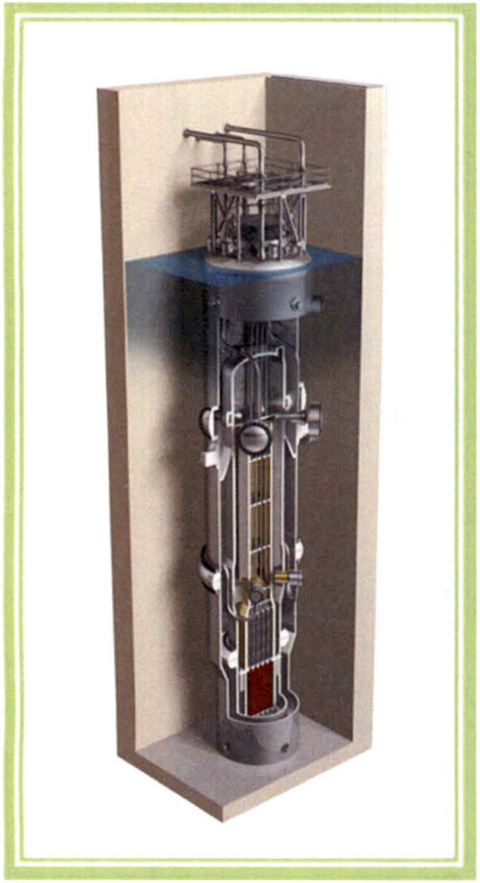
Enclosure 1:

"NuScale Plant Response to Beyond-Design-Basis Events." PM-0516-49199-NP, Revision 0, nonproprietary version

NuScale Plant Response to Beyond-Design-Basis Events



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Revision: 0

NuScale Power™

Acknowledgement and Disclaimer

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Abbreviations

Abbreviation	Definition
AFW	auxiliary feedwater
BDBEE	beyond-design-basis external event
CIV	containment isolation valve
DCA	design certification application
DCD	design control document
DHRS	decay heat removal system
ECCS	emergency core cooling system
ELAP	extended loss of alternating current power
FLEX	diverse and flexible coping strategy
LOLA	loss of large area
LUHS	loss of normal access to the ultimate heat sink
MBDBE	mitigation of beyond-design-basis event
NEI	Nuclear Energy Institute
RCS	reactor coolant system
RPV	reactor pressure vessel
RRV	reactor recirculation valve
RVV	reactor vent valve
SG	steam generator
UHS	ultimate heat sink

Purpose

- Describe the general design features of the NuScale small modular reactor
- Discuss NuScale's response and feedback on proposed rulemaking 10 CFR 50.155 and guidance documents
- Present an overview of the content in the Mitigation of Beyond Design Basis Events (MBDBE) Design Certification Document (DCD) Chapter 20
- Describe NuScale's proposed strategies for coping in an extended loss of AC power/loss of normal access to the ultimate heat sink (ELAP/LUHS)
- Describe NuScale's approach to loss of large area (LOLA) event
- Provide the NRC staff with an opportunity to give feedback on the NuScale approach to MBDBE

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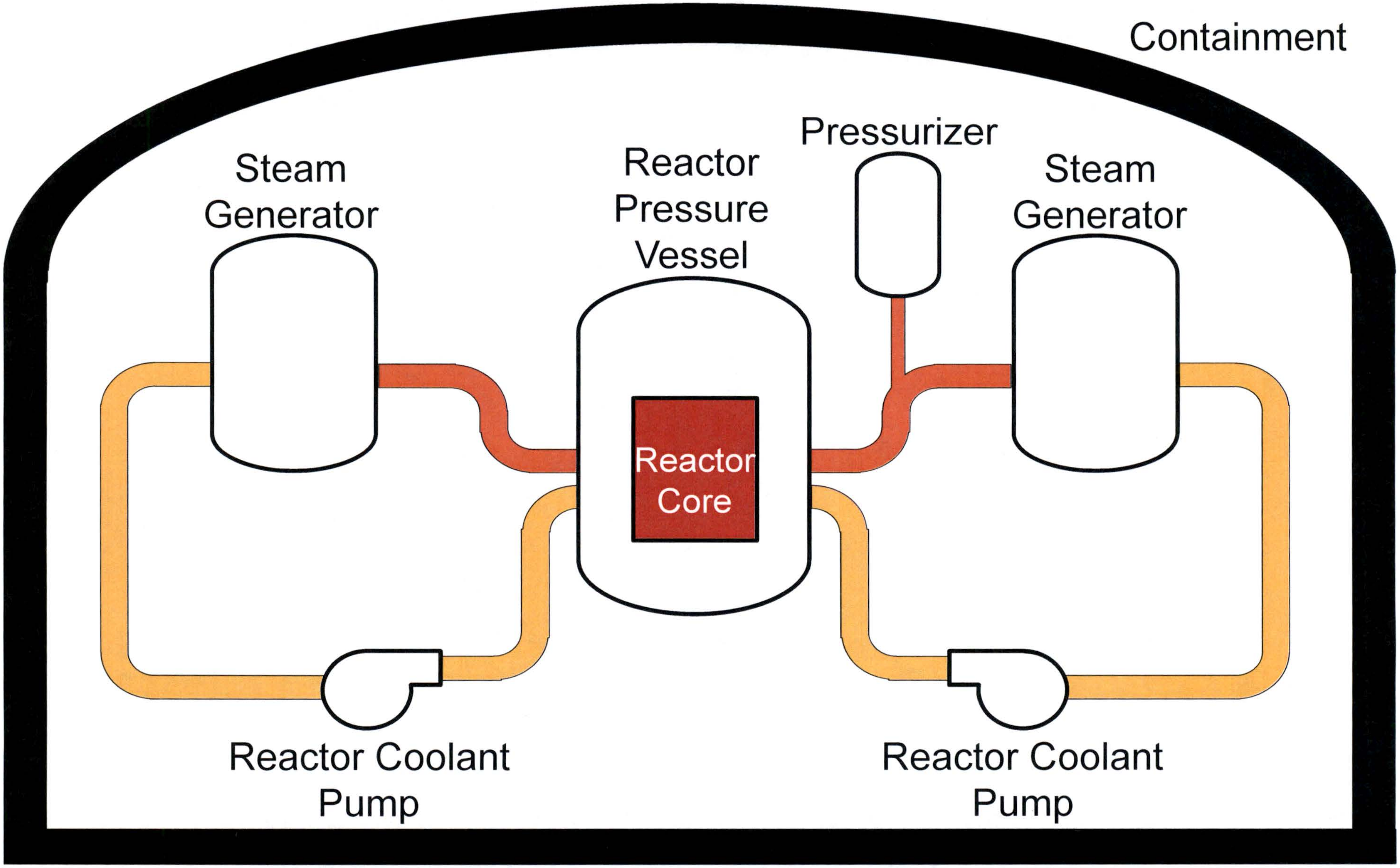
The NuScale Design

Pressurized Water Reactor Basics



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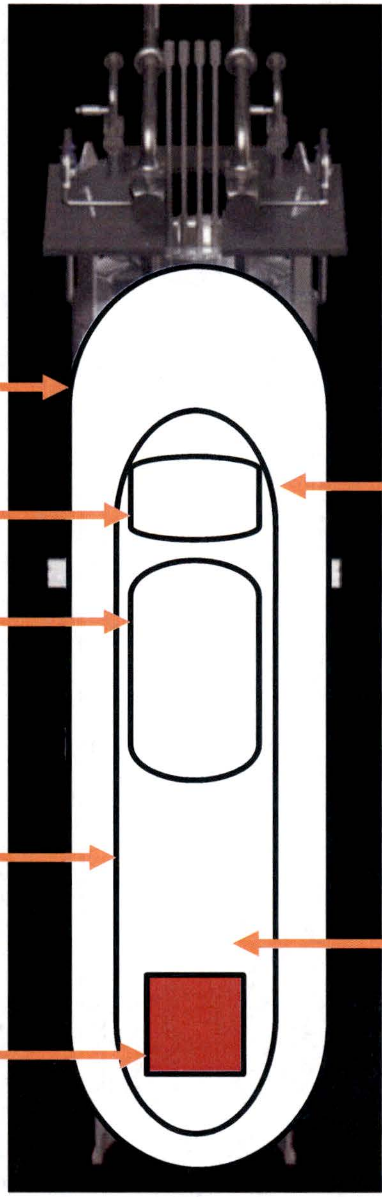
NuScale Small Modular Reactor

- Containment
- Pressurizer
- Steam Generators
- Reactor Pressure Vessel (RPV)
- Reactor Core



- Coolant Level
- Control Rods

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NuScale's Normal Operation

Flows to the downcomer

Flows up the riser

Heated in the core

Transfers heat to steam generator

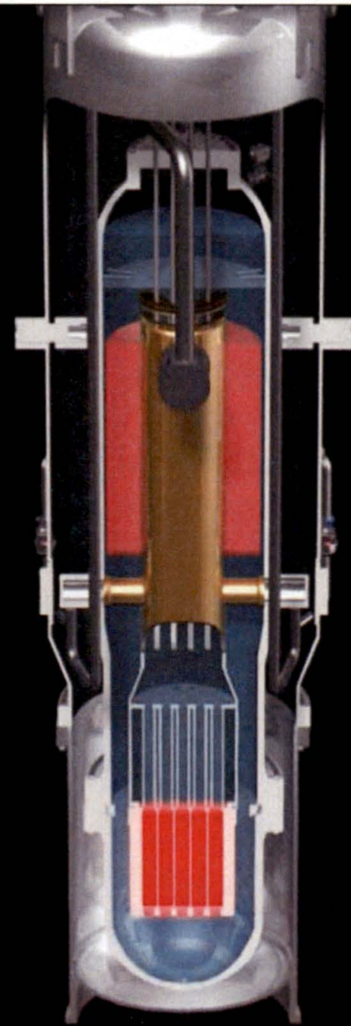
Flows to bottom of reactor pressure vessel

Repeats the cycle

NuScale's Normal Operation

Steam flows out through Main Steam Isolation Valves (MSIVs)

Feedwater becomes steam inside steam generator tubes



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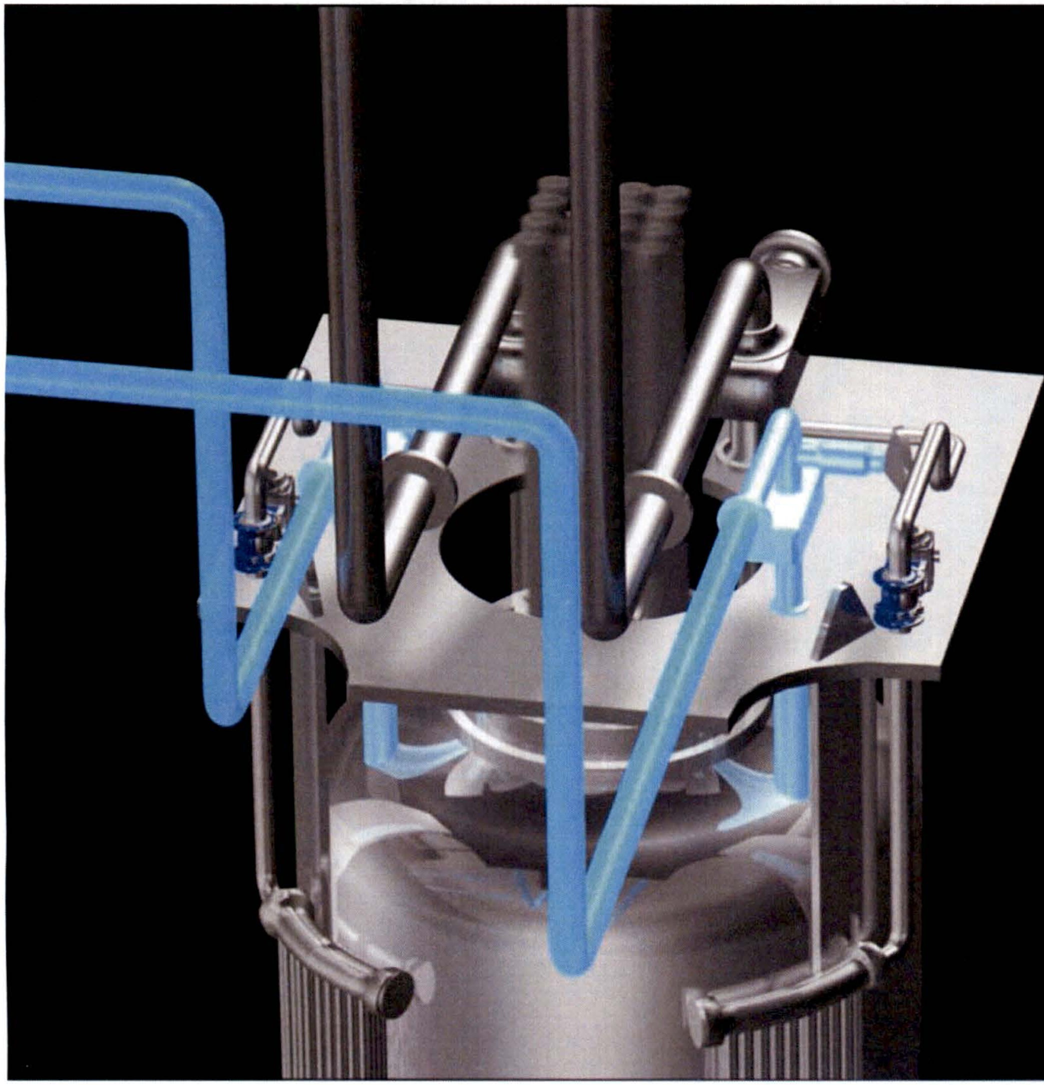
NuScale's Normal Operation



Feedwater is supplied to steam generator tubes through Feedwater Isolation Valves (FWIVs)

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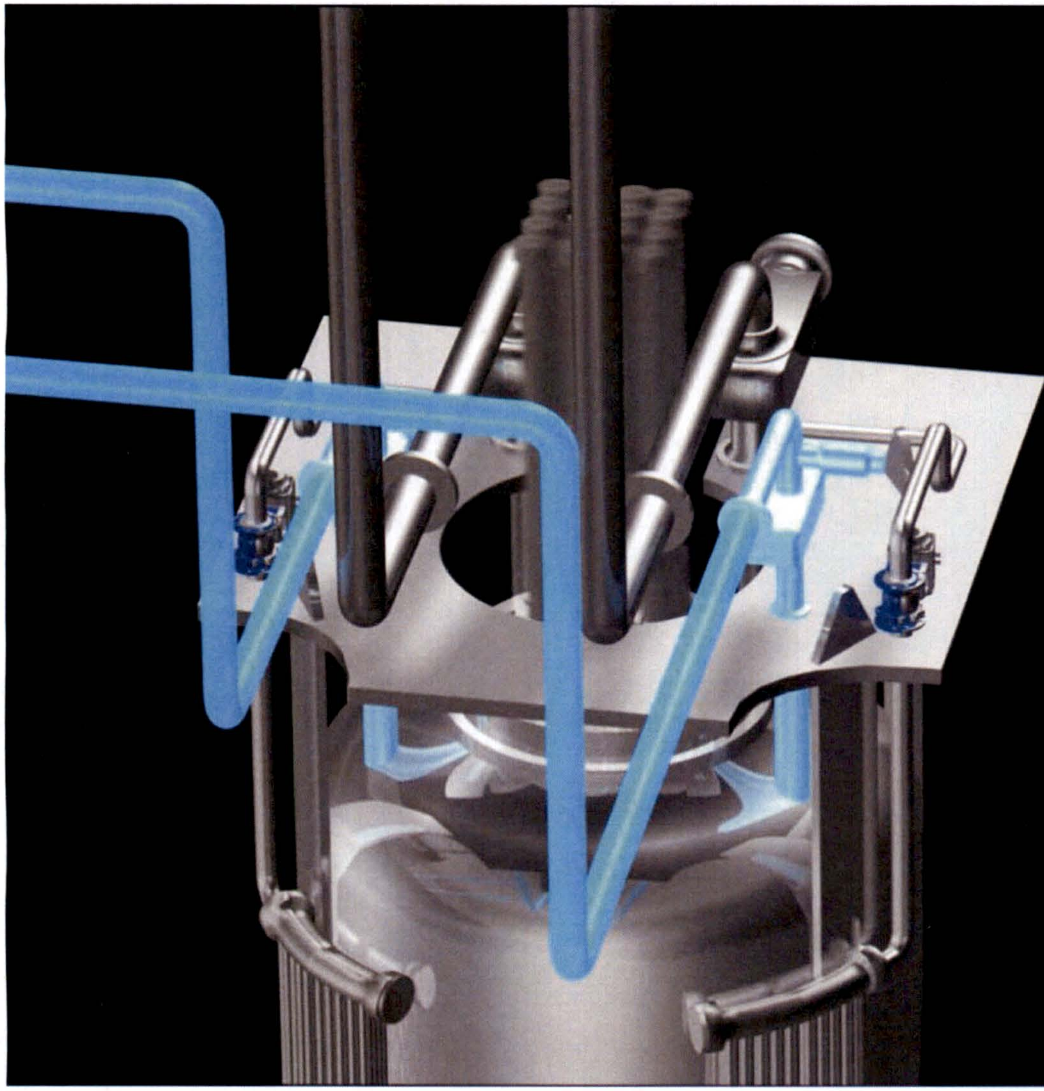
NuScale's Normal Operation



Feedwater is again heated through steam generator tubes by reactor coolant

Repeats the cycle

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NuScale's Safety-Related Decay Heat Removal Systems

Ultimate Heat Sink (UHS)

- Safety-related supply of water used to remove residual heat to establish and maintain safe shutdown conditions.

- Typically, the UHS water is pumped through heat exchangers to remove decay heat.

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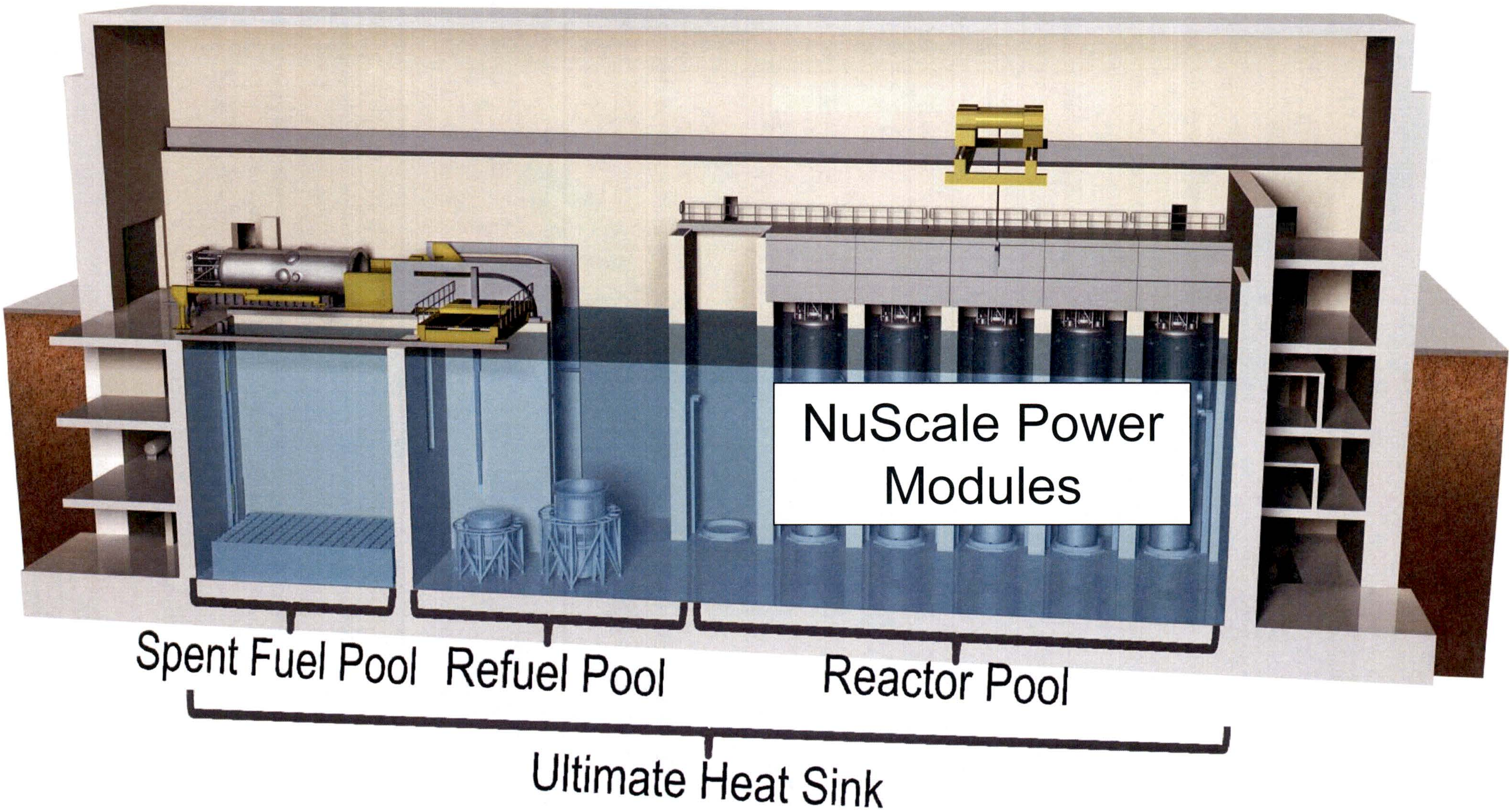
NuScale's
Ultimate Heat Sink

NuScale's UHS



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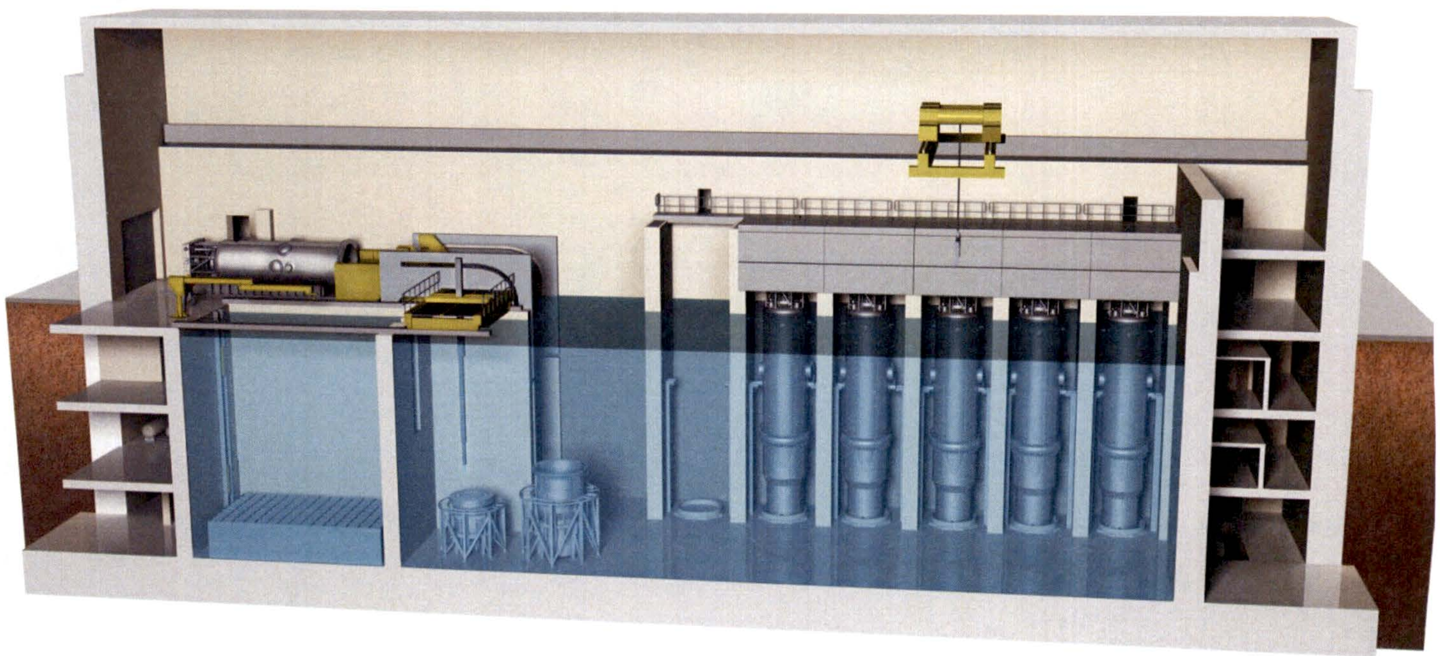
NuScale's UHS

- Located inside the Reactor Building
  - Safety-related, Seismic Category I building
  - Designed to withstand the effects of natural phenomena (e.g., earthquakes, tornados, hurricanes, floods, and lightning)
  - Designed to withstand the impact of a large commercial aircraft
- Below grade

Ground level

≈ 100 feet



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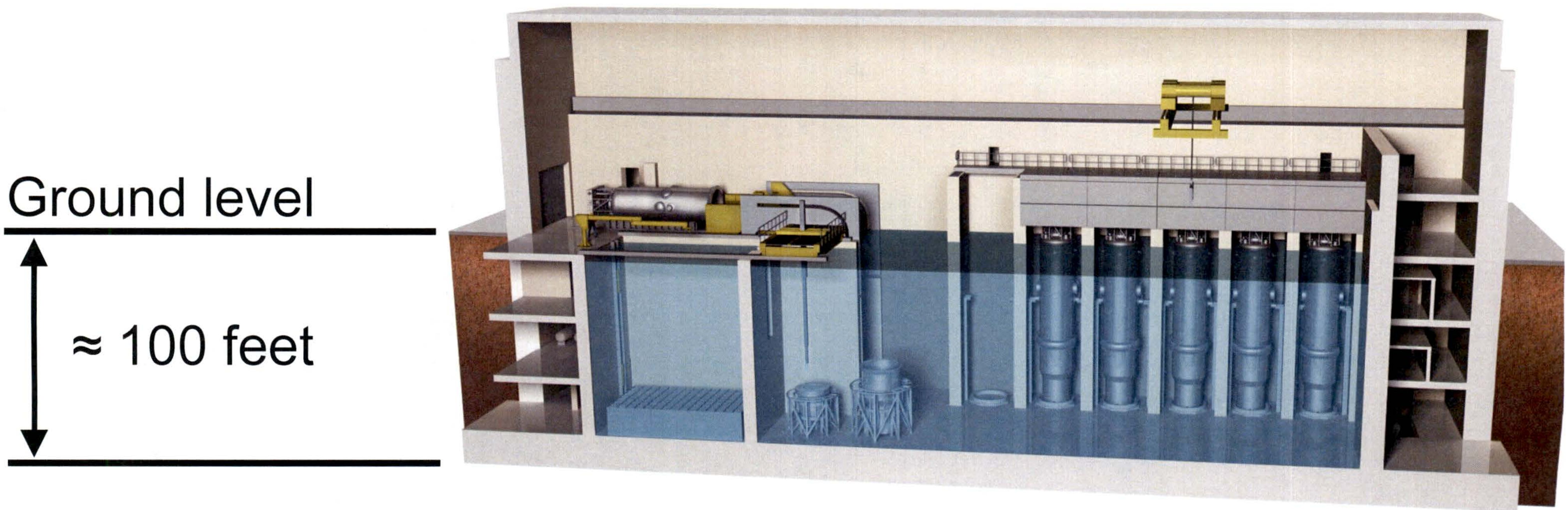
NuScale's UHS

- UHS Assured Makeup Line
  - Seismic Category I
  - Connection provided external to the Reactor Building



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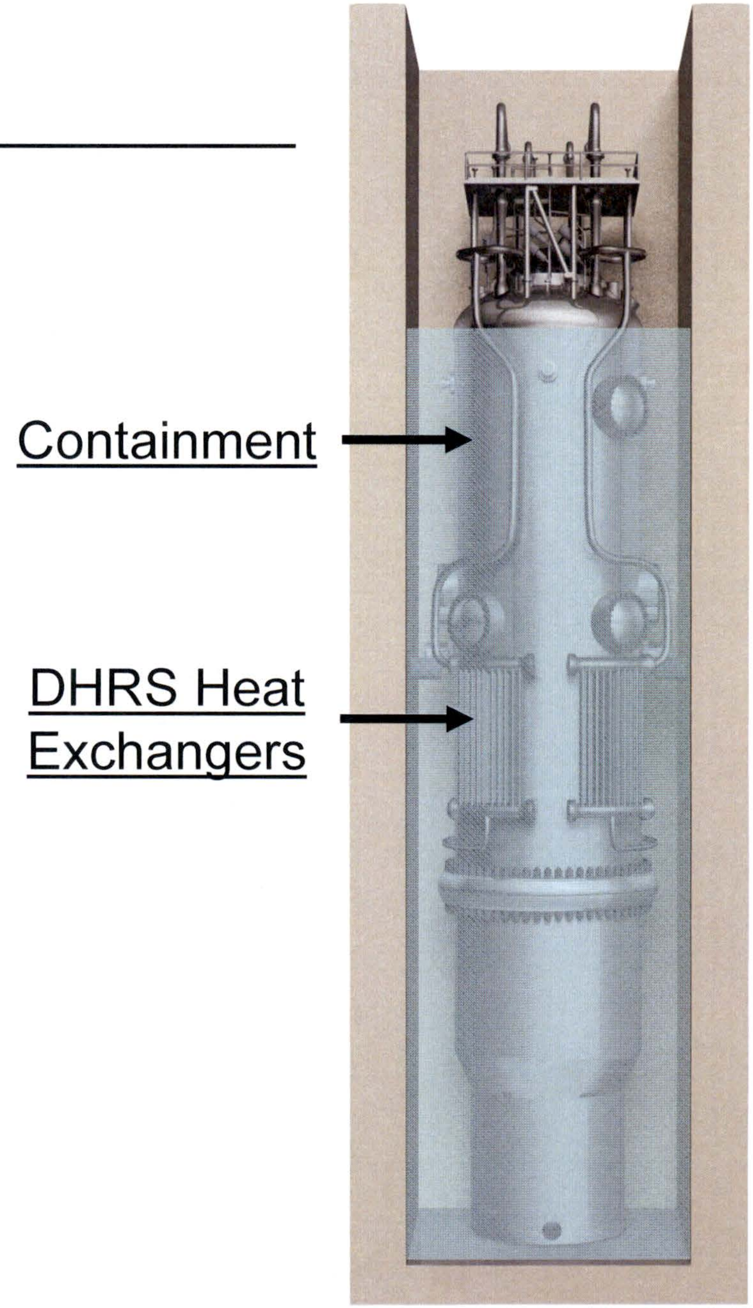
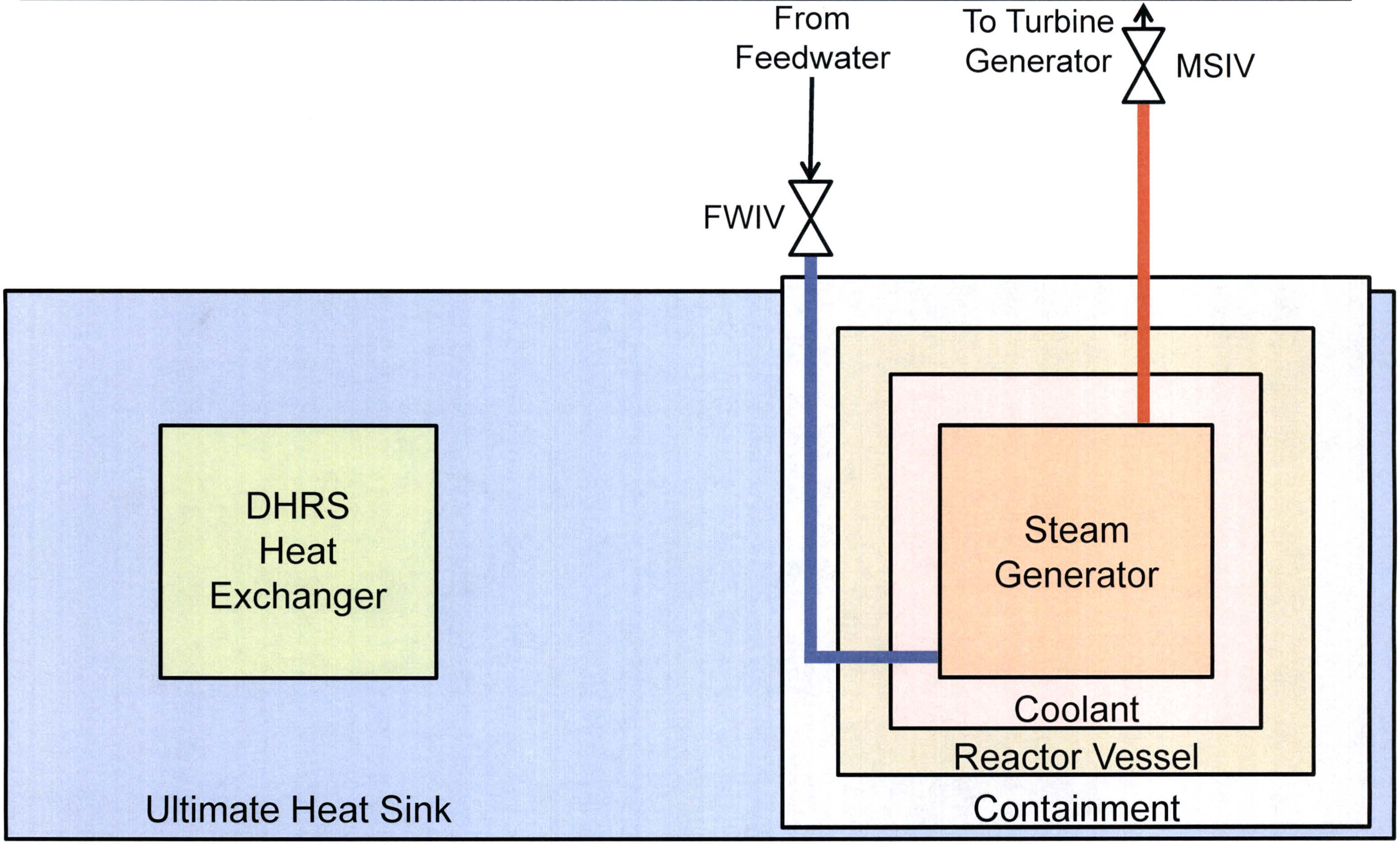
NuScale's UHS

- All but the top of the containment vessel is submerged in the UHS.
- Decay Heat Removal System (DHRS) heat exchangers are fully submerged in the UHS.
- Forced circulation not required for decay heat removal.

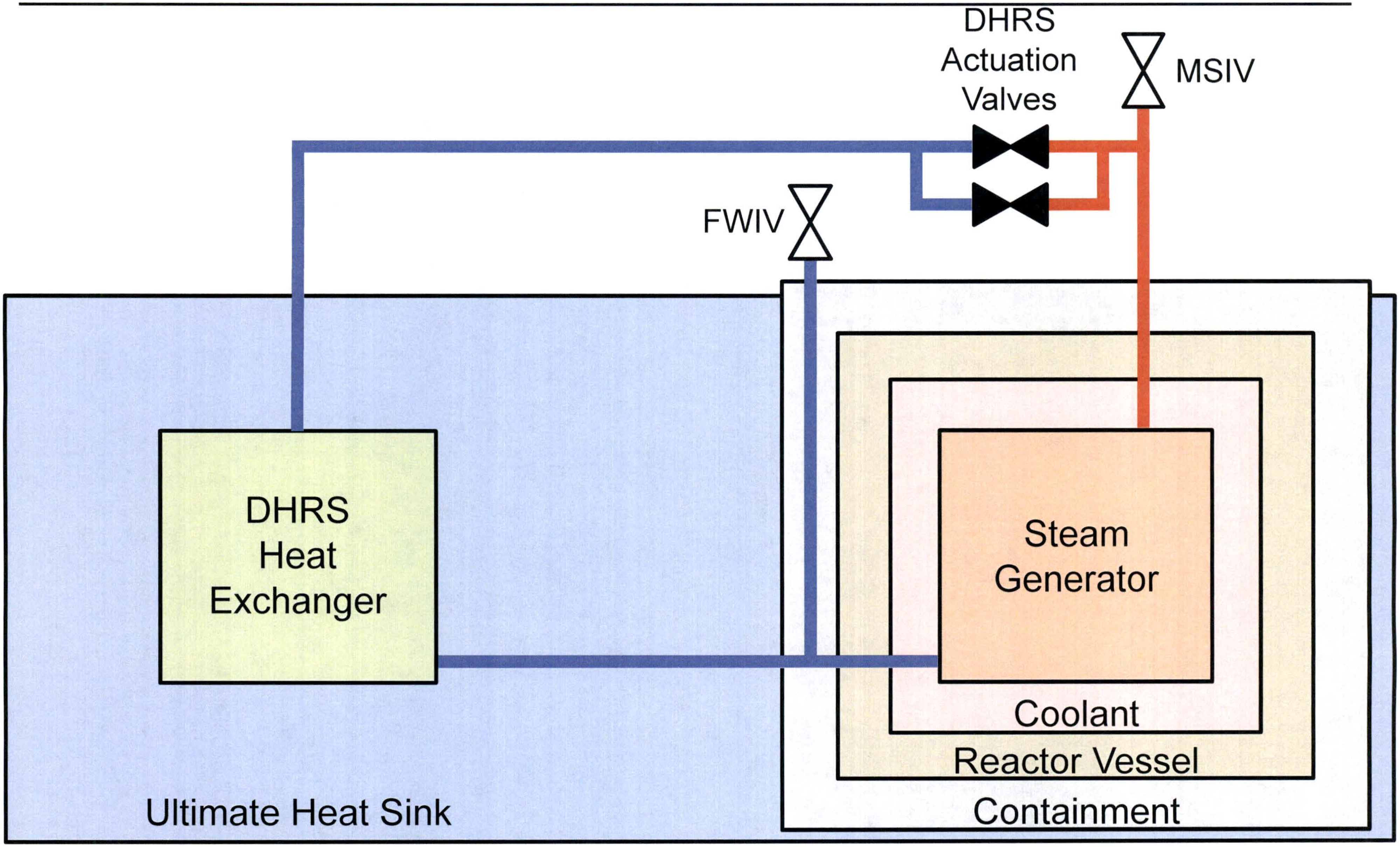


NuScale's
Decay Heat Removal System

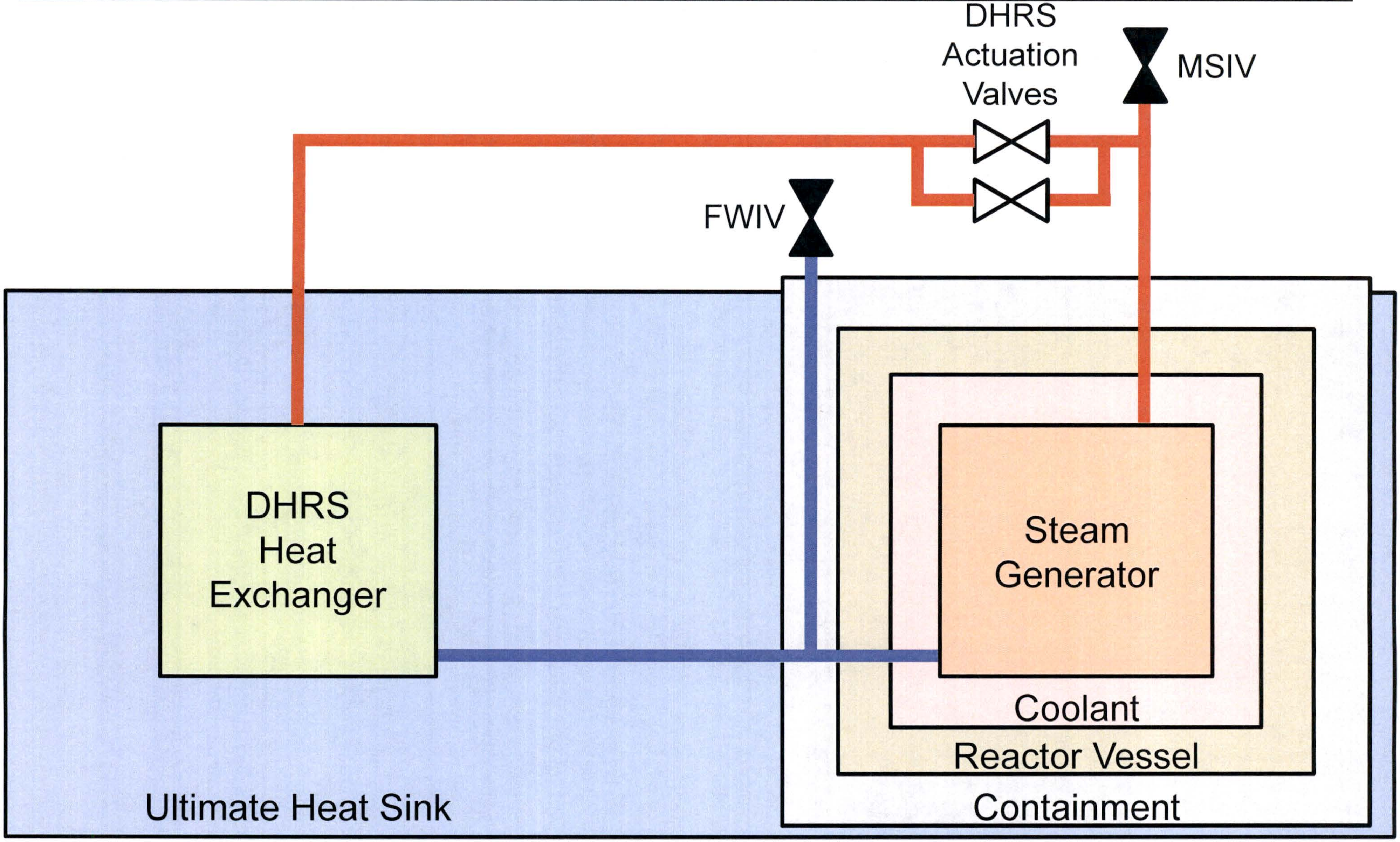
Decay Heat Removal System



Decay Heat Removal System



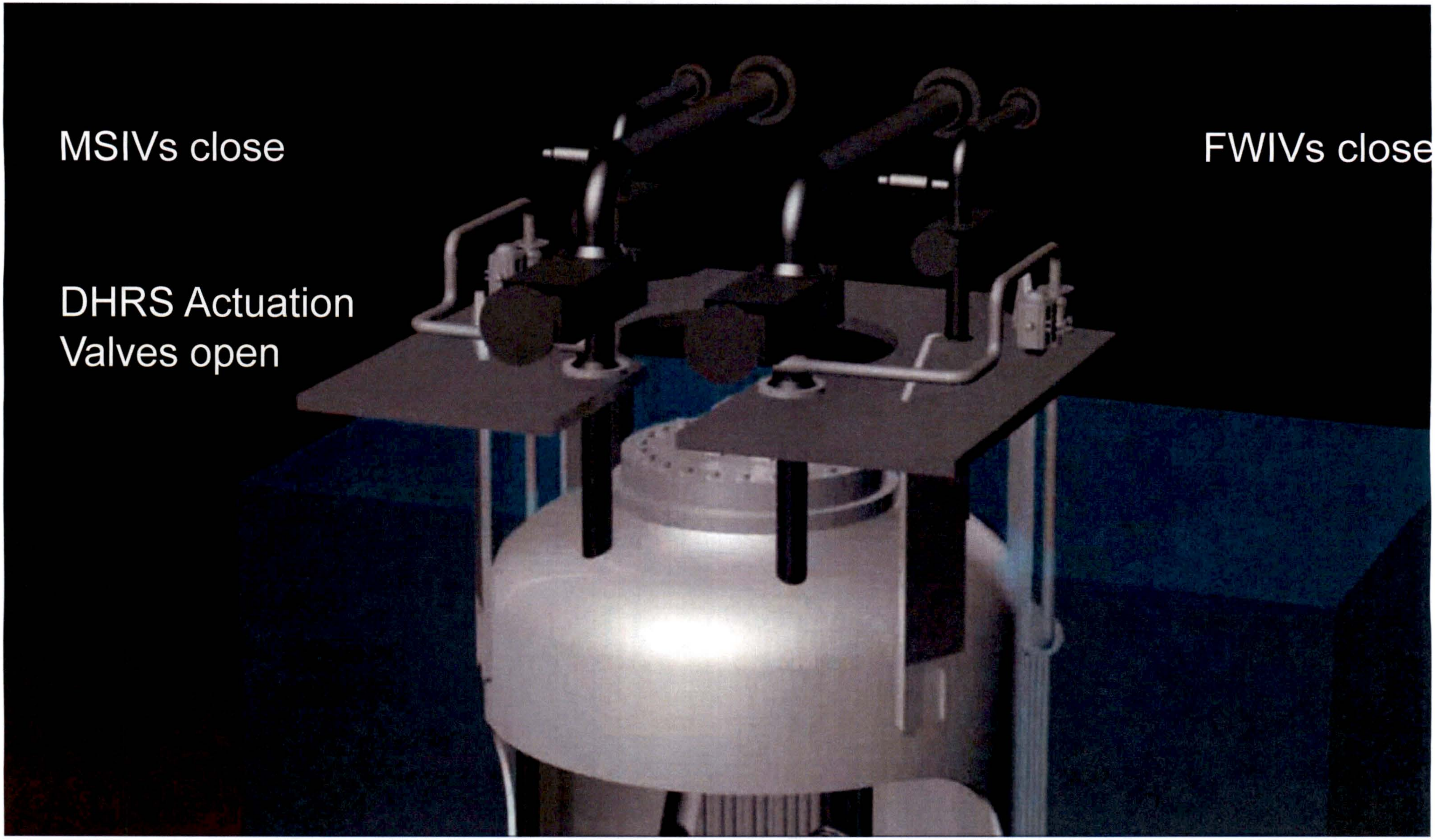
Decay Heat Removal System



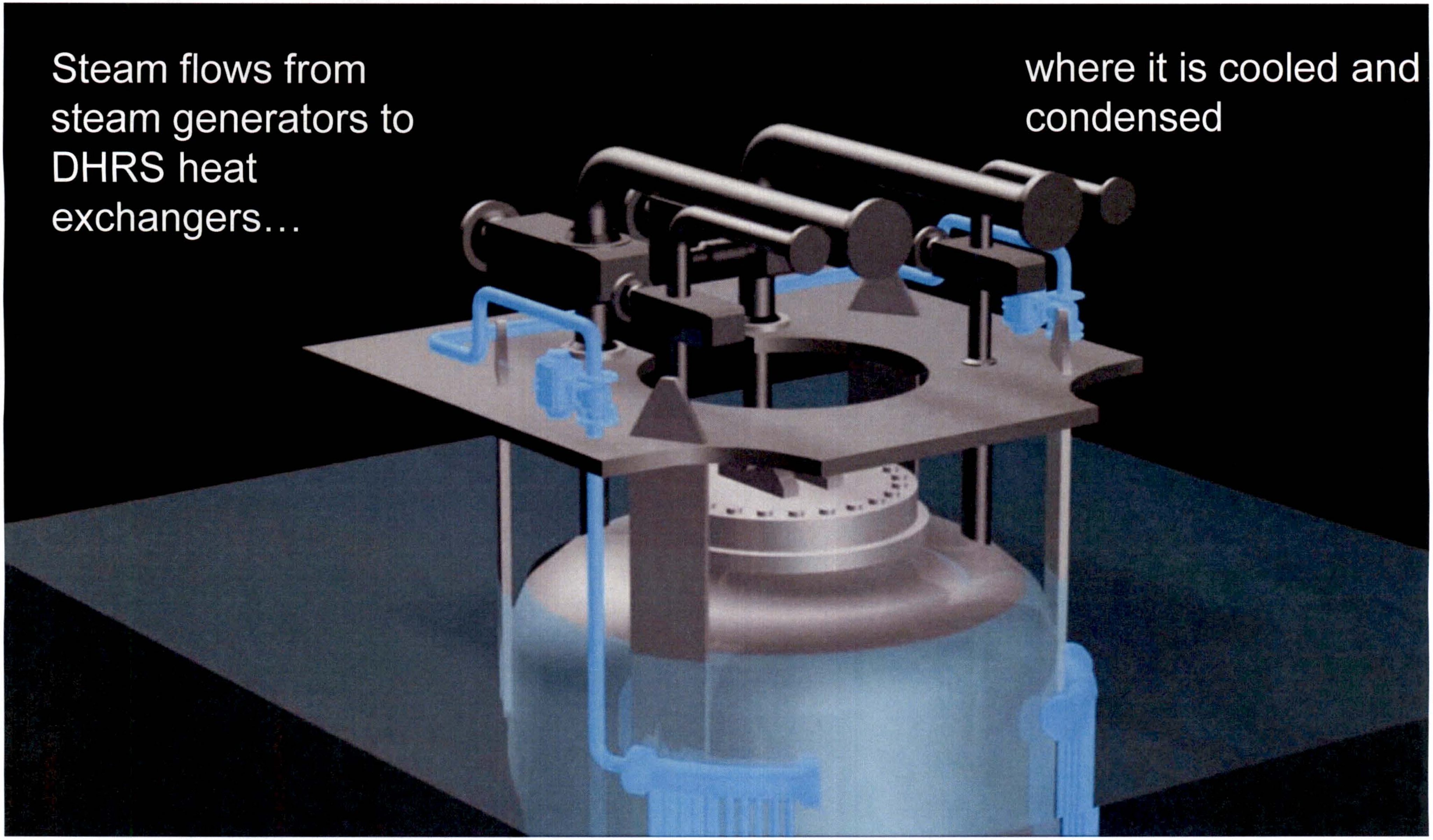
Decay Heat Removal System

- Two, 100% redundant trains of DHRS per NuScale Power Module.
  - Each train has an independent heat exchanger.
  - Each train has two DHRS Actuation Valves.
  - Operation of only one valve, in only one of the trains is sufficient to remove all core decay heat.
- DHRS Actuation Valves
  - No electrical power required to open the valves.
  - Automatically open:
    - An actuation signal is received, or
    - Loss of power to the valve

DHRS Operation



DHRS Operation



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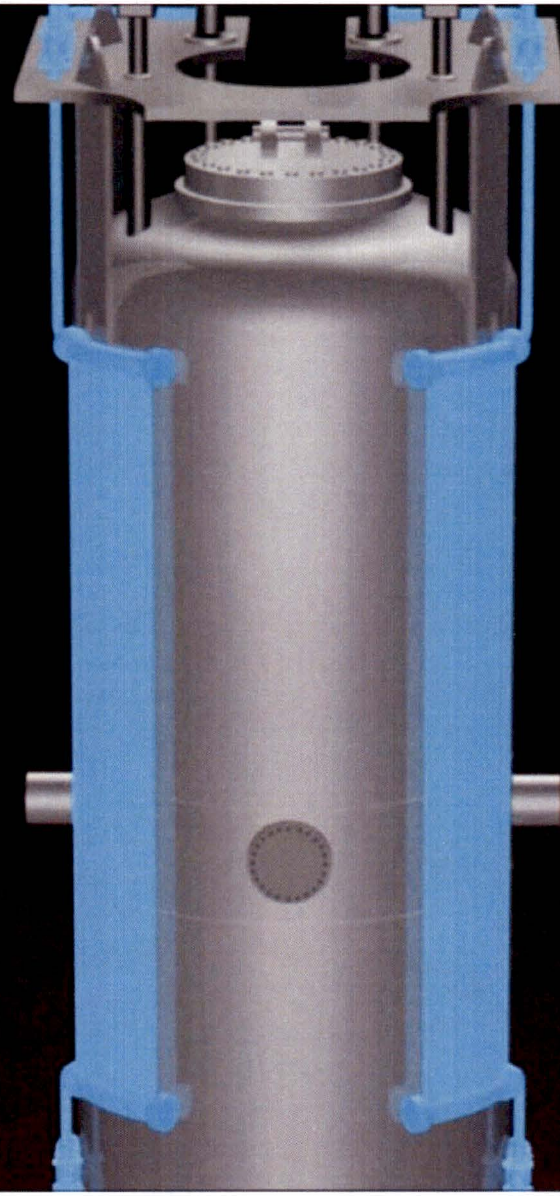
DHRS Operation

Water gravity drains back into steam generator tubes



Reactor coolant hea is transferred throug tubes

Water inside tubes once again become steam

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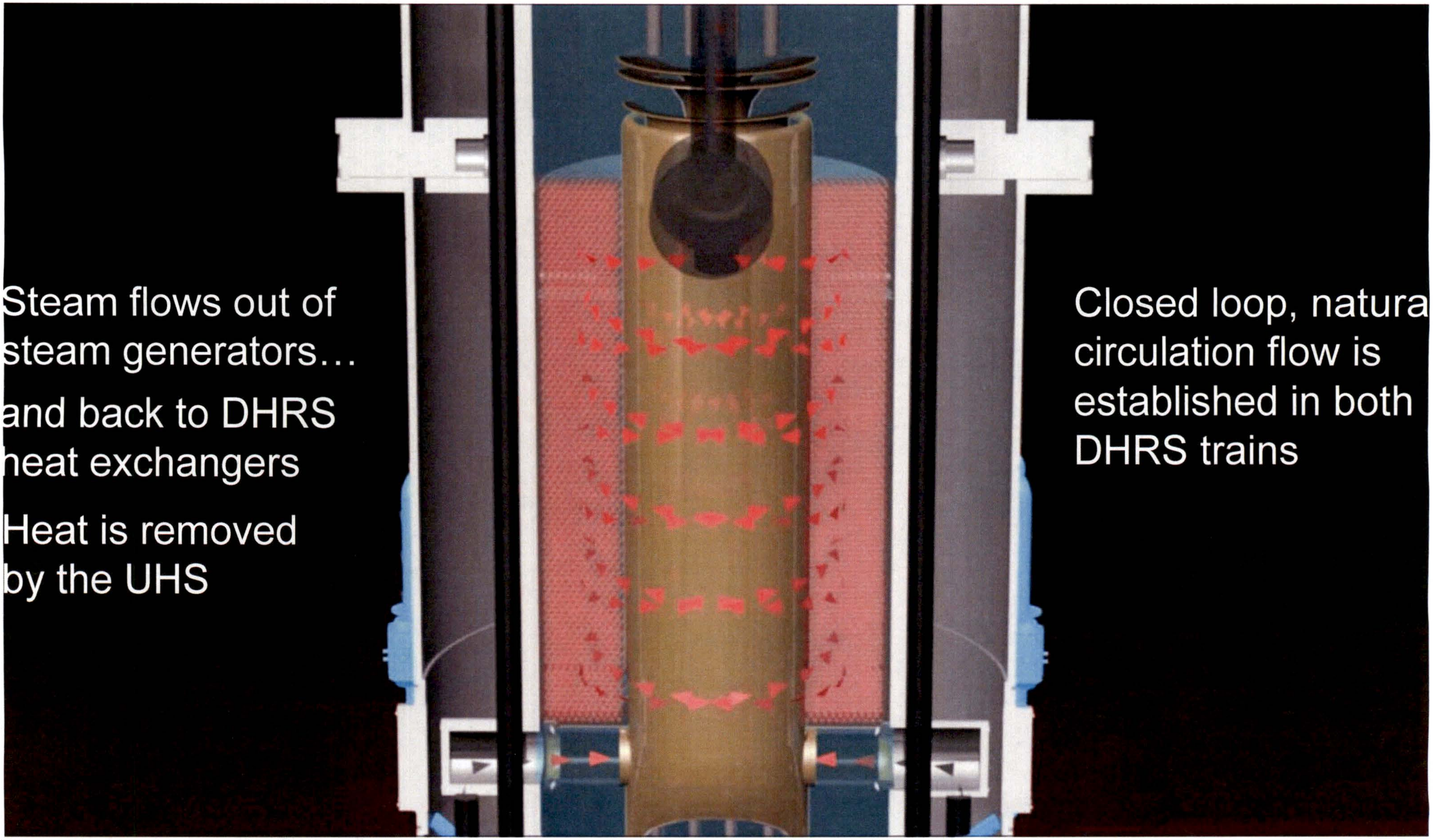
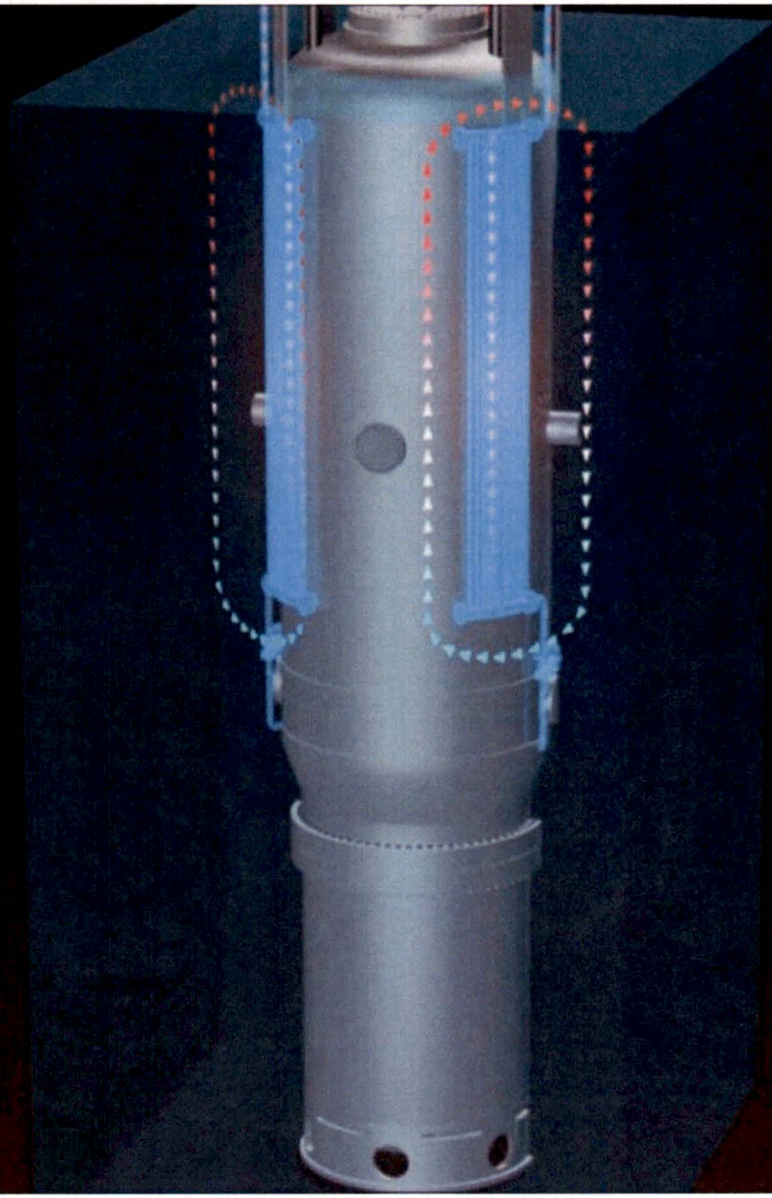
DHRS Operation



DHRS Operation

Heat is transferred
- Core to coolant
- Coolant to DHRS through the steam generator tubes
- DHRS to UHS
- No electrical power needed
- No operator actions needed



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Emergency Core Cooling Systems

- Emergency core cooling systems (ECCS) are designed to provide core cooling during a loss of coolant accident.

- Typically include a combination of pumps, valves, heat exchangers, tanks, and piping to remove residual heat from the reactor core and maintain the core covered.

- Typical designs need AC electrical power to perform their safety functions.

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NuScale's
Emergency Core Cooling System

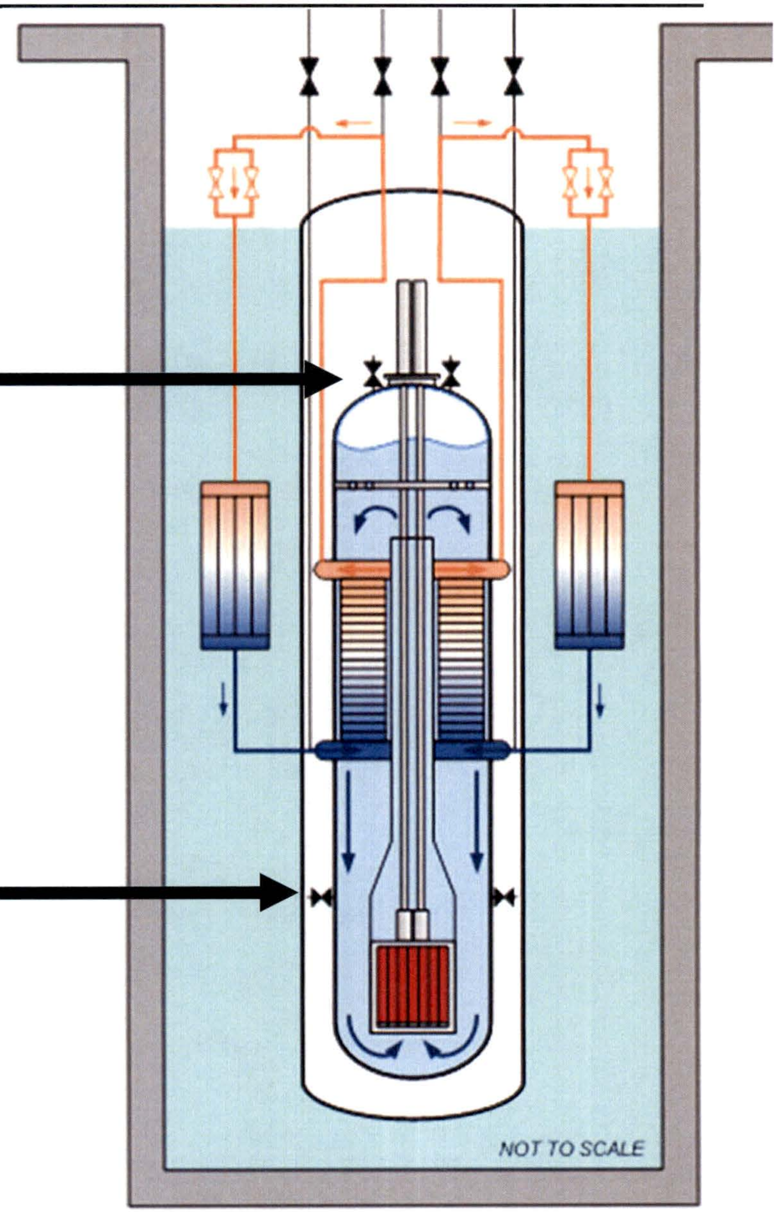
NuScale's ECCS

- The NuScale design's Emergency Core Cooling System is unique.
  - Passive safety system
  - Relies on natural circulation
  - Does not need electrical power to perform its safety function
  - Does not need operator actions to perform its safety function
- ECCS performs the core cooling function using:
  - Valves located inside containment
  - The containment vessel
- ECCS operation maintains coolant level above the core at all times.

NuScale's ECCS

- Reactor Vent Valves (RVVs) are connected to the top of the RPV (pressurizer).

- Reactor Recirculation Valves (RRVs) are connected to a lower point on the RPV downcomer region, but above the reactor core.



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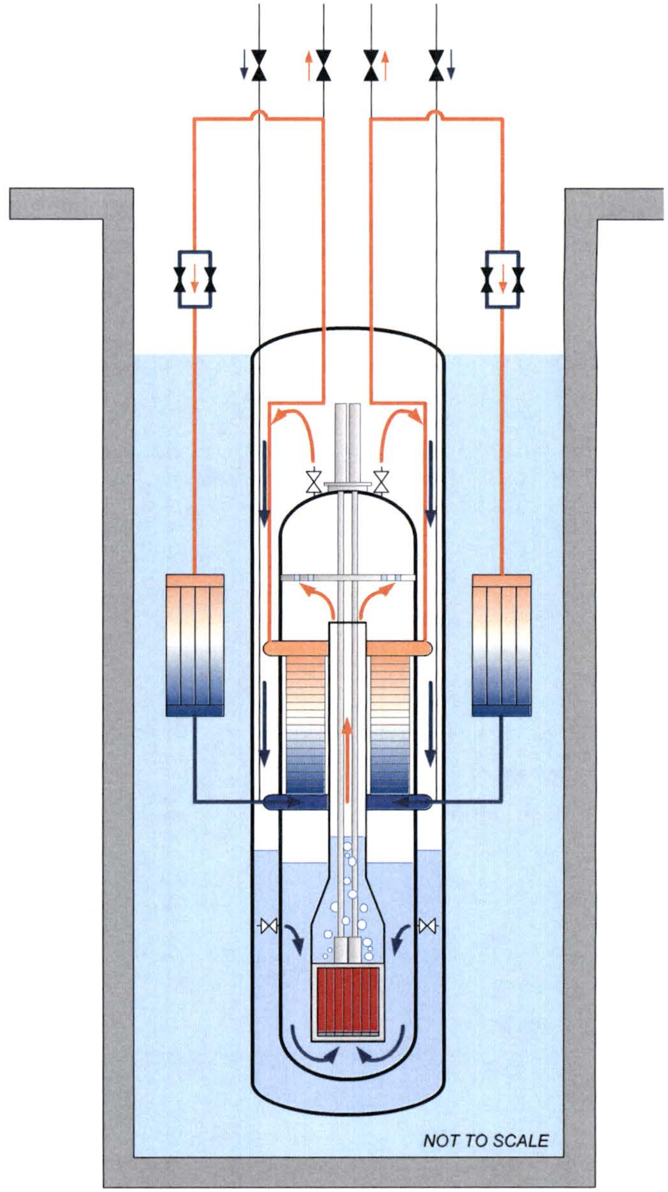
NuScale's ECCS Operation

- During ECCS operation, reactor coolant is vented as steam into containment through the RVVs.
- Because the containment is in direct contact with the UHS, the steam condenses on the inside surface of the containment vessel.
- The liquid coolant collects in containment and flows back into the RPV through the RRVs.
- The coolant is then heated again by the core until the coolant is once again vented through the RVVs.



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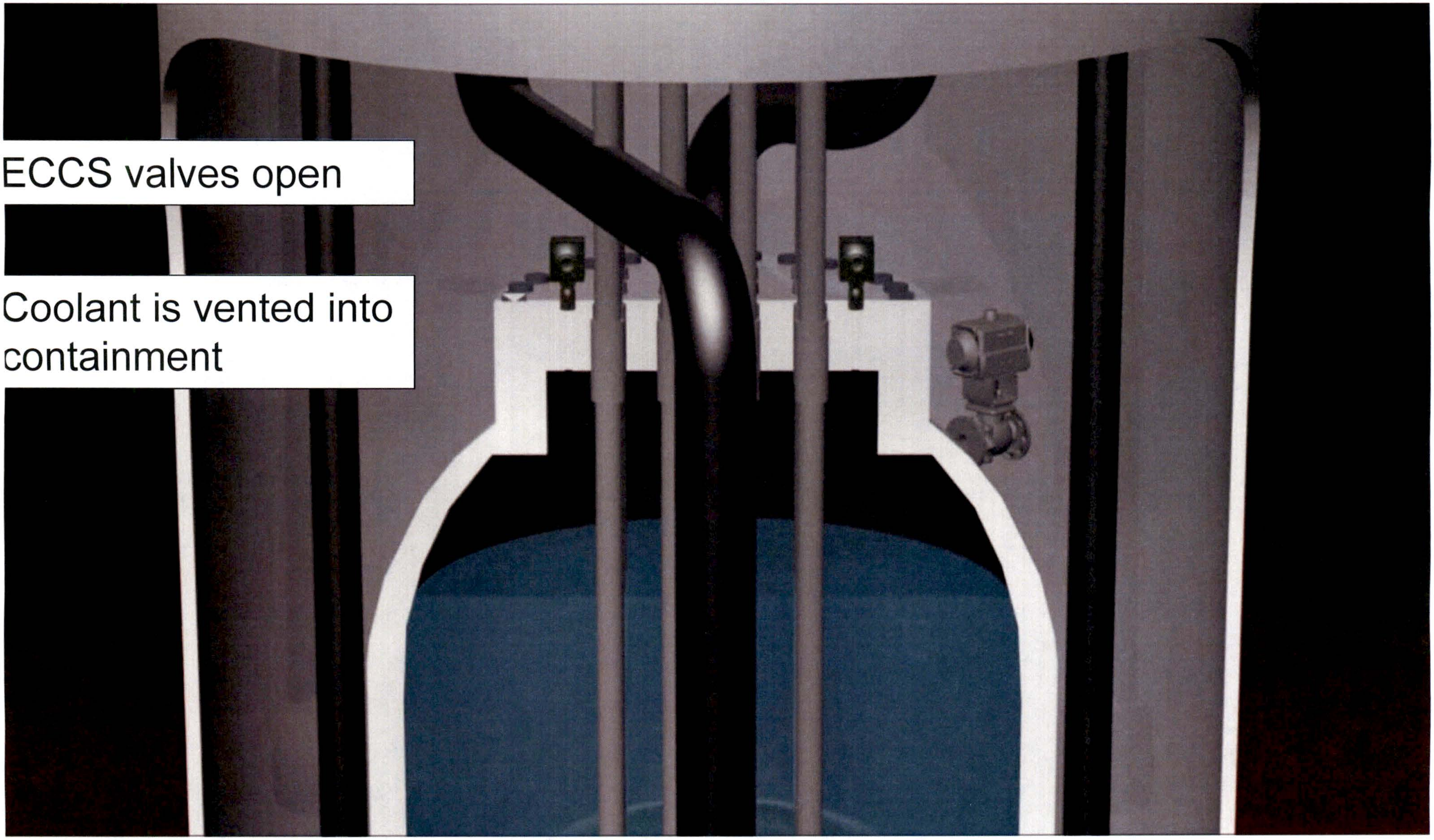
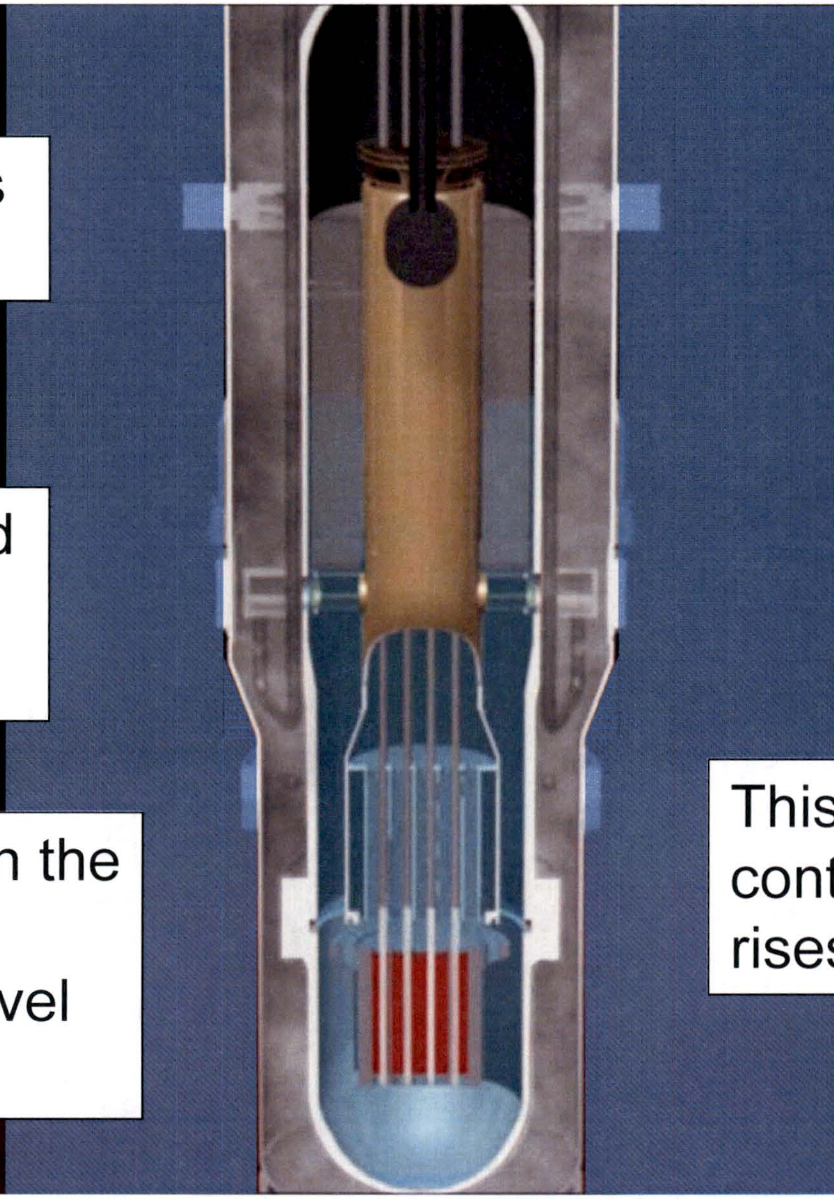
NuScale's ECCS Operation



ECCS valves open

Coolant is vented into containment

NuScale's ECCS Operation



Containment vessel is surrounded by UHS

Steam condenses and liquid collects in containment vessel

As RPV level lowers in the downcomer region, containment vessel level rises

This continues until containment vessel level rises above RRVs.

NuScale's ECCS Operation

Coolant flows from the containment vessel into the RPV

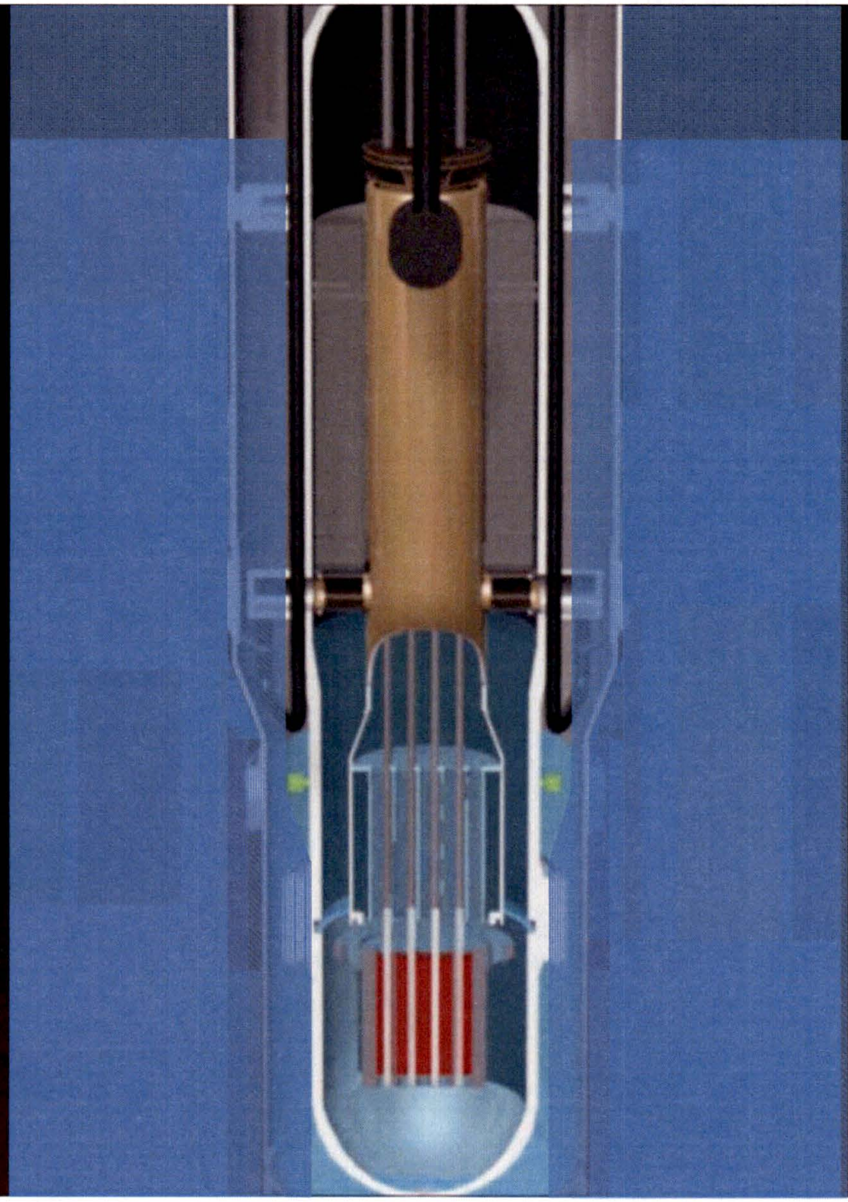
Flows to bottom of RPV and back to the core

Heated by the core

Flows up to top of RPV

Coolant again exits through RVVs

Repeats the cycle



Coolant level remains above the core, and containment level remains above the RRVs

Heat is transferred
- Core to coolant
- Coolant to containment vessel
- Containment vessel to UHS
- No electrical power needed
- No operator actions needed

Emergency Core Cooling System

- ECCS Valves
  - Redundant valves included to ensure system operation when required.
  - No electrical power required to open the valves.
  - Automatically open:
    - An actuation signal is received, or
    - Loss of power to the valve

NuScale Proposed Rulemaking Comments

Background

- November 13, 2015, the NRC requested comments on the proposed mitigation of beyond-design-basis event regulation
  - U.S. Nuclear Regulatory Commission, "Mitigation of Beyond-Design-Basis Events," Federal Register, Vol. 80, No. 219, November 13, 2015, pp. 70610 – 70647
- February 11, 2016, NuScale Power, LLC submitted comments
  - NuScale letter LO-0216-21680, NuScale Power, LLC Comments on the Draft Mitigation of Beyond-Design-Basis Events Rulemaking Package (Docket ID NRC-2014-0240)

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NuScale General Comments

- NuScale endorses the industry comments submitted by Nuclear Energy Institute, "Industry Comments on Draft Mitigation of Beyond Design Basis Events (Docket ID NRC-2014-0240)" dated February 9, 2016
- Guidance document (NEI 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*) was developed with the existing operating fleet in mind
  - As a result, the guidance does not reflect NuScale's unique, passive design
- NuScale will demonstrate an acceptable methodology to mitigate beyond-design-basis events in the DCA

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NuScale Specific Comments

- NEI 12-06 (as endorsed by draft DG-1301, *Flexible Mitigation Strategies for Beyond-Design-Basis Events*) states:

  "...Regardless of installed coping capability, all plants will include the ability to use FLEX equipment to provide RPV/RCS/SG makeup as a means to provide a diverse capability beyond plant equipment...."

- NuScale's unique, passive design relies on containing inventory and natural circulation for core cooling
- Recommendation for DG-1301 clarification:

  "...Regardless of installed coping capability, <u>plants that are not designed with passive closed loop cooling capability</u> will include the ability to use FLEX equipment to provide RPV/RCS/SG makeup as a means to provide a diverse capability beyond plant equipment...."

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NuScale Specific Comments (cont'd)

- Staff position in DG-1301 states:

  "Appendices C and D of NEI 12-06, Rev. 1A contain summaries of performance attributes for boiling-water and pressurized-water reactors respectively, address guideline (2) of NEI 12-06, Rev. 1A, Section 3.2.2 by specifying that procedures/guidance will include local manual initiation of AFW/EFW/HPCI/RCIC/IC."

- NuScale is a passive, failsafe design that does not rely on AC or DC power for DHRS or ECCS initiation. Therefore, local manual initiation is not needed.

- Recommendation for DG-1301 clarification:

  "…section 3.2.2 by specifying that procedures/guidance will include local manual initiation of AFW/EFW/HPCI/RCIC/IC. No manual actions are required to initiate passive failsafe SSCs."

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NuScale Specific Comments (cont'd)

- Transition phase is defined in DG-1301 as:

  "The transition phase will be accomplished by supplementing the use of installed equipment with portable equipment stored on-site.... The duration of the transition phase should provide sufficient overlap with both the initial and final phases to account for the time it takes to install equipment and for uncertainties."

- NuScale's position is that there is no need to require on-site equipment if additional FLEX equipment is not needed to maintain key safety functions prior to the final phase
- For the NuScale design, key safety functions are maintained for >72 hours in an ELAP/LUHS event

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NuScale Specific Comments (cont'd)

- Previous draft proposed 10 CFR 50.155 rulemaking contained a requirement for new plants

  "...include design features in the plant design sufficient to enhance coping durations and minimize reliance on human actions to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities during...[an ELAP/LUHS]."

- Previous draft guidance (DG-1301, Appendix A) allowed for the exclusion of the transition phase due to a 72 hour coping time

- Recommendation for DG-1301 clarification:

  "Depending upon the plant design, a transition phase using on-site portable equipment may not be needed if the initial phase is of sufficient duration (e.g., 72 hours or greater) to transition directly to the final phase."

NuScale Specific Comments (cont'd)

- Final phase is defined in DG-1301 as:

  "The final phase will be accomplished using the portable equipment ...obtained from off-site until power, water, and coolant injection systems are restored or commissioned."

- NuScale's position is that off-site equipment should not be required if not needed to maintain key safety functions
- Recommendation for DG-1301 clarification:

  "Depending upon the plant design, a final phase using off-site equipment to maintain key safety functions may not be needed if the initial phase is of sufficient duration (e.g., 30 days or greater). Therefore, there is no requirement to establish a means to ensure FLEX equipment available from offsite."

DCD Chapter 20 Table of Contents

DCD Chapter 20

- New chapter in Design Control Document (DCD)
  - Discusses proposed rule 10 CFR 50.155, *Mitigation of Beyond-Design-Basis Events*
- Table of Contents

  20.1. Mitigating Strategies for Beyond-Design-Basis External Events

  20.2. Loss of Large Areas of the Plant Due to Explosions and Fires

  20.3. Integration with Emergency Procedures

  20.4. Enhanced Emergency Response Capabilities for Beyond-Design-Basis Events

NEI 12-06 FLEX Strategies

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Mitigation of BDBEE

The purpose of NEI 12-06 is to provide strategies for restoring or maintaining three key safety functions during a beyond-design-basis external event.

- Core cooling
- Containment
- Spent fuel pool cooling

NEI 12-06 FLEX Strategy

- NEI 12-06 describes a strategy which includes a three phase approach for coping with:
  - an extended loss of alternating current power (ELAP) and
  - loss of normal access to the ultimate heat sink (LUHS).

- Initial Phase: Cope relying on plant equipment.
- Transition Phase: Use on-site FLEX equipment to maintain or restore key functions.
- Final Phase: Use equipment from off-site sources to obtain additional capability and redundancy.

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NEI 12-06 FLEX Strategy

- NEI 12-06, although generic, was developed through consideration of those designs licensed at the time of guidance development
  - some recommendations are not applicable to the NuScale design
  - some recommendations did not anticipate NuScale design features that eliminate the need for the recommendation
  - inherent in the NuScale design are features that explicitly meet the NEI 12-06 recommendations

NEI 12-06 LUHS

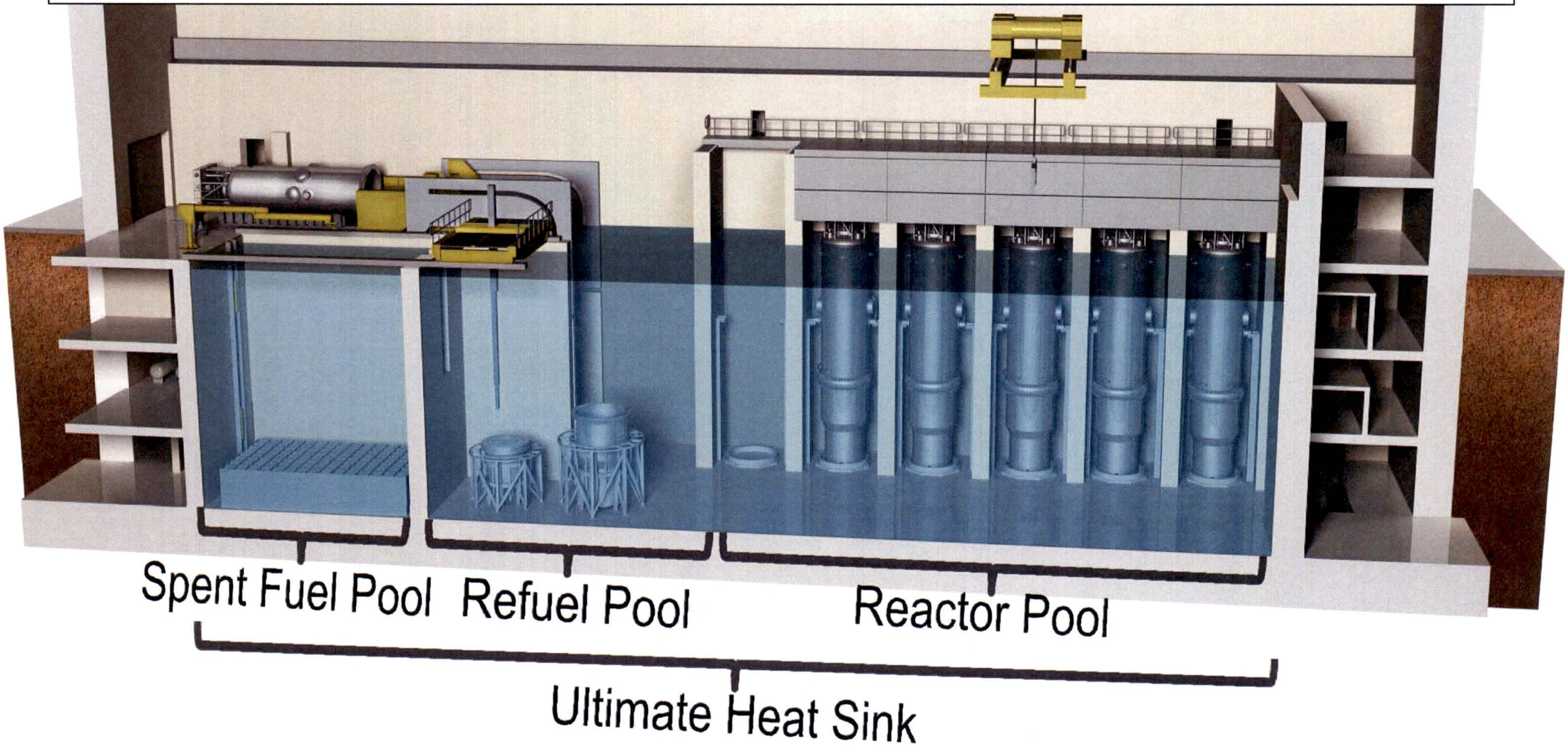
- NEI 12-06 describes a strategy which includes a three phase approach for coping with:
  - an extended loss of alternating current power (ELAP) and
  - loss of normal access to the ultimate heat sink (LUHS).

- Loss of normal access to the ultimate heat sink:
  - Loss of ability to provide a forced flow of water to key plant systems (i.e., the pumps are unavailable and not restorable as part of the coping strategy).
  - Water inventory in the UHS remains available.

- LUHS shapes the NEI 12-06 strategies.

NuScale UHS

- Functions without electrical power or pumps.
- The NuScale design removes the potential for a LUHS.



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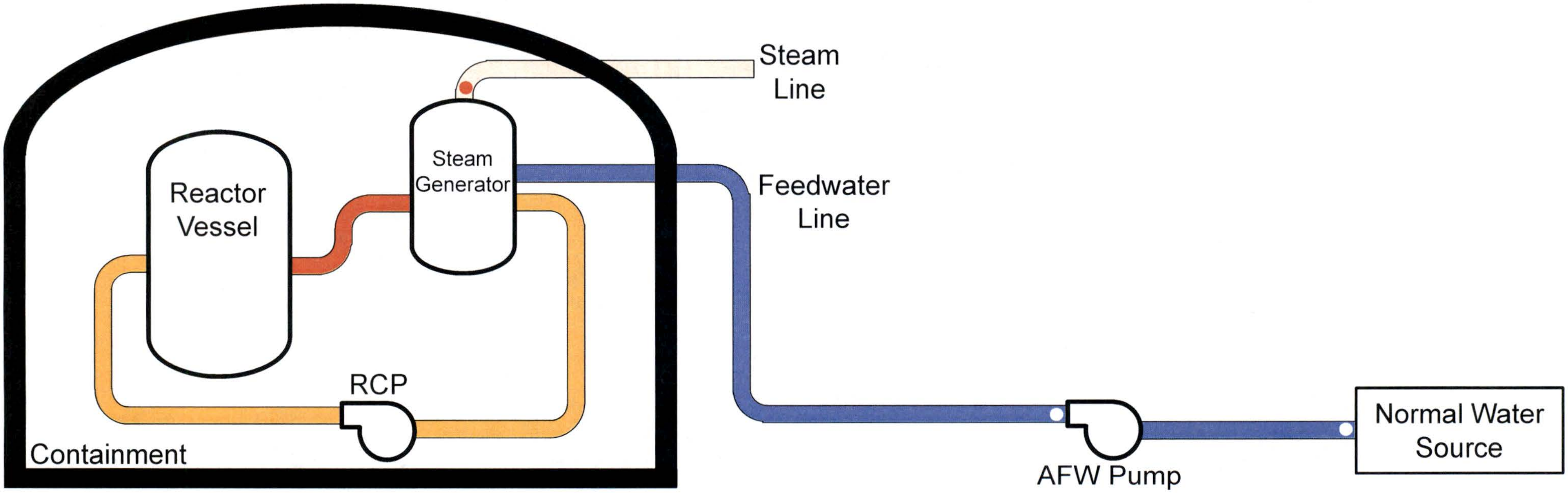
NEI 12-06
Summary of Performance Attributes for PWR Functions – Core Cooling

NEI 12-06 Recommendations



Core Cooling Functions

Steam Generator Decay Heat Removal

- Auxiliary Feedwater
  - Procedure for manual operation of AFW

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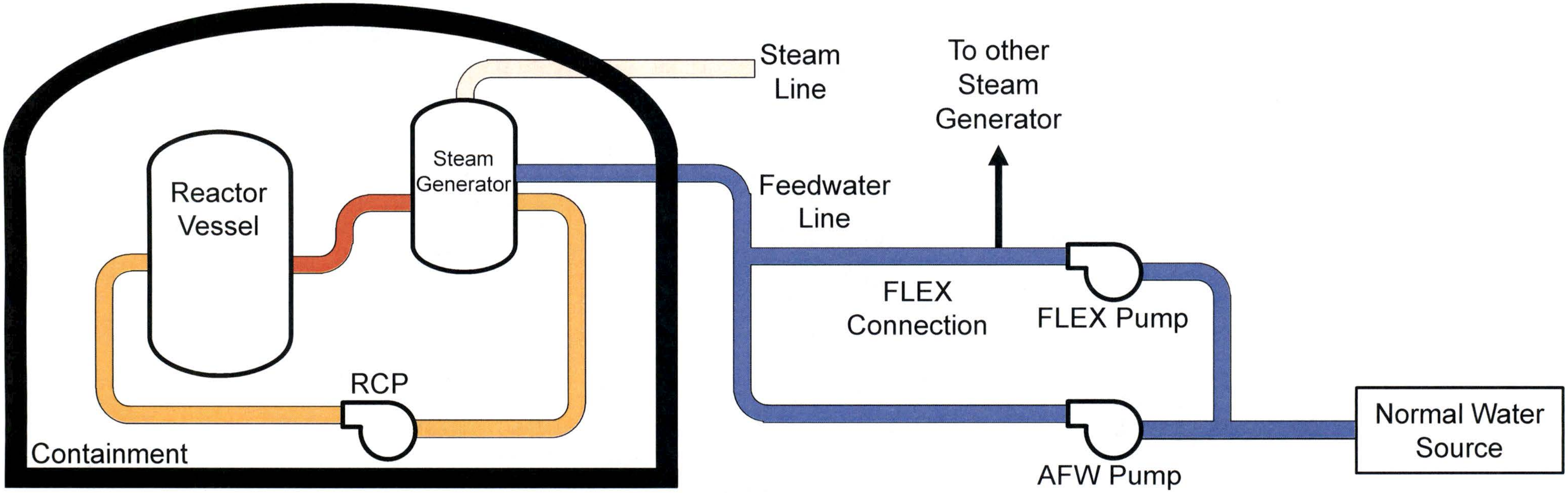
NEI 12-06 Recommendations

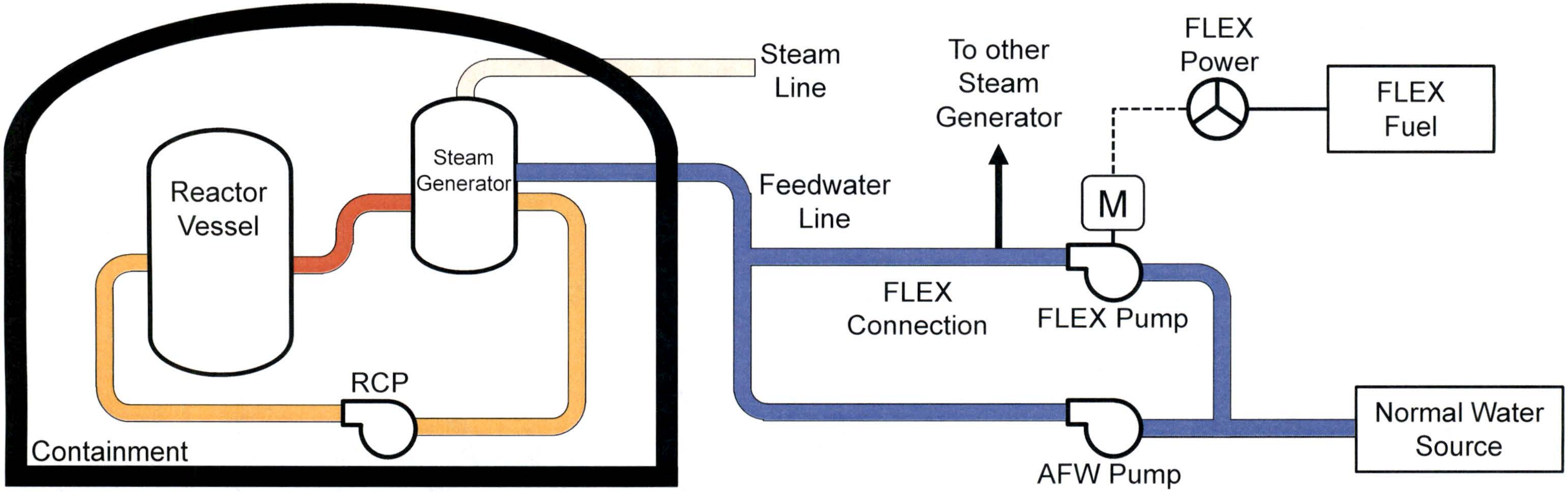


Core Cooling Functions

Steam Generator Decay Heat Removal

- FLEX pump
  - FLEX connection
  - Alternate FLEX connection

NEI 12-06 Recommendations

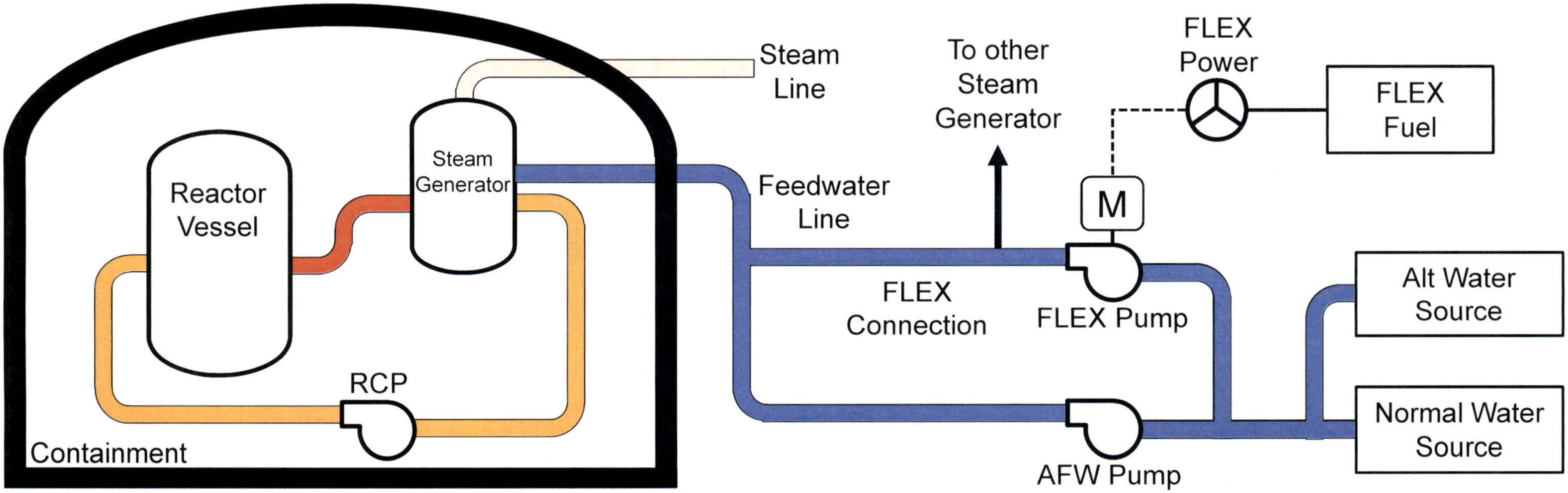


<u>Core Cooling Functions</u>

Steam Generator Decay Heat Removal

- FLEX pump
  - FLEX power
  - FLEX fuel

NEI 12-06 Recommendations



Core Cooling Functions

Steam Generator Decay Heat Removal

- Sustained Source of Water
  - Alternate water supply

NuScale's Core Cooling Strategy

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Loss of AC Power - NuScale

- **NuScale Power Module response when operating at 100% power:**
  - Reactor trip
  - Decay Heat Removal System initiates
  - Containment isolates

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Containment Isolation Valves

- **NuScale Containment Isolation Valves (CIVs):**
  - Safety-related valves
  - Open valves will automatically close
    - if a containment isolation signal is received
    - if the valve loses electrical power

Loss of AC Power - NuScale

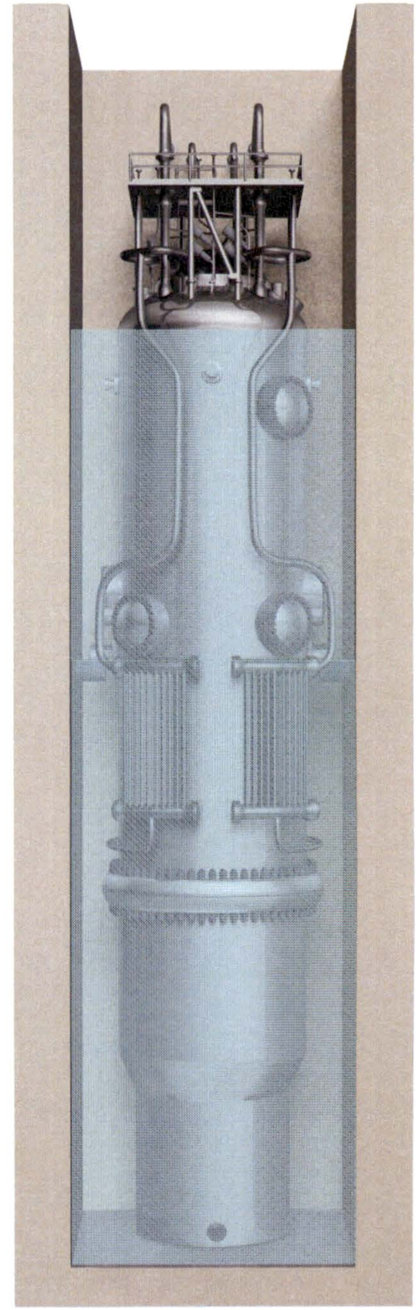
- **NuScale Power Module response when operating at 100% power:**
  - Reactor trip
  - Decay Heat Removal System initiates
  - Containment isolates
- ECCS automatically initiates after 24 hours
- With the reactor shutdown and passive decay heat removal established, safe shutdown conditions are established.
- Decay heat passively transferred to the UHS.

Loss of AC Power - NuScale

- **NuScale Ultimate Heat Sink response:**
  - Assumes all 12 NuScale Power Modules were operating at 100% power for the past 100 days at the time of the event.
  - Assumes Spent Fuel Pool contains 18 years worth of spent fuel, including assemblies from a freshly offloaded core.
- UHS temperature will rise and reach boiling after approximately 5 days.
- UHS level will lower as inventory is boiled off.

NuScale's UHS Level

- The NuScale UHS has a large volume.
- Without any FLEX mitigating actions, it requires more than **40 days** for UHS level to lower to the top of the DHRS heat exchangers.
- Decay heat removal continues to be provided by ECCS.



Loss of AC Power - NuScale

- **All 12 NuScale Power Modules in safe shutdown.**
  - Reactors tripped
  - Decay Heat Removal Systems initiated
  - Containments isolated
  - ECCS in operation after 24 hours
  - Decay heat passively transferred to the UHS
- Occurs without operator actions.
- Occurs without on-site FLEX equipment.
- Occurs without a FLEX power supply.

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NuScale's Core Cooling Strategy

Function: Core Cooling

Strategy: Passive Decay Heat Removal

Method:

DHRS
- Support
  - CIVs
  - UHS inventory
    - Outside connection
    - Water supply

ECCS
- Support
  - CIVs
  - UHS inventory
    - Outside connection
    - Water supply

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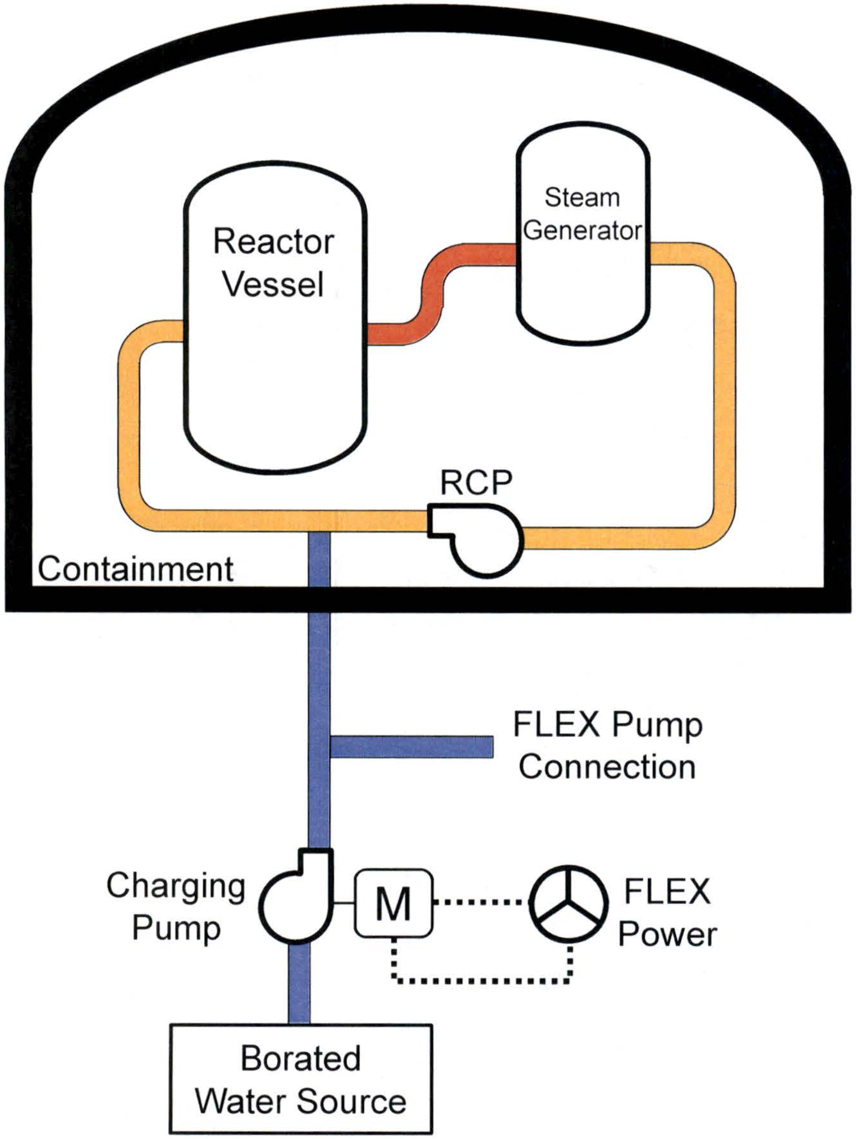
NEI 12-06 Recommendations



<u>Core Cooling Functions</u>

RCS Inventory Makeup

- Low leak RCP Seals
- Borated high pressure makeup
  - Charging pump with multiple power connection points
  - Charging pump with a single power connection and a FLEX pump makeup connection

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NEI 12-06 Recommendations

- Purpose of the RCS makeup recommendations:

  "Extended coping without RCS makeup is not possible without minimal RCS leakage."

- Expected RCS leakage sources:
  - Reactor coolant pump seal leakage

    The NuScale design does not include RCPs

  - Losses from letdown unless automatically isolated

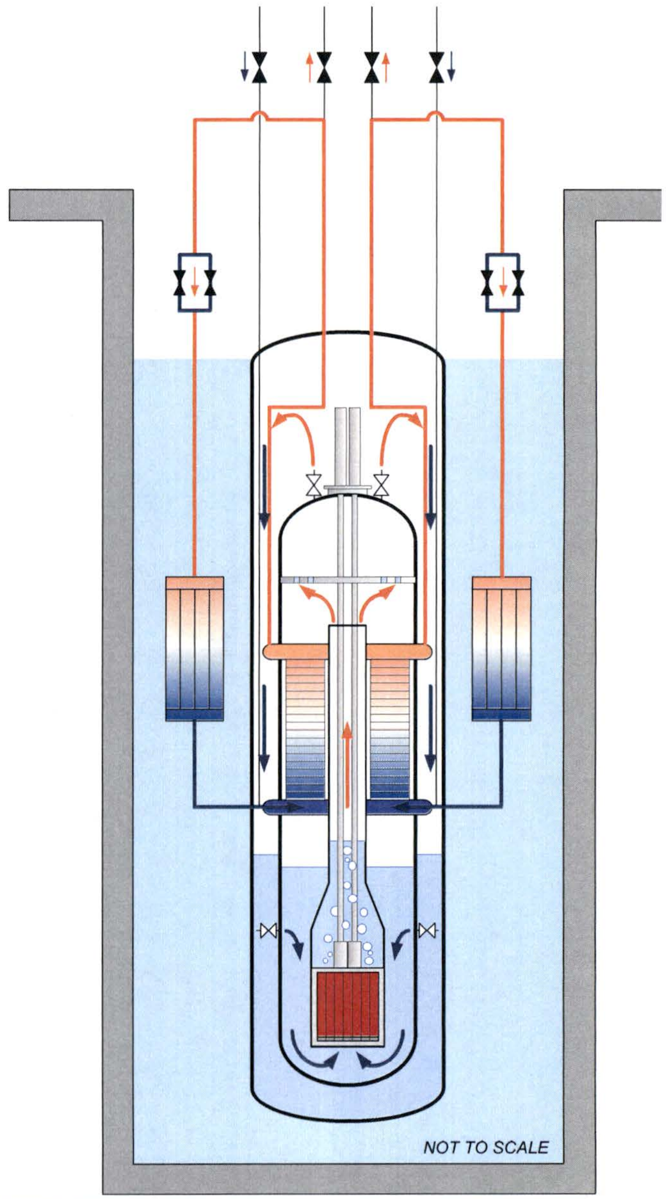
    The letdown path automatically isolates in the NuScale design

  - Normal system leakage into containment

    Containment is part of the normal ECCS flowpath and ECCS function

The NuScale Design

- Effect of RCS volume transfer into NuScale containment:
  - The coolant would collect in containment, as designed.
  - The inventory is preserved for ECCS operation, as designed.
- RCS volume to thermal power ratio is four times larger than the typical design => large inventory reserve.



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NuScale's Core Cooling Strategy

Function: Core Cooling

Strategy: RCS Inventory Makeup

Not needed for the NuScale design.

"Extended coping without RCS makeup is not possible without minimal RCS leakage."

Method:

- No RCPs
- Isolation of potential leakage paths outside of containment
- Inventory preserved for ECCS operation

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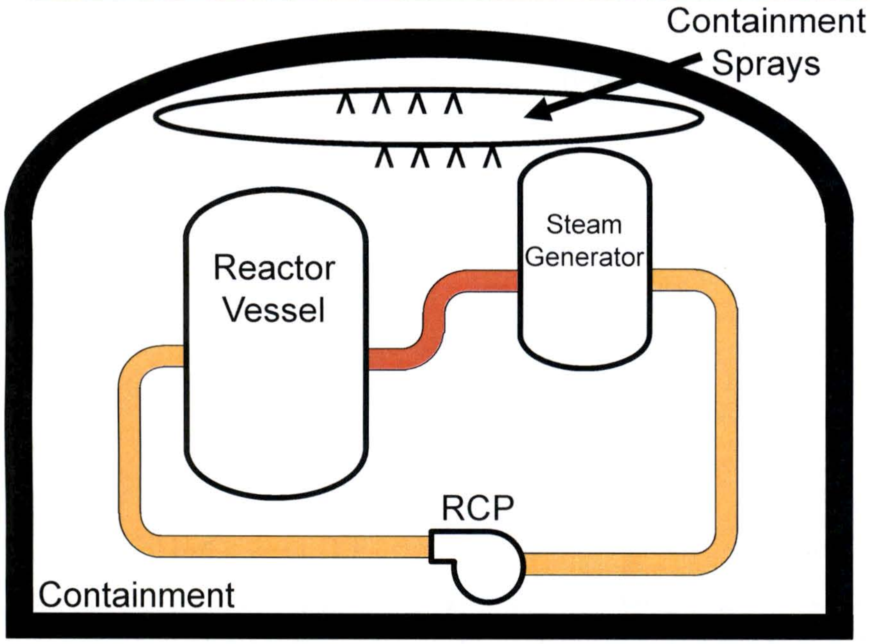
NEI 12-06
Summary of Performance Attributes for PWR Functions – Containment

NEI 12-06 Recommendations



Containment Function

Containment Spray

- FLEX connection
  - Modification not required
  - Identify a temporary connection location

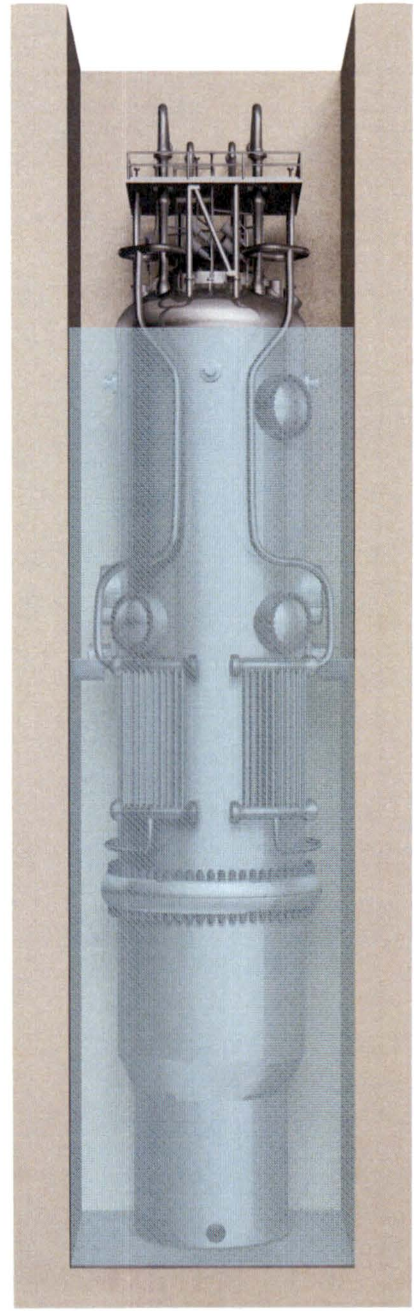
NEI 12-06 Recommendations

- Purpose of the containment spray recommendation:

  "In the long-term containment pressure may rise due to leakage from RCS adding heat to containment. Containment spray can help manage containment pressure."

The NuScale Design

- The containment vessel is partially submerged in the UHS, which provides the necessary cooling.
- Without any FLEX mitigating actions, it requires more than **40 days** for UHS level to lower to the top of the DHRS heat exchangers.



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NuScale's Containment Strategy

Function: Containment Function

Strategy: Passive Containment Cooling

Method: Partial submergence in the UHS

- UHS inventory
  - Outside connection
  - Water supply

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NEI 12-06 Summary of Performance Attributes for PWR Functions – Spent Fuel Pool Cooling

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NEI 12-06 Recommendations

Makeup to the Spent Fuel
<u>Pool (SFP) with FLEX Source</u>

- Spray via nozzles on refuel floor using FLEX pump
- Makeup via hoses on refuel floor
- Makeup via connection to SFP piping or alternate location
- Vent path for steam from the SFP

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NEI 12-06 Recommendations

Makeup to the Spent Fuel Pool (SFP) with FLEX Source

- Spray via nozzles on refuel floor using FLEX pump
  - Not needed for below grade SFPs
- Makeup via hoses on refuel floor
- Makeup via connection to SFP piping or alternate location
- Vent path for steam from the SFP

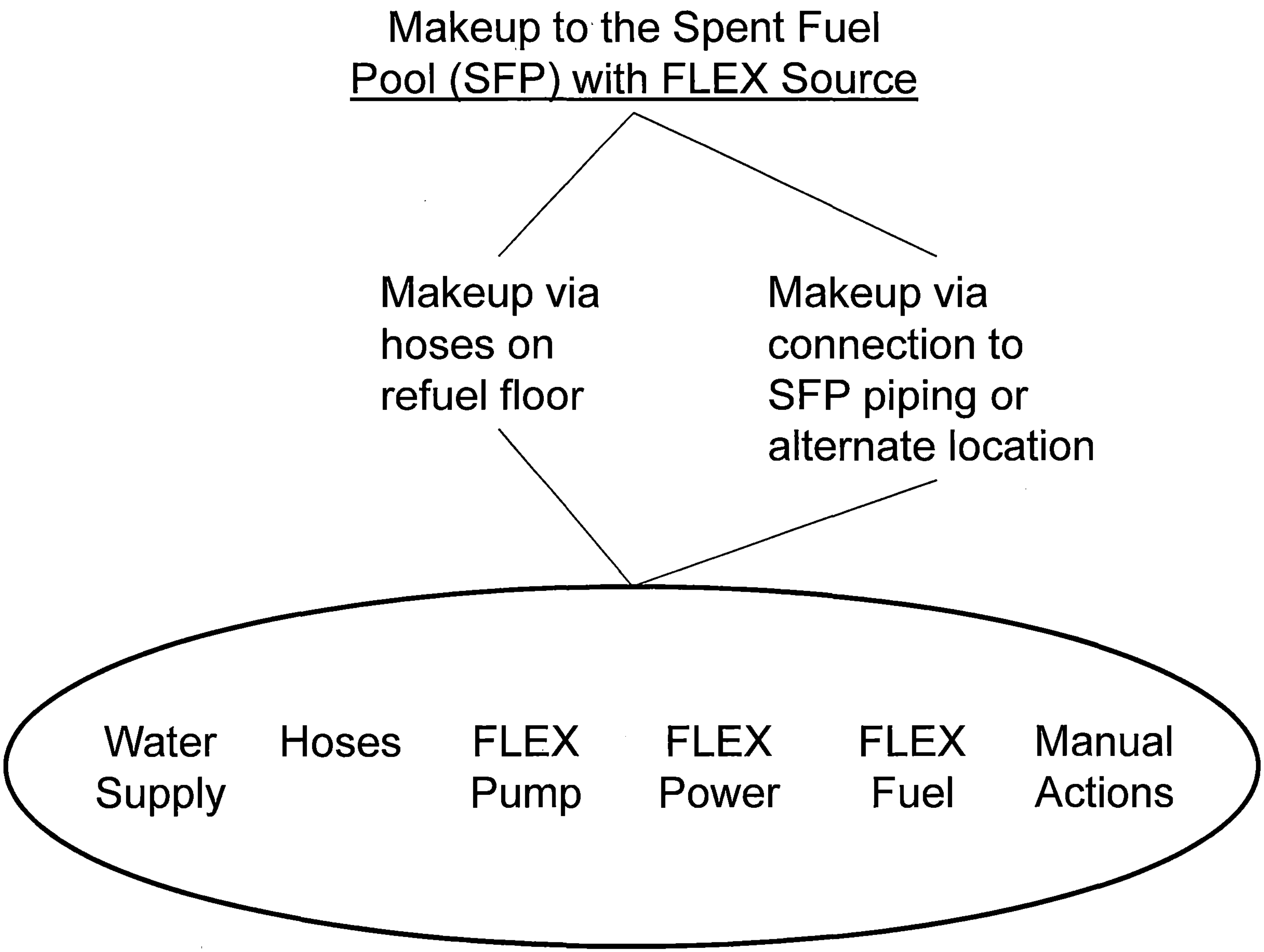
NEI 12-06 Recommendations

Makeup to the Spent Fuel
Pool (SFP) with FLEX Source

- Makeup via hoses on refuel floor
- Makeup via connection to SFP piping or alternate location
- Vent path for steam from the SFP

Recommended "as needed"

NEI 12-06 Recommendations



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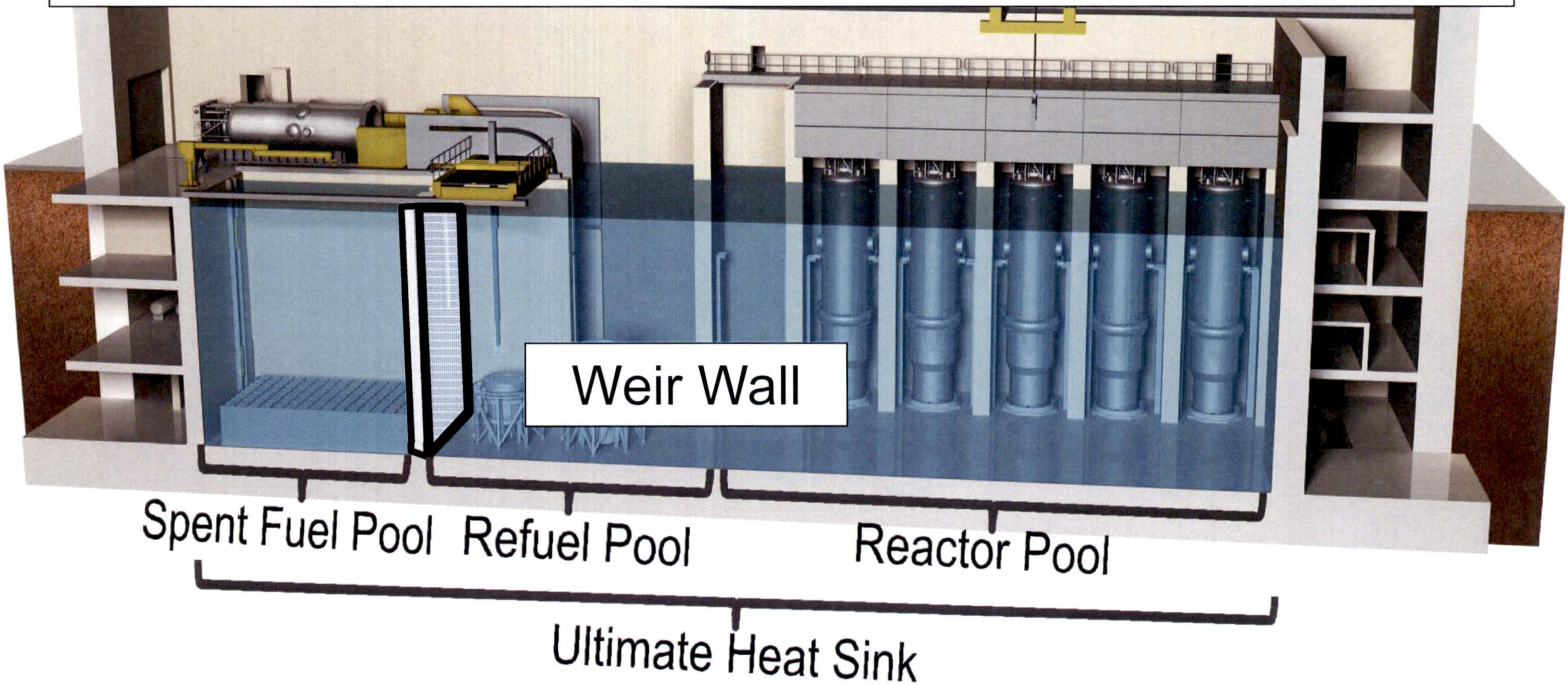
NuScale's Spent Fuel Cooling Strategy

The NuScale Design

- The Spent Fuel Pool is part of the UHS.
- The Spent Fuel Pool is partially separated from the Refuel and Reactor Pools by the Weir Wall.



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NuScale's Spent Fuel Pool

- The Weir Wall contains a partial opening (weir) that allows fuel to be moved between the UHS pools during refueling activities.
- This opening also allows the pool volumes to communicate.
- The Refuel Pool and Reactor Pool provide makeup water to the Spent Fuel Pool until UHS level is below the weir.

NuScale's Spent Fuel Pool

- Plant conditions:
  - Assumes all 12 NuScale Power Modules were operating at 100% power for the past 100 days at the time of the event.
  - Assumes Spent Fuel Pool contains 18 years worth of spent fuel, including assemblies from a freshly offloaded core.
- Without any addition of inventory, Spent Fuel Pool level would:
  - Fall below the weir after more than **4 months**.
  - Reach the top of spent fuel after more than **5 months**.

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NuScale's SFP Cooling Strategy

Function: Spent Fuel Cooling

Strategy: Submergence in the Spent Fuel Pool

Method:

Passive makeup from the Reactor Pool

- UHS inventory

Makeup via connection to SFP

- Assured Makeup Line
- Water supply

MBDBEE (FLEX) Strategy Summary

Strategy Comparison – Core Cooling

NEI 12-06

- AFW operation
  - Manual operation
- FLEX Pump operation
  - Primary connection
  - Alternate connection
  - FLEX power supply
  - FLEX fuel supply
  - Manual connection
- Adequate water supply

NuScale

- DHRS operation
  - Two independent trains
  - No electrical power needed
  - No operator actions needed
  - Passive decay heat removal
- ECCS operation
  - No electrical power needed
  - No operator actions needed
  - Passive decay heat removal
- Adequate UHS inventory
  - Long term makeup

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Strategy Comparison – RCS Inventory

NEI 12-06

- Low leak RCP Seals
- Charging Pump operation
  - Primary power connection
  - Alternate power connection
  - FLEX power supply
  - FLEX fuel supply
  - Manual connection
- FLEX Pump operation
- Borated water supply

NuScale

Not needed for the NuScale design

- Containment isolation
  - No electrical power needed
  - No operator actions needed
- No RCPs
- Inventory preserved for ECCS operation

Strategy Comparison – Containment

NEI 12-06

- Containment spray
  - FLEX connection
  - FLEX pump
  - FLEX power supply
  - FLEX fuel supply
  - Manual connection
- Adequate water supply

NuScale

- Passive heat removal for pressure control
  - Partial submergence in UHS
  - No electrical power needed
  - No operator actions needed
- Adequate UHS inventory
  - Long term makeup

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Strategy Comparison – SFP Cooling

NEI 12-06

- SFP makeup via hoses
  - FLEX pump
  - FLEX power supply
  - FLEX fuel supply
  - Manual connection
- SFP makeup via piping
  - FLEX connection
  - Manual connection
- Adequate water supply

NuScale

- Passive makeup from Reactor and Refuel Pools
  - Pools communicate via weir
  - Large reserve inventory
- Makeup via connection to SFP
  - Assured Makeup Line
  - Gravity fed
  - Manual connection
- Adequate water supply

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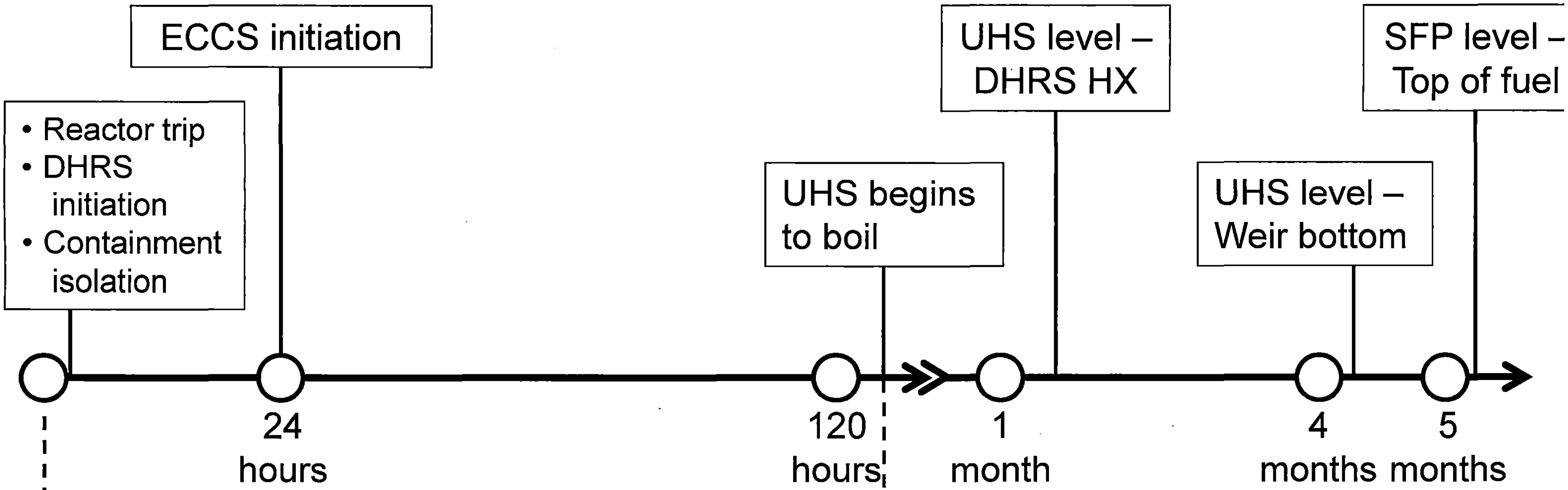
NuScale's FLEX Strategy Summary

Plant Response without FLEX strategy implementation



Installed plant safety systems
- Passive core cooling
- Passive containment heat removal
- Passive spent fuel heat removal

SFP/UHS level begins to lower and will continue to decrease

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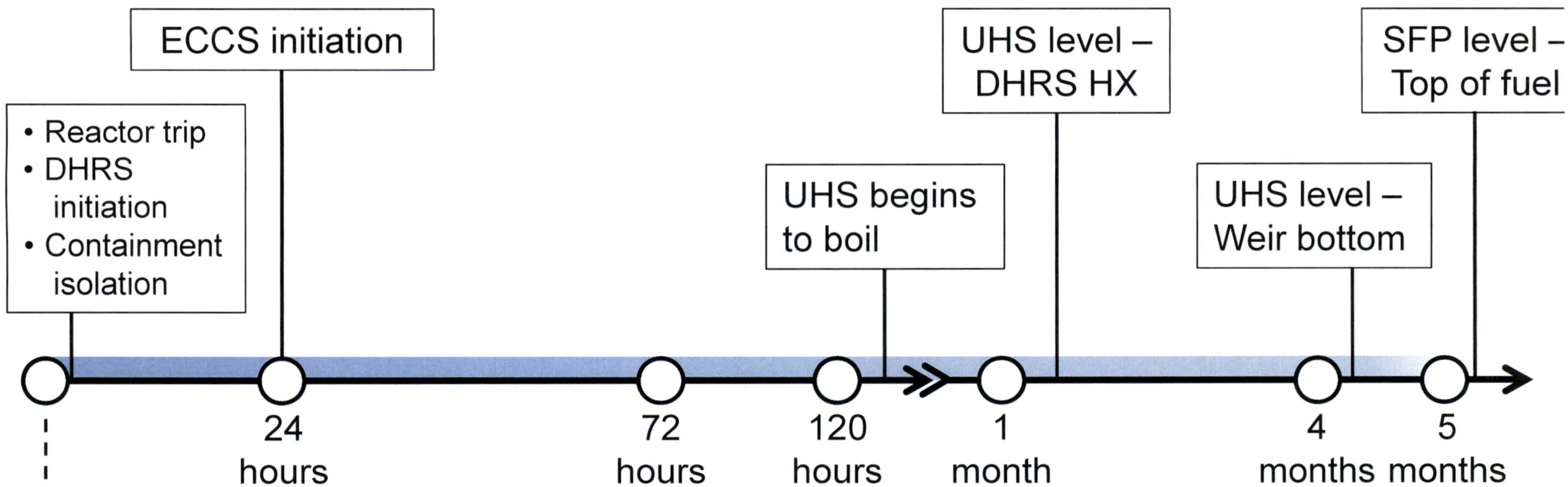
NuScale's FLEX Strategy Summary

FLEX strategy implementation response



Installed plant safety systems

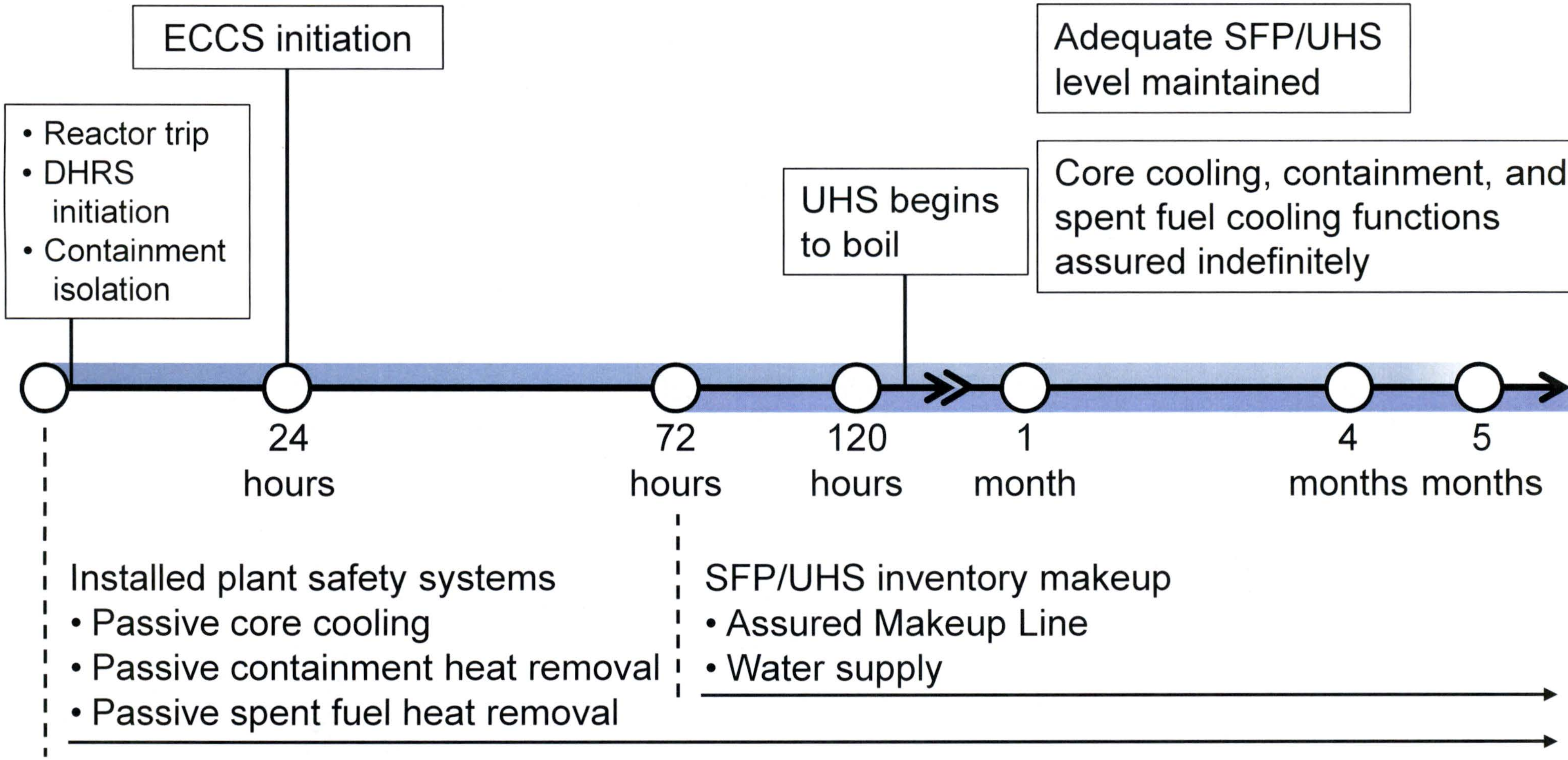
- Passive core cooling
- Passive containment heat removal
- Passive spent fuel heat removal

SFP/UHS inventory makeup

- Assured Makeup Line
- Water supply

NuScale's FLEX Strategy Summary

FLEX strategy implementation response



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NuScale's FLEX Strategy Summary

- The NuScale design provides a coping time of sufficient duration to eliminate the need for on-site FLEX equipment.
- NuScale phased approach
  - Initial Phase: Cope relying on installed plant equipment
  - Final Phase: Use equipment from off-site sources to continue to maintain the key safety functions

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Loss of Large Area

- 10 CFR 50.54(hh)(2) requires licensees to develop guidance and strategies for addressing the Loss of Large Areas (LOLAs) due to explosions or fire.
- Proposed Mitigation of Beyond-Design-Basis Events rulemaking moves 10 CFR 50.54(hh)(2) requirements to 10 CFR 50.155 (b)(2)
- Sections 50.34(i) and 52.80(d) require an applicant to submit a description and plans for implementation of the guidance and strategies intended to maintain or restore:
  - core cooling
  - containment
  - spent fuel pool cooling

Loss of Large Area

- Specifically, Section 50.54(hh)(2) requires licensees to develop and implement guidance and strategies in the following areas:
  - fire fighting
  - operations to mitigate fuel damage in the spent fuel pool
  - actions to minimize radiological release due to damage to fuel in the reactor vessel

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Loss of Large Area

- NUREG 0800, Standard Review Plan, Section 19.4, Strategies and Guidance to Address Loss of Large Areas of the Plant Due to Explosions and Fires, describes acceptance criteria for new design certification applications
- Strategies described in the application should be consistent with the guidance in Appendix D of NEI 06-12, (B.5.b Phase 2 & 3 Submittal Guideline, Revision 3)
- Description of LOLA capabilities will be provided in Chapter 20 of the Design Certification Document (DCD)

LOLA Strategy

- A technical report will be submitted to summarize the results of the LOLA assessment, including:
  - all key safety functions are maintained
  - primary and alternate methods for Reactor Coolant System (RCS) inventory, RCS heat removal, and containment isolation meet the separation guidance in NEI 06-12
  - portable equipment is only required to minimize radiological release and supply the fire main
  - spent fuel pool strategies are not required for subterranean designs

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