DEACTIVATED SM-1 NUCLEAR REACTOR FACILITY DECOMMISSIONING AND DISMANTLEMENT

PROJECT OVERVIEW & SIX MONTH LOOK AHEAD

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US Army Corps of Engineers®

TOPICS

- History of the Army Nuclear Power Program and the SM-1 Deactivated Nuclear Power Plant
- Radiological Information
- Final Decommissioning of the SM-1
  - Wetlands and Resource Protection Area
  - Monitoring and Sampling (Radiological and Environmental)
  - Waste Shipments
- Six Month Look Ahead
- Communications
- Questions and How to Learn More

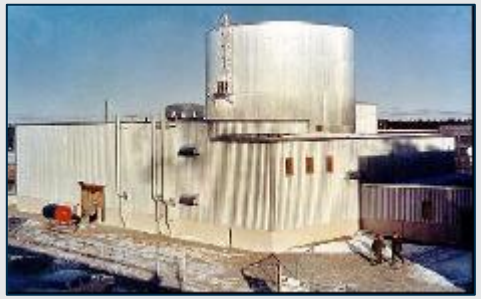
US Army Corps of Engineers

US ARMY NUCLEAR PROGRAM

Six DOD power reactors fielded between 1957-1976

- Four Army:

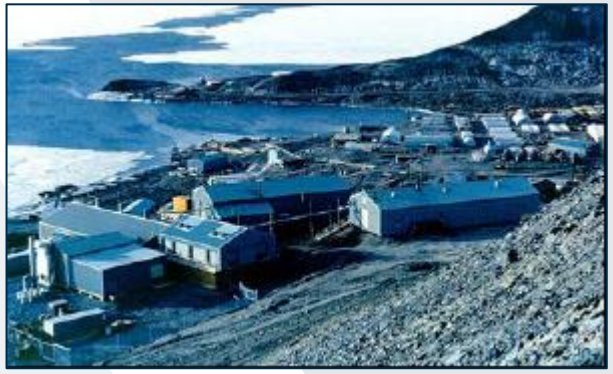





- Two at National Reactor Testing Station, Idaho:


- One Air Force:

- One Navy:



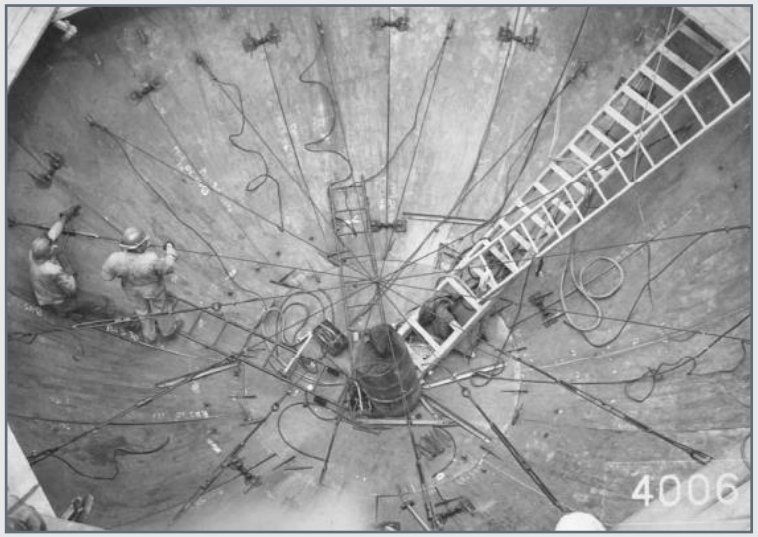
HISTORIC USE OF SM-1

- SM-1 provided partial power to Fort Belvoir (first reactor to provide sustained power to a commercial electric grid in U.S.)
- Primarily used to train nuclear operators/technicians (approximately 800 personnel trained over the 16-year lifespan)
- Served as the prototype for the rest of the reactors designed by the Army
- After deactivation, facility operated as a museum highlighting the Army Nuclear Power Program
- The history of SM-1 will be documented through historical mitigation in compliance with State Historic Preservation Office

Service members from the Army, Air Force, and Navy are pictured in the control room of SM-1, which was used for training nuclear technicians from all branches.

CONSTRUCTION OF SM-1 VAPOR CONTAINER

Excavation at the site for the building and structures



Construction of the bottom of the Vapor Container

Construction of Building and Vapor Container nearing completion

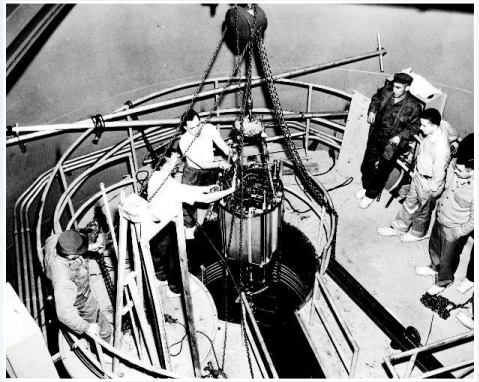
Installation of the Reactor Pressure Vessel into the Vapor Container

1956 Construction Photos

1973-74 PARTIAL DECOMMISSIONING ACTIVITIES AND SAFSTOR

- Removed the nuclear fuel
- Shipped the radioactive waste
- Minor decontamination and preparations for final decommissioning
- Sealed the vapor container (which includes the Reactor Pressure Vessel, Steam Generator, Pressurizer, Reactor Coolant Pumps and primary system piping)
- Installed appropriate security, warning signs and monitoring devices
- Contained remaining radioactivity and sealed in safe storage (SAFSTOR) mode for the past 45-plus years
  - SAFSTOR is a radiological industry practice where radioactive materials are safely stored to allow the shorter-lived radionuclides to decay
- USACE conducts quarterly environmental monitoring to ensure the site does not pose any hazards to the surrounding installation tenants, the community or the environment

SM-1 TIMELINE: DETAILS



1952
DoD studies development of reactor plants

1955
SM-1 construction begins

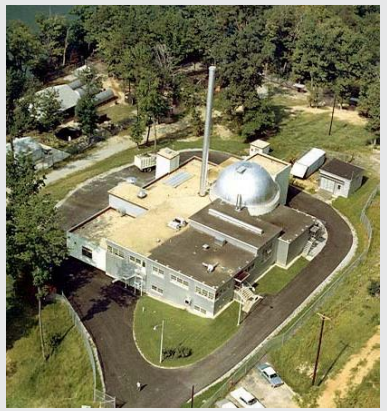
1957
SM-1 reactor startup

1973
SM-1 deactivated

1973-1974
Partial decommissioning
- Remaining low-level radioactivity placed in SAFSTOR with majority of remaining radioactivity allowed to decay over the years

2014
USACE awards decommissioning planning contract for SM-1
- Planning has been completed; including EA preparation & NEPA compliance

2020
USACE awards decommissioning contract for SM-1
- USACE awards contract to A2D. Award was protested and was resolved February 2021



2021
Decommissioning Start November 2021

2025
Decommissioning Complete August 2025

Fort Belvoir, Virginia
U.S. Army Engineer Reactors Group

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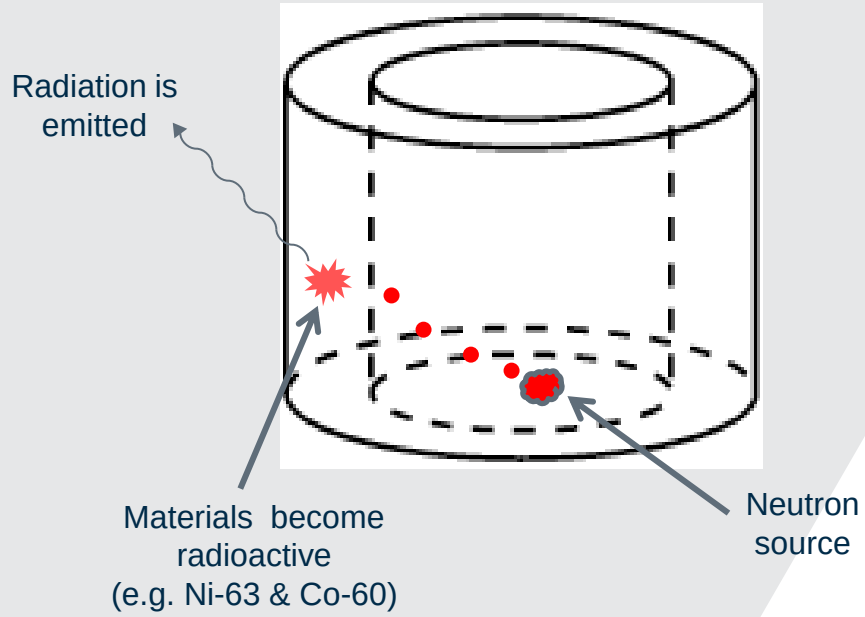
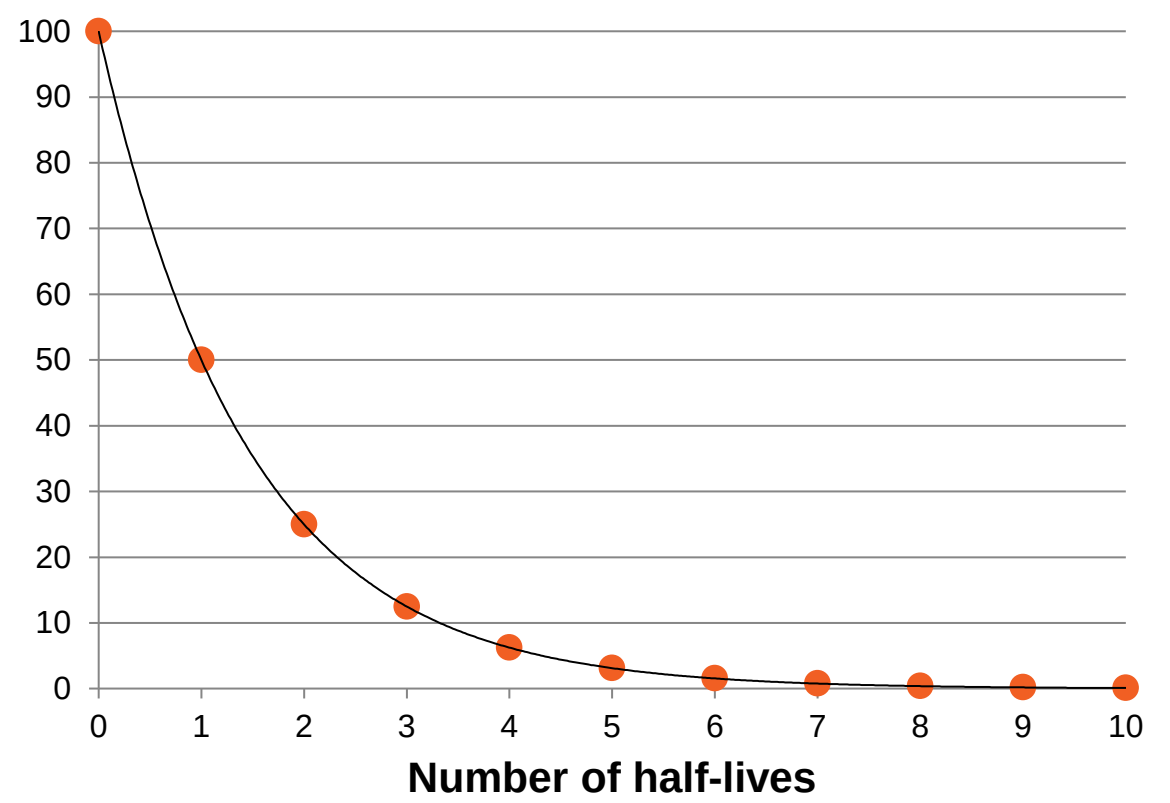
FORT BELVOIR LEADERS IN EXCELLENCE
A2D

SM-1 RADIOACTIVE MATERIALS

- Primary radionuclides in SM-1 are activation products
  - Co-60 - emits beta and gamma radiation (occupational risk)
  - Ni-63 - emits low-energy beta radiation (determines disposal classification)
- Most of the radioactivity is in the form of radioactive metal in the reactor pressure vessel and the primary shield tank
- Small amounts of radioactivity are present in the form of contamination on or within debris and soils

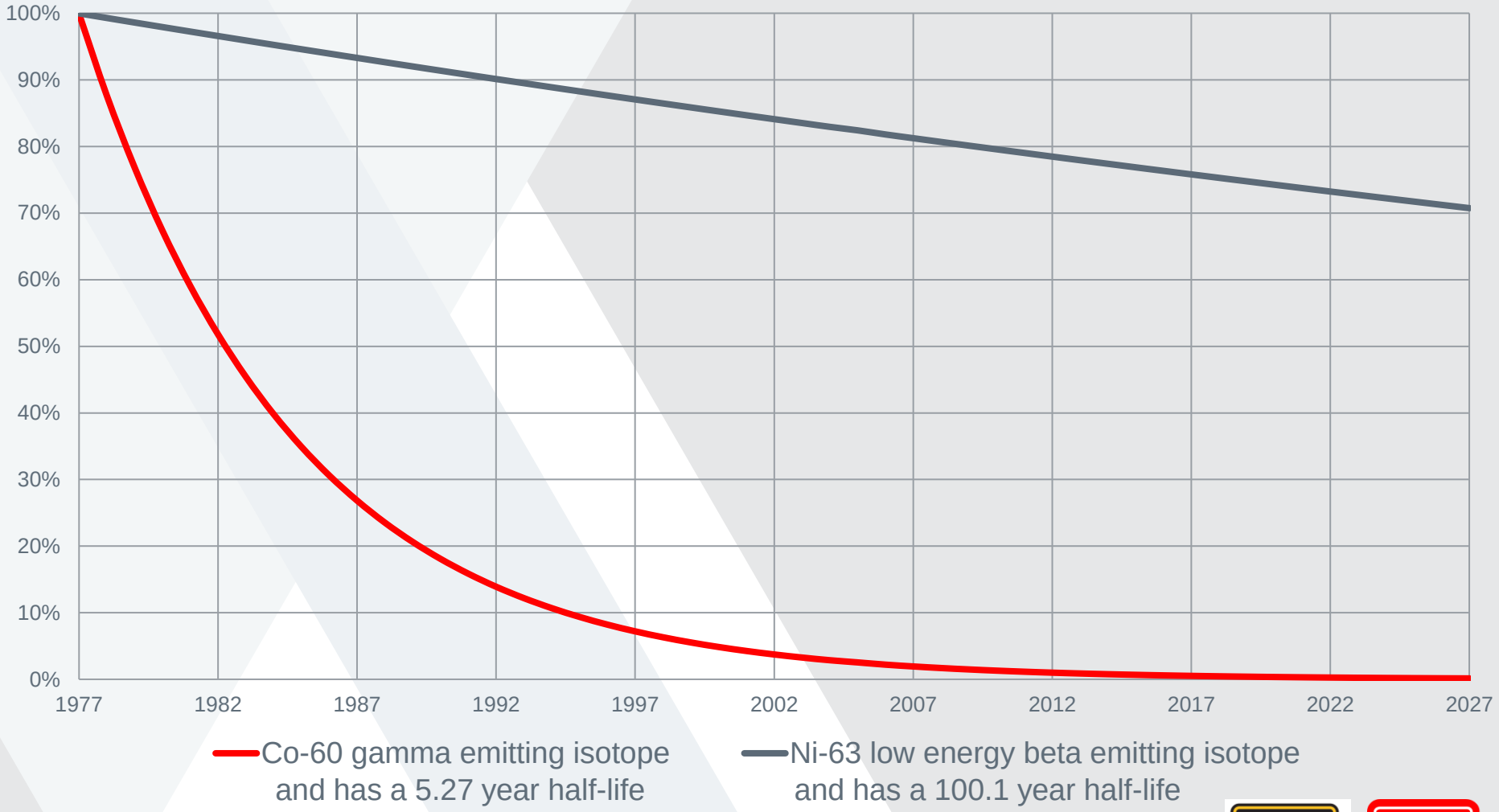


SAFSTOR ALLOWS FOR RADIOACTIVE DECAY

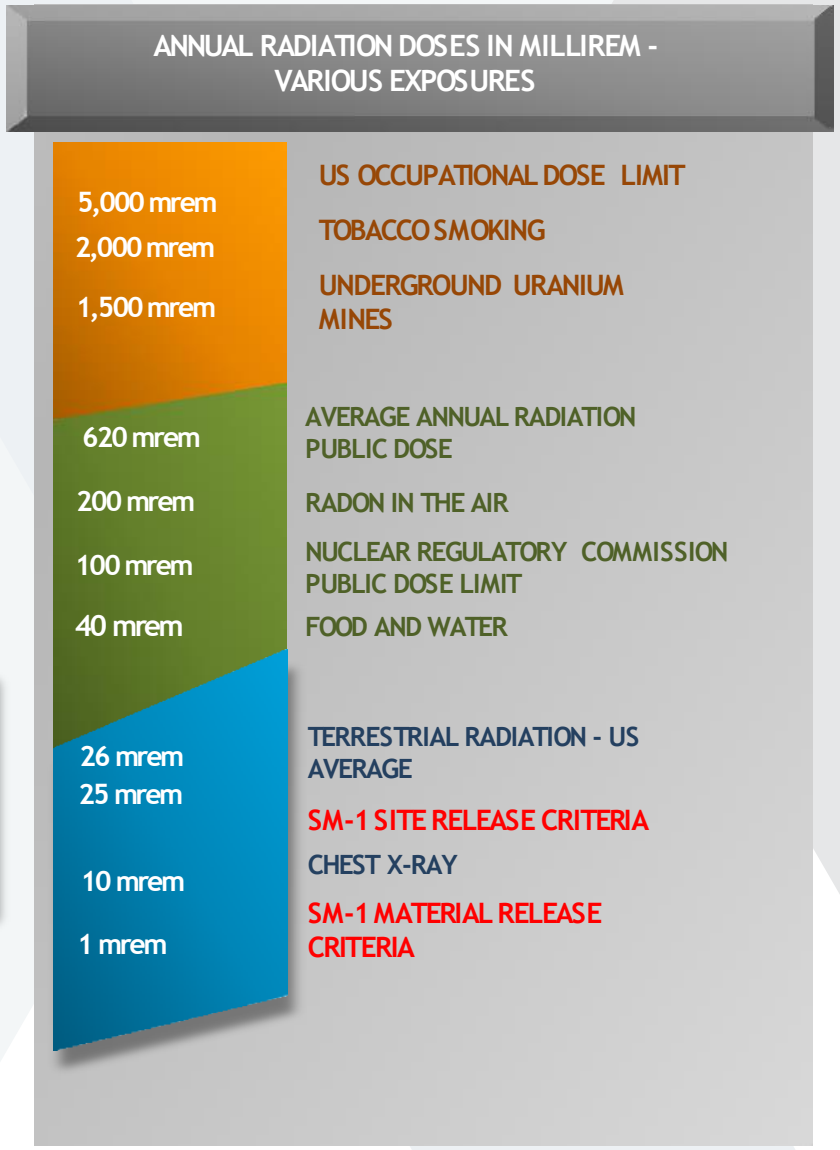


- Half-life is the time it takes for 1/2 of the amount of radioactive atoms to decay
- The half-life of Co-60 is 5.27 years
- The half-life of Ni-63 is 100.1 years
- Co-60 has gone through approximately 10 half-lives and its radioactivity has substantially decreased since initial deactivation reducing potential radiation exposure

RADIOACTIVE DECAY SINCE SHUTDOWN



ANNUAL RADIATION DOSE IN MILLIREM



mrem =

MILLIREM= 1/1000 REM. UNIT OF ABSORBED DOSE IN THE BODY THAT MEASURES THE IMPACT OF DEPOSITED ENERGY

- Since the beginning of time, all living creatures have been, and are still being, exposed to radiation.
- Nonetheless, most people are not aware of all the natural and man-made sources of radiation in our environment.

Average dose to individual in US is <u>620</u> millirem per year

PROJECT STATUS AND PATH FORWARD

- Decommissioning planning is complete
  - The Environmental Assessment and Finding of No Significant Impact (EA/FNSI) has been completed and has been signed by the Garrison Commander and the Baltimore District Commander (includes a Finding of No Practicable Alternative (FONPA)
  - Section 106 Historical Mitigation Memorandum of Agreement (MOA) has been completed and has been signed by the Garrison Commander and the Baltimore District Commander, plus the consulting parties
  - The USACE Decommissioning Plan and Waste Management Plan are completed and have been reviewed by our regulator – the Army Reactor Office (ARO)
  - USACE has obtained a Decommissioning Permit
- Decommissioning Implementation Planning
  - The Project Team is preparing the Decommissioning Permit required plans and have submitted several plans for the ARO's review for project implementation

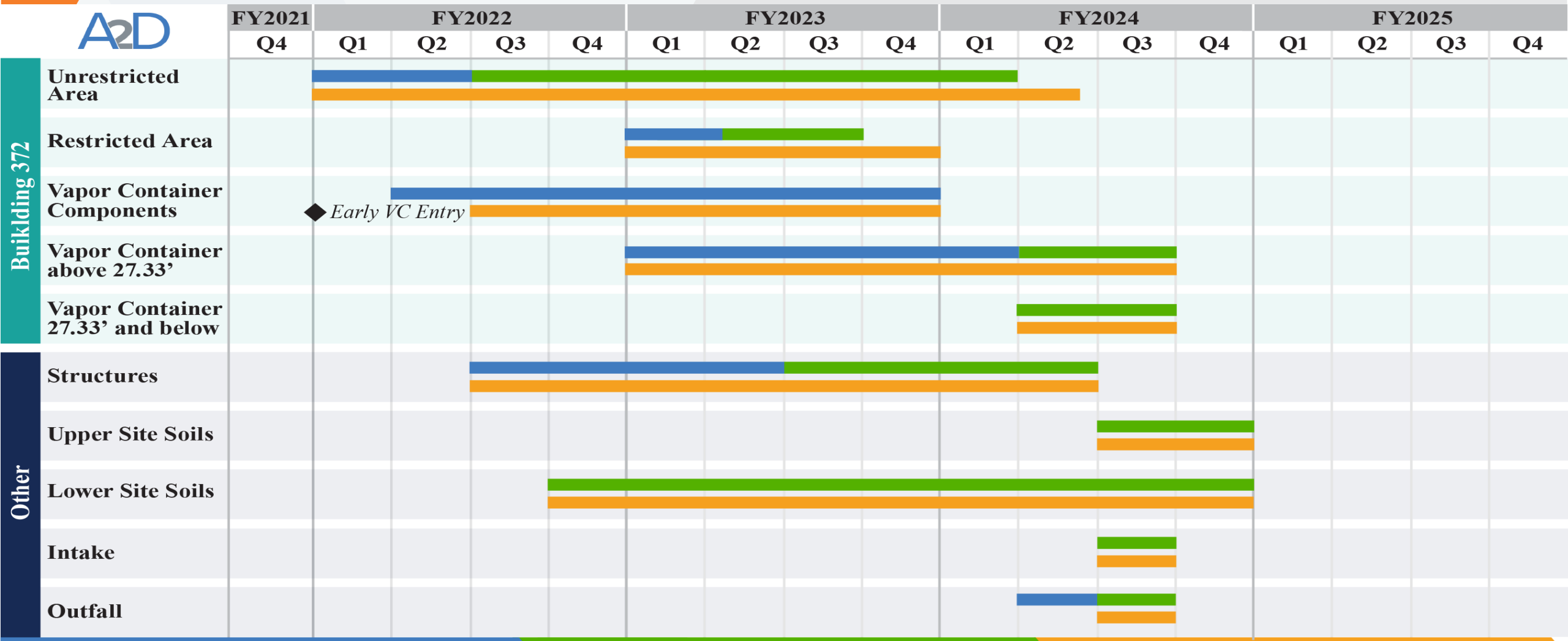
SM-1 DECOMMISSIONING IMPLEMENTATION

- A2D has been selected as the contractor and will prepare plans that will support the decommissioning of the SM-1 in accordance with the contract and the Decommissioning Permit issued to USACE
- Decommission/dispose of materials in accordance with final plans, decommissioning permits, and relevant Federal and State requirements; and
  - Project management (cost controls, scheduling, manpower resourcing, etc.)
  - Prepare work plans, safety and radiological plans, and prepare complex engineering assessments
  - Prepare community outreach and emergency response plans
  - Removal of all reactor components and radiologically contaminated materials
  - Prepare all radiological waste for proper shipment; then transport and dispose of the waste
  - Perform radiological surveys
  - Perform demolition of non-contaminated equipment and building components, including the intake pier; all subsurface utilities will be removed, too
  - Excavate contaminated soils
- Final site restoration
- Adherence to NRC and Army, as well as other Federal standards and guidance where relevant and as required by the Army Reactor Office and USACE

DECOMMISSIONING FIELDWORK SUMMARY

- Site Preparations
  - Temporary Power
  - Office Trailers
  - Setup Environmental Monitoring
- Building 372 (SM-1) Dismantlement
  - Removal all hazardous materials
  - Dismantle the building around the Vapor Container
- Reactor Removal
  - Access Vapor Container and remove the reactor components
- Vapor Container Dismantlement
  - Dismantle the Vapor Container to ground surface
- Upper Soils
  - Remove Soils beneath the SM-1 footprint
- Lower Soils
  - Remove all utilities connected to SM-1 and associated contaminated soils
- Remove Other Structures
  - Other buildings (warehouse, pump house, etc.)
  - Intake Pier
  - Outfall Structure

OVERALL PROJECT SCHEDULE



Decommissioning

- Task level engineering
- Hazardous abatement
- M&E systems and components
- Decontamination
- MARSAME

Dismantlement

- Task level engineering
- M&E structures to slab
- M&E slab and below
- Remedial action soils (surveys)
- MARSSIM

Transportation and Disposal

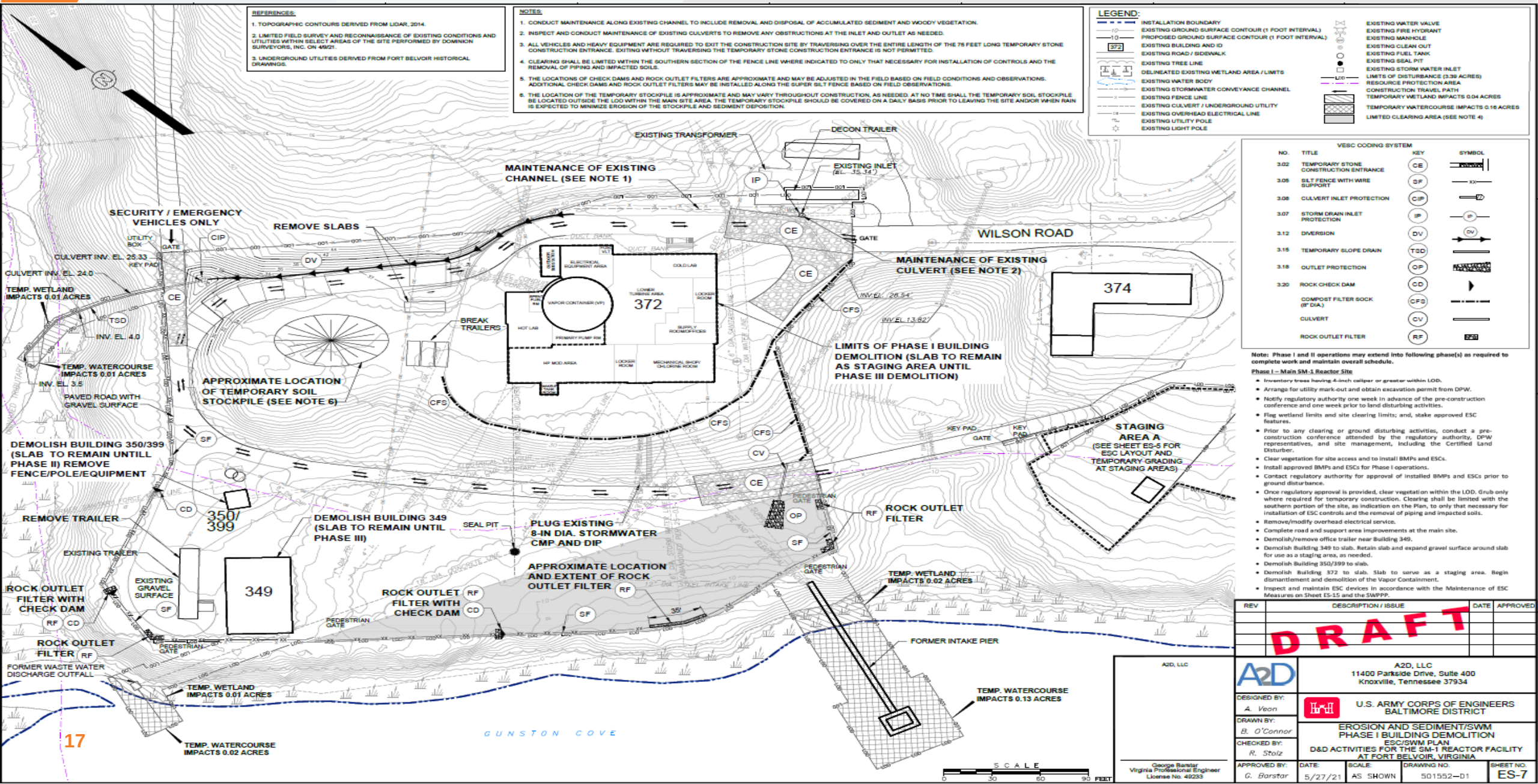
- Packaging – Intermodals, bags, specialty containers
- Transportation – Truck, rail, heavy haul
- Disposition – Local landfill, WCS, wastewater plant

WETLANDS AND RESOURCE PROTECTION AREA

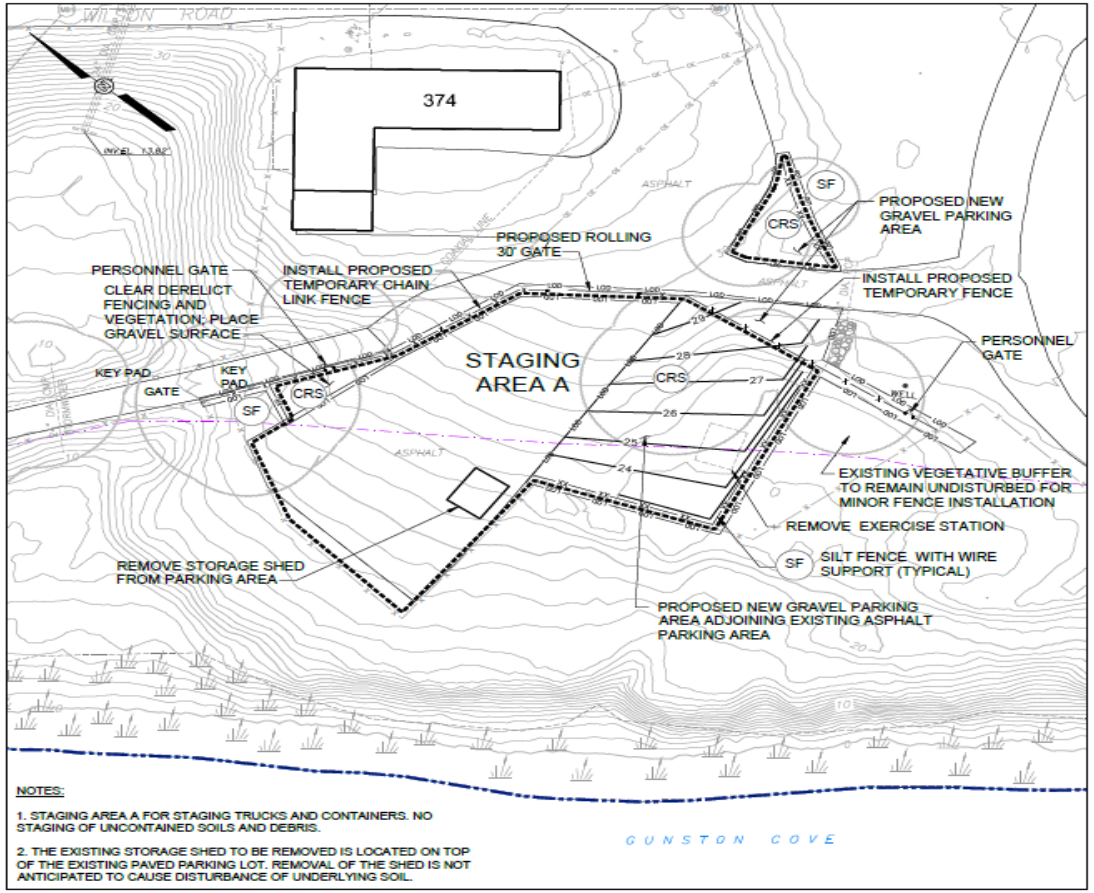
- The former water intake pier and outfall pipe must be removed
- Removal of these structures will allow the shoreline to return to a natural condition, resulting in a beneficial long-term impact
- The Project Team will be submitting a Joint Permit Application in the near future
  - This application will cover all necessary permits that are required for work in the wetlands, Gunston Cove, and within the Resource Protective Area

Intake Pier

PROJECT SITE LAYOUT



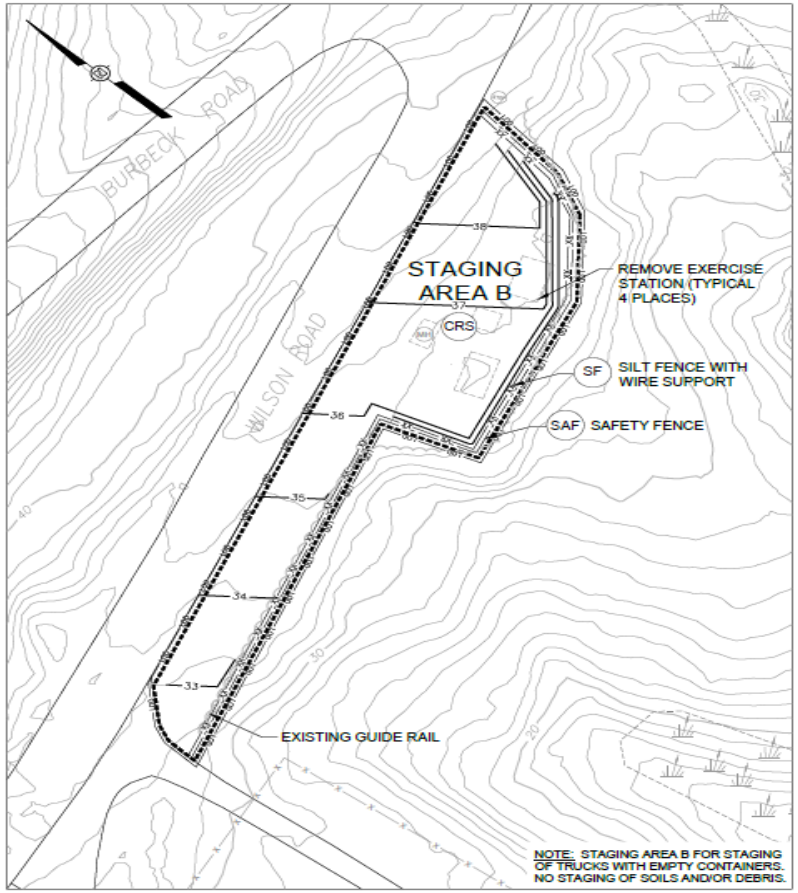
PROJECT STAGING AREAS



NOTES:

1. STAGING AREA A FOR STAGING TRUCKS AND CONTAINERS. NO STAGING OF UNCONTAINED SOILS AND DEBRIS.
2. THE EXISTING STORAGE SHED TO BE REMOVED IS LOCATED ON TOP OF THE EXISTING PAVED PARKING LOT. REMOVAL OF THE SHED IS NOT ANTICIPATED TO CAUSE DISTURBANCE OF UNDERLYING SOIL.

STAGING AREA A



NOTE: STAGING AREA B FOR STAGING OF TRUCKS WITH EMPTY CONTAINERS. NO STAGING OF SOILS AND/OR DEBRIS.

STAGING AREA B

LEGEND:

- INSTALLATION BOUNDARY
- EXISTING GROUND SURFACE CONTOUR (1 FOOT INTERVAL)
- 372 EXISTING BUILDING AND ID
- EXISTING ROAD / SIDEWALK
- EXISTING TREE LINE
- DELINEATED EXISTING WETLAND AREA / LIMITS
- EXISTING WATER BODY
- EXISTING FENCE LINE
- EXISTING CULVERT / UNDERGROUND UTILITY
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING MANHOLE
- EXISTING STOP SIGN
- EXISTING UTILITY POLE
- EXISTING WATER VALVE
- EXISTING FIRE HYDRANT
- EXISTING CLEAN OUT
- RESOURCE PROTECTION AREA
- PROPOSED GROUND SURFACE CONTOUR (1 FOOT INTERVAL)
- PROPOSED STAGING AREA
- PROPOSED TEMPORARY CHAIN LINK FENCE LINE
- PROPOSED LIMITS OF DISTURBANCE (STAGING AREA A - 0.19 ACRES) (STAGING AREA B - 0.26 ACRES)

EROSION AND SEDIMENT CONTROL LEGEND

NO.	TITLE	KEY	SYMBOL
3.01	SAFETY FENCE	SAF	SAF
3.03	CONSTRUCTION ROAD STABILIZATION	CRS	CRS
3.05	SILT FENCE WITH WIRE SUPPORT	SF	SF

REFERENCES:

1. TOPOGRAPHIC CONTOURS DERIVED FROM LIDAR, 2014.
2. LIMITED FIELD SURVEY AND RECONNAISSANCE OF EXISTING CONDITIONS AND ABOVEGROUND UTILITIES WITHIN SELECT AREAS OF THE SITE PERFORMED BY DOMINION SURVEYORS, INC. ON 4/6/21.
3. UNDERGROUND UTILITIES DERIVED FROM THE JUNE 2020 FINAL DECOMMISSIONING PLAN FOR THE SM-1 REACTOR FACILITY, FORT BELVOIR, FAIRFAX COUNTY, VIRGINIA.

SCALE 0 25 50 150 FEET

Phase I – Staging Areas A and B

- Inventory trees having 4-inch caliper or greater within LOD.
- Arrange for utility mark-out and obtain excavation permit from DPW.
- Flag site clearing limits; and, stake approved ESC features.
- Clear vegetation for site access and to install BMPs and ESCs.
- Install approved BMPs and ESCs for Phase I operations.
- Contact regulatory authority for approval of installed BMPs and ESCs prior to ground disturbance.
- Clear vegetation within the LOD where indicated on the approved ESC/SWM Plans. Grub only where required for temporary construction.
- Remove and store exercise stations at Staging Areas A and B pending re-installation during site restoration.
- Expand parking and staging areas to indicated limits.
- Install proposed temporary chain link fencing, 30-ft. rolling gate, and personnel gates at Staging Area A.
- Inspect and maintain ESC devices in accordance with the Maintenance of ESC Measures on Sheet ES-16 and the SWPPP.

Note - Phase I installation of ESC devices at the staging areas will remain for all subsequent phases of work.

REV	DESCRIPTION / ISSUE	DATE	APPROVED
	DRAFT		

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Knoxville, Tennessee 37934

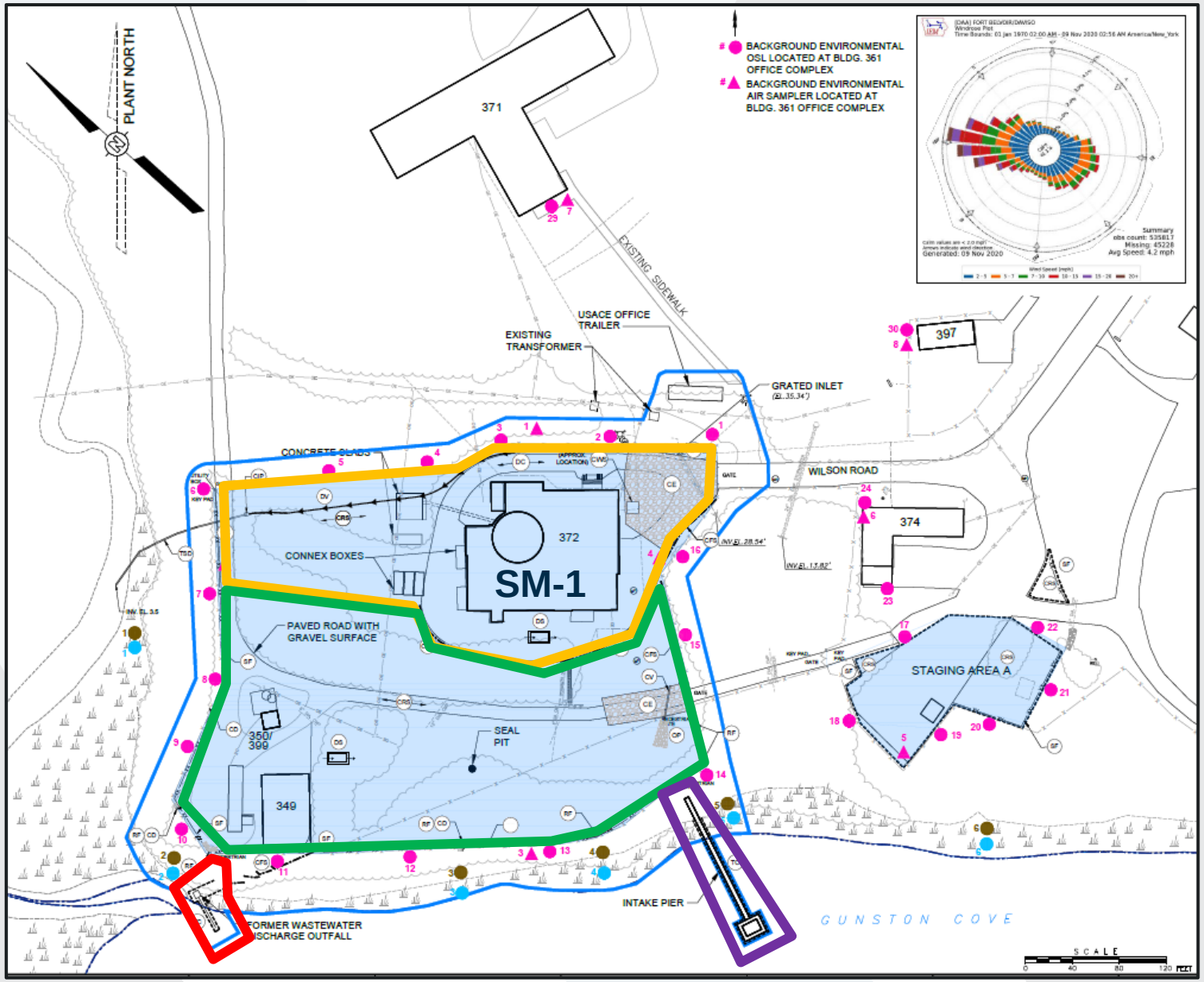
U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT

EROSION AND SEDIMENT/SWM LAYOUT
OFFSITE STAGING AREAS
ESC/SWM PLAN
D&D ACTIVITIES FOR THE SM-1 REACTOR FACILITY
AT FORT BELVOIR, VIRGINIA

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:	SCALE:	DRAWING NO.	SHEET NO.
A. Veon	B. O'Connor	R. Stolz	G. Barstar	7/19/21	AS SHOWN	501552-D1	ES-6

OFFICE Pittsburgh, PA
DRAWING NUMBER 501552-D1

ENVIRONMENTAL RADIATION MONITORING LOCATIONS



- Restricted Area
- Environmental OSL
- Environmental Air Monitor
- Sediment/Soil Sampling Point
- Surface Water Sampling Point
- SM1 Security Controlled Area
- SM1 Site Boundary and Buffer

- Upper Soils
- Lower Soils
- Intake Pier
- Outfall Structure

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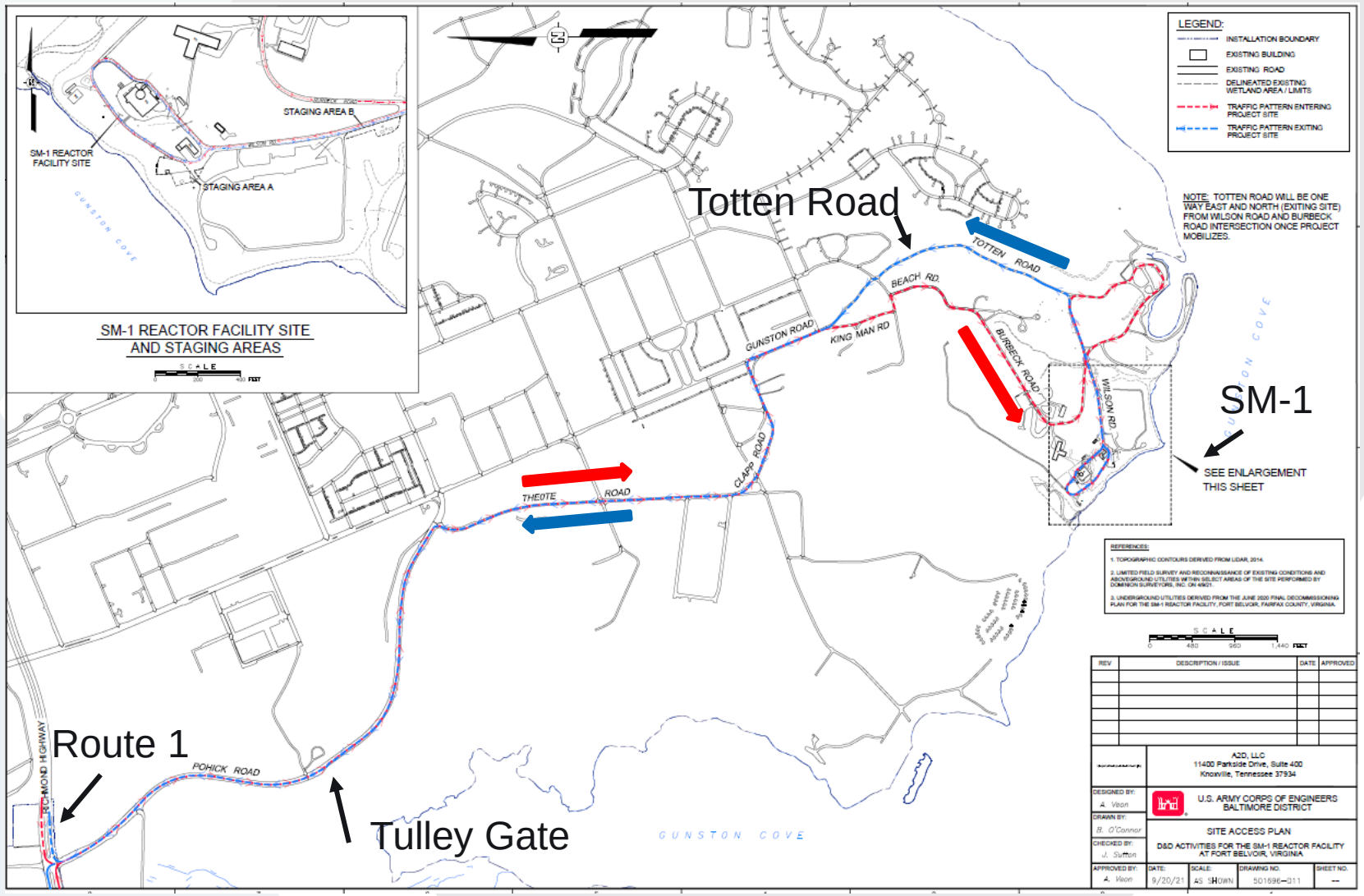
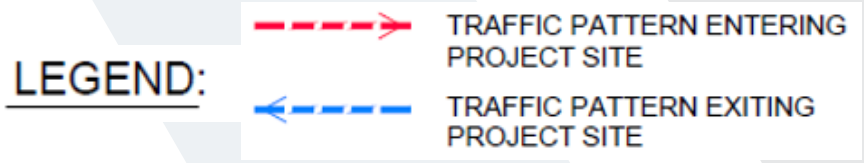
WASTE TRANSPORTATION ROUTE

- All activities where installation roads and parking areas will be impacted by the movement of vehicles and equipment, a traffic control plan that meets regulatory requirements will be implemented and communicated
- Totten Road reversed and closed for recreational use (walker/joggers)
- Exclusive use of Totten Road coordinated with the 300 Area
- Electronic Traffic Signs will be located at both ends of Totten Road for information
- Wilson Road will be closed beyond Wilson Road and parking lot intersection
- Fitness Trail will be closed





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PROJECT SHIPMENTS

- Estimated 1,150 round-trip trucks over the next 5-years
  - Includes both waste shipments and clean fill soil delivery
- Estimated maximum of 9 outbound shipments per day at height of project
  - Shipments are done in a campaign
  - Exit through Staging Area A
  - Staged at Staging Area B along Wilson Road
- Estimated 750 outbound waste shipments over project duration
- All waste will be packaged and transported in accordance with USDOT, EPA, and NRC requirements

Intermodal container (IMC)

WASTE TRANSPORTATION AND DISPOSAL

1. Package waste into DOT compliant containers and load onto trucks at the SM-1 Facility

2. Transport to a local rail transfer facility

3. Containers will be transferred onto rail cars

4. Containers transported via rail cars to the USACE approved waste facility (Utah or Texas)

5. Containers disposed of at the USACE approved waste facility

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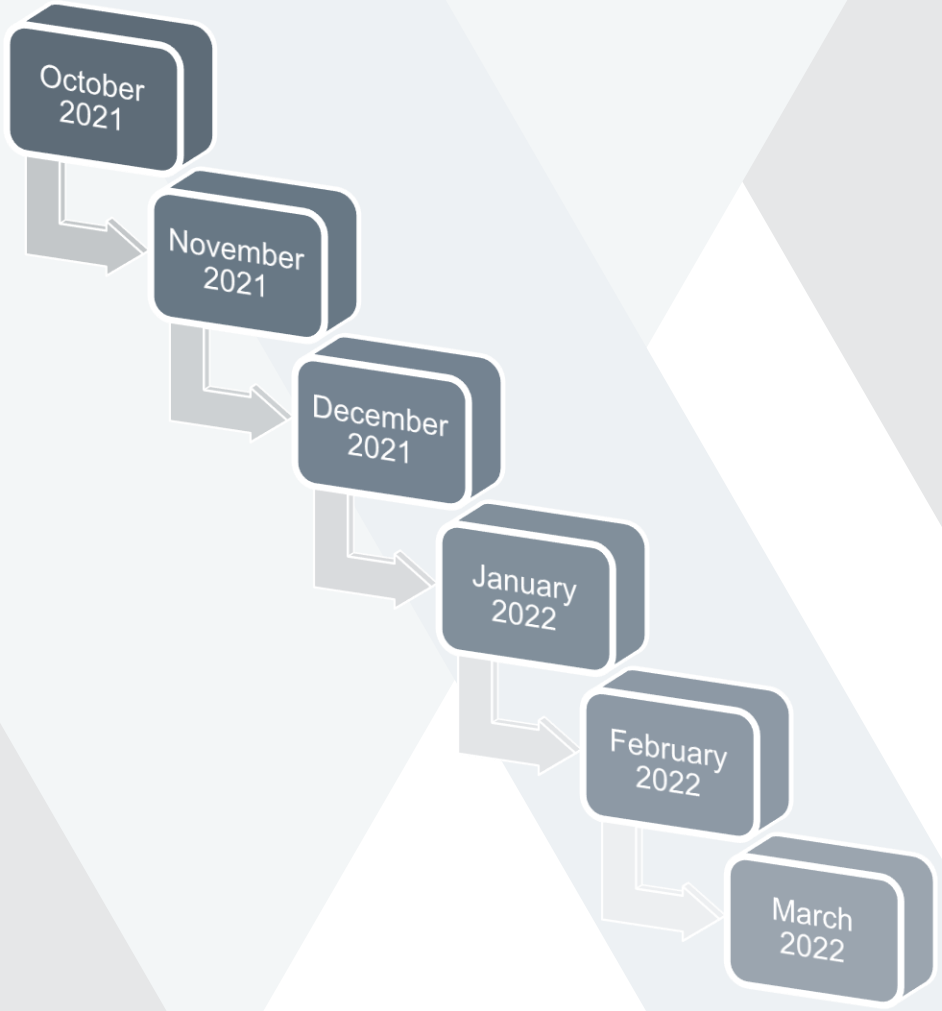
SIX MONTH LOOK AHEAD



Intake Pier

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OCTOBER 2021

- Continue to finalize planning documents
- Basic site preparations will begin
  - Installation of crew trailers (three)
  - Drilling and sampling
  - Begin work on temporary site power
  - Security features
  - Deenergizing existing utilities
  - Water/sewer hookups for the office trailers
- The Project Team will continue to work with Fort Belvoir Directorate of Public Works, state, and local regulatory agencies to obtain required permits
- Begin development of Technical Work Documents
  - Work plans that lay out processes and procedures to complete various tasks

Crew Trailer

NOVEMBER 2021

- The Project Team anticipates implementing a Decommissioning Permit
- Prior to implementing this permit, Totten Road will be closed for recreational use and reversed for the duration of the project, electronic traffic signs placed at both ends of the road as a reminder
- Site preparations will continue but will be sufficiently completed to begin decommissioning tasks
  - Above ground storage tank removal
  - Asbestos and hazardous material (lead, oil, refrigerant) abatement
  - Remove historical artifacts from the building for restoration
  - Begin exterior electrical equipment removal
- Technical Work Document Development

SM-1 Control Panel

DECEMBER 2021

- Baseline Status Survey of new storage areas
- Continue asbestos and hazardous material removal
- Finish removing the exterior electrical equipment
- Remove the AC units located around the building
- Begin the fence and gate modifications around the site
- Technical Work Document Development

Electrical sub-station
&
AC unit

JANUARY 2022

- Continue asbestos and hazardous material removal
- Finish fence and gate modifications around the site
- Geophysical survey and sampling (soil samples) at Building 358
- Preliminary entry into the Vapor Container for data collection
- Technical Work Document Development

Geotechnical drill

FEBRUARY/MARCH/APRIL 2022

- Continue asbestos and hazardous material removal
- Continue Technical Work Document Development
- Continue asbestos and hazardous material removal
- Install Erosion and Sediment Control measures
- Install stormwater management measures
- Cut the trees onsite
- Staging Areas A and B development

Super Silt Fence

FEDERAL OVERSIGHT

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

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ORAU

DECOMMISSIONING RISKS AND HOW WE REDUCE THEM

- Safety is the Army's number one priority – the safety and health of the community and our workers are paramount to the success of our project
- Trained professionals will use proven techniques and precautions to ensure the safety of the workers and the public
- To the greatest extent possible, work will be completed using appropriate engineering controls
- All wastes will be properly packaged in compliance with U.S. Department of Transportation and Nuclear Regulatory Commission requirements
- Wastes will be disposed of at licensed / permitted off-post facilities

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PUBLIC ENGAGEMENT

- The Army is committed to sharing accurate information with all stakeholders in a timely manner throughout this project, ensuring information is coordinated and concerns from stakeholders are quickly addressed
- The Project Team will continue to host meetings throughout implementation to advise the public on next steps as we start the field work for the Decommissioning project
- Stakeholder updates will be provided throughout the Decommissioning to continue to keep all parties updated on our progress
- Specific Community Outreach will be provided to the following groups:
  - Residents on base who live along the transportation route (at intersection of Gunston Road and 21st Street)
  - Recreational users who utilize the waters along the shoreline of the site
  - Hunters who utilize the duck blinds along the shoreline of the site
- Members of the public are invited to sign up for the SM-1 project update e-mail list by sending a request to CENAB-CC@usace.army.mil

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QUESTIONS AND HOW TO LEARN MORE

Learn more about the SM-1 Project online at:

www.nab.usace.army.mil/SM-1/

Sign up for the SM-1 stakeholder update e-mail list by e-mailing:

CENAB-CC@usace.army.mil

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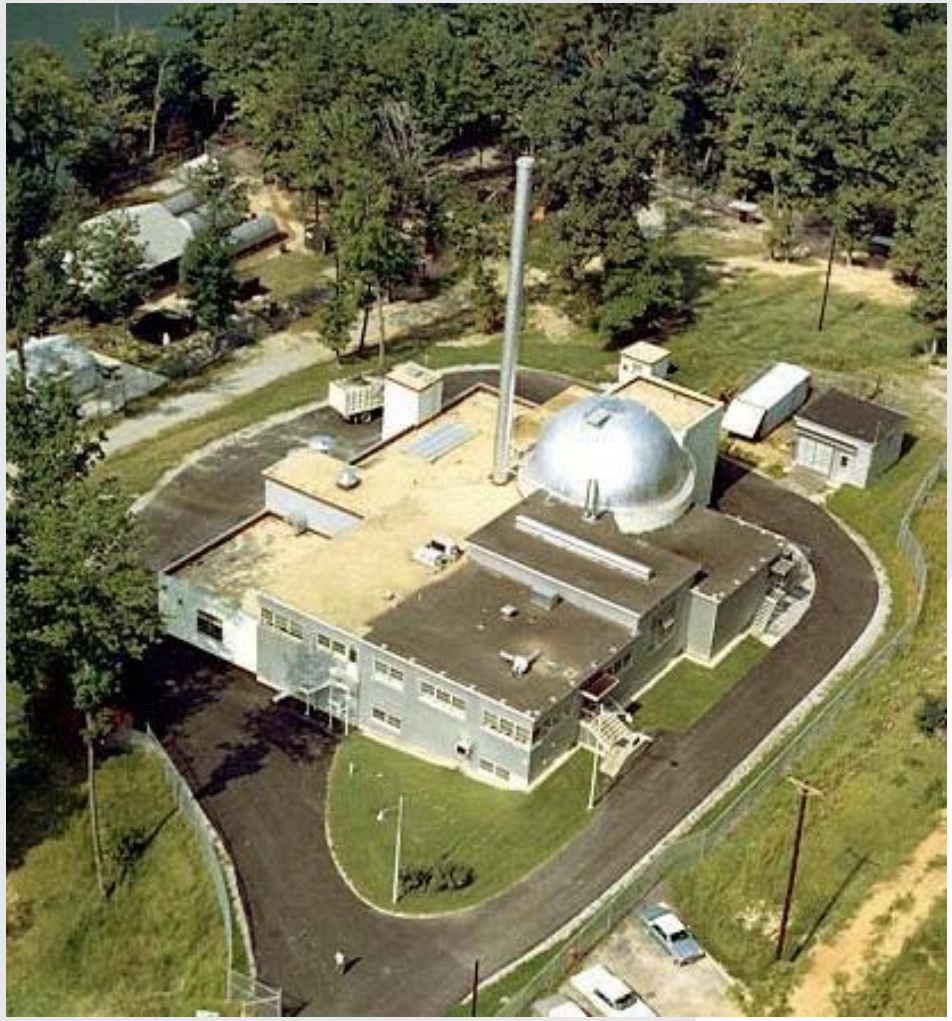

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