Barry Miles

Deputy Director, Reactor Refueling

Naval Nuclear Propulsion Program

Naval Nuclear Propulsion Program

Overview of Naval Nuclear Propulsion Program (NNPP)

Overview of Container Shipments

Shipping Container Accident Exercises

M-290 Spent Fuel Shipping Container

NNPP Background

- **Naval Nuclear Propulsion Program founded in 1948**
- **Currently operating:**
  - 96 reactors (compared to 99 for the US commercial industry)
  - 10 nuclear powered aircraft carriers (two more under construction)
  - 72 submarines (four more under construction)
  - Two land based prototypes
  - Two Moored Training Ships
- **Nuclear-powered warships comprise more than 45% of all the Navy's major combatants**

NAVAL NUCLEAR PROPULSION PROGRAM

NAVAL REACTORS

480 people

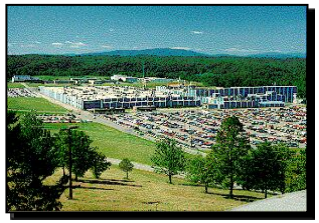
Field Offices

REPORT TO DIRECTOR
- Ensures focus on mission
- Immediate identification of concerns

NAVAL REACTORS FACILITY

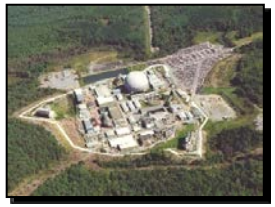
- Dry Storage Program
- Expended Core Facility

DEDICATED LABORATORIES
- Bettis Atomic Power Laboratory
- Knolls Atomic Power Laboratory
- GOCO



SPECIALIZED INDUSTRIAL BASE

- 1 dedicated equipment prime contractor
- Hundreds of suppliers



R&D/TRAINING REACTORS - Train 3000 students/year

NUCLEAR POWERED FLEET
- 82 warships
- About 45% of major combatants

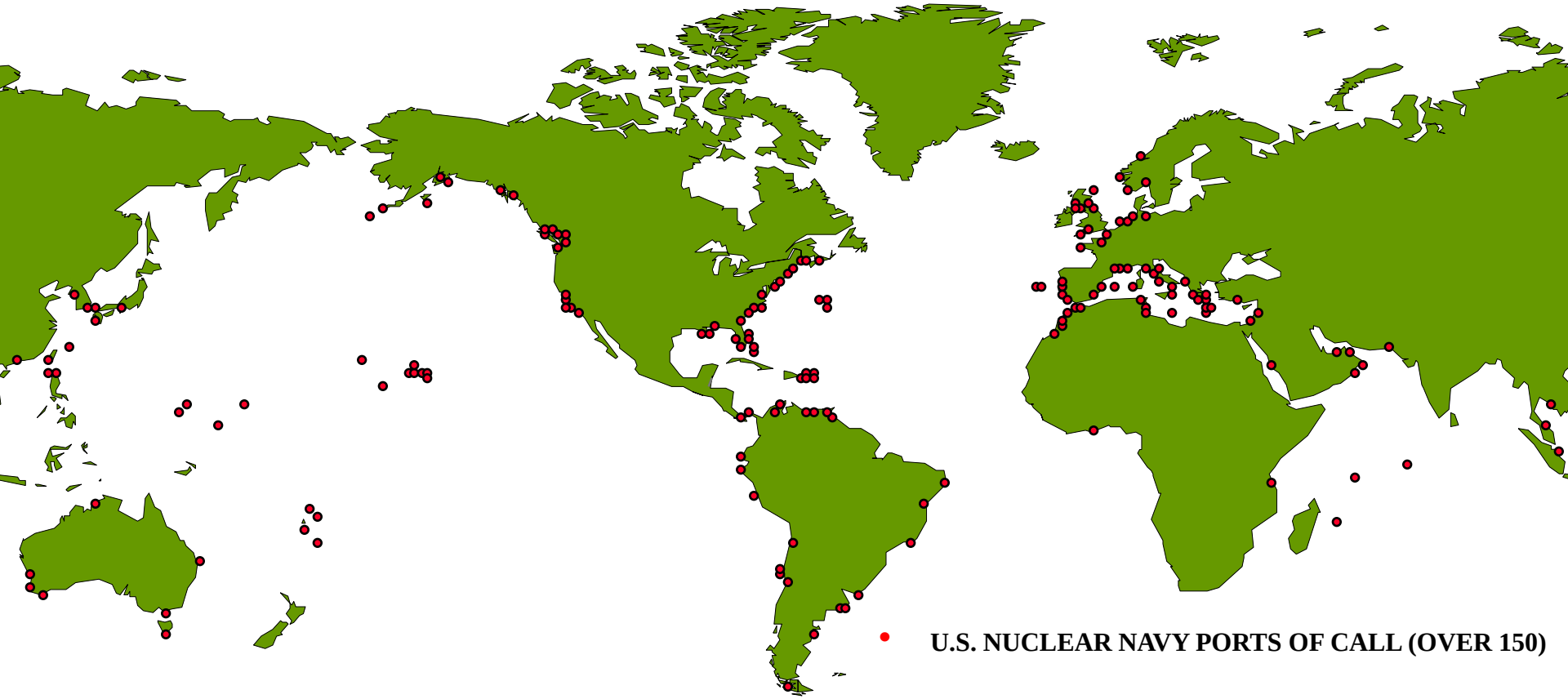
SHIPYARDS

4 Public / 2 Private

SCHOOLS
- Nuclear Power School
- Nuclear Field “A” School

96 reactors operating worldwide

World-Wide Access and Demonstrated Safety Record



- World-wide operation, visiting over 150 ports in over 50 countries and dependencies.
- Over 6,700 reactor-years of operating experience without a reactor accident or any problem causing a significant effect on the environment.
- Over 156 million miles safely steamed by nuclear-powered ships.

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NNPP Reactor Core Component Shipments

- For over 60 years, NNPP shipments of reactor core components have traveled safely throughout the United States by rail.
- Two types of shipments:
  - New components not yet installed in a propulsion plant
  - Used components removed from a propulsion plant (spent fuel)
- All shipments classified (security) and invoke the Department of Transportation (DOT) National Security Exemption (49CFR173.7b).
  - Radioactive labels and placards not used.
  - Shipping papers supplied to the railroads do not identify all information normally provided by the DOT regulations.
    - NRLFO shipment couriers have all required DOT information.
  - No advance notification

New Component Boxcar

- Metal shipping containers mounted/tied-down inside boxcars.
- Boxcars locked and sealed.
- Radioactivity release and increased radiation levels not issues for new components.

New Component Flatcar and Shipping Container

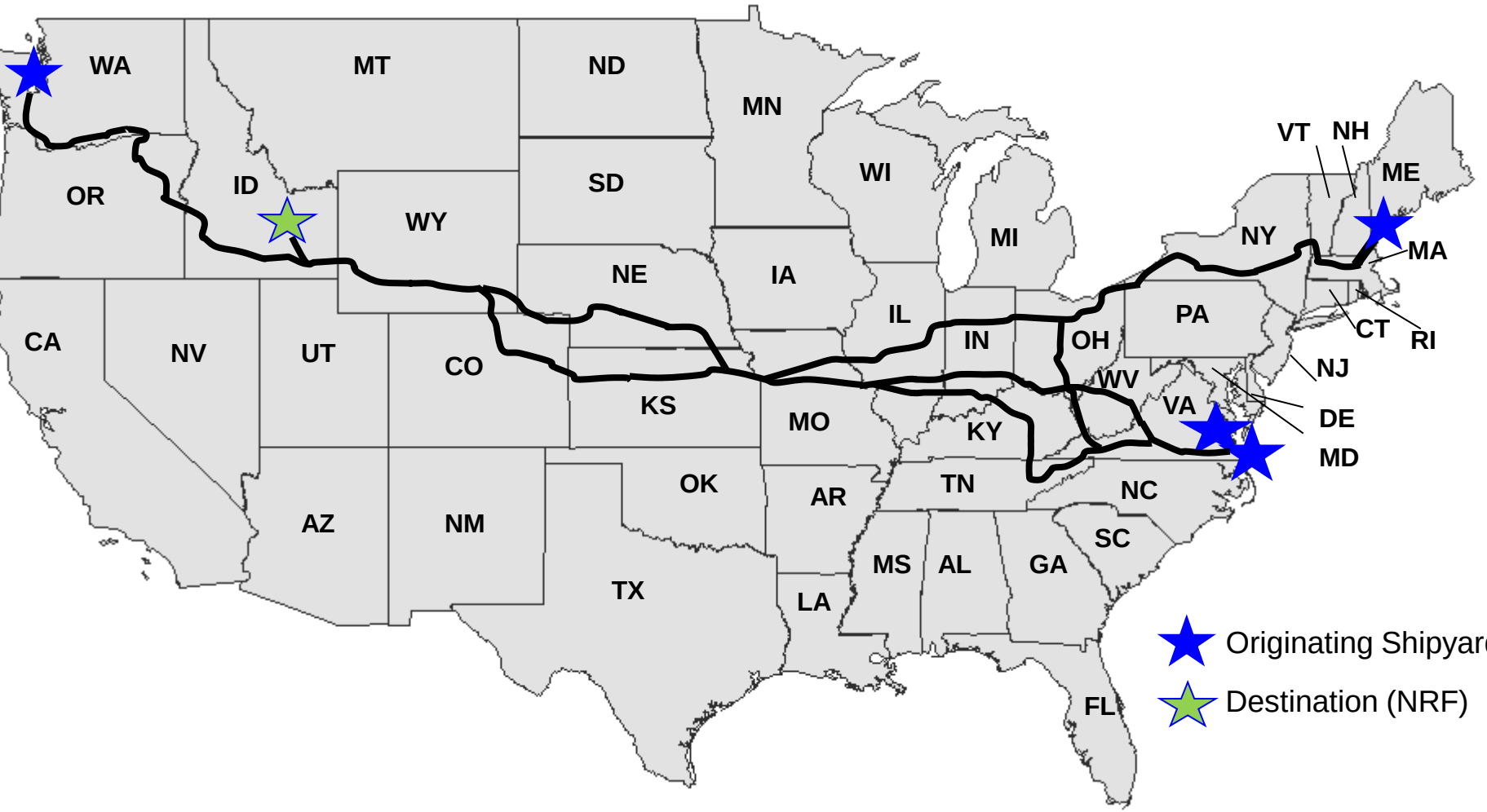
- **Large, heavy self-protecting.**
- **Radioactivity release and increased radiation levels <u>not</u> issues for new components.**

Naval Spent Fuel Cycle

- **Upon refueling/defueling, all naval spent fuel transported by rail to Program's facility in Idaho for examination to:**
  - Ensure maximum performance of current fuel
  - Enable design of new fuel with longer lifetimes
- **For perspective:**
  - First nuclear powered submarine fuel operated 2 years
  - Current fuel operates for 33 years – the life of an attack submarine
- **Fuel is stored temporarily pending disposal in geologic repository or interim storage site.**

Naval Spent Fuel Shipping Routes

844 CONTAINERS SAFELY SHIPPED
(March 1957 to Present)



Shipment Safety

- **Nature of the Fuel**
  - **Rugged**
- **Shipping Containers**
  - **Robust**
- **Shipping Practices**
  - **Couriers**

NAVAL SPENT FUEL SHIPMENTS ARE SAFE

Naval Fuel Characteristics

- Solid metal; not flammable, explosive, or corrosive
- Built for combat battle shock conditions (well over 50g's)
- Contains fully all long-lived radioactivity (fission products)
- Safe to operate in close proximity to sailors on warships

EXCEPTIONALLY WELL-SUITED FOR SAFE TRANSPORT AND STORAGE FOR LONG PERIODS

Naval Spent Fuel Type B Shipping Containers

- Models M-140 and M-290:
  - o Type B NRC/DOE Certified
  - o At least 10” thick solid stainless steel
  - o 350,000 and 520,000 pounds (loaded), respectively

- Thick, solid steel typically results in radiation levels much lower than the safe maximum DOT limits:

	DOT Limit	Naval Container	Typical Chest X-Ray
On contact	200 mR/hr	1 to 5 mR/hr	10 mR
At 2 meters	10 mR/hr	.1 to .5 mR/hr	

- Everyday life exposure to radiation:
  - o ~300 mr/yr – soil, rocks, cosmic rays, radon (Source: NCRP Report No. 160)

M-140 Naval Spent Fuel Shipping Container

M-290 Naval Spent Fuel Shipping Container

Shipping Practices

- Railcars inspected and maintained at highest standard
- Location and status constantly monitored via satellite tracking
- Advance arrangements with railroad operations and railroad police
- Outreach with civilian authorities, e.g., accident exercises

ESCORT VEHICLE

- Escorted by specially trained NNPP shipment couriers
  - 24/7 surveillance
  - Immediate emergency response

Accident Derailment Response

Emergency Response Priorities:

- Emergency first-aid
- Summon assistance
- Prevent further injury/damage
- Verify radiological condition

NNPP Couriers assist Incident Commander:

- Shipper Specialist Employee (29CFR1910.120)
- Response priorities
- Communications and public information

ROBUST SHIPPING CONTAINERS PROVIDE A FORMIDABLE BARRIER TO PREVENT RELEASE OF RADIOACTIVE MATERIAL OR SIGNIFICANT RADIATION LEVELS

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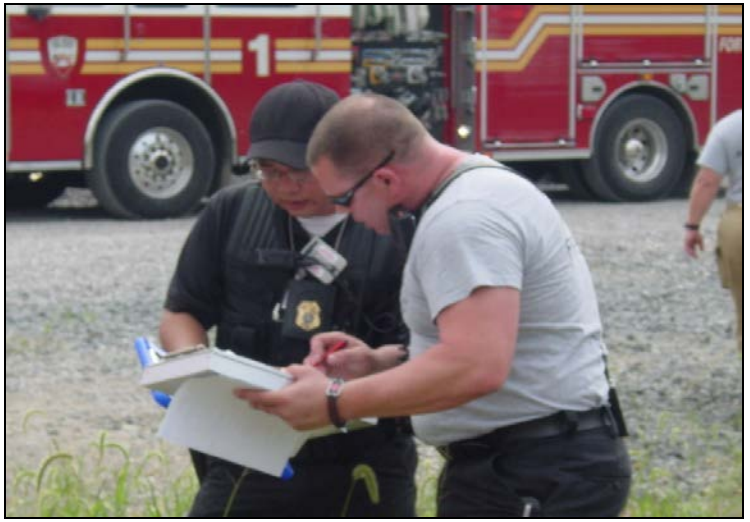
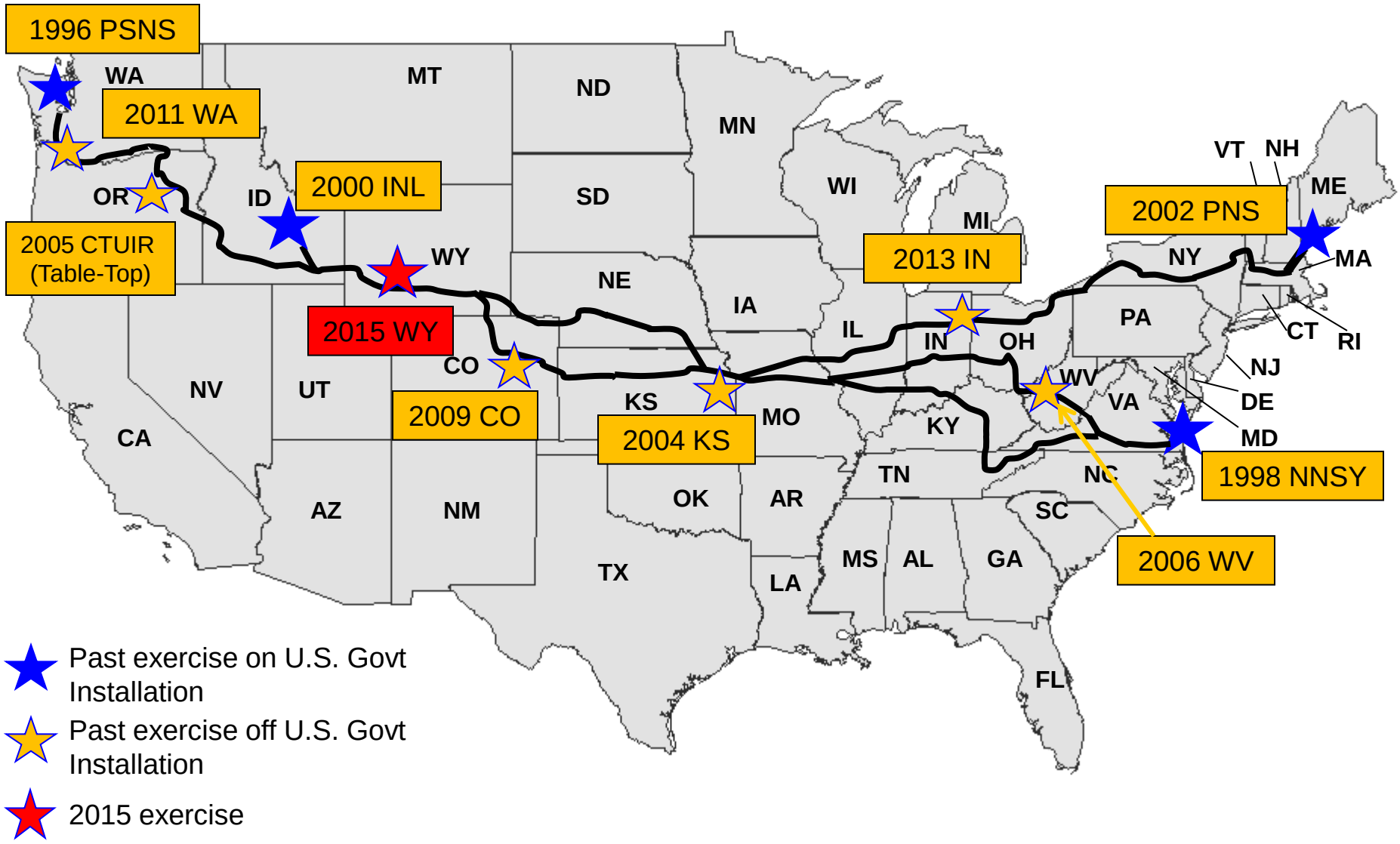
Naval Spent Fuel Shipment Exercise Objectives

- Familiarize stakeholders with Naval spent fuel shipping container characteristics and shipping practices.
- Evaluate the interactions of NNPP couriers accompanying spent fuel shipments and civilian emergency services representatives.
- Gain an understanding of how communication links would be activated in an accident involving a Naval spent fuel shipment.
- Evaluate the NNPP's ability to integrate into Unified Command and the Joint Information Center (JIC) (if established).



Naval Spent Fuel Shipment Exercises

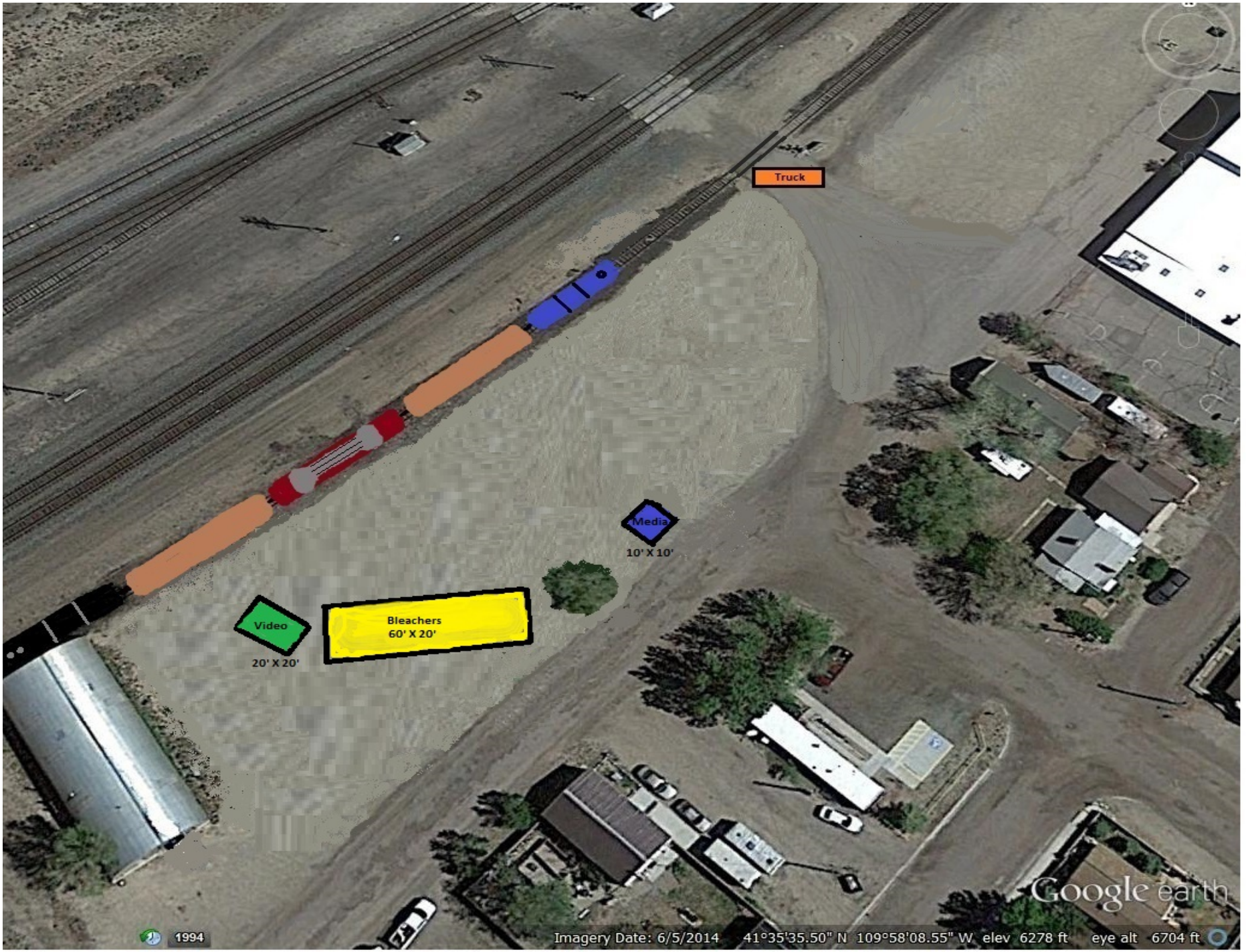


Summary of 2015 Wyoming Exercise Planning

- Site Assessment – 15 October 2014
- Initial Planning Conference – 2 April 2015
- Exercise Planning Conference #2 – 7 May
- Tabletop Exercise – 29 July
- Full Scale Exercise – 13 August
- Final Demonstration – 17 September

2015 Wyoming Exercise Scenario

- Naval spent fuel shipment en route from Newport News VA to the Naval Reactors Facility in Idaho- escorted by two NNPP couriers
- Dump truck collides with the M-290 container railcar at a railroad crossing in Granger, WY ; one truck is derailed
- Driver is injured
- Communications between shipper (NNPP), Union Pacific Railroad, local responders, and State of Wyoming
- Unified Command established
- Local media and resident approach the scene
- Radiological surveys – NNPP couriers and Rock Springs Regional Emergency Response Team
- Radiological condition normal; re-rail and continue shipment


Truck
Media
10' X 10'
Video
20' X 20'
Bleachers
60' X 20'
Google earth
1994
Imagery Date: 6/5/2014 41°35'35.50" N 109°58'08.55" W elev 6278 ft eye alt 6704 ft

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M-290 Loading Facility – Newport News

Pineapple Event
May 6, 2014


PROSPORT
Express
ALWAYS THERE, ALWAYS ON TIME
Great Dane

Naval Nuclear Propulsion Program

Operating naval nuclear propulsion plants and shipping naval spent fuel safely for over 50 years. Key to the U.S. Navy continuing to meet its national security mission.

Questions:
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