Cooling Water Availability

a TerraPower & GE-Hitachi technology

TP-LIC-PRSNT-0023

SUBJECT TO DOE COOPERATIVE AGREEMENT NO. DE-NE0009054

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Natrium™ TerraPower

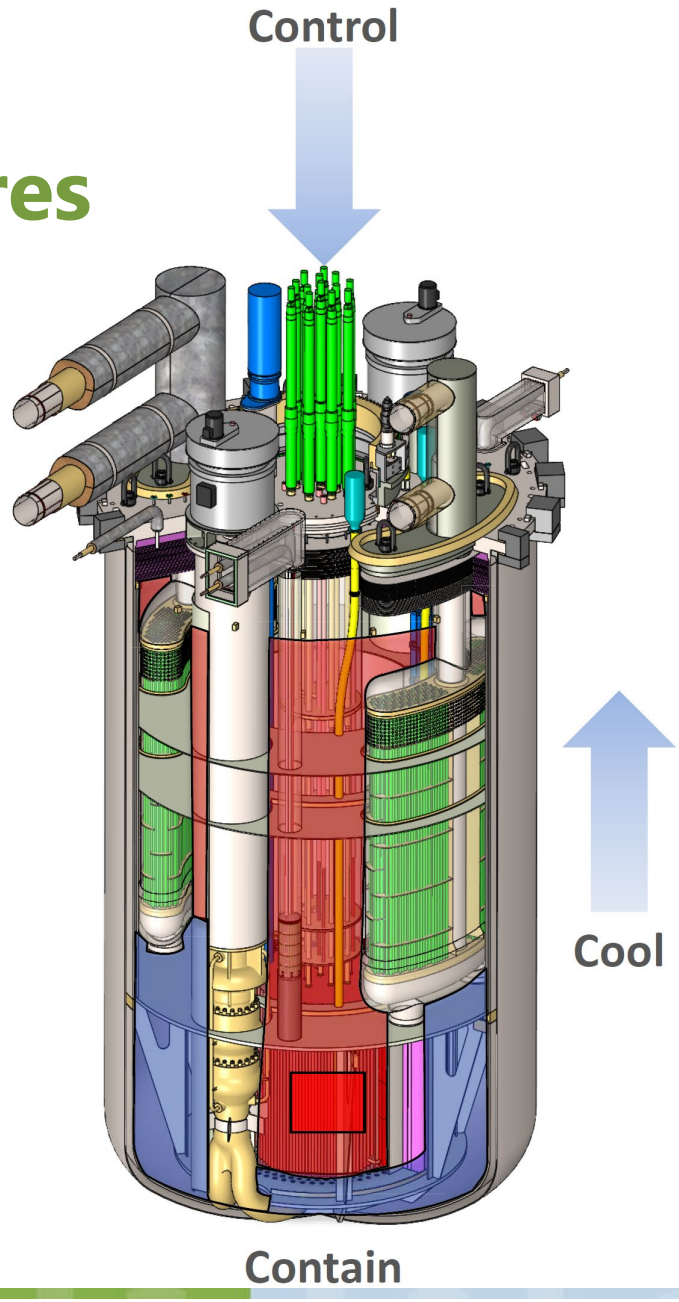
Natrium Reactor Overview

- The Natrium project is demonstrating the ability to design, license, construct, startup and operate a Natrium reactor.

- Pre-application interactions are intended to reduce regulatory uncertainty and facilitate the NRC's understanding of the Natrium design and its safety case.

Natrium Safety Features

- Pool-type Metal Fuel SFR with Molten Salt Energy Island
  - Metallic fuel and sodium have high compatibility
  - No sodium-water reaction in steam generator
  - Large thermal inertia enables simplified response to abnormal events
- Simplified Response to Abnormal Events
  - Reliable reactor shutdown
  - Transition to coolant natural circulation
  - Indefinite passive emergency decay heat removal
  - Low pressure functional containment
  - No reliance on Energy Island for safety functions
- No Safety-Related Operator Actions or AC power
- Technology Based on U.S. SFR Experience
  - EBR-I, EBR-II, FFTF, TREAT
  - SFR inherent safety characteristics demonstrated through testing in EBR-II and FFTF



Control

- Motor-driven control rod runback and scram follow
- Gravity-driven control rod scram
- Inherently stable with increased power or temperature

Cool

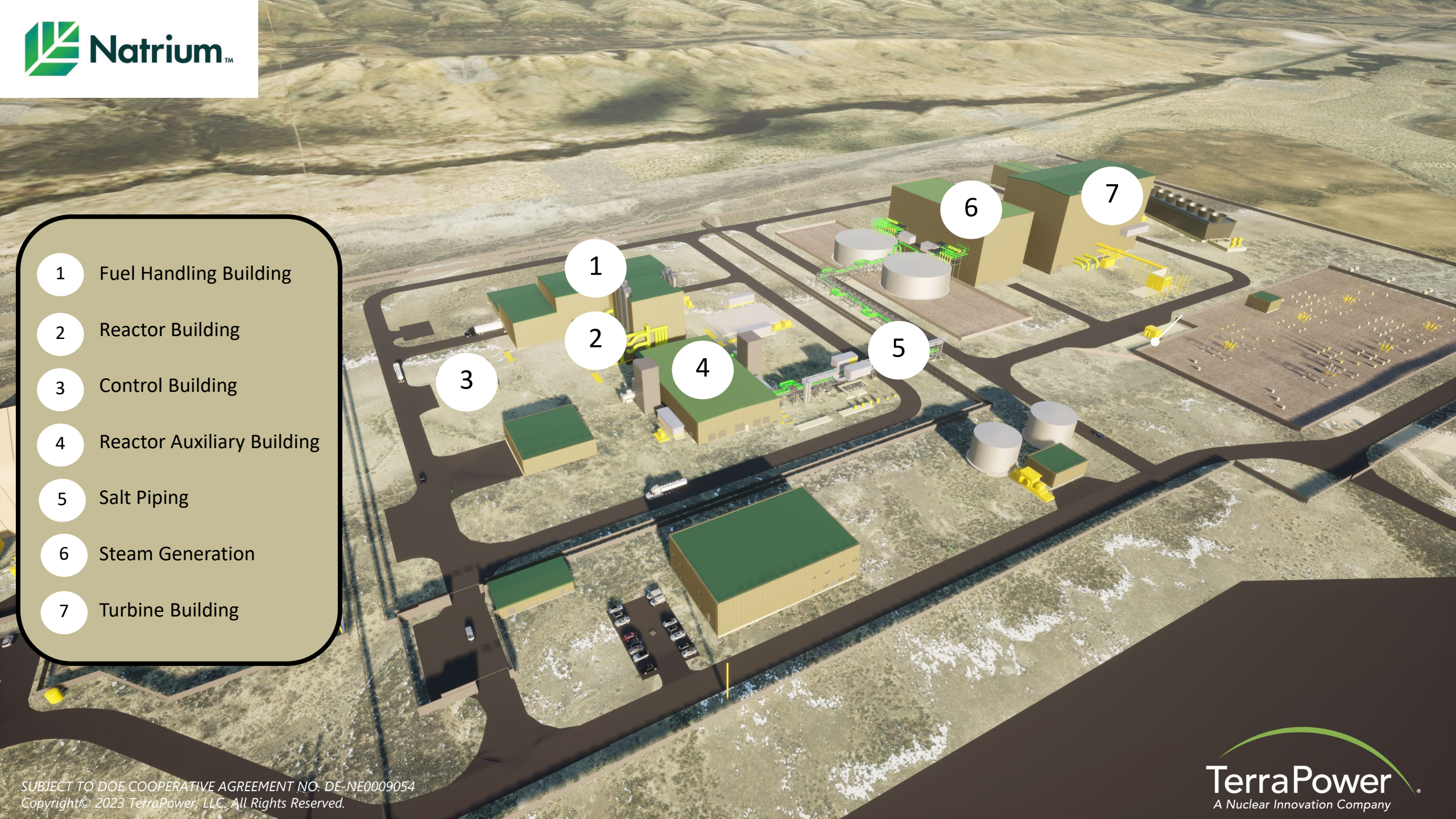
- In-vessel primary sodium heat transport (limited penetrations)
- Intermediate air cooling natural draft flow
- Reactor air cooling natural draft flow – always on

Contain

- Low primary and secondary pressure
- Sodium affinity for radionuclides
- Multiple radionuclides retention boundaries

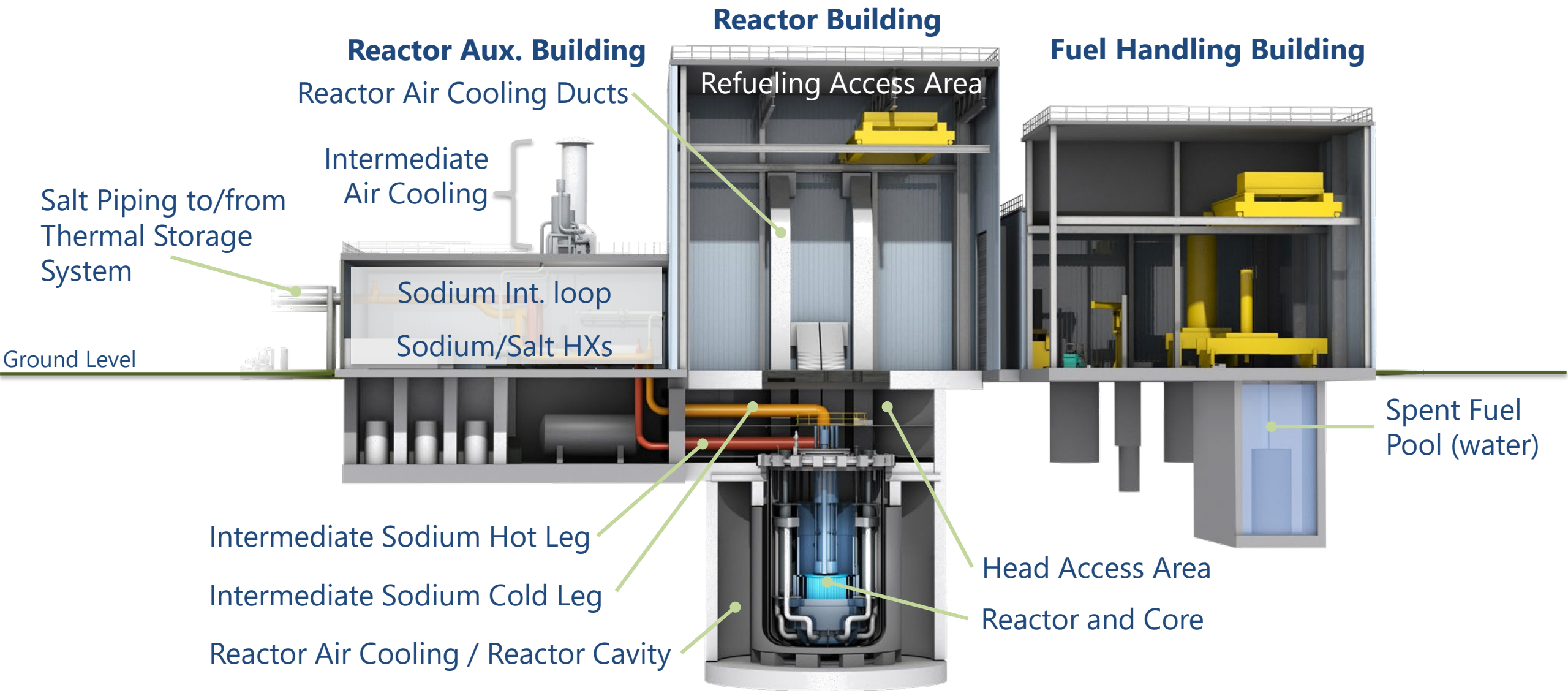
Natrium™ TerraPower

Natrium™



1. Fuel Handling Building
2. Reactor Building
3. Control Building
4. Reactor Auxiliary Building
5. Salt Piping
6. Steam Generation
7. Turbine Building

TerraPower
A Nuclear Innovation Company



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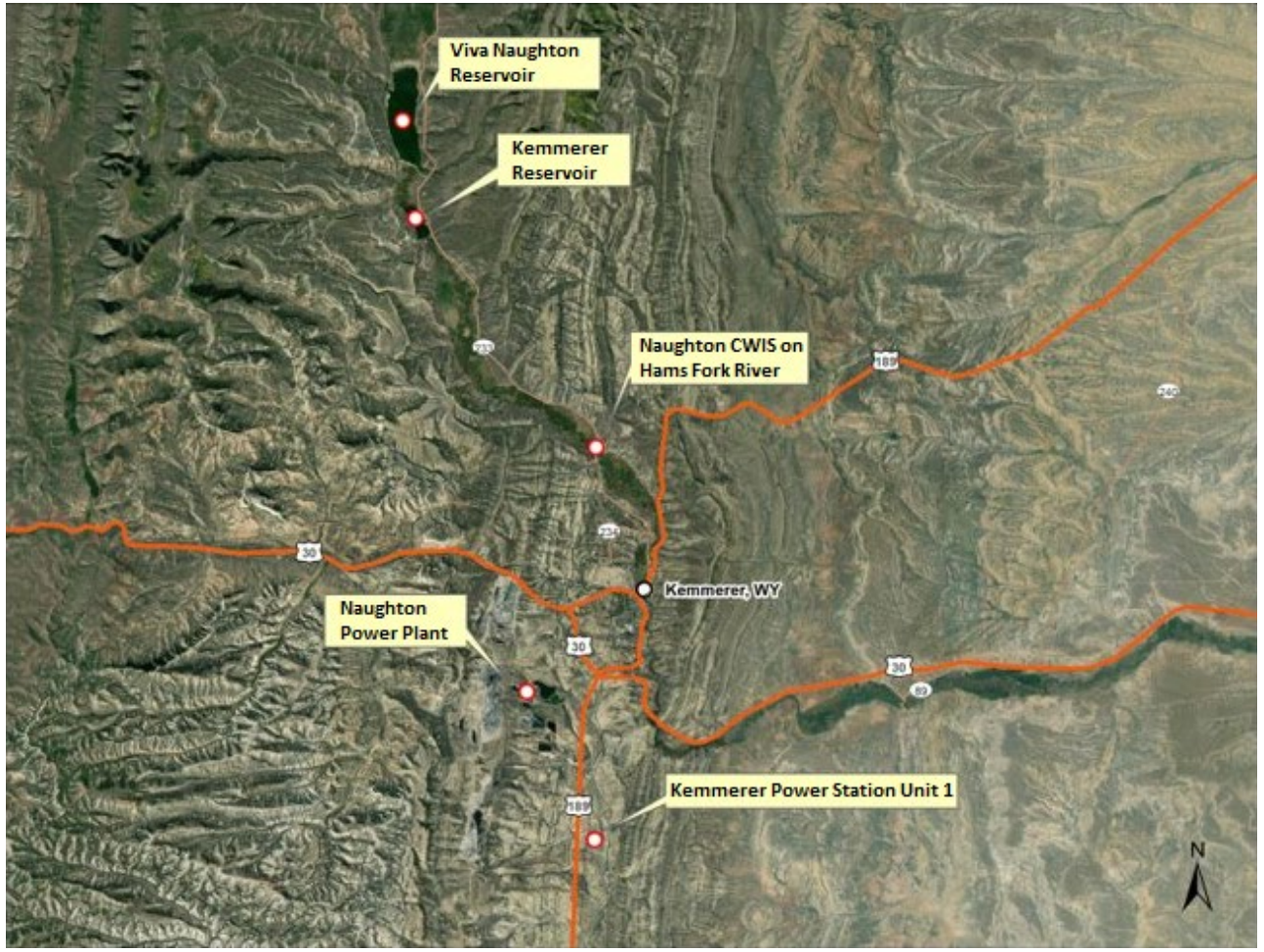
Water Source

Water Source

- Kemmerer Power Station Unit 1 (Kemmerer Unit 1) and linear facilities are located approximately 4 miles south of Kemmerer in Lincoln County, WY
- PacifiCorp owns Naughton Power Plant, a three-unit fossil fueled electricity generating site nearby to the northwest
- 2023-03-31 PacifiCorp published their most recent IRP
- Units 1 and 2 are now planned to be converted to natural gas in 2026
- Units 1-3 are now planned to operate through 2036
- Kemmerer Unit 1 is now planned to be an additional user of Naughton Power Plant's water supply and infrastructure

Water Source

- Naughton Power Plant is in the Green River Basin planning area
- PacifiCorp owns and operates Viva Naughton Reservoir, allowing for 45,465 acre-ft of water storage to regulate flow in the portion of Hams Fork River near the Naughton Power Plant CWIS
- Water taken from Hams Fork River is sent to the Naughton Power Plant Raw Water Settling Basin

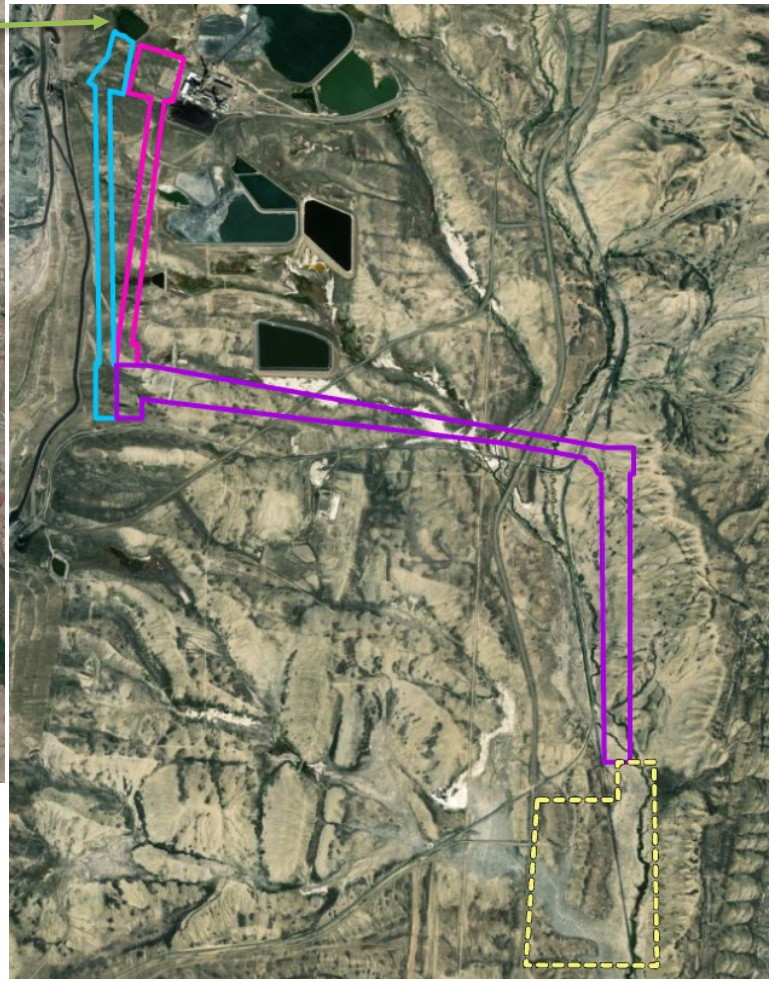


Water Source

- Water pumped from Naughton Power Plant Raw Water Settling Basin to Kemmerer Unit 1 via pipeline

- The Naughton Power Plant Raw Water Settling Basin holds approximately 75 acre-ft of water

Source: Google Earth, modified



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Water Use

Water Use

- Majority of water consumption for EI cooling

- No reliance on water for safety functions
  - Transition to coolant natural circulation
  - In-vessel primary sodium heat transport
  - Intermediate air cooling natural draft flow
  - Reactor air cooling natural draft flow always on

Water Use

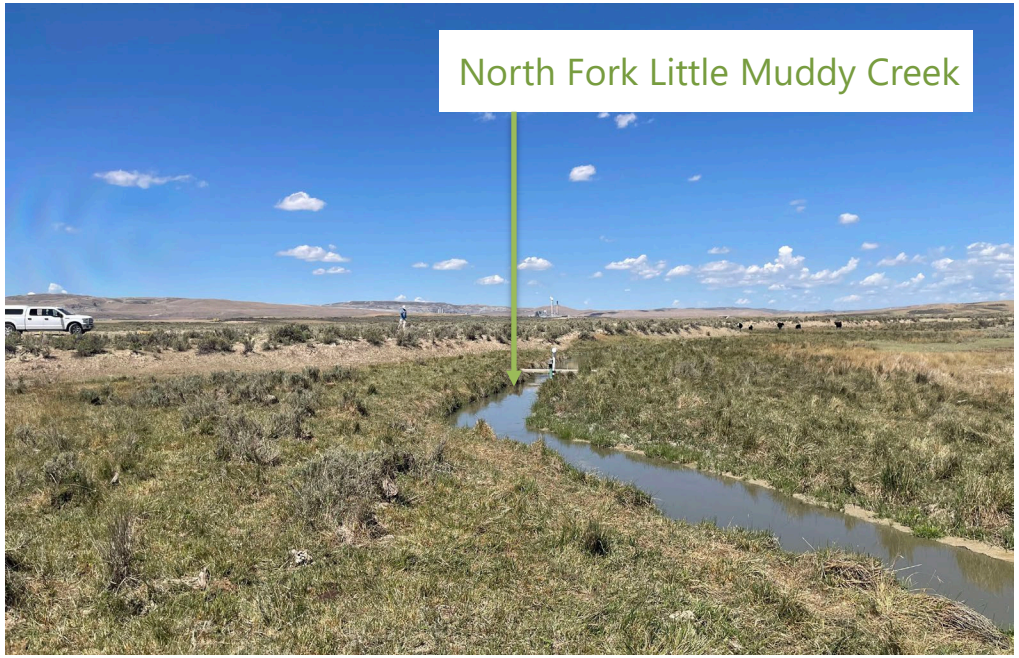
Water Uses:
- Cooling Makeup Water
- Demineralized Water for Power Cycle Makeup
- Fire Water Storage
- Potable Water

Discharged Sources:
- Cooling Tower Blowdown
- Water Treatment Reject
- Sanitary Wastewater
- Oil Water Separator

Average Water Usage Rate:
~3,689 gpm (~5,950 acre-ft/year)

Average Discharge Flow Rate:
~787 gpm (~1,270 acre-ft/year)

Source: Google Earth, modified



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Water Use

- Naughton Power Plant annual water consumption is variable
- Total average annual water use of all four units ~14,000 acre-feet per year
- Anticipated average water consumption results in ~75% increase in water use from historical average water use at Naughton Power Plant
- Represents ~30% of water storage rights

Source: 2023 Integrated Resource Plan, Volume II, Table G.1

Plant Name	Zero Discharge	Cooling Media	2019	2020	2021	2022	4-year Average
Chehalis		Air	63	66	71	47	62
Currant Creek	Yes	Air	101	95	113	85	98
Dave Johnston		Water	8,485	7,856	6,571	5,901	7,203
Gadsby		Water	281	409	339	454	371
Hunter	Yes	Water	15,808	15,103	16,326	13,426	15,166
Huntington	Yes	Water	9,028	7,929	12,019	11,717	10,173
Jim Bridger	Yes	Water	19,893	18,184	19,103	19,076	19,064
Lake Side		Water	3,894	4,075	4,421	4,591	4,245
Naughton	Yes	Water	10,195	7,622	7,236	6,929	7,996
Wyodak	Yes	Air	292	336	333	324	321
TOTAL			**68,040**	**61,675**	**66,531**	**62,551**	**64,699**

Permitting

Permitting: State Engineer's Office

- Wyoming SEO has issued to PacifiCorp water storage Permit 6418R and Enlargement Permit 7476R
  - Permit 6418R approved 42,393 acre-feet annually for storage of Hams Fork River water with a priority date August 1, 1957
  - Enlargement Permit 7476R approved an additional 3,072 acre-feet annually for storage of Hams Fork water with a priority date August 20, 1971
- By letter dated April 14, 2022, Wyoming SEO confirmed that the proposed use of Permit 6418R and Enlargement Permit 7476R for Kemmerer Power Station Unit 1 is "essentially equivalent" to the existing uses for Naughton Power Plant
  - The Wyoming SEO confirmed that no change in use or amendment to these permits is required
  - The Wyoming SEO also agreed to meet with representatives of the NRC as needed
- TerraPower and PacifiCorp are currently negotiating commercial terms of lease for initial period of NRC Operating License (40 years) with options for periods of extended operations (20 years)

Permitting: Other Water Related

- US Army Corps of Engineers
  - NWP 14[1]
- Wyoming Department of Environmental Quality
  - Industrial Siting[1,3]
  - Construction Stormwater[1]
  - Industrial Discharge[2]
  - Drinking Water[2]
- Wyoming State Engineer's Office
  - Beneficial Ground Water Use from construction dewatering[1]
- Lincoln County
  - Small Wastewater[1]

1 - Supports construction
2 - Supports operation
3 - Requires water supply and yield analysis be provided to, and an opinion rendered by, SEO

Questions?

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Acronym List

AC - Alternating Current
Aux. - Auxiliary
DOE - Department of Energy
EBR - Experimental Breeder Reactor
EI - Energy Island
FFTF - Fast Flux Test Facility
gpm - gallons per minute
HX - Heat Exchanger
Int. - Intermediate
NRC - Nuclear Regulatory Commission
NWP - Nationwide Permit
SEO - State Engineer's Office
SFR - Sodium Fast Reactor
TREAT - Transient Reactor Test