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Portsmouth and Paducah Deactivation and Decommissioning Roadmap Interview Summary Report

Evan Koelker

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Executive Summary

In October 2023, the Department of Energy (DOE) Office of Environmental Management (EM) tasked the Savannah River National Laboratory (SRNL) with leading a team of subject matter experts (SMEs) established through the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) involving multiple national laboratories, industry, academia, and internal DOE personnel to conduct an evaluation of deactivation and decommissioning (D&D) missions within the DOE Complex. The team of SMEs, i.e., “The Roadmap Team”, assessed the technical achievements and needs of each individual site as related to ongoing D&D project work. This work builds upon the DOE EM D&D Technology Development Workshop held in April 2022, that culminated in a report published in June 2022, SRNL-RP-2022-00426.

Each D&D SME were solicited for their experience and knowledge of the matter to be on the Roadmap Team and participate in internal meetings and interviews with D&D project missions. Team members belonged to multiple national laboratories including Savannah River National Laboratory, Argonne National Laboratory, Oak Ridge National Laboratory, Idaho National Laboratory, and Pacific Northwest National Laboratory; Primary contractors for the DOE including Longenecker, and Central Plateau Cleanup Company; DOE Environmental Management personnel; and academic researchers from Florida International University and Mississippi State University.

DOE-EM sites with ongoing D&D project work were chosen for assessment by the Roadmap Team. These project sites include Portsmouth, Paducah, Oak Ridge, Savannah River, the West Valley Demonstration Project, the Idaho Cleanup Project, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Nevada National Security Site, and the Hanford Site. Each project site was solicited for information in a two-step process. First, D&D project teams were provided a questionnaire composed of twelve questions pertaining to technology use, development, and needs specific to D&D project work. The questionnaire was intended to be completed by multiple personnel ranging from lead engineers, contractor representatives, project managers, and senior project advisors within each site's D&D team. Responses were then assessed by the Roadmap Team for topics related to the use of, and need for, technology improvements. Finally, an interview between the D&D team respondents to the questionnaire and the Roadmap Team was held to further examine the highlighted topics and identify technology categories of each issue.

This summary report details the Roadmap questionnaire, its responses, and the interview process for the Portsmouth and Paducah projects. The specific D&D projects referenced during the Roadmap assessment at Portsmouth and Paducah are the deactivation and decommissioning of the former gaseous diffusion plant buildings and associated infrastructure at each location.

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List of Abbreviations

AI	Artificial Intelligence
ALARA	As Low As Reasonably Achievable
D&D	Deactivation and Decommissioning
DOE	Department of Energy
EPA	Environmental Protection Agency
EM	Environmental Management
FIU	Florida International University
ISD	In-situ Decommissioning
LITR	Low-Intensity Test Reactor
LTS	Long Term Storage
NNLEMS	Network of National Laboratories for Environmental Management and Stewardship
MSA	Material Sizing Area
OEPA	Ohio Environmental Protection Agency
OSTI	Office of Scientific and Technical Information
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmouth Gaseous Diffusion Plant
PPE	Personal Protective Equipment
PPM	Parts Per Million
PPPO	Portsmouth Paducah Project Office
R&D	Research and Development
ROD	Record of Decision
S&M	Security and Maintenance
SME	Subject Matter Expert
SRNL	Savannah River National Laboratory
TD	Technology Development
WAC	Waste Acceptance Criteria
USEPA	United States Environmental Protection Agency

1.0 Introduction

The D&D Roadmap initiative was developed to identify high-priority technical needs and the research areas required to meet those needs in support of the ongoing deactivation and decommissioning of Department of Energy infrastructure across the United States. Responses to inquiries for information via a standardized questionnaire and data collected during interviews with D&D project teams were analyzed by the Roadmap Team and categorized into technical areas to achieve the aforementioned goal. Each D&D technology related response and topic identified during the Roadmap initiative, from all D&D projects interviewed, were collected, categorized, and compiled to determine a more wholistic view of critical science and technology areas of interest.

Technical D&D related responses, as from through the questionnaire and interviews, varied widely. This variation extended beyond classification of responses into distinct categories for technology use such as non-destructive assay or waste size reduction. Responses also pertained to the stage of D&D work (such as deactivation, long term security and maintenance, or full building decommissioning and demolition), utilization and availability of technology, and the level of project impact that the identified technology had on the D&D project overall. Therefore, to meet the objective of finding high priority technical needs to support ongoing deactivation and decommissioning projects multiple filters were applied to the pool of responses from each D&D project team.

Once a specific gap in technological capability for ongoing D&D work was identified, specific questions were asked of the D&D team to better understand the issue during the site interview. In addition, efforts were made to find and contact SMEs or researchers with related experience or research project work to provide context and potential solutions to each gap. Commercially available products and mature research project solutions were made a priority during this stage of the Roadmap assessment.

Beyond the identification of needed technology and research areas, the procurement and communication of D&D related information by D&D project teams were assessed. Though not specific to the stated intent of the Roadmap initiative, the propagation of information regarding the successful employment of technological solutions to D&D challenges was seen to be germane to the Roadmap's purpose. An inquiry to the methods of finding technology and/or expertise taken by each D&D project team was made to understand what methods this communication utilized.

The potential to utilize ongoing D&D projects for test bed opportunities was the final assessment point for the Roadmap initiative. Any new technology must undergo significant testing and evaluation prior to wider employment. The final stages of testing typically employ a real-world, albeit controlled, setting or utilize data collected from ongoing field projects. In direct competition with this need is the inherent risk and cost of accessing a D&D project, especially one that involved hazardous chemicals or radionuclide contamination. It is a hazardous, expensive, and challenging undertaking for workers to physically enter the premises of many of the evaluated D&D sites. Sufficient incentive is necessary to justify this cost. Often monetary compensation to the D&D project team is not available for facilitation of testing research products unless funded by the

research itself. Moreover, the driving forces for D&D project teams is to typically limit worker exposure to only that is necessary to complete a task and utilize technology or methods known and previously demonstrated to be capable of success. A notable alternative to this eventuality is research projects targeted for specific needs at each site that are identified during various stages of D&D. These opportunities can take years to develop, and are sometimes used only once, successfully or otherwise.

This summary report details the findings gathered during the questionnaire and interview assessment solely related to the Portsmouth and Paducah D&D project sites.

2.0 Portsmouth and Paducah Background and Planned D&D Strategy

2.1 Portsmouth

The Portsmouth Gaseous Diffusion Plant (PORTS) is one of three historical large gaseous diffusion plants constructed in the United States for the purpose of producing enriched uranium to support the nation's nuclear weapons program and commercial nuclear reactors. Located in Pike County, Ohio, the Portsmouth plant operated from 1954 to 2001 when uranium production was ceased and is located on a 3,777-acre federal land reservation. The Portsmouth plant comprised of approximately 415 facilities that included three massive process buildings (X-326, X-330, and X-333) with accompanying structures such as laboratories, cooling towers, wastewater treatment facilities and other auxiliary buildings (Figure 1). The three main process buildings cover a 90-acre footprint in the center of the PORTS reservation. Following initial shutdown in 2001, the process buildings were put into a temporary stand-by status until 2005. Following 2005, the facilities were placed into long term security and maintenance designation to await full decommissioning. Deactivation and decommissioning methods for the PORTS complex facilities are documented in the associated record of decision (ROD) dated July 30, 2015 between the US DOE and the Ohio Environmental Protection Agency (OEPA).

Uranium enrichment at PORTS was conducted buildings X-333, X-330, and X-326 in series. Each process facility is two story, concrete and steel building, with a combined footprint of over 7.7 million square feet. The vast bulk of uranium processing equipment including piping, converter tanks, compressors, and pumps were operated within these three buildings (DOE-PPPO/03-0425&D2). These process buildings contain the majority of remaining radiological contaminants, such as uranium-234, uranium-235, and technetium-99, of the PORTS. Currently, the X-326 facility has been fully deactivated, and completely decommissioned by the removal of the facility structure and the disposal of remaining building debris. The X-333 building deactivation is ongoing with process infrastructure and contamination removal being conducted in conjunction with radioactive contaminant characterization. Deactivation of the X-330 facility has not yet begun.

Given the size, differing stages of D&D proceedings at the three process buildings, and the nature of contaminants within them, technical discussions conducted by the Roadmap Team focused on the X-326 and X-333 facilities.

2.2 Figures – Portsmouth Project Site

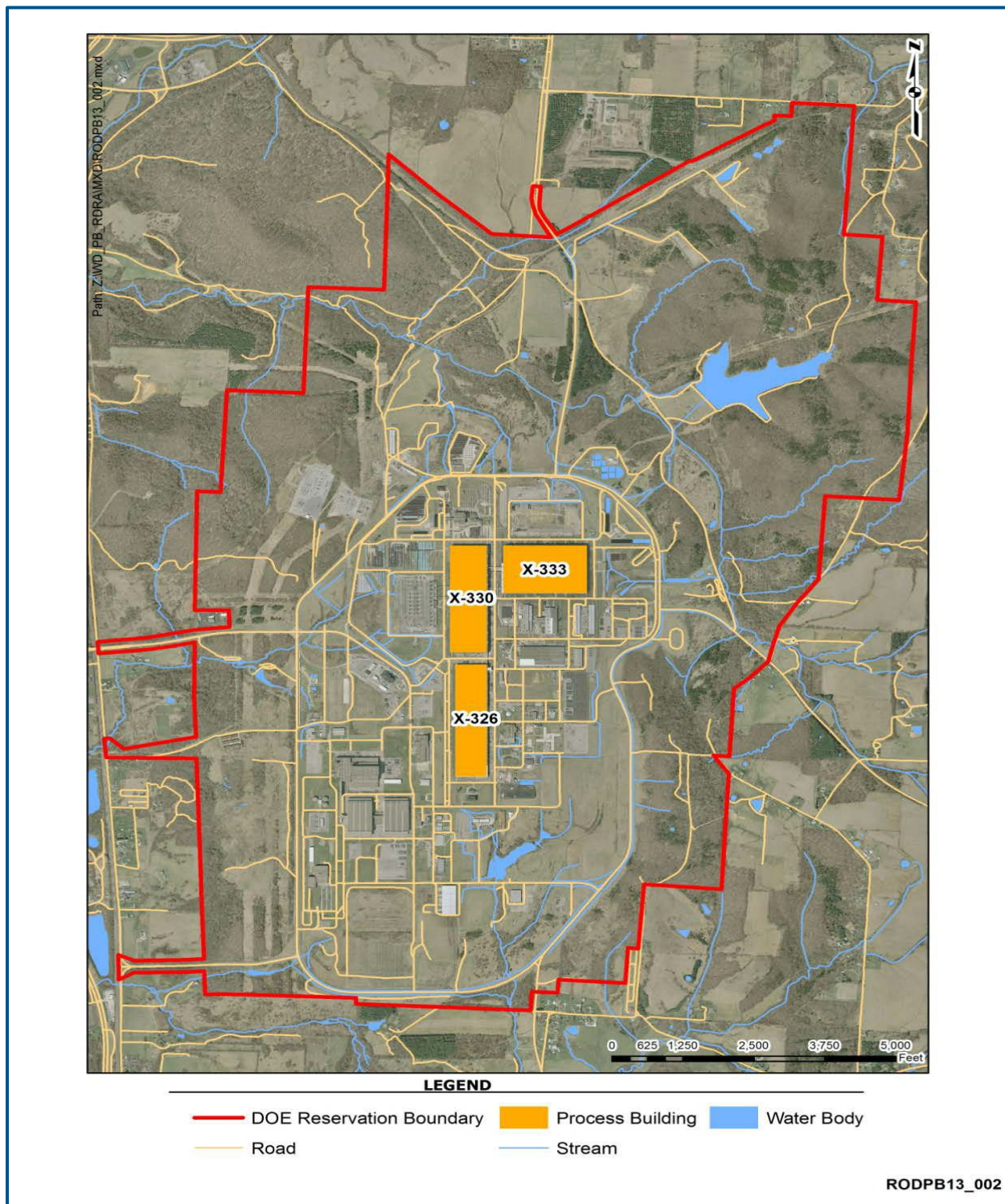


Figure 1. PORTS Facility with highlighted process buildings (DOE-PPPO/03-0425&D2 - 2015)

2.3 Paducah Gaseous Diffusion Plant

Paducah, Kentucky is the location of a second, former, uranium enrichment plant operated by the DOE. The Paducah Gaseous Diffusion Plant (PGDP) operated as a 'sister' facility to the PORTS gaseous diffusion plant from 1952 to production cessation in 2013. The PGDP plant footprint encompasses approximately 750 acres of land and contains a multitude of facilities similar to PORTS. The site consists of 161 buildings including uranium process lines, power plants, office buildings, laboratories, cooling towers, and other associated structures (ORAU 2012). Buildings C-331, C-333, C-335, and C-337 contained the main process equipment for the PGDP (Figure 2). The PGDP was listed as a Superfund site in 1994, with an accompanying Federal Facility Agreement between the DOE, US Environmental Protection Agency, and the State of Kentucky taking place in 1998. This agreement established a set of consistent requirements for achieving comprehensive site remediation in accordance with Resource Conservation and Recovery Liability Act (CERCLA) regulations including standards for D&D practices (FRNP 2023). Uranium enrichment activities ceased in 2013, and the overall site mission of the PGDP shifted to D&D, environmental cleanup, depleted uranium conversion, and waste disposition (US EPA 2025).

Current D&D operations at the PGDP are focused on the C-333 Process Building. Major operations include the decommissioning of cascade series infrastructure such as compressor and converter stages, nearly identical in scope to work performed at the PORTS. This operation involves the removal of large (~70,000 pounds) steel converter tanks and their accompanying downsizing/segmentation by cutting and characterization by non-destructive assay. During the interview session with PGDP SMEs, it was shared with the Roadmap Team that lessons learned from decommissioning work performed at the PORTS heavily influenced planning and execution of the closely related work scopes at PGDP. In fact, personnel transfer from PORTS to PGDP is common, and a mode of primary D&D knowledge sharing between these closely related project sites.

2.4 Figures – PGDP Site Map

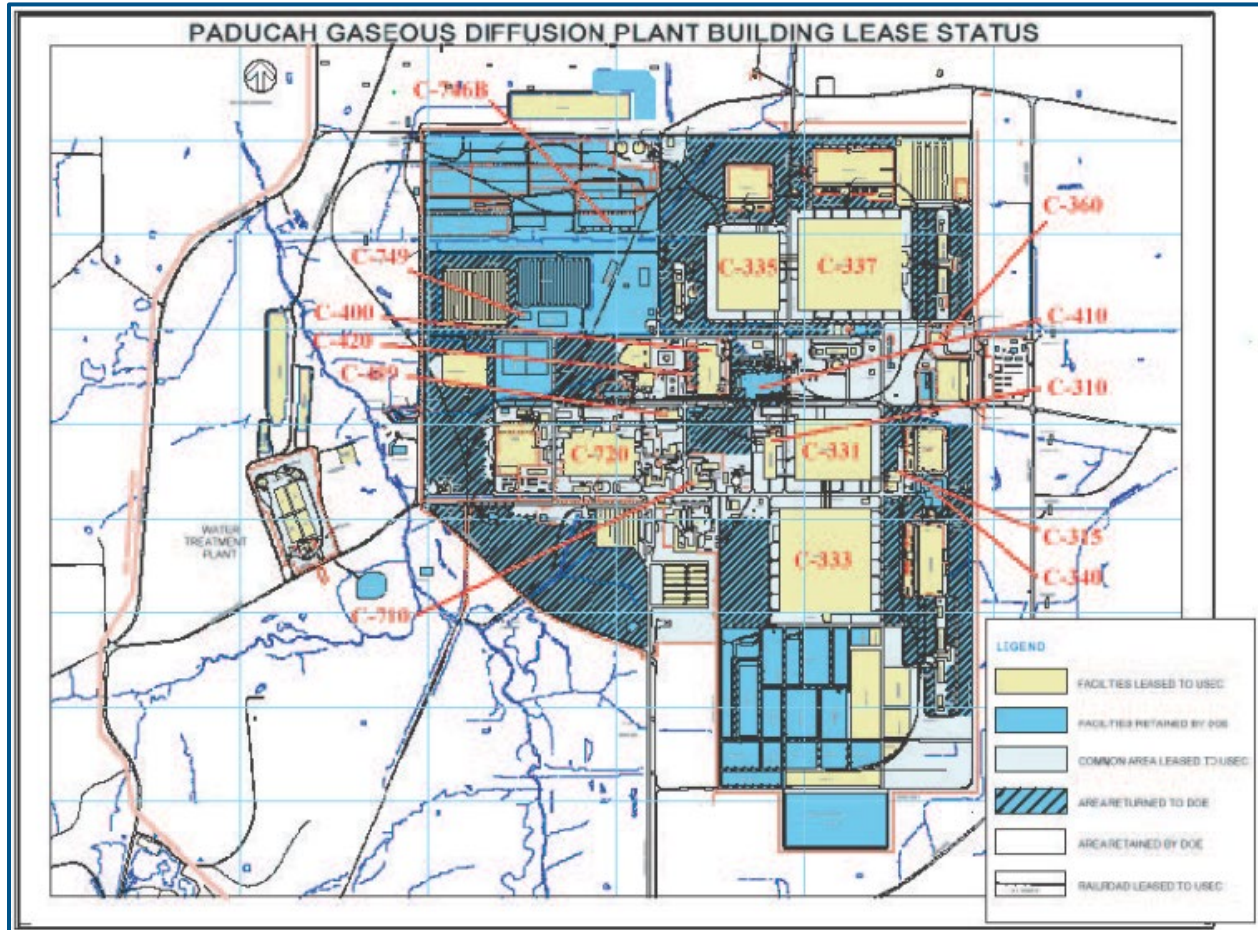


Figure 2. PGDP with process building highlights and labels (ORAU - 2012)

3.0 Questionnaire and Responses

The Roadmap initiative developed a 12-part questionnaire to assess the technological utilization and needs of each D&D project targeted. The questionnaire was provided to each site and routed to each D&D project team through the associated site's DOE Liaison for completion. It was intended for the questionnaire to be completed by multiple D&D project personnel including, but not limited to, lead engineers, project managers, associated SMEs related to the project, and project contracting leads (where available). Questionnaires as completed by PORTS and PGDP personnel are presented in Appendix A.

The responses received from completed questionnaires were sorted by the Roadmap Team to determine their usefulness in fulfilling the overall goals of the Roadmap Initiative, to find technology gaps and critical research areas for strategic DOE planning purposes or current and near future D&D projects. To categorize technology needs, six categories were applied: the D&D stage, the technology needs' timeline, the technology needs' driver, the project impact level, the challenge type, and the needed technology type.

Each response pertaining to a technology need was assessed by the Roadmap Team using the 6 categories and their corresponding criteria to determine their relevance to the stated Roadmap goal. These criteria are summarized below:

1. Stage of D&D Work Category – Each step to prepare a facility for an end state involve the need for specific technologies. For example, responses for a project in the deactivation phase highlighted concerns with contaminant assay and sampling. This was due to the nature of that phase, as deactivation typically contains the act of inventorying the contaminant hold-up necessary. That inventory is then needed to decide upon a strategy for decommissioning. Therefore, as a project moves to the decommissioning phase, it is less concerned with technology needed for contaminant assay or sampling simply because it has already been completed (in some cases, years prior). For the purposes of the Roadmap assessment, three stages were recognized.
 1. Deactivation
 2. Long Term Storage (LTS)
 3. Decommissioning
2. Needs' Timeline Category – The responses received contained information useful to the Roadmap Team's assessment of D&D work but varied temporally. For clarity, responses contained information regarding technology that would have been useful or produced a more desirable outcome if employed in the past, is needed for work currently being conducted, or is needed for work that is planned to be executed in the near future. To properly recommend critical research areas to the DOE, the understanding of when the products of this research will be needed most is necessary. For the purposes of the Roadmap assessment, three timeline categories were recognized.
 1. Near past
 2. Current
 3. Near future
3. Needs' Driver Category – Each technology need identified by the Roadmap questionnaire was assessed for a “needs driver” and categorized by four criteria. A needs driver is defined by the overall benefit a project may receive by implementing a new technology. Four criteria have been created for this category.
 1. Project Cost
 2. Project Schedule
 3. Project efficiency
 4. Safety risk
4. Project Impact Level Category – Questionnaire responses were assessed by the Roadmap Team for the level of impact the technology had, is having, or would have upon the D&D project itself. This category was created to weigh each identified technology category using the Roadmap Team's experience and knowledge gained during the interview process. By placing weight on a technology identified in the questionnaire responses, a more accurate picture of what technology is critical to the overall D&D mission for the DOE can be seen. This was achieved by filtering out the technology that may be less beneficial and focusing on those most critical to a D&D project's success. Three criteria were created for this purpose by the Roadmap Team.

1. High
2. Medium
3. Low
5. Challenge Type Category – The utilization of technology, or the need for new technology arise from specific challenges found during each stage of D&D work. The identified challenge can correlate to the overarching reason a technological solution is needed. Thus, incorporation of a set of criteria to categorize the need provided a detail analysis of the multitude of questionnaire responses. The Roadmap assessment of responses recognized eight primary ‘challenge types’.
 1. Contaminant Type
 2. Contaminant Control
 3. Security and Maintenance
 4. Worker Safety
 5. Waste Processing
 6. Characterization
 7. Accessibility
 8. Project Management
6. Technology Type Category – To fully assess a potential research area that encompasses technology needed by a D&D project team, categories of technology were created. The Roadmap Team created these categories specific enough to allow for a detailed review of the assessed responses, but broad enough to group them in a useful way for strategic planning by DOE leadership. A total of 17 technology criteria were created for this assessment.
 1. Modelling
 2. Non-destructive Assay
 3. Sample Collection and Analysis
 4. Robotic/Remote Applications
 5. Fixatives and Coatings
 6. Decay and Byproduct Control
 7. Grout and Entombment
 8. Contaminant Collection and Removal
 9. Personal Protective Equipment
 10. Exposure Monitoring
 11. Waste Preparation
 12. Waste Treatment
 13. Waste Shipment and Disposal
 14. Interim Waste Storage
 15. Artificial Intelligence

3.1 PORTS and PGDP Roadmap Response Assessment

The Roadmap Team initiated the questionnaire process with the D&D project team members and SMEs overseeing D&D operations at the PORTS and PGDP sites respectively. Responses to the questionnaire were received on June 10, and July 25, 2024. In total, thirteen respondents provided completed questionnaires for assessment by the Roadmap Team. Respondents

included Operations and Logistics Managers, Area Project Managers, Health and Safety Operations Managers, representatives from D&D contractors, health physicists, waste management specialists, and the associated Federal Project Directors. Of the 156 total questions (12 questions per questionnaire as completed by 13 respondents) 89 detailed responses were received, 54 from PORTS and 35 from PGDP. These detailed responses covered multiple related topics including several direct mentions of technology utilized or potentially needed during work pursuing D&D at the former gaseous diffusion plants. Repeat mentions of each identified topic of technology were discounted from an overall questionnaire analysis for technology categories conducted at all sites interviewed by the Roadmap Team. This was done to eliminate possible data bias produced by many respondents from a single site with responses pertaining to one topic or technology. The assessment criteria pertaining to the chosen questionnaire response by the Roadmap Team is presented in Appendix B-1.

The technology needs assessed by the Roadmap Team, based on the responses and requests from the SMEs interviewed at PORTS and PGDP, were closely related due to the nature of the nearly identical missions conducted at each project site. For the purposes of the D&D Roadmap, responses and technology needs were assessed in combination. The buildings currently undergoing D&D at the PDGP and PORTS house cascade series process equipment and, in the context of overall facility removal, require very similar processes for the removal of contamination, building structure demolition, and worker safety. Therefore, the technical challenges identified at one site in large part mirror those at the other. Primary drivers for technology needs identified at each site included improved technology and methodology for the removal and downsizing of large process equipment, the control of dust and off gas related to waste downsizing, waste handling and segregation, the survey and characterization of waste at all stages of D&D, and improved maintenance of buildings that await D&D.

Questionnaire responses chosen for assessment by the Roadmap Team were given identifying labels that designate the origin of the site, referenced D&D project, and number as they are presented in Appendix B-2 (ex.: PORTS – X330 – 1). Where more general topics are covered, a designation of “Misc.” is used instead of a specific project building (ex.: PGDP – Misc. – 2).

The topics related to technical needs identified by the Ports and PGDP teams, and their assessment by the D&D Roadmap Team include:

- **Waste Segmentation and Size Reduction** – During the questionnaire and interview process with the PORTS and PGDP D&D teams, technology needs related to the removal and segmentation of uranium enrichment process equipment was found to be the genesis of multiple technology needs. The large scale of enrichment process infrastructure removal and the necessary downsizing of its components for waste transportation or burial necessitate multiple stages of preparation. Each stage in turn has its inherent set of hazards, objectives, and methods that lead to unique technical needs. Therefore, though the large, contaminated equipment must be segmented by cutting, it also must be decontaminated and characterized, each of which retaining their own specific technical needs within the overall segmentation process. Waste downsizing of this nature is an ongoing effort at both PGDP and PORTS for the coming years.

Technology criteria found to apply to segmentation and size reduction are:

1. PORTS – X330 – 1: Automated Segmentation of Large Process Equipment – Infrastructure removal at PORTS and PGDP necessitate the handling, segmentation, and disposition of hundreds large, steel, components up to 24 feet in length and 13 feet in width which can contain remnant radioactive materials or other hazardous chemicals. Cutting and downsizing is performed at PORTS and PDGP often by hand plasma torch cutting. Difficult work environments due to fumes, dust, and excessive heat and the physically demanding nature of this work necessitate the use of respirators, various ventilation methods, and continual worker rotation shifts to mitigate these hazards. This is the most efficient method of completing process equipment segmentation currently. During the Roadmap assessment, the automation of various large equipment segmentation was identified by the PORTS, PGDP and Roadmap teams as a possible method for eliminating human exposure to the identified hazards inherent to this work. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: ‘Decommissioning’
 - ii. Needs Timeline: ‘Near Past’, ‘Current’, and ‘Near Future’
 - iii. Needs Driver: ‘Project Schedule’, ‘Project Efficiency’, and ‘Safety Risk’
 - iv. Project Level Impact: ‘Medium’
 - v. Challenge Type: ‘Worker Safety’ and ‘Waste Processing’
 - vi. Technology Type: ‘Robotic/Remote Applications’, ‘Contaminant Collection/Removal’, and ‘Waste Preparation’
2. PGDP – C333 – 2: Cold Cutting for Segmentation and Downsizing – Among the most predominant hazards associated with plasma torch or other hot cutting methods are the fumes and gasses produced during operation. Nitrogen oxide gasses, airborne dust particulate, and gasses produced dure exothermic reactions by sensitive process equipment internals create an atmosphere hazardous to human occupation. All cutting is performed within cleared areas of the former enrichment buildings. Within the C-333 Building at the PGDP, a specially designed, ventilation controlled, Material-Sizing Area was constructed to supplement the engineering controls for materials downsizing (PPPO, 2024). At both the PORTS and PGDP project sites, airline respiratory equipment is necessary for occupation of the workspace where this work is performed. Thermal based cutting methods inherently produce gas hazardous to worker breathing zone and with the volume and relatively enclosed nature of this work at PORTS and PDGP this has been reported as a primary area open to improvement. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: ‘Long Term Storage’ and ‘Decommissioning’
 - ii. Needs Timeline: ‘Current’, and ‘Near Future’
 - iii. Needs Driver: ‘Project Schedule’, ‘Project Efficiency’, and ‘Safety Risk’
 - iv. Project Level Impact: ‘Medium’
 - v. Challenge Type: ‘Worker Safety’ and ‘Waste Processing’

- vi. Technology Type: 'Contaminant Collection/Removal' and 'Waste Preparation'
3. PGDP – C333 – 3: Material Handling Process Improvements – Downsizing of process equipment at the PORTS and PGDP necessitates the relocation of hundreds of large, single piece, components to areas designated for segmentation. The building footprints of the former diffusion plants compound the distances components must be moved and/or the relocation of segmentation equipment to complete this work. Often, the only method for moving these components are the ceiling mounted cranes which were installed into the plant for construction and maintenance purposes during the operating lifespan of the diffusion plants. The evaluation of material handling technology, including improvements to existing cranes, is a continual process the both the PORTS and PGDP D&D teams. The D&D Roadmap Team has assessed this technology need as:
- i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Near Past', 'Current', and 'Near Future'
 - iii. Needs Driver: 'Project Efficiency'
 - iv. Project Level Impact: 'High'
 - v. Challenge Type: 'Worker Safety' and 'Waste Processing'
 - vi. Technology Type: 'Waste Preparation', 'Waste Treatment', and 'Waste Shipment and Disposal'
4. PORTS – Misc. – 4: Asbestos Materials Size Reduction – During downsizing and removal of specialized infrastructure, consideration of the material composition can affect the methods used to complete this work. Specific to the PORTS and PGDP sites, large diameter, asbestos containing, piping will likely require removal in specific areas. Special consideration, technology, and methodology for this work is requested by the PORTS and PDGP D&D teams. The D&D Roadmap Team has assessed this technology need as:
- i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Near Past', 'Current', and 'Near Future'
 - iii. Needs Driver: 'Project Schedule' and 'Safety Risk'
 - iv. Project Level Impact: 'Low'
 - v. Challenge Type: 'Waste Processing'
 - vi. Technology Type: 'Waste Preparation'
- Contaminant Detection and Monitoring – Identifying and quantifying the nature of contaminants or otherwise hazardous or regulated materials is necessary to all stages of D&D. Technical needs responses collected from the PORTS and PDGP teams exemplify the wide range of applications, and improvement opportunities, technology used to find and characterize these materials have. Questionnaire responses and the subsequent interviews with D&D project teams at the former gaseous diffusion plants detail the use of contaminant monitoring devices for the initial contaminant characterization during deactivation via NDA, the monitoring of combustion gases during waste downsizing, the

survey of equipment and materials for waste segregation/reuse, and the shortcomings of monitoring devices during work in non-ideal temperatures and atmospheric conditions.

Technology criteria found to apply to segmentation and size reduction are:

1. PGDP – C333 – 5: Breathing Zone Airborne Contaminant Monitoring – The large volume of process equipment segmentation within the PORTS and PGDP, conducted by plasma torch, produces multiple forms of gaseous byproducts such as nitrogen oxides or hydrofluoric acid vapor. These byproducts have the potential to create hazardous breathing zones, which necessitates the use of personal air monitors for D&D teams who encounter these atmospheres. Personal air monitors, such as the Drager 5100 X-am and Drager 5600 X-am, are available and were determined to be the most effective by Paducah D&D personnel, however improvement is possible and was requested during the Roadmap interview process. Heat, humidity, and dust are also byproducts created during process equipment segmentation and were reported to be the likely cause of false positive alarms, which result in work stoppages and project delays during usage of these personal monitors. An improved method for real-time breathing zone monitoring would further minimize these intermittent false positive alarms. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Current'
 - iii. Needs Driver: 'Safety Risk'
 - iv. Project Level Impact: 'Medium'
 - v. Challenge Type: 'Worker Safety'
 - vi. Technology Type: 'Personal Protective Equipment' and 'Exposure Monitoring'
2. PGDP – C333 – 6: Environmentally Hardened Sensors – Potentially contaminated equipment must be fully characterized for the purposes of proper waste disposal technique and segregation. During deactivation, when a building or facility is prepared for long term storage (LTS or "cold and dark status") often the shutdown or even removal of environmental controls, ventilation systems, and utility isolation is performed to minimize security and maintenance (S&M) costs during multi-year timespans as the facility awaits final decommissioning. The Former process buildings at the PORTS and PGDP were subject to this series of events, and therefore all work conducted within these buildings is subject to surrounding atmospheric conditions. Humidity, heat, and cold are all concerns that D&D teams must contend with. D&D SMEs interviewed at the PORTS and PGDP reported that the delicate sensors required for the measurement of radioactive contaminants, used by Industrial Hygiene (IH) and RADCON, are limited to certain ranges of environmental conditions to function properly. This large size and open areas of the former diffusion plant buildings further compound this issue, as localized heating, cooling, or de-humidifiers are challenging costly to deploy. Interviewees at the PORTS and PGDP specifically referenced NDA equipment with the ability to operate in a wider range of environmental conditions as desirable. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Long Term Storage' and 'Decommissioning'

- ii. Needs Timeline: 'Near Past' and 'Current'
 - iii. Needs Driver: 'Project Efficiency' and 'Safety Risk'
 - iv. Project Level Impact: 'Medium'
 - v. Challenge Type: 'Worker Safety'
 - vi. Technology Type: 'Personal Protective Equipment' and 'Exposure Monitoring'
3. PGDP – C333 – 7: Component Recycling and Reuse – PORTS and PGDP SMEs interviewed detailed that the reuse or recycling materials during decommissioning is a priority. However, the cost of performing the necessary characterization of components or machinery may often exceed the cost for disposal. The equipment necessary to efficiently and fully assess difficult to reach areas, or materials with surface coatings are not available to the PORTS and PGDP teams. As a result, the option of disposal of potentially reusable equipment is the logical and efficient conclusion. Improved deployment methods, or sensor technology, would benefit the PORTS and PGDP sites or other D&D project with similar challenges. The D&D Roadmap Team has assessed this technology need as:
- i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Current'
 - iii. Needs Driver: 'Project Efficiency'
 - iv. Project Level Impact: 'Medium'
 - v. Challenge Type: 'Worker Safety'
 - vi. Technology Type: 'Non-Destructive Assay'
- Non-Destructive Assay – NDA is an integral part of the D&D of facilities contaminated by radioisotopes. The quantification of radioactive hold-up within legacy facilities must be performed to maintain ALARA, perform waste segregation, determine in-situ decommissioning possibilities, and develop criticality protocol for contaminated waste burial among others. While necessary and informative at nearly every step of D&D projects, NDA can be a relatively expensive and time consuming process. These necessities, benefits, and costs inherent to NDA likewise make improvements rewarding to a wide range of D&D projects.

Technology criteria found to apply to NDA are:

1. PORTS – X330 -8: Large Component NDA – Several aspects of NDA applications that were identified during the Roadmap interview process at the PORTS and PGDP related to the size of components this work is being performed upon. Large piping galleys and valve assemblies, up to 17 feet in length, that were constructed in elevated positions and without the consideration for end of life characterization pose significant challenges to the placement and efficiency of NDA sensors for D&D teams at the gaseous diffusion plants. These components may also contain significant radioactive holdup, including uranium 235 exceeding 1% enrichment. In-situ NDA of these large components would negate the need for their removal and downsizing prior to full characterization. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Decommissioning'

- ii. Needs Timeline: 'Current' and 'Near Future'
 - iii. Needs Driver: 'Project Cost', 'Project Schedule', and 'Project Efficiency'
 - iv. Project Level Impact: 'High'
 - v. Challenge Type: 'Characterization'
 - vi. Technology Type: 'Non-Destructive Assay'
- 2. PGDP – C333 – 9: Robotic Deployment of NDA – Robotic pipe crawlers have been utilized for NDA at the PGDP in recent years. The experiences encountered by the D&D teams, who deployed robotic pipe crawlers for this purpose, led directly to requests for technology improvements identified by the Roadmap Team. SMEs involved with these deployments reported that pipe crawlers required specific deployment points, and frequent assistance by operating personnel to reach piping sections separated by valves or long vertical sections. Improvements that incorporate greater versatility by the incorporation of high quality cameras and forms of more versatile mobility, while retaining the capability for qualitative NDA, would help PORTS and PGDP D&D teams increase efficiency by remotely identifying areas where more sensitive quantitative NDA needs to be applied. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Deactivation' and 'Decommissioning'
 - ii. Needs Timeline: 'Near Past', 'Current', and 'Near Future'
 - iii. Needs Driver: 'Project Efficiency'
 - iv. Project Level Impact: 'High'
 - v. Challenge Type: 'Characterization'
 - vi. Technology Type: 'Non-Destructive Assay' and 'Robotic/Remote Applications'
- Infrastructure Security and Maintenance – The length of time between deactivation and full decommissioning for large facilities, such as the PORTS and PGDP, can often be measured in decades. Shutdown of the PORTS diffusion process buildings was conducted in 2001, and the building put into a “cold and dark”, or LTS, status in 2005. Decommissioning at PORTS is not yet complete, twenty years following. Project lifespans ranging in the decades are not unique to the PORTS or PDGP. Many legacy facilities in the DOE complex were constructed for Project Manhattan era research, and still exist today. Similar to the deactivation and decommissioning steps a project may go through, the LTS stage has unique benefits, goals, and drawbacks. LTS goals, as reported by D&D project teams interviewed, typically focus the reduction of security and maintenance costs for facilities that no longer perform a mission for the DOE. This can be accomplished in a multitude of ways that typically involve the removal of electrical or other utilities, specialized equipment or components that require upkeep, and the reduction of routine maintenance that would otherwise be needed for occupied buildings. While immediate spending is reduced for the LTS phase through these means, there can be consequences for D&D procedures that follow. Additionally, degraded infrastructure that can result from LTS practices may result in increased costs associated with full deactivation. These consequences may also not be realized for years following the decision that created them,

making them difficult to reliably identify and plan for in future D&D projects or quantify their cost.

Technology criteria found to apply to Infrastructure Security and Maintenance are:

1. PORTS – X330 – 10: Durable Coatings and Hazard Markings – In LTS, the elimination of utilities can remove the power supply non-essential systems, such as fans and climate control, need to operate. PDGP D&D SMEs reported that unintended consequences of LTS resulted in the degradation of coatings, signage, and hazard markings that in turn can lead to contaminant control issues. These markings and coatings are designed and placed to identify hazards and contain contamination during facility operation. Even so, reapplication may be required as routine maintenance during that time. As a building moves into LTS, this may not be performed. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Long Term Storage' and 'Decommissioning'
 - ii. Needs Timeline: 'Current' and 'Near Future'
 - iii. Needs Driver: 'Project Cost', 'Project Schedule', and 'Project Efficiency'
 - iv. Project Level Impact: 'High'
 - v. Challenge Type: 'Characterization'
 - vi. Technology Type: 'Non-Destructive Assay'
2. PORTS – Misc. – 11: Degrading Infrastructure Solutions – Degrading infrastructure can be a consequence of lowering maintenance routine for legacy facilities. At the PORTS specifically, an example of this eventuality was reported to the Roadmap Team in the form of leaking roofs of auxiliary buildings that surround the gaseous diffusion process buildings. The goal of LTS to lower lifetime costs for deactivated facilities may remain common and legitimate procedure for D&D projects in the future, however technical solutions for the inherent consequences of lowered maintenance (such as leaking roofs) is an opportunity to further lower overall D&D project costs. These solutions may even take the form of upgrades or augmentations to the facility that would not be suitable for continued occupancy or operating mission objectives but would be sufficient to prevent the degradation of infrastructure to the point where its removal becomes ever more difficult, hazardous, and expensive. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Deactivation', 'Long Term Storage', and 'Decommissioning'
 - ii. Needs Timeline: 'Near Past', 'Current', and 'Near Future'
 - iii. Needs Driver: 'Safety Risk'
 - iv. Project Level Impact: 'Medium'
 - v. Challenge Type: 'Contaminant Type', 'Security and Maintenance', and 'Accessibility'
 - vi. Technology Type: 'Fixatives and Coatings' and 'Decay and Byproduct Control'
3. PORTS – Misc. – 12: Emergency Response – Though buildings may be placed into LTS, and not continually occupied by humans, the risk for contaminant release is still present. At least some monitoring is typically performed to ensure that legacy

facilities to not pose imminent threat to the health and safety of nearby populations and at least some amount of routine entry by humans is performed. Drones or robotics that are equipped with chemical monitoring equipment was specifically requested by the PORTS D&D SME team. The D&D Roadmap Team has assessed this technology need as:

- i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Current', and 'Near Future'
 - iii. Needs Driver: 'Safety Risk'
 - iv. Project Level Impact: 'Medium'
 - v. Challenge Type: 'Worker Safety' and 'Characterization'
 - vi. Technology Type: 'Robotic/Remote Applications'
- Worker Safety – Primary hazards for PORTS and PGDP D&D teams take the form of airborne dust and hazardous gasses, the release of which is driven by the downsizing and segmentation of large process equipment. D&D planning and management teams have continually implemented new technology and work procedures to mitigate these hazards with examples such as specialized material sizing area (MSA) at Paducah, work shift scheduling to reduce exposure, and the testing of many personal monitoring devices to find the most effective safety equipment. During the interview process, several other topics were identified for technology improvements.

Technology criteria found to apply to Worker Safety are:

1. PORTS – X330 – 13: Energized Source Detection – Confirmation of energy sources, both electrical and pressurized, is critical for maintaining safety during D&D. Large facilities and buildings may have more than one electrical supply, after long periods of LTS the hazard markers designating energized systems may not remain in place, and pressurized vessels may remain. Technologies improving the detection of these hazards was requested by the PORTS and PGDP D&D teams. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: 'Decommissioning'
 - ii. Needs Timeline: 'Current' and 'Near Future'
 - iii. Needs Driver: 'Safety Risk'
 - iv. Project Level Impact: 'High'
 - v. Challenge Type: 'Security and Maintenance' and 'Worker Safety'
 - vi. Technology Type: 'Personal Protective Equipment' and 'Exposure Monitoring'
2. PGDP – C333 – 14: Heat Stress PPE – Personal protective equipment (PPE) designed to protect D&D teams from hazardous atmospheres carry drawbacks that include additional hazards such as heat stress. Thermal cutting conducted during segmentation of metal components creates elevated heat within the same areas where full supplied air suits must be worn. When these suits contact liquid, such as sweat, the integrity of containment can be breached by contaminants. A secondary request made by the PORTS and PGDP teams is technology that combines the protective qualities of full suit protection and cooling systems to keep body temperatures lower for longer and reduce the sweat-thru hazards that exist now. Currently, this hazard is mitigated by

shorter working times and rotation of teams at set schedules. A technology to slow the rate of body temperature increase would improve working ergonomics and project efficiency. The D&D Roadmap Team has assessed this technology need as:

- i. D&D Stage/s: 'Decommissioning'
- ii. Needs Timeline: 'Near Past', 'Current' and 'Near Future'
- iii. Needs Driver: 'Project Efficiency' and 'Safety Risk'
- iv. Project Level Impact: 'Medium'
- v. Challenge Type: 'Worker Safety'
- vi. Technology Type: 'Personal Protective Equipment'

3. PGDP – C333 – 15: Work Zone Air Quality Control – Air quality control during downsizing and segmentation of process equipment is an integral part of hazard mitigation at the PORTS and PGDP. Though solutions such as filtration, localized containment areas, and ventilation are all utilized by these D&D teams improvements would be attractive continuing work. The D&D Roadmap Team has assessed this technology need as:

- i. D&D Stage/s: 'Current' and 'Decommissioning'
- ii. Needs Timeline: 'Current' and 'Near Future'
- iii. Needs Driver: 'Project Efficiency'
- iv. Project Level Impact: 'Medium'
- v. Challenge Type: 'Contaminant Control' and 'Worker Safety'
- vi. Technology Type: 'Contaminant Collection/Removal' and 'Personal Protective Equipment'

4. PORTS – X330 – 16: Chlorine Trifluoride Control – The majority of lines and equipment that provided chlorine trifluoride (ClF₃) to the PORTS and PGDP process buildings were purged and treated to reduce concentrations of the gas to below 1 ppm. However, there are localized remaining components that could not be accessed for this gas purging system. Both the PORTS and PGDP sites would benefit from improved technology to purge difficult to reach systems containing ClF₃. The D&D Roadmap Team has assessed this technology need as:

- i. D&D Stage/s: 'Decommissioning'
- ii. Needs Timeline: 'Current' and 'Near Future'
- iii. Needs Driver: 'Safety Risk'
- iv. Project Level Impact: 'High'
- v. Challenge Type: 'Worker Safety' and 'Waste Processing'
- vi. Technology Type: 'Contaminant Collection/Removal'

- Additional Requested Technology – Multiple, relatively unique, technology needs were requested by the PORTS and PGDP D&D teams during the D&D Roadmap interview process.

Technology criteria found to apply to Worker Safety are:

1. PGDP – C333 – 17: Interim Waste Storage – Final disposal of waste at either on-site or off site waste disposal facilities may take significant time to complete, and decommissioning can out pace this process. Large scale decommissioning project such as the PORTS and PGDP projects require similarly large areas designated for waste storage. Local waste facilities, such as on-site waste disposal, typically proves the most cost effective, but can require interim storage of waste while such facilities are prepared or the acceptance of certain waste. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: ‘Decommissioning’
 - ii. Needs Timeline: ‘Current’ and ‘Near Future’
 - iii. Needs Driver: ‘Project Cost’ and ‘Project Efficiency’
 - iv. Project Level Impact: ‘Low’
 - v. Challenge Type: ‘Contaminant Control’ and ‘Worker Safety’
 - vi. Technology Type: ‘Interim Waste Storage’
2. PORTS – X330 – 18: Artificial Intelligence Application – Large multi-year projects in D&D require the compilation and analysis of large volumes of information and documents. Examples of these can include information related to engineering drawings or as-builts, applicable regulatory guidance, health and safety documentation, and project control protocol. Artificial intelligence (AI) is a continually improving technology with the capability to perform large scale analysis and organization of such information. In addition, these programs would be able to remain in place during routine employee turnover and reduce the amount of information loss in situations where experienced employees are no longer available to a wider project team. The PORTS and PGDP D&D teams reported that this could be an avenue for improved technical performance in D&D projects. The D&D Roadmap Team has assessed this technology need as:
 - i. D&D Stage/s: ‘Deactivation’, ‘Long Term Storage’ and ‘Decommissioning’
 - ii. Needs Timeline: ‘Near Past’, ‘Current’ and ‘Near Future’
 - iii. Needs Driver: ‘Project Efficiency’ and ‘Safety Risk’
 - iv. Project Level Impact: ‘Low’
 - v. Challenge Type: ‘Project Management’
 - vi. Technology Type: ‘Artificial Intelligence’

4.0 D&D Team Interview Process

Prior to the teleconference, Roadmap Team members devised inquiries specific to each targeted questionnaire response. Where possible, researchers in areas of specific interest were contacted to provide context and information related their work and were welcomed to participate on the interview call. Each area of interest during the questionnaire response assessment was discussed further during the interview process. Each interview teleconference was recorded.

On July 15 and 31, 2024, the Roadmap Team conducted a virtual interview with the multiple senior D&D team members from the PORTS and PGDP D&D sites, respectively. All participation by Roadmap Team members was voluntary for this interview. All respondents to the D&D questionnaire, the D&D team management, and associated SMEs were invited to

participate in the interview as well. Topics identified during the Roadmap Team assessment of the questionnaire were specifically targeted for further discussion during the interview.

In addition to discussions regarding each area of technology interest identified during the questionnaire response assessment and associated interview, two separate topics were discussed. Firstly, the methods of procuring and communicating D&D related information or technology by the PORTS and PGDP project teams, and secondly, the suitability of either facility for testbed opportunities.

4.1 D&D Technology Procurement and Communication

The development and testing of new technology are also critical processes for the improvement of work procedures, project performance, and worker safety in the inherently hazardous and technically challenging projects to D&D contaminated legacy facilities around the DOE complex. This process depends upon communication between the D&D team who needs a solution and the manufacturer or researchers that can provide or develop that solution. Much of the same equipment, infrastructure, and residual contamination are in varying stages of removal at each the PORTS and PGDP sites. Lessons learned, personnel, and best practices have been widely shared between project teams throughout D&D implementation. This close relationship was found to be due to several main factors.

First, each project is managed through the Portsmouth/Paducah Project Office (PPPO). This unified structure of oversight and DOE involvement facilitates the communication of information between project teams at each location. During the Roadmap interviews, many of the same SMEs and site managers participated in both the Portsmouth and Paducah sessions as each had insight and experience with both.

Secondly, the PGDP and PORTS D&D projects not only have very similar scope and scale but are being undertaken in generally the same part of the country and at nearly the same time. Proximity of SMEs and D&D personnel makes communication and information sharing more easily accomplished in a more in depth way, including site visits, that might take place at more distant locations. The somewhat staggered timeline of D&D at the PORTS and PDGP also was reported to play a factor. D&D at Portsmouth began several years prior to that of Paducah, and lessons learned by project teams, conducting very similar work, were shared by many of the same people who learned them. In fact, some project D&D personnel at the PORTS obtained experience at the K-25 decommissioning complete at Oak Ridge in 2020. As Portsmouth moves to begin decommissioning of the X-330 building, more information and D&D process improvements collected at Paducah may likely be shared in return.

The proximity, timeline, and similar work scope for D&D at the PORTS and PDGP provide these projects with a unique position for a positive feedback loop regarding D&D technical improvements. The communication of technology utilization at the PORTS and PDGP sites, as assessed by the Roadmap Team, includes standard reporting, presentations, and promotion as supplementary to this collaboration. National Laboratories have also participated in the deployment of robotics or other technology as have been required during D&D at these projects sites as well. Ultimately, the Roadmap Team concludes that many of the technical and process

advancements at the PORTS and PDGP have developed from the close relationship of these long term projects with such similar missions with supplementary involvement from outside institutions through more standard means.

4.2 Testbed Opportunities

The PORTS and PDGP projects have been the deployment sites for technology research and development such as robotics for several years. During the Interview process, SMEs from each project site were open to the implementation of further technology deployments provided the applicability to their ongoing objectives was deemed suitable.

Challenges to the PORTS and PDGP for more general testbed initiatives include the nature of the work being conducted to meet cleanup goals. Major work including downsizing and segmentation require large equipment and create hazardous breathing zones within work areas. These areas are continually mobile throughout the diffusion plant buildings which may also pose challenges to longer term research projects.

5.0 Roadmap Findings Summary

Assessment of the PORTS and PDGP D&D projects was conducted by the Roadmap Team in two phases. A questionnaire was applied to the D&D project team, and contained 12 questions related to technology needs and project specific details related to D&D. The questionnaire was completed by the D&D project team management, lead engineers, DOE project directorate staff, and facility SMEs with specific in-depth knowledge of the project sites.

Responses to the questionnaire were assessed by the Roadmap Team to determine specific interests related to technology application by the D&D project team. This analysis resulted in primary topics of interest for further discussion during the subsequent virtual interview. These topics include process equipment downsizing and segmentation, waste characterization during this process, and worker safety. Each questionnaire response related to each topic of interest was assessed by the Roadmap Team to determine the stage of D&D, the timeline a technology may be needed, the level of impact to the project a technology would have, the overall role a technology may fulfill, and the specific technology category associated with the response. This was done to accomplish one of the stated goals of the D&D Roadmap, to identify current and near-future priority areas of technology needs related to D&D projects around the DOE complex. Multiple areas of technology R&D areas were identified to apply to these D&D projects of varying degrees of priority by the Roadmap Team.

A virtual interview was held between participating members of the Roadmap Team and PORTS PDGP project teams to further discuss specific interest areas. During the interview, additional subjects were related to the opportunities presented by SMEs for further testbed utilization, the procurement of new information and D&D related technology by the D&D project team, and the effects of R&D product deployment in the past. Findings resulting from the interview included valuable input from the D&D project teams regarding all topics discussed, and most notably on the viability for testbed potential of D&D technology developments in different.

Technology types identified during the Roadmap assessment of the PORTS and PDGP projects will be utilized for a wholistic view of needed research areas at the conclusion of the Roadmap initiative in Spring of 2025. A more detailed conclusion that includes the data gathered during the questionnaire and interview of D&D project teams will be provided in a final report at that time. Continued efforts by the Roadmap Team have been made in the interim to find suitable technology solutions to specific needs of the PORTS and PDGP D&D teams leading up to that final report.

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Appendix A.

A.1 PORTS and PGDP D&D Team Questionnaire Responses

Responses to the D&D Roadmap questionnaire are presented as received by the D&D Roadmap Team. No edits or alterations have been made.

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Caleb Kline

Job Title: Technical Services Director

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

Primary objective of D&D work taking place includes characterization and decommissioning of former Gaseous Diffusion Plant Process Facilities. Objective is to prepare facility for demolition and eventual disposal within a future on-site waste disposal facility.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

A number of NDA methods or technology are relied upon to support characterization efforts of process gas equipment. Some of these methods include advanced sodium iodide detection, gamma, and neutron detection methods. Additionally, there are a variety of Ventilation and UF6 capture systems we utilize as engineering controls during equipment cut out and sampling activities. A dust collection system/strategy is also an enhancement to worker safety and enhanced performance.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

In-Situ measurement methods for NDA characterization of large process gas equipment are presently limited in threshold measurement values achievable.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Major worker safety concerns pertain to the management of dust and airborne debris, and HF and combustion gas mitigation. Several methodologies and technologies have been investigated to mitigate the generation of these gases during plasma cutting. Improved PPE technology which mitigated or minimizes sweat-out or sweat-thru and incorporates cooling for the worker would be beneficial.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

Unknown

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

Characterization and Deactivation Strategy to Project considers the ultimate construction of an On-Site Waste Disposal CERCLA cell for disposition of waste to be generated from demolition of the facility. If an OSWDF facility is not constructed project outcome would be negatively impacted. Other issues include the Waste Acceptance Criteria not yet known.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

Yes, as it relates to Regulatory Decision Documents pertaining to an On-site waste disposal facility.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

Deployment of a mobile on-site laboratory with key analytical capabilities would improve schedule and cost performance.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

Intended Life Span of D&D for the Site is 30+ years which does not capture any long term environmental monitoring or reuse of the site.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

Advanced NDA Methodologies and research to investigate mitigation strategies to more accurately address background impacts without adding measurement uncertainty.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

Early elimination of non-essential systems (Exhaust/Supply Fans, Heating/Cooling) may lead to unanticipated consequences such as moisture/humidity management issues within large facilities. This further leads to contamination control issues resulting from early internal coating and signage/markings failures.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Technical Service Director

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Common difficulty with technological and methodological improvements is acceptance by the work force if it pertains to safety, and acceptance by regulators if it relates to Characterization/NDA. Quality level must be documented and understood.

Respondent's Position in Relation to D&D Project: Technical Service Director

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
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2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

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Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Donnie Harris

Job Title: Stabilization & Deactivation Director

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

Our objective for C-333 is to complete modified Deactivation of the building by the end of FY2025.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Our efforts are enhanced by the LINAS capabilities allowing accurate NDA of converters. An In-Situ method for large items and equipment like compressors would prevent time and resources required to cut them out and measure them elsewhere. Something similar to the Rotochopper at Portsmouth which would be an effective way to downsize metal and other materials to save on waste costs. Based on Lessons Learned from the Portsmouth site a Dust collection system was installed which has been very effective at preventing the spread of smoke soot throughout the building.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

An In-Situ method for large items and equipment like compressors would prevent time and resources required to cut them out and measure them elsewhere. Something similar to the Rotochopper at Portsmouth which would be an effective way to downsize metal and other materials to save on waste costs.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Worker exposure to radiological contaminants will continue to be present until work is complete. Additionally, the movement of large components and the use of heavy equipment is a safety risk. Due to the building having no environmental controls heat and cold stress require significant attention as well as humidity which impacts instruments needed for monitoring.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

No interagency priorities have been identified.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

Budget confinements has led us to explore options to segmented parts and pieces within the C-333 facility. This saves money in the near term until an on-site waste disposal facility is available; however, with such limited space, storing parts and pieces in this manner creates a potential need to relocate the equipment to complete pre-demo work in the future.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

None identified

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

An In-Situ method for large items and equipment like compressors would prevent time and resources required to cut them out and measure them elsewhere. Something similar to the Rotochopper at Portsmouth which would be an effective way to downsize metal and other materials to save on waste costs.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

Our current scope to complete modified deactivation of C-333 is expected to be complete 9/30/2025. Once complete, efforts will be taken to complete pre-demo to prepare the building for demolition in the future.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

A method of cutting that is efficient and does not produce NOx gases that would negate the need for airline respirators to decrease worker exposure and improve worker efficiency due to less hazards required to mitigate

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

Improvement in a method to decrease exposure to NOx which decreases the need for additional PPE would have a significant positive impact to future work. the Dust Collector has been very beneficial is being implemented in the next MSA shop in Portsmouth.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Majority of our monitoring equipment is restricted to use to within particular parameters i.e. temperature and humidity, and with minimal ability to control those parameters on a large building that is no longer in production we experience delays or require additional mitigations in order to maintain production. Identifying equipment with a broader range in the area of humidity and temperature would be a great benefit to the project.

Respondent's Position in Relation to D&D Project: Stabilization & Deactivation Director

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

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Respondent Information

Name: Todd Walker

Job Title: Project Engineering Manager

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

We are in the process of removing, segmenting, shaping and storing process equipment used in the Gaseous Diffusion process since the early 50s. The objective is to remove and disposition nearly 500 large components (up to 24 ft. long x 13 ft. diameter), and other components, containing remnants of uranium and other hazardous chemicals, for eventual removal of the large process building they are located in down to grade. Other clean, more standard industrial facilities are also being demolished as part of the project, but the focus is on the first of four main process buildings. We will eventually move to the second building, similar in scope. The desire is to also build a future on-site waste disposal facility to hold the demolition waste from these projects.

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

There are many successes and challenges we have faced with the C-333 DEAC project. This is our first of four buildings, so we are new to much of what is required for a large project. We did benchmarking of PORTS in Ohio who is about 10 years ahead of us on DEAC, so much of what we do is patterned after them. Here are some thoughts on our technology/methodology:

1. Material handling – use of old building cranes is a maintenance problem; however, is the only way to move some equipment. We upgraded two main cranes which has helped. Our equipment is on a 2nd floor, so floor loading is a limitation on material handling equipment. We have purchased some new material handling equipment. We are constantly evaluating material handling improvements, whether crane fixtures, mobile cranes, forklifts, pallet jacks, air casters, carts pulled by tuggers, etc. Handling waste and use of waste containers is also important (metal containers, bags, lifting fixtures, etc.).

2. Ventilation – we must use NAMs, Hepa Vacs, etc, to help with air quality during segmentation. We also installed a dust collection system to remove and filter air from the DEAC processes. These work well, but we continue to work ideas to improve for better air quality and ease on worker. Also, access to HVAC is important for human comfort and will increase productivity. Recommend choosing area for work with ventilation if possible. Measuring and testing instruments,

such as those used by IH and RADCON, also may be highly sensitive to temperature/humidity. Ideas for improved instrument technology would also be helpful.

3. Plasma cutting – We have been using this method for downsizing of material. There is inherent problems such as fumes, dust, excessive heat, etc.; however it is most efficient for cutting. Also, good ventilation will reduce reliance on PPE.

4. Other technology/methodology used: Roller stand to rotate large diameter equipment; Hydraulic equipment crusher unit (similar to automobile crusher) used to reduce size of components.

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

A method for cutting steel without producing the heat of plasma cutting, but just as effective and efficient. The cutting produces fumes and dust harmful to workers. It would be greatly beneficial if an alternate method could reduce or eliminate that. PPE technology that incorporates cooling/heating for the worker would help productivity.

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Ideas in answer to question 3 above.

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

Unknown

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

None

D&D Project Referenced: C-333 DEAC

Respondent's Position in Relation to D&D Project: Project Engineering Manager

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

None

Respondent's Position in Relation to D&D Project: Project Engineering Manager

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

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Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov

2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

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Respondent Information

Name: William Wessel

Job Title: Federal Project Director

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

The C-333 D&D Project supports the PPPO Mission to conduct the safe, secure, compliant, and cost effective environmental legacy cleanup of the Portsmouth and Paducah Uranium Enrichment Sites. The current deactivation activities are being performed under DOE Atomic Energy Act authority; however, decommissioning of the facility will be performed as a CERCLA action. The Uranium Enrichment Decontamination and Decommissioning Fund was created by the Energy Policy Act to pay for this work. The current distribution of UED&D funds creates challenges to complete D&D work at the Paducah Site.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Characterization of the facility has been positively impacted by a qualitative nondestructive assay method through the deployment of a robotic pipe crawler for performing visually-assisted gamma scans. While the use of sodium iodide detectors to perform nondestructive assay measurements is not a new technology, pairing the detector with a quality camera for visual analysis, and placing the detector and camera on a robotic platform that is remotely operated improves the worker experience, decreases schedule, and helps identify areas in which quantitative NDA methods are required.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

Deactivation of C-333 involves segmenting components with temperature sensitive internals in which heat from plasma cutting creates an exothermic reaction concern. The project could benefit from an efficient method to cold cut these large pieces of equipment. The project could also benefit from new in-situ NDA methods that can perform qualitative and quantitative measurements for characterization of process gas equipment. One of the goals of the C-333 D&D project is to reuse/recycle equipment and

materials to the greatest extent possible; however, the effort required to perform radiological surveys required to free release this equipment/material often exceeds the cost for disposal making reuse/recycle cost prohibitive. This project and many others could benefit from a technology that more efficiently identifies the presence of radiological contamination in hard to access areas or on equipment with painted surfaces.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Equipment is often removed and downsized by the use of plasma cutting, potentially exposing the workers to combustion gases. This often requires workers to wear air line respiratory equipment. The D&D project could benefit from alternative cutting methods that alleviate the need for this level of respiratory protection.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

The C-333 D&D Project is governed by the Tri-Party Federal Facility Agreement between DOE, The U.S. Environmental Protection Agency, and the Kentucky Natural Resources and Environmental Protection Cabinet. The regulatory decision documents (i.e., demolition, soil, and waste disposal) for D&D of facilities will be scheduled through the Site Management Plan.

Regulatory challenges potentially impacting the C-333 D&D project include: Clean Water (Radiological Effluent Limits/PFAS), Corrective Action Management Unit/ Areas of Concern, 5G National Emission Standards for Hazardous Air Pollutants Applicable or Relevant and Appropriate Requirements, and Security Requirements (classified material, export-controlled information, etc.).

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

The C-333 D&D Project Cost and Schedule may be significantly impacted by whether waste must be shipped offsite for disposal or if an on-site waste disposal facility will be available to accept building demolition debris. The C-746-U sanitary landfill limits prohibit many process gas equipment components from being disposed of on-site, requiring costly offsite shipment, handling, and disposal. The absence of a WAC for the planned On-Site Waste Disposal Facility, creates challenges regarding characterization and future project planning.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

There are no specific public engagement or hazard protection requirements for the public outside of those activities required by CERCLA and interaction with the Paducah Citizens Advisory Board.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

None known beyond those presented in Response #3.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

Modified deactivation of the C-333 Process Building is scheduled to complete in FY25 and transition to a pre-demo phase. Based on the current Federal Site Lifecycle Estimate, demolition of the facility is scheduled for completion in FY36. Current plans include repurposing the land for industrial/recreational to the greatest extent possible.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

While there are no known emerging technologies to support D&D of C-333, PPPO welcomes the opportunity to test any that do emerge.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

The C-333 D&D project has incorporated lessons learned from similar projects completed at our sister site in Portsmouth, Ohio and avoided issues that they experienced in the past.

D&D Project Referenced: C-333

Respondent's Position in Relation to D&D Project: Federal Project Director

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

The project has experience issues with real-time monitoring of hydrofluoric acid (Drager 5100 X-am) and combustion gases (Drager 5600 X-am) created during plasma cutting operations. Specifically, false alarms have been observed on personal air monitors due to interference or "burning out" the sensors on these monitors. A better method for real-time monitoring in the worker's breathing zone would minimize project delays.

Respondent's Position in Relation to D&D Project: Federal Project Director

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

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1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
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2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
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May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

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Respondent Information

Name: Judson Lilly

Job Title: FPD

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

Portsmouth is a cleanup site. That is why we are doing D&D.

FSLE timeframe is 15-20 years.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Enhanced:

Demolition of these buildings is feasible with currently available demolition techniques.

Air monitoring line conditioners were added to reduce electronic noise in data.

Hindered:

Non-destructive assay for uranium holdup delays characterization and impacts costs.

Converter segmentation process – although process worked, there are opportunities in the areas of physical segmentation and crushing of the interior structure.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

Improvements in NDA technology could improve schedule and cost.

Automated Converter segmentation.

Automated size reduction of demo debris.

Demolition-friendly heavy equipment tracks that are non-destructive to surface.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Our emphasis on performing Demolition with large track mounted demolition shears has moved the worker away from the hazard and has improved safety.

Manual removal of interior/exterior transite material.

Unidentified and unexpected energized or pressurized systems.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

Portsmouth was not included on the NPL.

We are performing D&D under DOE's CERCLA authority by way of a formal agreement with the State of Ohio.

Ohio EPA has been an active and involved regulator.

US EPA has not had a major role in D&D at Portsmouth, therefore the bureaucracy of D&D regulatory decisions at Portsmouth has been more streamlined than it would have been at an NPL site.

Other sites may have opportunities to perform D&D as a DOE Removal Action under DOE's CERCLA authority.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

Portsmouth has a waste disposition ROD.

Hybrid approach, some waste off site and some wastes on-site.

The majority of deactivation wastes are sent off site.

The majority of demolition wastes on-site.

This has also made it economically attractive to dig up impacted plumes and landfills on the Portsmouth site to use these materials as engineered fill.

Unknown contents of waste in a classified landfill that is planned to be excavated.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

Yes.

Visibility of major buildings at Portsmouth is very high profile.

Public engagement was extensive.

Hazard protection has been extensive.

Water detention berm and water treatment system.

Extensive use of dust suppression misting and fixatives.

Modeling of potential airborne impacts.

Extensive monitoring for potential airborne contaminants during the work.

Timely Posting of monitoring results on websites available to the public.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

Other than NDA, No.

Absence of survey techniques and decontamination techniques and release standards makes recycling from GDP not feasible.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D work will proceed until Portsmouth cleanup has been completed.

The current plan extends to ~ 2037-2040.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

Can't think of any.

Low dose rates make the site a poor candidate to test robotics, robotics are not needed at Portsmouth.

Drones have been very effective at gathering photographic record of the work. And the drone photographs have been very valuable in describing the work to stakeholders.

Incorporation of AI in risk analysis, regulatory documents, and project controls.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326 Process Building; Demolition of the X-333 Process Building.

Respondent's Position in Relation to D&D Project: Current FPD for these projects

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

The sequence of deactivation work has been inefficient.
The reluctance to perform proper NDA has delayed schedules and increased costs.
Demolition on the other hand has had exceptional cost and schedule performance.
See X-326 CAP 1, X-326 CD-2/3, X-326 CAP 2 CD-2/3, and Technical Approach handout from the
IPR.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326
Process Building; Demolition of the X-333 Process Building.
Respondent's Position in Relation to D&D Project: Current FPD for these projects

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Portsmouth is generally a poor candidate for D&D technology research.

The doses are low and standard Demolition techniques have been effective.

One of the major keys to successful demolition at Portsmouth has been a streamlined regulatory approach with DOE using CERCLA and Ohio functioning as the prime regulator.

Direct flow of deactivation debris to OSWDF.

There is degrading infrastructure i.e. leaking roofs. There is a need for a short term quick fix.

D&D Project Referenced: Deactivation of the X-333 Process Building; Demolition of the X-326
Process Building; Demolition of the X-333 Process Building.
Respondent's Position in Relation to D&D Project: Current FPD for these projects

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry

Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov

2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Kristi Wiehle

Job Title: Environmental Protection Specialist

Contact Information: _____

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

Regulatory Framework – Regulatory Documents, Interface with Regulators, Environmental/Regulatory Compliance

D&D Project Referenced: X-326, X-333 & X-330 Process Buildings (PB) _____

Respondent's Position in Relation to D&D Project: DOE as stated above

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

The X-326 PB has been demolished and is completed. The X-333 is the next PB to be demolished and we currently have an Ohio EPA approved Demolition Design Plan that describes how we intend to accomplish this work. Generally, we try not to get too specific or detailed but in certain circumstances, the nature of the demolition or compliance with ARARs calls for details. If a certain technology/methodology is not currently described in a regulatory document that has been approved by the regulators, a field change notice must be submitted and reviewed and concurred with by the regulators which, depending on the complexity, could take time. Again, in general we try our hardest to avoid details to allow the project flexibility but depending on the conditions, delays in regulatory concurrence may occur.

D&D Project Referenced: X-333 PB

Respondent's Position in Relation to D&D Project: Same as above

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

a) The X-333 Demolition Design Plan (DDP) which is the approved regulatory document that governs the demolish of the X-333 PB and this X-333 DDP contains the applicable ARARs and describes how we intend to comply with those ARARs. b) Not sure, but I do not think so.

D&D Project Referenced: X-333

Respondent's Position in Relation to D&D Project: Same as above

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

In order to meet the WAC for our OSWDF, many of the items coming out of the X-333 will not meet the size requirements of the WAC and will need to be size reduced before being transported to our OSWDF. The size reduction activities will happen on the X-333 slab. The concrete slab is being used to help us meet one of our TSCA ARARs and several others. Given the size and weight of this equipment needing reduced, there is concern that the slab, even with reinforcements will not hold up to this heavy equipment action.

D&D Project Referenced: X-333 PB Demo

Respondent's Position in Relation to D&D Project: Same as above

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

Public engagement already was officially completed as a part of the Record of Decision (ROD) process completed under CERCLA several years ago. DOE continues to engage the public through semi-annual public meetings, envoy programs, programs aimed specifically at engaging area youth – science alliance, science bowl, science fairs and our annual ASER project for several local high schools.

D&D Project Referenced: PORTS D&D Project

Respondent's Position in Relation to D&D Project: Same as above

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Respondent's Position in Relation to D&D Project: _____

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: _____

Job Title: _____

Contact Information: _____

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

In the near term and the future (+5 years), the most significant waste processing questions/issues will relate to excavations, including the X-749A Classified landfill and the asbestos-containing water piping (RCW piping). During the excavation of the landfill (+5 years), there is a potential for prohibited items to be excavated, so the waste acceptance organization will need extra care to monitor these excavations. In addition, thousands of feet of RCW piping will be excavated. Depending on the ability to downsize to minimize cell volume and meet compaction requirements, this waste stream's disposition path could be off-site or on-site at the cell. Downsizing for on-site disposal is currently being evaluated by the contractor, evaluating a crushing process, which would allow for the piping to meet sizing requirements for OSWDF but also create additional environmental, health, and safety concerns that must be mitigated.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Respondent's Position in Relation to D&D Project: _____

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2. Marion Cofer
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May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

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Questionnaire Instructions:

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Respondent Information

Name: Daniel Mains

Job Title: General Engineer

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

I oversee the groundwater plume and landfill excavations and at- and below-grade demolition projects at PORTS. The primary driver for the work taking place is the regulatory framework, D&D DFF&O between DOE and Ohio EPA. The groundwater plume and landfill excavations are providing engineered fill for the Onsite Waste Disposal Facility. The excavation of the groundwater plumes expedites the timeframe of clean-up by removing soil containing higher concentrations of TCE. The D&D work at PORTS reduces DOE's environmental risk and liability. The issued budget each fiscal year has the potential to slow the progress of clean-up of PORTS.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Enhanced - Water management and treatment is crucial during soil excavations for slope stability and contaminant control; Enhanced - Soil Conditioning Bench study Work Plan developed and performed for treating saturated soils to meet moisture content requirements for placement in OSWDF (Solution - calciment blending), Enhanced - Drone to Map was an improvement over traditional surveys for determining volumes of soils excavated, Enhanced - Utilizing GPS sensors on heavy equipment was important to stay within bounds of excavation design.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

The areas to be excavated are based on existing groundwater data from monitoring wells installed over the history of the groundwater plume remediation. This provides the basis for areas to be excavated during the project. Samples are collected post-excavations but there is a potential for TCE concentrations to rebound from neighboring geologic formations. These excavations are backfilled with clay soil overburden. The backfill is blended with calciment, compacted and tested. Groundwater modeling of post-excavation conditions may aide in future groundwater plume excavation decisions on the extent of excavations.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

During the 5-Unit Groundwater Plume Excavation, there have been drums and other wastes encountered during the wide and deep excavation. The workers have also encountered odors. In all cases, the project pauses and investigates each unforeseen condition. For the drums and waste types, samples are collected of the drum/unsuspected waste for proper management and disposal. This includes industrial hygiene sampling of the environmental for both unsuspected drums/waste and odors to identify risks and ensure workers have appropriate levels of PPE. The excavations include the use of large heavy equipment that are operated by trained and experienced union work force. Methods and process for moving the heavy equipment within the excavation are important to follow to prevent accidents.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

ARARs are identified for the excavations that are required to be followed. Ohio EPA visits the site routinely and observes the 5-Unit Groundwater Plume Excavation Project. The basis for determining the limits of groundwater plume excavations is not driven by Federal or State Regulations but have been approved by Ohio EPA in the Comprehensive OSWDF RD/RA Work Plan. Further, Ohio EPA has approved the 5-Unit Excavation Work Plan that indicates the depth and area of the groundwater plume to be excavated for the project. All future plume and landfill excavations will have work plans submitted to Ohio EPA for approval prior to commencement of work.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

Large diameter recirculating cooling water pipes within the footprint of the 5-Unit Excavation and across the Plant site. These pipes consist of asbestos. The off-site disposal of these pipes will be cost prohibitive. Alternatives for management and size reducing of the RCW piping is being evaluated for ultimate disposal into the OSWDF.

The 7-Unit Excavation Project (not yet designed) consists of higher concentrations of TCE. The existing Waste Acceptance Criteria for the OSWDF for TCE is concentrations below 5,000 mg/kg. If soil is encountered at concentrations greater than 5,000 mg/kg, the soils will require treatment prior to placement. A treatment plan including the methodology of treatment will be need to developed and submitted to Ohio EPA for approval in accordance with D&D DFF&O/WD ROD.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project and 7-Unit GW Plume Excavation

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

There is continuous air monitoring with established action levels based on air modeling. All water encountered within the excavation is pumped and treated in a project designed waste water treatment plant. The influent and effluent of the waste water treatment plant is sampled and compared against action levels for the constituents of concern from the plume excavation of the project.

I will defer to Kristi Wiehle and Greg Simonton's responses for public engagement.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

Not aware of any technological or methodology improvements to improve the performance of impacted soil excavations for engineering fill in the OSWDF.

D&D Project Referenced: 5-Unit Groundwater Plume Excavation Project
Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

2024 FSLE timeline, majority of property transferred to SODI for future reindustrialization, limited liability to be turned over to DOE Legacy Management.

D&D Project Referenced: PORTS D&D Project (holistic concept)
Respondent's Position in Relation to D&D Project: General Engineer

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

Predictive modeling for TCE rebound following source removal (removal of soils with TCE concentrations ≥ 50 $\mu\text{g/L}$) and backfill with different soil than native geologic formation.

D&D Project Referenced: Groundwater Plume Excavations
Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

Understanding future engineered fill demand by the OSWDF to ensure continued operations of debris placement.

D&D Project Referenced: X-740 Groundwater Plume Excavation Project

Respondent's Position in Relation to D&D Project: General Engineer

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Unknown contaminants and waste encountered during the excavation of closed landfills and groundwater plume excavations. Process for identifying waste during closed landfill excavations, collecting and analyzing samples within timeframes that don't hinder project progress. Real-time analysis to be the preferred method of investigating the unknowns encountered during excavations.

Respondent's Position in Relation to D&D Project: General Engineer – Project Manager

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Richard Mayer _____

Job Title: Safety System Oversight Engineer _____

Contact Information: email: REDACTED _____

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

Ensuring that D&D activities are conducted in a manner that results in minimization of nuclear hazards through characterization, deactivation, demolition, and disposal of each PORTS and PAD nuclear facility.

D&D Project Referenced: PORTS D&D Project

Respondent's Position in Relation to D&D Project: Nuclear Safety Oversight

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Characterization techniques often need to be developed that are specific to each facility being demolished. Several new techniques were developed for X-326, our highest assay Gaseous Diffusion Building. Additional techniques needed to be developed for X-333, our lowest assay Gaseous Diffusion Building. Characterization in both of these facilities is already completed. Techniques did not exist for efficient characterization of pipe galleys or large valves in X-333, and needed to be developed. The techniques for characterization of pipe galleys will need to be developed for X-330, our middle-assay building, because the criticality limits will be different. In addition, the techniques developed for large valves are not sufficient to provide final characterization values for some valves. These valves must be removed during demolition because of worker safety concerns. The same issue will exist in X-330 and all Paducah facilities that exceed 1% ²³⁵U enrichment. We have shared developed characterization techniques with Paducah personnel. Future development efforts for better characterization of large valves would benefit the project if completed in time for X-330, and would benefit D&D efforts at the Paducah facilities.

D&D Project Referenced: PORTS D&D Project

Respondent's Position in Relation to D&D Project: Nuclear Safety Oversight

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

Enhanced methods for characterization of large valves would be beneficial, as indicated in the response to Question 2.

D&D Project Referenced: PORTS D&D Project

Respondent's Position in Relation to D&D Project: Nuclear Safety Oversight

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Personnel currently need to access pipe galleys and installed valves from both the bottom and the top. Because the pipe galleys are relatively high up in the air and have a limited number of walkways intended for human use, detector placement can sometimes be an increased risk for characterization personnel. In addition, large valves are up to 17 feet in length, and pose the same concern. Man-lifts are typically used to position detection instrumentation and personnel for characterization, but improved characterization techniques that do not require access from both the top and bottom of pipe galleys would improve worker safety.

A second worker safety issue involves lines that were used to provide ClF_3 to the plant when it was in operation. The system in X-333 was purged and treated to remove residual gaseous ClF_3 with the goal to reduce its concentration to below 1 ppm. A holding tank could not be reduced to this level after multiple treatments, and remains above the immediately dangerous to life and health (IDLH) level. Improved techniques for treating such systems would be beneficial, as the system also fed X-330 at PORTS and a system was also used in Paducah.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

D&D Project Referenced: _____
Respondent's Position in Relation to D&D Project: _____

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Respondent's Position in Relation to D&D Project: _____

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Dewintus Powell

Job Title: Infrastructure General Engineer

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

Eliminate the flow of lime sludge from X-611 to the X-611 Lime Sludge Lagoon, with the eventual plan to deactivate/close the lagoon and treat the waste water with a pellet form water softening treatment that reduces lime waste significantly. Local softening could be performed at the point of use for facilities who require softening (such as X-670 and X-690).

Sewage Treatment Plant has numerous areas that need to be upgraded. Modification to install new mercury-removing equipment at the X-6619

DOE and its operating contractor are obligated to comply with the NERC regulations for BES operations. The high voltage system is best described as degraded. Reliable operation of the antiquated equipment is becoming more of a challenge. Continued operation and maintenance costs will continue to increase. X-530 high voltage equipment must be upgraded or replaced in order to reduce the risk of failure and to avoid the consequential long recovery time associated with such a failure

Public Warning Siren System -The PWS control system (computers and software) are dated and should be replaced.

The Storm Drain System consists of an underground piping network (that includes catch basins and manholes) that captures stormwater runoff. This system is needed to keep the site drained of stormwater, and prevents flooding of low-lying areas around site. However, this system is only in fair condition.

D&D Project Referenced:

Respondent's Position in Relation to D&D Project:

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

The information technology service has been inefficient due to end-of-life computer equipment hardware and storage. The log-in times for users has been unacceptable and has created inefficiencies for users. Although this is in the process of being addressed, the improvement of the new virtual desktop interface (VDI) hardware and storage will not be completely in effect until FY 2026. IT hardware and storage upgrades will need to be addressed again in FY 2031 (affecting D&D projects +5 years).

Respondent's Position in Relation to D&D Project:

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Tony Takacs, Steven Schaeffer, Steve Ater - Facility Reps. Gilbert Whithurst - Health Physicist

Job Title: _____

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

The primary objective and drive of the D&D work is the Deactivation and decommissioning of the Portsmouth Gaseous Diffusion Plant. Work scope includes characterization, clean up, demolition, and disposal of material from both category II nuclear facilities and non-nuclear facilities.

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

Multiple facilities at PORTS rely on overhead bay cranes to move large components. During the D&D process these cranes were upgraded to be controlled remotely. This reduced the hazards for the crane operators and increased productivity on multiple projects.

Multiple projects at PORTS, including our Onsite Waste Disposal Facility (OSWDF), have been able to utilize drones equipped with LIDAR technology to improve regulatory compliance and efficiency of projects.

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

The use of drones equipped with radiological and chemical monitoring equipment would be beneficial to our emergency services department.

D&D Project Referenced: DOE Facility Representative

Respondent's Position in Relation to D&D Project: DOE Facility Representative

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

Hazards associated with the PORTS D&D project include, but are not limited to; radiological, chemical, thermal, pneumatic, electrical, mechanical, ergonomic, and other hazardous energy.

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

The primary regulatory controls and agencies that affect the PORTS D&D project are DOE Orders, 29 CFR 851, 29 CFR 1910, 29 CFR 1926, and Ohio EPA.

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

N/A

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

N/A

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

N/A

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

The intended project lifespan of the PORTS site is indefinite. DOE has begun and will continue to turn over land to the community for reindustrialization.

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

N/A

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

N/A

D&D Project Referenced: PORTS D&D

Respondent's Position in Relation to D&D Project: DOE Facility Representative

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the

expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

N/A

Respondent's Position in Relation to D&D Project: DOE Facility Representative

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

Purpose:

This initiative has been formed to identify high-priority technical needs and the Technology Development (TD) tasks required to meet those needs in support of the ongoing deactivation and decommissioning (D&D) of Department of Energy infrastructure across the United States. This questionnaire is intended to be completed by the personnel involved with current and near-future D&D projects in the DOE Complex. A small team of subject matter experts (SMEs) led by SRNL from the Network of National Laboratories for Environmental Management and Stewardship (NNLEMS) professionals will assess the critical needs, scientific capabilities, and practical technologies identified by this questionnaire and prioritize research and development of TD projects in the D&D focus area to assist ongoing D&D work across the DOE complex. Each D&D project will be asked to complete a questionnaire and participate in a subsequent video interview process to achieve these goals.

This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

Questionnaire Instructions:

The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: Tom Hines

Job Title: Nuclear Safety Oversight Lead

Contact Information: REDACTED

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

The Mission of the Portsmouth/Paducah Project Office (PPPO) is to conduct the safe, secure, compliant, and cost effective environmental legacy cleanup of the Portsmouth and Paducah Uranium Enrichment Sites on behalf of the local communities and the American taxpayer. After environmental cleanup activities are completed, the sites will be available for reuse with a range of uses up to and including heavy industry.

D&D Project Referenced: Decommissioning and Decontamination (D&D) of inactive facilities.

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

There are no specific hindrances. See response 3.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

The needs for PPPO are primarily to gather information on what is available to help improve performance on what is already being done. Are there better ways complete site activities? Is there better technology available? There are floor loading problems at the Portsmouth, Ohio plant in the X-330 Building that could be improved with better technology. There is currently only 40 lbs/ft² floor load capacity between cells. That is not enough capacity to allow characterization of the equipment that is required to proceed with deactivation.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

There are floor loading concerns in Portsmouth on the X-330 cell floor. The X-330 cell floor was evaluated and it was determined that much of the equipment intended for deactivation cannot be used across the majority of the cell floor (i.e., forklifts, man lifts, characterization equipment) because of the limitations of the floor load capacity (40 lbs/ft² between cells, see Figure 1).

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

Demolition will be conducted under DOE authority or under CERCLA. Under CERCLA ARARs will be identified in a ROD.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

No issues regarding waste processing.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

Yes, PPPO communicates the hazards of the DOE activities honestly and openly with the public. The public has a right to know about the hazards near them. No public engagement required beyond standard CERCLA community participation activities. Standard hazard protections will be protective of the public.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

That would be a desired outcome of this effort. Developing methods to perform semi-automated work vs manual work would be safer and more cost effective.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

See response 1.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

unknown

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

The project teams routinely distribute lessons learned from the DOE sites that are appropriate for consideration of the work activities.

D&D Project Referenced: D&D of inactive facilities

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Please see response 3 above.

Respondent's Position in Relation to D&D Project: Technical/Safety Oversight

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

Should there be any questions or comments to this questionnaire, please contact the project leads listed below.

1. Evan Koelker
Senior Scientist, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Evan.Koelker@srnl.doe.gov
2. Marion Cofer
Manager, Environmental Sciences & Dosimetry
Savannah River National Laboratory
Marion.Cofer@srnl.doe.gov

May 2, 2024

TO: Deactivation and Decommissioning Project Team

FROM: Deactivation and Decommissioning Roadmap Initiative Team

D&D Roadmap: Facility Questionnaire for Technical Needs

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This questionnaire is designed to allow interviewers and interviewees to preface a video conference with topics the D&D project team finds of critical importance. By responding to the questions below the formal video conference will be a more focused process. Each interview will be summarized in a corresponding report that will be issued to the D&D project team, DOE TD division, and other participating D&D site teams that are interviewed. All projects will be assessed for opportunities to test key technologies identified by the D&D Roadmap team. A final workshop will be organized and made available for participation and presentation by each entity involved with this D&D Roadmap initiative, including private contractor companies.

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The questions and topics below have been selected by the Roadmap SME team to solicit a broad range of information regarding D&D activities at the site. The questionnaire should be completed by personnel involved in the planning, implementation, and assessment of D&D projects that are currently taking place or are slated to take place in the next three to five years. Multiple answers to each question may be necessary. A complete picture of current technological needs and potential problem points is critical to the success of the D&D Roadmap initiative and its ability to provide value to the individual D&D teams. Photographs or related attachments of specific areas of interest are encouraged to be provided in addition to any questions that they may pertain to. Please have three to five employees answer each section of this questionnaire separately:

Respondent Information

Name: _____

Job Title: _____

Contact Information: _____

1. Project Driver

Please describe the primary objective and/or driver of the D&D work taking place that you are currently involved in. This may be timeframe, environmental risk, budgetary concerns, regulatory framework, worker safety, or otherwise.

- A Record of Decision is in place, determination that demolition was the preferred option.

D&D Project Referenced: X-326 process building

Respondent's Position in Relation to D&D Project: _____

2. Project Progress

Are there any specific instances of D&D work being hindered or enhanced by technological improvements or methodology? A specific objective of this project is to propagate useful technology or D&D techniques to other projects in the DOE complex.

- Real time emissions and radionuclide monitoring enhanced project (quelled fears, set a performance standard) uploaded to public website for transparency
- Judicious application of fixative prior to and during demolition activities
- Truck shields utilized during loadout to minimize radiological surveys and to keep trucks out of Controlled Area

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

3. Technological Application

Are any technological needs that may improve the results of your D&D project absent or not functioning? This may refer to currently existing, but unobtainable, technology, theoretical application of existing technology, or fully theoretical specialized equipment.

- None noted

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

4. Worker Safety

Are there any barriers or significant risks to D&D worker safety that apply to the current D&D project that have or could impact the performance of this work? This could involve critical safety devices, D&D techniques in hazardous environments, or specific hazard controls related to each project.

- Utilization of a tracked carrier for application of fixative to debris piles mitigated proximity of exposed workers to hazards associated with heavy equipment and uneven terrain and shifting debris
- Remote control fogging cannons and misters kept personnel away from the “working face” of the demolition and debris sizing operations.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

5. Regulatory Framework

What regulatory controls most affect this D&D project? Are there any significant instances of inter-agency priorities that affect this project? This may range from regulatory engagement, regulation clarity, conflicting regulation, or otherwise specified by the project team.

- Limited regulatory agency resources to support timely document reviews.
-

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

6. Waste Disposition and Disposal

What issues exist that may affect project outcome that relate to waste processing on this project? This may refer to waste collection, storage, shipment, disposal facility requirements, or otherwise identified by the project team.

- Volume reduction of waste decreased the overall number of waste loads and increased efficiencies with respect to the loadout cycle.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

7. Public Engagement

Does the D&D project require specific public engagement or hazard protection required for the successful conduct of this work?

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

8. Cost Efficacy

Are there any technological or methodology improvements that could conceptually improve the performance of this D&D project?

- None noted

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

9. Project Lifespan

What is the intended project lifespan and outcome of this D&D work? This may involve eventual public use of the property (with or without environmental restrictions), long term environmental monitoring, reuse of the land by the DOE, or otherwise as identified by the D&D project team.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

10. Research Possibilities

What areas or possibilities are available in this D&D project to deploy emerging technology? Are there any opportunities to test new research and technology related to D&D that may become available in the near future?

- No new technologies noted at this time

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

11. Site Specific

What other issues have arisen during the current or previous phases of this D&D project that it is possible to improve? What lessons learned have the project team identified that may be useful to future D&D work on this or other projects?

- Co-located, but independent, emissions monitoring by facility and state regulators provided a validation of monitoring results.
- Public domain for posting of air monitoring data (portsdemo.com)
- Stake holder outreach in the community of site status / progress
- Willingness to pause operations to apply water or fixatives as need to maintain contamination control
- Establishing alarm set points for emissions well below the regulatory thresholds allowed for timely mitigating actions to preclude exceeding regulatory limits.

D&D Project Referenced: _____

Respondent's Position in Relation to D&D Project: _____

12. Open Ended

Please describe any other issues that may relate to D&D project work pertaining to technological or methodological improvements that are, or may be, possible and applicable. This initiative relies upon the expertise and insight of individuals who drive D&D work for the DOE and the expertise of the interview team to recommend or initiate research to aid them.

Respondent's Position in Relation to D&D Project:_____

The D&D Roadmap team appreciates all feedback and answers to this questionnaire. There are no wrong answers, and all input from experienced individuals with experience in D&D work are valuable to the success of this project and related work in the DOE complex. Results of this initiative will be shared freely with D&D project teams with the sole intention of improving the quality of work and life of these teams.

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Appendix B.

B.1 D&D Roadmap Assessment Categories and Criteria

D&D Roadmap Assessment Categories and Criteria

Category 1

D&D Stage

- 1.) Deactivation
- 2.) Long Term Storage
- 3.) Decommissioning

Category 4

Project Impact Level

- 1.) High
- 2.) Medium
- 3.) Low

Category 6

Technology Type

- 1.) Modelling
- 2.) Non-Destructive Assay
- 3.) Sample Collection
- 4.) Robtoic/Remote Applications
- 5.) Fixatives and Coatings
- 6.) Decay and Byproduct Control
- 7.) Grout and Entombment
- 8.) Contaminant Collection/Removal
- 9.) Personal Protective Equipment
- 10.) Exposure Monitoring
- 11.) Waste Preparation
- 12.) Waste Treatment
- 13.) Waste Shipment and Disposal
- 14.) Interim Waste Storage
- 15.) Artificial Intelligence

Category 2

Needs Timeline

- 1.) Near Future
- 2.) Current
- 3.) Near Past

Category 5

Challenge Type

- 1.) Contaminant Type
- 2.) Contaminant Control
- 3.) Security and Maintenance
- 4.) Worker Safety
- 5.) Waste Processing
- 6.) Characterization
- 7.) Accessibility
- 8.) Project Management

Category 3

Needs Driver

- 1.) Project Cost
- 2.) Project Schedule
- 3.) Project Efficiency
- 4.) Safety Risk

B.2 PORTS and PGDP Roadmap Assessment of Oak Ridge Questionnaire Responses

D&D Roadmap Assessment of PPPO Questionnaire Responses

PORTS - X330 - 1: Automated Segmentation of Large Process Equipment		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Automated size reduction of demo debris would reduce risk and improve efficiency.	Stage	3
	Timeline	1,2,3
	Driver	2,3,4
	Impact	2
	Challenge	4,5
	Technology	4,8,11

PGDP - C333 - 2: Cold Cutting for Segmentation and Downsizing		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
A method for cutting steel without producing the heat of plasma cutting, but just as effective and efficient. The cutting produces fumes and dust harmful to workers. It would be greatly beneficial if an alternate method could reduce or eliminate that. PPE technology that incorporates cooling/heating for the worker would help productivity.	Stage	2,3
	Timeline	1,2
	Driver	2,3,4
	Impact	2
	Challenge	4,5
	Technology	8,11

PGDP - C333 - 3: Material Handling Process Improvements		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Material handling – use of old building cranes is a maintenance problem; however, is the only way to move some equipment. We upgraded two main cranes which has helped. Our equipment is on a 2nd floor, so floor loading is a limitation on material handling equipment. We have purchased some new material handling equipment. We are constantly evaluating material handling improvements, whether crane fixtures, mobile cranes, forklifts, pallet jacks, air casters, carts pulled by tuggers, etc. Handling waste and use of waste containers is also important (metal containers, bags, lifting fixtures, etc.).	Stage	3
	Timeline	1,2,3
	Driver	3
	Impact	1
	Challenge	4,5
	Technology	11,12,13

PORTS - Misc. - 4: Asbestos Materials Size Reduction		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Large diameter recirculating cooling water pipes within the footprint of the 5-Unit Excavation and across the Plant site. These pipes consist of asbestos. The off-site disposal of these pipes will be cost prohibitive. Alternatives for management and size reducing of the RCW piping is being evaluated for ultimate disposal into the OSWDF.	Stage	3
	Timeline	1,2,3
	Driver	2,4
	Impact	3
	Challenge	5
	Technology	11

PGDP - C333 - 5: Breathing Zone Airborne Contaminant		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
The project has experience issues with real-time monitoring of hydrofluoric acid (Drager 5100 X-am) and combustion gases (Drager 5600 X-am) created during plasma cutting; false alarms have been observed on personal air monitors due to interference sensors on these monitors. A better method for real-time monitoring in the worker's breathing zone would minimize project delays. Improvement in a method to decrease exposure to NOx which decreases the need for additional PPE would have a significant positive impact to future work. the Dust Collector has been very beneficial is being implemented in the next MSA shop in Portsmouth.	Stage	3
	Timeline	1,2
	Driver	4
	Impact	2
	Challenge	4
	Technology	9,10

PGDP - C333 - 6: Environmentally Hardened Sensors		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Due to the building having no environmental controls heat and cold stress require significant attention as well as humidity which impacts instruments needed for monitoring. Majority of our monitoring equipment is restricted to use to within particular parameters i.e. temperature and humidity, and with minimal ability to control those parameters on a large building that is no longer in production we experience delays or require additional mitigations in order to maintain production. Identifying equipment with a broader range in the area of humidity and temperature would be a great benefit to the project. Measuring and testing instruments, such as those used by IH and RADCON, also may be highly sensitive to temperature/humidity. Ideas for improved instrument technology would also be helpful.	Stage	2,3
	Timeline	1,2
	Driver	3,4
	Impact	2
	Challenge	4
	Technology	9,10

PGDP - C333 - 7: Component Recycling and Reuse		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
One of the goals of the C-333 D&D project is to reuse/recycle equipment and materials to the greatest extent possible; however, the effort required to perform radiological surveys required to free release this equipment/material often exceeds the cost for disposal making reuse/recycle cost prohibitive. This project and many others could benefit from a technology that more efficiently identifies the presence of radiological contamination in hard to access areas or on equipment with painted surfaces.	Stage	3
	Timeline	2
	Driver	3
	Impact	2
	Challenge	6
	Technology	2

PORTS - X330 - 8: Large Component NDA		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Non-destructive assay (NDA) for uranium holdup delays characterization and impacts costs. Improvements in NDA technology could improve schedule and cost. The sequence of deactivation work has been inefficient. The reluctance to perform proper NDA has delayed schedules and increased costs. Future development efforts for better characterization of large valves would benefit the project if completed in time for X-330, and would benefit D&D efforts at the Paducah facilities. Large valves are up to 17 feet in length, and pose the same concern. Man-lifts are typically used to position detection instrumentation and personnel for characterization, but improved characterization techniques that do not require access from both the top and bottom of pipe galleys would improve worker safety.	Stage	3
	Timeline	1,2
	Driver	1,2,3
	Impact	1
	Challenge	6
	Technology	2

PGDP - C333 - 9: Robotic Deployment of NDA		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Characterization of the facility has been positively impacted by a qualitative nondestructive assay method through the deployment of a robotic pipe crawler for performing visually-assisted gamma scans. Pairing the detector with a quality camera for visual analysis, and placing the detector and camera on a robotic platform that is remotely operated improves the worker experience, decreases schedule, and helps identify areas in which quantitative NDA methods are required.	Stage	1,3
	Timeline	1,2,3
	Driver	3
	Impact	1
	Challenge	6
	Technology	2,4

PORTS - X330 - 10: Durable Coatings and Hazard Markings		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Early elimination of non-essential systems (Exhaust/Supply Fans, Heating/Cooling) may lead to unanticipated consequences such as moisture/humidity management issues within large facilities. This further leads to contamination control issues resulting from early internal coating and signage/marketing failures.	Stage	1,2
	Timeline	1,2
	Driver	4
	Impact	2
	Challenge	2
	Technology	5

PORTS - Misc. - 11: Degrading Infrastructure Solutions		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Area of Opportunity: There is degrading infrastructure i.e. leaking roofs. There is a need for a short term quick fix.	Stage	1,2,3
	Timeline	1,2,3
	Driver	4
	Impact	2
	Challenge	1,3,7
	Technology	5,6

<u>PORTS - Misc. - 12: Emergency Response</u>		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
The use of drones equipped with radiological and chemical monitoring equipment would be beneficial to our emergency services department.	Stage	3
	Timeline	1,2
	Driver	4
	Impact	2
	Challenge	4,6
	Technology	4

<u>PORTS - X330 - 13: Energized Source Detection</u>		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Unidentified and unexpected energized or pressurized systems during deactivation and excavations on and in the deteriorating facilities.	Stage	3
	Timeline	2,3
	Driver	4
	Impact	1
	Challenge	3,4
	Technology	9,10

<u>PGDP - C333 - 14: Heat Stress PPE</u>		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Unidentified and unexpected energized or pressurized systems during deactivation and excavations on and in the deteriorating facilities.	Stage	3
	Timeline	1,2,3
	Driver	3,4
	Impact	2
	Challenge	4
	Technology	9

<u>PGDP - C333 -15: Work Zone Air Quality Control</u>		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Ventilation – we must use NAMs, Hepa Vacs, etc, to help with air quality during segmentation. We also installed a dust collection system to remove and filter air from the DEAC processes. These work well, but we continue to work ideas to improve for better air quality and ease on worker. Also, access to HVAC is important for human comfort and will increase productivity. Recommend choosing area for work with ventilation if possible.	Stage	2,3
	Timeline	1,2
	Driver	3
	Impact	2
	Challenge	2,4
	Technology	8,9

<u>PORTS - X330 - 16: Chlorine Trifluoride Control</u>		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
A second worker safety issue involves lines that were used to provide ClF3 to the plant when it was in operation. The system in X-333 was purged and treated to remove residual gaseous ClF3 with the goal to reduce its concentration to below 1 ppm. A holding tank could not be reduced to this level after multiple treatments, and remains above the immediately dangerous to life and health (IDLH) level. Improved techniques for treating such systems would be beneficial, as the system also fed X-330 at PORTS and a system was also used in Paducah.	Stage	3
	Timeline	1,2
	Driver	4
	Impact	1
	Challenge	4,5
	Technology	8

PGDP - C333 - 17: Interim Waste Storage		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Budget confinements has led us to explore options to segmented parts and pieces within the C-333 facility. This saves money in the near term until an on-site waste disposal facility is available; however, with such limited space, storing parts and pieces in this manner creates a potential need to relocate the equipment to complete pre-demo work in the future. The desire is to also build a future on-site waste disposal facility to hold the demolition waste from these projects.	Stage	3
	Timeline	1,2
	Driver	1,3
	Impact	3
	Challenge	2,4
	Technology	14

PORTS - X330 - 18: Artificial Intelligence Application		
Chosen Questionnaire Response	Assessment Category	Assessment Criteria
Possible R&D: Incorporation of AI in risk analysis, regulatory documents, and project controls.	Stage	1,2,3
	Timeline	1,2,3
	Driver	3,4
	Impact	3
	Challenge	8
	Technology	15

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