Vogtle Units 1 & 2 Pre-Submittal Meeting 2: TSTF-51, TSTF-471, TSTF-490, and Alternative Source Term License Amendment Request

Tuesday May 10th, 2022

Southern Nuclear

Overview

- Purpose
- Recap of 1st Pre-Submittal Meeting
- License Amendment Request (LAR) Overview
- Table of Contents
- Preliminary Dose Analyses Summary
- Impact of TSTFs on AST Dose Analyses
- Submittal and Requested Review Schedule
- Comments and Discussion

Purpose

Discuss the following:

- An overview of the LAR contents
- SNC schedule for LAR submittal
- Requested LAR review duration

Recap of 1st Pre-Submittal Meeting

- Requested use of AST to allow for peak burnup ≤ 62 GWD/MTU (covered by RG-1.183 Rev. 0)
- Requested exception to allow up to 40% of rods in an assembly exceed RG-1.183 Rev. 0 LHGR limit of 6.3 kW/ft
  - Requested LHGR of 7.5 kW/ft for 40% of rods
- Requested to include TSTF-490 in the submittal
- Meeting materials and notes can be found in
  - ML21238A384; ML21172A131

Recap of 1st Pre-Submittal Meeting

- Precedents for RG-1.183 Rev. 0 Footnote 11 exception

Plant	% of Rods Exceed	ADAMS #
Kewaunee	50	ML070430020
Point Beach	100	ML110240054
Indian Point 2	100	ML042960007
Indian Point 3	100	ML050750431
Wolf Creek	10	ML19100A122
Vogtle 1 & 2 (Requested)	40	TBD

License Amendment Request Overview-TSTFs

- TSTF-490 Rev. 0, “Deletion of E Bar Definition and Revision to RCS Specific Activity Tech Spec” (ML052630462)
- TSTF-51-A, Rev. 2, “Revise Containment Requirements During Handling Irradiated Fuel and Core Alterations” (ML040400343)
- TSTF-471-A, Rev. 1, “Eliminate Use of Term Core Alterations in Actions and Notes” (ML19101A215)

License Amendment Request Overview-AST Technical Evaluations

- Technical Evaluations for AST:
  - Atmospheric Dispersion Factors
    - » Meteorological data used is same as in the approved analyses of record (AOR)
    - » New Onsite X/Q dose-receptor pairs used for non-LOCA events (Fuel Building, ARV discharge to atmosphere)
  - Core and RCS Source Terms
  - Loss of Coolant Accident (LOCA)
  - Fuel Handling Accident (FHA)
  - Locked Rotor Accident (LRA)
  - Control Rod Ejection Accident (CRE)
  - Main Steam Line Break Accident (MSLB)
  - Steam Generator Tube Rupture Accident (SGTR)

License Amendment Request Overview (cont'd)

- Key analysis specific descriptions and inputs included in the enclosures:
  - Control Room Emergency Filtration System (CREFS) modeling specifics
  - Analysis specific X/Qs
  - Analysis specific gap fractions
  - Generic Inputs
    - RCS mass and volumes
    - SG mass and volumes
    - Break flows (where applicable)
    - Primary to secondary flows (where applicable)
    - Atmospheric flows, leak rates, etc.

License Amendment Request Overview (cont'd)

- RG-1.183 Rev. 0 Conformance Tables
- AST Accident Analysis Input Values Comparison Tables
- Environmental Qualification
  - Impacts evaluated using legacy approved approach (TID-14844)
  - EQ is unaffected by the adoption of AST methods

LAR Table of Contents

Enclosure

1.0 Summary of Description

2.0 Detailed Description

3.0 Technical Evaluation

4.0 Regulatory Evaluation

5.0 Environmental Evaluation

6.0 References

LAR Table of Contents

Attachments

1. Operating License and TS Markups
2. TS Bases Markups
3. RG 1.183 Conformance Tables
4. LOCA Analysis
5. FHA Analysis
6. MSLB Analysis
7. SGTR Accident Analysis
8. CRE Accident Analysis
9. LR Accident Analysis
10. AST Accident Analysis Input Values Comparison Tables

Preliminary Dose Analyses Summary

REM (TEDE)				
Accident	**EAB**	**LPZ**	**CR**	**Acceptance Criteria (EAB/LPZ/CR)**
LOCA	8.4	9.6	4.4	25/25/5
FHA	1.0	0.4	3.9	6.3/6.3/5
LRA	<0.1	<0.1	0.3	2.5/2.5/5
CRE*	1.5	1.8	1.1	6.3/6.3/5
MSLB**	0.2	0.2	0.2	2.5/2.5/5
SGTR***	1.6	0.9	0.6	25/25/5

*Containment release limiting for offsite. Secondary release limiting for onsite.
**Concurrent Spike case is limiting and reported above (both analyzed)
***Pre-accident Spike case is limiting and reported above (both analyzed)

All doses demonstrate margin to regulatory limits

Preliminary Dose Analyses Summary

Accident	Discussion
LOCA	Limiting analysis for dose (EAB/LPZ/CR)
FHA	1. Utilizes increased gap fractions for RG-1.183 Footnote 11 exception (LHGR) 2. Unfiltered 2-hour release from Fuel Building is limiting by inspection (X/Qs) 3. No credit for filtration or containment hatch closures 4. All doses demonstrate margin to regulatory limits
LRA	Not a significant contributor to dose
CRE	Containment release limiting offsite. Secondary release limiting for onsite
MSLB	Not a significant contributor to dose
SGTR	Not a significant contributor to dose

Preliminary Dose Analyses Summary

- Highlights
  - LOCA
    - » Most limiting accident for total dose
  - FHA
    - » Models 100% of rods as exceeding LHGR limit, even though only 40% could exceed
      - Uses increased release fractions for all damaged rods (314)
      - Decay time is 70 hours after shutdown

Impact of TSTFs on AST Dose Analyses

- TSTF-490
  - RCS equilibrium initial dose concentrations for noble gases based on dose equivalent Xenon – 133 at (280 µCi/g)
- TSTF-471 and TSTF-51
  - Applicable in shutdown modes where fuel movement or core alterations occur
  - FHA analysis takes no credit for filtered ventilation or closure of containment hatches

Proposed TS Changes

- TS 1.1 Definitions
- TS 3.3.6 Containment Ventilation Isolation Instrumentation
- T 3.3.7 CREFS Actuation Instrumentation
- TS 3.4.16 RCS Specific Activity
- TS 3.7.12 CREFS - Both Units Shutdown
- T 3.8.2 AC Sources – Shutdown
- T 3.8.5 DC Sources – Shutdown
- TS 3.8.8 Inverters – Shutdown
- TS 3.8.10 Distribution Systems – Shutdown
- TS 3.9.1 Boron Concentration
- TS 3.9.2 Unborated Water Source Isolation Valves
- TS 3.9.3 Nuclear Instrumentation
- TS 3.9.4 Containment Penetrations
- TS 3.9.7 Refueling Cavity Water Level

TS 1.1 Definitions

~~CORE ALTERATION~~	~~CORE ALTERATION shall be the movement of any fuel, sources, or other reactivity control components within the reactor vessel with the vessel head removed and fuel in the vessel. Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position.~~
CORE OPERATING LIMITS REPORT (COLR)	The COLR is the unit specific document that provides cycle specific parameter limits for the current reload cycle. These cycle specific parameter limits shall be determined for each reload cycle in accordance with Specification 5.6.5. Unit operation within these limits is addressed in individual Specifications.
DOSE EQUIVALENT I-131	~~DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The thyroid dose conversion factors used for this calculation shall be those listed in EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA 520/1-88-020, September 1988.~~ DOSE EQUIVALENT I-131 shall be that concentration of I-131 (microcuries per gram) that alone would produce the same dose when inhaled as the combined activities of iodine

TS 1.1 Definitions

	isotopes I-131, I-132, I-133, I-134, and I-135 actually present. The determination of DOSE EQUIVALENT I-131 shall be performed using Committed Dose Equivalent (CDE) or Committed Effective Dose Equivalent (CEDE) dose conversion factors from Table 2.1 of EPA Federal Guidance Report No. 11.]
DOSE EQUIVALENT XE-133	DOSE EQUIVALENT XE-133 shall be that concentration of Xe-133 (microcuries per gram) that alone would produce the same acute dose to the whole body as the combined activities of noble gas nuclides [Kr-85m, Kr-85, Kr-87, Kr-88, Xe-131m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Xe-138] actually present. If a specific noble gas nuclide is not detected, it should be assumed to be present at the minimum detectable activity. The determination of DOSE EQUIVALENT XE-133 shall be performed using [effective dose conversion factors for air submersion listed in Table III.1 of EPA Federal Guidance Report No. 12, 1993, "External Exposure to Radionuclides in Air, Water, and Soil" or the average gamma disintegration energies as provided in ICRP Publication 38, "Radionuclide Transformations" or similar source].

TS 3.3.6 Containment Ventilation Isolation Instrumentation

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. ----------NOTE---------- Only applicable during ~~CORE ALTERATIONS or~~ movement of recently irradiated fuel assemblies within containment. ----------	C.1 Place and maintain containment purge and exhaust valves in closed position.	Immediately
	OR	
No radiation monitoring channels OPERABLE.	C.2 Enter applicable Conditions and Required Actions of LCO 3.9.4, "Containment Penetrations," for containment purge supply and exhaust isolation penetrations not in required status.	Immediately
OR		
Required Action and associated Completion Time for Condition A not met.		

TS 3.3.6 Containment Ventilation Isolation Instrumentation

Table 3.3.6-1 (page 1 of 1)
Containment Ventilation Isolation Instrumentation

	FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS	TRIP SETPOINT
1.	Manual Initiation	1,2,3,4	2	SR 3.3.6.6	NA
2.	Automatic Actuation Logic and Actuation Relays	1,2,3,4	2	SR 3.3.6.2 SR 3.3.6.3 SR 3.3.6.5	NA
3.	Containment Radiation	1,2,3,4,6[(c)]	2[(a)]	SR 3.3.6.1 SR 3.3.6.4 SR 3.3.6.7 SR 3.3.6.8	
	a. Gaseous (RE-2565C)				(b)
	b. Particulate (RE-2565A)				(b)
	c. Iodine (RE-2565B)				(b)
	d. Area Low Range (RE-0002, RE-0003)				≤ 15 mr/h[(c)] ≤ 50x background[(d)]
4.	Safety Injection[(d)]	1,2,3,4	Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.		

(a) Containment ventilation radiation (RE-2565) is treated as one channel and is considered OPERABLE if the particulate (RE-2565A) and iodine monitors (RE-2565B) are OPERABLE or the noble gas monitor (RE-2565C) is OPERABLE.

(b) Setpoints will not exceed the limits of Specifications 5.5.4.h and 5.5.4.i of the Radioactive Effluent Controls Program.

(c) During ~~CORE ALTERATIONS and~~ movement of recently irradiated fuel assemblies within containment.

(d) During MODES 1, 2, 3, and 4.

T 3.3.7 CREFS Actuation Instrumentation

3.3 INSTRUMENTATION

3.3.7 Control Room Emergency Filtration System (CREFS) Actuation Instrumentation

LCO 3.3.7 The CREFS actuation instrumentation for each Function in Table 3.3.7-1 shall be OPERABLE.

APPLICABILITY: Either unit in MODES 1, 2, 3, or 4,
During movement of recently irradiated fuel assemblies in either unit~~,~~
~~During CORE ALTERATIONS in either unit~~.

TS 3.4.16 RCS Specific Activity

3.4.16 RCS Specific Activity

LCO 3.4.16 ~~The specific activity of the reactor coolant shall be within limits.~~ RCS DOSE EQUIVALENT I-131 and DOSE EQUIVALENT XE-133 specific activity shall be within limits.

APPLICABILITY: MODES 1 ~~and~~ 2, 3 and 4
MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.

ACTIONS

----------NOTE----------
LCO 3.0.4c is applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 not within limit ~~1.0 µCi/gm~~.	A.1 Verify DOSE EQUIVALENT I-131 ~~≤~~ 60 µCi/gm ~~within the acceptable region of Figure 3.4.16-1~~. AND A.2 Restore DOSE EQUIVALENT I-131 to within limit.	Once per 4 hours 48 hours
B. ~~Gross specific activity of the reactor coolant~~ DOSE EQUIVALENT XE-133 not within limit.	B.1 ~~Be in MODE 3 with T_{avg} < 500°F~~ Restore DOSE EQUIVALENT XE-133 to within limit.	~~6~~ 48 hours

(continued)

TS 3.4.16 RCS Specific Activity

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition A or B not met. OR DOSE EQUIVALENT I-131 > 60 µCi/gm ~~in the unacceptable region of Figure 3.4.16-1~~.	C.1 Be in MODE 3 with T_{avg} < 500°F. AND C.2 Be in Mode 5	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

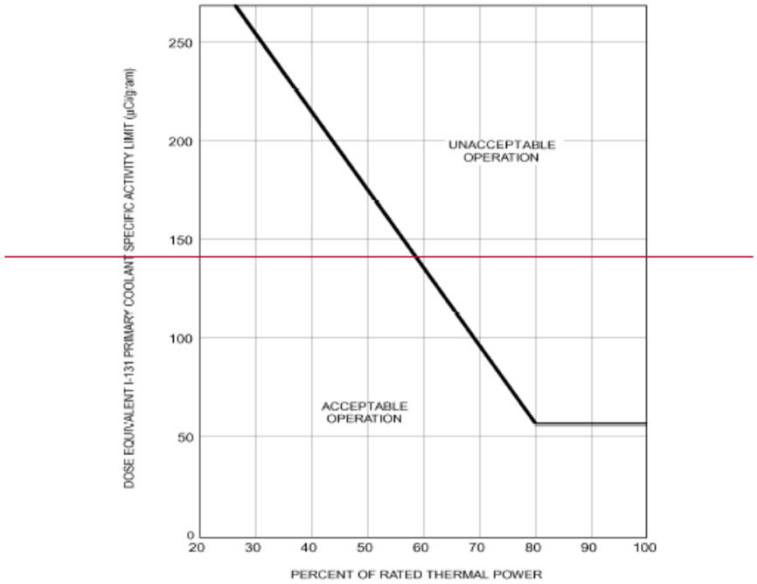
SURVEILLANCE	FREQUENCY
SR 3.4.16.1 ~~NOTE~~ Only required to be performed in MODE 1 and 2, MODE 3 with RCS average temperature ≥ 500 °F. Verify reactor coolant DOSE EQUIVALENT XE-133 specific activity ≤ 280 µCi/gm. ~~Verify reactor coolant gross specific activity ≤ 100/$\bar{E}$ µCi/gm.~~	In accordance with the Surveillance Frequency Control Program
SR 3.4.16.2 ~~NOTE~~ ~~Only required to be performed in MODE 1.~~ Verify reactor coolant DOSE EQUIVALENT I-131 specific activity ≤ 1.0 µCi/gm.	In accordance with the Surveillance Frequency Control Program AND Between 2 and 6 hours after a

TS 3.4.16 RCS Specific Activity

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
~~SR 3.4.16.3~~	~~NOTE~~ ~~Not required to be performed until 31 days after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~ ~~Determine $\bar{E}$ from a sample taken in MODE 1 after a minimum of 2 effective full power days and 20 days of MODE 1 operation have elapsed since the reactor was last subcritical for ≥ 48 hours.~~	~~In accordance with the Surveillance Frequency Control Program~~

TS 3.4.16 RCS Specific Activity



~~FIGURE 3.4.16-1~~
~~REACTOR COOLANT DOSE EQUIVALENT I-131 REACTOR COOLANT SPECIFIC ACTIVITY LIMIT VERSUS PERCENT OF RATED THERMAL POWER WITH THE REACTOR COOLANT SPECIFIC ACTIVITY >1 µCi/gram DOSE EQUIVALENT I-131~~

TS 3.7.12 CREFS - Both Units Shutdown

3.7 PLANT SYSTEMS

3.7.12 Control Room Emergency Filtration System (CREFS) - Both Units Shutdown

LCO 3.7.12 Four CREFS trains shall be OPERABLE.

----------NOTE----------
The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: Both units with average Reactor Coolant Temperature ≤ 200°F during movement of recently irradiated fuel ~~or CORE ALTERATIONS~~ in either unit.

TS 3.7.12 CREFS - Both Units Shutdown

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Four CREFS trains inoperable. OR The CREFS train required in the emergency mode by Required Actions of Conditions A, B, C, or D not capable of being powered by an OPERABLE emergency power source. OR One or more CREFS trains inoperable due to an inoperable CRE boundary.	E.1 Suspend movement of recently irradiated fuel assemblies. ~~AND~~ ~~E.2 Suspend CORE ALTERATIONS.~~	Immediately ~~Immediately~~

T 3.8.2 AC Sources - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required offsite circuit inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.10, with one required train de-energized as a result of Condition A. ----------	
	A.1 Declare affected required feature(s) with no offsite power available inoperable.	Immediately
	OR	
	~~A.2.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
		(continued)

T 3.8.2 AC Sources - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.~~2~~1 Suspend movement of recently irradiated fuel assemblies.	Immediately
	AND	
	A.2.~~3~~2 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.~~4~~3 Initiate action to restore required offsite power circuit to OPERABLE status.	Immediately
B. One required DG inoperable.	~~B.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
	B.~~2~~1 Suspend movement of recently irradiated fuel assemblies.	Immediately
	AND	
	B.~~3~~2 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	B.~~4~~3 Initiate action to restore required DG to OPERABLE status.	Immediately

T 3.8.5 DC Sources - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DC electrical power sources inoperable.	A.1.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	~~A.2.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
	A.2.~~2~~1 Suspend movement of recently irradiated fuel assemblies.	Immediately
	AND	
	A.2.~~3~~2 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.~~4~~3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

TS 3.8.8 Inverters - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required inverters inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	~~A.2.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
	A.2.~~2~~1 Suspend movement of recently irradiated fuel assemblies.	Immediately
	AND	
	A.2.~~3~~2 Initiate action to suspend operations involving positive reactivity additions.	Immediately
	AND	
	A.2.~~4~~3 Initiate action to restore required inverters to OPERABLE status.	Immediately

TS 3.8.10 Distribution Systems - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable. OR ~~A.2.1 Suspend CORE ALTERATIONS.~~ ~~AND~~ A.2.~~2~~1 Suspend movement of recently irradiated fuel assemblies. AND A.2.~~3~~2 Initiate action to suspend operations involving positive reactivity additions. AND	Immediately ~~Immediately~~ Immediately Immediately (continued)

TS 3.8.10 Distribution Systems - Shutdown

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.~~4~~3 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution subsystems to OPERABLE status. AND A.2.~~5~~4 Declare associated required residual heat removal subsystem(s) inoperable and not in operation.	Immediately Immediately

TS 3.9.1 Boron Concentration

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Boron concentration not within limit.	~~A.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
	A.~~2~~1 Suspend positive reactivity additions.	Immediately
	AND	
	A.~~3~~2 Initiate action to restore boron concentration to within limit.	Immediately

TS 3.9.2 Unborated Water Source Isolation Valves

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each unborated water source isolation valve.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ----------NOTE---------- Required Action A.3 must be completed whenever Condition A is entered. ---------- One or more valves not secured in closed position.	~~A.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	AND	
	A.~~2~~1 Initiate actions to secure valve in closed position.	Immediately
	AND	
	A.~~3~~2 Perform SR 3.9.1.1 (verify boron concentration).	12 hours

TS 3.9.3 Nuclear Instrumentation

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required source range neutron flux monitor inoperable.	A.1	Suspend ~~CORE ALTERATIONS~~positive reactivity additions.	Immediately
	AND		
	A.2	Suspend positive reactivity additions.	Immediately
B. ----------NOTE---------- Condition A entry is required when Condition B is entered. ---------- Two required source range neutron flux monitors inoperable.	B.1	Initiate action to restore one source range neutron flux monitor to OPERABLE status.	Immediately
	AND		
	B.2	Perform SR 3.9.1.1 (verify boron concentration).	Once per 12 hours

TS 3.9.4 Containment Penetrations

APPLICABILITY: ~~During CORE ALTERATIONS,~~
During movement of recently irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more containment penetrations not in required status.	~~A.1 Suspend CORE ALTERATIONS.~~ ~~AND~~ A.~~2~~1 Suspend movement of recently irradiated fuel assemblies within containment.	~~Immediately~~ Immediately

TS 3.9.7 Refueling Cavity Water Level

APPLICABILITY: ~~During CORE ALTERATIONS, except during latching and unlatching of control rod drive shafts,~~
During movement of irradiated fuel assemblies within containment.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Refueling cavity water level not within limit.	~~A.1 Suspend CORE ALTERATIONS.~~	~~Immediately~~
	~~AND~~	
	A.~~2~~1 Suspend movement of irradiated fuel assemblies within containment.	Immediately

Submittal and Requested Review Schedule

Comments and Discussion

Southern
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