concrete Due to Irradiation
- 3.5.2.2.2.7, Expected Further Evaluation for Loss of Fracture Toughness due to Irradiation Embrittlement of Reactor Pressure Vessel (RPV) Supports from NRC Review of the Previous SLRAs
- 4.2, Reactor Vessel Neutron Embrittlement Analysis (entire section)

For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and operating experience by reviewing documentation contained in the SLRA and ePortal. The table below lists documents (in addition to those listed in Section 2, "AMR Items Not Associated with an AMP," of this report) that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
WCAP-18124-NP-A	Fluence Determination with RAPTORM3G and FERRET - Supplement for Extended Beltline Materials	Revision 0, Supplement 1-P
LTR-REA-21-1-NP	St. Lucie Units 1 & 2 Subsequent License Renewal: Unit 1 Reactor Vessel, Vessel Support, and Bioshield Concrete Exposure Data	Revision 1
LTR-SDA-21-021-P	St. Lucie Units 1&2 Subsequent License Renewal: Reactor Pressure Vessel Supports Assessment	Revision 1

SLRA TLAA Sections 4.2.2 through 4.2.5

Summary of Information in the Application. The staff's audit addresses the following TLAAs collectively due to their relationship in analyzing the reactor vessel neutron embrittlement:

- SLRA section 4.2.2, "Pressurized Thermal Shock" discusses the analysis for assessing the pressurized thermal shock (PTS) of the RPV as required by 10 CFR 50.61. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(ii).
- SLRA section 4.2.3, "Upper-Shelf Energy" discusses the analysis for assessing the projected reduction in the upper-shelf energy (USE) properties of RPV base metal and weld components. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(ii).
- SLRA section 4.2.4, "Adjusted Reference Temperature" discusses the analysis for assessing the use of adjusted reference temperature (ART) limits to adjust the pressure-temperature limit curves to account for irradiation effects. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(ii).
- SLRA section 4.2.5, "Pressure-Temperature (P-T) Limits and Low Temperature Overpressure Protection (LTOP) Setpoints" discusses the assessment of P-T limits and LTOP setpoints for the RPV. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(iii).

To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
WCAP-18609-NP	St. Lucie Units 1 & 2 SLR: Time-Limited Aging Analyses on Reactor Vessel Integrity	Revision 2
NEA150217 – 646530901 (offsite box number)	St. Lucie 1 Reactor Vessel Material Certification Reports – 19367 - 74167	Revision 0
NEA150218 – 646530901 (offsite box number)	St. Lucie 2 Reactor Vessel Material Certification Reports – 71172	Revision 0

During the audit of the applicable TLAAs, the staff verified that the applicant provided the basis to support its disposition of 10 CFR 54.21(c)(1)(ii) for PTS, USE and ART and 10 CFR 54.21(c)(1)(iii) for P-T limits and LTOP setpoints. However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition as described above. In order to obtain the necessary information, the staff will consider issuing an RAI.

During the audit, the staff made the following observations:

- The staff verified that the material information (e.g., initial RT_{NDT}, %Cu, %Ni, initial USE, margin values) for the "Beltline" materials for Unit 1 and Unit 2 contained in applicant SLRA Tables (Unit 1 –tables 4.2.2-1, 4.2.3-1, 4.2.4-3 and 4.2.4-5; Unit 2 - tables 4.2.2-2, 4.2.3-2, 4.2.4-4 and 4.2.4-6) are consistent with the applicant's current licensing basis (e.g., UFSAR, license amendments revising Pressure-Temperature Limits).

- The staff verified that the material information (e.g., initial RT_{NDT}, %Cu, %Ni, initial USE) for the "Extended Beltline" materials for Unit 1 contained in SLRA Tables 4.2.2-1, 4.2.3-1 4.2.4-3 and 4.2.4-5 were based on information from certified material test reports, fabrication records, and/or database containing reactor vessel material information for the specific material with the exception of two reactor vessel materials. Additionally, based on this verification, the staff observed that the appropriate margin value consistent with Regulatory Guide 1.99, Rev. 2, were applied for each Unit 1 reactor vessel material for the purposes of addressing PTS and ART. For two reactor vessel materials (i.e., Upper to Intermediate Shell Girth Weld Seam 8-203 and Upper Shell Axial Weld Seams 1-203 A, B, & C), the staff will consider issuing an RAI to obtain the necessary information.
  ▪
- The staff verified that the material information (e.g., initial RT_{NDT}, %Cu, %Ni, initial USE) for the "Extended Beltline" materials for the "Extended Beltline" materials for Unit 2 contained in SLRA tables 4.2.2-2, 4.2.3-2, 4.2.4-4 and 4.2.4-6 were based on information from certified material test reports, fabrication records, an NRC-approved topical report, and/or database containing reactor vessel material information for the specific material. Additionally, based on this verification, the staff observed that the appropriate margin value consistent with Regulatory Guide 1.99, Rev. 2, were applied for each reactor vessel material for the purposes of addressing PTS and ART.

The staff also audited the description of the SLRA TLAA section 4.2.2, 4.2.3, 4.2.4 and 4.2.5 provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA TLAA Section 4.3.1, Metal Fatigue of Class 1 Components

Summary of Information in the Application. SLRA section 4.3.1, "Metal Fatigue of Class 1 Components," discusses the fatigue analysis for class 1 piping and components. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(iii). To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant's CAP database.

The table below lists documents that were reviewed by the staff and were found relevant to the TLAA. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
AR 2374153	License Renewal Effectiveness and SLR Interview Track	11/2/2020
NEESL00008-REPT-037	St. Lucie Units 1 and 2 SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1
SIR-01-102	Thermal Cycle Evaluation for St. Lucie Units 1 and 2	Revision 3
CEN-387-P	Pressurizer Surge Line Flow Stratification Evaluation	Revision 1-P-A
CEN-387-NP	Pressurizer Surge Line Flow Stratification Evaluation	Revision 1-NP-A
CN-SDA-II-20-026	St. Lucie Unit 1 and Unit 2 80-year Transient Cycle Projections	Revision 2

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(iii). However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing RAIs.

- SLRA Tables 4.3.1-1 and 4.3.1-2 describe the design transients for St. Lucie Units 1 and 2, respectively. These tables indicate that some transients will not be monitored in the Fatigue Monitoring Program (e.g., "plant loading, five percent/minute" and "10 percent step load increase" transients). In addition, tables 1 and 2 of the Westinghouse LTR-SDA-II-20-32-NP report indicate that these design transients were excluded from cycle monitoring because the transients resulted in a fatigue usage less than 0.1 or large margins were present with respect to actual cycle counts versus allowable cycle limits. The staff found a need to clarify that the basis of excluding these transients from fatigue monitoring is valid for 80 years of operation (e.g., demonstration of the conservatism associated with the 80-year estimated cycles compared to the design cycles to confirm a large cycle margin).

- As discussed above, SLRA tables 4.3.1-1 and 4.3.1-2 describe the 80-year projected cycles for the design transients of St. Lucie Units 1 and 2, respectively. These table do not include the bolt-up transient for the reactor vessel. In comparison, the following reference evaluates the design basis thermal cycles for the current licensing basis (Reference: SIR-01-102, revision 3, "Thermal Cycle Evaluation for St. Lucie Units 1 and 2"). This reference includes the bolt-up transient as a design transient. The SIR-01-102 report also explains that the transient is excluded from cycle counting based on a large cycle margin in the current licensing basis. The staff found a need for the applicant to clarify why SLRA tables 4.3.1-1 and 4.3.1-2 do not identify the bolt-up transient as a design transient in contrast with the SIR-01-102 report and the basis of excluding this transient from cycle counting for the 80-year operation.

- SLRA section 4.3.1 states that the transients, which are included in the current Fatigue Monitoring program but not included in the original St. Lucie LRA, are presented in SLRA tables 4.3.1-3 and 4.3.1-4 for St. Lucie Units 1 and 2, respectively. SLRA tables 4.3.1-5 and 4.3.1-6 describe the 80-year projections for the additional transients (e.g., "loss of letdown flow" transient) that support the 80-year fatigue evaluations for St. Lucie Units 1 and 2, respectively. However, the SLRA does not clearly discuss whether the Fatigue Monitoring Program will monitor these additional transients.

The staff also audited the description of the SLRA fatigue TLAA for Class 1 components provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA TLAA Section 4.3.2, Metal Fatigue of Non-Class Components

Summary of Information in the Application. SLRA Section 4.3.2, "Metal Fatigue of Non-Class 1 Components," discusses the fatigue analysis for non-Class 1 piping systems. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(ii) for the hot-leg sample lines and 10 CFR 54.21(c)(1)(i) for the other non-Class 1 piping systems. To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant's CAP database.

The table below lists documents that were reviewed by the staff and were found relevant to the TLAA. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
AR 2374153	License Renewal Effectiveness and SLR Interview Track	11/2/2020
NEESL00008-REPT-037	St. Lucie Units 1 and 2 SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1
NEESL00008-CALC-002	St. Lucie Unit 1 Analysis of RCS Hot-Leg Sample Lines for SLR	Revision 0
NEESL00008-CALC-003	St. Lucie Unit 2 Analysis of RCS Hot-Leg Sample Lines for SLR	Revision 0

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its dispositions of 10 CFR 54.21(c)(1)(ii) for the hot-leg sample lines and 10 CFR 54.21(c)(1)(i) for the other non-Class 1 piping systems. However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing an RAI.

During the audit, the staff made the following observations. The staff will consider issuing an RAI to address the potential concerns associated with these observations.

- SLRA Table 4.3.3-2 indicates that the reactor coolant sampling line is subject to approximately 29200 cycles for 80 years of operation. Accordingly, the applicant used a stress range reduction factor of 0.7 for the sample lines, which allows thermal cycles up to 45000. However, the SLRA does not clearly discuss how the stress analysis for sample lines with the stress range reduction factor (0.7) meets a relevant acceptance criterion.

The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the fatigue TLAA for the non-Class 1 components. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement description.

SLRA TLAA Section 4.3.3, Environmentally-Assisted Fatigue

Summary of Information in the Application. SLRA Section 4.3.3, "Environmentally-Assisted Fatigue," discusses the environmentally-assisted fatigue (EAF) for reactor coolant pressure boundary components. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(iii). To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant's CAP database.

The table below lists documents that were reviewed by the staff and were found relevant to the TLAA. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
AR 2374153	License Renewal Effectiveness and SLR Interview Track	11/2/2020

Document	Title	Revision / Date
NEESL00008-REPT-037	St. Lucie Units 1 and 2 SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1
Westinghouse Calculation Note CN-SDA-II-20-022	St. Lucie Units 1 and 2 SLR: Primary Equipment and Piping EAF Screening Evaluation	Revision 1
Westinghouse Report LTR-SDA-II-20-31-NP	St. Lucie Units 1 and 2 Subsequent License Renewal: Primary Equipment and Piping EAF Evaluations	Revision 2
BWXT Report MSLEF-SR-01-NP	St. Lucie Unit 1 Replacement Steam Generator EAF Report	Revision 0
Framatome Document No. 86-9329647-000	St. Lucie SLR CUF_{en} Evaluations Summary	07/15/2021
SIA Report 2001262.403	Summary of Fatigue Usage for Charging Nozzle at St. Lucie Units 1 and 2 for Subsequent License Renewal	Revision 0

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(iii). However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing RAIs.

During the audit, the staff made the following observations. The staff will consider issuing RAIs to address the potential concerns associated with these observations.

- The Framatome 86-9329644-001 report summarizes the EAF analysis for St. Lucie Unit 2 replacement steam generators, Unit 1 and 2 replacement reactor vessel closure heads, Unit 2 pressurizer repairs, Unit 2 weld overlays and Unit 2 auxiliary spray line reducer (Reference: Framatome Document Number 86-9329644-001, St. Lucie SLR CUF_{en} Evaluations Summary, July 15, 2021). Table 5-2 of the Framatome report specifies the reduced cycles of the transients that are used in the environmental cumulative usage factor (CUF_{en}) calculations, as reduced from the design cycles. Some of these transients, which involve reduced cycles, will not be monitored in the Fatigue Monitoring Program, as indicated in SLRA section 4.3.1. The staff found a need for the applicant to clarify the basis for excluding the transients with the reduced cycles from fatigue monitoring.

- The staff also noted that the "primary coolant pump starting/stopping" transient (also designated as the DP transient) is used in the EAF analysis for the St. Lucie Unit 2 steam generator tube-to-tubesheet weld. However, SLRA section 4.3.1 and Framatome 86-9329644-001 report do not clearly address whether the pump transient for St. Lucie Unit 2 will be monitored in the Fatigue Monitoring Program. In addition, SLRA Section 4.3.1 and

Framatome report, tables 5-2 and 5-3 address pressurizer spray nozzle transients. However, these tables do not clearly discuss whether the following transients, which involve reduced cycles in the CUF_{en} calculations, will be monitored in the Fatigue Monitoring Program: (1) “spray nozzle” transient (also called the spray nozzle transient 17A/B/C); (2) “main spray initiation” transient; (3) “auxiliary spray at power 1” and “auxiliary spray at power 2” transients; and (4) “main spray term in cooldown” transient.

The staff also audited the description of the SLRA EAF TLAA for reactor coolant pressure boundary components provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA TLAA Section 4.3.4, High Energy Line Break Analyses

Summary of Information in the Application. SLRA section 4.3.4, “High Energy Line Break Analyses,” discusses the HELB TLAA for St. Lucie Unit 2 piping systems. The applicant dispositioned the HELB TLAA in accordance with 10 CFR 54.21(c)(1)(iii) for the ASME Code Class 1 piping and in accordance with 10 CFR 54.21(c)(1)(i) for the non-Class 1 piping. To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal. Furthermore, the staff conducted additional OpE searches on the applicant’s CAP database.

The table below lists documents that were reviewed by the staff and were found relevant to the TLAA. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-037	St. Lucie Units 1 and 2 SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(i) for the Unit 2 non-Class 1 piping and 10 CFR 54.21(c)(1)(iii) for the Unit 2 class 1 piping. However, the staff found that sufficient information was not available to complete its review of the applicant’s basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing an RAI. During the audit, the staff made the following observations. The staff will consider issuing an RAI to address the potential concerns associated with these observations.

SLRA section 4.3.4 indicates that the postulation of HELB locations is, in part, based on the CUF criterion for class 1 piping (i.e., CUF greater than 0.1). However, the applicant did not

clearly address whether the 80-year operation may increase the CUF values at the class 1 piping locations above the CUF threshold of 0.1 for HELB postulation such that additional break locations may need to be evaluated in the HELB analysis.

The staff also audited the description of the SLRA HELB TLAA for reactor coolant pressure boundary components provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA TLAA Section 4.4, Environmental Qualification of Electric Equipment

Summary of Information in the Application. SLRA Section 4.4, “Environmental Qualifications (EQ) of Electrical Equipment,” discusses the thermal, radiation, and cyclical aging analyses for the plant electrical and instrument and control (I&C) equipment. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(iii). To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA.

Audit Activities. During its audit, the staff interviewed the applicant’s staff, and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant’s methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
AR 02013850	U1: MSIV Solenoid Valve Coil Thermal Life (EQ)	12/17/2014
AR 02128663	EQ CDBI Identified CHRRM Indication Error During DBA	04/28/2016
AR 02137338	ACE to Address Green NCV from NRC EQ CDBI	06/10/2016
AR 02128751	EQ DCBI Identified Issue Related to Program Documentation	04/29/2016
AR 02388818	OE from PB EQ SLR NRC Review Regarding Use of EPRI NP-1558	04/05/2021
AR 02214276	U2: EQ/HCV-09-2B Replace Limit Switch	07/10/2017
AR 02347464	Rosemount Interim Eval of Deviation	03/06/2020
AR 02376733	EQ LR Effectiveness Review	11/26/2020
AR 02128612	EQ Doc Pac Did Not Specify Limiting Component	04/28/2016
N/A	EQ Program Health Report	11/24/2020

Document	Title	Revision / Date
NEESL-00010-CALC-001	PSL SLR 80-Year Doses for Equipment Qualification	Revision 0
PSL-ENG-LRAM-00-099	EQ Program–License Renewal Basis Document	Revision 8
St. Lucie Plant Unit No 2 Equipment Qualification Documentation Package Drawing No. 2998-A-451-1000	Equipment Qualification Report and Guidebook	Revision 12
St. Lucie Plant Unit No 1 Equipment Qualification Documentation Package Drawing No. 8770-A-451-1000	Equipment Qualification Report and Guidebook	Revision 14
ER-AA-112	EQ Program	Revision 5
QI-2-PSL-6	EQ of Electric Equipment	Revision 9
N/A	PSL SLR EQ Program Update Review	N/A
Doc Pac No. 41.0	AVCO Solenoid Valves	NEW & Revision 5
Doc Pac No. 5.0	Brand-Rex Cable Company Electric Cable	NEW & Revision 9

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(iii). The staff notes that the applicant generated AR 02388818 to evaluate whether the recent revision to EPRI NP-1558, “A Review of Equipment Aging Theory and Technology,” has any adverse effects on the qualification of electric equipment at St. Lucie Nuclear Plant, Units 1 and 2 (specifically related to the activation energy used to determine the qualification of components). The staff finds that this corrective action should be adequate to ensure the continued environmental qualification of electric equipment is within the scope of this TLAA.

The staff also audited the descriptions of SLRA sections 19.2.1.3, “Environmental Qualification of Electric Equipment,” and 19.3.4, “Environmental Qualification of Electric Equipment,” of appendixes A1, “Unit 1 Updated Final Safety Analysis Report Supplement,” and A2, “Unit 2

Updated Final Safety Analysis Report Supplement." The staff verified that the descriptions are consistent with the descriptions provided in the SRP-SLR Report.

SLRA TLAA Section 4.5, Concrete Containment Tendon Prestress

St. Lucie Units 1 and 2 containments utilize a reinforced concrete design without the use of prestressed tendons. Therefore, the loss of tendon prestress is not applicable to the St. Lucie containment shield buildings.

SLRA TLAA Section 4.6, Containment Liner Plate, Metal Containments and Penetration Fatigue

Summary of Information in the Application. SLRA section 4.6 "Containment Liner, Metal Containments and Penetrations Fatigue" discusses the analysis for fatigue of the metal containment vessel (thus no containment liner) and penetrations. The applicant dispositioned the TLAA for the metal containment and penetrations in accordance with 10 CFR 54.21(c)(1)(i). To verify that the applicant provided a basis to support its disposition of the TLAAs, the staff audited the above TLAAs. The staff will address issues identified during the audit in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-037	SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1
PSL-1FSC-01-020	Steel Containment Fatigue Evaluation, PSL Unit 1	09/18/2001
PSL-2FSC-01-021	Steel Containment Fatigue Evaluation, PSL Unit 2	09/18/2001
PSL-69-5065	Nuclear Containment Vessel Stress Report, Unit 1	Revision 2
PSL-73-7302	Stress Report for PSL 2, For EBASCO Inc. & FPL Co. Steel Containment Vessel Stress Report (3 Volumes) Unit 2	Revision 1
FLO-2998.124	EBASCO Specification Containment Piping Penetration Assemblies for St Lucie Plant, Unit No. 2 (containment sump anchors instead on fuel transfer tube positioner in Unit 1)	Revision 4
FLO-8770.124	EBASCO Specification Containment Piping Penetration Assemblies, for St Lucie Plant Unit No. 1 [Equipment required by spec are fuel transfer tube penetration assembly, flued head piping penetration assemblies, expansion bellows, removable steel	Revision 5

	protective covers over bellows, and fuel transfer tube positioner]	
PSL-ENG-LRTA-00-051, Attachment 8.5-1	Evaluation of Containment Bellows	Revision 0
Drawing 8770-G-213, Sheet 1 of 4	Reactor Containment Building Piping Penetrations, St Lucie Plant, Unit 1	Revision 6
Drawing 8770-G-213, Sheet 2 of 4	Reactor Containment Building Piping Penetrations), St Lucie Plant, Unit 1 (Fuel Transfer Tube)	Revision 7
Drawing 8770-G-213 Sheet 3 of 4	Reactor Containment Building Piping Penetrations (Type I & Type III), St Lucie Plant, Unit 1	Revision 8
Drawing 8770-G-213, Sheet 4	Reactor Containment Building Piping Penetrations (Shield Wall Pipe Sleeves), St Lucie Plant, Unit 1	Revision 6
2998-G213 Sheet 1 of 4	Reactor Containment Building Piping Penetrations (Type II & Type IV Penetration), St Lucie Plant, Unit 2	Revision 6
2998-G213 Sheet 2 of 4	Reactor Containment Building Piping Penetrations, St Lucie Plant, Unit 2 (FTT)	Revision 6
2998-G213 Sheet 3	Reactor Containment Building Piping Penetrations (Type I & Type III), St Lucie Plant, Unit 1	Revision 9
2998-G213 Sheet 4	Reactor Containment Building Piping Penetrations (Shield Wall Pipe Sleeves), St Lucie Plant, Unit 2	Revision 8
UFSAR, Appendix 3G	Appendix 3G - Piping Penetrations Calculations, PSL Unit 1 UFSAR	05/2020 (Amendment No. 30)

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(i). However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing RAIs during the audit.

During the audit, the staff made the following observations:

- The staff noted that SLRA section 4.6 (Penetrations Fatigue) cited NUREG-1779 as the technical input information source for the TLAA, which is the NRC staff's SER related to the license renewal of St Lucie Nuclear Plant and not a CLB document for St Lucie. Therefore, it was not clear what the source of input cycles stated above is that was used for the TLAA for fatigue of containment penetrations. It was also not clear whether the containment penetrations fatigue applies to only containment piping (mechanical) penetrations.
- The staff noted that SLRA Section 4.6 (Penetrations Fatigue - Type I through Type IV) lacked clarity with regard to: (i) what type of fatigue analysis (e.g., CUF, fatigue waiver, implicit) was performed for the containment penetrations and what fatigue parameter (e.g., CUF, fatigue waiver parameters, cracking) was evaluated against what acceptance criteria; (ii) what is the expected number of cycles of the transient considered in the design for 80 years of operation to justify that the cycles considered in the design are bounding for SPEO; and (iii) the justification for the conclusion that the fatigue analysis for the referenced penetrations is bounded by that of the associated piping systems,

especially considering that their design criteria and codes of record are different. Further, the statement regarding being bounded also appears to be contradictory to a related statement in SLRA section 3.5.2.2.1.5 that fatigue waiver analyses were performed on mechanical penetrations.

- The staff noted that SLRA table 3.5.2-1 does not include AMR line item(s) corresponding to table 3.5-1, item 3.5-1, 009 for the containment vessel. The staff also noted that SLRA table 3.5-1, item 3.5-1, 027 included a contradictory statement that a fatigue analysis was not performed for the containment vessel, which appears to be an error.

The staff also audited the descriptions of the SLRA TLAA "Containment Liner Plate, Metal Containments and Penetrations Fatigue" provided in the UFSAR supplement in section 19.3.5 of SLRA appendices A1 and A2. The staff found that sufficient information was not available to determine whether the description provided in the UFSAR supplement was an adequate description of the SLRA TLAA "Containment Liner Plate, Metal Containments and Penetrations Fatigue." The staff will consider issuing an RAI and/or use a voluntary SLRA supplement offered by the applicant during the audit in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement descriptions.

SLRA TLAA Section 4.7.1, Leak-Before-Break of Reactor Coolant System Piping

Summary of Information in the Application. SLRA section 4.7.1, "Leak-Before-Break of Reactor Coolant System Piping," discusses the leak-before-break (LBB) analysis for the reactor coolant system piping. St. Lucie dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(ii). To verify that St. Lucie provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this report in the SER.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. The staff conducted its review of the St. Lucie OpE database using keywords: "crack," "leak rate," "leak-before-break," "RCS piping," "rupture."

During the audit breakout session, the staff interviewed the St. Lucie staff and reviewed documentation provided by St. Lucie. The staff reviewed the following relevant documents:

Relevant Documents Reviewed

Documents	Title	Revision/Date
CEN-367-A	LBB Evaluation of Primary Coolant Loop Piping in Combustion Engineering-Designed Nuclear Steam Supply Systems	Revision 0 02/1991
WCAP-18617-NP	St. Lucie Units 1 & 2 SLR: Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis	Revision 1 06/2021
WCAP-18617-P	St. Lucie Units 1 & 2 SLR: Technical Justification for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis	Revision 1 06/2021

NUREG/CR-4513	Estimation of Fracture Toughness of Cast Stainless Steels During Thermal Aging in LWR Systems	Revision 1 05/1994
NUREG/CR-4513	Estimation of Fracture Toughness of Cast Stainless Steels During Thermal Aging in LWR Systems	Revision 2 05/2016
NUREG-0800, Section 3.6.3	LBB Evaluation Procedures	Revision 1 03/2007

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(ii). The staff found sufficient information was available to complete its review of the applicant's basis for its TLAA disposition. If further information is needed to complete the staff's SE input, the staff will consider issuing RAIs.

The staff also audited the description of the SLRA TLAA LBB provided in the UFSAR supplement. The staff verified that this description is consistent with the information provided in the UFSAR supplement of the SLRA TLAA LBB. If further information is needed to complete the staff's SE input, the staff will consider issuing RAIs.

SLRA TLAA Section 4.7.2, Alloy-600 Instrument Nozzle Repairs

Summary of Information in the Application. The SLRA states that TLAA 4.7.2, "Alloy 600 Instrument Nozzle Repairs," discusses the analysis for the following small-bore Alloy 600 nozzles that have been repaired, either due to leakage or as a preventative measure.

- Unit 1 Instrument Identification numbers PDT-1121D, TE-1112HA, TE-1112HB, TE-1112HC, TE-1112HD, TE-1111X, TE-1122HA, TE-1122HB, TE-1122HC, TE-1122HD, TE-1121X, PDT-1111A, PDT-1111B, PDT-1111C, PDT-1111D, PDT-1121A, PDT-1121B, PDT-1121C and RC-143.

- Unit 2 Instrument Identification numbers PZR Upper Head Steam Space A, PZR Upper Head Steam Space B, PZR Upper Head Steam Space C, PZR Upper Head Steam Space D, RC-105, RC-130, TE-1101, TE-1112HA, TE-1111X, TE-1122HC, TE-1122HD, TE-1121X, TE-1112HB, TE-1112HC, TE-1112HD, TE-1122HA, TE-1122HB, PDT-1121B, PDT-1111A, PDT-1111B, PDT-1111C, PDT-1111D, PDT-1121A, PDT-1121C, PDT-1121D, RCS Hot-Leg Flow Nozzle Sample Line and 30 pressurizer heater sleeves.

The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(i).

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
CE Owners Group Topical Report, CE NPSD-1198-P	Low-Alloy Steel Component Corrosion Analysis Supporting Small-Diameter Alloy 600/690 Nozzle Repair/Replacement Programs CEOG	Revision 00 02/08/2001
Westinghouse Report LTR-SDA-20-097-NP	St. Lucie Units 1 & 2 SLR: Alloy 600 Half-Nozzle Repair Flaw Evaluation	Revision 3 09/15/2021
Westinghouse Report LTR-SDA-20-097-P	St. Lucie Units 1 & 2 SLR: Alloy 600 Half-Nozzle Repair Flaw Evaluation (Proprietary)	Revision 3 09/16/2021
Westinghouse Calculation Note, CN-CI-02-71	Summary of Fatigue Crack Growth Evaluation Associated with Small-Diameter Nozzles in CEOG Plants	Revision 2 12/09/2005
WCAP-15973-P-A	Low-Alloy Steel Component Corrosion Analysis Supporting Small-Diameter Alloy 600/690 Nozzle Repair/Replacement Programs	Revision 0 2/2005
Westinghouse Calculation Note CN-CI-02-69	Evaluation of Fatigue Crack Growth Associated with Small-Diameter Nozzles for St. Lucie 1 & 2 (Proprietary)	Revision 0 10/09/2002
Westinghouse Calculation Note CN-SDA-II-20-026	St. Lucie Unit 1 and Unit 2 80-Year Transient Cycle Projections	Revision 2 07/12/2021
CE Design Analysis A-CEoG-9449-1242	Evaluation of the Corrosion Allowance for Reinforcement and Effective Weld to Support Small Alloy 600 Nozzle Repairs	Revision 00 06/13/2000

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(i).

SLRA TLAA Section 4.7.3, Unit 1 Core Support Barrel Repairs

Summary of Information in the Application. SLRA section 4.7.3 contains a description of the applicant's TLAA related to Unit 1 Core support barrel (CSB) repairs (henceforth termed the "Unit 1 Core Support Barrel Repair TLAA"). The applicant dispositioned the Unit 1 CSB repairs in accordance with 10 CFR 54.21(c)(1)(ii) because the applicant has projected the CSB repair plug and patch deflections through the SPEO in accordance with 10 CFR 54.21(c)(1)(ii). The applicant analyzed the CSB degradation as shown in Westinghouse letter reports LTR-SDA-20-104-NP (non-proprietary) and LTR-SDA-20-104-P (proprietary), which are presented in Enclosures 4 and 5 of the SLRA, respectively. The applicant determined that the Unit 1 CSB repair plug and patch deflections are acceptable for 80 years of plant operation. To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA.

Audit Activities. During the audit, the staff reviewed relevant documents contained in the SLRA, the applicant's ePortal and previously submitted materials. The staff discussed matters related to this TLAA with the applicant during the staff's virtual audit breakout session meeting that was held with the applicant on January 18, 2022. The table below lists documents that were reviewed by the staff and were found relevant to the Unit 1 CSB repairs TLAA. The staff will document its review of this information in the SER.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
FPL Letter L-2019-013	Evaluation of CSB Spring 2018 Inspection Results (. ML19044A636 and ML19044A638)	2/11/2019
FPL Letter L-2019-130	St. Lucie Unit 1 Revised Plant-Specific Evaluation of the CSB Spring 2018 Inspection Results (. ML19232A095 and ML19232A096)	8/19/2019
FPL Letter L-2020-066	WCAP-18452-P, Revision 1, St. Lucie Unit 1 CSB and Core Shroud Flaw Analysis (ML20134J047 and ML20134J048)	4/30/2020
St Lucie SLRA Enclosure 4 Attachment 12	Westinghouse Letter LTR-SDA-20-104-NP, Rev 3 St. Lucie Units 1&2 SLR: Evaluation of Time-Limited Aging Analysis of the RVIs, September 14, 2021 (Non-proprietary)	Revision 3 9/14/2021
St Lucie SLRA Enclosure 5 Attachment 7	Westinghouse Letter LTR-SDA-20-104-P, Rev 3 St. Lucie Units 1&2 SLR: Evaluation of Time-Limited Aging Analysis of the RVIs, September 14, 2021 (proprietary)	Revision 3 9/14/2021
Westinghouse Calculation Note, F-ME-C-000019	"Evaluation of CSB Repair Plug Preloads for RSG and License Renewal," in ePortal.	Revision 0, 9/20/2001
Westinghouse Calculation Note, CN-RIDA-09-4	"St. Lucie Unit 1 EPU Evaluation of CSB Repair Plug Preload," in ePortal.	Revision 0, 3/31/2009
Westinghouse Calculation Note, CN-RIDA-09-9	"St. Lucie Unit I EPU RVIs Stress Analysis," as modified by: (a) Assessment Record, CN-RJDA-09-9-R1-ASMT-1," in ePortal.	Revision 1, 8/30/2013
Combustion Engineering Calculation, 19367-640-60	"Calculation of Minimum Allowable Plug Flange Deflections," in ePortal.	Revision 01, 9/10/1985

Document	Title	Revision / Date
Combustion Engineering Document, 19367-MD-GI-0I	"Guidelines for Post Installation Inspection of CSB Plugs and Patches," in ePortal.	Revision 05, 10/23/1985

During the audit, the staff observed the following:

- The staff observed that, in the SLRA, the applicant manages applicable aging effects in the CSB assembly components as part of the applicant's SLRA bases for implementing its RVIs Program, which the SLRA states is an "Existing" AMP for the facility (SLRA AMP B2.3.7). However, the staff also observed that the applicant is not crediting its RVIs AMP for management of loss of preload due to irradiation-assisted stress relaxation or creep in the installed Unit 1 CSB repair plugs and support lug patches. The staff observed that, instead, the applicant is using the Unit 1 CSB Repair TLAA in section 4.7.3 of the SLRA as the basis for managing this aging effect in these components. The staff notes that section 1.2.1 of NUREG-2192, "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," indicates that TLAAs may be used as an alternative option (i.e., in lieu of using an AMP or defined aging management activities) for managing the aging effects in accordance with the requirements in 10 CFR 54.21(a)(3) and thus finds this approach acceptable.

- The staff observed that SLRA section 4.7.3 states that the applicant installed the Unit 1 CSB repair plugs and patches as part of the past corrective actions for resolving degradation in CSB assembly-to-thermal shield support lug interfaces in 1983, where the cracking was detected in the CSB assembly in areas adjacent to the thermal shield lugs and the CSB was determined to have separated from the thermal shield lugs. The staff observed that the applicant implemented the following corrective actions for resolving this OpE event to ensure and maintain the core support function of the CSB assembly:

  - Removed the Unit 1 thermal shield as a design modification for the RVIs design of the unit.

  - Installed crack arrest holes in portions of the CSB that contains through-wall crack indications and implemented machining to remove non-through-wall cracks detected in the CSB assembly (i.e., for the cracks detected in the regions of the CSB adjacent to the thermal shield support lugs).

  - Installed plugs in the CSB crack arrest holes and patches to the damaged support lug tear areas.

  - Performed a time-dependent analysis (Combustion Engineering Calculation No. 19367-640-60) to assess potential loss of preload that might occur in the CSB support lug patches and crack arrest hole plugs over time. The staff noted that, for the objectives of the SLRA, the applicant is using the updated loss of preload analysis in Westinghouse Letter No. LTR-SDA-20-104-P, revision 3, as the basis for the CSB Repair Plug TLAA that is evaluated in SLRA section 4.7.3 and for projecting the applicable preload analysis out to the end of the subsequent period of extended operation.

During the audit of the subject TLAA, the staff verified that the applicant has provided its basis that supports its disposition of Unit 1 CSB repairs in accordance with 10 CFR 54.21(c)(1)(ii). The staff will provide its safety evaluation of the Unit 1 CSB Repair TLAA in section 4.7.3 of the SER.

The staff notes that the TLAA of the CSB repair is related to the AMR of RVI components. As such, below is the staff's audit of RVI AMR that is associated with the Unit 1 CSB repair.

Staff Review of AMR Item for RVI Components

Summary of Information in the Application. During the AMR audit, the staff reviewed the component-specific or commodity group-based line items for RVI components and plant documentation associated with SLRA able 3.1.2-2, "Reactor Vessel Internals – Summary of Aging Management Evaluation," against component-specific AMR screening results for RVI components in SLRA able 2.3.1-2, "Reactor Vessel Internals Components Subject to Aging Management Review."

Relevant Documents Reviewed

Document	Title	Revision / Date
NRC SLR-ISG Document No. SLR-ISG-2021-01-PWRVI	Updated Aging Management Criteria for RVI Components for Pressurized Water Reactors (ML20217L203)	01/08/2021
NUREG-2191, Volume 1	Generic Aging Lessons Learned for GALL-SLR Report (ML17187A031)	02/07/2017
EPRI Report No. 3002017168	Materials Reliability Program: Pressurized Water Reactor Internals I&E Guidelines MRP-227, Revision 1-A (ML20175A112)	12/2019

The staff also audited the summary description of the Unit 1 CSB Repair TLAA provided in the UFSAR supplement in SLRA, appendix A1, section 19.3.6.3. The staff verified that the summary description is consistent with the description provided in section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," of the SRP-SLR. The staff will provide its evaluation of the UFSAR supplement for Unit 1 Core Support Repair TLAA in section 4.7.3 of the SER.

SLRA TLAA Section 4.7.4, Reactor Coolant Pump Flywheel Fatigue Crack Growth

Summary of Information in the Application. SLRA section TLAA 4.7.4, "Reactor Coolant Pump Flywheel Fatigue Crack Growth" (henceforth RCP flywheel TLAA), discusses the fatigue crack growth analyses for the reactor coolant pump (RCP) flywheel at St Lucie Units 1 and 2. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(i). To verify that the applicant provided an acceptable technical basis to support its disposition of the TLAA, the staff audited the TLAA.

Audit Activities. During the audit, the staff reviewed relevant documents provided by the applicant in its ePortal, previously submitted materials, and SLRA. The staff discussed matters related to this TLAA with the applicant during the staff's virtual audit breakout session meeting

that was held with the applicant on January 18, 2022. The staff reviewed the following relevant documents.

RELEVANT DOCUMENTS REVIEWED

Document	Title	Revision / Date
Atomic Energy Commission (AEC) Safety Guide 14[1]	RCP Flywheel Integrity (ML12305A254)	Revision 0, 10/27/1971
NRC Regulatory Guide 1.14	RCP Flywheel Integrity, Revision 1, August 1975 (ML003739936)	Revision 1 08/1975
Unit 1 UFSAR section 1.7, including Table 1.7-1[1]	Design Compliance with AEC Safety Guides, Information Guides and Code of Federal Regulations Cross References, (. ML20141L646)	Amendment No. 30, 5/2020
Unit 2 UFSAR, section 1.8, including Table 1.8-1	Applicable NRC Regulatory Guides (ML20268A117)	Amendment No. 26, 9/2020
Unit 1 UFSAR	Section 5.5.5.3, RCP Flywheel Analysis (ML20141L651)	Amendment No. 30, 5/2020
Unit 2 UFSAR	Section 5.4.1.1, RCP Flywheel Integrity (. ML20268A125)	Amendment No. 26, 9/2020
NUREG-1779	Section 4.1.2, SER Related to the License Renewal of St Lucie Units 1 and 2 (. ML032940205)	Revision 1 9/2003
Topical Report SIR-94-080-A	Relaxation of RCP Flywheel Inspection Requirements (ML20211N486 for the cover letter and ML20211N492 for the report)	Revision1 10/14/1997
NRC Safety Evaluation	NRC SE of topical report SIR-94-080, Relaxation of RCP Flywheel Inspection Requirements (ML20013C086)	5/21/1997
FPL Letter L-2019-091	License Amendment Request to modify RCP inspection program in Technical Specifications (ML19282D338)	10/9/2019

1. Unit 1 UFSAR table 1.7-1 references the applicant's basis for conforming to staff's original guidelines in AEC "Safety Guide 14, RCP Flywheel Integrity." Per the information in SLRA Section 4.7.4, the applicant applies the updated basis for AEC Safety Guide 14 in NRC Regulatory Guide 1.14, as referenced in the first- and second-line item entries in the above table. The applicant is permitted to use the updated guidance in NRC RG 1.14 in lieu of the prior guidance for RCP flywheel integrity in AEC Safety Guide 14.

During the audit, the staff made the following observations:

- The staff observed that applicant's basis for performing an analysis of fatigue crack growth in the RCP flywheel rotors and discs was originally performed as an original design basis calculation for conforming to AEC Safety Guide 14, as referenced in the table above. The

staff noted that per the information in SLRA section 4.7.4, the applicant references use of the updated staff guidance for RCP flywheel integrity in NRC Regulatory Guide 1.14.

- The staff observed that the RCP flywheel fatigue crack growth analysis that forms the basis for the RCP flywheel TLAA (applicable to Units 1 and 2) is given in topical report SIR-94-080-A, revision 1. The staff observed that the time-dependent flaw growth analysis in SIR-94-080-A, revision 1, was approved in an NRC SE dated May 21, 1997. The staff noted that although the referenced NRC SE for the topical report was related to a license amendment for the Arkansas Nuclear One, Units 1 and 2, the NRC's SE is also applicable to the RCP flywheel fatigue flaw growth analyses at St. Lucie Units 1 and 2.

- In the SE of the topical report, the staff made the following statement regarding the use of SIR-94-080-A for the RCP flywheel inspection intervals at St. Lucie Units 1 and 2:

  "*Licensees for ANO-2, Palisades. Millstone 2, Waterford 3, and St. Lucie 1 & 2 who plan to submit a plant-specific application of this topical report need to verify the reference temperature RTNDT for their RCP flywheels. Also, if these licensees have flywheels made of materials other than SA 533 B and SA 508, they need to justify the use of the K_{IC} v.s. ($T - RT_{NDT}$) curve in appendix A of section XI of the ASME Code to derive their respective K_{IC} values.*"

  The staff observed that the applicant addressed the above matters for St. Lucie Unit 2 in the applicant's license amendment request of October 10, 2019, for St. Lucie Unit 2, which formed the basis for maintaining re-inspections of the Unit 2 RCP flywheels on a 10-year re-inspection interval basis.

During the audit of the TLAA, the staff verified that the applicant has provided its technical basis that supports its disposition of RCP flywheel fatigue crack growth in accordance with 10 CFR 54.21(c)(1)(i).

The staff will evaluate this TLAA and the relationship of these observations to the TLAA in SER section 4.7.4.

The staff also audited the summary description of the TLAA for the RCP flywheel fatigue crack growth analyses provided in the UFSAR supplement in SLRA appendix A1, Section 19.3.6.4 for Unit 1 and appendix A2, Section 19.3.6.3 for Unit 2. The staff verified these summary descriptions are consistent with the generic description provided in section 4.7, "Other Plant-Specific Time-Limited Aging Analyses," of the SRP-SLR. The staff will provide its evaluation of the UFSAR supplement for the Units 1 and 2 RCP flywheel fatigue crack growth analyses TLAA in section 4.7.4 of the SER.

SLRA TLAA Section 4.7.5, Reactor Coolant Pump Code Case N-481

Summary of Information in the Application. SLRA section 4.7.5, "Reactor Coolant Pump Code Case N-481," discusses the analysis for the acceptability of applying code case N-481 to the reactor coolant pump casings at St. Lucie. The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(1)(i). To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA. The staff will address issues identified but not resolved in this audit report in the SER.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the

OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and operating experience by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
Westinghouse Letter Report LTR-SDA-20-099-P Revision 2	St. Lucie Units 1&2 Subsequent License Renewal: Task 9E RCP Casing Code Case N-481 Evaluation	Revision 2 09/15/2021
ASME Code Case N-481	Alternative Examination Requirements for Cast Austenitic Pump Casings, Section XI, Division 1	03/28/2004
Combustion Engineering Owners Group CEN-412, Revision 2	Relaxation of Reactor Coolant Pump Casing Inspection Requirements	Revision 2 04/1993

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports the disposition of 10 CFR 54.21(c)(1)(i).

The staff also audited the description of the SLRA reactor coolant pump code case N-481 provided in the UFSAR supplement. The staff verified this description is consistent with the description provided in the SRP-SLR.

SLRA TLAA Section 4.7.6, Crane Load Cycle Limit

Summary of Information in the Application. SLRA section 4.7.6, "Crane Load Cycle Limits," discusses the analyses of crane load cycles for cranes that comply with NUREG-0612 and are in the scope of SLR, including the reactor building polar cranes, spent fuel handling machines, turbine building gantry cranes, and others. The applicant dispositioned the TLAAs in accordance with 10 CFR 54.21(c)(1)(i). To verify that the applicant provided a basis to support its disposition of the TLAA, the staff audited the TLAA.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-037	St. Lucie Units 1 and 2 SLR TLAA and Exemptions Based on Time-Limited Assumptions	Revision 01
CMAA Specification No. 70	ONS Crane Manufacturers Association of America, Inc. Specification No. 70	1975

NUREG-1779	SER Related to the License Renewal of St. Lucie Nuclear Plant, Units 1 and 2, Section 4.6.2, "Crane Load Cycle Limit"	07/2003
NUREG-0612	Control of Heavy Loads at Nuclear Power Plants	07/1980
PSL UFSAR, Unit 1	Section 9.6.3, "Implementation of NUREG-0612 Guidelines" Section 18.3.6, "Crane Load Cycle Limit"	Amendment 23 Amendment 20
PSL UFSAR, Unit 2	Section 9.6.3, "Implementation of NUREG-0612 Guidelines" Section 18.3.6, "Crane Load Cycle Limit"	Amendment 24 Amendment 25
UFSAR, U1, Sec. 18.3.6	Crane Load Cycle Limit	Amendment No. 20
UFSAR, U2, Sec. 18.3.6	Crane Load Cycle Limit	Amendment No. 25

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(i).

The staff also audited the description of the SLRA Crane Load Cycle Limit TLAA provided in the UFSAR supplement. The staff verified this description is consistent with the guidance provided in the SRP-SLR section 4.7.3.

SLRA TLAA Section 4.7.7, Flaw Tolerance Evaluation for CASS RCS Piping Components

Summary of Information in the Application. SLRA section 4.7.7, "Flaw Tolerance Evaluation for CASS RCS Piping Components," discusses the applicant's TLAA evaluation for the reactor coolant piping components fabricated from CASS materials. The section addresses the susceptibility of the CASS components to thermal aging embrittlement and the associated flaw tolerance analysis. The applicant dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(ii), stating that the analysis has been projected to the end of the subsequent period of extended operation. To verify that the applicant has provided a valid basis to support its disposition of this TLAA, the staff audited the TLAA.

Audit Activities. During its audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Document	Title	Revision / Date
NEESL00008-REPT-078	St. Lucie Units 1 and 2 SLR Aging Management PBD - Thermal Aging Embrittlement of Cast Austenitic Stainless Steel	Revision 0, 7/28/2021

Document	Title	Revision / Date
NEESL00008-REPT-037	SLR Time-Limited Aging Analyses and Exemptions Based on Time-Limited Assumptions	Revision 1
Structural Integrity Report No. 2001262.402	Flaw Tolerance Evaluation of St. Lucie, Units 1 and 2 CASS Components for SLR	Revision 1, 7/15/2021
Structural Integrity Report No. 1301079.402	Flaw Tolerance Evaluation of St. Lucie Units 1 and 2 CASS Components	Revision 0, 11/5/2020

During the audit of TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(ii). However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing RCIs, RAIs and/or use a voluntary SLRA supplement offered by the applicant during the audit.

During the audit, the staff made the following observations:

- The staff reviewed the TLAA basis document Structural Integrity Report No. 2001262.402, Revision 1, "Flaw Tolerance Evaluation of St. Lucie Units 1 and 2 CASS Components for SLR," dated July 15, 2021. The staff noted that tables 3 through 6 of the report contain the 60-year CASS evaluation results for Safety Injection Nozzle Safe Ends, Surge Lines, and RCP Safe Ends. The tolerable flaw depth in Safety Injection Nozzle Safe Ends and Surge Lines is 0.98 inches. At the bounding stress paths, the final flaw depth in the Safety Injection Nozzle Safe Ends would reach 0.91 inches in 480 months and in the Surge Lines it would reach 0.97 inches in 252 months. In contrast, table 9 of the report shows the same CASS re-evaluation results for the same components but for 80 years of operation. These crack growth results show that, after 960 months, the final limiting flaw depth following the bounding stress path would only reach 0.45 inches, less than half of the tolerable flaw depth of 0.98 inches that was previously estimated.

- The NRC staff noted that aside from the updated 80-year projected cycles and applying the fatigue crack growth law of ASME code case N-809, "Reference Fatigue Crack Growth Rate Curves for Austenitic Stainless Steels in Pressurized Water Reactor Environments," the remaining inputs to the 80-year flaw evaluation were similar to those for 60-years. However, the results suggest that operating period more than three times longer than the previously evaluated limiting time would result in a flaw less than half of the previously evaluated flaw depth. Additionally, SLRA section 4.7.7 states, *"For the SPEO, the SI Report used an updated version of crack growth software pc-Crack, which eliminated some of the unnecessary conservatisms in the PEO report."* Apparently, this new version eliminates some of the unnecessary conservatisms by allowing the user to input "rise time" and "metal temperature" when doing the calculations. However, it was not clear to the staff: (a) what conservatisms were removed, (b) how these conservatisms decrease the maximum flaw growth so greatly from the previous analysis that 80-year operation is now justified, and (c) how the removal of these conservatisms will ensure safe operation of the plant up to 80 years.

During the audit of the OpE associated with the TLAA, the staff independently searched the plant-specific database to identify any previously unknown or recurring aging effects. The staff did not identify any additional aging effects that would have an impact on the applicant's evaluation of the TLAA.

The staff also audited the UFSAR supplement description of the SLRA TLAA "Flaw Tolerance Evaluation for CASS RCS Piping," provided in sections 19.3.6.7 and 19.3.6.6 of SLRA appendices A1 and A2. The staff found that sufficient information was not available to determine whether the descriptions provided in the UFSAR supplements were an adequate description of the SLRA TLAA on the flaw tolerance analysis for CASS RCS piping components. The staff will consider issuing an RAI in order to obtain the information necessary to verify the sufficiency of the UFSAR supplement descriptions.

SLRA TLAA Section 4.7.8, Unit 2 Structural Weld Overlay PWSCC Crack Growth Analysis

The SLRA states that TLAA 4.7.8, "Unit 2 Structural Weld Overlay PWSCC Crack Growth Analysis," discusses the analysis for the following Unit 2 dissimilar metal welds.

- Pressurizer surge nozzle
- Pressurizer relief valve nozzle
- Hot-leg shutdown cooling nozzles
- Hot-leg surge nozzle
- Hot-leg drain nozzle

The applicant dispositioned the TLAA in accordance with 10 CFR 54.21(c)(iii).

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. The staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. The table below lists documents that were reviewed by the staff and were found relevant to the program. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
Framatome Document No. 86-9329648-000	St. Lucie SLR Crack Growth Analysis Summary - Non-Proprietary	07/02/2021
Framatome Document No. 86-9329645-000	St. Lucie SLR Crack Growth Analysis Summary - Proprietary	07/01/2021

Document	Title	Revision / Date
ASME Code Case N-770-5	ASME/BPVC CASE N-770, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated With UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1"	Revision 5 11/07/2016

During the audit of the TLAA, the staff verified that the applicant has provided its basis that supports its disposition of 10 CFR 54.21(c)(1)(iii). However, the staff found that sufficient information was not available to complete its review of the applicant's basis for its TLAA disposition. In order to obtain the necessary information, the staff will consider issuing an RAI.

During the audit, the staff made the following observations:

- From review of Document No. 86-9329645-000, the staff noted in Section 2.4, "PWSCC Crack Growth Mechanisms," the primary water SCC (PWSCC) crack growth rate for Alloy 52M that the applicant used. The NRC has not endorsed this crack growth rate and is currently reviewing its adequacy.

- The staff interviewed the applicant to verify: (a) if the NRC endorses a different crack growth rate, what actions would the applicant take to address the revised rate, and (b) where this process is documented in the applicant's procedures.

AMR Items Not Associated with an AMP

SLRA AMR FE 3.5.2.2.2.6, Reduction of Strength and Mechanical Properties of Concrete Due to Irradiation and 3.5.2.2.2.7, Expected Further Evaluation for Loss of Fracture Toughness due to IE of RPV Supports from NRC Review of the Previous SLRAs

Summary of Information in the Application. During the audit, the staff reviewed plant documentation associated with the following:

- SLRA table 3.5.2-1: "Containment Building Structures – Summary of Aging Management Evaluation," which cites primary shield wall concrete exposed to indoor air uncontrolled environment.
- SLRA table 3.5.2-1: "Containment Building Structures – Summary of Aging Management Evaluation," which cites RV steel supports and bolting exposed to indoor air uncontrolled environment.
- SLRA table 3.5.2-1: "Containment Building Structures – Summary of Aging Management Evaluation," which cites sliding surfaces (Lubrite®) exposed to indoor air uncontrolled environment.
- SLRA table 3.5.2-1: "Containment Building Structures – Summary of Aging Management Evaluation," which cites RCS Class 1 steel supports exposed to indoor air uncontrolled environment.

- SLRA table 3.5.2-1: “Containment Building Structures – Summary of Aging Management Evaluation,” which cites RCS Class 1 steel supports exposed to air with borated water leakage environment.
- SLRA table 3.5.2-16: “Component Support Commodity – Summary of Aging Management Evaluation,” which cites steel anchorage/embedment exposed to indoor air uncontrolled and air with borated water leakage environments.
- SLRA table 3.5.2-16: “Component Support Commodity – Summary of Aging Management Evaluation,” which cites ASME Class 1 structural bolting exposed to indoor air uncontrolled environment.

In addition, the staff reviewed:

- SLRA table 3.5.2-1: Containment Building Structures – Summary of Aging Management Evaluation,” which cites for concrete primary shield wall exposed to indoor air uncontrolled environment has plant-specific note that states irradiation of the concrete primary shield wall is addressed in section 3.5.2.2.2.6 and is managed by the Structures Monitoring (B.2.3.33) AMP.
- SLRA table 3.5.2-1: “Containment Building Structures – Summary of Aging Management Evaluation,” which cites RV steel supports and bolting exposed to indoor air uncontrolled environment has a plant-specific note that states that the loss of fracture toughness aging effect due to IE of the steel reactor vessel supports and bolting is addressed in section 3.5.2.2.2.7 and is managed by the ASME Section XI, Subsection IWF (B.2.3.30) AMP.

Audit Activities. During its audit, the staff interviewed the applicant’s staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. The table below lists documents that were reviewed by the staff and were found relevant to SLRA AMRs 3.5.2.2.2.6 and 3.5.2.2.2.7. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title	Revision / Date
NEESL00008-Rept-098	St. Lucie Units 1 and 2 SLR Primary Shield Wall Irradiation Evaluation	Revision 0
Enercon Addendum to NEESL00008-Rept-098	PSW CLB History Slides	02/17/2022
EPRI Report 3002002676	Expected Condition of Reactor Cavity Concrete After 80 Years of Radiation Exposure	02/2014
EPRI Report 3002011710	Irradiation Damage of the Concrete Biological Shield	05/2018
EPRI Report 3002013995	Irradiation Damage of the Concrete Biological Shield	07/2018

Journal of Advanced Concrete Technology Vol. 14	Review of the Current State of Knowledge on the Effects of Radiation on Concrete (pages 368-383)	07/2016
N/A	E-mail from H. Gordon to S. Jacques and S. Franzone: 8064534 (Dynamic Friction and Wear of a Solid Film Lubricant During Radiation Exposure in a Nuclear Reactor)	02/10/2022
NASA TN D-6940	Dynamic Friction and Wear of a Solid Film Lubricant During Radiation Exposure in a Nuclear Reactor	09/1972
FLO-8770.473	EBASCO Specification Concrete – NNS Class: Seismic, St. Lucie Plant Unit 1, 1974 – 890,000KW Installation	Revision 6
FLO-2998.473	EBASCO Specification Concrete – NNS Class: Seismic, St. Lucie Plant Unit 2, 890,000KW	Revision 4
FLO 2998-761	EBASCO Specification Structural Steel, Florida Power and Light, Class: Seismic Category I, Non-Seismic Category, NN Safety, St. Lucie Plant Unit 2, 890,000KW	Revision 4
FLO 2998-761	EBASCO Specification Structural Steel (Visual Weld Acceptance Criteria), Florida Power and Light, Class: Seismic Category I, Non-Seismic Category, NN Safety, St. Lucie Plant Unit 2, 890,000KW	Revision 6
FLO 8770-761	EBASCO Specification Structural Steel Hutchinson Island Plant, 1973 -890 MW Installation	Revision 2
8770-16346	St. Lucie Unit1 2 Civil Engineering Design Criteria, EBASCO Backfit Engineering, Florida Power and Light	04/22/2007
Addendum, FLO 8770-761	Addendum to EBASCO Specification FLO 8770-761 – Class I Structures and Components	Revision 2
FPL Book C412	Florida Power and Light, St. Lucie Unit 1, Reactor Building Cavity Wall – North Anna Analysis, Final Report.	Revision 0
DBD-CNTMT-1	Maximum Lubrication Plate Temperature, System Parameter Worksheet, St. Lucie Unit 1, Containment Systems, Design Basis Document	Revision 7
DBD-CNTMT-2	Maximum Lubrication Plate Temperature, System Parameter Worksheet, St. Lucie Unit 2, Containment Systems, Design Basis Document	Revision 7
PSLWEC-21-0039	FPL Request for Information to Westinghouse	Revision 0
PSLWEC-21-0066	FPL Request for Information to Westinghouse	Revision 0

WCAP-18623-P (PROPRIETARY)	St. Lucie Units 1 & 2 SLR: Fracture Mechanics Assessment of RPV Structural Steel Supports	Revision 1
INSPECTIONS/WORK ORDERS		
MIL-STD-271D, N-121	Magnetic Particle Inspection. Newport News Shipbuilding and Dry Dock Company	Revision D-3 (1969)
NAVSHIPS 0900-000-1000, N-123	Magnetic Particle Acceptance Standards (Welds, Castings, and Wrought Materials). Newport News Shipbuilding and Dry Dock Company	Revision E-3 (1969)
Procedure W-7/107/207	Instructions for Stress Relief Control of Welded Assemblies. Newport News Shipbuilding and Dry Dock Company	Revision B (1972)
MSMA-36	Procedure Specifications for Manual-Shielded Metal Arc Welding – Fillet and Groove Welds. PEDEN Steel Company	05/20/1970
SA-36	Procedure Specifications for Submerged Arc Welding – Fillet and Groove Welds. PEDEN Steel Company	02/17/1972
SAT-F-36, SAS-G-36, SAA-F-36, SAS-F-36	Various Procedures for Mechanized Welding. PEDEN Steel Company	1969-1972
R-79-964	FPL, Unit 2, Receipt Inspection Report (Inspections: magnetic particle, ultrasonic, visual inspections. Certifications: mill tests, material certifications, welding materials. heat treatment, NDE and welding personnel qualifications - Lakeside Bridge and Steel)	06/06/1979
AR 01716657	PSL-1 Reactor Vessel Supports Not in the ISI Program	01/21/2013
010950/010930/010910 4.3-057/-058/-059	PSL-1, Reactor Vessel Support @180 Deg. (1A1&1A2 Cold-Leg, 1B Hot-Leg) VT-3 Examination Record, Mechanical and Welded Attachments	01/27/2012
010920	PSL-1, Reactor Vessel Support Attachment @180 Deg. (B Hot-Leg) Magnetic Particle Examination	01/27/2012
SL1-010910 WO 40516972	PSL1-VT-18-001, Reactor Vessel Support @180 Deg. (B Hot-Leg) VT-3 Examination Record (ASME XI, 2001 Ed/2003 Add, F-A/F1.40)	03/31/2018
SL1-010920 WO40516972	PSL1-MT-18-002, Reactor Vessel Support @180 Deg. (B Hot-Leg) Magnetic Particle Examination (ASME XI, 2001 Ed/2003 Add, B-K/B10.10)	03/31/2018
SL1-010930 WO 40709203	PSL1-VT-21-037, Reactor Vessel Support @60 Deg. (A1 Cold-Leg) VT-3 Examination Record, (ASME XI, 2007 Ed/2008 Add, F-A/F1.40) – Upper and Lower Half Reports	04/24/2021

SL1-010950 WO 40709203	PSL1-VT-21-038, Reactor Vessel Support @300 Deg. (A2 Cold-Leg) VT-3 Examination Record, (ASME XI, 2007 Ed/2008 Add, F-A/F1.40) – Upper and Lower Half Reports	04/24/2021
010580 4.3-032	PSL-2, Reactor Vessel Support @60 Deg. (A1 Cold-Leg) Visual Examination Record, VT-3, Mechanical and Welded Attachments	09/20/2012
010560 4.3-035	PSL-2, Reactor Vessel Support @180 Deg. (B Hot-Leg) Visual Examination Record, VT-3, Mechanical and Welded Attachments	09/22/2012
010593 4.3-033	PSL-2, Reactor Vessel Support @300 Deg. (A2 Cold-Leg) Visual Examination Record, VT-3, Mechanical and Welded Attachments	09/20/2012
DRAWINGS		
DWG 2998-G-529 (EBASCO)	FPL Co. (FPL) St. Lucie Plant (PSL), 1983 – 890,000KW Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel. Cavity Masonry	Revision 4
DWG 2998-G-530 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel Cavity Masonry, SH 2	Revision 5
DWG 2998-G-533 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 1	Revision 2
DWG 2998-G-534 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 2	Revision 2
DWG 2998-G-535 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 3	Revision 4
DWG 2998-G-553 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 4	Revision 2
DWG 2998-G-065 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. General Arrangement. Reactor Building, Floor Plans SH 1	Revision 30
DWG 2998-G-066 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. General Arrangement. Reactor Building, Floor Plans SH 2	Revision 13
DWG 2998-G-067 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. General Arrangement. Reactor Building, Sections, SH 1	Revision 20

DWG 2998-G-068 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. General Arrangement. Reactor Building, Sections, SH 2	Revision 16
DWG 2998-G-497 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Interior Base Concrete, Plan Reinf. SH 1	Revision 5
DWG 2998-G-514 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Interior Base Concrete, Sect. & Dets Reinf. SH 6	Revision 3
DWG 2998-G-518 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Internal Conc. Plans & Sect. Mas., SH 1	Revision 2
DWG 2998-G-519 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Internal Conc. Plans & Sect. Mas., SH 2	Revision 1
DWG 2998-G-794 (EBASCO)	FPL, PSL, 1983 – 890MWe Extension – Unit 2. Reactor Building, Equipment Supports, SH 2	Revision 3
DWG 8770-G-529 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Reactor Primary Shield & Refuel. Cavity Masonry	Revision 2
DWG 8770-G-530 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Reactor Primary Shield & Refuel Cavity Masonry, SH 2	Revision 2
DWG 8770-G-533 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 1	Revision 1
DWG 8770-G-534 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 2	Revision 1
DWG 8770-G-535 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Reactor Primary Shield & Refuel Cavity Reinf., SH 3	Revision 1
DWG 8770-G- 541 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Operating Floor Plan & Sect. Masonry	Revision 4
DWG 8770-G-065 (EBASCO)	FPL, PSL, 1976 – 890,000KW Installation – Unit 1. General Arrangement. Reactor Building, Floor Plans SH 1	Revision 28
DWG 8770-G-066 (EBASCO)	FPL, PSL, 1976 – 890,000KW Installation – Unit 1. General Arrangement. Reactor Building, Floor Plans SH 2	Revision 15

DWG 8770-G-067 (EBASCO)	FPL, PSL, 1976 – 890,000KW Installation – Unit 1. General Arrangement. Reactor Building, Sections, SH 1	Revision 17
DWG 8770-G-068 (EBASCO)	FPL, PSL, 1976 – 890,000KW Installation – Unit 1. General Arrangement. Reactor Building, Sections, SH 2	Revision 19
DWG 8770-G-497 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Interior Base Concrete, Plan Reinf. Sheet 1	Revision 4
DWG 8770-G- 502 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building. Interior Base Concrete Sect. & Det., SH 5	Revision 1
DWG 8770-G-518 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Internal Conc. Plans & Sect. Mas., SH 1	Revision 3
DWG 8770-G-519 (EBASCO)	FPL, Hutchinson Island Plant – 1973 – 890,000KW Installation – Unit 1. Reactor Building, Internal Conc. Plans & Sect. Mas., SH 2	Revision 3
DWG 8770-G-794 (EBASCO)	FPL, PSL, 1973 – 890,000 KW Installation – Unit 1. Reactor Building, Equipment Supports, SH 1, SH 2, SH 7, SH 8,	Revision 5
DWG 8770-G-794 (EBASCO)	FPL, PSL, 1973 – 890,000 KW Installation – Unit 1. Reactor Building, Equipment Supports, SH 3, SH 4, SH 9	Revision 2
DWG 8770-G-794 (EBASCO)	FPL, PSL, 1973 – 890,000 KW Installation – Unit 1. Reactor Building, Equipment Supports, SH 5	Revision 3
DWG 8770-G-794 (EBASCO)	FPL, PSL, 1973 – 890,000 KW Installation – Unit 1. Reactor Building, Equipment Supports, SH 6	Revision 6
DWG 8770-G-794 (EBASCO)	FPL, PSL, 1973 – 890,000 KW Installation – Unit 1. Reactor Building, Equipment Supports, SH 1-10	Revision 5
DWG-72-3860, 22/5 (CBI)	Details of Reactor Supports, FPL, EBASCO Services, Hutchinson Island Plant (Unit 1)	Revision 3
DWG-72-3860, 25/1 (CBI)	Reinforcement Bar Holes for Reactor Support Assemblies, FPL, EBASCO Services, Hutchinson Island Plant (Unit 1)	Revision 1
DWG-72-3860, 23/3 (CBI)	Details for Reactor Supports, FPL, EBASCO Services, Hutchinson Island Plant (Unit 1)	Revision 3
DWG-72-3860, 21/3 (CBI)	Reactor Supports for FPL, EBASCO Services, Hutchinson Island Plant (Unit 1)	Revision 3
DWG 9126-902 (Lakeside Bridge & Steel)	Reactor Supports Unit 2, Assembly Plan, EBASCO Services, Hutchinson Island Plant	Revision 2

DWG 9126-1 (Lakeside Bridge & Steel)	Reactor Supports Unit 2, Support Columns “A” & “B,” EBASCO Services, Hutchinson Island Plant	Revision 1
DWG 9126-2 (Lakeside Bridge & Steel)	Reactor Supports Unit 2, Reactor Supports, EBASCO Services, FPL, Hutchinson Island Plant	Revision 3
DWG 9126-3 (Lakeside Bridge & Steel)	Reactor Supports Unit 2, Reactor Supports, EBASCO Services, FPL, Hutchinson Island Plant	Revision 3
DWG 9126-4 (Lakeside Bridge & Steel)	Reactor Supports Unit 2, Anchor Bolts. EBASCO Services, FPL, Hutchinson Island Plant	Revision 1
E-233-507 (Combustion Engineering)	FPL, Reactor Vessel 1. Vessel Supports for 172”. D. PWR, Final Machining.	Revision 3
E-STD-220-002 (Combustion Engineering)	FPL, Reactor Vessel 1. Vessel Support Details	Revision 1
E-STD-220-003 (Combustion Engineering)	FPL, Reactor Vessel 2. Vessel Support Arrangement and Installation	Revision 1
E-71172-171-010 (Combustion Engineering)	FPL, Reactor Vessel 2. Vessel Supports, Final Machining	Revision 1
E-13172-340-002 (Combustion Engineering)	FPL, Reactor Vessel 2. Vessel Support Details	Revision 1
E-13172-340-003 (Combustion Engineering)	FPL, Reactor Vessel 2. Vessel Support Arrangement and Installation	Revision 1

During the audit, the staff made the following observations for SLRA sections 3.5.2.2.2.6, “Reduction of Strength and Mechanical Properties of Concrete due to Radiation” and 3.5.2.2.2.7 “Expected Further Evaluation for Loss of Fracture Toughness due to IE of Reactor Vessel (RV) Supports from NRC Review of the First Three SLRAs,” hereinafter referenced as “FE sections”:

(a) The staff noted that the SLRA FE Sections did not include sufficient information regarding the following:
- Alignment with Unit 1 and Unit 2 UFSARs, as applicable, (e.g., design codes used, loading conditions used).

(b) The staff noted that SLRA section 3.5.2.2.2.6 did not include sufficient information regarding the following:

- Description of the reactor cavity concrete aligning it with PSL Unit 1 and 2 drawings and UFSARs, as applicable.
- Information that the structural design for the two Units' PSWs/LCC differs (e.g., different reinforcing grade steels used) and as to why Unit's 1 design bounds (controls) assessment of SLRA section 3.5.2.2.2.6.
- Details of the controlling Unit's (i.e., PSL Unit 1) design (e.g., PSW/LCC concrete compressive strength(s), aggregate(s) used in concrete mix, rebar steel grade(s) used).
- Which of the analyses and loading conditions included in the UFSAR have been used in "the original analysis [analysis of record (AOR)] of the PSW/LCC under CLB loading conditions" to evaluate radiation induced effects on reactor cavity concrete "IR [Interaction Ratio] = applied stresses/allowable stresses) associated with the governing failure mode of 0.77."

(c) The staff noted that the SLRA section 3.5.2.2.2.7 did not include sufficient information regarding the following:

- Information on the RV support analysis and assumption used (e.g., separate beam column analyses, LOCA loads used in loading combinations).
- Details on the reactor support slide plate configuration, on the lubricant used to facilitate nozzle sliding, and whether radiation effects could affect their intended function.
- Information on the application of the site specific ASME Section XI, subsection IWF program to the RV structural steel assembly support components (e.g., for the purpose of inspections, all three supports are considered as one) and further clarification of NDEs (other than visual) used and continued to be used during the subsequent period of extended operation.
- The effects of partial penetration weldments (i.e., fillet or groove welds) in the RV structural steel assembly, as shown for example in EBASCO Drawing Nos. 8770-G-794 and 2998-G-794, on the stresses on the RV structural steel assembly, especially at the locations of highest stress discussed in Section 6.2 of LTR-SDA-21-NP, revision 1 (Enclosure 4, Attachment 3 to the SLRA, ML21215A320) for the non-proprietary version and section 6.2 of LTR-SDA-21-P, Revision 1 (Enclosure 5, Attachment 1 to the SLRA,. ML21215A322) for the proprietary version.

(d) The staff also noted the need for the SLRA FEs to include:

- Reference(s) to core design procedures.
- Clarity on the uncertainty on the reported ex-vessel fluence and gamma dose in SLRA table 3.5.2.2-2 augmented by uncertainties and its effects on the PSW/LCC AOR calculations, as discussed in the breakout sessions.
- Clarity on the uncertainty on the reported ex-vessel fluence and gamma dose in SLRA tables 3.5.2.2-3 and 3.5.2.2-4, its effects and RV structural steel assembly, and whether it aligns with that assumed in the Point Beach structural steel fracture

mechanics calculations with which the PSL fracture mechanics evaluation asserts its conservatism.

- Additional AMR line items, for example, to manage the effects of aging for reduction/loss of fracture toughness of the RV structural steel support assembly due to radiation exposure.
- Readdress the ex-vessel estimated/calculated fluence uncertainty for concrete material properties degradation, as the breakout sessions' discussed uncertainties on fluence/gamma dose, not reflected in the SLRA, may lead the calculated fluence to exceed "threshold(s) of concern" identified in NUREG-2192.
- Review effects of uncertainty in radiation on the AOR including on the Stress Interaction Ratios" (IR=applied stresses/allowable stresses) of PSW/LCC.
- Further explain that the normalized ratios in SLRA table 3.5.2.2-5 are based on linear and nonlinear elastic fracture mechanics when compared to the to the linear elastic fracture mechanics RV structural steel assessment at Point Beach.
- Confirm relevance of ASME section XI, subsection IWF service conditions at PSL with those at Point Beach Nuclear Plant (PBN), since the applicant has based its fracture mechanics evaluation to the guidance provided in NUREG-1509 by comparison to PBN evaluation.

The staff will consider issuing RCIs and RAIs subsequent to its review and evaluation of applicant's voluntarily offered SLRA supplement to obtain the necessary information related to the staff's observations above.

SLRA AMR Further Evaluation 3.6.2.2.2, Reduced Insulation Resistance Due to Age Degradation of Cable Bus Arrangements Caused by Intrusion of Moisture, Dust, Industrial Pollution, Rain, Ice, Photolysis, Ohmic Heating and Loss of Strength of Support Structures and Louvers of Cable Bus Arrangements Due to General Corrosion and Exposure to Air-Outdoor

Summary of Information in the Application. During the audit, the staff reviewed the information associated with the following five AMR items discussed in SLRA 3.6.2.2.2 further evaluation section:

- SLRA table 3.6.1-027, "Cable bus: external surface of enclosure assemblies galvanized steel; aluminum; air – indoor controlled or uncontrolled (*air - outdoor*)"
- SLRA table 3.6.1-029, "Cable bus: electrical insulation insulators – exposed to air – indoor controlled or uncontrolled, air – outdoor"
- SLRA table 3.6.1-030, "Cable bus: external surface of enclosure assemblies composed of steel exposed to air – indoor uncontrolled or air – outdoor"
- SLRA table 3.6.1-031, "Cable bus external surface of enclosure assemblies composed of galvanized steel; aluminum exposed to air – outdoor"
- SLRA table 3.6.1-032, "Cable bus: external surface of enclosure assemblies: composed of steel; air – indoor controlled"

Audit Activities: During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA. The applicant did not provide any documents on the ePortal or any OpE data for this AMR item.

The staff conducted an onsite audit and discussed maintenance practices associated with cable buses and metal enclosed buses that perform similar functions with the applicant. The staffs observed that the installed cable bus system appeared well maintained, and that the applicant was in the process of replacing all metal enclosed bus (6.9 kiloVolt (kV) [not within the scope of SLR] and 4.16 kV [within the scope of SLR]) with cable bus (either 750 MCM or 500 MCM medium-voltage power cable).

The staff reviewed the applicant's further evaluation in SLRA section 3.6.2.2.2, "Reduced Insulation Resistance Due to Age Degradation of Cable Bus Arrangements Caused by Intrusion of Moisture, Dust, Industrial Pollution, Rain, Ice, Photolysis, Ohmic Heating and Loss of Strength of Support Structures and Louvers of Cable Bus Arrangements Due to General Corrosion and Exposure to Air-Outdoor." This input will be used in SER section 3.6.2.2.2.

SLRA AMR Further Evaluation (FE) 3.6.2.2.3, Loss of Material Due to Wind-Induced Abrasion, Loss of Conductor Strength Due to Corrosion, and Increased Resistance of Connection Due to Oxidation or Loss of Preload for Transmission Conductors, Switchyard Bus, and Connections

Summary of Information in the Application. During the audit, the staff reviewed plant documentation associated with the following five AMR items discussed in SLRA 3.6.2.2.3 FE section:

- SLRA table 3.6.1-004, "Transmission conductors composed of aluminum exposed to air-outdoor"
- SLRA table 3.6.1-005, "Transmission connectors composed of aluminum exposed to air-outdoor"
- SLRA table 3.6.1-006, "Switchyard bus and connections composed of copper and bronze; with aluminum hardware exposed to air – outdoor"
- SLRA table 3.6.1-007, "Transmission conductors composed of aluminum exposed to air-outdoor"
- SLRA table 3.6.1-021, "Transmission conductors composed of aluminum exposed to air-outdoor"

Audit Activities: During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and documents provided by the applicant via the ePortal.

The table below lists documents that were reviewed by the staff and were found relevant to the AMR items. These documents were provided by the applicant.

Document	Title	Revision / Date
NEESL00008-REPT-038	St Lucie Units 1 and 2, SLR Aging Effects OpE	Revision 0

Document	Title	Revision / Date
NEESL00008-REPT-036	St. Lucies Units 1 and 2 SLR Screening Results and Aging Management Review – Electrical Commodities	Revision 1

During the audit, the staff made the following observations:

The staff noted that the overhead conductors at St. Lucie are All Aluminum Alloy Conductors compared to Aluminum Conductor Steel Reinforced that has been evaluated for degradation due to environmental factors by Ontario Hydro and accepted by NRC staff. The staff will address this difference in the SER.

SLRA AMR FE, SCC and Loss of Material for Stainless Steel, Nickel Alloys, and Aluminum Alloys

Summary of Information in the Application. The SLRA addresses FE of cracking due to SCC, and loss of material due to pitting and crevice corrosion, of stainless steel, nickel alloys, and aluminum alloys in the Engineered Safety Features systems, Auxiliary systems, and Steam and Power Conversion systems. The SLRA sections for these FE discussions are: 3.2.2.2.2, 3.2.2.2.4, 3.2.2.2.8, 3.2.2.2.10, 3.3.2.2.3, 3.3.2.2.4, 3.3.2.2.8, 3.3.2.2.10, 3.4.2.2.2, 3.4.2.2.3, 3.4.2.2.7, and 3.2.2.2.9.

Audit Activities. During the audit, the staff interviewed the applicant's staff and reviewed documentation contained in the SLRA and provided by the applicant via the ePortal. For the OpE review, the applicant made a presentation on the process used to identify and evaluate the pertinent OpE. Afterwards, the staff conducted its review of the applicant's methodology and OpE by reviewing documentation contained in the SLRA and ePortal. The staff audited this topic to determine if the information in the SLRA is consistent with the FE information in the SRP-SLR Report.

The table below lists documents that were reviewed by the staff and were found relevant to these FE sections. The staff will document its review of this information in the SER.

Relevant Documents Reviewed

Document	Title / Description	Revision / Date
NEESL00008-REPT-038	St. Lucie Units 1 and 2 SLR Aging Effects OpE	Revision 0
NEESL00008-REPT-052	St. Lucie Units 1 and 2 SLR Aging Management PBD – Outdoor and Large Atmospheric Metallic Storage Tanks	Revision 0
PSL-ENG-SERS-16-001	PSL Asset Management Plan for the UPTIP	Revision 1

3. Supplements to the SLRA

By letters dated April 7, 2022 (ML22097A202), April 13, 2022 (ML22103A014) and May 12, 2022 (ML22139A083), FPL voluntarily submitted Supplements 1,2, and 3 to the SLRA resulting from discussions held during the audit.

4. Audit Questions Provided to FPL

Over the course of the audit, the NRC staff provided audit questions to FPL to facilitate the audit discussions.

Subject Area	Meeting Date	Questions Provided to FPL
Breakout Session: TRP 30 – Fuel Oil Chemistry	02/01/22	ML22013A317
Breakout Session: TRP 29 – Atmospheric Metallic Tanks	01/25/22	ML22010A094
Breakout Session: TRP 11 – Cracking of Nickel-Alloy Components and Loss of Material Due to Boric Acid-induced Corrosion in Reactor Coolant Pressure Boundary Components	01/24/22	ML21354A837
Breakout Session: TRP 33 – Selective Leaching	01/31/22	ML22010A100
Breakout Session: TRP 14 – Buried Piping	01/20/22	ML21351A239
Breakout Session: Corrosion OpE	01/19/22	ML22013A282
Breakout Session: TRP 15 – Internal Coatings	01/20/22	ML21351A241
Breakout Session: TRP 38 – Internal Surfaces	01/31/22	ML22010A097
Breakout Session: TRP 84 – SS Nickel-Alloy Aluminum Alloy Further Evaluations	02/03/22	ML22013A307
Breakout Session: TRP 60 – Fatigue Monitoring	01/27/22	ML22013A301
Breakout Session: TRP 143.4 – High Energy Line Break Analyses	01/28/22	ML22013A305
Breakout Session: TRP 143.1 – Metal Fatigue of Class 1	01/28/22	ML22013A302
Breakout Session: TRP 143.3 – Environmentally-Assisted Fatigue	01/27/22	ML22013A304
Breakout Session: TRP 143.2 – Non-Class 1 Fatigue Analyses	01/28/22	ML22013A303
Breakout Session: TRP 19 – Steam Generators	02/10/22	ML22130A654 ML22130A660
Breakout Session: TRP 26 – Fire Protection	01/19/22	ML21351A248
Breakout Session: Fire Protection Scoping and Screening	01/24/22	ML21356A577
Breakout Session: TRPs 148.3, Unit 1 CSB Repair Plug Preload Relaxation and 148.4, RCP Flywheel Fatigue Crack Growth	01/18/22	ML21356A011
Breakout Session: TRP 148.1, LBB of Reactor Coolant System Piping	01/18/22	ML21351A238
Breakout Session: TRP 20 – Open-Cycle Cooling Water	02/01/22	ML22013A316

Breakout Session: Scoping and Screening – Reactor Coolant System	02/02/22	ML22012A391
Breakout Session: TRP 17 – Flow-Accelerated Corrosion	02/07/22	ML22130A654 ML22130A663
Breakout Session: Structural Scoping and Screening	01/19/22	ML22013A277
Breakout Session: TRP 45 – Masonry Walls	01/25/22	ML22013A293
Breakout Session: TRP 77 – Corrosion Structural	01/27/22	ML22013A297
Breakout Session: TRP 27 – Fire Water System	02/07/22	ML22130A654 ML22130A667
Breakout Session: TRP 140.1 – Plant-Specific AMP, Pressurizer Surge Line	02/24/22	ML22130A654 ML22130A661
Breakout Session: TRP 147.8 and 23 – Crane and Inspection of Load Handling	01/27/22	ML22130A654 ML22130A665
Breakout Session: TRP 3 – RPV Closure Head Studs	02/01/22	ML22012A263
Breakout Session: TRP 10 – Boric Acid Corrosion	01/26/22	ML22010A096
Breakout Session: TRP 53.3 – Electrical	01/13/22	ML22130A654 ML22130A669
Breakout Session: TRP 76 – Irradiated Concrete	02/09/22	ML22130A654 ML22130A670
Breakout Session: TRP 43 – ASME Section XI, Subsection IWF	02/01/22	ML22130A654 ML22130A668
Breakout Session: TRP 142 – RV Neutron Embrittlement Analyses	02/14/22	ML22130A654 ML22130A674
Breakout Session: TRP 74 – Concrete	01/31/22	ML22013A296
Breakout Session: TRP 47 – Water-Control Structures	01/24/22	ML22013A295
Breakout Session: TRP 18 – Bolting Integrity	01/25/22	ML22013A284
Breakout Session: TRP 46 – Structures Monitoring	01/26/22	ML22013A294
Breakout Session: TRP 146 – Containment Liner Plate, Metal Containments, and Penetration Fatigue Analyses	02/02/22	ML22130A654 ML22130A671
Breakout Session: TRP 41 – ASME XI, Subsection IWE	01/31/22	ML22013A292
Breakout Session: TRP 16 – PWR Vessel Internals	02/03/22	ML22130A654 ML22130A673
Breakout Session: TRP 148.6 – Flaw Tolerance Evaluation for CASS RCS Piping Components	02/17/22	ML22130A654 ML22130A672
Breakout Session: TRP 1 – ASME XI – ISI	01/25/22	ML22003A038

5. Applicant Personnel Contacted During Audit

Name	Affiliation
Glenn Andrews	FPL
Paul Atkinson	FPL
Scott Boggs	FPL
Edwin Burgos	FPL
Eric Christopher	FPL
John Daily	FPL
Leonard Davis	FPL

Lahcen Elaadi	FPL
Steve Franzone	FPL
Michael Friedman	FPL
Daniel Griffin	FPL
Jay Kabadi	FPL
Charles Kato	FPL
Joe Loor	FPL
William Maher	FPL
Wendall Moore	FPL
Kevin Muggleston	FPL
Richard Orthen	FPL
Basil Pagnozzi	FPL
Swadesh (Chuck) Ramdeen	FPL
Carrie Roberts	FPL
Andrew Rode	FPL
Donna Slivon	FPL
Gary Thomas	FPL
Kester Thompson	FPL
Maribel Valdez	FPL
Shane (Chris) Webb	FPL

Name	Affiliation
Philip Barnes	ENERCON
Bruce Beisler	ENERCON
Matt Brunton	ENERCON
Andrew Cianek	ENERCON
Clay Corley	ENERCON
Steve Cornell	ENERCON
Spencer Feuerstein	ENERCON
Jeff Gromatzky	ENERCON
Aaron Halstrom	ENERCON
Stephen Hale	ENERCON
Jim Hamlen	ENERCON
Dave Hartmangruber	ENERCON
Jeffrey Head	ENERCON
Ronald Hepp	ENERCON
JR (Jack) Hoffman	ENERCON
Allison Hoke	ENERCON
Farrah Khanpour	ENERCON
Tanton Mattson	ENERCON
Mitch McFarland	ENERCON
Ian Miller	ENERCON
William Moody	ENERCON
Brian Norman	ENERCON
Anthony Ploplis	ENERCON
Duygu Saydam	ENERCON
Troy Skillen	ENERCON
Steve Sklaventis	ENERCON
Caleb Trainor	ENERCON

Matt Wilkinson	ENERCON
Mark Windsor	ENERCON

Name	Affiliation
Benjamin Amirir	Westinghouse
Dulai Bhowmick	Westinghouse
Nicholas Bisceglia	Westinghouse
Gordon Hall	Westinghouse
Susan Jaques	Westinghouse
Stephen Longwell	Westinghouse
Brett Lynch	Westinghouse
Tim Nowicki	Westinghouse
Maya Chandrashekhar	Framatome
Dave Skulina	Framatome
Pavan Thallapragada	Framatome
Nat Cofie	Structural Integrity Associates
Dave Gerber	Structural Integrity Associates
Terry Herman	Structural Integrity Associates
Kevin Wong	Structural Integrity Associates
SM Fluit	BWXT
D Hartman	BWXT

6. Exit Meeting

An exit meeting was held with the applicant on February 28, 2022, to discuss the results of the regulatory audit. The staff is considering the issuance of RAIs and RCIs to support the completion of the staff's SLRA review.