

STURGIS Barge Decommissioning Project

U.S. Army Corps of Engineers

Nov. 17, 2014



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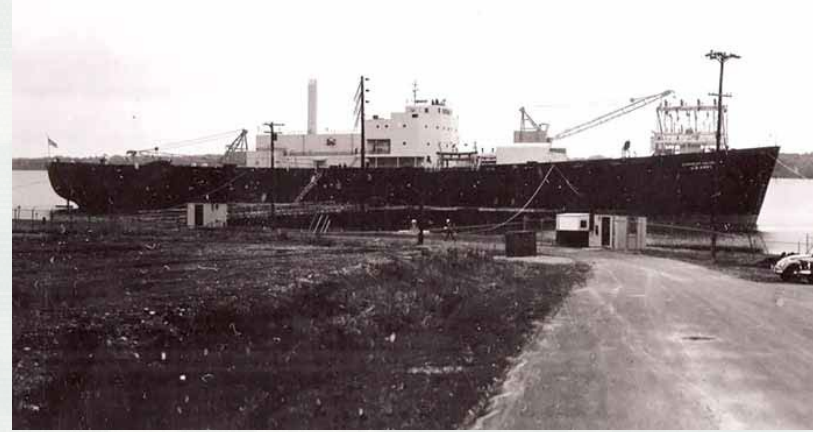
US Army Corps of Engineers
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Today's Presentation

- History of the STURGIS
- Environmental Assessment
- Decommissioning
 - ▶ Waste Segregation
 - ▶ Safety Measures
 - ▶ Oversight
 - ▶ Milestones
- Economic Impact
- Questions



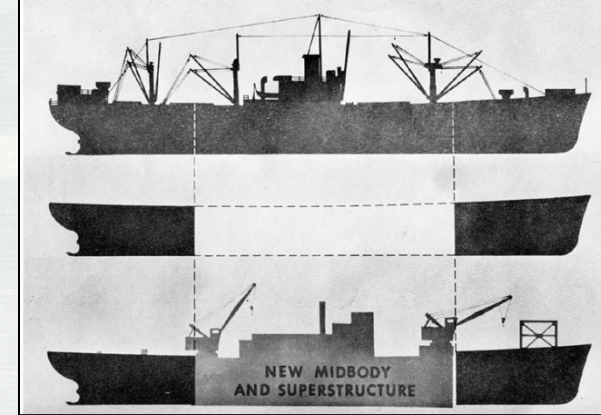
First Barge Mounted Nuclear Power Plant



- The former World War II Liberty Ship, *SS Charles H. Cugle*, was converted into a nuclear power plant in 1966.
- STURGIS was the first barge mounted nuclear plant to regularly supply power to a shore station.
- The STURGIS' nuclear reactor, MH-1A, was used to generate electricity for military and civilian use in the Panama Canal from 1968-1976.



The STURGIS is a Historic Property



Design schematic from 1959

- The STURGIS is considered a historic property eligible for listing in the National Register of Historic Places.
- During decommissioning, the Corps will preserve items of historic interest, including an electronic repository of documents



Fuel Removal and Long-term Storage



- In 1977, the STURGIS returned to Fort Belvoir where the nuclear fuel was removed, and the vessel was prepared for safe long-term storage.
- The STURGIS has been maintained in James River Reserve Fleet at Joint Base Langley-Eustis, VA since 1978.
- The Corps of Engineers has performed quarterly monitoring and periodic maintenance for the past 36 years.



Characterization Confirms Very Low Radiation Levels

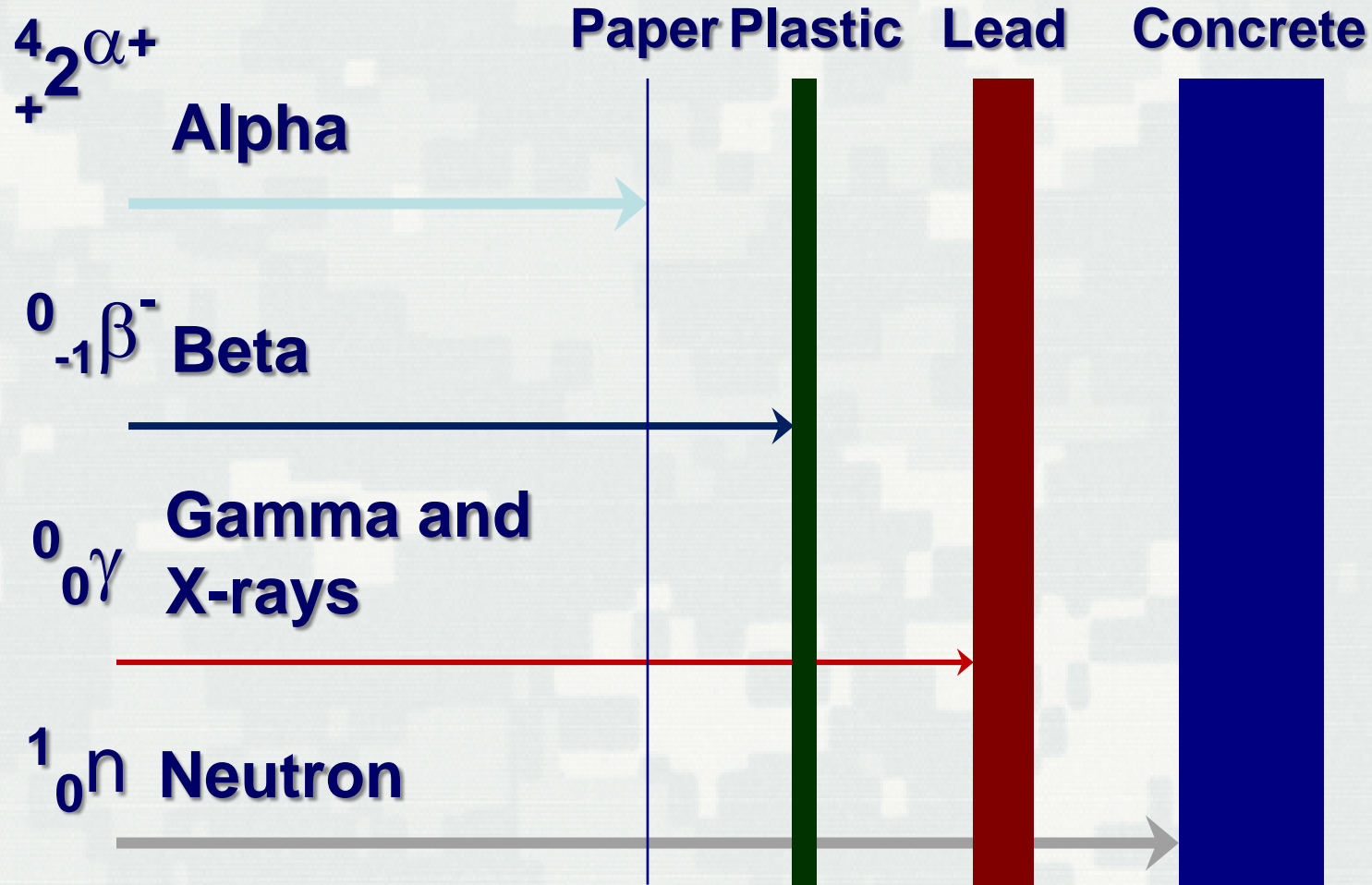
- The vessel's radiological and chemical contaminants were evaluated in 2001.
- The extensive characterization confirmed that radiation levels have decayed to safe working levels.



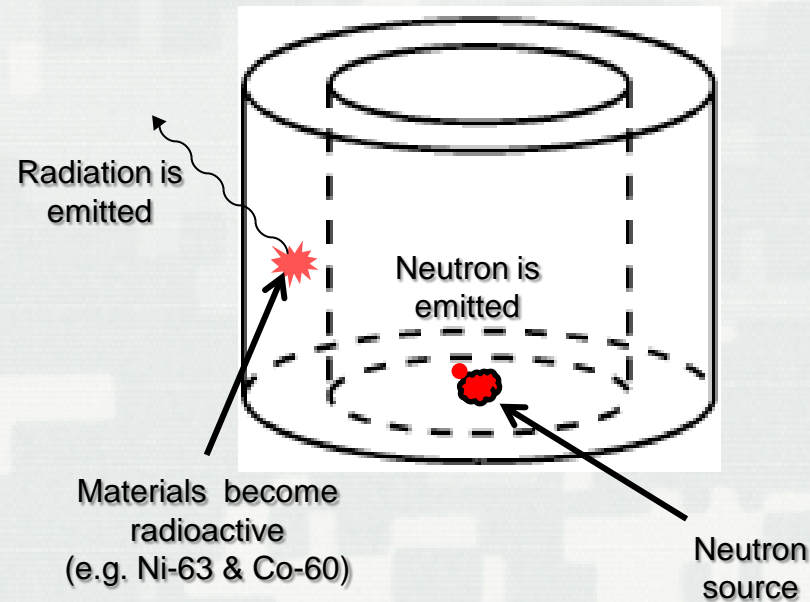
Characterization



Basic Types of Ionizing Radiation



Where Did the Radioactivity Come From?



Materials become stable
Co-60 > Ni-60
Ni-63 > Cu-63



STURGIS Primary Radionuclides

- Primary radionuclides are activation products
 - ▶ Co-60
 - ▶ Ni-63
- Most of the activity is in the form of radioactive metal in the reactor pressure vessel and the primary shield tank
- Ni-63 emits low-energy beta radiation
- Co-60 emits beta and gamma radiation

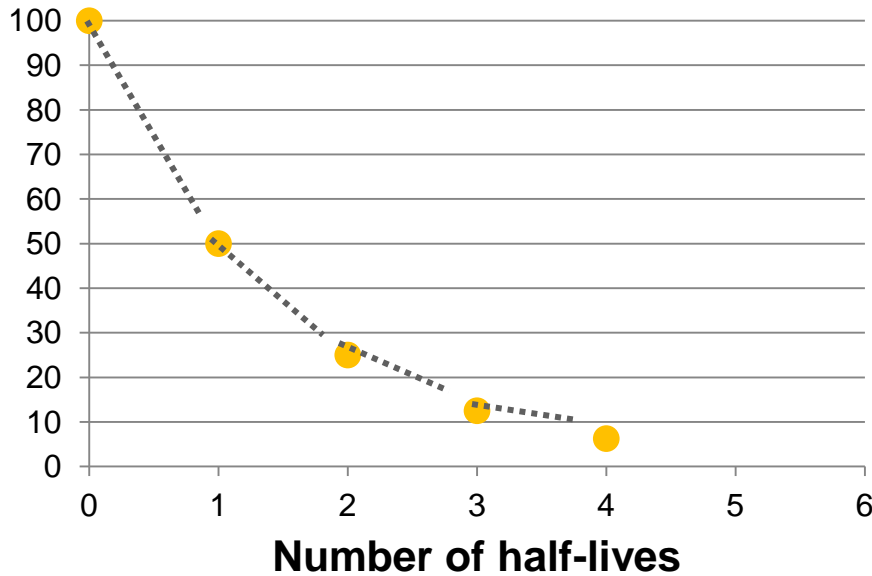


Characteristics of the Important Radionuclides

Radionuclide	Abbreviation	Half-life (years)	Radiation Emitted	% Abundance 12/14
Cobalt-60	Co-60	5.27	Beta/gamma	27.05 %
Nickel-63	Ni-63	100.1	Low-energy beta	72.46%



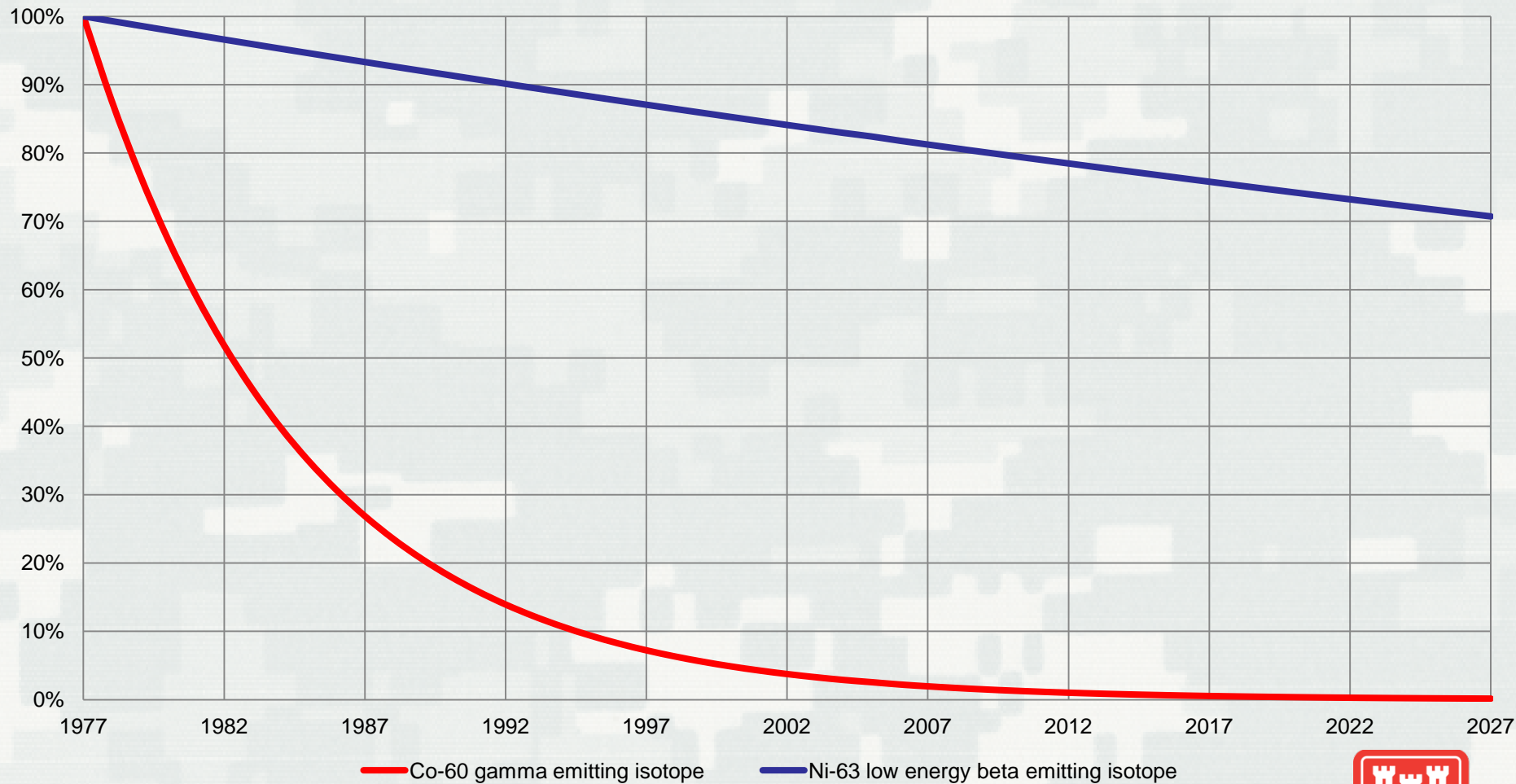
The Half-Life of a Radionuclide



- Half life is the time it takes for 1/2 of the atoms to decay.
- The half-life of Co-60 is 5.27 yrs.
- The half-life of Ni-63 is 100.1 yrs.



Radioactive Decay Since Shutdown



Environmental Assessment



Four Coastal Cities Were Selected for the Assessment

- Galveston, TX
- Hampton Roads, VA
- Baltimore, MD, and
- Charleston, SC



Site Selection Was Based On:

- Proximity to the Corps of Engineers' offices
- Proximity to waste disposal facilities, and
- Availability of shipyards and ship breaking operations.



An Environmental Assessment was Conducted in 2013

- The purpose of an environmental assessment is to determine the potential environmental impacts associated with each selected site.



The Environmental Assessment Considered:



- ▶ Ecology, including marine mammals, essential fish habitat, benthic communities and protected species
- ▶ Cultural resources, including preservation of historical documents
- ▶ Water, including bays, estuaries and wetlands
- ▶ Air quality, including towing and decommissioning activities
- ▶ Waste management, including hazardous and radioactive waste



The Bottom Line: There are no significant impacts

- The environmental assessment concluded there are no significant environmental impacts, including impacts related to transportation.



Decommissioning



Primary Objectives



- Decommission, then dismantle the vessel.
- Remove radioactive material to permit the STURGIS to be released for unrestricted use.
- Segregate waste streams.
- Ensure wastes are disposed in licensed facilities.
- Recycle nonradioactive material.
- Terminate the Army Reactor Office permit.



Path Forward

- Inspect STURGIS prior to relocation.
- Conduct baseline radiological survey at Malin Shipyard prior to towing.
- Prepare STURGIS for towing to Malin Shipyard.
- Remove STURGIS' residual radiological and hazardous materials.



Path Forward

- All parts and contents of STURGIS and the MH-1A reactor will be disposed as
 - ▶ Clean (recycled/land filled) [Estimated ~90%]
 - The shipbreaking is planned to be completed in Brownsville, TX
 - ▶ Radioactive [Estimated ~8%]
 - ▶ Hazardous [Estimated ~2%]
 - ▶ Mixed waste (Radioactive and hazardous/asbestos/universal) [Estimated <1%]



Towing Route



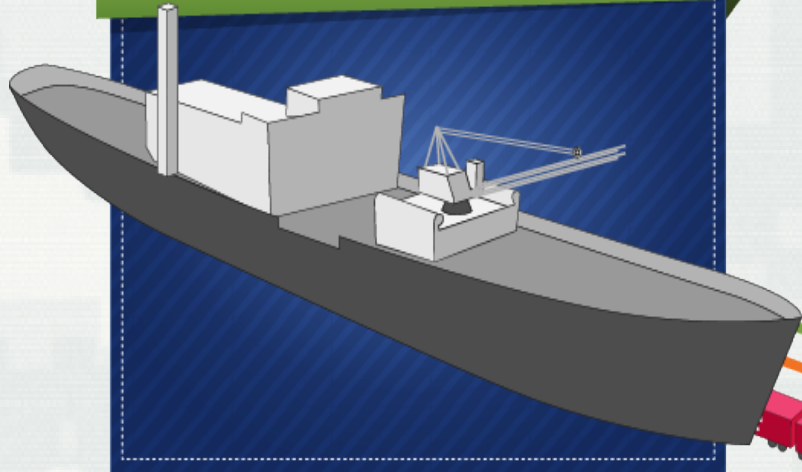
TAMU-Galveston



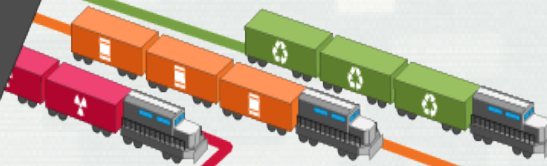
Malin Shipyard



WHERE DOES IT ALL GO?



TRAINS/TRUCKS
TRANSPORT WASTE



REMOVAL OF RADIOACTIVE WASTE TO A LICENSED DISPOSAL FACILITY

- **RADIOLOGICALLY ACTIVATED**
 - REACTOR PRESSURE VESSEL (RPV)
 - REACTOR COMPONENTS
 - NEARBY METALS
- **RADIOLOGICALLY CONTAMINATED**
 - PRIMARY REACTOR SYSTEM EQUIPMENT
 - LIQUID WASTE MANAGEMENT SYSTEM



REMOVAL OF NON-RADIOLOGICALLY CONTAMINATED MATERIAL & EQUIPMENT (M&E) WILL BE RECYCLED

- **OVERWHELMING MAJORITY OF M&E FALL INTO THIS CATEGORY**
 - SPARE PUMPS, GASKETS, MANUAL TOOLS
 - CONTROL ROOM CONSOLES
 - ELECTRICAL DISTRIBUTION EQUIPMENT
 - PIPE AND VALVES
 - CREW FURNISHINGS
 - CLEAN VESSEL

REMOVAL OF NON-RADIOLOGICALLY CONTAMINATED HAZARDOUS WASTE FORMS

- ASBESTOS INSULATION, FLOOR TILES, MASTICS, ETC.
- LUBRICATION OILS
- DIESEL RESIDUES FROM EMERGENCY GENERATOR
- CLEANING MATERIALS
- UNIVERSAL WASTE

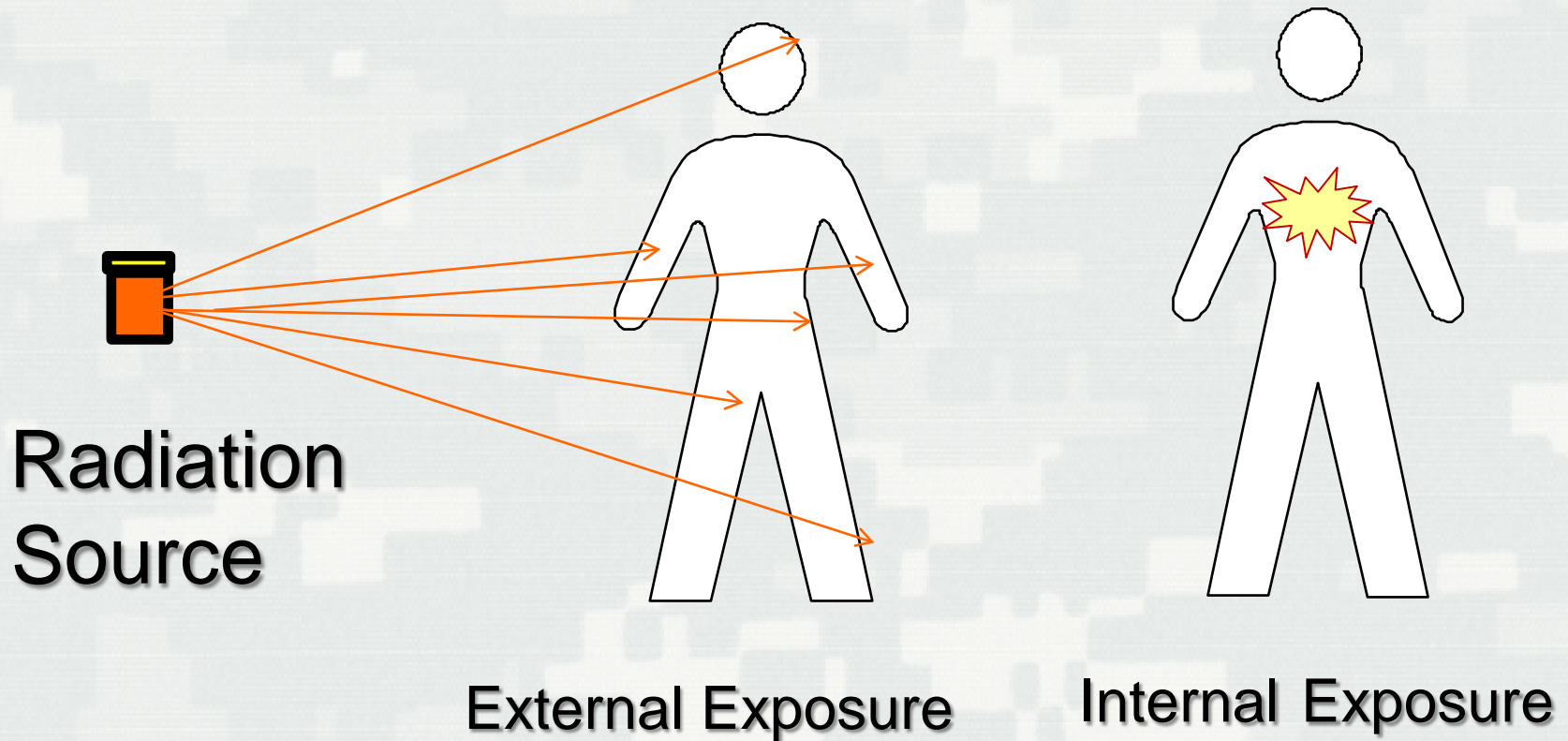


Risk Reduction and Safety

- The potential risks from radiation sources may result from
 - ▶ Internal exposures, or
 - ▶ External exposures
- Different control methods are used depending on the type of exposure



Internal and External Exposure



Risk Reduction and Safety

- External radiation protection

- Establishing a security perimeter to control access
- Using shielding on components that have higher exposure rates
- Minimizing the time any of the higher exposure rate components are not shielded
- Using 3-D laser mapping to facilitate planning

- Internal radiation protection

- Conduct activities in a contained area of the barge using proven industry standards
- Use contamination control methods such as glove bags, foaming, and fixatives
- Control air flow and emissions using HEPA filtration units



Hurricane Plan



- A detailed hurricane plan will be prepared:
 - ▶ Double tie the STURGIS in place and make sure it is water tight.
 - ▶ STURGIS will be left in the shipyard to ride out the storm.
 - ▶ Consistent with what Malin Shipyard has done before during previous hurricanes.



Project Team and Schedule



Contract Award

- March 2014, award of \$34.6M to CB&I to complete the STURGIS decommissioning in Galveston
- Award was based on best value considering technical approach, management, past performance, and cost factors.



Project Team

- Members of the project and oversight team include:
 - ▶ Professional Engineers
 - ▶ Certified Health Physicists (Radiation Safety)
 - ▶ Environmental Scientists
 - ▶ Regulatory Specialists
 - ▶ Safety Specialists
 - ▶ Qualified Technicians



Highly Skilled and Experienced Contractor Team



CB&I
Prime Contractor

Project Management
Quality Assurance
Safety and Health
Radiological Program
Project Controls

Contract Management
Procurement
Decommissioning
Dismantlement
Engineering



EnergySolutions

Waste Management
Radiological Controls
Waste Certifications

Waste Transport
Waste Disposal
Regulatory Support



Malin International

Towing Plan
Naval Architect
Pierside Operations

Decommissioning Facility
Shipyards Labor
Drydock (Submersible Barge)



EMR

Ship Breaking, Recycling, and Vessel Disposal

STUR_103_5

Federal Oversight

- U.S. Army Corps of Engineers will provide quality assurance over the contractor and their quality control program
- Corps of Engineers National Environmental Center of Expertise
- Army Reactor Office and Reactor Council
- Oak Ridge Associated Universities – Independent Review



State Oversight



- Texas Commission on Environmental Quality
 - ▶ Disposal of Low level Radioactive Waste
 - ▶ Remediation of Asbestos Containing Materials
- Texas Department of State Health Services
 - ▶ Release of materials
 - ▶ Materials in transport
 - ▶ Licensing Asbestos workers



STURGIS Schedule

- Tow STURGIS in 2015
- Begin decommissioning in 2015
- Decommissioning will take 12-14 months



Economic Impact



Economic Impact

- Employment:
 - ▶ EnergySolutions and Malin will require 45 people for the job
 - ▶ EnergySolutions will hire four to six radiation technicians
 - ▶ Malin Shipyard will hire ten employees: laborers, security officers, riggers, electricians and mechanics
 - ▶ EnergySolutions – will use union Longshoremen at transload facility for waste shipment
- The current estimate of direct economic impact for the City of Galveston is \$17,500,000.



QUESTIONS?

