Orano

Giving Nuclear Energy
Its Full Value

Update to the DCPP CEP
April 20, 2022
End-to-end provider of safe and secure packaging, transportation, and storage solutions for nuclear and radioactive materials, including nuclear medicine.

**Engineering & Licenses**
- Product development
- Product design and Licensing
- Fab engineering
- Support to the SMR community

**Manufacturing**
- ASME steel fab
- Coating
- NQA-1
- Precast concrete

**Transportation**
- Logistics services for all materials Uranium, UF6, Fresh fuel, waste
- Innovative solutions for used fuel, rad. Waste, Future Materials (SMR, R&D…)

**Field services**
- “Pool to pad”
- Facility management
- Aging management
- Pool cleanout and core waste management
- Package fleet maintenance
Developing a new generation of targeted therapies against cancer using the unique properties of lead-212

- Combines the ability of biological molecules to target cancer cells with the short-range cell-killing capabilities of alpha emitters.
- Creating a robust pipeline of lead-212-based therapies
- Securing a robust supply chain of lead-212
- Production and R&D facilities in France and U.S.
- Technology progressing through clinical trials in U.S.
- Original raw material from Orano’s mining waste
Focus Topic:
Diablo Canyon Pool Offload
Orano Pool Offload Experience

Plant shutdown in August of 2020

- Orano TN performed full scope for engineering, licensing, fabrication and pool-to-pad (P2P)
- The 24/7 operations achieved better than 2 loadings per week utilizing only 1 set of transfer equipment
- Loaded 30 NUHOMS canisters including a custom designed failed fuel canister for a failed assembly
- Offload safely completed April 10, 2022 resulting in emptying the SFP just 20 months after plant shutdown
- Record set for SFP offload beating previous record by 30%, a full 10 months resulting in significant savings to the customer
- Achieved the offload at 92% of the dose projection

This is the fourth full pool offload performed by Orano TN since 2017 with no Safety or Regulatory issues, under the dose goal and on schedule and budget
EOS® Storage System
Selected for Diablo Canyon
SFP Offload

- 69 EOS 37PTH Dry Shielded Canisters (DSC) and 5 TN Rad Waste Canisters (RWC) for Greater Than Class C Waste (GTCC)
- The proposed system will load up to 50 kW total heat load with 4.2 kW max heat per assembly
- Higher heat load per fuel assembly will allow for offload to complete inside of 24 months from shutdown
- EOS 37PTH DSCs have been loaded at several operating sites including many canisters over 40kW
  - Davis Besse
  - Beaver Valley
  - North Anna
  - Surry
  - Millstone (Fall 2022)
  - Wolf Creek
NUHOMS® EOS™ System
Design Basis & Beyond Design Basis Capabilities

- Environmental Conditions and Natural Phenomena
- Extreme Environmental Conditions
- Blast and Airplane crash performance
- Smart Flood
- Vent blockage under extreme landslide conditions
- Beyond design basis earthquake
- Design margin under extreme heat
- Fuel Retrieval
- Monitoring and Inspection
Design Basis Earthquake

Systems are tied together in groups using high strength robust steel rods.

Center of gravity to base ratio is extremely low such that the systems will never tip over. Systems would slide to absorb the seismic energy.
DCPP ISFSI Configuration
Design Margin Under Extreme Heat

- NUHOMS EOS System is designed and licensed for a maximum heat load of 50kW per system.
- Orano TN has previously loaded EOS systems at other commercial nuclear power plants with heat loads exceeding 46kW.
- The highest anticipated heat per system at the Diablo Canyon ISFSI will be approximately 46kW.
- The average heat load for the entire project is anticipated to be less than 43kW.
- The proposed loading plan will have significant margin on heat rejection capacity of the system to accommodate for severe weather conditions “extreme heatwaves” and other beyond design basis conditions.
Canister Handling and Retrieval

- Fuel canisters will never be freely suspended under any circumstance.
- Fuel canisters are always horizontally supported on guide rails inside the HSM and Transfer Cask.
- Low profile transfer equipment is used to retrieve the fuel canister.

Each Cell is individually accessible for transport off-site.
Active Aging Management Program Ensures Compliance

Extensive analyses have shown that dry storage of used nuclear fuel is a secure method of interim storage with an Aging Management Program.

- During recent regulatory inspections of NUHOMS dry storage canisters at 6 U.S. nuclear reactor sites, no corrosion concerns or precursor indications of chloride-induced stress corrosion cracking (CISCC) were found.
- Supersonic cold spray technology can mitigate any surface degradation concerns.

Technology, innovations, and methodologies to provide safety now and into the future
In-situ Inspection and Corrosion Mitigation is Available Now to Better Inform Learning Aging Management Programs

- Fully shielded inspection and repair system eliminates the need for a pool to perform mitigation
- Tested and ready for use in 2021 at SONGS
- Full surface and volumetric examination capability (VT, UT, ECT) and Cleaning capability
- In-situ corrosion mitigation
- Advances in sensor technology will allow in-situ monitoring of systems

Technology to Inform AMPs
Transportation – Continuing the Safe Record

Multiple waste shipments from VY decommissioning to WCS in Texas for disposal using same transportation cask licensed to transport UNF stored in TN canisters

Transportation Regulations are Robust and the Systems are Proven

Orano is engaging transportation stakeholders through regional government organizations—the same way we effectively consulted with stakeholders for VY waste shipments to WCS disposal facility.
Licensed CISF Project

- Interim Storage Partners LLC, a JV between WCS and Orano, established in 2018.
- Environmental aspects analyzed for up to 40,000 MTHM in canisterized systems.
- 8 separate phases; 5,000 MTHM in each phase.
- License for 40 years with 40 year renewals.
- Operational reactor DFS systems will be added by amendment as necessary.
- Orano TN is the O&M Prime Contractor / DFS Technology provider - NAC International supplies DFS technology as well.
- NRC Part 72 Specific License granted Sept 13, 2021

Orano is committed to working with all stakeholders to bring the value and security of a CISF to the US in Place
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