Barry Miles
Deputy Director, Reactor Refueling
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
• 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

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

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

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

SCHOOLS
- Nuclear Power School
- Nuclear Field "A" School

SHIPYARDS
4 Public / 2 Private

SPECIALIZED INDUSTRIAL BASE
- 1 dedicated equipment prime contractor
- Hundreds of suppliers

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

NAVAL REACTORS
- Dry Storage Program
- Expended Core Facility

Field Offices

96 reactors operating worldwide
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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Shipping Container Accident Exercises

M-290 Spent Fuel Shipping Container
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
Metal shipping containers mounted/tied-down inside boxcars.

Boxcars locked and sealed.

Radioactivity release and increased radiation levels not issues for new components.
- Large, heavy self-protecting.
- Radioactivity release and increased radiation levels not issues for new components.
• 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.
844 CONTAINERS SAFELY SHIPPED
(March 1957 to Present)

Naval Spent Fuel Shipping Routes

- Originating Shipyard
- Destination (NRF)
NAVAL SPENT FUEL SHIPMENTS ARE SAFE

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

Shipment Safety
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:

<table>
<thead>
<tr>
<th></th>
<th>DOT Limit</th>
<th>Naval Container</th>
<th>Typical Chest X-Ray</th>
</tr>
</thead>
<tbody>
<tr>
<td>On contact</td>
<td>200 mR/hr</td>
<td>1 to 5 mR/hr</td>
<td>10 mR</td>
</tr>
<tr>
<td>At 2 meters</td>
<td>10 mR/hr</td>
<td>.1 to .5 mR/hr</td>
<td></td>
</tr>
</tbody>
</table>

• Everyday life exposure to radiation:
  o ~300 mr/yr – soil, rocks, cosmic rays, radon (Source: NCRP Report No. 160)
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
- Escorted by specially trained NNPP shipment couriers
  - 24/7 surveillance
  - Immediate emergency 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
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

- 1996 PSNS
- 2011 WA
- 2005 CTUIR (Table-Top)
- 2000 INL
- 2015 WY
- 2009 CO
- 2004 KS
- 2002 PNS
- 2013 IN
- 1998 NNSY
- 2006 WV

Past exercise on U.S. Govt Installation
Past exercise off U.S. Govt Installation
2015 exercise
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
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M-290 Spent Fuel Shipping Container
M-290 Shipping Container
M-290 Shipping Container
M-290 Loading Facility – Newport News
Pineapple Event
May 6, 2014
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:
Barry Miles
Manager, Spent Fuel Transportation
Naval Nuclear Propulsion Program
Barry.Miles@navy.mil; 202-781-5921