End-User Perspective

U.S. DOE-EM Portsmouth Gaseous Diffusion Plant Deactivation and Decommissioning

WM 2017 - 062 PANEL-
NUCLEARIZED ROBOTICS
PERSPECTIVES ON USE AND NEED

Marty Reibold,
Fluor-BWXT Portsmouth, LLC
Director of Strategic Initiatives

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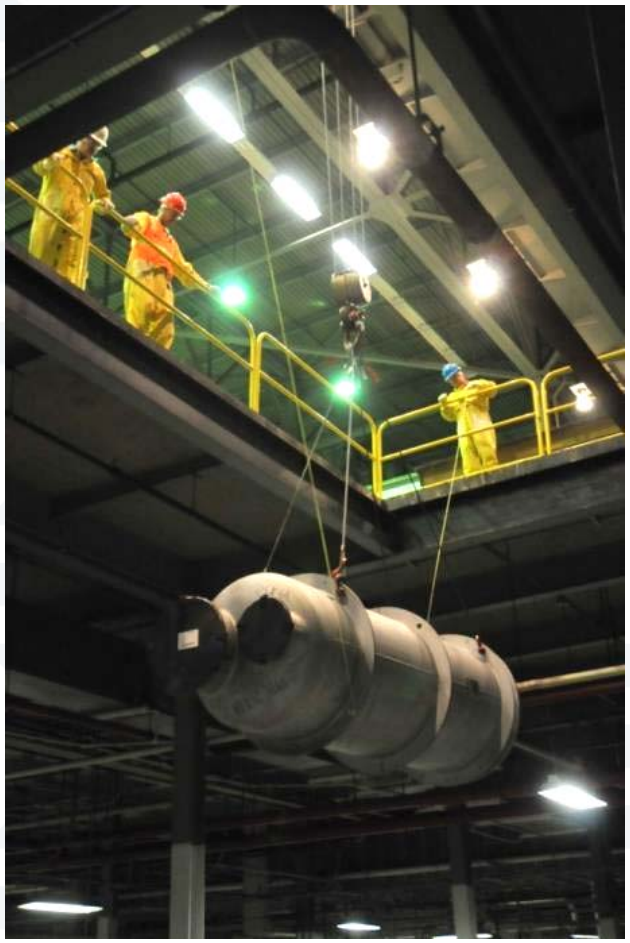
Portsmouth Gaseous Diffusion Plant

- **PORTS GDP**
  - Built in 1952 to produce enriched uranium for national defense and later to fuel commercial nuclear power plants
  - 3,777-acre site with 415 structures
  - DOE's largest facility under roof, with three large process buildings that house the gaseous diffusion process equipment and span the size of 158 football fields

Portsmouth Gaseous Diffusion Plant

- **Deactivation Goal – 'Cold & Dark'**
  - Downgrading facility from a Cat 2 Nuclear Facility
  - Downgrading security
  - Utility isolation and relocation
  - In the past three years, more than 7,000 process components have been removed.
- **Primary Hazards**
  - Uranium, Hydrogen Fluoride, Technitium-99, Asbestos
- **D&D Challenges**
  - Characterization and removal of equipment
  - Complex, labor-intensive processes



DOE-EM Science of Safety Demonstrations

- Solicited and identified candidate technologies (12) with a wide range applications and maturity
- Tailored demonstrations (22) to potential site needs
- Evaluated each of the technologies against range of nominal D&D tasks
- Assessed strengths, weaknesses and applicability and identified TRL levels
- Identified several technologies with strong potential for future applications at PORTS and other DOE-EM sites

Key Observations

- **Contamination Control**
  - Many available commercial and prototype robotics are not "nuclearized" and are either not robust enough or present challenges to decontaminate
- **Worker Safety**
  - Robotics can be effective at tele-operation by removing the worker from the work face but maintaining remote control
- **Operator Training**
  - Workers adapted quickly to the new technology and were relatively proficient within a short time
- **Work Force Engagement**
  - Hands-on use by workers was by far the best way of identifying potential applications
- **Emergency Response**
  - Robotics have an immediate application in collecting data (monitors, detectors and cameras) to assess hazardous or off-normal events

Additional Perspectives

- **Demonstrations raised awareness of operating staff and management team**
  - Increased potential for acceptance of implementation by work force and management
  - Identified institutional barriers and paradigms (e.g. existing work control procedures and security restrictions)
- **Experience gained helped expedite PORTS implementation of robotic technologies**
  - Virtual reality work planning
  - Emergency response platform
  - Tele-operated systems for equipment dismantlement and size reduction
  - Pipe inspection for detection of deposits
- **Applicability is Everything**
  - The most critical success factor is the identification of applicable tasks otherwise the technologies are “hammers in search of a nail”

PREPARING THE FUTURE
PORTS
D&D PROJECT

At PORTS, The Future Is Now

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