SNubber Users Group 2026 Summer Conference & Trade Show

Call To Order

Mitch Etten-Bohm

Administrative Items

- Safety Items & Logistics
- Agenda Review
  - Afternoon Closed Session at 3 pm

Acknowledgements & Recognition

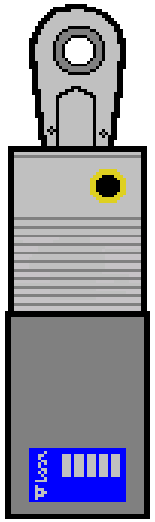
SNUG
SNUBBER USERS GROUP

ACKNOWLEDGEMENTS & RECOGNITION

SNUG
SNUBBER USERS GROUP

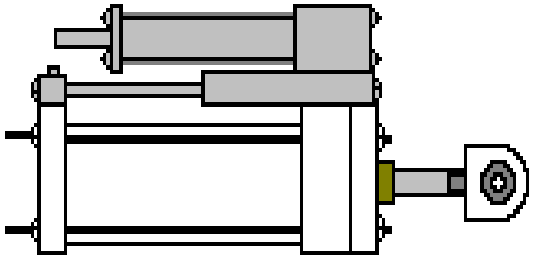
PRESIDENTS AWARD

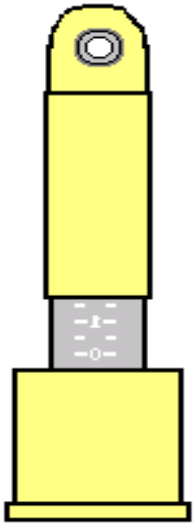
Dominion Nuclear CT
Millstone Unit 3
Tefzel Seal Life Study



Ed Dundon

SNUG Summer July 2026 Conference





Background

Since the plant was initially qualified for a 40 year life, some of the qualified materials are elastomeric materials.

One of these materials was Tefzel.

Due to the harsh environment, many nonmetallic materials do not stand up well inside containment.

Background (cont.)

ETFE was developed by DuPont in the 1970s initially as a lightweight, heat-resistant film in the aerospace industry.

ETFE (ethylene tetrafluoroethylene), commonly referred to as Tefzel®, is a modified copolymer of ethylene and tetrafluoroethylene. It has medium stiffness, which makes it suitable for applications such as chemical tank linings that require weldability and the ability to conform to curved metal or FRP surfaces. ETFE is often used in applications that demand mechanical toughness, moderate stiffness, outstanding chemical resistance and resistance to radiation environment.

Millstone U3 Design

Unit 3 is a 4 loop Westinghouse design that produces 1200 Mwe.

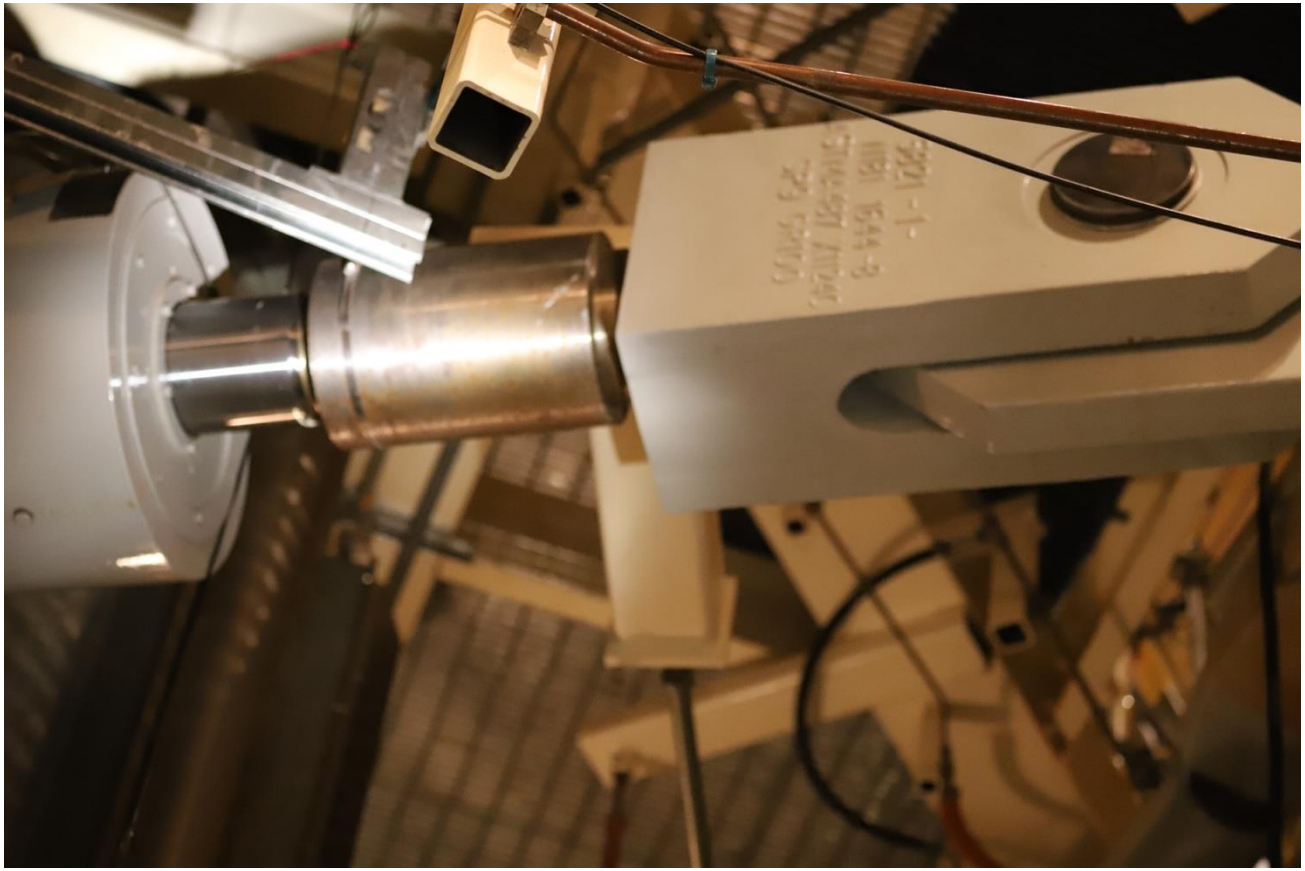
- The plant has a small containment structure with an Enclosure Bldg. that encapsulates the Containment to reduce potential offsite releases
- S&W installed 2000 KIP snubbers to secure the steam generators and RCS pumps
- 44 snubbers: 8 per steam generator and 3 per RCS pump

Millstone U3 Design

- Due to our DBA environment condition, MP3 has 2000 KIP Paul-Munroe snubbers which utilize metallic main piston seals with an infinite life

- Over 6 outages from November 1987 to February 2001, MP3 installed the True Test in-Place (TTIP) system in order to leak test the snubber's metallic piston seals

Paul-Munroe Snubber for SG

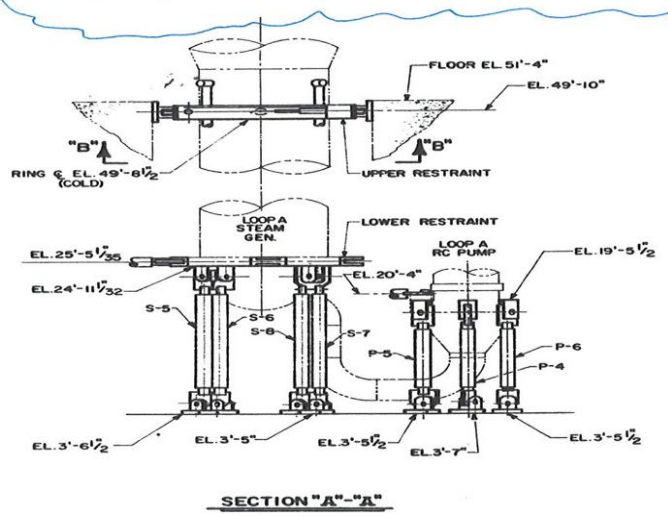



CAUTION
SNUBBER LOCAL ID NUMBER
3RCS-SUP4-24

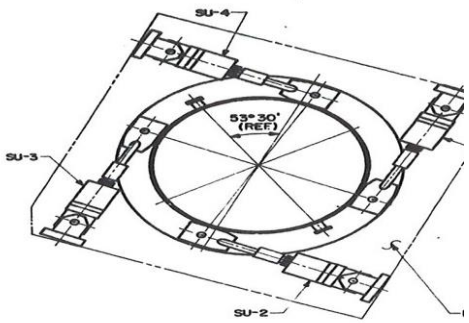
Typical Loop Arrangement with Elevation

3RCS1-SUP4-01	S-2
3RCS1-SUP4-03	S-4
3RCS1-SUP4-04	S-1
3RCS1-SUP4-19	P-1
3RCS1-SUP4-22	P-2
3RCS1-SUP4-27	S-3
3RCS1-SUP4-31	SU-3
3RCS1-SUP4-36	SU-2
3RCS1-SUP4-38	P-3
3RCS1-SUP4-47	SU-1
3RCS1-SUP4-48	SU-4

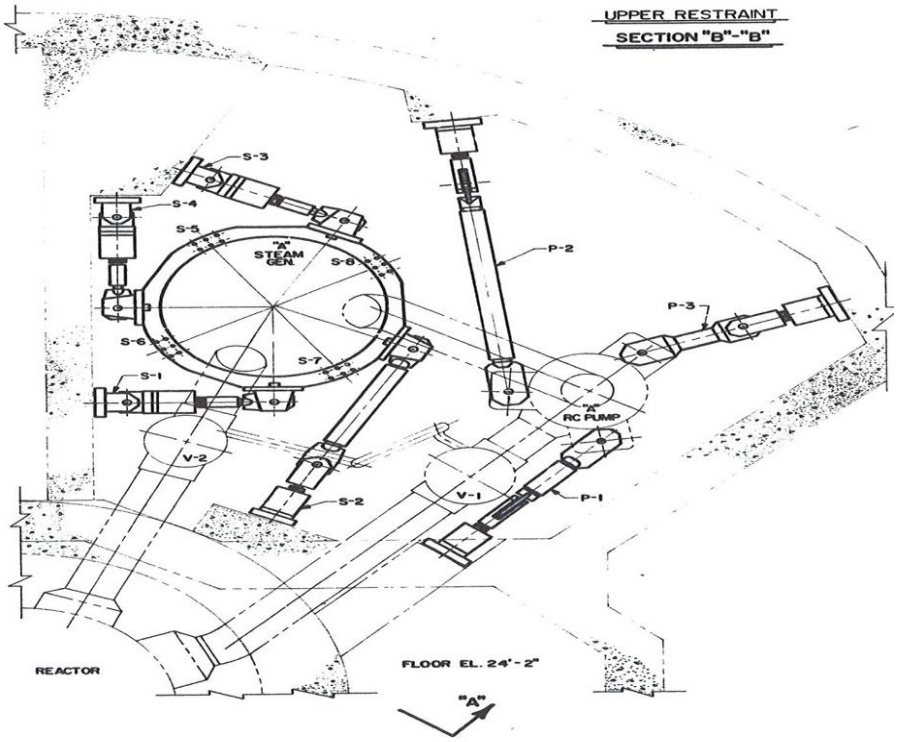
This info is from EV-10HA and put on this dwg as an aid.
It is not part of this dwg



SECTION "A"-"A"



UPPER RESTRAINT
SECTION "B"-"B"

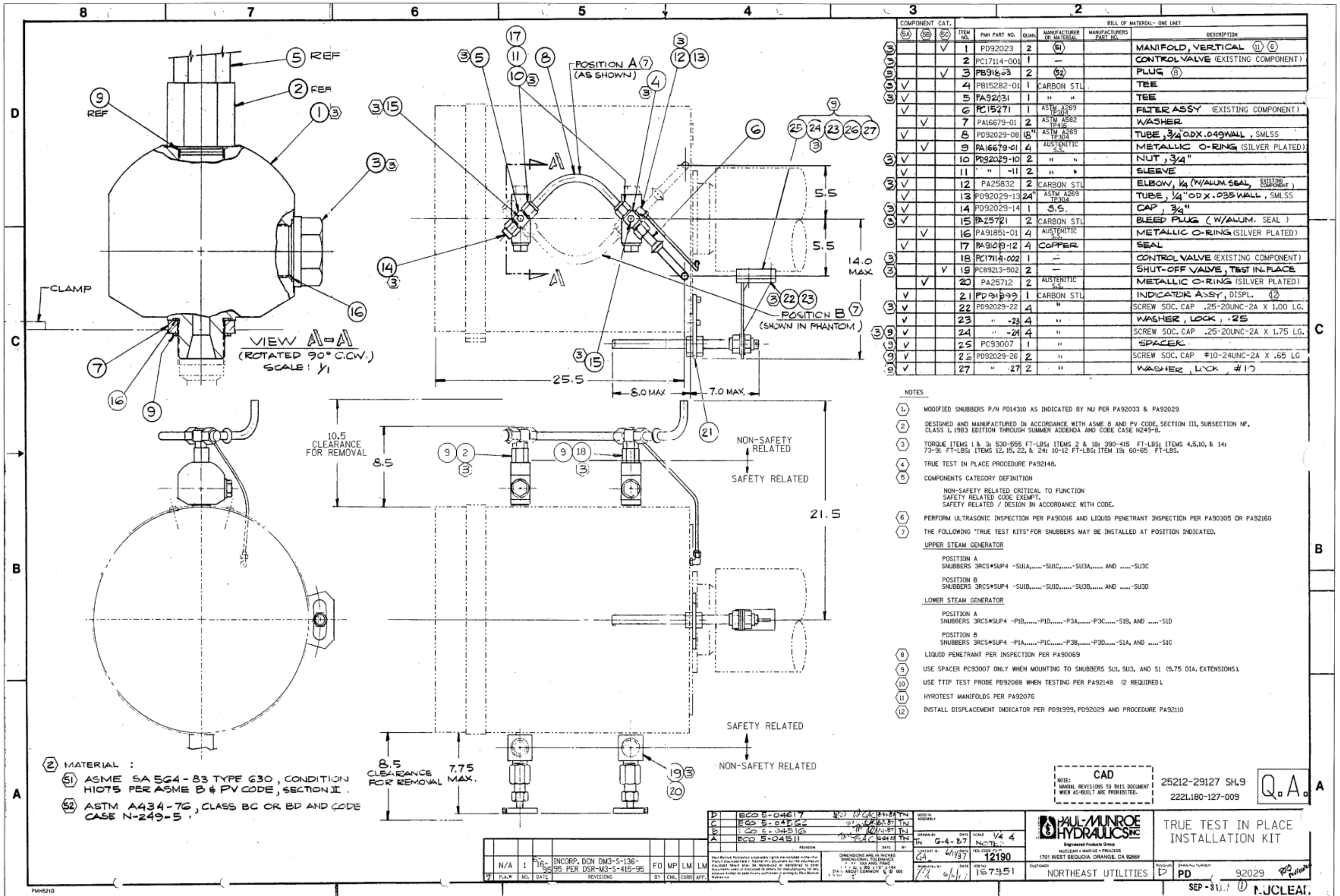


TTIP Installation

TTIP HARDWARE INSTALLATION SCHEDULE

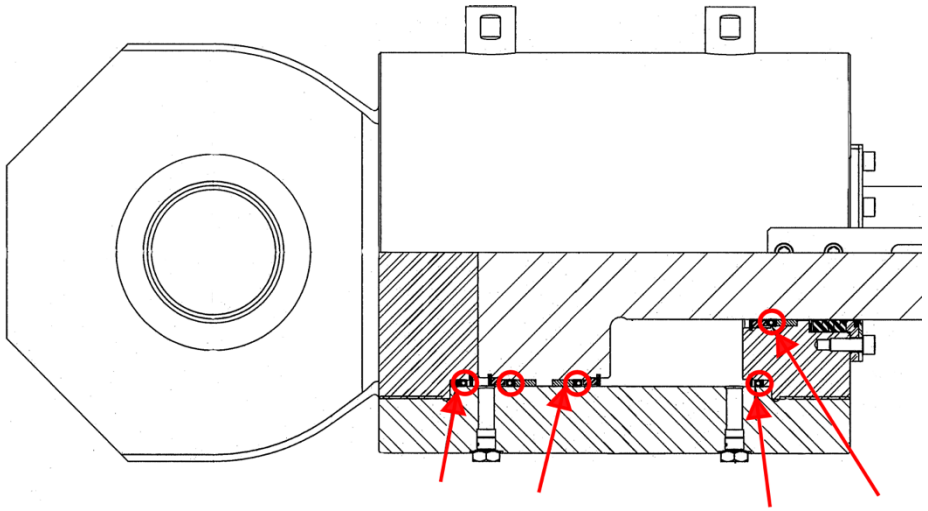
SNUBBER	SEC I.D.	SERIAL NO. (PDI4310-)	ISI ZONE No.	TTIP INST. (TYPE) VERT / HOR.	VENDOR DRAWING	DISPL IND. (VEND. DWG.)	DRAGON NEEDLE VALVES	RFO	FUNCT. TEST	AWO 'S		SECONDARY SEAL REPLACEMENT	
										INSTALLATION	TESTING	AWO	RFO
3RCS1-SUP4-01	3RCS*SUP3-S2A	143	53	NONE	NONE	NONE	NONE	N/A	YES	INTERFERENCE	M3-01-21171	M3-00-10256	7
3RCS1-SUP4-02	3RCS*SUP3-S4B	144	54	HOR.	PD-93820	NONE	NONE	3	YES	MP-91-00845	MP-91-01110	M3-02-13993	8
3RCS1-SUP4-03	3RCS*SUP3-S4A	145	53	HOR.	PD-93820	NONE	NONE	5	YES	MP-95-02066	MP-95-02068	MP-95-02067	5
3RCS1-SUP4-04	3RCS*SUP3-S1A	146	53	VERT.	PD-92029	PD-91999	YES	1	YES	MP-87-14228	M3-01-21698	M3-02-12837	8
3RCS1-SUP4-05	3RCS*SUP3-S4D	147	56	HOR.	PD-93820	NONE	NONE	PRE 6	YES	MP-95-03844	MP-95-03839	MP-95-03850	PRE 6
3RCS1-SUP4-06	3RCS*SUP3-S2C	149	55	NONE	NONE	NONE	NONE	N/A		INTERFERENCE	M3-00-10367	MP-98-10308	6
3RCS1-SUP4-07	3RCS*SUP3-SU1C	150	55	VERT.	PD-92029	NONE	NONE	2	YES	MP-87-06753	MP-89-00650	MP-98-10309	6
3RCS1-SUP4-08	3RCS*SUP3-S1D	151	56	VERT.	PD-92029	PD-91999	YES	1	YES	M3-87-14226	M3-87-14199	M3-02-12838	8
3RCS1-SUP4-11	3RCS*SUP3-S3B	153	54	HOR.	PD-93820	NONE	NONE	5	YES	MP-94-06648	MP-94-06651	MP-94-06676	5
3RCS1-SUP4-12	3RCS*SUP3-S3C	154	55	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-01297	MP-99-03436	MP-99-03436	6
3RCS1-SUP4-13	3RCS*SUP3-SU4B	155	54	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-09974	MP-98-09969	MP-98-10310	6
3RCS1-SUP4-14	3RCS*SUP3-S4C	156	55	HOR.	PD-93820	NONE	NONE	PRE 6	YES	MP-96-03233	MP-96-03171	MP-96-03235	PRE 6
3RCS1-SUP4-15	3RCS*SUP3-S1C	157	55	VERT.	PD-92029	PD-91999	YES	2	YES	M3-87-14229	MP-89-00646	M3-00-10382	7
3RCS1-SUP4-17	3RCS*SUP3-S3D	159	56	VERT.	PD-92029	NONE	NONE	3	YES	MP-91-00836	MP-91-01111	M3-02-13753	8
3RCS1-SUP4-18	3RCS*SUP3-S1B	160	54	VERT.	PD-92029	PD-91999	YES	2	YES	M3-87-14227	MP-89-00648	M3-02-13994	8
3RCS1-SUP4-19	3RCS*SUP1-P1A	161	53	HOR.	PD-93820	NONE	NONE	4	YES	MP-93-03913	MP-93-03920	M3-00-10296	7
3RCS1-SUP4-20	3RCS*SUP1-P1B	162	54	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-09975	MP-98-09970	MP-98-10311	6
3RCS1-SUP4-21	3RCS*SUP3-SU3B	163	54	VERT.	PD-92029	PD-91999	YES	1	YES	M3-87-14227	M3-87-14210	MP-97-00844	PRE 6
3RCS1-SUP4-22	3RCS*SUP1-P2A	164	53	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-09976	MP-98-09971	MP-98-10312	6
3RCS1-SUP4-23	3RCS*SUP1-P3C	165	55	VERT.	PD-92029	PD-91999	YES	1	YES	M3-87-14229	M3-87-14221	M3-02-13870	8
3RCS1-SUP4-24	3RCS*SUP1-P1D	166	56	HOR.	PD-93820	NONE	NONE	5	YES	MP-94-06645	MP-94-06654	MP-94-06673	5
3RCS1-SUP4-25	3RCS*SUP1-P1C	167	55	HOR.	PD-93820	NONE	NONE	4	YES	MP-93-05585	MP-93-05586	M3-00-10300	7
3RCS1-SUP4-26	3RCS*SUP1-P2C	168	55	HOR.	PD-93820	NONE	NONE	PRE 6	YES	MP-95-03843	MP-95-03838	MP-95-03849	PRE 6
3RCS1-SUP4-27	3RCS*SUP3-S3A	169	53	HOR.	PD-93820	NONE	NONE	7	YES	M3-00-11718	M3-00-10375	M3-02-13754	8
3RCS1-SUP4-28	3RCS*SUP1-P3B	170	54	HOR.	PD-93820	NONE	NONE	PRE 6	YES	MP-95-03842	MP-95-03837	MP-97-05168	6
3RCS1-SUP4-29	3RCS*SUP3-SU1D	171	56	VERT.	PD-92029	NONE	NONE	3	YES	M3-87-14226	MP-91-01107	MP-98-10321	6
3RCS1-SUP4-30	3RCS*SUP3-SU2B	172	54	VERT.	PD-92029	NONE	NONE	3	YES	MP-91-00837	MP-91-01108	MP-95-04384	PRE 6
3RCS1-SUP4-31	3RCS*SUP3-SU3A	173	53	VERT.	PD-92029	NONE	YES	1	YES	M3-87-14228	M3-00-21701	MP-98-10313	6
3RCS1-SUP4-32	3RCS*SUP3-SU2C	174	55	HOR.	PD-93820	NONE	NONE	5	YES	M3-05-08924	MP-94-06650	M3-05-08924	10
3RCS1-SUP4-33	3RCS*SUP3-SU3C	175	55	VERT.	PD-92029	PD-91999	YES	1	YES	M3-87-14229	MP-89-02847	MP-95-04386	PRE 6
3RCS1-SUP4-34	3RCS*SUP1-SU1B	176	54	VERT.	PD-92029	PD-91999	YES	1	YES	M3-87-14227	M3-00-21702	MP-98-10320	6
3RCS1-SUP4-35	3RCS*SUP3-SU3D	177	56	VERT.	PD-92029	PD-91999	NONE	2	YES	M3-87-14226	MP-89-00647	MP-97-04589	PRE 6
3RCS1-SUP4-36	3RCS*SUP3-SU2A	178	53	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-09977	MP-98-09972	MP-98-10314	6
3RCS1-SUP4-37	3RCS*SUP3-S2B	179	54	NONE	NONE	NONE	NONE	N/A		INTERFERENCE	M3-00-10384	M3-00-10384	7
3RCS1-SUP4-38	3RCS*SUP1-P3A	180	53	HOR.	PD-93820	NONE	NONE	5	YES	MP-94-06646	MP-94-06653	MP-94-06674	5
3RCS1-SUP4-39	3RCS*SUP3-SU4C	181	55	HOR.	PD-93820	NONE	NONE	4	YES	MP-93-03925	MP-93-03923	MP-98-10318	6
3RCS1-SUP4-40	3RCS*SUP3-SU4D	182	56	VERT.	PD-92029	NONE	NONE	3	YES	MP-91-00844	MP-91-01109	MP-97-04588	PRE 6
3RCS1-SUP4-41	3RCS*SUP1-P3D	183	56	HOR.	PD-93820	NONE	NONE	6	YES	MP-98-09978	MP-98-09973	MP-98-10315	6
3RCS1-SUP4-42	3RCS*SUP3-S2D	184	56	NONE	NONE	NONE	NONE	N/A		INTERFERENCE	M3-01-21173	M3-00-10303	7
3RCS1-SUP4-43	3RCS*SUP1-P2D	185	56	HOR.	PD-93820	NONE	NONE	4	YES	MP-93-03924	MP-93-03922	M3-02-13995	8
3RCS1-SUP4-45	3RCS*SUP1-P2B	187	54	HOR.	PD-93820	NONE	NONE	4	YES	MP-93-03914	MP-93-03921	MP-98-10316	6
3RCS1-SUP4-46	3RCS*SUP3-SU2D	188	56	HOR.	PD-93820	NONE	NONE	7	YES	M3-00-11720	M3-00-10382	MP-97-04590	PRE 6
3RCS1-SUP4-47	3RCS*SUP3-SU1A	189	53	VERT.	PD-92029	NONE	YES	2	YES	M3-87-14228	MP-89-00649	MP-98-10319	6
3RCS1-SUP4-48	3RCS*SUP3-SU4A	190	53	HOR.	PD-93820	NONE	NONE	7	YES	M3-00-11721	M3-00-10383	MP-98-10317	6

Tefzel Seal with SR Boundary



Typical Tefzel Seal Locations for Curtiss-Wright Hydraulic Snubbers

- Snubber main seals
- Safety related seal
- 1 rod seal for single sided rod snubbers
- 2 rod seals for double sided rod snubbers
- 4 piston / head seals
  - head and piston seals usually the same
- Harder to replace

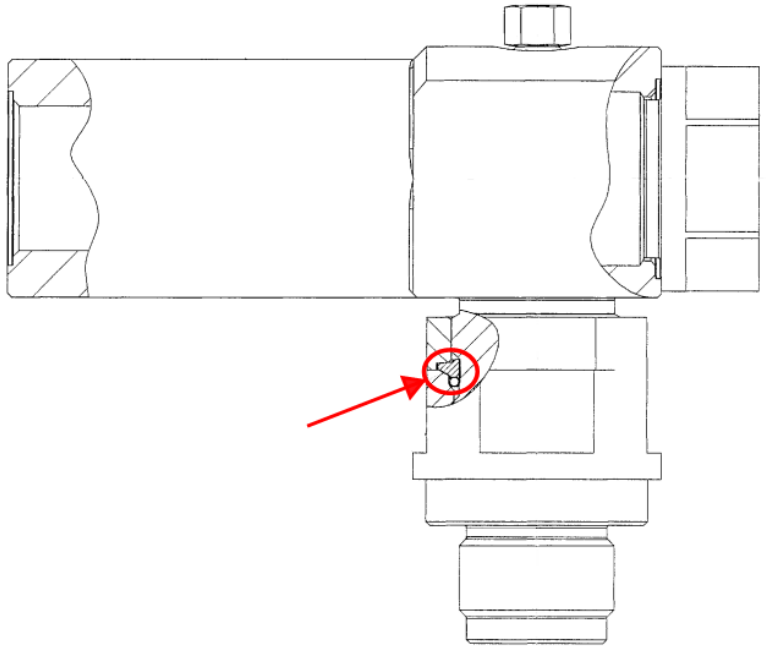


TTIP

Tefzel Seal Locations In Curtiss-Wright TTIP Manifolds

- Snubbers with horizontal TTIP kit
- Safety related seal
- 2 seals per TTIP kit
- Easier to replace

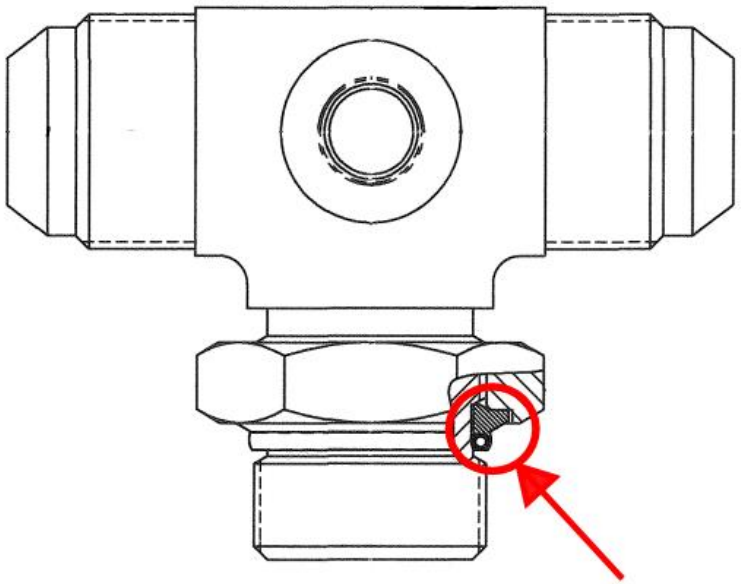
Horizontal TTIP Manifold



Tefzel Seal Locations In Curtiss-Wright TTIP Manifolds

- Snubber with tees and elbows after control valve
- Commercial related seal
- 1 seal per tee/elbow
- Easier to replace

Vertical TTIP Manifold



Information for the Engineering Study

After confirming that Tefzel seal was part of pressure boundary, determine the following

- Installation date each type
- Type of TTIP: horizontal, vertical, or none
- When plant operated
- Temperature history
- Radiation surveys
- Update accident analysis

Reactor Engineering Input

- Power uprates – 3 over the life of plant
- Plant Outages – duration and number (3R23)
- Planned and unplanned shutdown
- Force shutdown (NRC)
- Based on entries into & out of modes 5 and 6 - this was back checked with PPC
- Data was placed in Excel format - based on calendar dates

Engineering Input

- PPC containment temperature in vicinity of the SG & RCP snubbers
- Piping dwg to locate snubbers in relationship to temperature indication
- Files were downloaded in an Excel format based on date
- Problems encountered
  - Failed temperature transmitter
  - Lost data – either missing or on microfilm
  - PPC upgrades caused data be stored differently.
  - Sample rates varied (one sample an hour to a day)
  - No local temperature indicator

HP Input

- PPC Containment rad exposure in vicinity of the SG & RCP snubbers
- Piping dwg to locate snubbers in relationship to rad detectors
- Files were downloaded in an Excel format based on date
- Radiation survey maps when online & shutdown
- Problems
  - Failed temperature transmitter
  - Lost data – either missing or on microfilm
  - PPC upgrades caused data be stored differently.
  - Sample rates varied (one sample an hour to a day).
  - No local radiation detector

FSAR Update

Revised normal / accident equipment qualification study

- 40-year to 60-year life extension
- Radiation
- Humidity
- Temperature

Curtiss-Wright Engineering Study Summary

- Low temperatures - areas around lower SGs & RCPs increased life
- Higher temperatures - area around upper SGs reduced life
- Life was saved due to the extend time in mode 5 & less
- Life was affected based on when the TTIP was installed
- Vertical TTIP manifolds do not have Tefzel seals & do not require a new seal

.

Curtiss-Wright Engineering Study Conclusion

April 1986 - MP3 Commercial Operation

November 1987- First TTIP installation

3R24 Fall of 2026 - Original plan was 11 snubber manifolds to be upgraded with new Tefzel seals

After the Study

May 2032 – 2 TTIP manifold seal replacements - (3R27)

Nov 2033 – 2 TTIP manifold seal replacements - (3R28)

*

*

2056 - 2 TTIP manifold seal replacements - (3R??)

Question and Comments

MP3 TTIP Tefzel Seal Replacement

or

Tefzel Seal Replacement in Paul-Munroe Snubber Main Piston

or

Curtiss-Wright Engineering Study.

SNUG
SNUBBER USERS GROUP

Question Cards
or
Questions from the Floor

?

Morning Beverage Break
Sponsored by

Return By 10:00 am

Southern Nuclear

Lessons Learned from IST Interval Update - 2022 Code

Mitchell Etten-Bohm
July 2026

Purpose

Discuss changes to the Code and Code Cases that can affect the next IST Interval Update at plants.

Note: this presentation is not all encompassing and a complete review of the version of the Code you will adopt should be reconciled against the previous version.

However, there will be pop quizzes throughout the presentation.

What is an IST Interval Update?

ISTA-3120 Inservice Examination and Test Interval

(a) The examination and test interval shall be determined by calendar years following placement of the unit into commercial service.

(1) Initial Examination and Test Interval: 10 yr following initial start of unit commercial service

(2) Successive Examination and Test Intervals: **10-yr following the previous test interval**

Code Cases

REGULATORY GUIDE 1.192, REVISION 5

1. OMN-13, Revisions 3 & 4 (2020 Edition) Performance-Based Requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants [OMN-13 Revision 3 incorporated into 2022 Edition]
2. OMN-15, Revision 4 (2022 Edition) Performance-Based Requirements for Extending the Snubber Operational Readiness Testing Interval at LWR Power Plants

Can you use both?

Table ISTD-4252-1
Visual Examination Table

(22)

Population or Category [Note (1)]	Number of Unacceptable Snubbers		
	Column A for Extended Interval [Notes (2), (3)]	Column B for Interval Same as Previous [Notes (2), (4), (5)]	Column C for Interval Reduction to 2/3 [Notes (2), (5), (6)]
1	0	0	1
80	0	0	2
100	0	1	4
150	0	3	8
200	2	5	13
300	5	12	25
400	8	18	36
500	12	24	48
750	20	40	78
≥1000	29	56	109

Changes to the OM Code since last Update

Table ISTD-4252-1

(7) If the previous examination was performed at the maximum interval of two fuel cycles as described in Note (3) and the number of un-acceptable snubbers is equal to or less than the number in Column A, the subsequent examination interval may be extended to a maximum of 10 yr provided all requirements of ISTD-4253 are met. No grace period extension is applicable to extend any visual examination beyond 10 yr.

Changes to the OM Code since last Update

ISTD-1750 Transient Dynamic Event.
If an unanticipated transient dynamic event that may affect snubber operational readiness occurs and is identified outside the scope and performance of ISTD-4200 or ISTD-5200, then the affected snubbers and systems shall be reviewed and any appropriate corrective action taken. Any action so taken shall be considered independent of the requirements of ISTD-4200 and ISTD-5200. (specific events, and preservice events are removed)

Changes to the OM Code since last Update

ISTD-3240 Test Acceptance Criteria.

(Not in the 2004 Ed.-2006 Ad. Code)

The Owner shall establish and document test acceptance criteria for each applicable preservice and inservice test parameter specified in ISTD-5120 and ISTD-5210. Snubbers not meeting the established criteria shall be considered unacceptable in accordance with ISTD-5320 and ISTD-5420. Criteria shall be established prior to initiation of a test campaign and shall not be revised for the duration of that test campaign. However, criteria that is based upon specific design factors (fluid type, valve models, part numbers, etc.) may be adjusted for newly identified design differences within a population when the changed criteria can be shown to be more appropriate for the specific snubbers involved.

Changes to the OM Code since last Update

ISTD-4234 Examination Prior to Maintenance or Testing.
(Not in the 2004 Ed.-2006 Ad. Code)

All snubbers shall be examined in accordance with the requirements of ISTD-4210 through ISTD-4240 prior to conducting any maintenance, stroking, or testing, and prior to removal, for any reason, from their installed location.

Changes to the OM Code since last Update

ISTD-4252 Subsequent Examination Intervals

(e) Snubbers determined to be unacceptable based on the visual examination acceptance criteria at any time during the interval shall be counted in determining the subsequent examination interval in accordance with Table ISTD-4252-1, regardless of the means of discovery. This shall include, for example, all unacceptable snubbers found during scheduled visual examinations; observed during walkdowns, maintenance, testing, snubber replacement, reservoir fluid level monitoring, transient dynamic event or water hammer evaluations; or service life monitoring activities. The total number of unacceptable snubbers shall be applied when using Table ISTD-4252-1 and ISTD-4253.

Changes to the OM Code since last Update

ISTD-5240 Test Frequency.

OM Code 2004 Ed.–2006 Ad. – …..Snubber testing may begin no earlier than 60 days before a scheduled refueling outage……until?

2022 – ….. Testing associated with each test campaign shall begin no earlier than 92 days before a scheduled refueling outage and shall be completed prior to completion of that refueling outage.

Conclusion

Perform a Code Reconciliation line by line so that you understand the changes made from the old version to the new version.

Conclusion

ISTD-1520 Post-Maintenance or Repair Examination and Testing	Snubbers that are maintained or repaired by removing or adjusting a snubber part that can affect the results of tests required by ISTD-5120 shall be examined and tested in accordance with the applicable requirements of ISTD-5120 before returning to service. Additionally, the requirements of ISTD-4110 shall be met. The requirements selected shall ensure that the parameters that may have been affected are verified to be acceptable by suitable examination and tests.[1] [1] Examples of parts and activities that can affect the test results of ISTD-5120 are as follows: (a) mechanical or hydraulic snubber internal moving parts; (b) hydraulic snubber internal seals (i.e., where bypass can affect test results; (c) activities that can permit air to be entrapped in the main cylinder or the control valve of a hydraulic snubber; and (d) hydraulic control valve adjustment.	**ISTD-1520 Post-Maintenance or Repair Examination and Testing**	Snubbers that are maintained or repaired by removing or adjusting a snubber part that can affect the results of tests required by ISTD-5120 shall be tested in accordance with the applicable requirements of ISTD-5120 before returning to service. Additionally, the requirements of ISTD-4110 shall be met. The requirements selected shall ensure that the parameters that may have been affected are verified to be acceptable by suitable examination and tests.[1] [1] Examples of parts and activities that can affect the test results of ISTD-5120 are as follows: (a) mechanical or hydraulic snubber internal moving parts; (b) hydraulic snubber internal seals (i.e., where bypass can affect test results; (c) activities that can permit air to be entrapped in the main cylinder or the control valve of a hydraulic snubber; and (d) hydraulic control valve adjustment.	Change: This is a Code correction: The "examination" requirement has been removed in reference to adherence to ISTD-5120. No impact on HATCH snubber program as no examination is required by ISTD-5120.
ISTD-1600 Snubber Modification and Replacement		**ISTD-1600 Snubber Modification and Replacement**		Heading. No change.
ISTD-1610 Suitability	Replacement or modified snubber(s) shall have a proven suitability for the application and environment.	**ISTD-1610 Suitability**	Replacement or modified snubber(s) shall have a proven suitability for the application and environment.	No change.
ISTD-1620 Examination and Testing	Replacement or modified snubbers shall be examined and tested in accordance with written procedures. The applicable requirements of ISTD-4100, ISTD-4200, and ISTD-5200, ISTD-5300, or ISTD-5400, and ISTD-5500 shall be included in these procedures. The requirements selected shall ensure that the criteria of ISTD-4110, ISTD-4230, and ISTD-5210 can be satisfied.	**ISTD-1620 Examination and Testing**	Replacement or modified snubbers shall be examined and tested in accordance with written procedures. The applicable requirements of ISTD-4100, ISTD-4200, and ISTD-5200 and ISTD-5500 shall be included in these procedures. The requirements selected shall ensure that the criteria of ISTD-4110, ISTD-4230, and ISTD-5210 can be satisfied	Change: Adherence to applicable requirements of "ISTD-5300 and ISTD-5400" has been removed. NOTE: This change does not affect the HATCH Program as the requirement remains in ISTD-5200.

Discussion?

COMPARISON OF CURRENT OM CODE, OM-1 CODE AND OM-2 CODE

BACKGROUND

The format of the current OM Code (the 2022 Edition is current) has been unchanged for many years. However, with the onset of the current nuclear renaissance, the ASME OM organization realized that the new advanced reactor designs of nuclear power facilities was going to be very different from the legacy plants in operations today. It was also realized that, due to the likelihood that the new designs were going to be much more passive than current legacy designs, the use of pumps, valves and snubbers (and possibly other types of dynamic restraint devices) could also be significantly different. Therefore, it was decided that a new OM code was going to be needed to address the way that inservice testing would be performed at these new advanced reactor designed plants. So, a new OM code was developed to address these needs and in 2024, the new code, branded OM-2 was published. This new code will not be included in future rulemakings, but instead is to be endorsed by Reg Guide 1.220. This new code for advanced reactor designs will place more emphasis on the Owner for establishing the Inservice Test Program Plan to be used at these facilities.

BACKGROUND

While the new OM-2 Code is substantially different in not only technical content, but in general formatting as well, the ASME OM organization realized that this code was much easier to navigate than the current OM Code and decided to undertake another effort to reformat the existing OM code to make it also easier to navigate. While some technical content was changed during the reformat exercise, the most evident change was the division of existing sections into easier to manage sections. For example, while the existing OM Code has all valve requirements in section ISTC, the new reformatted OM Code, which has been rebranded as OM-1, has valve requirements divided as follows:

- Air operated valve requirements are in section AOV
- Motor operated valve requirements are in section MOV
- Check valve requirements are in section CV
- Solenoid operated valve requirements are in section SOV
- Manual valve requirements are in section MV
- Hydraulic operated valve requirements are in section HOV

BACKGROUND

Realizing that the new advanced reactor designs could include components that are also of a new design and may have been created just for these new plants, during the creation of the new OM-2 Code it was decided that the current ISTD section would be referred to as the DRD section to leave the door open for inclusion of any new type of dynamic restraint device that may need to be included in the inservice test program. That thought process was carried over into the rebranded OM-1 Code for legacy plants, just in case any new device that was created for a new advanced reactor plant found its way into a legacy plant in the future.

COMPARISON OF THE CODES

The next few slides will show you how the major requirements for what is now only snubbers look in the current 2022 Edition of the OM Code as compared to what the requirements will look like for legacy plants in what is expected to be the 2027 Edition of the rebranded OM-1 code and what the same requirements look like in the already issued 2024 Edition of the OM-2 Code for new advanced reactor design plants.

CODE TITLES

Current OM Code ISTD 2022 Edition	New OM-1 Code Expected to be 2027 Edition	New OM-2 Code 2024 Edition
Operation and Maintenance of Nuclear Power Plants	Operation and Maintenance of Nuclear Power Facilities	Component Testing Requirements at Nuclear Facilities

SECTION TITLES

Current OM Code 2022 Edition Section ISTD	New OM-1 Code Expected to be 2027 Edition Section DRD	New OM-2 Code 2024 Edition Section DRD
Preservice and Inservice Requirements for Dynamic Restraints (Snubbers) in Water-Cooled Reactor Nuclear Power Plants	Dynamic Restraint Devices	Dynamic Restraint Devices

SCOPE COMPARISONS

Current OM Code 2022 Edition Section ISTD	New OM-1 Code Expected to be 2027 Edition Section DRD	New OM-2 Code 2024 Edition Section DRD
• used in systems that are credited to perform a specific function in shutting down a reactor to the safe shutdown condition • used in systems that are credited to perform a specific function in maintaining a safe shutdown condition • used in systems that are credited to perform a specific function in in mitigating the consequences of an accident • used to ensure the integrity of the reactor coolant pressure boundary	• used in systems that are credited to perform a specific function in shutting down a reactor to the safe shutdown condition • used in systems that are credited to perform a specific function in maintaining a safe shutdown condition • used in systems that are credited to perform a specific function in in mitigating the consequences of an accident • Used to ensure the integrity of the reactor coolant pressure boundary	• as specified as part of the plant licensing process

BOUNDARY COMPARISONS

Current OM Code 2022 Edition Section ISTD	New OM-1 Code Expected to be 2027 Edition Section DRD	New OM-2 Code 2024 Edition Section DRD
the snubber assembly from pin to pin, inclusive	the dynamic restraint device assembly from pin to pin, inclusive	the dynamic restraint device assembly from the connection point of the building or support structure to the connecting point of the pipe or equipment, pin to-pin inclusive (if so equipped)

PERSONNEL QUALIFICATION COMPARISONS

Current OM Code 2022 Edition Section ISTA	New OM-1 Code Expected to be 2027 Edition Section GR	New OM-2 Code 2024 Edition Section GR
Owner's Responsibilities ISTA-1500(e) qualification of personnel who perform and evaluate examinations and tests in accordance with the Owner's quality assurance (QA) program.	Owners Responsibilities GR-2.3(m) qualify personnel who prepare, perform and evaluate examinations and tests in accordance with the Owner's quality assurance (QA) program	Owner Requirements GR-2.1(e) qualify personnel who perform and evaluate IST activities

PRESERVICE VISUAL EXAMINATION COMPARISONS

Current OM Code 2022 Edition Section ISTD	New OM-1 Code Expected to be 2027 Edition Section DRD	New OM-2 Code 2024 Edition Section DRD
ISTD-4110 An initial preservice examination shall be performed on all snubbers prior to or during initial plant startup. For snubbers placed in new or modified systems, preservice examinations shall be performed prior to declaring the affected systems, structures, or components to be operable.	DRD-2.5.1(a) An initial baseline examination shall be performed on all dynamic restraint devices prior to or during initial plant startup. For dynamic restraint devices placed in new or modified systems, baseline examinations shall be performed prior to declaring the affected systems, structures, or components to be operationally ready to perform its function.	DRD-2.2.1(a) An initial baseline examination shall be performed on all dynamic restraint devices prior to or during initial plant startup.

INSERVICE VISUAL EXAMINATION COMPARISONS

Current OM Code 2022 Edition Section ISTD	New OM-1 Code Expected to be 2027 Edition Section DRD	New OM-2 Code 2024 Edition Section DRD
ISTD-4200 Snubbers shall be visually examined on the required schedule and evaluated to determine their operational readiness.	DRD-2.2.2 Dynamic restraint devices shall be visually examined on the required schedule and evaluated to determine their operational readiness.	DRD-2.2.2 Dynamic restraint devices shall be visually examined on the required schedule and evaluated to determine operational readiness.

PRESERVICE OPERATIONAL READINESS TESTING COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
ISTD-5110 Preservice operational readiness testing shall be performed on all snubbers. Testing may be performed at the manufacturer's facility.	DRD-2.6.1(a) Baseline operational readiness testing shall be performed on all dynamic restraint devices. Testing may be performed at the manufacturer's facility.	DRD-2.3.1(a) Baseline operational readiness testing shall be performed on all dynamic restraint devices. Testing may be performed at the manufacturer's facility.

INSERVICE OPERATIONAL READINESS TESTING COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
ISTD-5200 Snubbers shall be tested for operational readiness during each fuel cycle as defined in ISTD-5240. Test campaigns are required to be in accordance with a specified sampling plan as defined in ISTD-5260. Testing may be performed during normal system operation, or during system or plant outages.	DRD-2.6.1(a) Dynamic restraint devices shall be tested for operational readiness during each fuel cycle as defined in para. 2.6.2.3. Test campaigns are required to be in accordance with a specified sampling plan as defined in para. 2.6.2.5. Testing may be performed during normal system operation, or during system or plant outages.	DRD-2.3.2 Dynamic restraint devices shall be tested for operational readiness during each service cycle. Test campaigns are the series of actions required to complete testing of dynamic restraint devices performed in accordance with a specified sampling plan as described in the Program Plan. Testing shall be performed during normal system operation or during system or plant outages.

OPERATIONAL READINESS TEST PLAN COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
The snubbers of each DTPG shall be tested using either of the following: (a) the 10% testing sample plan (b) the 37 testing sample plan	The dynamic restraint devices of each DTPG shall be tested using either of the following: (a) the 10% testing sample plan (b) the 37 testing sample plan	The Program Plan shall specify one of the following plans: (-a) Test, or replace, all dynamic restraint devices within each DTPG every 10 yr or at the service life expiration date, whichever comes first. (-b) Dynamic restraint devices may be selected for testing on a rotational basis.

TEST PLAN COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
10%, 37 Optional FMG	10%, 37 Optional FMG	All snubbers every 10 yrs No FMG

DRAG TEST COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
Mechanical Running	Mechanical	Mechanical

INITIAL SERVICE LIFE REQUIREMENT COMPARISONS

Current OM Code 2022 Edition section ISTD	New OM-1 Code Expected to be 2027 Edition section DRD	New OM-2 Code 2024 Edition section DRD
Initial predicted snubber service life shall be established based on the manufacturer's recommendation and review of actual and expected service conditions corresponding to a snubber location.	Initial predicted dynamic restraint device service life shall be established based on the manufacturer's recommendation and review of actual and expected service conditions corresponding to the inservice location.	Initial service life shall be predicted based on the manufacturer's specification or design review.

COMPARISON OF CURRENT OM CODE, OM-1 CODE AND OM-2 CODE

Questions

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U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Snubber Inservice Testing Issues and Updates

Snubber User Group Conference
July 13-15, 2026

Gurjendra S. Bedi, PE
Mechanical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Disclaimer

- This presentation was prepared by staff of the U.S. Nuclear Regulatory Commission (NRC). It may present information that does not currently represent an agreed upon NRC staff position. NRC has neither approved nor disapproved the technical content.

NRC Regulatory Activities applicable to Snubbers

- Current Title 10 of the Code of Federal Regulations (10CFR) Section 50.55a, “Codes and standards” Regulatory Requirements and Snubber Program.
- ASME BPV and OM Code Case Rulemaking including Regulatory Guide (RG) 1.192 Regulatory Guide Update
- Other Guidance
- 10 CFR Part 21, Failure to Make an Interim 10 CFR Part 21 Report
- Seismic Isolator for Small Modular Reactor and Advance Reactor (Nuclear)
- Conclusion

Current 10 CFR 50.55a Regulatory Requirements

- Incorporates by Reference with Conditions:
  - ASME OM Code 2022 Edition
  - ASME BPV Code 2021 Edition
  - Inservice Inspection (ISI)/Inservice Testing (IST) Program Code of Record (COR) Interval and Code Case Final Rule (Revision 40)
  - RG 1.192, Revision 5 (OM)

10 CFR 50.55a Rulemaking

- Inservice Inspection (ISI)/Inservice Testing (IST) Program Code of Record (COR) Interval and Code Case Final Rule (Revision 40)
- ASME *Operation and Maintenance of Nuclear Power Plants* (OM Code), 2022 Edition, and ASME BPV Code, 2021 Edition, Final Rule

- Note: ISI/IST COR Program COR Interval includes Snubber Program Interval

ISI/IST Program including Snubber Program COR Interval and Code Case Rule (Rev. 40)

- 10 CFR 50.55a Final Rule issued in ***Federal Register*** on August 30, 2024 (89 FR 70449).
- Final rule specifies licensees required to update IST/ISI Program COR every two consecutive IST/ISI intervals if licensee implementing 2017 Edition (or later) of OM Code and 2019 Edition (or later) of BPV Code.
- Final rule includes RG 1.192, Revision 5, to accept OMN-28, 29, and 30 without conditions, and OMN-31 with conditions.

ASME OM Code-2022 Edition and Snubber Program

- 10 CFR 50.55a Final Rule issued in *Federal Register* on August 30, 2024 (89 FR 70449).
- Final rule incorporates by reference in 10 CFR 50.55a the 2022 Edition of ASME OM Code and 2021 Edition of ASME BPV Code.
- Final rule includes changes to 10 CFR 50.55a to reflect 2022 Edition of OM Code and clarifications.
- Changes to specific IST conditions (only snubber) indicated on next slides.

ASME OM Code-2022 Edition and Snubber Program Condition

- 10 CFR 50.55a(b)(3)(vii), OM Condition*: Snubber visual examination interval extension*
  - Clarifies when implementing ISTD-4253, and Note 7 of Table ISTD-4252-1 in 2022 Edition, licensees prohibited from applying OMN-15, Revision 2 or Revision 3.

Notes: the

1. **ASME OM-2020 and earlier Editions**: Code Case OMN-13, which allows to extend visual examination of snubber once every 10 years, shall not be used with in conjunction with Code Case OMN-15, which allows to extend inservice testing of snubbers once every 10 years.
2. **ASME OM-2022** incorporates Code Case OMN-13. Therefore, 10 CFR 50.55a includes condition 10 CFR 50.55a(b)(3)(vii), while using ASME OM-2022.

Transition at End of Current Snubber Program Interval to 20/24-Year Interval (Snubber Program may be align to ISI or IST)

End of Current Snubber Program Interval 0 (COR) Note 1	**Prior to Entering Snubber Program Interval 1 (10-year or 12-year)**	**Prior to Entering Snubber Program Interval 2 (10-year or 12-year)**	**Prior to Entering Snubber Program Interval 3 (10-Year or 12 year)**
Using Earlier than 2017 Edition of ASME OM Code	- Apply 2017 or Later ASME OM Code - Submit reliefs and alternatives - Submit Snubber Program plan	- No change to COR required - Submit reliefs and alternatives (Note 2) - Submit Snubber Program plan	- Update COR - Submit reliefs and alternatives - Submit Snubber Program plan

Note 1: "You are here" at the star and using an earlier Code edition than 2017, Prior to entering Interval 1:

Note 2: NRC is attempting to match reliefs and alternative requests to the Code of Record vs. the interval, so resubmittal may not be necessary.

ASME OM Code Cases Accepted Without Condition In RG 1.192, Revision 5 (for snubbers only)

- Code Case OMN-13, Revision 3 and 4
- Code Case OMN-15, Revision 4

- For Applicability Index see RG 1.192, Revision 5

10 CFR 50.55a 2023 BPV Code and Code Cases Rulemaking (Revision 41)

- 2023 BPV Code Rulemaking in progress
  - Uses Proposed Rule – Final Rule process
    - Will continue this process biennially
  - Plan is to use of Direct Final Rule process for the next rulemaking
- OM Code Cases proposed for inclusion in RG 1.192 Rev 6:
  - OMN-32, Revision 1: Alternative Requirements for Range and Accuracy of Pressure, Flow, and Differential Pressure Instruments Used in Pump Tests
  - OMN-34: Use of a Pump Curve for Testing
- Final rule scheduled to be published 1/20/2027

Snubber Program Submittal

Recently NRC Staff collected the information related to Snubber Program at various Plants in USA from ADAMS and found the following:

- Plants using ISTD= 59
- Plants using Technical Specification = One
- Plants with No information about using ISTD, or TS or Section XI = 33

Licensees are required to submit the snubber program. NRC staff is putting together a database. Expect Plants' Project Managers to ask their licensing contacts for the references if the NRC can't easily find the snubber programs in ADAMS.

Snubber Program Submittal

- Snubber Program plan and its updates must be submitted to NRC as required by
  - ASME OM Code, paragraph ISTA-3200 if using ASME OM Code 2017 or earlier edition OR
  - 10 CFR 50.55a(f)(7) if using ASME OM Code 2020 or later Edition.

ASME OM-2-2024 Code

- ASME has issued OM-2-2024
  - IST Code for new and advanced reactors.
  - Scope includes pumps, valves and dynamic restraints (snubbers)
  - Heavy reliance on QME-1 and full testing capability
  - Specifies use of QME-1 (or equivalent) for initial qualification of IST components.
  - Allows flexibility for advanced condition monitoring methods.
- NRC staff has issued new RG 1.1220 accepting the use of OM-2, with regulatory position for Part 52, via direct regulatory guide process.
  - Federal Register Notice published 6/4/2026. Post-promulgation comments due 7/6/2026

NUREG-1482, Revision 4
Guidelines for Inservice Testing at Nuclear Power Plants

- Describes regulatory basis for IST programs for nuclear power plants.
- Provides guidance for development of IST programs:
  - Scope
  - IST program documentation
  - Preconditioning
  - Specific valve guidance
  - Specific pump guidance
  - New reactor IST programs
  - Snubber IST program (Appendix-A)
- In September 2025, NRC staff issued Revision 4 to NUREG-1482 to provide updated IST guidance based on regulatory requirements, OM Code editions, and operating experience.

NUREG-1482, Revision 4

- Updated IST guidance includes:

  - Updated to reflect 2022 ASME OM Code, specific OM Code Cases, and associated regulatory requirements.

  - Relocation of IST Plan submittal requirement from ASME OM Code to 50.55a(f)(7).

  - New Appendix C, “Guidance for Code of Record Interval,” discussing COR interval changes in 50.55a rule.

Extended Power Uprate (EPU) and Snubbers

- An Extended Power Uprate (EPU) is a process where the nuclear power plant increase its maximum power output beyond its original licensed thermal power level.
- EPU in nuclear power plants increase thermal output and flow rates, shifting piping vibration frequencies. This aggressive post-uprate environment can lead to accelerated snubber degradation, seal leaks, and mechanical lockup failures,
- Snubber Evaluation: During EPU with the change in loads and potential increased vibration, a re-evaluation of snubber functionality and integrity is necessary.
- Recently, NRC staff learned that a few snubbers were failed due to piping load increase and vibration following implementation of an EPU.
- During the EPU process, licensees should review and evaluate the plants' snubbers for increased loads from EPU implementation.

Failure to Make an Interim 10 CFR Part 21 Report

Notification of Anomaly:

- NRC inspector completed an inspection March 31, 2024, at Diablo Canyon Power Plant (DCPP) (ML24113A066).

- One of the finding is Severity Level IV, non-cited violation of 10 CFR 21.21(a)(2), “Reporting of Defects and Noncompliance,” for the failure to make an interim report within 60 days after identification of a potential deviation in installed pipe snubbers.

Failure to Make an Interim 10 CFR Part 21 Report

Description:

- During refueling outage 1R24, the DCPP discovered test anomalies associated with pipe snubbers installed in the plant starting on October 4, 2023.
- DCPP discovered that snubber had loose locking washers, excessive grease, out of tolerance parts, components installed incorrectly, loose tie-wires, and anomalies in the ball nut screw assembly. The licensee completed onsite troubleshooting on October 16, 2023.
- The licensee-initiated Notification 51214999 on November 16, 2023, and initiated a task for a Part 21 evaluation to be completed on April 16, 2024, after vendor's evaluation due to be completed.

Failure to Make an Interim 10 CFR Part 21 Report

Description (cont.):

- Due to the snubbers being contaminated, the licensee experienced delays in shipping the snubbers to the vendor for evaluation. The licensee failed to make an interim Part 21 report within 60 days (by December 15, 2023).

Conclusion:

- The licensees are cautioned that if a plant is unable to complete a Part 21 within the committed date, they must submit Part 21 interim reports to avoid any violation.

Seismic Isolators for Small Modular Reactors and Advanced Reactors (Nuclear)

Advanced Reactors and Small Modular Reactors (SMRs) Dynamic Restraints (Snubbers)

- Snubbers (Mechanical and Hydraulic)
- Viscoelastic Dampers
- Seismic Isolators

Seismic Isolators for Small Modular Reactors and Advanced Reactors (Nuclear)

- Seismic isolators (SI) are crucial for enhancing the safety and resilience of SMRs and Advanced Reactors against earthquakes.
- SI devices, typically installed at the base of the reactor building, isolate the structure from ground-shaking, reducing the impact of seismic events and protecting the reactor and its components.
- Some of NRC issued NUREG/CR applicable to SI devices are listed in next page.
- ASME OM Code, Subgroup ISTD, should discuss if seismic isolator could be part of the ISTD for its examination and testing.

Seismic Isolators for Small Modular Reactors and Advanced Reactors (Nuclear)

- NUREG/CR-7253, Technical Considerations for Seismic Isolation of Nuclear Facilities (ML19050A422)
- NUREG/CR-7254, Seismic Isolation of Nuclear Power Plants Using Sliding Bearings (ML19158A513)
- NUREG/CR-7255, Seismic Isolation of Nuclear Power Plants using Elastomeric Bearings (ML19063A541)

Conclusions

Licensees who believe that some of the items discussed are applicable to their facilities may wish to review their current snubber program and modify their program as appropriate.


ANY
QUESTIONS

Southern Nuclear

Unexpected Impacts during 50.69 Implementation

Mitchell Etten-Bohm
July 2026

What is risk informed treatment of Snubbers?

If you have a risk-informed ISI program, you may be able to categorize your components by risk significance. If your site also has received approval to use 10CFR50.69, those components that grade out as low risk, specifically RISC-3 and RISC-4, are eligible for “alternative treatment”.

Alternative Treatment

RISC-3 and RISC-4 SSCs can be scoped out of these regulatory programs

Local Leak Rate Testing with limitations (see next slide) [10 CFR 50 Appendix J]	Quality Requirements [10 CFR 50 Appendix B]	In-service Inspection [10 CFR 50.55a(g)]	ASME XI repair & replacements, applicable portions, with limitations [10 CFR 50.55a(g)]
Maintenance Rule [10 CFR 50.65]	In-service Testing [10 CFR 50.55a(f)]	Environmental Qualification [10 CFR 50.49]	Event Reporting [10 CFR 50.55(e)]
Seismic Qualification [Portions of Appendix A to 10 CFR Part 100]	Deficiency Reporting [10 CFR Part 21]	Applicable Portions of IEEE standards [10 CFR 50.55a(h)]	Notification Requirements [10 CFR 50.72, 50.73]

A discussion on “50.69.”

- The benefit is the site can move snubbers from a prescriptive examination and testing program required by OM Code to a risk-based program for examination and testing driven by 40-50 years of data at your plant.

- Thresholds will need to be established for snubbers addressed by alternate treatment for PM frequencies, failures, and service life.

- You will not have one or the other. You will have both. Vogtle and Farley have reduced their OM Code populations by 65% but ALL snubbers must still undergo testing and examination.

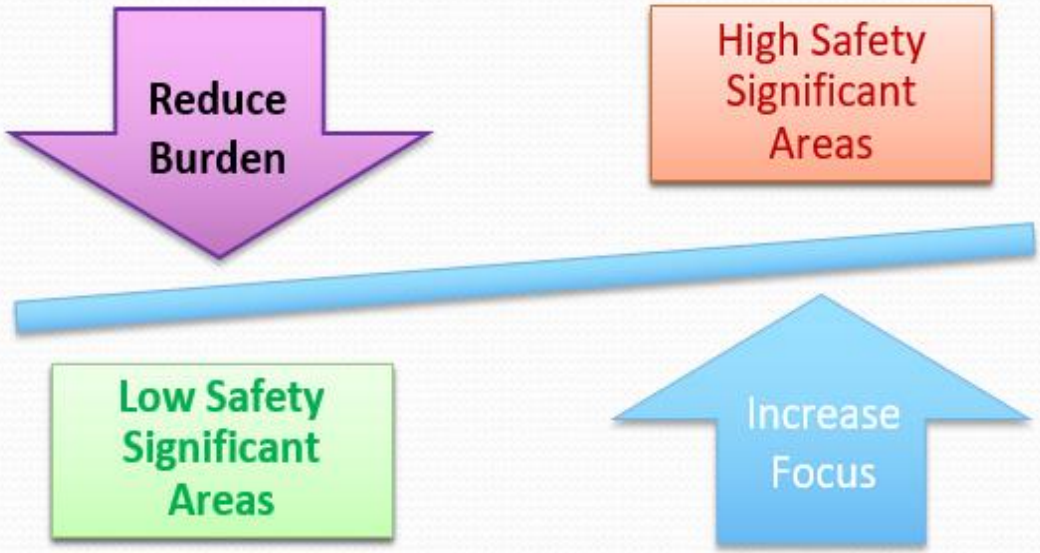
Snakes in the grass

1. The snubbers that remain in OM Code are the snubbers that are high risk, critical, and often difficult to access.

The Goal of 50.69

Provide Flexibility to Reduce Cost and Improve Plant Operations & Safety Margins

It has the potential to provide the industry substantial cost savings and drive the goals of the *Delivering the Nuclear Promise* Initiative



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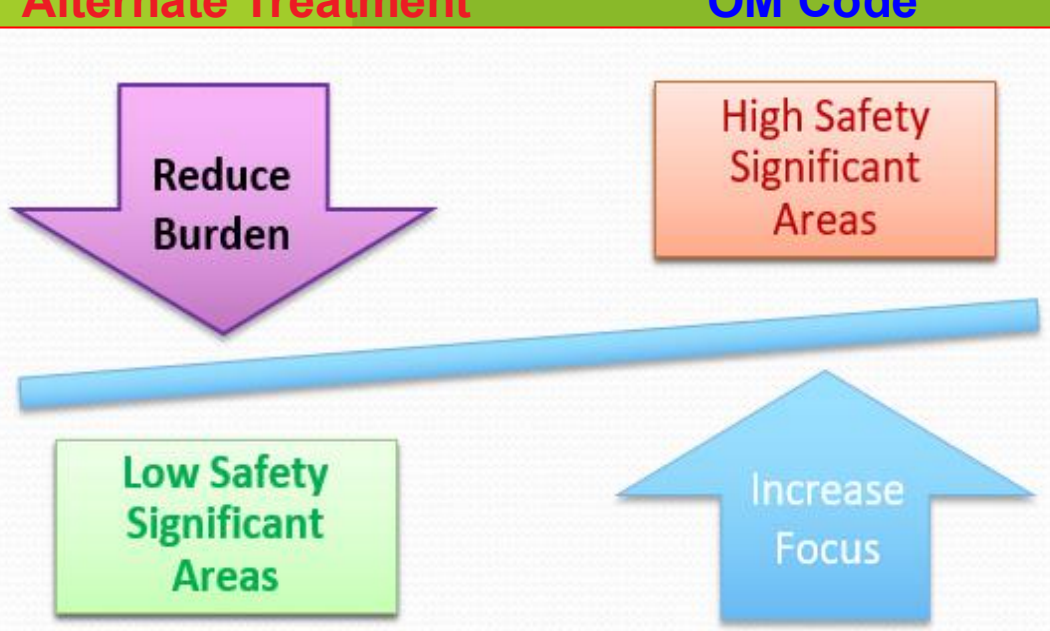


Snakes in the grass

1. The snubbers that remain are not accessible in early in the outage and may require the vessel to be defueled before OPS is comfortable with them being removed for testing. Any scope expansions will all be from the same population.

Snakes in the grass

2. Visual exam failures allowed by OM Code diminish as populations decrease.

Table ISTD-4252-1
Visual Examination Table

(22)

Population or Category [Note (1)]	Number of Unacceptable Snubbers		
	Column A for Extended Interval [Notes (2), (3)]	Column B for Interval Same as Previous [Notes (2), (4), (5)]	Column C for Interval Reduction to 2/3 [Notes (2), (5), (6)]
1	0	0	1
80	0	0	2
100	0	1	4
150	0	3	8
200	2	5	13
300	5	12	25
400	8	18	36
500	12	24	48
750	20	40	78
≥1000	29	56	109

Snakes in the grass

2. For sites performing visual examinations using OMN-13, the margins to failure are small. Risks of emergent 100% visual examinations in a single outage increase.

Snakes in the grass

3. New snubbers may be added to the program from the Non-safety population.

Snakes in the grass

The Risk Informed Safety Class (RISC), a designation determined by a probabilistic risk assessment, determines the component's contribution to safety.

Specifically;

- *Risk-Informed Safety Class (RISC)–1* structures, systems, and components (SSCs) means safety-related SSCs that perform safety significant functions.
- *Risk-Informed Safety Class (RISC)–2* structures, systems and components (SSCs) means non-safety-related SSCs that perform safety significant functions.
- *Risk-Informed Safety Class (RISC)–3* structures, systems and components (SSCs) means safety-related SSCs that perform low safety significant functions.
- *Risk-Informed Safety Class (RISC)–4* structures, systems and components (SSCs) means non-safety-related SSCs that perform low safety significant functions.

Snakes in the grass

3. Hatch has identified four snubbers that may grade out as RISC-2. These would be Non-Safety Snubbers with high safety significance that have never been addressed by OM-Code. If they are RISC-2, they will be added to the OM-Code Program.

Snakes in the grass

4. Risk-rankings are periodically reviewed. Risk-Rankings for 10CFR50.69 can change previous risk-rankings from what was originally identified.

Snakes in the grass

4. Vogtle had to add several snubbers back into the OM Code Program following a categorization review which identified some non-conservatism.

Recommendations

There is pressure to implement 50.69 to reduce scope, outage burden, eliminate PMs, etc…. There can also be significant benefit.

- Make sure you are ready to implement without conflicts between OM Code, TRM and Bases, 50.69 categorizations, your snubber program plan, and the procedures that implement it.
- Do not update your snubber lists every time a new system is categorized. This will create constant churn in the program that will affect outage scopes. Update it once annually.
- Examine **ALL** documents. Your procedures will need to identify the actions needed to address failures for snubbers monitored using 10CFR50.69. Following OM Code may not be the best option.

Conclusion

- Margin reduction for visual examination failures are noteworthy. Plan accordingly.
- This is a living process. RISC designations may change over time.
- There will be pressure from your management to do less. Make sure you establish thresholds in your procedures to do less but still do the right thing.
- You, as the program owner will likely still own the snubbers being addressed via alternate treatment under 50.69.

Discussion?

Lunch Sponsored By

Return By 1:00 pm

Administrative Items
Stephanie McCormick

- Logistics
- Agenda Overview
  - Conference Planning Committee Report
  - Service Life Monitoring of Snubbers
  - Advanced Reactor Status Update
  - Question Cards for Open Session
  - Afternoon Beverage Break
  - **Utility representatives only closed session**

Conference Planning Committee Report

Committee Members for 2026

- Nate Frank, Chair
- Scott Esposito, Ex-Officio Member
- Bob Fandetti, Standing Member
- Mitch Etten-Bohm, Standing Member
- Steve Norman. Standing Member
- Greg Mason (Element), Summer 2026
- Eric Kelland (Element), Summer 2026
- Dave Dutrow (Lisega), Summer 2027

Summer 2027 SNUG

Sponsored by:

and

Summer 2027 SNUG

Sonesta Nashville Airport Hotel

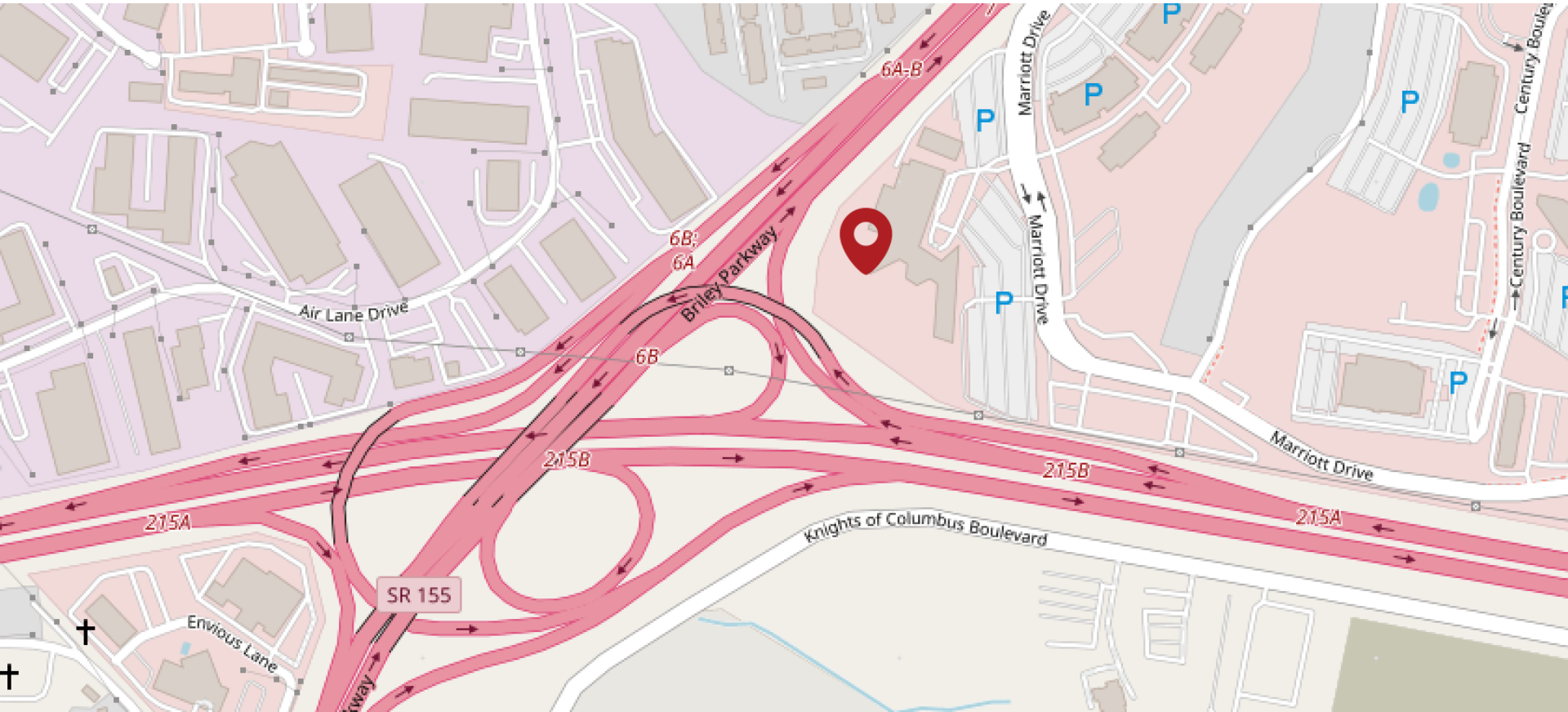
Nashville, Tennessee

July 19, 20 & 21, 2027

Room Rate for Standard Rooms: $164.00

Summer 2027 SNUG

Sonesta Nashville Airport Hotel
600 Marriott Drive, Nashville, TN 37214
Reservations: (615) 889-9300
Room Rate: $164.00




SONESTA
SONESTA

Things to Do.....

- GEODIS Park - Home of Nashville SC, Nashville, TN, 4.1 miles
- Tennessee State Fair, Nashville, TN, 4.2 miles
- Grand Ole Opry, Nashville, TN, 4.2 miles
- Adventure Science Center, Nashville, TN, 4.6 miles
- Nissan Stadium, Nashville, TN, 4.6 miles
- Country Music Hall of Fame and Museum, Nashville, TN, 4.7 miles
- The Johnny Cash Museum Cafe, Nashville, TN, 4.7 miles
- Nashville Zoo at Grassmere, Nashville, TN, 4.8 miles
- Bridgestone Arena, Nashville, TN, 4.8 miles
- National Museum of African American Music, Nashville, TN, 4.9 miles
- Ryman Auditorium, Nashville, TN, 4.9 miles
- Broadway, Nashville, TN, 5.4 miles
- Belmont Mansion, Nashville, TN, 5.7 miles
- Andrew Jackson's Hermitage, Hermitage, TN, 6.5 miles
- The Parthenon, Nashville, TN, 6.7 miles
- Belle Meade Historic Site and Winery, Nashville, TN, 10 miles

Hotel Dining....

Nashville Dining

- Discover the finest of Nashville dining without ever leaving the hotel and savor the flavors of American cuisine and cocktails, highlighting traditional tastes.

The Nashville Tap House

- This classic Nashville restaurant and sports bar is located on the lobby level of the Sonesta Nashville Airport hotel. Enjoy their “Best Breakfast Buffet”, named by Nashville Scene Readers, or savor famous local cuisine like their Hot Chicken for lunch and dinner while catching the games of your favorite sports teams on ttheir large TVs.

Starbucks®

- The Sonesta proudly serves Starbucks® for the quick cup of coffee, pastry, or grab-and-go snacks before catching your flight or heading out to explore all the city has to offer.

In-Room Dining

- Savor fresh ingredients and local flavors from the Nashville Tap House with no carts and no fuss. Available for pick up or delivered to your room with no signature required.

Amenities at the Sonesta Nashville Airport ....

The Sonesta Nashville Airport is proud to offer a wide array of amenities and services designed to make your stay as comfortable and effortless as possible.

Additionally, if you have any special requests for your stay, they would love to make them happen. Contact them at 615.889.9300.

Outdoor Swimming Pool

- Unwind in style. Dive into their seasonal heated outdoor pool, soak up the sun on the spacious sundeck, or lounge in comfortable chairs while surrounded by lush greenery. The outdoor pool is seasonal.

Indoor Swimming Pool

- Their sparkling indoor heated swimming pool is seamlessly connected to the outdoor pool and accessible year-round for your convenience. Relax in the comfy lounge chairs while taking in the views through large glass windows.

Fitness Center

- Elevate your fitness routine with Sonesta. Enjoy access to their state-of-the-art 24/7 fitness center, featuring elliptical machines, treadmills, free weights, and stationary bikes.

Business Center

- Stay connected with ease at the Sonesta Nashville Airport hotel. Designed with the busy business traveler in mind, our 24/7 business center features computer work stations, printing and copying services (available through the front desk), Wi-Fi access, boarding pass printing, and even connection to a notary public.

The Pantry

- Located inside Starbucks, The Pantry is well-stocked offering snacks, drinks and conveniences. Whether you're in search of an essential travel item you left at home, a quick grab-and-go pick-me-up, or craving a tasty snack, this is your one-stop shop for the little things.

Future Conference Sponsorship

We begin planning our conferences 18 months in advance, with a goal of having a signed contract 12 months in advance. If your company is interested in sponsoring a future conference, please notify us at least 18 months in advance if possible, so that we can include your organization in the site selection and the planning of the conference.

Future Conference Sponsors

EVENT	UTILITY	VENDOR
Summer 2027	TBD	Lisega
Summer 2028	TBD	Curtiss-Wright
Summer 2029	TBD	ASC Engineered Solutions
Summer 2030	TBD	Element Nuclear
Summer 2031	TBD	Lisega
Summer 2032	TBD	Curtiss-Wright

Preparing for Nashville…..

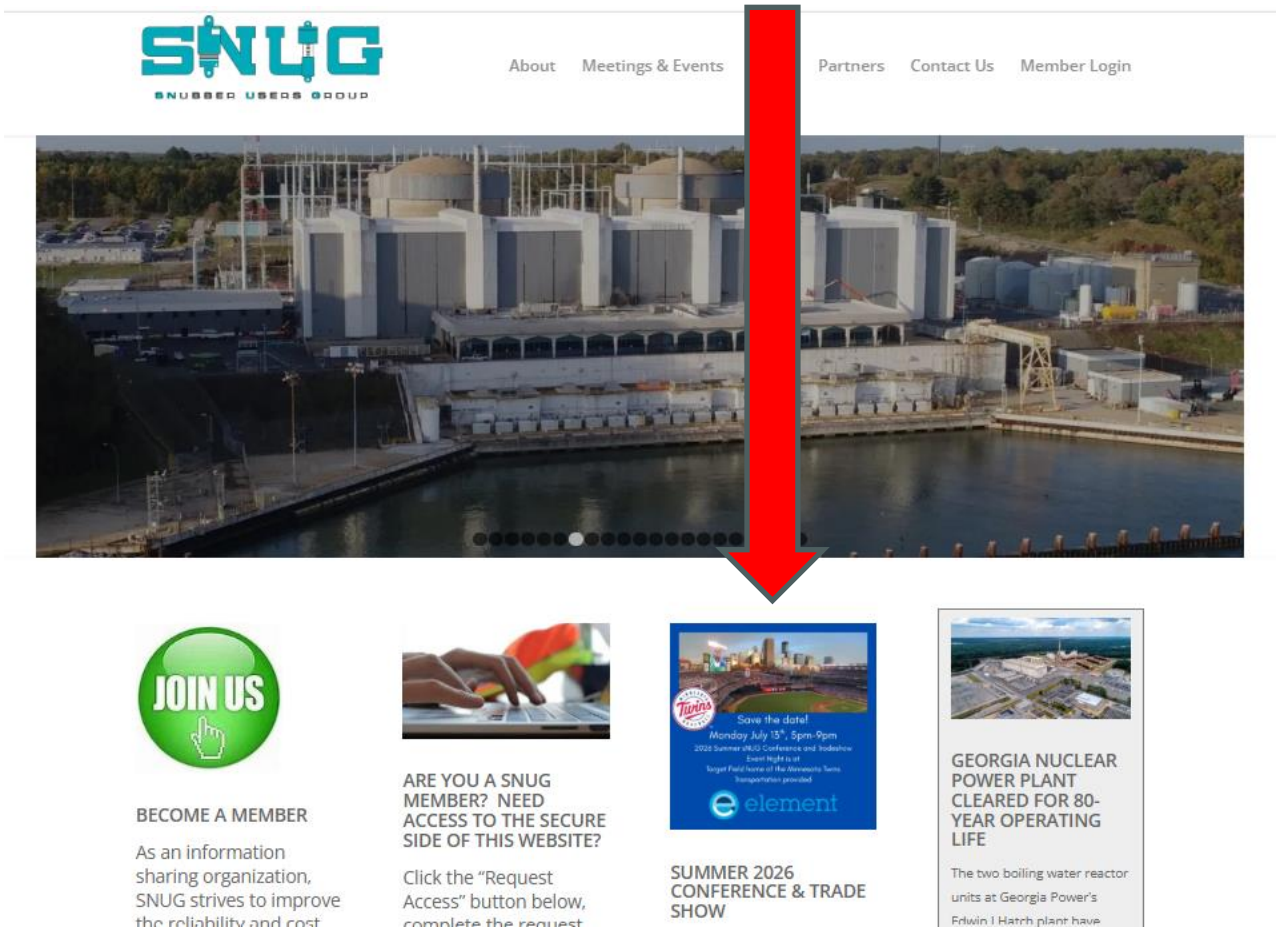
We already know that we will hold a summer conference next year. We also already know where it will be held, when it will be held and the room rate for the hotel. Begin preparing NOW.

Keep an eye on the SNUG website. We will soon begin populating the information you will need to make hotel reservations and register to attend.

What do I need to do?

Once we get the SNUG website information posted, you will be able to register with SNUG to attend, and you will also be able to reserve your guest room at the hotel. You can always cancel your room later if you are not approved to attend. We will also post a draft copy of the agenda but be aware that it will change many times between now and next summer. Check it often.

Conference information will be posted in this column



Conference Details link will open a new page for you

SUMMER 2026 CONFERENCE & TRADE SHOW

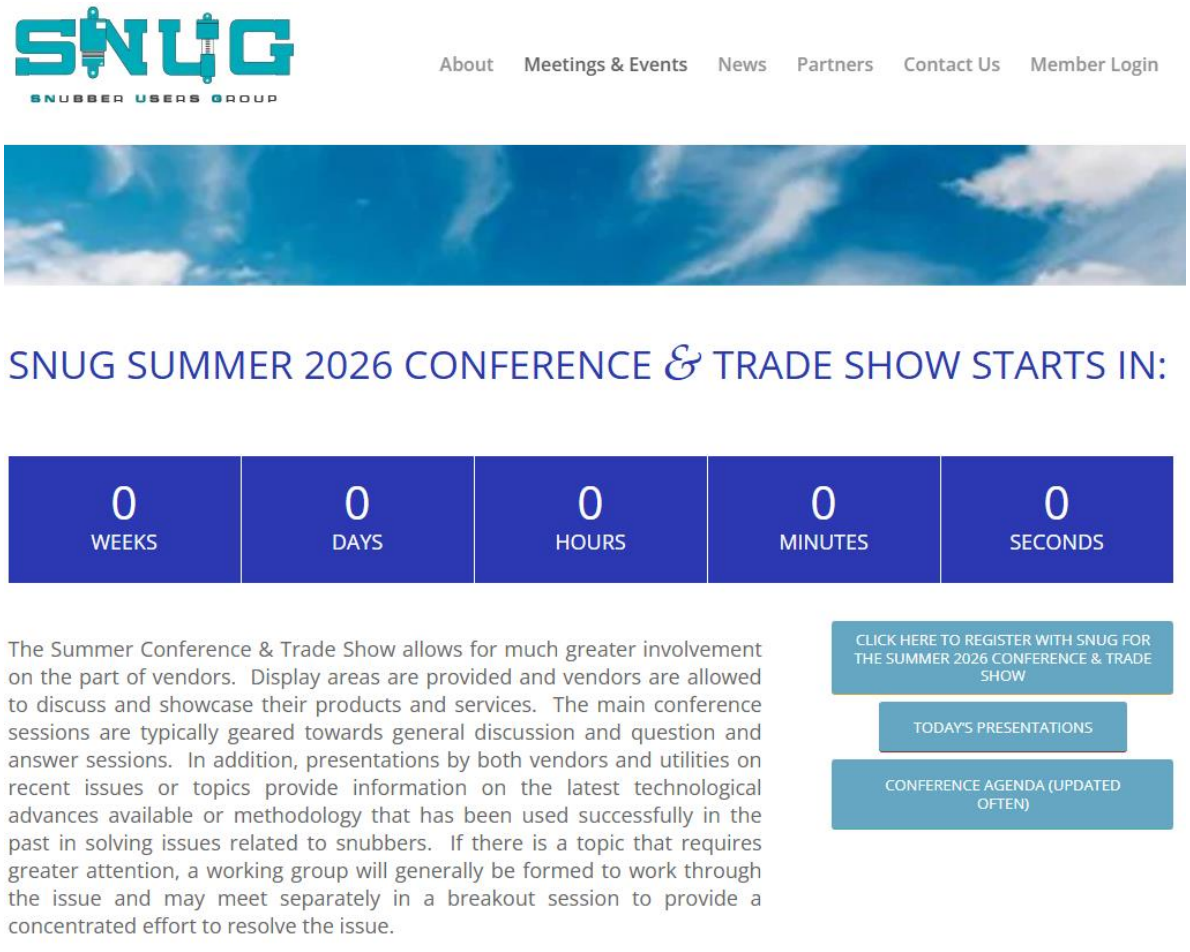
The Summer 2026 Conference & Trade Show is scheduled for July 13–15, 2026 in St. Paul, Minnesota. If you're involved in snubber program administration, licensing, compliance, planning, and field work, plan to attend.

CONFERENCE DETAILS

CLICK HERE FOR THE SUMMER 2026 CONFERENCE LANDING PAGE

CLICK HERE FOR 360 DEGREE PHOTOS OF THE DOUBLETREE HOTEL

This page will show you a countdown timer until the next conference and provide additional links



The function of these links may change, but should allow you to register with SNUG, reserve your hotel guest room and download the current agenda

Remember . . . . . .

- Registering with SNUG is VERY important. We use the information provided on your registration form for MANY purposes. Please do not register multiple attendees on one form. Use a new form for each attendee. If you are bringing a family member or significant other, you can add them to your registration form as a guest, but we need names for EACH guest.

Remember . . . . . .

- Registering with SNUG DOES NOT reserve a hotel guest room for you. You must contact the hotel using the link provided or by calling the reservation phone line yourself.
- Registering with the host vendor DOES NOT register you with SNUG. You still must register with SNUG using a SNUG registration form.

Remember . . . . . .

- Either SNUG or the host vendor signs a contract guaranteeing the hotel that we will occupy X number of rooms during our conference. If you or your corporate travel department decide to save a few dollars and book your room yourselves without notifying the hotel that you are attending the SNUG conference, you could cost SNUG or the vendor thousands of dollars in penalties.

Ideas for a SNUG 2028 Location

Give us some ideas now for a location for our Summer 2028 Conference & Trade Show. Curtiss–Wright will be our host vendor.

Ideas for SNUG 2027 Presentations

Give us some ideas now for presentations you would like to see (or present yourselves) for our Summer 2027 Conference & Trade Show in Nashville next year. Utilities, vendors, regulators or even guests can make a presentation.

Thank You!!

Conference Planning Committee Report

Service Life Monitoring of Snubbers

Summer 2026 Conference

July 14, 2026

St. Paul, MN

By: Scott Esposito

PURPOSE

WHY:

Increase Service Life Monitoring (SLM) requirements knowledge

BENEFIT:

Gain a better understanding of Service Life Monitoring

SLM GUIDANCE

- Non-Mandatory Appendix F
  - Predicted Service Life
    - Manufacturers recommendation
    - Design review
  - Service Life Reevaluation
    - Knowledge of the Operating Environment
    - Direct Measurement of Environmental Parameters
    - As-found Testing

SLM GUIDANCE

- Non-Mandatory Appendix F
  - Knowledge of Operating Environment Effects
    - Identification of Degraded Snubbers
    - Trending
  - Cause Evaluation of Degraded or Failed Snubbers
    - Failure Evaluation Data Sheet
    - Diagnostic Testing

SLM GUIDANCE

- Non-Mandatory Appendix F
  - Shortened Service Life
  - Service Life Extension
  - Separate Service Life Populations

SLM Code Requirements

- ISTD-6100 Initial Service Life
  - Manufacturer's recommendation
  - Review of actual and expected service conditions

SLM Code Requirements

- ISTD-6200 Service Life Reevaluation
  - Shall be performed for all installed snubbers at least once each fuel cycle
  - Based on review of results
  - If the snubber's service life will be exceeded it shall be:
    - Replaced
    - Technical Justification
    - Reconditioned

SLM Code Requirements

- ISTD-6300 Cause Determination
  - Causes of snubber failures shall be
    - Determined
    - Documented
    - Considered for reestablishing service life

SLM Code Requirements

- ISTD-6400 Additional Monitoring Requirements for Snubbers That Are Tested Without Applying a Load to the Snubber Piston Rod
  - Fluid sample monitoring for particulates, viscosity and moisture content
  - Monitoring of piston seal, piston rod seal and cylinder integrity

SLM Code Requirements

- ISTD-6500 Testing for Service Life Monitoring Purposes
  - Results of testing do not require additional testing in accordance with ISTD-5320 and ISTD-5420
  - Shall be evaluated for appropriate corrective actions

SLM Code Requirements

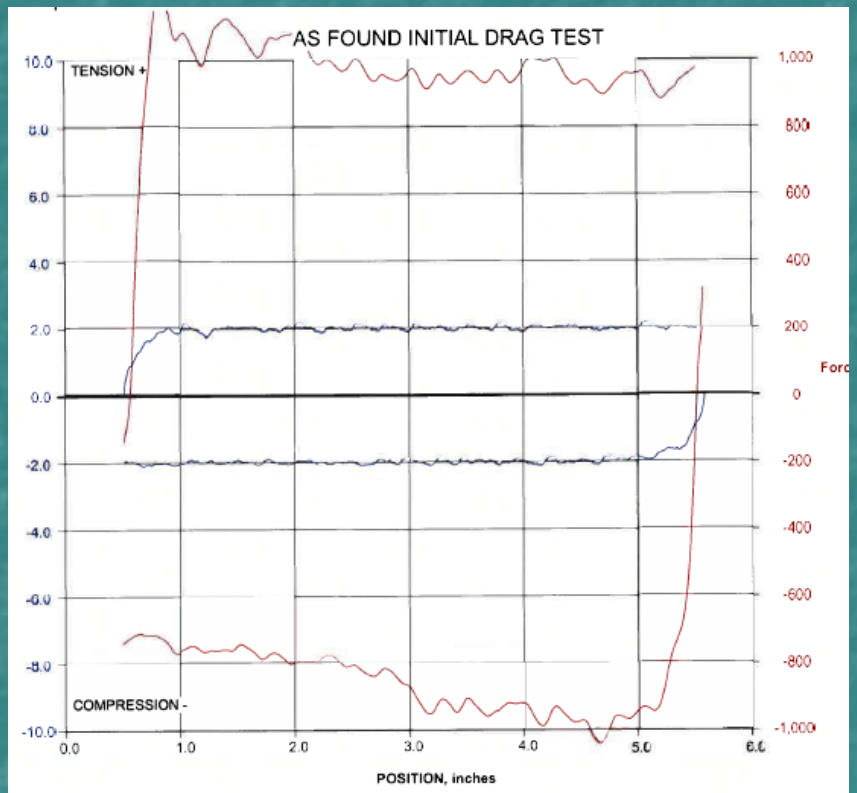
- ISTD-6600 Review of Operational Readiness Test Data
  - Review of traces
    - Snubber subjected to progressive degradation
    - Severe operating environments not previously identified

SLM Code Requirements

- ISTD-6700 Examination During Assembly
  - Review of traces
    - Examination of snubbers and parts during disassembly for signs of degradation or severe operating environments

SLM Disassembly Examination

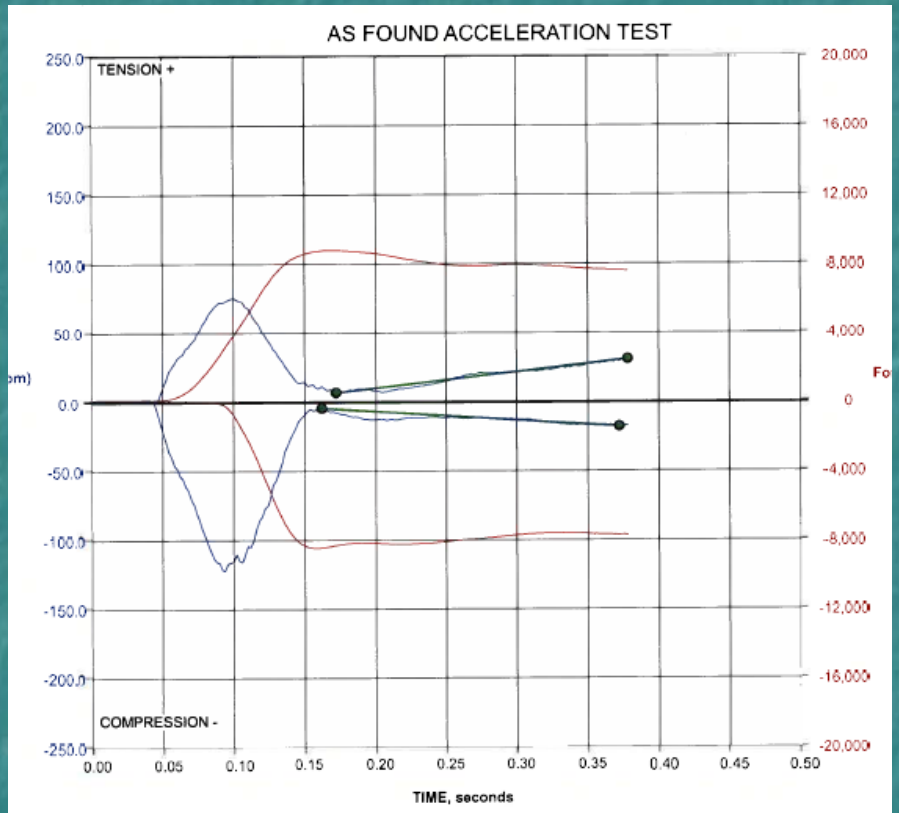
SLM Disassembly Examination



PARAMETER	MIN/MAX	TENSION	COMPRESSION
Breakaway Load (lb)	0/750.0	321.2	-226.9
Peak Load (lb)	0/750.0	1196.7*	-1040.7*
Average Load (lb)	0/750.0	900.7*	-775.7*

* indicates need for evaluation

SLM Disassembly Examination



PARAMETER	MIN/MAX	TENSION	COMPRESSION
Acceleration (g)	0.000/0.030	0.005	-0.003
Test Load (lb)	6,000/12,750	8812	-8445

SLM Mechanical Disassembly Examination

Possible signs of degradation:

- Changes in grease properties
  - Dark brown tacky consistency
  - Black pasty consistency
  - Brownish powdery consistency

- Which parts show signs of grease degradation?
- Is the grease located where it is not desired?
- Consider qualitative testing

SLM Mechanical Disassembly Examination

Possible signs of degradation:

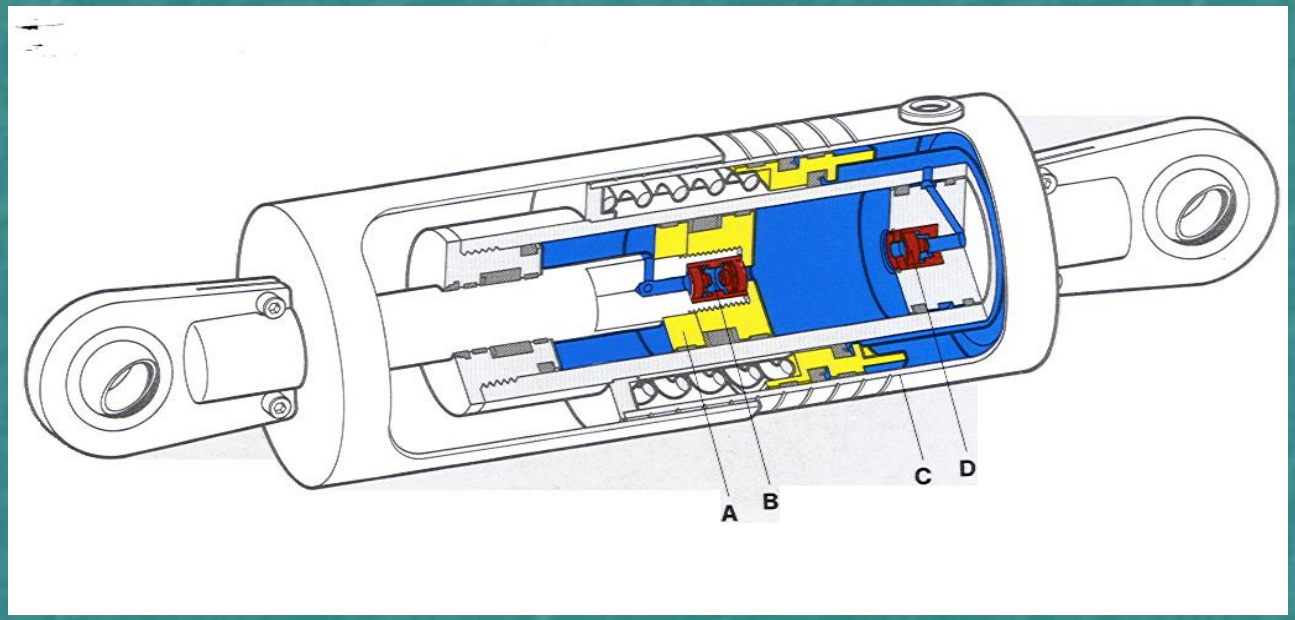
- Signs of vibration
  - Fretting on various parts
    - Internal or external

- Which parts show signs of vibration degradation?

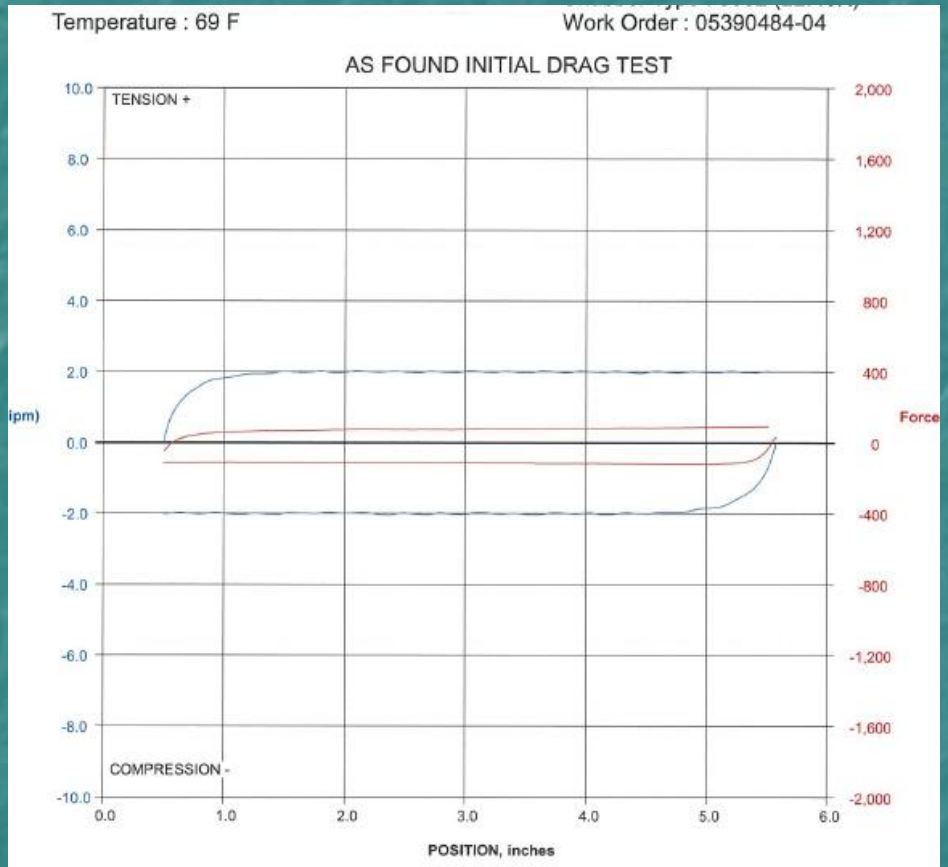
- How will the degraded parts affect future testing after refurbishment?

SLM Disassembly Examination

Hydraulic Snubber Cutaway

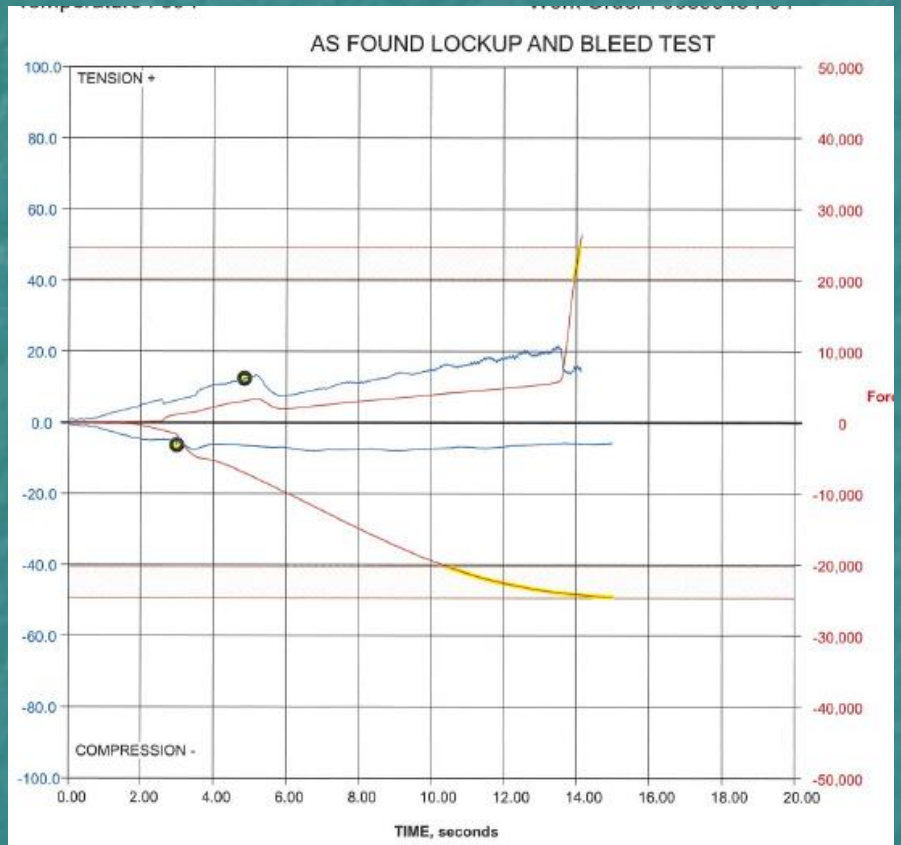


SLM Disassembly Examination



PARAMETER	MIN/MAX	TENSION	COMPRESSION
Breakaway Load (lb)	0/1122.5	8.9	-58.9
Peak Load (lb)	0/1122.5	92.4	-121.1
Average Load (lb)	0/1122.5	67.6	-105.1

SLM Disassembly Examination

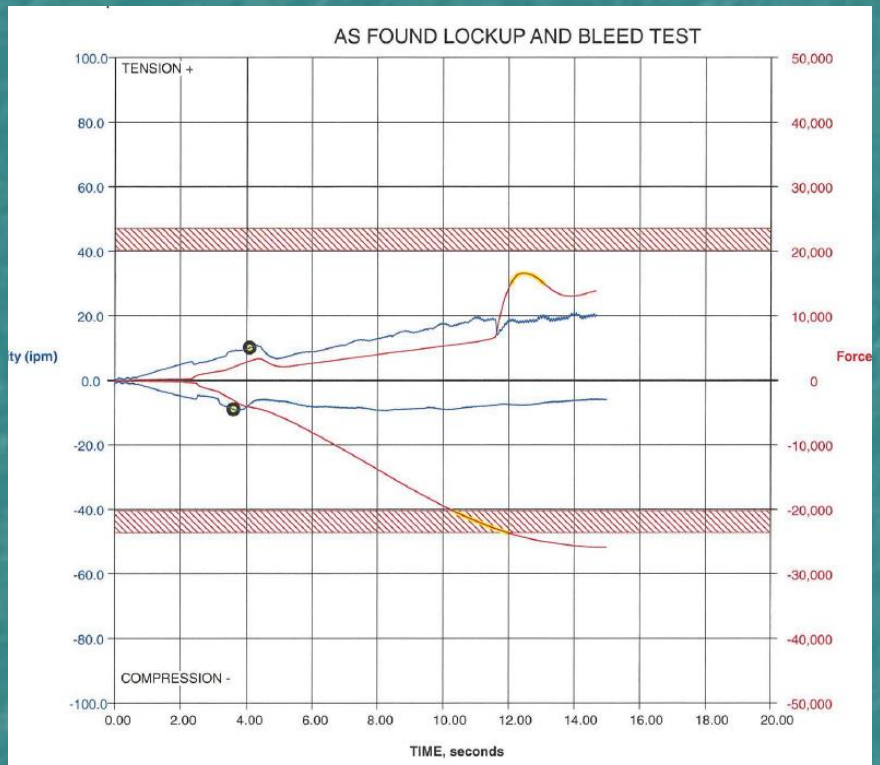


PARAMETER	MIN/MAX	TENSION	COMPRESSION
Lockup Rate (ipm)	4.72/50.00	12.44	-6.26
Bleed Rate (ipm)	0.47/4.72	15.28*	-6.47*
Test Load (lb)	20,205/24,695	22574	-22994

* indicates need for evaluation

SLM Disassembly Examination Previous Outage

SLM Disassembly Examination Previous Outage



PARAMETER	MIN/MAX	TENSION	COMPRESSION
Lockup Rate (ipm)	4.72/50.00	10.13	-8.97
Bleed Rate (ipm)	0.47/4.72	18.65*	-8.00*
Test Load (lb)	20,205/23,573	16103*	-22009

* indicates need for evaluation

SLM Hydraulic Disassembly Examination

Possible signs of degradation:

- Changes in oil properties
  - Dark brown or amber color
  - Black particles
  - Gunk or sludge

SLM Hydraulic Disassembly Examination

Possible signs of degradation:

- Signs of vibration
  - Scoring in the cylinder
  - Grooves in the piston
  - Wear band worn

SLM Hydraulic Disassembly Examination

Possible signs of degradation:

- Signs of heat
  - Discoloration on cylinder or piston shaft
  - Worn wiper

SERVICE LIFE MONITORING OF SNUBBERS

Questions?

Summer 2026 Snubber Users Group (SNUG) Conference: The Nuclear Industry Landscape and the Expansion of Data Centers/AI Computing and Power Needs

Maury Pressburger
Director, Nuclear Siting
Sargent & Lundy, L.L.C.

Background

Mr. Pressburger has over 44 years of project management and technical expertise in the Nuclear Power Industry at Sargent & Lundy and over 30 years working with ASME. He is currently Sargent & Lundy's Director of Nuclear Siting and also serves as Project Manager for many advanced reactor projects for Site Selection, Technology Selection, Site Characterization, and Environmental Reports, interfacing with the NRC on many issues to ensure licensing applications are successfully docketed.

ASME activities:

- Past Vice Chairman and current member of ASME Board on Nuclear, Clean Energy, Power, and Facilities Codes and Standards (BNCS)
- Chairman of BNCS Task Group on Advanced Reactors
- Past Chairman and current member of Committee on BNCS Operations (CBO)
- Past Member of ASME Committee for the International Conference on Nuclear Energy (ICONE)
- Past Member of ASME Conference on Advanced Reactor Deployment (CARD) Committee
- Past Member of Nominating Committee for the Board of Governors
- Past Chairman/Current Member of ASME QME-1 Standard
- Past Chairman/Current Member of the ASME QME QDR Subcommittee
- Member of the BNCS Strategic Committee on Nuclear Facilities (SCNF)
- Member of ASME O&M ISTD Subcommittee
- Member of ASME Plant Standard Design Committee

Membership in other professional societies:

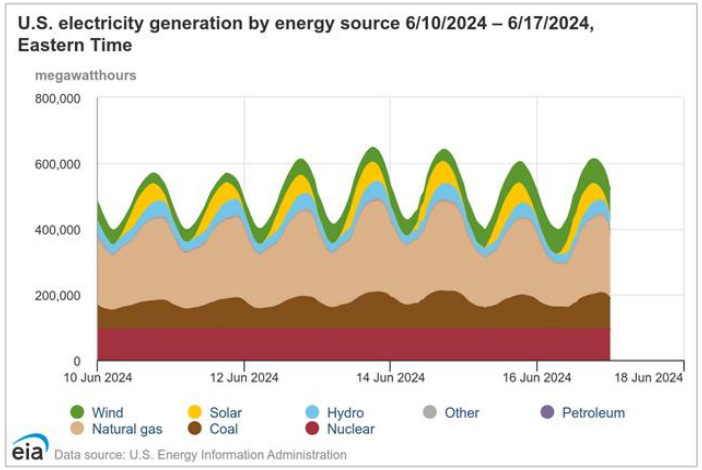
- Member of the EPRI/NEI Advanced Reactors Codes and Standards Collaboration Committee (ARCSC)
- NEI Siting Task Force
- NEI Part 53 Task Force
- NEI Microreactor Task Force
- NEI Licensing Modernization Users Group
- NEI New Nuclear Licensing Working Group
- Nuclear Energy Maritime Organization (NEMO)
- EPRI Advanced Nuclear Technology Advisory Committee

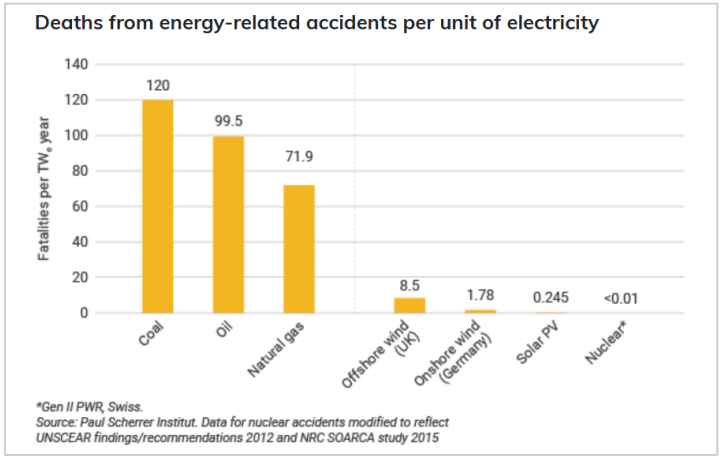
Where We Are

What is happening in the Nuclear Industry (and Power Industry) and why ASME Codes and Standards are central to moving the industry forward

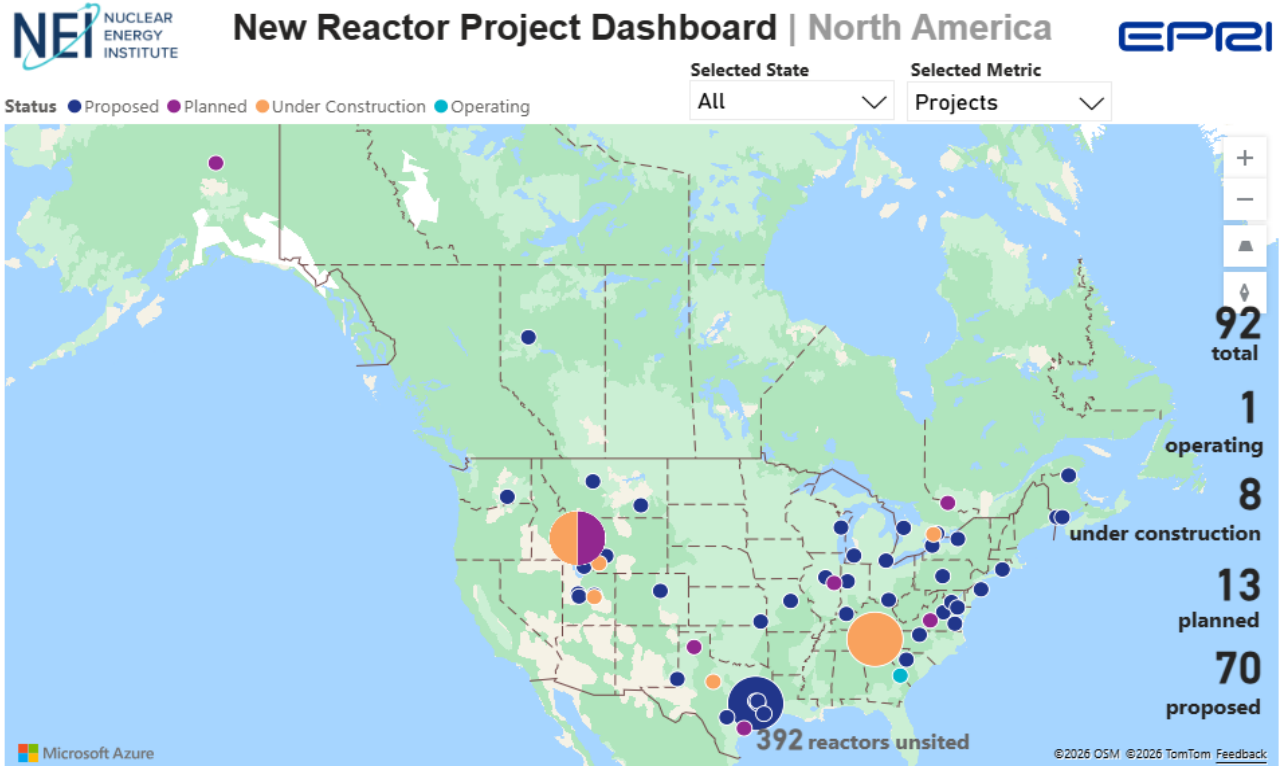
Why nuclear? – Nuclear power stats

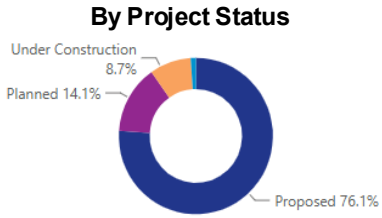
- Land use efficiency (1000 MW nuclear plant uses ~1.3 sq miles)
  - Energy density of nuclear fuel
- Excellent Safety Record in US
- Reliable, baseload, 24/7 power (93% capacity factor)

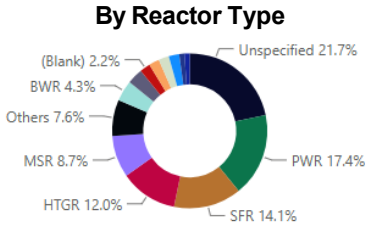


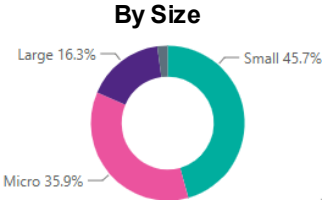


North America Advanced Reactor Projects

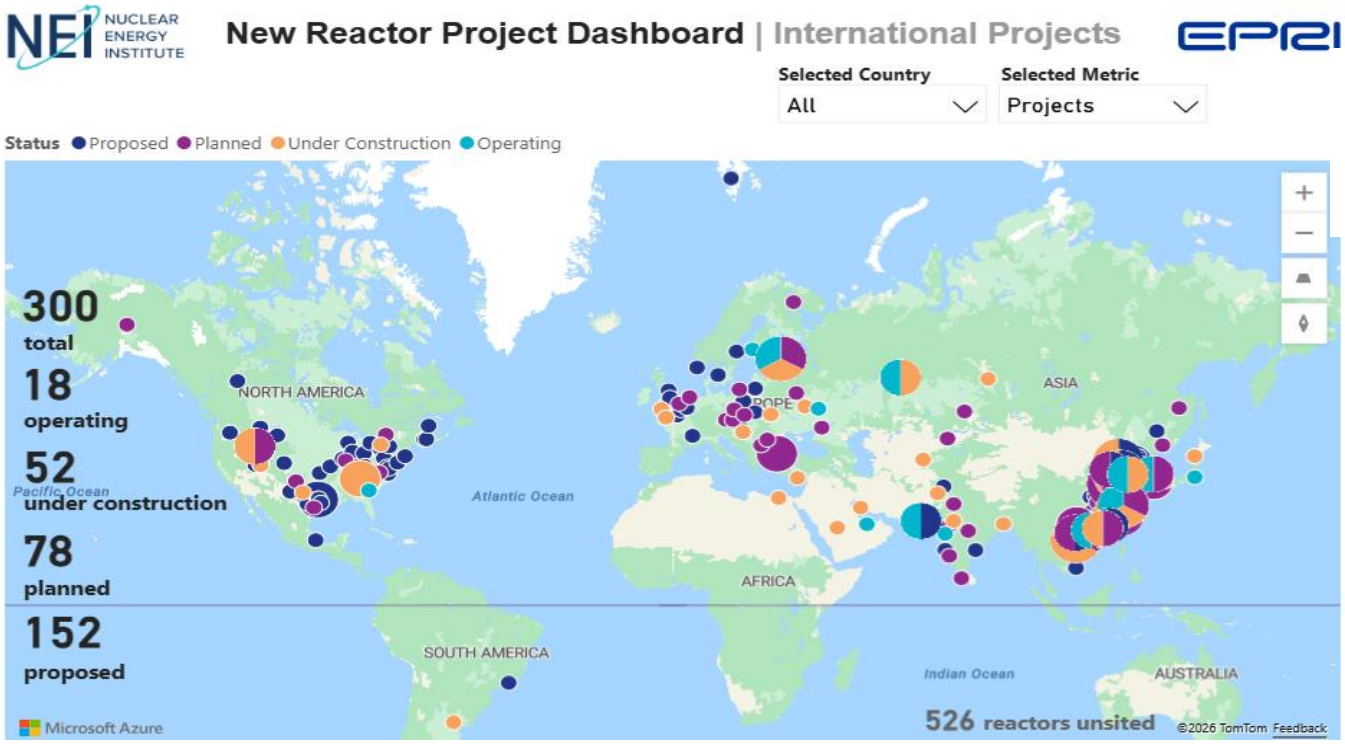


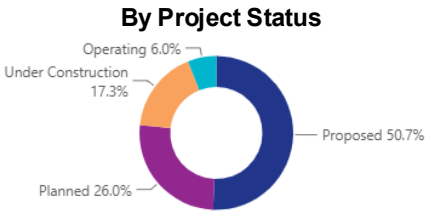


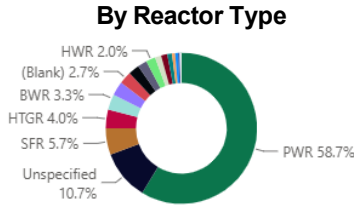


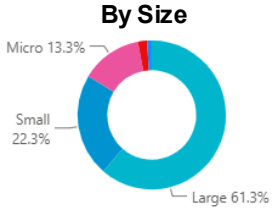


International Advanced Reactor Projects









Key Enablers from the Executive Orders on Nuclear Energy

EO: National Security

Purpose:

- Rapidly deploy advanced nuclear to support national security objectives, including powering artificial intelligence (AI) computing infrastructure and national security installations

Key Elements:

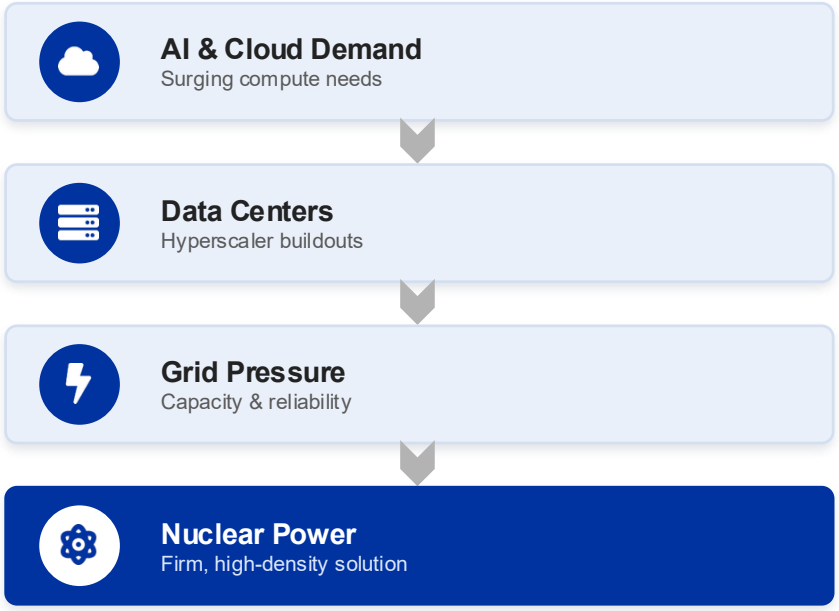
- Deployment and Use at Military Installations
- Deployment and Use at Department of Energy Facilities
- Provision of Fuel for Deployed Reactors
- Streamlining of NEPA for Deployment
- Promoting of Nuclear Exports

AI and Cloud Growth Are Driving New Power Demand

Expansion of data centers is increasing demand for firm, scalable electricity.

U.S. power demand is climbing fast — and AI is a key driver.

- AI and cloud computing are fueling a rapid rise in U.S. electricity demand.
- The U.S. hosts the world's largest data-center market and leading hyperscalers — Alphabet, Amazon, Meta, and Microsoft.
- These facilities need firm, scalable, always-on power, straining grids already facing capacity, reliability, and affordability challenges.
- As AI buildouts accelerate, nuclear is entering the conversation — high-density power that also supports climate commitments.



Federal regulators order grid operators to speed power to energy-hungry AI data centers

- WASHINGTON (AP) — Federal regulators, on 6/18/26, ordered regional grid operators to help large energy users connect more quickly to the nation's inefficient and aging electric transmission system, a step they said is needed to accommodate surging demand from power-hungry artificial intelligence data centers.
- Energy Secretary Chris Wright had urged the Federal Energy Regulatory Commission to act in an effort to help the United States better compete with China for superiority in the fast-growing AI sector.
- Tech companies and data center developers welcomed the chance to connect faster to the country's power supply for the biggest energy users ever built in the United States, including some that consume more electricity than a small city.

EO: Nuclear Industrial Base

Purpose:

- Expedite and promote the production and operation of nuclear energy

Key Elements:

- Strengthening the Domestic Nuclear Fuel Cycle
- Funding for Restart, Completion, Uprate, or Construction of Nuclear Plants
- Expanding the Nuclear Energy Workforce

Some Key EO Milestones

Date	Milestone
Feb 23, 2026	NRC proposed rulemaking for ‘wholesale revision’ of regulations
July 4, 2026	3 DOE approved reactors operating at non-DOE sites
Nov 23, 2026	NRC completes rulemaking for ‘wholesale revision’ of regulations
Sept 28, 2028	First advanced reactor operating on military base
Jan 2029	At least 20 new 123 Agreements in place
By 2030	**5 GWe of uprates and 10 new large reactors under construction**
2050	**Increase US commercial nuclear capacity to 300 GWe**

H.R.1 – One Big Beautiful Bill Act

Signed into law July 4, 2025

H.R.1 - 119th Congress (2025-2026):
One Big Beautiful Bill Act | Congress.gov | Library of Congress

It covers:

- 45Q – Carbon Capture
- **45U - Nuclear**
- 45V - Hydrogen
- **45Y – PTC**
- 48E – ITC
- 45Z – Clean Fuels
- Foreign Entity of Concern
- Transferability
- **Energy Dominance Financing**

Advancing Nuclear

- Department of Energy (DOE) created the **Reactor Pilot Program** to provide a new DOE pathway for advanced reactor demonstration to fast-track commercial licensing and unlock private sector investment.
- **DOME, the world's first microreactor test bed**, opened its doors to advanced reactor developers at Idaho National Laboratory (INL) in April 2026. The facility will provide a safe environment to test experimental reactor concepts and gather performance data that can be used to inform future commercial licensing applications.
- Eight companies were awarded a combined $94 million in May 2026 to address key gaps hindering the domestic nuclear industry. **These projects will help deliver new nuclear generation in the early 2030s, strengthen domestic supply chains, and accelerate large-scale deployment of Gen III+ SMRs.**
- Additionally, in March 2026 the **U.S. Department of Commerce announced a major $40 billion energy partnership with Japan to deploy GE Vernova Hitachi (GVH) BWRX-300 SMRs in Tennessee and Alabama. The deal, part of a U.S.-Japan Strategic Investment initiative, aims to provide 3 gigawatts of clean, baseload power to the region.**

- Executive Order Deploying Advanced Nuclear Reactor Technologies for National Security instructed DOE to provide technical advice to the Department of War (DoW) on the "design, construction, and operation of any advanced nuclear reactor on a military installation." **DOE is working closely with the U.S. Army and the U.S. Air Force to provide support for several efforts, including Project Pele, the Janus program, the Eielson Air Force Base pilot program, and the Advanced Nuclear Power for Installations (ANPI) program.**
- **Executive Order, Ensuring American Space Superiority**, establishing a U.S. space policy that calls on the development of multiple technologies — **including space nuclear energy** — to secure the nation's vital economic and security interests, unleash commercial development, and lay the foundation for a new space age.
- **DOE took the historic step** of awarding $19 million in February 2026 to five U.S. companies for research and **development of recycling technologies for used nuclear fuel.**
- **Expand U.S. Nuclear Energy Exports: DOE, USTDA, and DOS Programs in Europe, the Far East, and Africa.**

AR/SMR/Micro Progress Examples

As part of the U.S. Department of Energy (DOE) Reactor Pilot Program, Antares Nuclear's advanced reactor design, the Mark-0, successfully completed a zero-power fueled criticality demonstration at DOE's Idaho National Laboratory. This test confirms that the reactor can operate safely and establishes a basis that would allow subsequent reactors to produce electricity in 2027 and beyond. The Mark-0 is the first of multiple advanced reactors anticipated to go critical by the July 4th deadline set by President Trump in his May 2025 executive order.

Valar Atomics Ward 250: This reactor achieved the same milestone shortly after on June 18, 2026, although this specific demonstration took place outside of the national laboratory in Emery County, Utah.

Deployable Energy's Unity reactor completed a zero-power fueled criticality demonstration at the Idaho National Laboratory on June 30, the DOE said in the statement. Unity is the third DOE-authorized microreactor to go critical by the July 4 deadline set by Trump in the executive order.

In the early hours of July 4, **Aalo Atomics'** advanced reactor design, Aalo-X, completed a zero-power fueled criticality demonstration to become the fourth!

AR/SMR/Micro Progress Examples

Several projects supported by **DOE's Advanced Reactor Demonstration Program (ARDP)** reached historic milestones in the past year, including TerraPower's Natrium fast reactor project in Kemmerer, Wyoming. **TerraPower received its construction permit in March 2026** — the first ever issued by the NRC for a commercial non-light-water power reactor — and broke ground on the Natrium plant construction the following month.

The **NRC is currently reviewing a construction permit application from Dow for an X-energy Xe-100 reactor in Seadrift, Texas.** The U.S. Nuclear Regulatory Commission **issued a final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the proposed Long Mott Generating Station on May 18, 2026.**

Kairos Power initiated nuclear construction on their Hermes test reactor in May 2025 and broke ground on their Hermes 2 reactor in April 2026. Hermes 2 will be a commercial demonstration of the Kairos Power technology and is Kairos Power's first deployment under its agreement with Google to develop an advanced reactor fleet.

In June 2026, **NRC** staff published the safety evaluation report and **officially recommended that the commission issue the construction permit for TVA's Clinch River Nuclear site.**

GW Plant Restart

Holtec International Corp. is planning to reopen the Palisades plant in Michigan sometime this year, backed by state and federal financial support.

Three Mile Island in Pennsylvania is being brought back into service after Microsoft Corp. agreed to purchase its power for 20 years.

NextEra Energy Inc. is aiming to bring the Duane Arnold plant in Iowa back online in 2029 after reaching a 25-year power supply agreement with Google.

Fusion

The U.S. fusion sector is rapidly shifting from theoretical research to commercial pilot plants. There are currently over 50 nuclear fusion startups in the world, and they have raised a total of $6.7 Billion in Venture Capital funding. Some examples:

- Commonwealth Fusion Systems
- Xcimer Energy
- Blue Laser Fusion
- Helion Energy
- Zap Energy
- SHINE Technologies
- nT-Tao Compact Fusion Power
- General Atomics

Nuclear Fuel Recycling

Used nuclear fuel represents a potentially important untapped resource for the nation's nuclear fuel supply chain. Less than five percent of the potential energy in the nation's nuclear fuel is extracted after five years of operation in a commercial reactor. Effective recovery and recycling of used fuel could reduce the need for mined natural uranium and decrease the amount of high-level nuclear waste generated. Some examples:

- Curio Solutions
- Oklo
- SHINE Technologies
- Alpha Nur
- Flibe Energy

Maritime Nuclear: Floating Nuclear Power Plants

Maritime floating nuclear reactor fleets represent a shifting landscape in decarbonization and mobile power, integrating advanced Generation IV reactors and Small Modular Reactors (SMRs) onto seagoing or stationary buoyant vessels. These facilities offer massive energy density for commercial shipping and isolated coastal areas. Some examples:

- Core Power
- Samsung Heavy Industries
- Fleet Energy (formerly Thorcon)
- Seaborg Technologies

New Licensing: 10 CFR Part 53,

"Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors"

Sargent & Lundy

This final rule is a major NRC action that provides a clear risk-informed, technology-inclusive licensing framework to enable new nuclear to safely move faster from concept to construction.

Part 53's shift from a technology-specific to a technology-neutral approach to reactor licensing is intended to address a long-standing issue in regulatory frameworks that were developed for light water reactor technology. Licensing reactors that do not use LWR technology have required applicants seeking regulatory exemptions, leading to a cumbersome licensing process.

10 CFR Part 57,

"Licensing Requirements for Microreactors and Other Reactors with Comparable Risk Profiles"

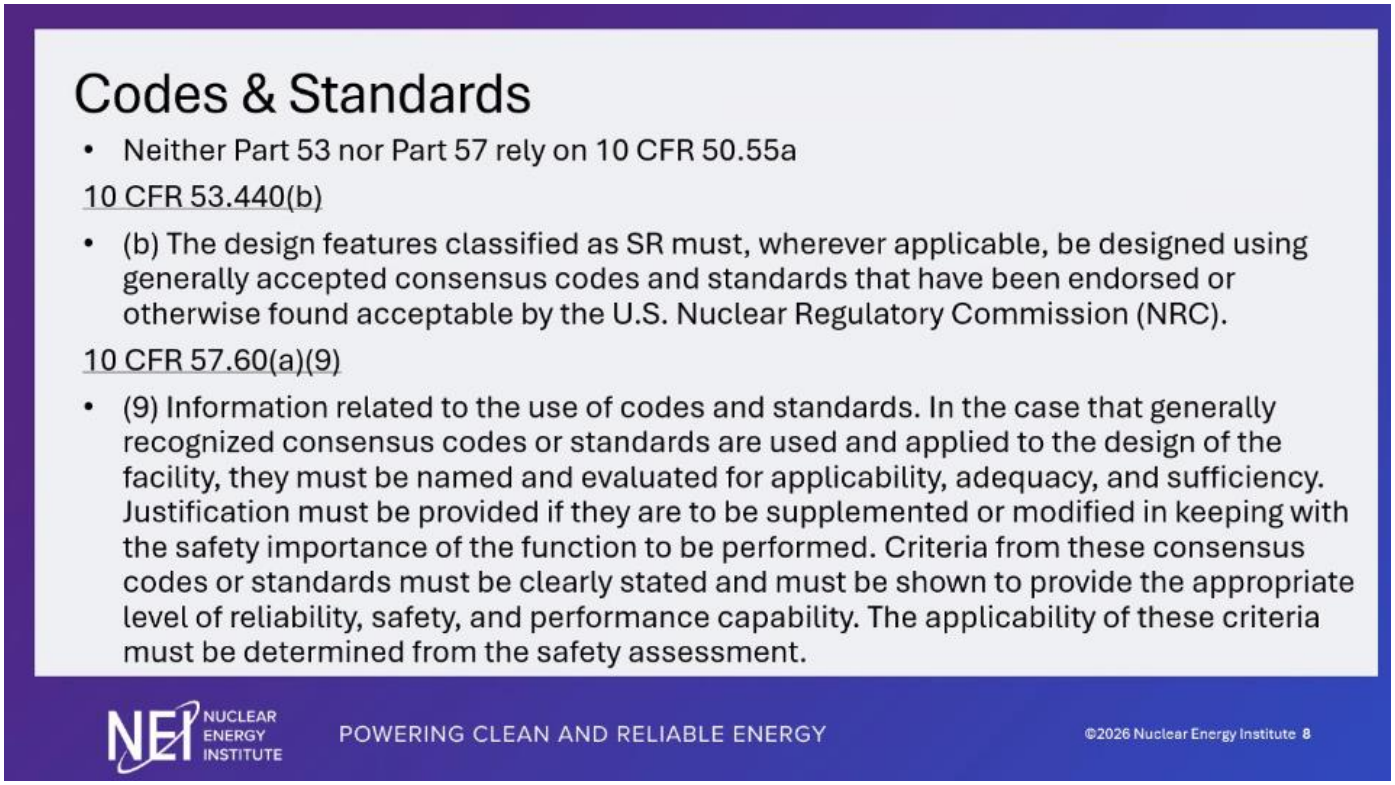
Sargent & Lundy

The Nuclear Regulatory Commission (NRC) proposed "Part 57," a new regulatory framework tailored for microreactors and low-risk advanced reactors. It accelerates licensing timelines to 6–12 months and allows for fleet approvals, transportability, and autonomous operations. The public comment period for Docket ID NRC-2025-0379 closed in June 2026.

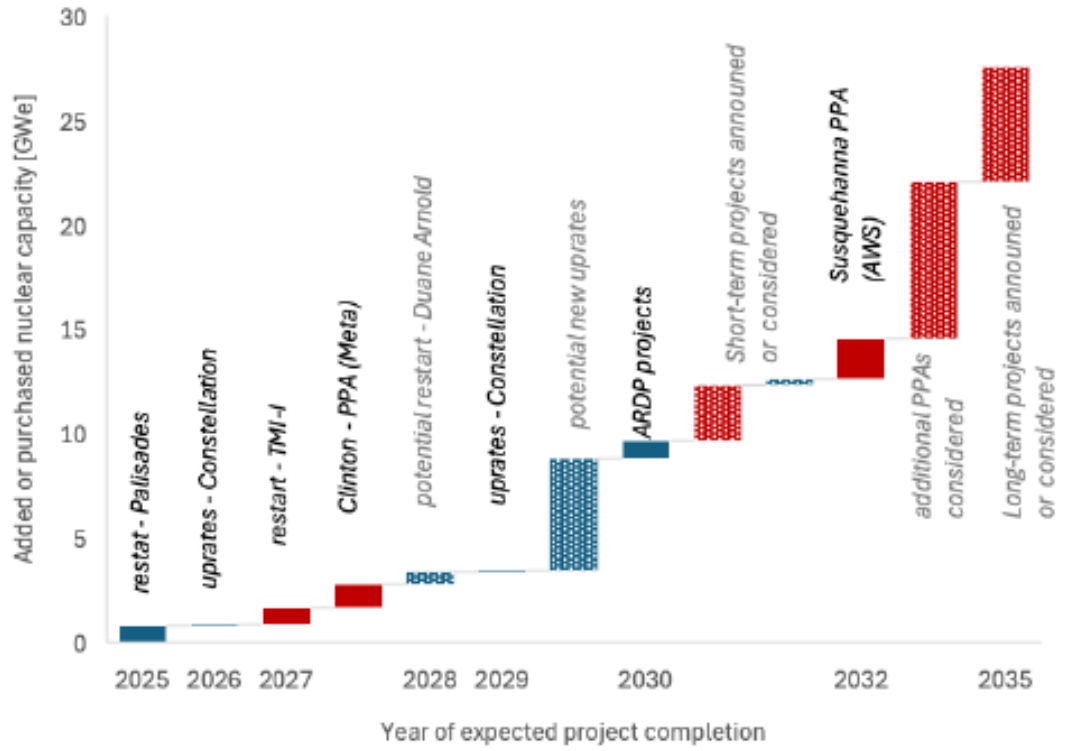
On May 1, 2026, the Nuclear Regulatory Commission (NRC) published a proposed rule to establish a new licensing framework under 10 C.F.R. Part 57 for microreactors and other low-consequence reactor designs. The rule is a significant development for the microreactor industry, aimed at enabling faster licensing timelines and repeatable, standardized deployment models, including factory-built microreactors at multiple sites.

Consistent with this deployment model, Part 57 would allow companies to submit a single joint application covering a construction permit (CP) and any number of operating licenses (OL) for reactors of essentially the same design at one or more sites or within designated geographic areas, rather than treating each reactor as a separate licensing exercise.

Codes and Standards Impact



Timeline of expected and potential additions of nuclear capacity to U.S. fleet



Data centers, AI, and Cloud Computing

Electricity demand is rising rapidly, along with growing enthusiasm for nuclear power. In addition to climate concerns and the desire for secure energy, these needs are driven in large part by the planned expansion of data centers for artificial intelligence and cloud computing. The United States is home to the world's largest data center market and the leading global cloud service providers,
including Alphabet (Google), Amazon, Meta (Facebook), and Microsoft.

The US has 74 gigawatts of new nuclear capacity in some stage of planning or development, of which 41% are hyperscalers. That's more than twice the 18% coming from utilities and public power buyers, while small modular reactors and non-light-water designs dominate most new commitments across the pipeline.

Nuclear Power Purchase Agreements by Technology Companies (March 2026)

Company	Description	Planned Capacity (GW)	Initial Operation Date
Alphabet	Working with Kairos Power and Tennessee Valley Authority (TVA) to develop a fleet of advanced nuclear power projects from which Alphabet will buy energy	.5	2030
Amazon	Purchasing power from Talen Energy's Susquehanna nuclear power plant and exploring future SMR deployments in Pennsylvania	1.9	2032
Meta	Relicensing and continued operation of Constellation Energy's Clinton Clean Energy Center nuclear power station in Illinois as well as extensions and uprates at plants in Ohio and Pennsylvania	3.7	2027
Microsoft	Supporting the restoration of Constellation Energy's Three Mile Island Unit 1 (to be renamed the Crane Clean Energy Center) in Pennsylvania	.8	2027
	TOTAL	**6.9**	

Technology Company Agreements for Nuclear Power Development (March 2026)

Company	Description	Planned Capacity (GW)	Initial Operation Date
Alphabet	Agreement with Elementl, a project developer, to prepare three sites for future SMR deployment with nuclear technology to be selected later.	1.8	2035
Amazon	Investment in X-energy and partnered with Energy Northwest for a nuclear project in Washington that could be significantly scaled up later, if successful.	.3	Mid-2030s
Meta	Agreement with TerraPower for up to 2.8 GW and Oklo for up to 1.2 GW	4.0	2032
Microsoft	No announced plans for direct partnership	--	--
	TOTAL	**6.1**	

Continually evolving:

July 13, 2026

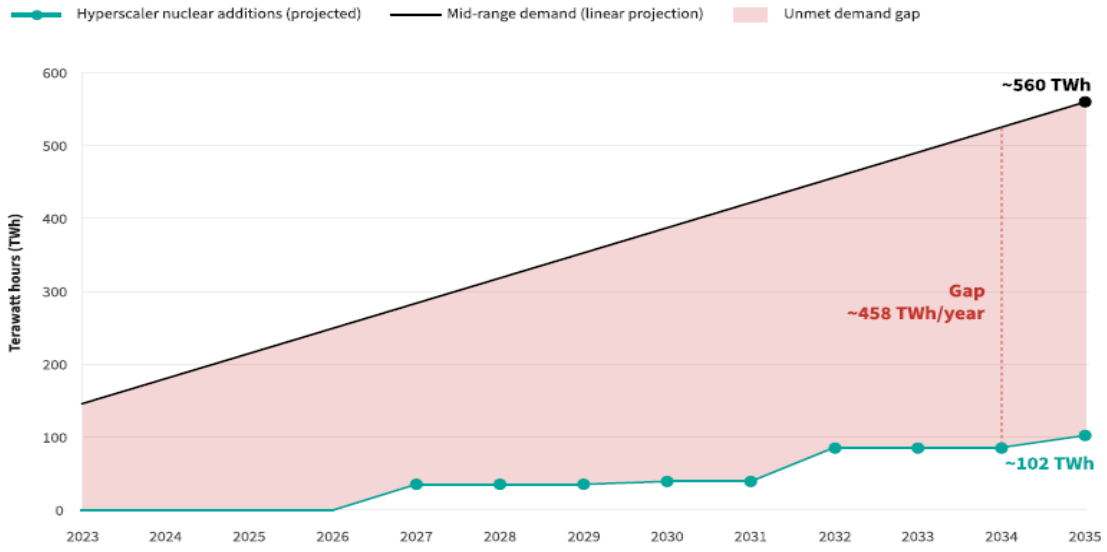
Meta Commits More Than $50 Billion for North Louisiana Project, Becoming One of the Largest Data Centers in History

Meta will expand its largest data center to **5 gigawatts of compute capacity** as investment in the project hits more than $50 billion, the company announced Monday.

The project will support 7,500 construction jobs, support 1,000 operational jobs and generate significant investments in local infrastructure and community services.

“As demand for artificial intelligence continues to accelerate worldwide, the infrastructure powering it is expanding to meet growing demand. With this investment, Meta is establishing its Richland Parish Data Center as the cornerstone of its global infrastructure.”

Projected Data Center Demand



Sources: Author's analysis of announced hyperscaler deals as of Much 2026; McKinsey & Company, "How Data Centers and the Energy Sector Can Sate AI's Hunger for Power," https://www.mckinsey.com/industries/private-capital/our-insights/how-data-centers-and-the-energy-sector-can-sate-ais-hunger-for-power; and Goldman Sachs, "AI Is Posed to Drive 160% Increase in Data Center Power Demand," https://www.goldmansachs.com/insights/articles/AI-poised-to-drive-160-increase-in-power-demand.

A new class of data center—AI training facilities

Sargent & Lundy

Data centers currently consume approximately 4–5% of total U.S. electricity. By the end of this decade, that figure is expected to approach 9–10%, with AI workloads accounting for a growing share of the increase.

For utilities accustomed to incremental change, this shift represents a return to large-scale capacity expansion—often on compressed timelines and in specific geographic pockets.

AI: The Load Accelerator

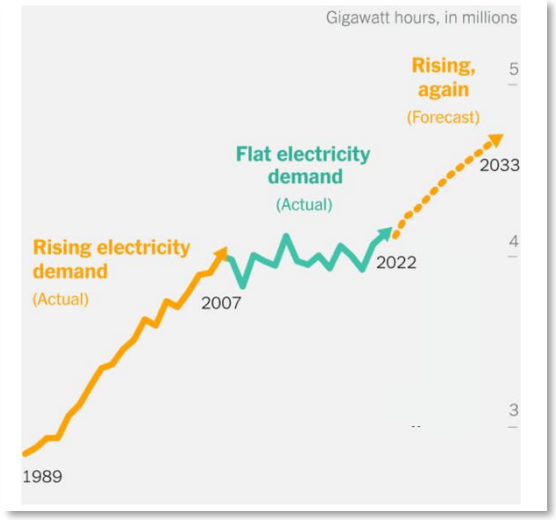
Artificial intelligence is the accelerant transforming data centers from large loads into *extraordinary* ones. Training modern AI models requires staggering amounts of computation—far beyond what Moore's Law efficiency improvements alone can deliver.

Historically, computing power increased through efficiency gains: smaller, faster, cheaper chips performing more work per watt. That trend flattened AI energy demand for years. Then, in the late 2010s, the trajectory changed. Developers began scaling performance not just by efficiency, but by **sheer volume of computation**, steepening the curve dramatically.

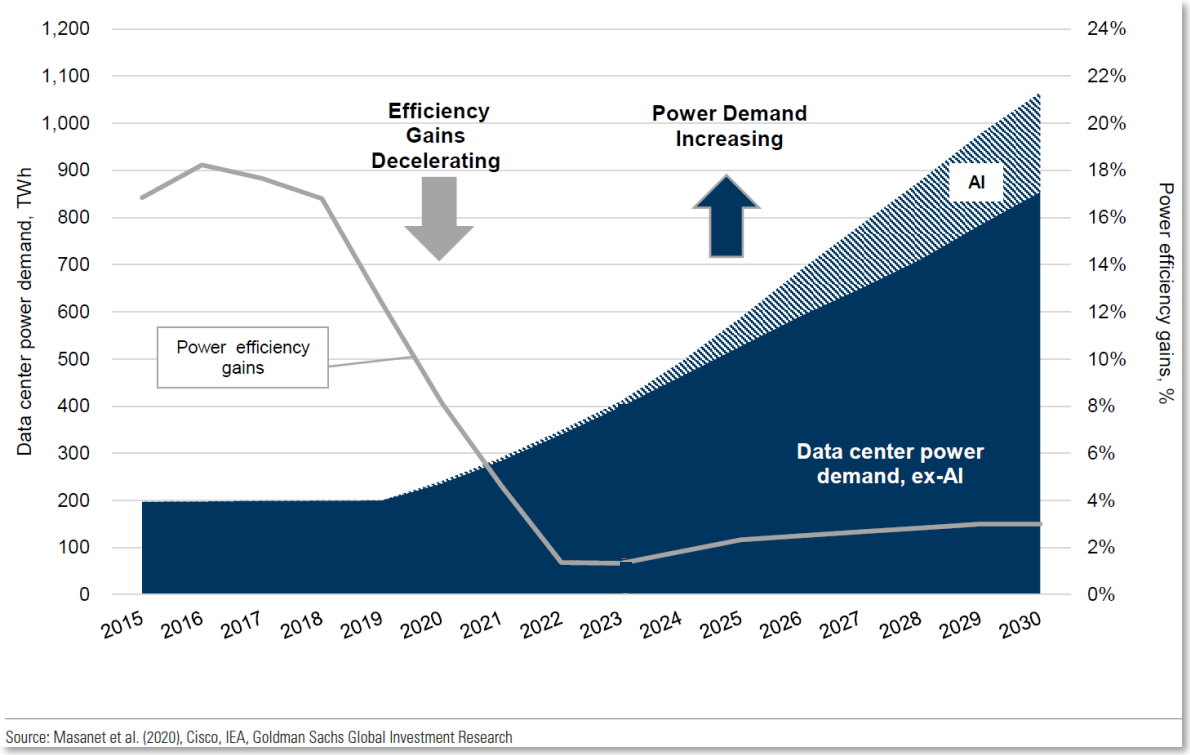
The result is a new class of data center—AI training facilities—that are less sensitive to latency but extremely sensitive to power availability. These facilities move relatively small amounts of data in and out, but process enormous workloads internally, driving sustained, high-density electricity demand.

The competition among AI developers is fundamentally about compute scale. Faster training enables faster model improvements, which translate directly into market advantage.

Data Centers driving a Generational Shift in Power Demands



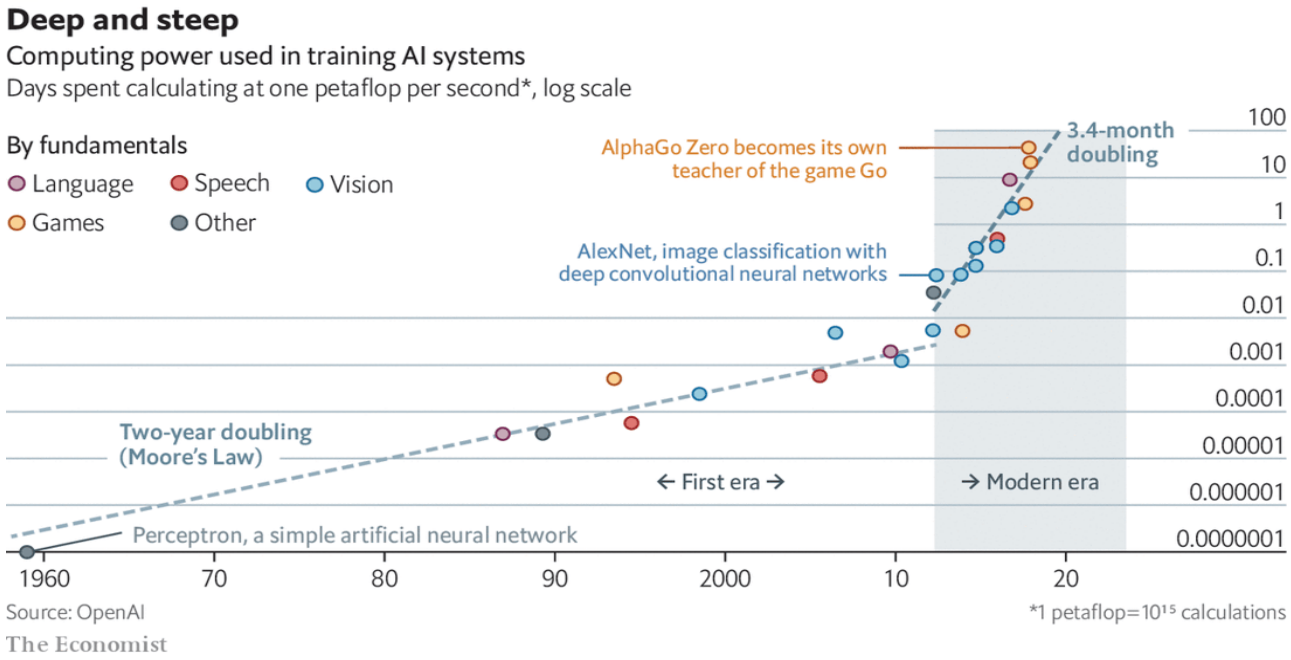
Technology companies are racing to ensure there's enough energy to operate and cool the servers that underpin artificial intelligence models. In a high-growth scenario, data centers' share of US power consumption could hit 17% by 2030, according to the Electric Power Research Institute, up from around 5% currently.



Source: Masanet et al. (2020), Cisco, IEA, Goldman Sachs Global Investment Research

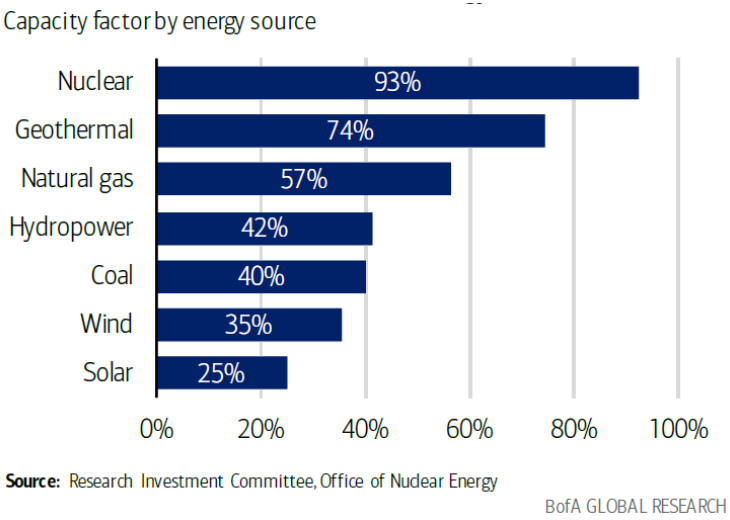
Artificial Intelligence (AI) & Compute Power

*Massive amount of computing power used to **train** AI models*



Challenges for New Nuclear

- High upfront capital costs for nuclear
  - Interest rates and inflation
  - FOAK. Economies of multiples vs economies of scale
- SMR project delivery model and risk allocation
  - EPC, OEM, Owner/Utility, Ratepayer, Government
  - Potential for cost overruns and construction delays
- Civil construction is still substantial
- Education of the public on safety, spent fuel, etc.
  - Opinion polls in US improving (77% approve of nuclear energy)
  - 1,000 MW plant produces 3 cubic meters of spent fuel per year
- HALEU fuel development in the US for Advanced Reactors
  - Russia accounts for 50% of enrichment capacity
  - Centrus Energy produced the nation's first 20 kilograms for DOE in 2023 at their Ohio plant.



ASME Challenge

ASME recognizes the industry's needs and is actively pursuing:

- Clear language revisions to the NQA-1 Standard
- Promotion of the graded approach already embedded in NQA-1
- New guidance materials
- Expanded training resources
- Streamlined audits
- Codes and Standards that address AR/SMR/Micro needs (ARCSC). Examples of those identified:
  - BPV III-Div 5
  - BPV III-Div 1
  - OM-2
  - QME-1
  - NQA-1
  - BPV XI-Div 2
  - AG-1

The Nuclear Regulatory Commission's proposed rulemaking on reactor licensing, safety oversight, and siting practices was unveiled on July 1. The NRC would allow licensees to request a broader scope of alternatives to the requirements in 10 CFR 50.55a(z), "Codes and Standards." This would allow for added flexibility without requiring exemptions. This proposed action would allow for requests for authorization of voluntary alternatives to a broader scope of requirements in 10 CFR 50.55a.

Our challenge: How can existing codes/standards be leveraged or modified to enable expanded nuclear technologies and the nuclear supply chain?

In Summary

The stars have aligned around massive investment in advanced nuclear, not the least of which is the clean, high-density, high-availability power demand from AI.

We've heard it before but for the first time since the 1970's, it's actually happening, and in a major way.

Codes and Standards have a challenge and play a big part in bringing this future into reality.

Sargent & Lundy

Thank You

Maury Pressburger
Director, Nuclear Siting
Sargent & Lundy
1-312-269-3111 | 1-224-565-1983 (mobile) | 1-312-269-1913 (fax)
maury.a.pressburger@sargentlundy.com
www.sargentlundy.com
77 West Wacker Drive| Chicago, IL 60601

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Question Cards
or
Questions from the Floor

?

Afternoon Beverage Break
Sponsored by

Closed Session Follows.
Utilities Return By 3:00 pm

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UTILITY ONLY CLOSED SESSION

Conference Adjournment

Safe Travels Home!!