



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

March 25, 2020

Mr. Randall L. Kurtz  
Vice-President & Quality Assurance Director  
Sargent & Lundy, LLC  
55 E. Monroe Street  
Chicago, IL 60603-5780

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF  
SARGENT & LUNDY, LLC, NO. 99900507/2020-201

Dear Mr. Kurtz:

From February 24 through February 28, 2020, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at Sargent & Lundy, LLC's (hereafter referred to as S&L) facility in Chicago, IL. The purpose of this limited-scope inspection was to assess S&L's compliance with provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 21, "Reporting of Defects and Noncompliance," and selected portions of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

This technically-focused inspection specifically evaluated S&L's implementation of the quality activities associated with the consulting, engineering, design, analysis, and supply of safety-related software being supplied for new plant construction and nuclear operating power reactor projects for the U.S. nuclear industry. The enclosed report presents the results of the inspection. This NRC inspection report does not constitute NRC endorsement of S&L's overall quality assurance (QA) or 10 CFR Part 21 programs.

Based on the results of this inspection, the NRC inspection team found that the implementation of your QA program met the applicable technical and regulatory requirements imposed on you by your customers or NRC licensees. No findings of significance were identified.

In accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," the NRC will make available electronically for public inspection a copy of this letter, its enclosure, and your response through the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System, which is accessible at <http://www.nrc.gov/reading-rm/adams.html>.

R. Kurtz

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If you have any questions concerning this matter, please contact Mr. Jonathan Ortega-Luciano of my staff at (301) 415-1159.

Sincerely,

Kerri A. Kavanagh, Chief **/RA/**  
Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation

Docket No.: 99900507

EPID No.: I-2020-201-0024

Enclosure:

Inspection Report No. 99900507/2020-201  
and Attachment

SUBJECT: NUCLEAR REGULATORY COMMISSION VENDOR INSPECTION REPORT OF SARGENT & LUNDY, LLC, NO. 99900507/2020-201 Dated: March 25, 2020

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<b>DATE</b>	3/20/2020	3/20/2020	3/23/2020
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<b>NAME</b>	JOrtega-Luciano	KKavanagh	
<b>DATE</b>	3/23/2020	3/25/2020	

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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
DIVISION OF REACTOR OVERSIGHT  
VENDOR INSPECTION REPORT**

Docket No.: 99900507

Report No.: 99900507/2020-201

Vendor: Sargent & Lundy, LLC  
55 E. Monroe Street  
Chicago, IL 60603-5780

Vendor Contact: Randall L. Kurtz  
Vice-President & Quality Assurance Director  
Email: randall.l.kurtz@sargentlundy.com  
Phone: 312-269-6562

Nuclear Industry Activity: Sargent & Lundy's scope of supply includes design and general engineering services for new plant construction and operating nuclear power plants in the U.S.

Inspection Dates: February 24 - 28, 2020

Inspection Team Leader Jonathan Ortega-Luciano NRR/DRO/IQVB

Inspectors: Yamir Diaz-Castillo NRR/DRO/IQVB  
Raju Patel NRR/DRO/IQVB  
Dong Park NRR/DRO/IQVB

Management: Russell Felts NRR/DRO Dep. Director  
Kerri Kavanagh NRR/DRO/IQVB Branch Chief

Approved by: Kerri A. Kavanagh, Chief  
Quality Assurance and Vendor Inspection Branch  
Division of Reactor Oversight  
Office of Nuclear Reactor Regulation

Enclosure

## EXECUTIVE SUMMARY

Sargent & Lundy, LLC  
99900507/2020-201

The U.S. Nuclear Regulatory Commission (NRC) staff conducted a vendor inspection at the Sargent & Lundy, LLC's (hereafter referred to as S&L) facility in Chicago, IL, to verify that it had implemented an adequate quality assurance (QA) program that complies with the requirements of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" and 10 CFR Part 21, "Reporting of Defects and Noncompliance." The NRC inspection team conducted this inspection on February 24 - 28, 2020. This was the third NRC inspection at the S&L facility in Chicago, IL.

This technically-focused inspection specifically evaluated S&L's implementation of the quality activities associated with design, engineering services, and development and supply of safety-related software for new plant construction and nuclear operating power reactor projects for the U.S. nuclear industry.

These regulations served as the basis for the NRC inspection:

- Appendix B to 10 CFR Part 50
- 10 CFR Part 21

During the course of this inspection, the NRC inspection team implemented Inspection Procedure (IP) 43002, "Routine Inspections of Nuclear Vendors," dated January 27, 2017, IP 43004, "Inspection of Commercial-Grade Dedication Programs," dated January 27, 2017, and IP 36100, "Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance," dated May 16, 2019.

The NRC inspection team concluded that S&L's QA policies and procedures comply with the applicable requirements of Appendix B to 10 CFR Part 50 and 10 CFR Part 21, and that S&L's personnel are implementing these policies and procedures effectively. The results of this inspection are summarized below.

### 10 CFR Part 21

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its 10 CFR Part 21 program. The NRC inspection team: (1) reviewed the 10 CFR Part 21 postings, (2) reviewed a sample of personnel training records; (3) reviewed a sample of purchase orders (POs), and (4) verified that S&L's performance improvement process (PIP) program provides a link to the 10 CFR Part 21 program. No findings of significance were identified.

### Design Control

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its design control program to verify compliance with the requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. The NRC inspection team confirmed that (1) design documents specified and included the appropriate technical and quality requirements, (2) S&L and its customers coordinated sufficiently on the design projects, (3) S&L integrated independent verifications and checks into the process and performed these activities, and (4) S&L effectively controlled and implemented design changes. The NRC inspection team also confirmed that each software validation and verification package included the purpose and scope, software technical requirements, assumptions, methodology and acceptance criteria, calculations, test results, and comparison of test results against benchmarked results. No findings of significance were identified.

### Commercial-Grade Dedication

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its commercial-grade dedication (CGD) program to determine compliance with the requirements of Criterion III, Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed two CGD packages for software to verify that the process was being adequately implemented. No findings of significance were identified.

### Oversight of Contracted Activities

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its supplier oversight program to verify compliance with the requirements of Criterion IV and Criterion VII of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of S&L's procurement documents and supplier audits. No findings of significance were identified.

### Nonconforming Material, Parts, or Components and Performance Improvement Process (i.e. Corrective Action)

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its nonconforming materials, parts or components and PIP programs to verify compliance with the regulatory requirements of Criterion XV, "Nonconforming Materials, Parts or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50. The NRC inspection team reviewed a sample of S&L's PIP reports and attended the Engineering Oversight Team meetings where PIPs dispositions are evaluated. The NRC inspection team also reviewed the implementation of S&L's corrective actions associated with their response to Notice of Nonconformance (NON) contained in NRC Inspection Report No.99900507/2009-201. The NRC inspection team verified that S&L had taken adequate corrective actions to address issues identified in NON-99900507/2009-201-01. This NON is now considered closed. No findings of significance were identified.

### Internal Audits

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its internal audit program to verify compliance with the regulatory requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50. The NRC

inspection team reviewed the frequency of the internal audits, the independence and qualification of auditors, the objective evidence, and verified findings were captured in the PIP program. No findings of significance were identified.

## REPORT DETAILS

### 1. 10 CFR Part 21 Program

#### a. Inspection Scope

The NRC inspection team reviewed Sargent & Lundy, LLC's (hereafter referred to as S&L) policies and implementing procedures that govern the implementation of its Title 10 of the Code of Federal Regulations (10 CFR) Part 21, "Reporting of Defects and Noncompliance," program to verify compliance with the regulatory requirements. The NRC inspection team also evaluated the 10 CFR Part 21 postings, and a sample of S&L's purchase orders (POs) for compliance with the requirements of 10 CFR 21.21, "Notification of Failure to Comply or Existence of a Defect and its Evaluation," and 10 CFR 21.31, "Procurement Documents."

In addition, the NRC inspection team also verified that S&L's nonconformance and corrective action procedures (known by Performance Improvement Process (PIP)) provide a link to the 10 CFR Part 21 program. The NRC inspection team noted there were no examples of 10 CFR Part 21 evaluations performed by S&L since the last NRC inspection conducted on September 2009. The NRC inspection team reviewed a sample of PIPs that S&L's Engineering Oversight Team had dispositioned as Significant Condition Adverse to Quality (Level 4) or Condition Adverse to Quality (Level 3) and evaluated for potential 10 CFR Part 21 applicability. The NRC inspection team determined that S&L had effectively implemented the requirements for evaluating deviations and failures to comply.

The NRC inspection team also discussed the 10 CFR Part 21 program with S&L's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusion

The NRC inspection team concluded that S&L is implementing its 10 CFR Part 21 program in accordance with the regulatory requirements of 10 CFR Part 21. Based on the limited sample of documents reviewed, the NRC inspection team also determined that S&L is implementing its policies and procedures associated with the 10 CFR Part 21 program. No findings of significance were identified

### 2. Design Control

#### a. Inspection Scope

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its design control program to verify compliance with the regulatory requirements of Criterion III, "Design Control," of Appendix B to 10 CFR Part 50. It's important to note that S&L doesn't manufacture or fabricate any components, their scope of supply is based on providing design and engineering services to the



nuclear industry.

The NRC inspection team selected a random sample of three safety-related projects to evaluate the implementation of S&L's design control program. Specifically, the NRC inspection team reviewed the following projects:

- Installation of isolation valves in the Emergency Core Cooling System room coolers for Quad Cities Nuclear Power Station, Units 1 and 2
- Implementation of the horizontal Extended Optimized Storage system to safely move spent fuel from the spent fuel pool to the existing Independent Spent Fuel Storage Installation for Davis-Besse Nuclear Power Station, Unit 1
- Replacement of the buried auxiliary feedwater pipe for Salem Nuclear Generating Station, Unit 1

The NRC inspection team reviewed S&L's design control process which included the development of Project Instructions (PIs) and Project Work Plans (PWP). PIs are written to describe alternate methods used by the project to implement the technical requirements. PWPs are prepared to (1) define the project scope; (2) describe the deliverables associated with the project; (3) document the process for interfacing with the customer; (4) document the agreed upon project schedule; and (5) describe the methodology used to complete the project, including the applicable technical requirements.

For the projects listed above, the NRC inspection team reviewed a sample of calculations, engineering drawings, guidance, and inter-design group correspondence. The NRC inspection team verified that design inputs were appropriate, acceptance criteria was adequately documented and appropriate, and design assumptions were adequately justified. The NRC inspection team confirmed that (1) design documents specified and included the appropriate technical and quality requirements, (2) S&L and its customers coordinated sufficiently on the design projects, (3) S&L integrated independent verifications and checks into the process and performed these activities, and (4) S&L effectively controlled and implemented design changes, as applicable.

The NRC inspection team reviewed S&L's validation and verification (V&V) process for two of the software developed by S&L that were used in the projects described above. One of the software is used for the stress evaluation of piping systems and determination of support loads while the other was used to qualify welded attachments on supports. The NRC inspection team confirmed that each V&V package included the purpose and scope, software technical requirements, assumptions, methodology and acceptance criteria, calculations, test results, and comparison of test results against benchmarked results. The NRC inspection team also confirmed that all software used in the calculations were used within the parameters of its intended use, and within the constraints and limitations noted in the V&V of the software in accordance with S&L's procedures.

The NRC inspection reviewed the training and qualification records for two of the Registered Professional Engineers (RPEs) that worked on the projects described above. The NRC inspection team confirmed that the RPEs were adequately trained and are maintaining their RPE qualifications in accordance with S&L's and regulatory

requirements.

The NRC inspection team also discussed the design control program with S&L's management and technical staff. The attachment to this inspection report lists the documents reviewed and the staff interviewed by the NRC inspection team.

b. Observations and Findings

During this inspection the NRC inspection team concentrated their efforts in understanding how open design items (ODIs) are controlled by S&L, specifically those generated as part of the Standard Plant Design (SPD) for the NuScale Small Modular Reactor Power Plant project. NuScale manages unverified assumptions that are required to be verified and identified through an ODI database for configuration management and tracking. ODIs are only used to track design assumptions that require future verification. When S&L receives an Interface Requirements Document (IRD) from NuScale with design inputs for the development of the SPD, and the IRD contains ODIs, S&L will track the ODI as an open item in its Master Document Database (MDD) if the ODI is within S&L's scope of work.

S&L will reference the design input document as unverified assumption, rather than the ODI contained within the design input document. In the course of developing the SPD, S&L may also generate unverified assumptions that are tracked as open items in the MDD. The MDD was developed by S&L for the development of the NuScale SPD for configuration control of documents numbers, revisions, design inputs, and open items of all design deliverables to be issued as part of the NuScale SPD. All open items will be resolved prior to the SPD being submitted to NuScale. NuScale is still ultimately responsible for ensuring that the ODIs are adequately addressed before closure.

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that S&L is implementing its design control program in accordance with the regulatory requirements of Criterion III of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that S&L is implementing its policies and procedures associated with the design control program. No findings of significance were identified

3. Commercial-Grade Dedication

a. Inspection Scope

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its commercial-grade dedication (CGD) program to verify compliance with the requirements of Criterion III, Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed S&L's specific procedures and engineering instructions used for the CGD of software. The NRC inspection team selected a sample of two CGD plans from S&L's "Software Planned for Use on SPD Design

Analyses” list, which is specific to the NuScale project. For the first CGD plan, Applied Flow Technology Impulse 6.0, the NRC inspection team verified the CGD plan was performed in accordance with the requirements laid out in S&L’s General Administrative Guideline, GAG-0204-01, “Computer Software Development, Procurement, Verification and Validation, Documentation, Configuration Control, and Error Reporting,” which provides guideline for conducting the technical evaluation of critical characteristics for methodology, accuracy, repeatability, and dependability.

For the second CGD plan, RELAP5/MOD33, the NRC inspection team verified that the CGD was performed in accordance with the requirements of S&L’s General Administrative Standard, GAS-0204-04, “Software Acceptance - Commercial Grade Dedication,” which is based on the guidance from Electric Power Research Institute Report No. 1025243, “Plant Engineering: Guidelines for the Acceptance of Commercial-Grade Design and Analysis Computer Programs Used in Nuclear Safety-Related Applications,” that has been accepted by the NRC in Regulatory Guide 1.231, “Acceptance of Commercial-Grade Design and Analysis Computer Programs Used in Safety-Related Applications for Nuclear Power Plants,” Revision 0, dated January 2017. GAS-0204-04 replaced GAG-0204-01 following a software control improvement initiative by S&L. The NRC inspection team verified the CGD plan along with the supporting documentation followed the process laid out in GAS-0204-04.

The NRC inspection team confirmed that the CGD plans identified potential failure modes for the software including solution methodology, accuracy of output, repeatability of results, critical input and output parameters, and dependability. These issues were further identified as critical characteristics to assure prescribed measures to evaluate for such potential failures.

The NRC inspection team also discussed the CGD program with S&L’s management and technical staff. The attachment to this inspection report lists the documents reviewed and staff interviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that S&L is implementing its CGD program in accordance with the regulatory requirements of Criterion III, Criterion IV, and Criterion VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team determined that S&L is implementing its policies and procedures associated with the CGD program. No findings of significance were identified.

4. Supplier Oversight

a. Inspection Scope

The NRC inspection team reviewed S&L’s policies and implementing procedures that govern the implementation of its supplier oversight program to verify compliance with the requirements of Criterion IV and Criterion VII of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed the nuclear qualified suppliers list (NQSL), a sample of supplier audits, and the most recent POs for these suppliers. For the sample of POs reviewed, the NRC inspection team verified that the POs included, as appropriate: the scope of work, right of access to facilities, and extension of contractual requirements to sub-suppliers. The NRC inspection team also confirmed that the POs adequately invoked the applicable technical, regulatory, and quality requirements.

S&L is a member of the Nuclear Industry Assessment Committee (NIAC), which consists of companies who supply goods and services to the nuclear industry based on a quality program that meets the requirements of Appendix B to 10 CFR Part 50 or NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications," and accept 10 CFR Part 21. NIAC develops and maintains procedures and processes necessary to plan, guide, and share supplier audits with its members. S&L uses NIAC audits to support the qualification and maintenance of suppliers. Once a NIAC audit is received, a qualified representative from S&L's Quality Assurance (QA) organization reviews and evaluates the audit report for completeness and adequacy, in accordance with S&L's QA program and the appropriateness of the scope and approves the audit report as the basis for including the supplier on the NQSL.

For a sample of supplier audits reviewed, the NRC inspection team verified the audit reports included an audit plan, any findings identified, adequate documented objective evidence of compliance with the applicable requirements, and a review by S&L's responsible management. In addition, the NRC inspection team verified that the supplier audits were performed by a qualified auditor. Furthermore, the NRC inspection team reviewed a sample of training and qualification records of S&L's lead auditors and confirmed that the auditing personnel had completed all the required training and had maintained the applicable qualification and certification in accordance with S&L's policies and procedures.

The NRC inspection team also discussed the supplier oversight program with S&L's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observation and Findings

No findings of significance were identified

c. Conclusion

The NRC inspection team concluded that S&L was implementing its supplier oversight program in accordance with the regulatory requirements of Criterion IV and Criterion VII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that S&L was implementing its policies and procedures associated with the supplier oversight program. No findings of significance were identified.

5. Nonconforming Materials, Parts, or Components and Performance Improvement Process

a. Inspection Scope

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its nonconforming materials, parts, or components and PIP programs to verify compliance with the requirements of Criterion XV, "Nonconforming Materials, Parts, or Components," and Criterion XVI, "Corrective Action," of Appendix B to 10 CFR Part 50.

The NRC inspection team attended S&L's Engineering Oversight Team (EOT) meeting where the EOT team performed a review of all the PIPs to discuss the various stages of the PIP process. For a sample of twenty PIPs selected from 2017 through 2020, the NRC inspection team verified that S&L: (1) ensured that conditions adverse to quality and significant conditions adverse to quality were promptly identified and corrected; (2) adequately documented and described conditions adverse to quality and significant conditions adverse to quality; (3) conducted an appropriate analysis of the cause of these conditions and took corrective actions to prevent recurrence, as applicable; (4) provided direction for review and approval by the responsible authority; (5) described the current status of the corrective actions; and (6) took follow-up actions to verify timely and effective implementation of the corrective actions. In addition, the NRC inspection team reviewed: (1) how the problems were identified; (2) if they were adequately dispositioned in accordance with S&L's approved procedures; (3) if appropriate technical justifications were presented for each disposition; and (4) if adequate corrective actions were taken by S&L. In addition, the NRC inspection team reviewed S&L's corrective actions to address the Notice of Nonconformance (NON) contained in NRC Inspection Report (IR) 99900507/2009-201.

The NRC inspection team reviewed S&L's 2018 Quality Assurance Management Review Annual Assessment report. S&L had performed an assessment of procedure deviations, internal and external PIPs, internal and external audit findings, status of preventive and corrective actions, as well as, evaluation of PIP trends that were indicative of significant conditions adverse to quality including programmatic weaknesses.

The NRC inspection team also discussed the nonconforming materials, parts, or components and PIP programs with S&L's management and technical staff. The attachment to this inspection report lists the documents reviewed by the NRC inspection team.

b. Observation and Findings

Corrective Action Associated with NON 99900507/2009-201-01

The NRC issued NON 99900507/2009-201-01 for S&L's failure to modify and/or supplement test problems to include the full range of S&L applications for South Texas Project (STP) Units 3 and 4. Specifically, S&L identified that a 94-soil layer model was required to perform the Soil-Structure Interaction analysis for the STP Units 3 & 4 control building. S&L performed V&V of the ACS SASSI software program using no more than 20-soil layer models.

In a letter dated November 24, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML093500009), S&L described its corrective actions that address the issues identified in the NON documented in IR 99900507/2009-201 (ADAMS Accession No. ML092990573).

The NRC inspection team reviewed S&L corrective actions in response to NON-99900507/2009-201-01. S&L had initiated PIP No. 2009-1579 to address the issue identified in the above NON. The NRC inspection team reviewed the documentation that provided objective evidence that all corrective actions were completed and adequately implemented. Based on this review and interview with S&L technical and QA personnel, the NRC inspection team closed the NON99900507/2009-201-01 documented in IR No. 99900507/2009-201.

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that S&L is implementing its nonconforming materials, parts, or components and PIP programs in accordance with the regulatory requirements of Criterion XV and Criterion XVI of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed, the NRC inspection team also determined that S&L is implementing its policies and procedures associated with the control of nonconforming materials, parts, or components and PIP programs. No findings of significance were identified.

6. Internal Audits

a. Inspection Scope

The NRC inspection team reviewed S&L's policies and implementing procedures that govern the implementation of its internal audit program to verify compliance with the requirements of Criterion XVIII, "Audits," of Appendix B to 10 CFR Part 50.

The NRC inspection team reviewed a sample of internal audits reports. The NRC inspection team verified that S&L had prepared and approved audit plans that identify the scope and criteria to be audited. The NRC inspection team confirmed that the audit reports contained objective evidence of the areas reviewed and that audit findings were entered the PIP program. Furthermore, the NRC inspection team verified that lead auditors were adequately qualified.

The NRC inspection team also discussed the internal audit program with S&L's management and technical staff. The attachment to this inspection report lists the documents reviewed and the staff interviewed by the NRC inspection team.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The NRC inspection team concluded that S&L is implementing its internal audits program in accordance with the regulatory requirements of Criterion XVIII of Appendix B to 10 CFR Part 50. Based on the limited sample of documents reviewed and activities observed, the NRC inspection team determined that S&L is implementing its policies and procedures associated with the internal audit program. No findings of significance were identified.

7. Entrance and Exit Meetings

On February 24, 2020, the NRC inspection team discussed the scope of the inspection with Mr. Delfo Bianchini, Executive Vice President Director, Nuclear Power Group, Mr. Randall L. Kurtz, Vice President & Quality Assurance Director, and other members of S&L's management and technical staff. On February 28, 2020, the NRC inspection team presented the inspection results and observations during an exit meeting with Mr. Bianchini, Mr. Kurtz, and other members of S&L's management and technical staff. The attachment to this report lists the attendees of the entrance and exit meetings, as well as those individuals whom the NRC inspection team interviewed.

## ATTACHMENT

### 1. Entrance/Exit Meeting Attendees and Persons Interviewed

Name	Title	Affiliation	Entrance	Exit	Interviewed
Jonathan Ortega-Luciano	Inspection Team Leader	Nuclear Regulatory Commission (NRC)	X	X	
Yamir Diaz-Castillo	Inspector	NRC	X	X	
Dong Park	Inspector	NRC	X	X	
Raju Patel	Technical Specialist	NRC	X	X	
Kerri Kavanagh	Branch Chief	NRC		X	
Russell Felts	Deputy Director, Division of Reactor Oversight	NRC		X	
Randall Kurtz	Vice President (VP)& Quality Assurance (QA) Director	Sargent & Lundy (S&L)	X	X	X
Adam Mrugacz	Project Associate	S&L	X	X	X
Amir Mold	Senior Manager	S&L			X
Athanasios Perros	Project Associate II	S&L			X
Anthony Neri	Project Director	S&L		X	
Carlos Mayen	Project Manager	S&L			X
Catherine McKnight	Performance Improvement Process Coordinator	S&L	X	X	X
Constantine Petropoulos	Nuclear Program Group (NPG) – Project Director Civil & Structural	S&L	X		
David Wright	Project Director	S&L		X	
Delfo Bianchini	Executive Vice President Director, Nuclear Power Group	S&L	X	X	
Dr. Jan Wisniewski	Sr. Manager Electrical Analytical Division	S&L			X
Edward Martin	Quality Service Manager	S&L	X	X	X
Elizabeth Mattson	Project Associate	S&L			X
Glen Pederson	Manager, Engineering	S&L			X
Ismail Manasra	Manager/Consultant Electrical Analytical System	S&L			X



<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Entrance</b>	<b>Exit</b>	<b>Interviewed</b>
James McIntyre	Quality Service Manger	S&L	X	X	X
Javad Moslemian	NPG VP	S&L	X	X	
Jill T. Zenner	Senior Associate	S&L	X		X
John Gomez	Project Manager	S&L			X
Joseph Banach	Project Manager	S&L			X
Keith Miller	QA Director/Material Engineer	S&L	X	X	
Kevin Huberty	VP & Project Director	S&L	X	X	X
Khaled Ata	Manager, Engineering	S&L			X
Mark Santschi	Director of Operations / Director of Engineering	S&L	X		
Martin McDonald	Project Manager	S&L			X
Matthew B. Cooper	VP & Project Director	S&L	X		X
Michael Shervin	Project Manager	S&L			X
Mike Warpehoski	Project Manager	S&L			X
Nick Villione	NPG – Project Director	S&L	X		
Paul S. Kish	Manager, Nuclear Power Technologies	S&L	X	X	X
Richard Chittenden	Manager Mechanical Engineering	S&L			X
Robert J. Peterson	Senior Manager	S&L		X	X
Roger Coppel	NPG – Project Director	S&L	X		
Sandra Jannetty	Project Director	S&L	X		X
Shiven Sulkar	Project Director	S&L	X	X	
Tira L. Seals	Executive Assistant QA	S&L	X	X	
Tom Behringer	Project Manager	S&L	X		
Vijay Verma	Sr. Consultant Piping Group	S&L			X

## 2. INSPECTION PROCEDURES USED

- Inspection Procedure (IP) 36100, “Inspection of 10 CFR Part 21 and Programs for Reporting Defects and Noncompliance,” dated May 16, 2019
- IP 43002, “Routine Inspections of Nuclear Vendors,” dated January 27, 2017
- IP 43004, “Inspection of Commercial-Grade Dedication Programs,” dated January 27, 2017

3. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

<b>Item Number</b>	<b>Status</b>	<b>Type</b>	<b>Description</b>
99900507/2009-201-01	CLOSED	NON	Criterion III

4. DOCUMENTS REVIEWED

Policies and Procedures

- S&L Nuclear Quality Assurance Program Topical Report SL-TR-1A, Revision 24, dated January 9, 2018
- Standard Operating Procedure (SOP)-0101, "Assessments of Sargent & Lundy Quality Assurance Programs," Revision 5A, dated January 24, 2019
- SOP-0203, "Project Management," Revision 10, dated February 3, 2020
- SOP-0204, "Computer Software Quality Policies and Requirements," Revision 14, dated October 10, 2019
- SOP-0301, "Contracts," Revision 11, dated August 1, 2016
- SOP-0401, "Design Drawings," Revision 7, dated October 30, 2017
- SOP-0402, "Design Calculations," Revision 12, dated January 2, 2018
- SOP-0403, "Control of Design Input," Revision 7, dated November 23, 2015
- SOP-0404, "Design Reviews," Revision 4, dated June 27, 2017
- SOP-0405, "Engineering Evaluations and Reports," Revision 11, dated January 2, 2018
- SOP-0406, "Control of Design Changes," Revision 3, dated June 16, 2017
- SOP-0407, "Specifications," Revision 2, dated January 24, 2019
- SOP-0408, "Commercial Grade Dedication," Revision 1, dated November 26, 2012
- SOP-0501, "Document and Data Control," Revision 9, dated February 3, 2020
- SOP-0504, "Managing Vendor Information," Revision 5, dated November 23, 2015
- SOP-0506, "Professional Engineering Requirements," Revision 1, dated October 10, 2019
- SOP-0601, "Project Procurement," Revision 16A, dated May 30, 2019
- SOP-1401, "Performance Improvement Process," Revision 13, dated June 4, 2019

- SOP-1405, "Reporting of Defects and Noncompliance," Revision 7, dated March 9, 2017
- SOP-1801, "Process Definition and Associated Personnel Qualifications," Revision 7, dated February 3, 2020
- SOP-1803, "Personnel Training," Revision 7A, dated November 13, 2015
- SOP-Glossary, Revision 14, dated December 2, 2019
- Quality Assurance Standard (QAS)- 0601, "Supplier Quality Program Evaluation," Revision 12, dated July 14, 2017
- QAS-1700, "Audit, Surveillance, Survey and Evaluation Planning and Scheduling," Revision 14B, dated April 4, 2019
- QAS-1701, "Qualification of Audit Personnel," Revision 9, dated October 29, 2019
- QAS-1702, "Audits and Surveillances," Revision 8, dated October 29, 2019
- QAS-1703, "Nuclear Industry Assessment Corporation (NIAC) Assessment," Revision 1A, dated September 26, 2018
- QAS-1704, "Auditing Quality Assurance Division Activities," Revision 1, dated October 29, 2019
- General Administrative Standard (GAS)-0204-06, "Software Development," Revision 1, dated October 4, 2019
- GAS-0204-04, "Software Acceptance - Commercial Grade Dedication," Revision 0, dated January 30, 2019
- General Administrative Guidance-0204-01, "Computer Software Development, Procurement, Verification and Validation, Documentation, Configuration Control, and Error Reporting," Revision 15, dated July 28, 2017
- NuScale Power Standard Plant Design Project Manual, Revision 1, dated October 31, 2019
- Project Instruction (PI)-NUSCALE -104, "Control of Design Input & Design Information Transmittal," Revision 1, dated February 21, 2020
- PI-NUSCALE-105, "Preparation, Control, and Processing of Design Calculations," Revision 1, dated February 19, 2020
- PI-NUSCALE-107, "Preparation and Control of Design Drawings," Revision 0, dated November 13, 2019
- PI-NUSCALE-108, "Document Control," Revision 0, dated November 13, 2019

- PI-NUSCALE-112, "Component Classification and Numbering," Revision 0, dated November 18, 2019
- PI-NUSCALE-113, "Master Document Database," Revision 1, dated February 21, 2020
- PI-NUSCALE-121, "Preparation and Control of Piping & Instrumentation Diagrams (P&ID) and Process Control Narratives," Revision 1, dated February 21, 2020
- PI-NUSCALE-132, "Preparation and Control of Data Sheets," Revision 1, dated February 21, 2020
- General Engineering Guideline No. 401-01, "Design Inputs, Assumptions, and Engineering Judgment," Revision 1, dated February 24, 2020
- Project No. A13913, "Project Quality Plan, NuScale Power LLC, Standard Plant Design Project," Revision 1, dated February 21, 2020

#### Design Control and Software Verification and Validation

- Software Configuration Control Form GAG-0204-01-03, "A Piping Analysis System for Windows," software number 03.7.727, Version 1.5, dated May 21, 2018
- Software Configuration Control Form GAG-0204-01-03, "Weldment Attachment Evaluation Program," for software number 03.7.348, Version 2.0, dated January 8, 2004
- 10 CFR 50.59 Screen No. 16-03130, "Dry Cask Storage, Independent Spent Fuel Storage Installation (ISFSI Parent)," Revision 2
- 10 CFR 50.59 Screen No. 16-02967, "Spent Fuel Storage System Incorporation," Revision 1
- Configuration Change No. 80118665, "Unit 2 Buried Aux Feed Pipe Replacement," Revision 1
- Design Analysis No. Q1-DGSW-02B(C), "Diesel Generator Service Water Piping Analysis," Revision 12
- Design Analysis No. Q2-DSGW-01B(C), "Piping Analysis for System Q2-DSGW-01B(C)," Revision 11
- Design Analysis No. S-C-AF-MDC-1789, "Auxiliary Feedwater Thermal Hydraulic Flow Model," Revision 0
- Design Analysis No. 6S0-1883, "Qualification of Safety-Related Buried Commodities for Tornado Missile and Seismic Evaluation," Revision 0
- Electronic Correspondence from Martin W. McDonald to Brad Reineck, "DB EOS Lift Yoke / Crane Hook Fit-Up," dated March 12, 2019
- Engineering Change Package (ECP) Design Report Summary No. 15-0086-000,

## Revision 2

- ECP Design Report Summary No. 15-0093-000, Revision 2
- ECP No. 15-0086-002, "Implementation Documents Table of Contents," Revision 0
- ECP No. 15-0093-006, "EOS-HSM No. 9 through 20 Installation," Revision 0
- ECP No. 15-0093-007, "DSC Installation into HSM No. 9," Revision 0
- Engineering Evaluation Request No. 601199274, "Evaluate Haul Path for EOS HSM Delivery," dated April 1, 2019
- Interface Requirements Document (IRD) No. B114-7678, "Radioactive Waste Drain System," Revision 0
- IRD-B175-7549, "Ultimate Heat Sink," Revision 0
- IRD-C-050-7568, "Condenser Air Removal System," Revision 0
- IRD-F012-7682, "Reactor Building Components," Revision 0
- IRD-F080-7542, "Central Utilities Building," Revision 0
- Project Work Plan (PWP) for S&L Project No. A11334.557, "ECCS Room Cooler Isolation Valves," Revision 0
- PWP for S&L Project No. 13077.608, "ISFSI Project - EOS System Implementation," Revision 1, dated October 25, 2018
- PWP for S&L Project No. 12800-672, "Buried Auxiliary Feedwater Pipe Replacement," Revision 0, dated February 15, 2017
- Regulatory Applicability Determination No. 16-03130, "Dry Cask Storage, Independent Spent Fuel Storage Installation (ISFSI Parent)," Revision 2
- Regulatory Applicability Determination No. 16-02967, "Spent Fuel Storage System Incorporation," Revision 1
- Software Configuration Control, "Mechanical Engineering Piping Analysis Software for PSEG's Salem and Hope Creek Stations," dated May 13, 2013
- Validation & Verification (V&V)-03.7.763-6.0-04102017 IMPULSE, TCS, UDT, ABSTRACT& MEMO 122017
- V&V-03.7.459-3.3KR RELAP5 MOD33 WIN7

## Purchase Orders (PO)

- PO No. 00597084 for engineering services, Revision 0, dated September 16, 2019

- PO No. 47831902 for engineering services, Revision 0, dated June 19, 2018
- PO No. 4500961785 for engineering services, Revision 0, dated February 9, 2017
- PO No. 0041482 for safety-related software, Revision 0, dated July 22, 2019
- PO No.0042351, for safety-related software, Revision 0, dated February 24, 2020

#### Commercial-Grade Surveys/Audit Reports

- Audit Report No. 2017-048, dated April 5, 2017
- Audit Report No. 2018-007, dated April 27, 2018
- Audit Report No. 2018-009, dated March 29, 2018
- Audit Report No. 2018-034, dated March 27, 2019
- Audit Report No. 2019-031, dated November 25, 2019
- Audit Report No. 2019-038, dated September 30, 2019
- Audit Report No. 2020-020, dated February 21, 2020
- Evaluation Report 2018-018, dated July 9, 2018
- Evaluation Report 2019-003, dated March 7, 2019
- Evaluation Report 2019-009, dated March 12, 2019
- Evaluation Report 2019-025, dated July 24, 2019
- Evaluation Report 2019-026, dated June 27, 2019
- Evaluation Report No. 2019-012, dated July 23, 2019
- Nuclear Industry Assessment Committee (NIAC) Audit No. 22074, dated June 12, 2017
- NIAC Audit No. 22078, dated July 26, 2017
- NIAC Audit No. 23091, dated March 30, 2018
- NIAC Audit No. 24026, dated February 25, 2019

#### Training

- Training records for two S&L Engineering personnel to SOP-1405

- Controlled List of S&L personnel qualified to perform American Society of Mechanical Engineers certification activities
- Training and Qualification Records for two S&L Registered Professional Engineers
- Lead Auditor Certification of Qualification for Employee No. 0T3259, dated October 26, 2015
- Lead Auditor Certification of Qualification for Employee No. 0P6116, dated January 5, 2009
- Lead Auditor Certification of Qualification for Employee No. 0U2244, dated May 18, 2017
- Lead Auditor Certification of Qualification for Employee No. 0L1283, dated April 12, 1999
- Lead Auditor Certification of Qualification for Employee No. 0L0768, dated November 21, 2001
- Lead Auditor Certification of Qualification for Employee No. 0P1522, dated May 5, 2010

Performance Improvement Process (PIP) (i.e., Corrective Action Process)

- PIP-2017-0419, 1296, 1672
- PIP- 2018-0049, 0488, 1327
- PIP-2019-0318, 0335, 0357, 0499, 0803, 1034, 1128, 1219, 1243, 1592
- PIP-2020-0151, 0154, 0243, 0223

PIP Generated During the Inspection

- PIP No. 2020-0279, "Clarify the Process for S&L Handling NuScale Open Design Items," dated February 26, 2020
- PIP No. 2020-0281, "Clarify 10CFR50.55(e) Requirements in the S&L QA Program," dated February 26, 2020
- PIP No. 2020-0285, "Discrepancy noted in Suppliers Audits," dated February 26, 2020
- PIP No. 2020-0286, "S&L evaluations of NIAC reports should be uniform in content," dated February 26, 2020
- PIP No. 2020-0287, "Enhancements for the NIAC Audit process," dated February 26, 2020

Miscellaneous

- Apparent Cause Evaluation Report for PIP No. 2017-1296, "Absence of Requirements to

Retain Signed and Sealed Version of Records,” dated September 28, 2017

- Apparent Cause Evaluation Report for PIP No. 2018-1327, “Ineffective Corrective Action,” dated September 28, 2018
- Apparent Cause Evaluation Report for PIP No. 2019-0206, “U1 EDG Governor Control Wiring Error,” Revision 0, dated April 18, 2019
- Root Cause Analysis for PIP No. 2017-0419, “Mark Vie Contact Ratings Do Not Meet Circuit Requirements,” dated April 18, 2017
- 2018 PIP Trend Report, “Data Analysis and Trending of 2018 PIPs,” Revision 1, dated April 3, 2019
- Technical Alert (TA)-2016-0001, “Vendor Drawing/Document Review (use of the word Approval),” for PIP 2016-1306, Revision 0, dated October 21, 2016
- TA-2018-002, “AutoCAD 2018 Not Compatible with Fusion P8 3.16,” for PIP 2018-1053, Revision 0, dated August 15, 2018
- Operating Technology Inc., ETAP ERCA-20-002, “Error Reporting & Corrective Action for software ETAP 19.5.0N and earlier,” dated February 5, 2020
- S&L Error Log Report for 2014 through 2020, dated February 26, 2020
- 2018 Management Review of the Quality Management System, dated July 10, 2019