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DOE's Site-Specific De-Inventory Reports

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- Snapshot of each report
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- Contractor's Recommended Next Steps
- Unique Challenges



History of Site-Specific De-Inventory Reports

- Reports are a deeper dive into the activities needed to remove spent nuclear fuel (SNF) from specific sites
 - Team led by Orano is producing the reports
 - Reports build off of NPP site evaluations
- Work on reports began in 2015 and resulted in 6 reports being completed and released in 2017
 - Big Rock Point, Connecticut Yankee, Humboldt Bay, Kewaunee, Maine Yankee, Trojan
- Five reports were on hold but are now being revised for public release
 - Crystal River, La Crosse, Rancho Seco, Yankee Rowe, Zion
- It is expected that these reports will be released in 2023

Content of Reports

- The reports have a consistent structure
 - Executive Summary
 - Introduction
 - Pertinent Site information
 - Transportation Route Analysis
 - Participating Entities
 - Multi-Attribute Utility Analysis
 - Metrics related to transportation routes, modes, transload locations
 - Concept of Operations
 - Budget and Spending Plan
 - Safety and Security Plans and Procedures
 - Emergency Response and Preparedness
 - Recommended Next Steps

Initial Site-Specific De-Inventory Report for Big Rock Point
Report No.: RPT-3014537-002

**Initial Site-Specific De-Inventory Report for
Big Rock Point**

RPT-3014537-002

Prepared by: AREVA Federal Services LLC

REVISION LOG

Rev.	Date	Affected Pages	Revision Description
000	9/29/2015	N/A	Initial Issue
001	11/13/2015	All	Responding to DOE comments
002	5/10/2017	All	Entire document revised and reformatted to match format and content of more recent de-inventory reports submitted to client. In addition, the title was revised to Initial Site-Specific De-inventory Report for Big Rock Point.

Initial Site-Specific De-Inventory Report for Big Rock Point
May 10, 2017

Plans for New Reports (FY2023)

- Five additional reports are expected to be released in the near future
- Two additional reports during Fiscal Year 2023
 - San Onofre and Vermont Yankee
- Other site specific de-inventory reports will be added as funding is available

Planning for SNF Transport

- DOE-NE has been gathering data from nuclear power plant sites
 - *Nuclear Power Plant Infrastructure Evaluations for Removal of Spent Nuclear Fuel (2021)*:
 - Includes input from site personnel, local Tribes/States, U.S. Department of Transportation (DOT), Federal Railroad Administration (FRA), and other stakeholders
 - As this work matured, DOE-NE looked for the next steps in understanding the challenges with and planning for the removal of SNF and greater-than-Class-C low-level waste (GTCC)



Photo courtesy of Connecticut Yankee



Photo courtesy of Humboldt Bay



Photo courtesy of Big Rock Point

Initial Site-Specific De-Inventory Reports

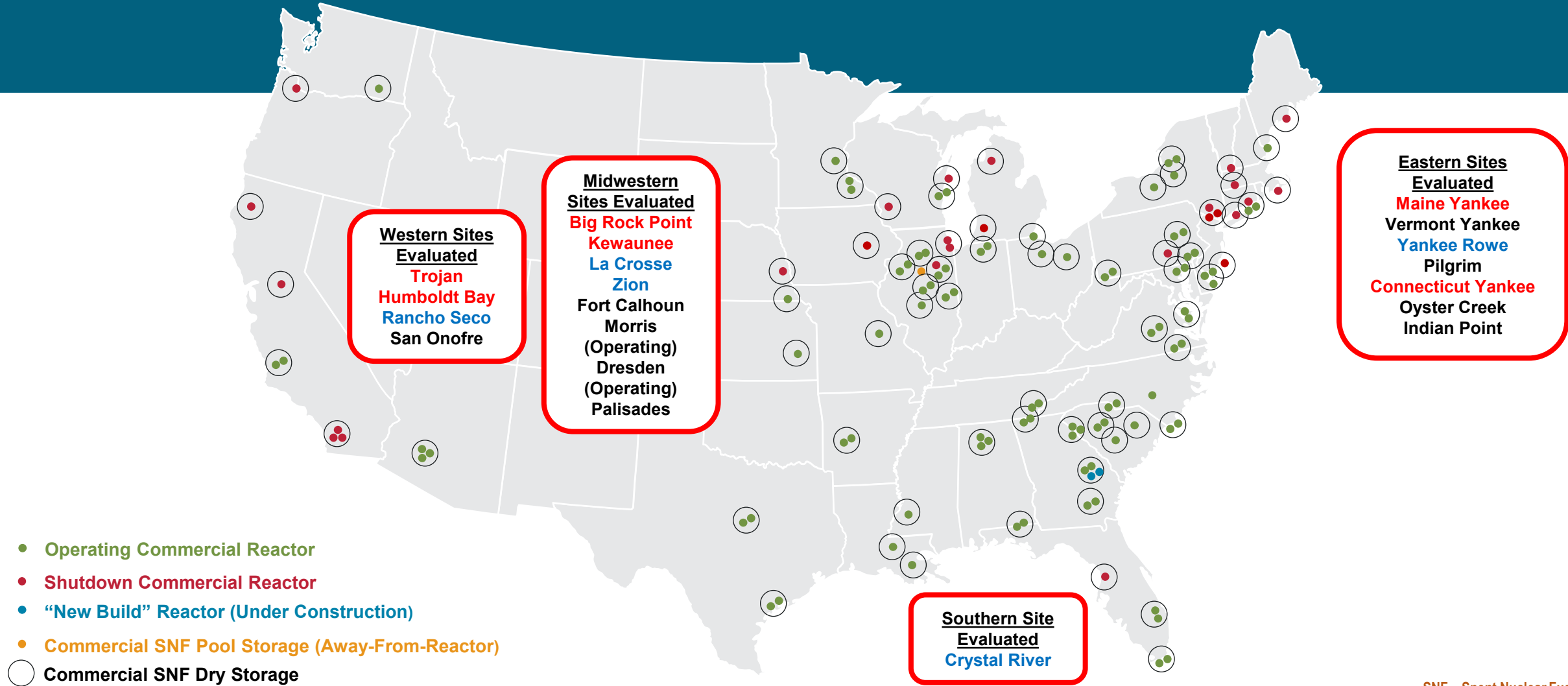
- These reports are a first look at how an integrating contractor could recommend going about removing SNF and GTCC waste from these sites
- The reports represent one contractor's perspective and do not represent DOE's plans
 - Contractor used a Multi-Attribute Utility Analysis (MUA) as a framework for future identification of preferred mode/route alternatives
 - As DOE-NE continues to develop system analysis tools (START, NGSAM, etc.), these tools can also be integrated into the decision-making process



Scope and Limitations of these Reports

- Contractor Team
 - AREVA Federal Services (now Orano Federal Services)
 - Teamed with MHF
 - Teamed with NAC for Connecticut Yankee, Maine Yankee, and Kewaunee
- Ground rules for reports
 - AREVA did not talk with nuclear power plant site personnel, State or Tribal stakeholders, or rail carriers
 - AREVA used information provided in DOE materials (*Nuclear Power Plant Site Infrastructure Evaluations*, etc.)
 - AREVA relied on staff/corporate experience
- These reports only focus on technical and logistical considerations

Locations of Commercial SNF



SNF – Spent Nuclear Fuel
 Updated October 2022

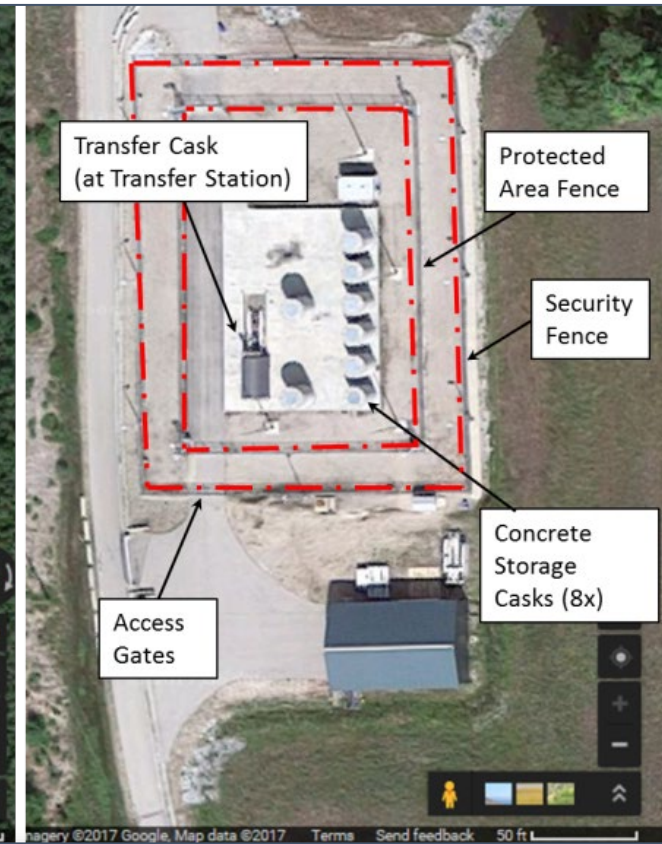
Note: Symbols do not reflect precise locations

Big Rock Point (BRP) Background

- Located on the eastern shore of Lake Michigan
 - 11 miles west of Petoskey
- Site inventory includes 8 casks
 - FuelSolutions storage systems
 - 7 SNF
 - 1 GTCC

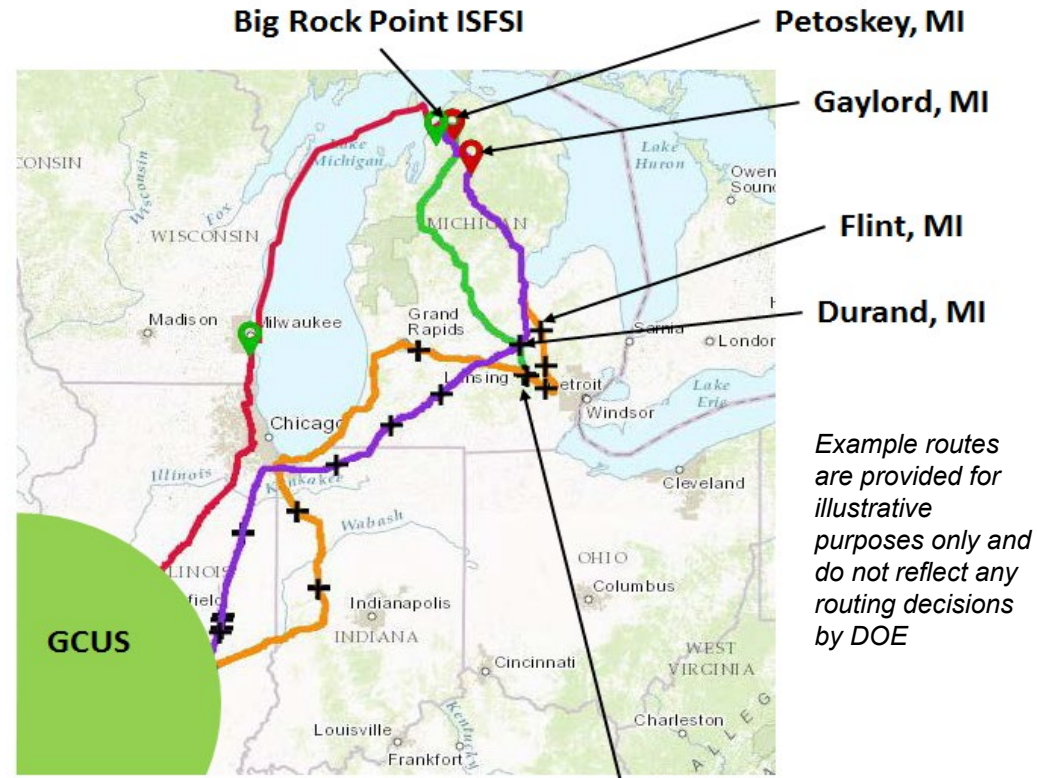


Photo courtesy of Big Rock Point

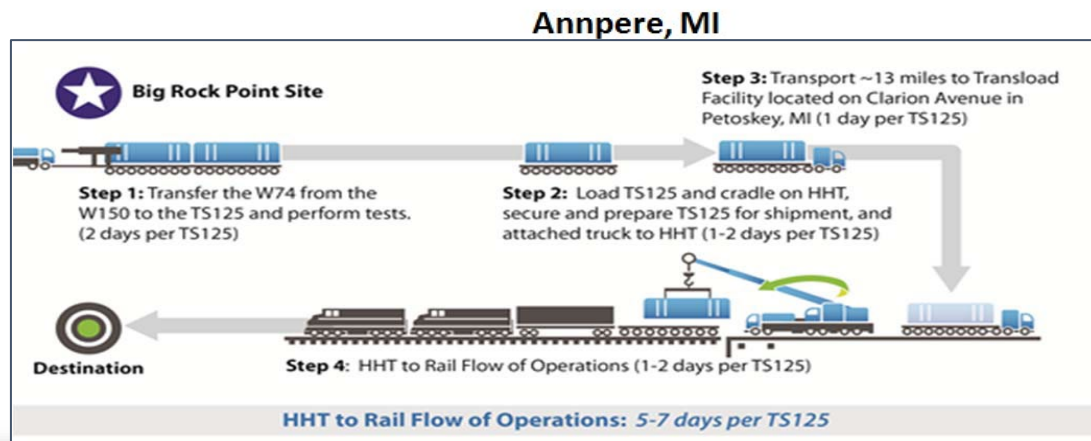


BRP operations estimated to take ~36 weeks, cost \$7.3M

- **Likely transport package: TS125**
 - ~285,000 lbs loaded
 - maximum diameter of 143.5"
- **Contractor's Recommended route/mode:**
 - Heavy-haul truck to Petoskey, local rail to Durand, Canadian National to destination/interchange
- **8 mini-campaigns of 1 cask each**
- **5-7 days per cask to get from ISFSI to rail**
- **Round-trip takes ~25 days**



Example routes are provided for illustrative purposes only and do not reflect any routing decisions by DOE



Connecticut Yankee (CY) Background

- Located on the eastern shore of the Connecticut River near Haddam Neck
 - 25 miles southeast of Hartford
- Site inventory includes 43 casks
 - NAC-MPC storage systems
 - 40 SNF
 - 3 GTCC



Photo courtesy of Connecticut Yankee



CY operations estimated to take ~60 weeks, cost \$17M

Likely transport package: NAC-STC

- ~255,000 lbs. loaded
- maximum diameter of 128"

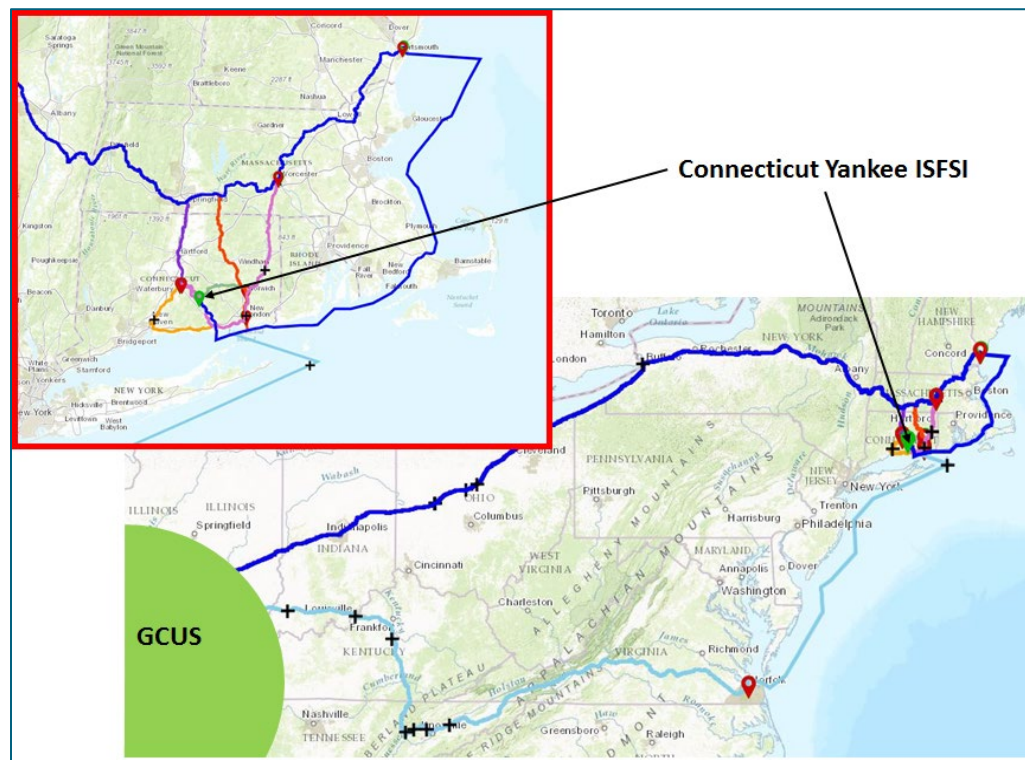
Contractor's Recommended route/mode:

- Heavy-haul truck 13 miles to rail in Portland, CT, local rail to Worcester, MA, CSXT to destination/interchange

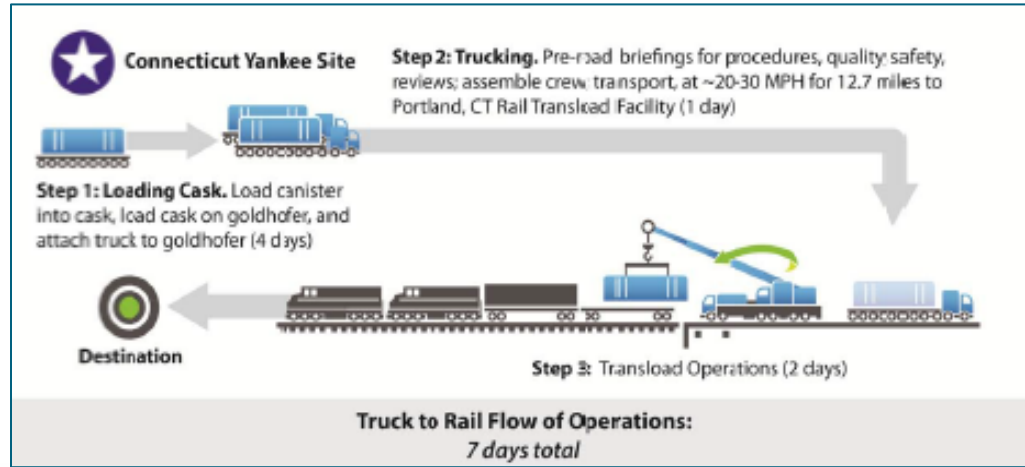
9 mini-campaigns of 4-5 casks each

~26 days for 5 casks to get from ISFSI to rail

Round-trip takes ~6 weeks



Example routes are provided for illustrative purposes only and do not reflect any routing decisions by DOE

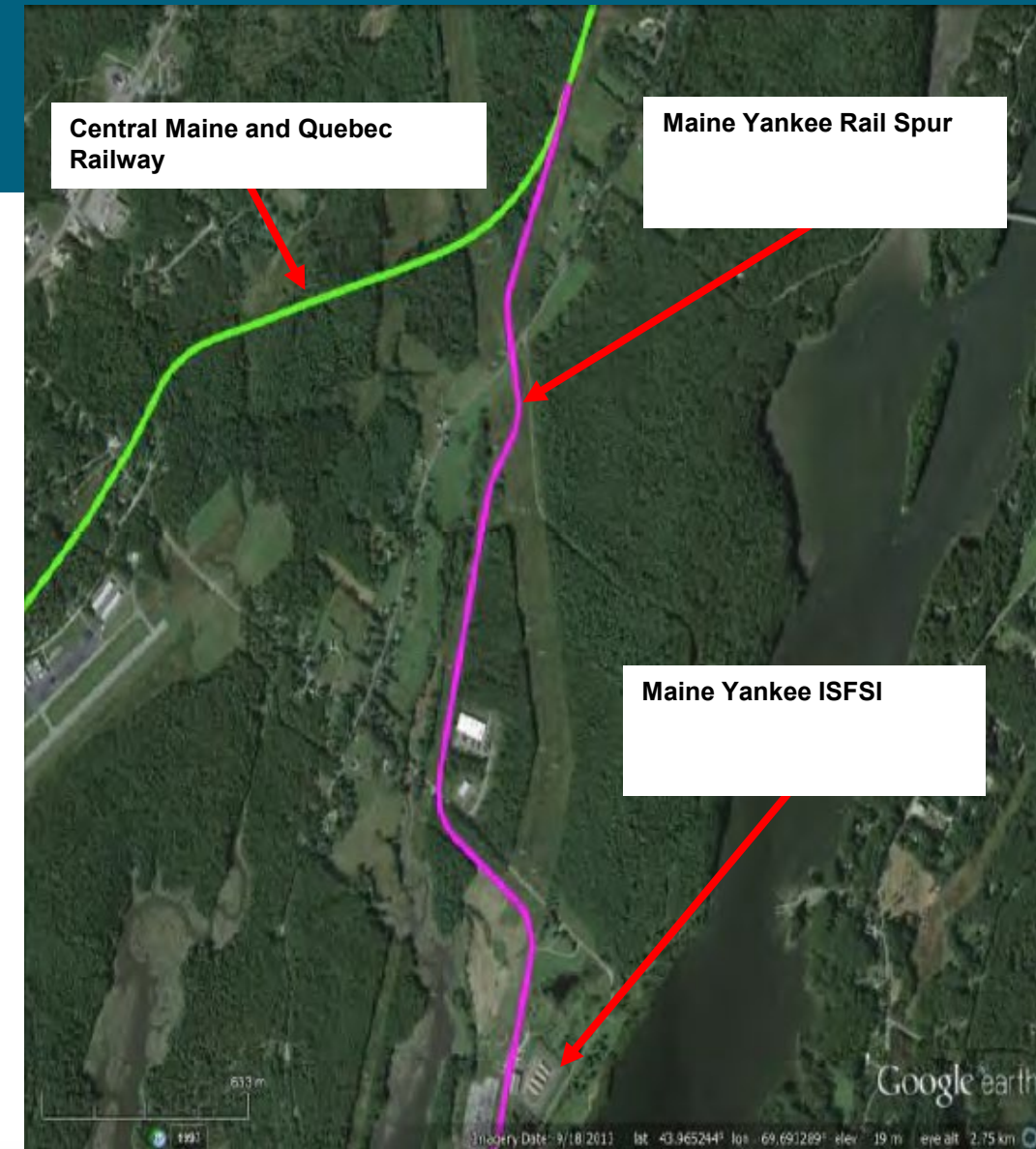


Maine Yankee (MY) Background

- Located in Wiscasset, Maine
 - 45 miles north of Portland
- Site Inventory includes 64 casks
 - NAC-UMS storage systems
 - 60 SNF
 - 4 GTCC

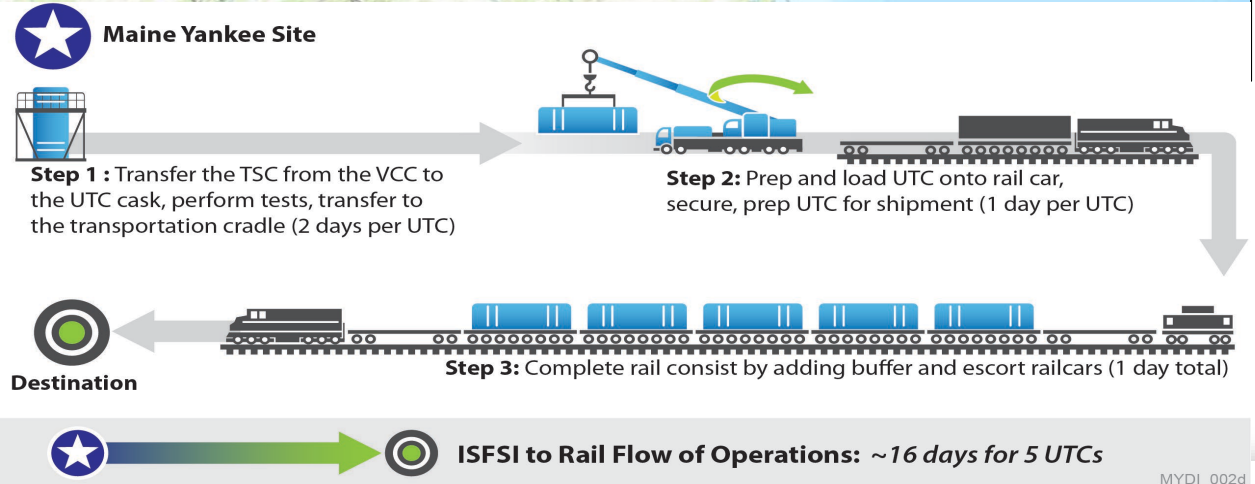


Photo Courtesy of Maine Yankee



MY Operations estimated to take 84 weeks, cost \$24.1M

- **Likely transport package: NAC-UMS**
 - ~255K lbs loaded
 - maximum diameter of 124"
- **Contractor's Recommended route/mode:**
 - Direct local rail from site to Barber's Junction, MA, CSXT to destination/interchange
- **13 mini-campaigns of 4-5 casks each**
- **~16 days for 5 casks to load onto direct rail**
- **Round-trip takes ~5 weeks**



MYDI_002d

Trojan Background

- Located in Columbia County, Oregon
 - Near Ranier, OR
- Site Inventory includes 34 casks
 - Holtec storage systems
 - 34 SNF
 - 0 GTCC

Portland and Western
Railroad

Trojan ISFSI

Columbia River

Former Reactor Site

Barge Slip Location



Photo Courtesy of Trojan

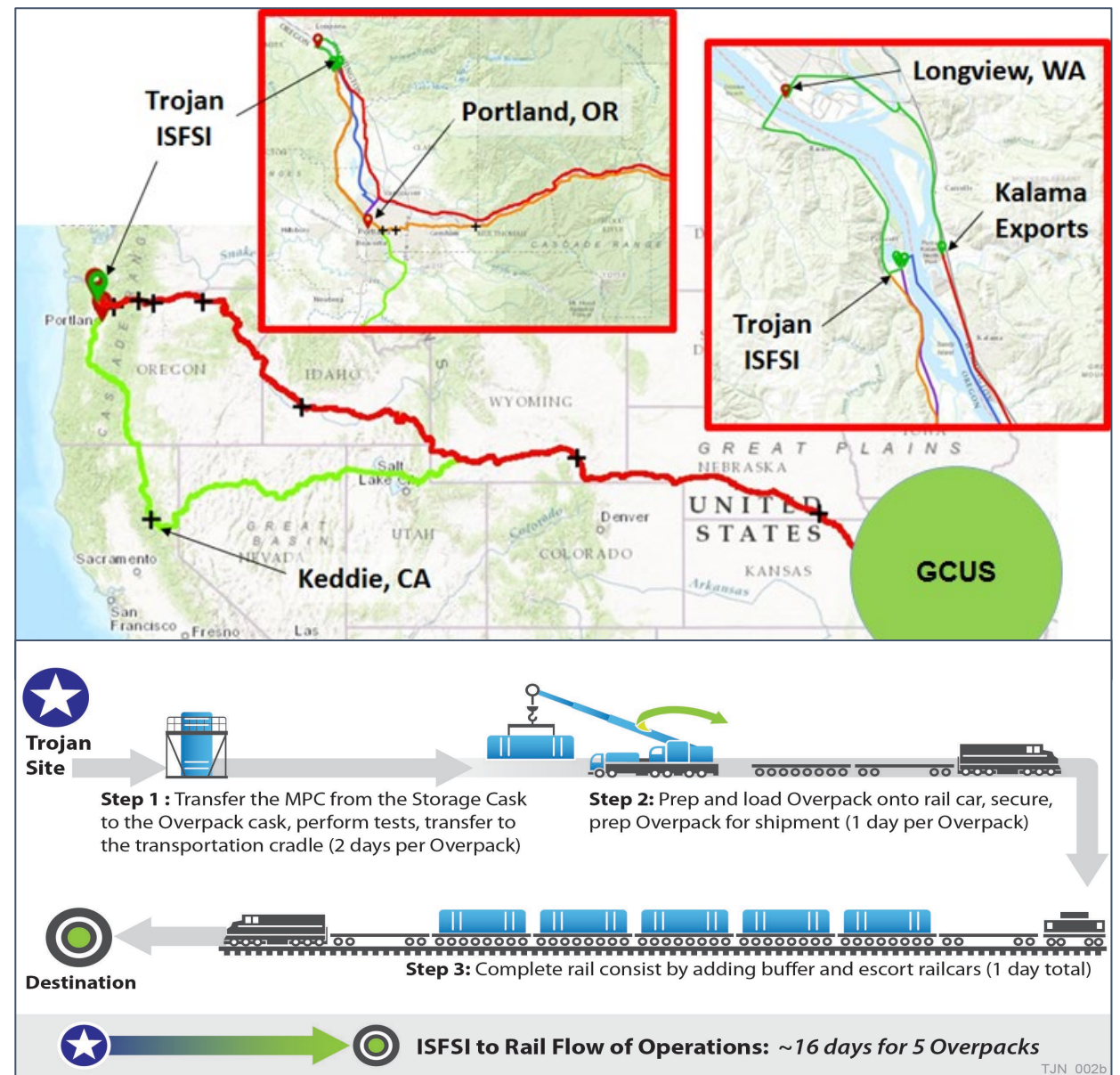


Photo Courtesy of Oregon Department of Transportation



Trojan operations estimated to take 45 weeks, cost \$11.8M

- **Likely transport package: HI-STAR 100**
 - ~280,000 lbs loaded
 - maximum diameter of 128"
- **Contractor's Recommended route/mode:**
 - Direct rail on UP to destination/interchange
- **7 mini-campaigns of 4-5 casks each**
- **~16 days for 5 casks to load onto direct rail**
- **Round-trip takes ~5 weeks**

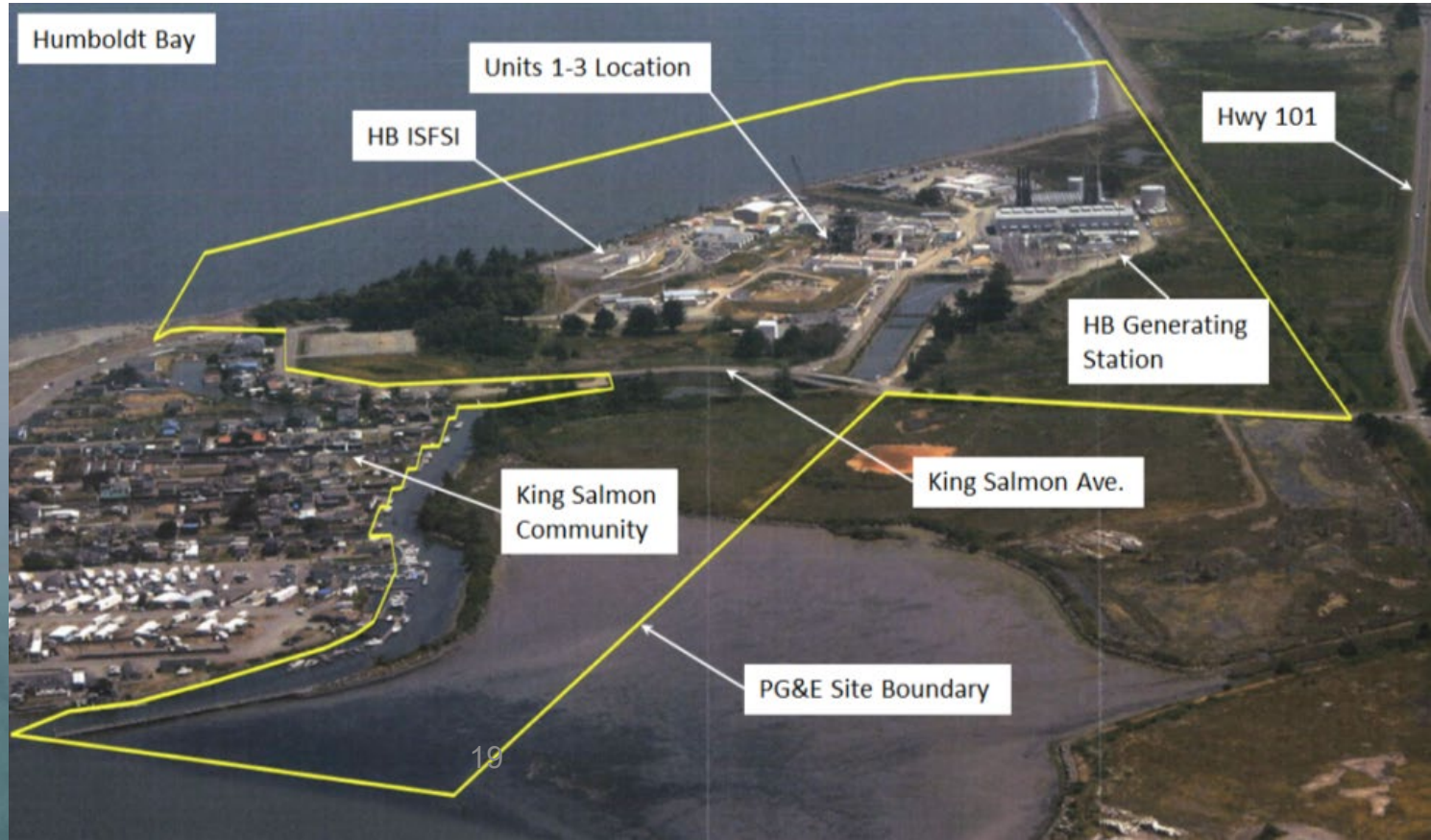


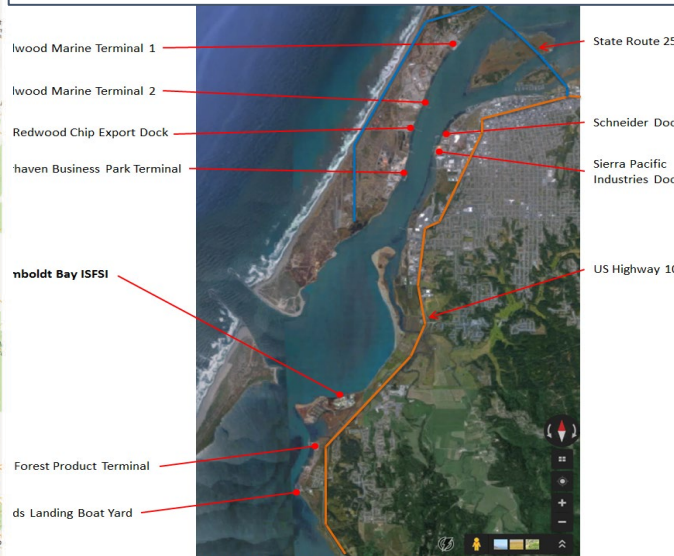
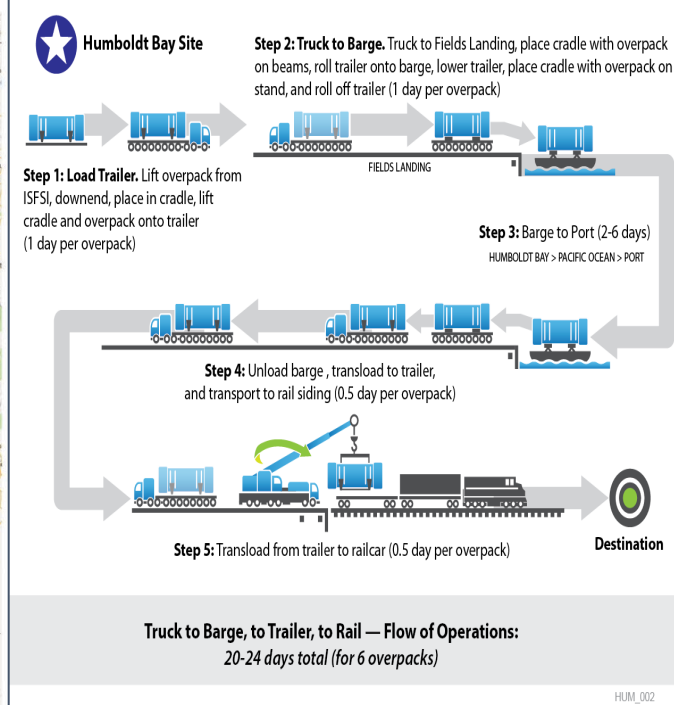
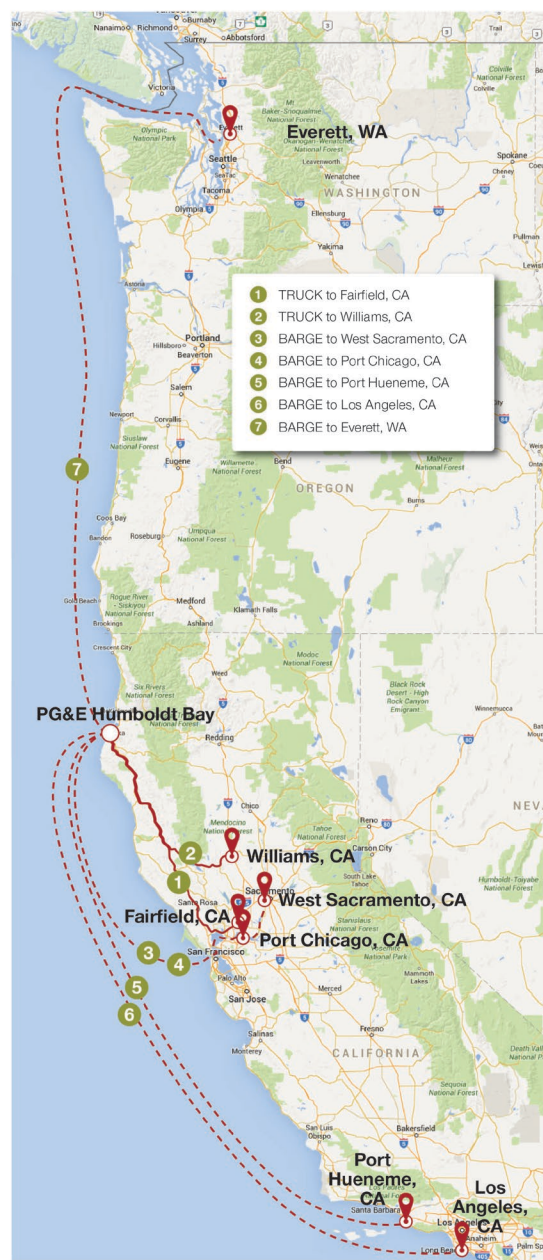
Example routes are provided for illustrative purposes only and do not reflect any routing decisions by DOE



Humboldt Bay (HB) Background

- Located on the shore of Humboldt Bay, near Eureka, California
 - ~260 miles north of San Francisco, CA
- Site inventory includes 6 casks
 - HI-STAR HB storage systems
 - 5 SNF
 - 1 GTCC





HB operations estimated to take ~5 weeks, cost ~\$2.7M

Likely transport package: HI-STAR HB

~187,000 lbs loaded
 maximum diameter of 128"

Contractor's Recommended route/mode:

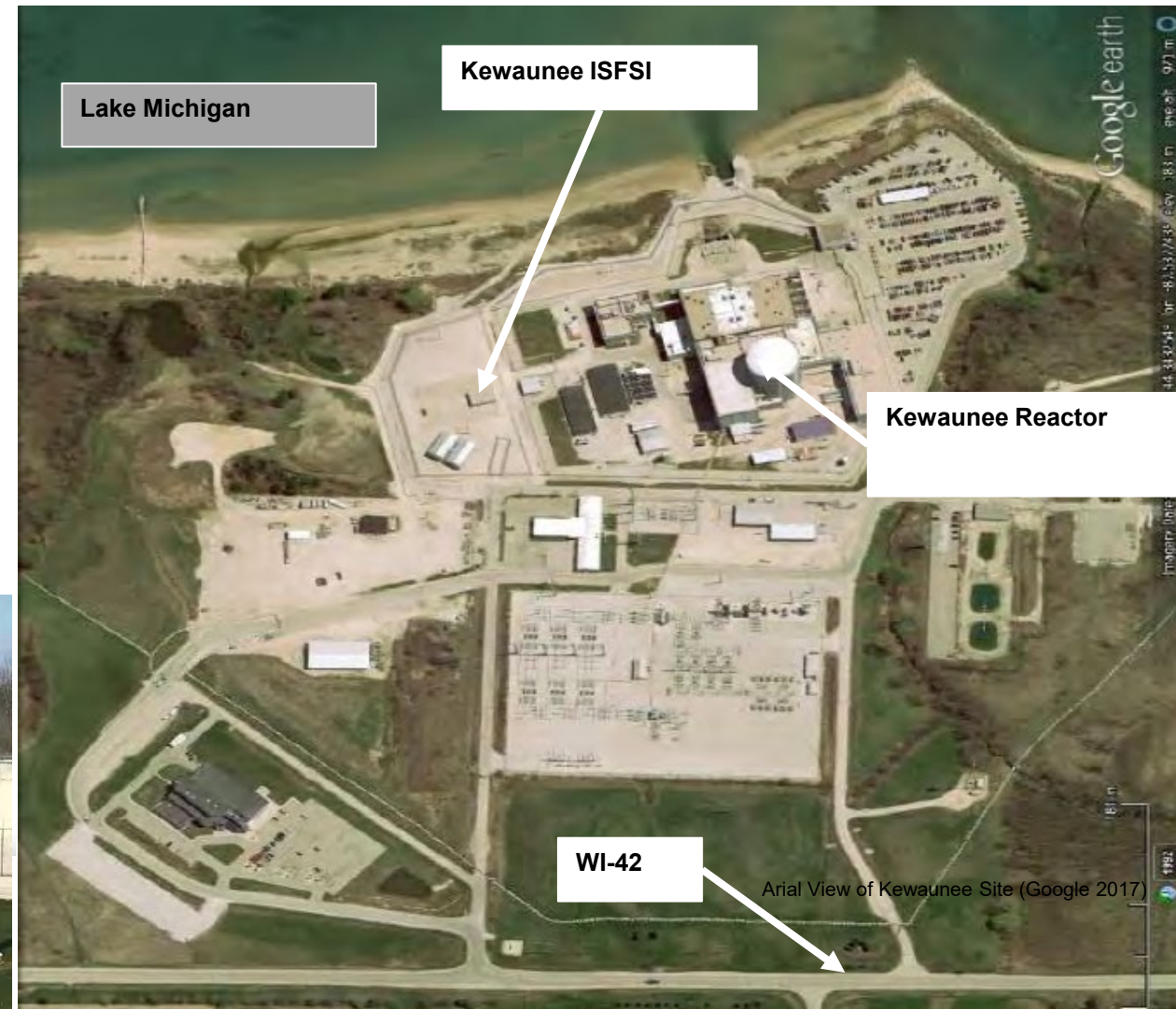
Heavy-haul truck 2 miles to Fields Landing, barge to Concord, CA, UP or BNSF rail to destination/interchange

1 campaign of 6 casks
 Transportation takes ~20-24 days

Example routes are provided for illustrative purposes only and do not reflect any routing decisions by DOE

Kewaunee Background

- Located in Kewaunee County, Wisconsin
 - 30 miles southeast of Green Bay, WI
- Site Inventory anticipated to include 40 storage units
 - Currently 38 SNF casks
 - 14 NUHOMS (32PT canisters)
 - 24 NAC MAGNASTOR (TSC-37 canisters)
 - Anticipated 2 GTCC (NUHOMS)



Kewaunee operations estimated to take 56 weeks, cost \$19.3M

Likely transport package for 32PT canisters and GTCC: MP197HB

~267,000 lbs loaded
maximum diameter of 126"

Likely transport package for TSC-37 canisters: MAGNATRAN

~312,000 lbs loaded
maximum diameter of 128"

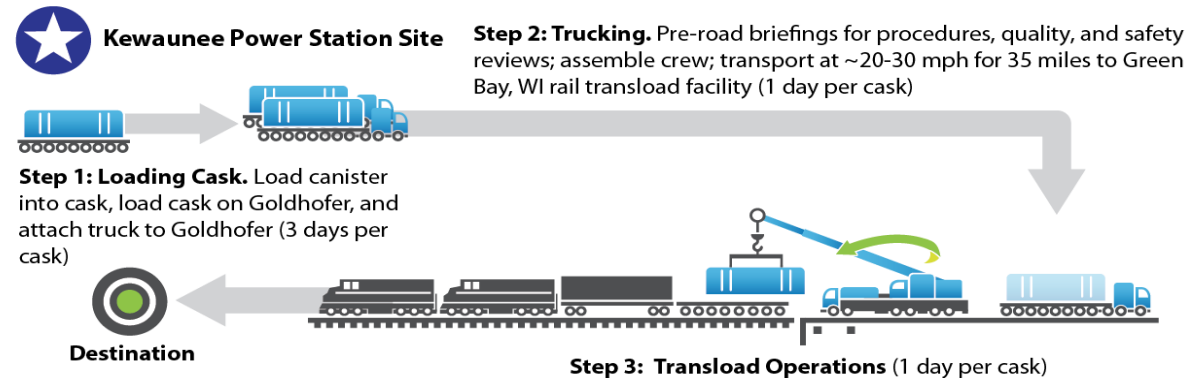
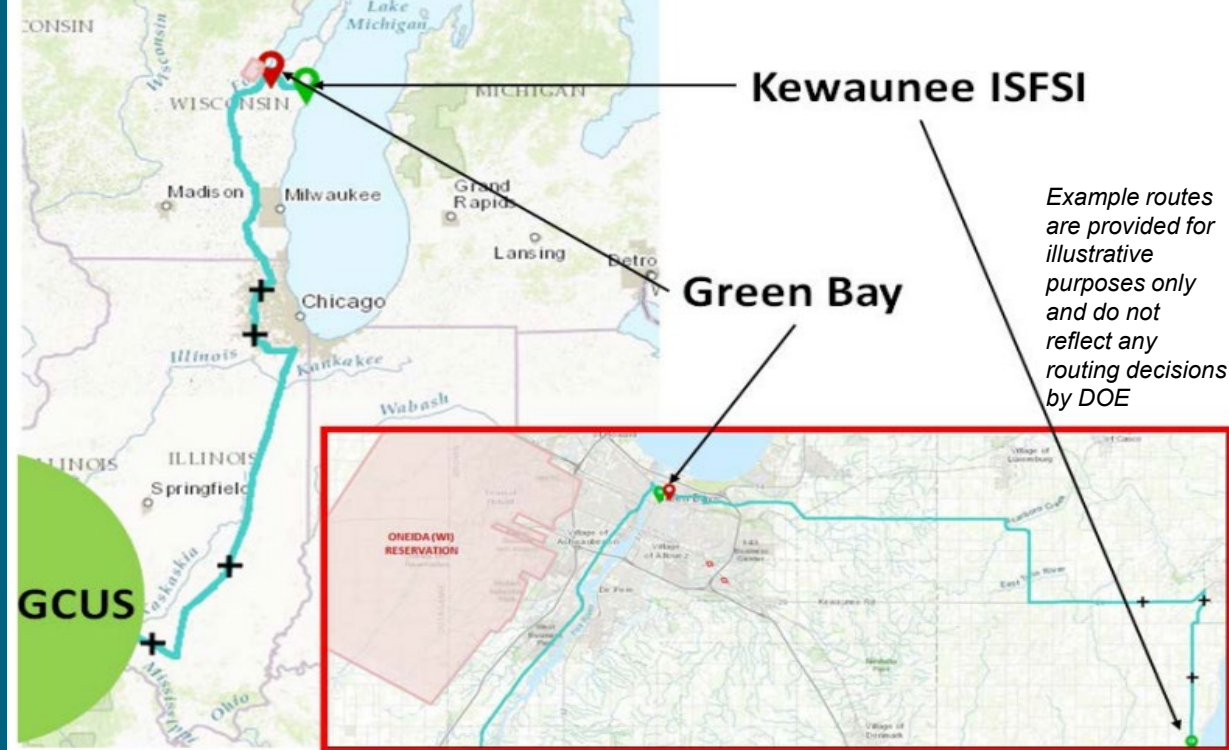
Contractor's Recommended route/mode:

Heavy-haul truck 30 miles to Green Bay, WI, Canadian National to destination/interchange

8 mini-campaigns of 4-5 casks each

~25 days for 5 casks to get from ISFSI to rail

Round-trip takes ~6 weeks



Truck to Rail Flow of Operations:
25 days for 5 casks

Technical Issues to be Addressed

- Each report included a section on “Recommended Next Steps”
- Based on data from DOE Nuclear Power Plant Site Evaluation Report, Orano’s, MHF’s, and NAC’s experience, etc.
 - NAC and ORANO experience at sites that use NAC and ORANO storage systems
 - Additional data obtained from sites as requested by Orano
 - Nuclear Power Plant Infrastructure Evaluations for Removal of Spent Nuclear Fuel leveraged earlier work of DOE-RW in Facility Interface Capability Assessment (FICA) Reports, Near-Site Transportation Infrastructure (NSTI) Reports, Services Planning Documents (SPDs), and Facility Interface Data Sheets (FIDS)

Contractor's recommended next steps applicable to many sites

- Verify dry storage canister contents allowed by transportation Certificate of Compliance (CoC)
 - Monitor status of 5-year renewal intervals
 - Verify any storage canister changes made through the 10 CFR 72.48 process have propagated to the transportation CoC
- Establish detailed equipment needs for transportation
 - Transportation casks, transfer casks, impact limiters, spacers, cradles, personnel barriers, etc.
 - Additional equipment as needed - mobile cranes, rigging equipment, etc.



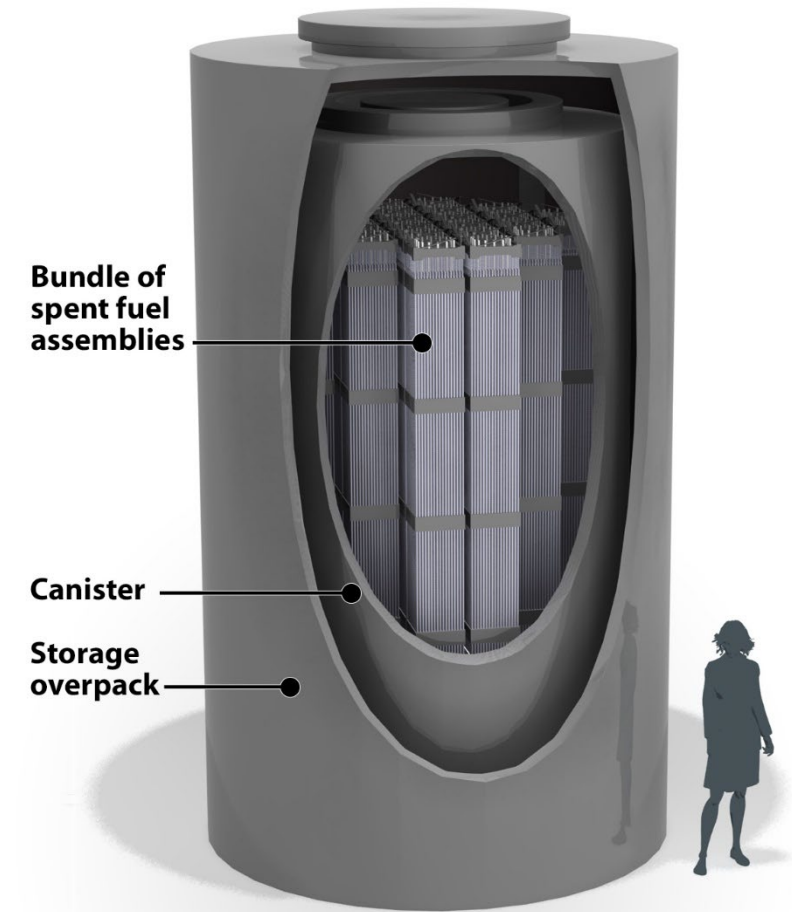
Contractor's recommended next steps applicable to many sites continued

- Establish electrical power requirements for performing operations and verify availability at the site
- Establish/re-establish on-site and near-site infrastructure
- Conduct route clearances and permitting for heavy-haul routes
 - If barge used, dredging may be required, which may require permits



Unique Challenges

- Big Rock Point:
 - Update TS125 transportation CoC to allow for fabrication (-85 to -96) and to allow for GTCC waste, **OR**
 - Modify transportation CoC for another transportation cask to allow transport of W74 canisters



ORNL 2015-G00467/aas

Unique Challenges continued

- Humboldt Bay:
 - Identified that revision of transportation CoC for HI-STAR HB would be required to allow transport of SNF with lower enrichments and GTCC waste
 - Revision completed
 - Potential issues associated with fuel channel thickness and lid bolts with reduced effective thread length
 - Clarification on need to perform vacuum drying, helium backfill, or leak-testing of GTCC waste containing cask prior to transportation
 - Using existing vertical cask transporter (shared with Diablo Canyon)



Photo from Holtec International

How will the information in a site-specific de-inventory report be used for future transportation planning?

- **Information in the de-inventory reports is being used to identify common challenges across sites, and to identify unique challenges at individual sites**
 - Data needs from de-inventory reports are being fed back to Nuclear Power Plant Site Evaluations
- **Information can inform future transportation planning**
 - Reports have identified SNF issues that in some cases have already been addressed by transportation cask vendors
 - Multi-Attribute Utility Analysis (MUA) provides a structured method for evaluating and comparing potential transload locations
 - Data contained in reports are being used in system modeling

Lessons Learned

- **What are the key lessons learned from preparing the site-specific de-inventory reports that can benefit operators of waste storage sites?**
 - Reports have highlighted the importance of preserving transportation infrastructure to enable removal of SNF
 - Transportation CoC changes may be required to transport SNF from some sites
 - In some cases, these transportation CoC changes will be driven by the 72.48 process, and will need to be considered in SNF storage at Federal or private Interim Storage Sites
 - Virtual meetings with sites now being used to verify and clarify information
- **Have these lessons learned been shared with the nuclear utilities?**
 - First 6 reports have been widely shared with nuclear utilities and transportation cask vendors, typically through participating in conferences
 - Five upcoming reports will be posted publicly

Summary

- Initial Site-Specific De-Inventory Reports build on nuclear power plant site evaluation work DOE has conducted
- Provide proposed next steps, activities, interfaces, schedules, and estimated costs for removing fuel from the sites
- Some sites have unique challenges
- No “showstopper” technical issues identified among the six sites



Questions?

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