STURGIS Barge Decommissioning Project

U.S. Army Corps of Engineers

Baltimore District

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US Army Corps of Engineers

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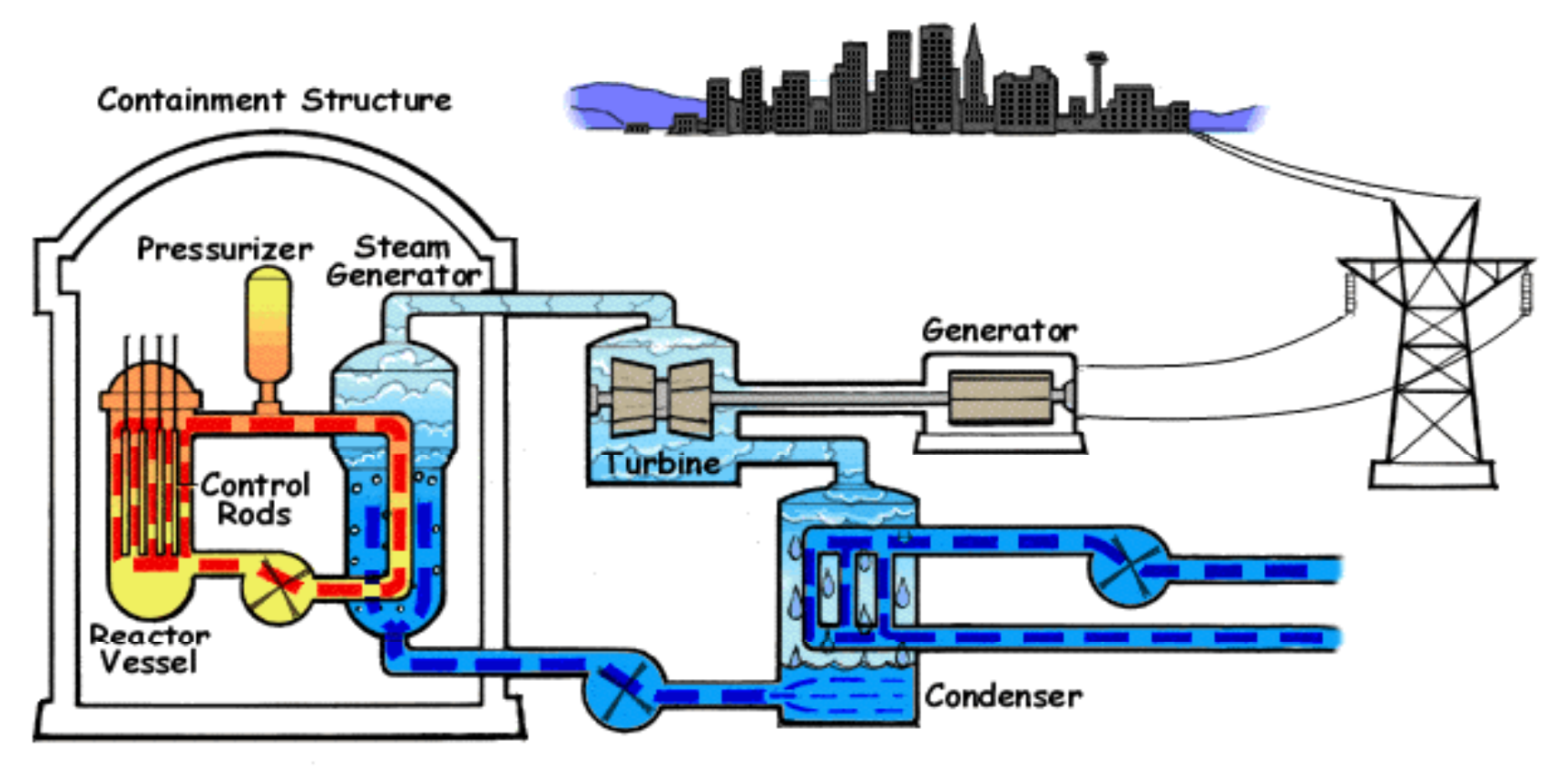
Today's Presentation

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

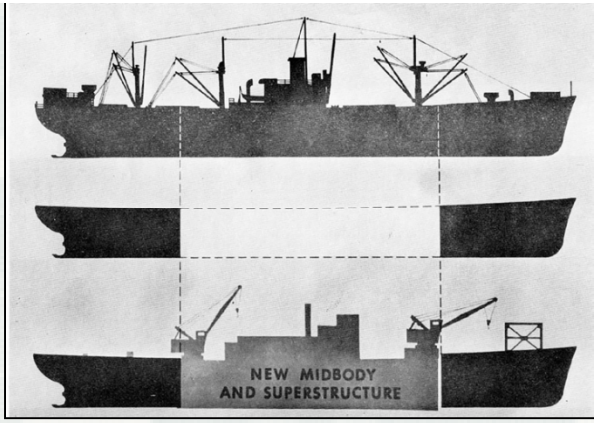
First Barge Mounted Nuclear Power Plant

- 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.

Typical Pressurized Water Reactor Operations



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

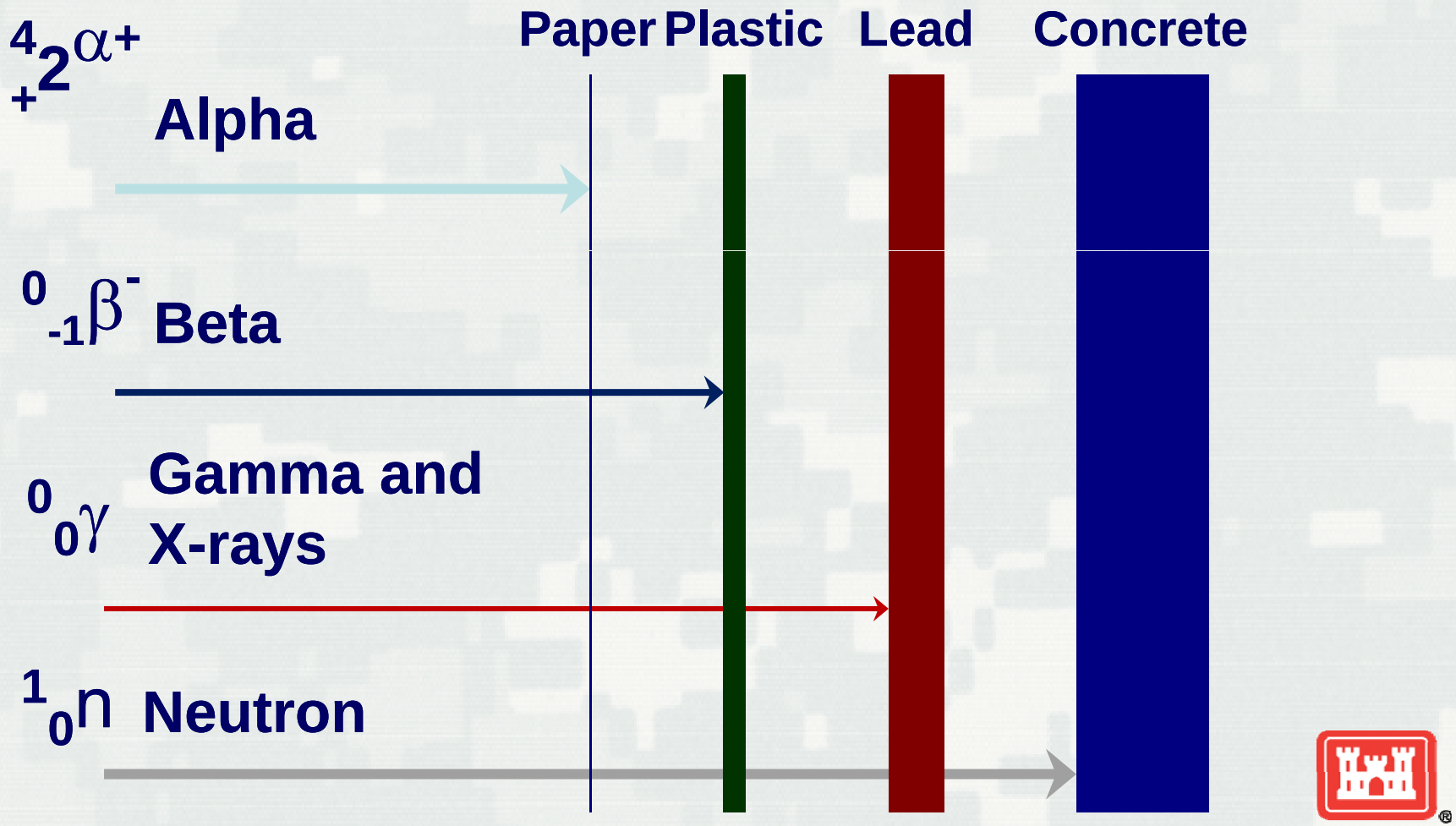
- In 1977, the STURGIS returned to Fort Belvoir where the nuclear fuel was removed, and the vessel was prepared for safe long-term storage.
- The STURGIS has been maintained in James River Reserve Fleet at Joint Base Langley-Eustis, VA since 1978.
- The Corps of Engineers has performed quarterly monitoring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

Characterization Confirms Very Low Radiation Levels

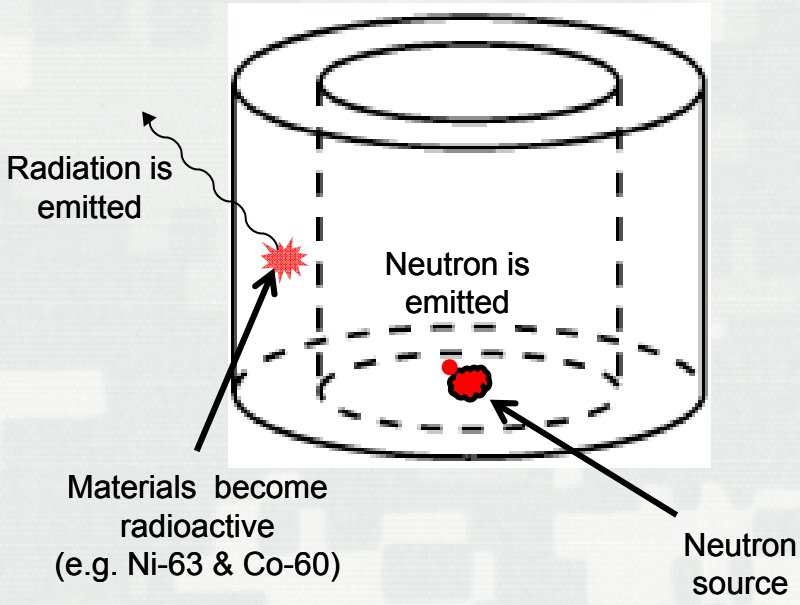
- The vessel's radiological and chemical contaminants were evaluated in 2001.
- The extensive characterization confirmed that radiation levels have decayed to safer working levels.

Characterization

Basic Types of Ionizing Radiation



Where Did the Radioactivity Come From?



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

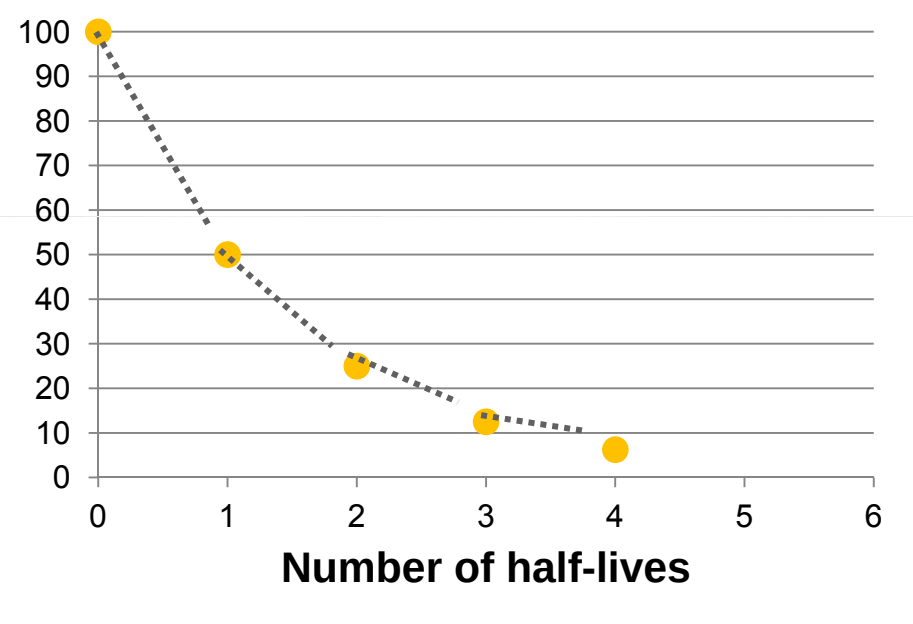
STURGIS Primary Radionuclides

- 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

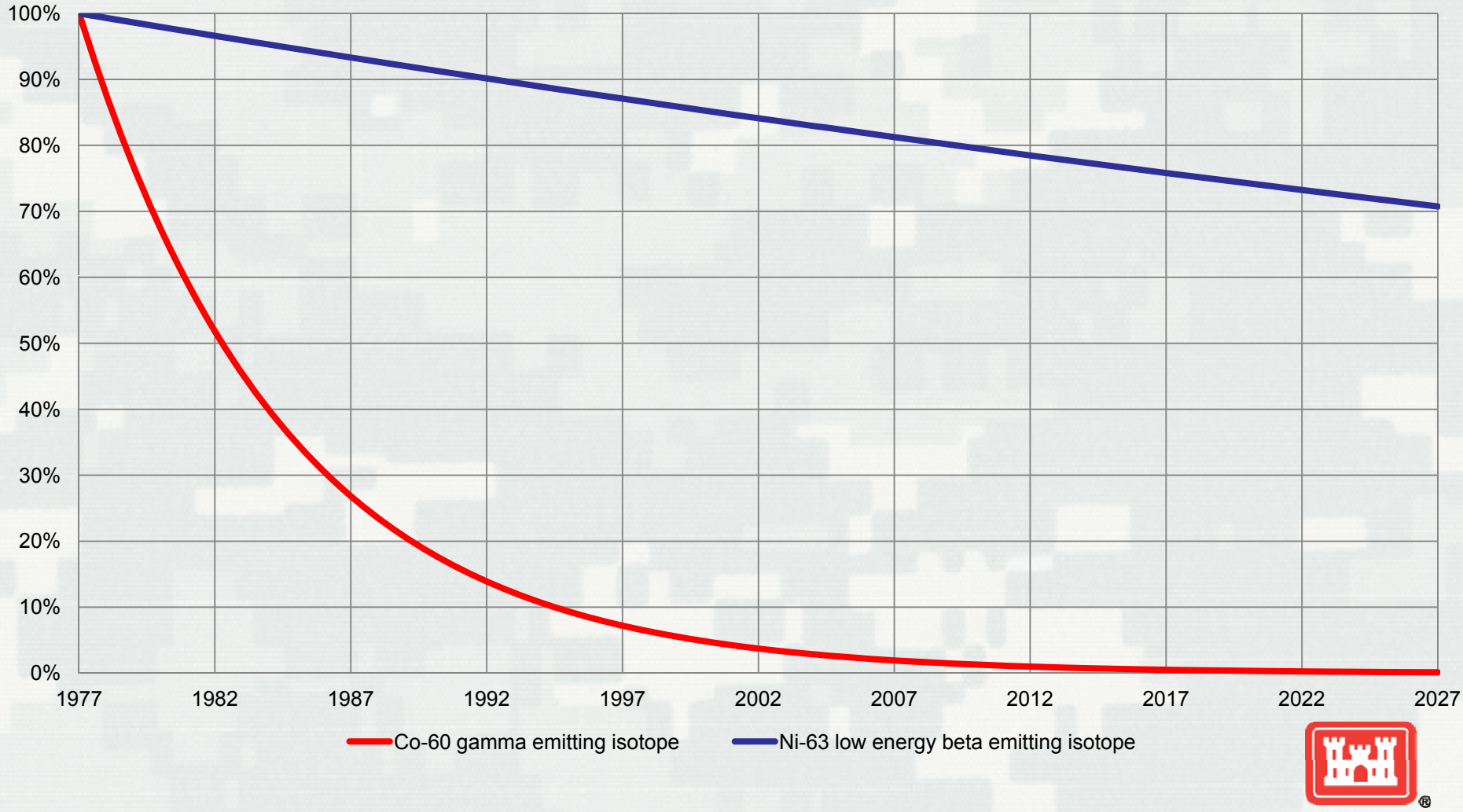
Radionuclide	Abbreviation	Half-life (years)	Radiation Emitted	Percent Abundance Dec 2014
Cobalt-60	Co-60	5.27	Beta/gamma	27.05 %
Nickel-63	Ni-63	100.1	Low-energy beta	72.46%

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.

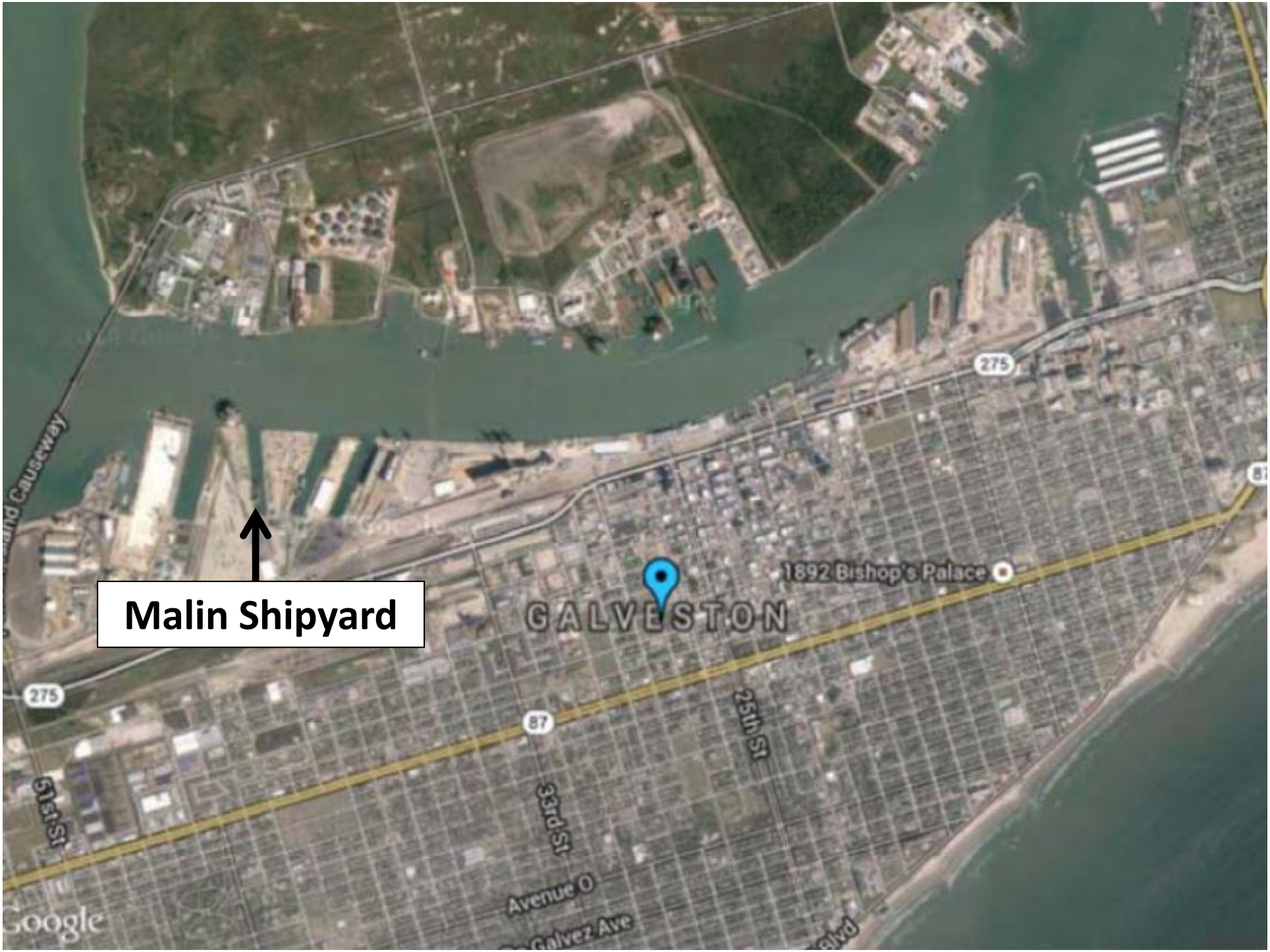
Path Forward

- 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


Malin Shipyard
GALVESTON
1892 Bishop's Palace
275
87
25th St
33rd St
51st St
Avenue O
Google

WHERE DOES IT ALL GO?

TRAINS/TRUCKS TRANSPORT WASTE

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 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 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

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

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 April 2015
- Begin decommissioning in May 2015
- Decommissioning will take 14-18 months

QUESTIONS?

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