



## Nuclear Deactivation and Downgrade of Enriched Uranium Facilities at the Y-12 National Security Complex

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# History of Building 9206

Constructed 1944

- Originally processed U-235 from Beta Calutrons to produce “Little Boy”
- Charge preparation, HEU recovery, chemical recycle, and metal production
- Production ceased in 1994



9206 Today

- In Surveillance & Maintenance Phase
- Hazard Category 2 Nuclear Facility
- High contamination areas
- >80 out-of-service process systems
- 65,000 gross sq. ft



# History of Building 9212

Constructed 1945

- Sister facility to Building 9206
- Charge preparation, HEU recovery, chemical recycle, and metal production



- Expanded after WWII to accommodate increased production of uranium and provide capability to recover and reclaim uranium from waste materials



9212 Today

- HEU processing, recovery, and accountability
- Source of all HEU used in test, research, and propulsion reactors, and isotope production
- >100 operations and >200 process systems
- 450,000 gross sq. ft with Material Access Area



## Buildings 9206 and 9212 – A Comparison

Building  
9212

Building  
9206

Constructed for the Manhattan Project as Uranium processing facilities with similar equipment and chemical processes

Both are Hazard Category 2 Nuclear Facilities with Nuclear Criticality Safety controls, credited CAAS, and documented safety basis

Building 9206 is an excess facility with no MAA  
Building 9212 is an active production facility with an MAA and a footprint ~7 times greater than Building 9206

Prior to transfer to DOE-EM for demolition, accountable nuclear materials must be removed to eliminate all facility security requirements and downgrade to Hazard Category 3 or Radiological status

# Facility Hazard Categorization

Hazard Categorization	Consequence
Hazard Category 1	Significant off-site consequences
Hazard Category 2	Significant on-site consequences beyond localized consequences
Hazard Category 3	Only local significant consequences
Below Hazard Category 3	Only consequences less than those that provide a basis for categorization as a hazard category 1, 2, or 3 nuclear facility

## PART 830 - NUCLEAR SAFETY MANAGEMENT

Authority: 42 U.S.C. 2201; 42 U.S.C. 7101 *et seq.*; and 50 U.S.C. 2401 *et seq.*

Source: 85 FR 66205, Oct. 19, 2020, unless otherwise noted.

### § 830.1 Scope.

This part governs the conduct of DOE contractors, DOE personnel, and other persons conducting activities (including providing items and services) that affect, or may affect, the safety of DOE nuclear facilities.

### § 830.2 Exclusions.

This part does not apply to:

- (a) Activities that are regulated through a license by the Nuclear Regulatory Commission (NRC) or a State under an Agreement with the NRC, including activities certified by the NRC under section 1701 of the Atomic Energy Act (Act);
- (b) Activities conducted under the authority of the Director, Naval Nuclear Propulsion, pursuant to Executive Order 12344, as set forth in Public Law 106-65;
- (c) Transportation activities which are regulated by the Department of Transportation;
- (d) Activities conducted under the Nuclear Waste Policy Act of 1982, as amended, and any facility identified under section 202(5) of the Energy Reorganization Act of 1974, as amended; and
- (e) Activities related to the launch approval and actual launch of nuclear energy systems into space.

### § 830.3 Definitions.

- (a) The following definitions apply to this part:

*Administrative controls* means the provisions relating to organization and management, procedures, recordkeeping, assessment, and corrective action.

*Bases appendix* means an appendix containing the bases for technical safety requirements.

*Critical assembly* means a nuclear assembly that may be subject to frequent mockups of reactor configurations.

*Criticality* means the condition of being critical.

*Design features* means the physical characteristics of a facility or system that are requirements that, if altered, would result in a significant change in the safety of the facility or system.

*Document* means records, data, or results.

*Documented safety analysis* means a safety analysis that has been operated safely with respect to the conditions, safety boundaries, and safety limits.

DOE-STD-1027-2018  
November 2018

**DOE STANDARD**  
HAZARD CATEGORIZATION OF DOE NUCLEAR FACILITIES



# Facility Decommissioning Policy

42 USC Ch. 103: Front Matter

From Title 42-THE PUBLIC HEALTH AND WELFARE  
CHAPTER 103-COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY  
Jump To:  
[Miscellaneous](#)

CHAPTER 103-COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY

SUBCHAPTER I-HAZARDOUS SUBSTANCES RELEASES, LIABILITY  
Sec. 9601. Definitions.  
9602. Designation of additional hazardous substances and establishment of quantities, regulations.  
9603. Notification requirements respecting released substances.  
9604. Response authorities.  
9605. National contingency plan.  
9606. Abatement actions.  
9607. Liability.  
9608. Financial responsibility.  
9609. Civil penalties and awards.  
9610. Employee protection.  
9611. Uses of Fund.  
9612. Claims procedure.  
9613. Civil proceedings.  
9614. Relationship to other law.  
9615. Presidential delegation and assignment of duties or powers and procedures.  
9616. Public participation.  
9617. High priority for drinking water supplies.  
9618. Response action contractors.  
9619. Federal facilities.  
9620. Cleanup standards.  
9621. Settlements.  
9622. Reimbursement to local governments.  
9623. Methane recovery.  
9624. Section 6921(d)(3)(A)(i) waste.  
9625. Indian tribes.  
9626. Recycling transactions.  
9627. State response programs.

SUBCHAPTER II-HAZARDOUS SUBSTANCE RESPONSE

PART A-HAZARDOUS SUBSTANCE RESPONSE  
9631 to 9633. Repealed.

PART B-POST-CLOSURE LIABILITY TRUST  
9641. Repealed.

SUBCHAPTER III-MISCELLANEOUS PROVISION  
9651. Reports and studies.  
9652. Effective dates; savings provisions.  
9653. Repealed.  
9654. Applicability of Federal water pollution control funding, etc., provisions.  
9655. Legislative veto of rule or regulation.  
9656. Transportation of hazardous substances; listing as hazardous materials.  
9657. Separability; contribution.  
9658. Actions under State law for damages from exposure to hazardous substances.  
9659. Citizens suits.  
9660. Research, development, and demonstration.  
9660a. Grant program.  
9661. Love Canal property acquisition.  
9662. Limitation on contract and borrowing authority.

SUBCHAPTER IV-POLLUTION INSURANCE

9671. Definitions.  
9672. State laws; scope of subchapter.  
9673. Risk retention groups.  
9674. Purchasing groups.  
9675. Applicability of securities laws.



U.S. Department of Energy  
U.S. Environmental Protection Agency

MAY 22 1995

MEMORANDUM

SUBJECT: Policy on Decommissioning Department of Energy Facilities Under CERCLA

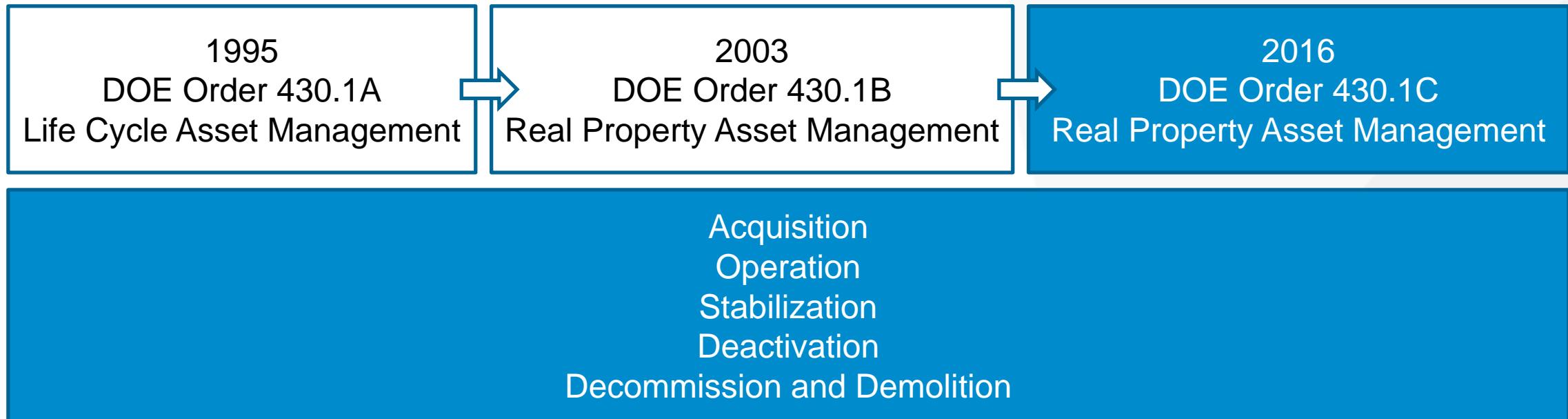
FROM: Steven A. Herman  
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United States Environmental Protection Agency

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United States Department of Energy



# Management of Federally-Owned Facilities



## Facility stabilization/deactivation (per DOE Order 430.1C):

“An interim process where the facility is placed in a stable, known condition including removal of hazardous and radioactive material to ensure adequate protection of workers, public and environment, thereby limiting the long term surveillance, stabilization, and maintenance costs, while awaiting ultimate decommissioning.”

# Federal Roles and Responsibilities



*National Nuclear Security Administration*

- Established 2000
- Enhances national security through military application of nuclear science
- Assumed responsibility of nuclear enterprise and associated infrastructure



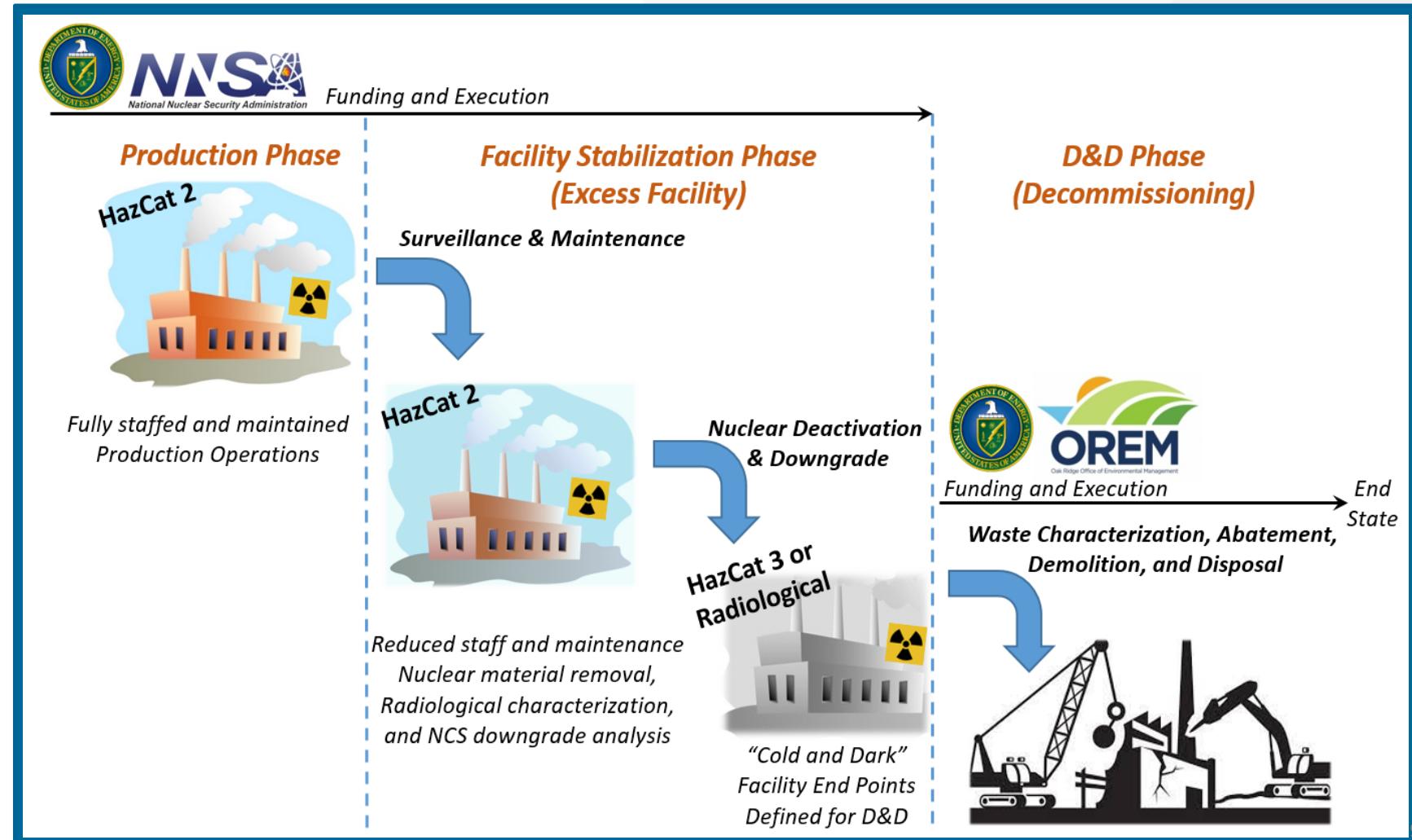
**U.S. DEPARTMENT OF  
ENERGY**

**OFFICE OF  
ENVIRONMENTAL  
MANAGEMENT**

- Established an Integrated Facility Disposition Program (IFDP) for ORNL and Y-12 for Transfer of Facilities and Materials to DOE-EM. The IFDP identified and defined:
  - Facility and material transfer conditions based on criteria in DOE Order 430.1B and DOE-EM policy
  - Facilities that do and do not meet criteria in DOE Order 430.1B for transfer to DOE-EM
  - Facility conditions and materials with a greater-than-normal degree of project risk and liability for deactivation and decommissioning by DOE-EM

# Conditions for Facility Transfer from NNSA to DOE-EM

- Removal of accountable materials so that the facility hazard category can be downgraded to Hazard Category 3 or Radiological.
- Cleanout of liquid systems.
- Removal of excess materials, chemicals, tools and equipment, office furniture, personal protective equipment, and loose items.
- Rerouting or decoupling utilities that interface with other facilities.
- Characterization of physical, chemical, and radiological conditions prior to transfer.



## After Facility Transfer to DOE-EM

DOE-EM assumes responsibility for:

Any remaining deactivation activities, such as abatement and removal of asbestos, lead paint, or other hazardous materials

Final characterization for disposition of waste

Isolation of building utilities from the site

Demolition

Disposal of waste and building debris

# Steps of Nuclear Criticality Deactivation and Downgrade Strategy

1. Identify and rank systems of nuclear criticality safety (NCS) concern, based on amount of uranium holdup or contamination within each system.
2. Define system endpoint criteria, including isolation of each system and acceptable levels of residual contamination.
3. Obtain non-destructive assay (NDA) data to fill data gaps and plan deactivation work packages.
4. Clean-out/deactivate systems as necessary to achieve desired NCS endpoint and ensure nuclear material cannot migrate between systems by equipment isolation and/or application of fixative. Highly-contaminated components are removed to meet NCS criteria, but systems are left largely intact for eventual demolition by DOE-EM.
5. Perform post-deactivation inspection and analysis of equipment to confirm NCS criteria are met, including NDA and visual inspection with a Borescope as possible.
6. Document basis for the incredibility of an inadvertent nuclear criticality in the facility once all systems have been deactivated and data collected.



## Nuclear Deactivation and Downgrade

Ensure each isolated/air-gapped system or equipment item in facility measures <700g of residual U-235 contamination

Mitigate nuclear criticality safety risk in Hazard Cat 2 facilities (9206 and 9212) by driving the potential for a nuclear criticality accident to be incredible

- Objective is to eliminate NCS controls and credited Criticality Accident Alarm System (CAAS)



# Forging a Transition Strategy for Building 9212

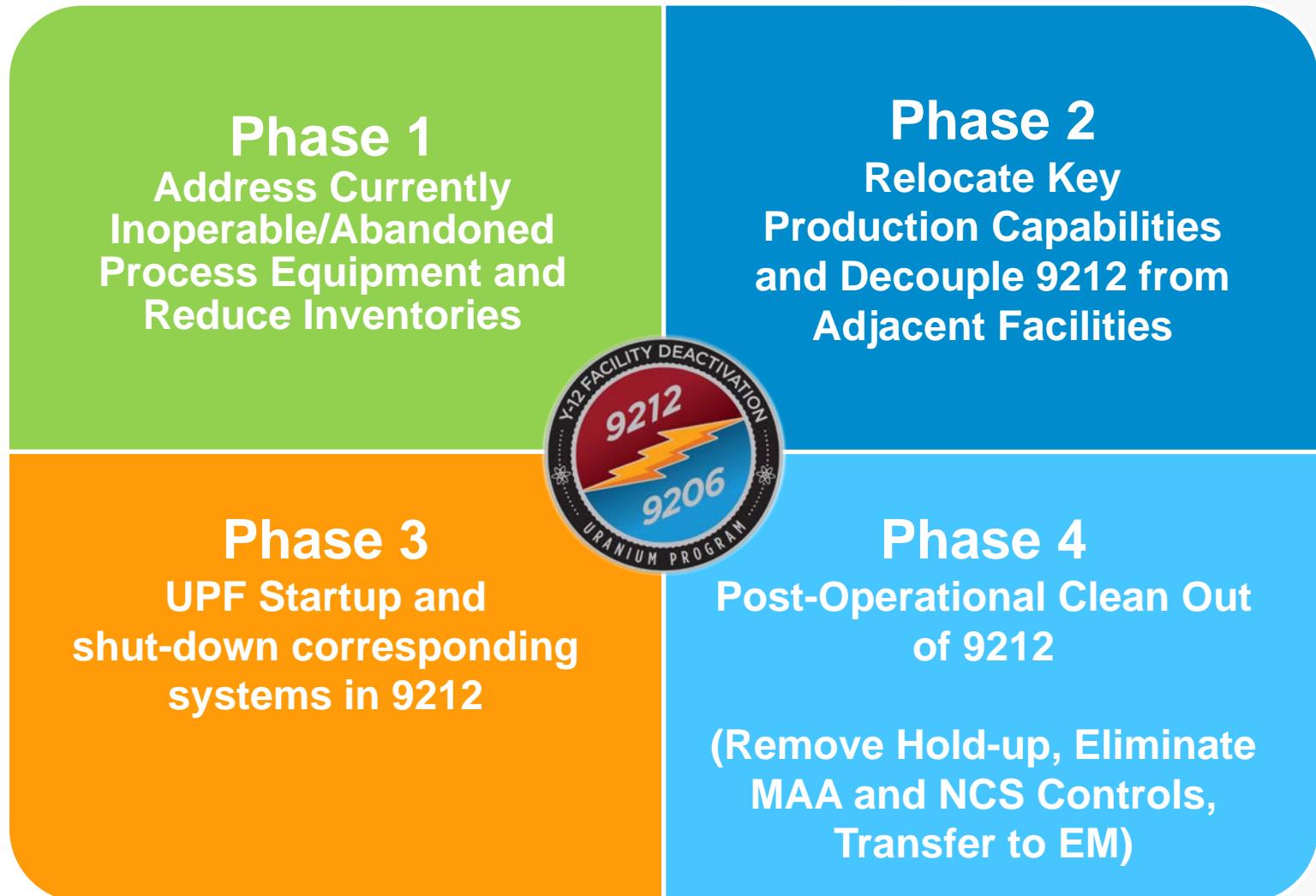


- Lessons learned and methodology from Building 9206 incorporated into the 9212 Transition Strategy

## Key objectives:

- Completing nuclear deactivation and facility downgrade of Building 9206 by 2025
- Initiating transition of enriched uranium production operations and nuclear deactivation proactively prior to shutdown of Building 9212

# Building 9212 Transition Strategy





# Transition Timeline for Buildings 9206 and 9212

1940s 1950s 1960s 1970s 1980s 1990s 2000s 2010s 2020s 2030s



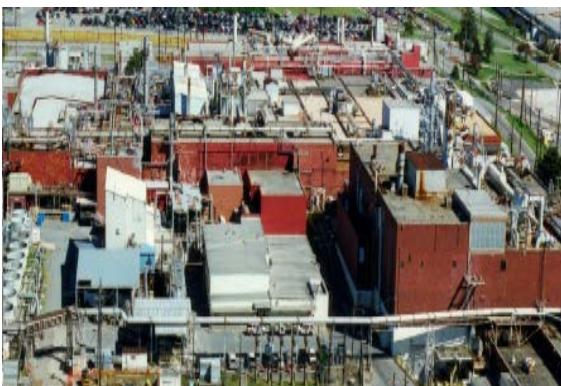
Building 9206

Production Operations

Nuclear  
Deactivation

Facility  
Downgrade

Transfer to  
DOE-EM



9212 Complex

Production Operations

Nuclear  
Deactivation

Facility  
Downgrade

Transfer to  
DOE-EM

## Conclusion

# Facility Disposition and Modernization Partnership



Leading modernization efforts through infrastructure investments, technology development, and facility stewardship



Development and implementation of the nuclear deactivation and downgrade strategy for nuclear facilities



Reduction of risk to the environment, public, and workers



Shrinking the DOE legacy footprint

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