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PANTEX PLANT | Y-12 NATIONAL SECURITY COMPLEX

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

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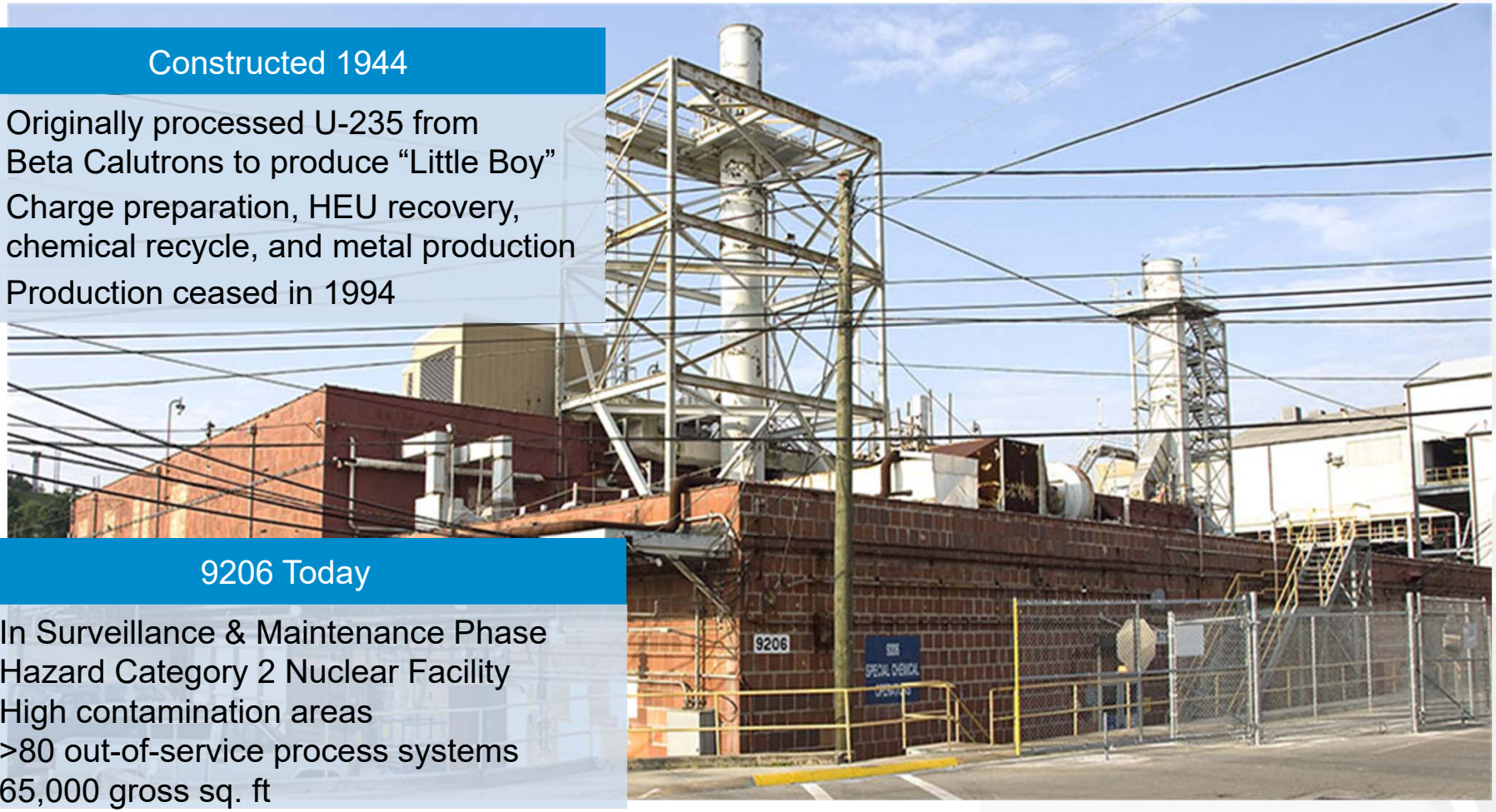
INMM & ESARDA Joint Annual Meeting, August–September, 2021

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

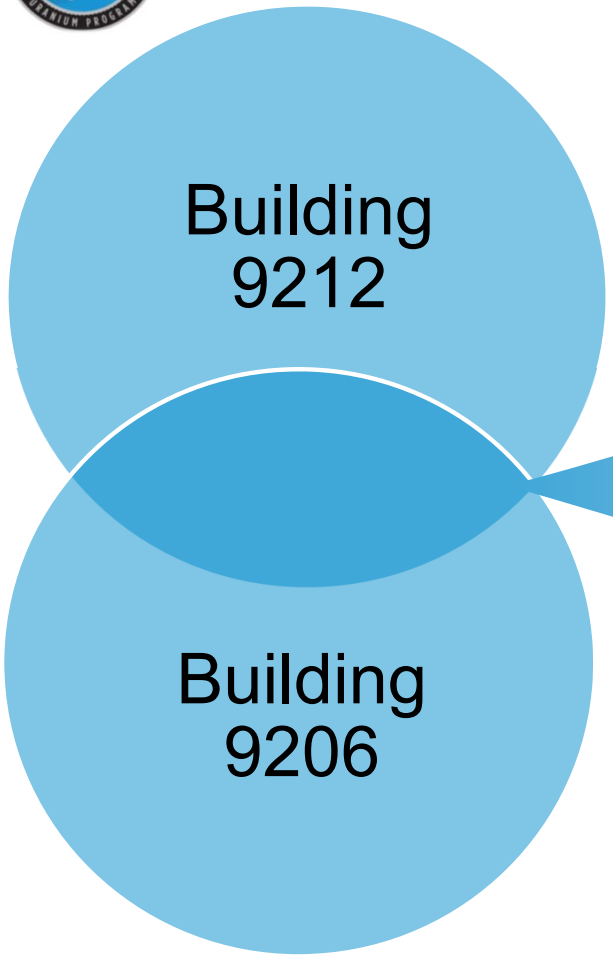
- Sister facility to Building 9206
- Charge preparation, HEU recovery, chemical recycle, and metal production

- 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



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

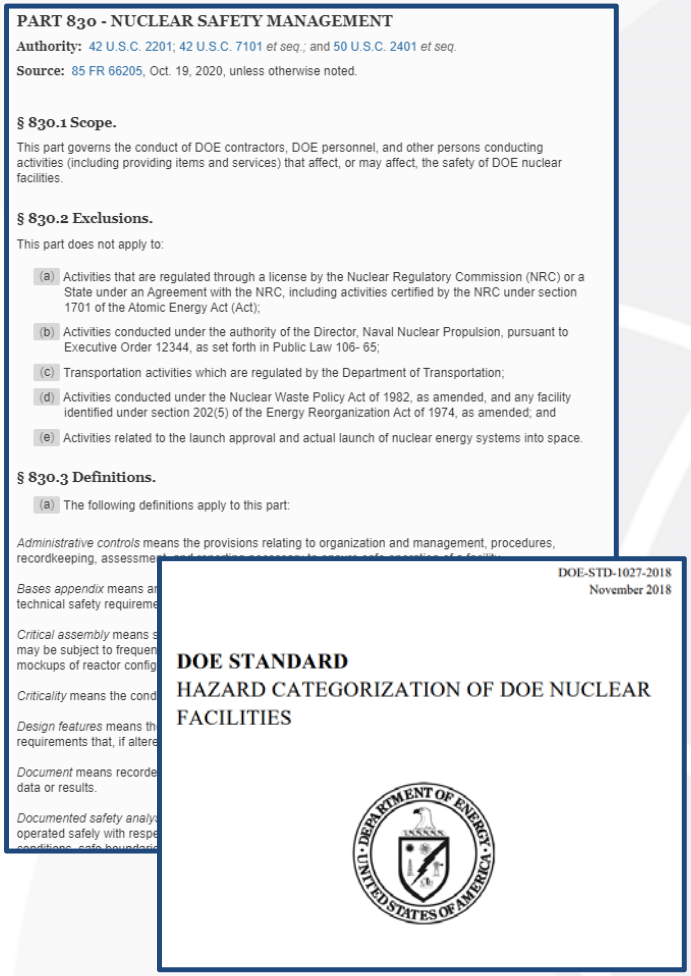
Both are Hazard Category 2 Nuclear Facilities with Nuclear Criticality Safety controls, credited CAAS, and documented safety basis

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

Bases appendix means a
technical safety requireme

Critical assembly means s
may be subject to frequen
mockups of reactor config

Criticality means the cond

Design features means th
requirements that, if altere

Document means recorde
data or results.

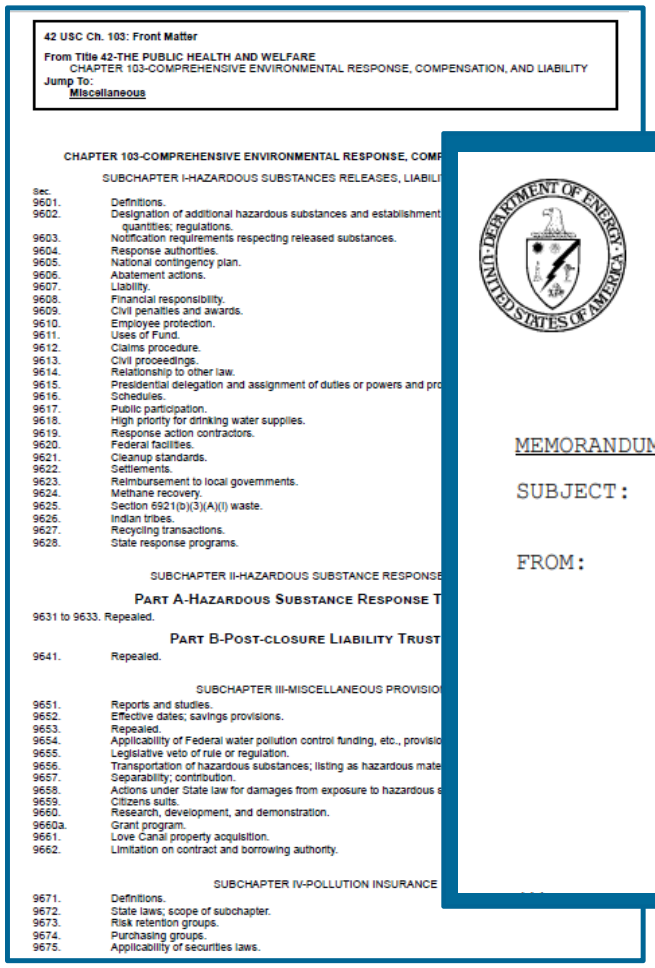
Documented safety analy
operated safely with respe

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, COMP

SUBCHAPTER I-HAZARDOUS SUBSTANCES RELEASES, LIABILI

Sec.
9601. Definitions.
9602. Designation of additional hazardous substances and establishment quantities; regulations.
9603. Notification requirements respecting released substances.
9604. Response authorities.
9605. National contingency plan.
9606. Abatement actions.
9607. Liability.
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9610. Employee protection.
9611. Uses of Fund.
9612. Claims procedure.
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9614. Relationship to other law.
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9616. Schedules.
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9622. Settlements.
9623. Reimbursement to local governments.
9624. Methane recovery.
9625. Section 6921(b)(3)(A)(i) waste.
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9627. Recycling transactions.
9628. State response programs.

SUBCHAPTER II-HAZARDOUS SUBSTANCE RESPONSE

PART A-HAZARDOUS SUBSTANCE RESPONSE T

9631 to 9633. Repealed.

PART B-POST-CLOSURE LIABILITY TRUST

9641. Repealed.

SUBCHAPTER III-MISCELLANEOUS PROVISIO

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9652. Effective dates; savings provisions.
9653. Repealed.
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9655. Legislative veto of rule or regulation.
9656. Transportation of hazardous substances; listing as hazardous mate
9657. Separability; contribution.
9658. Actions under State law for damages from exposure to hazardous s
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.
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9675. Applicability of securities laws.

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

MAY 22 1995

MEMORANDUM

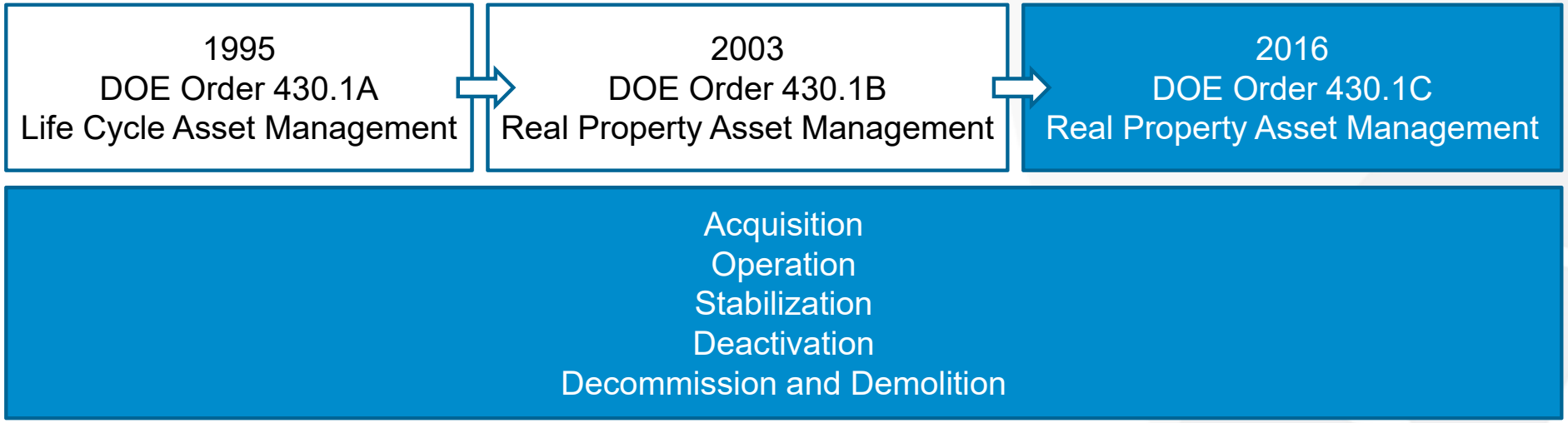
SUBJECT: Policy on Decommissioning Department of Energy Facilities Under CERCLA

FROM: Steven A. Herman
Assistant Administrator
Office of Enforcement and Compliance Assurance
United States Environmental Protection Agency

Elliott P. Laws
Assistant Administrator
Office of Solid Waste and Emergency Response
United States Environmental Protection Agency

Thomas P. Gumbly
Assistant Secretary for Environmental Management
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

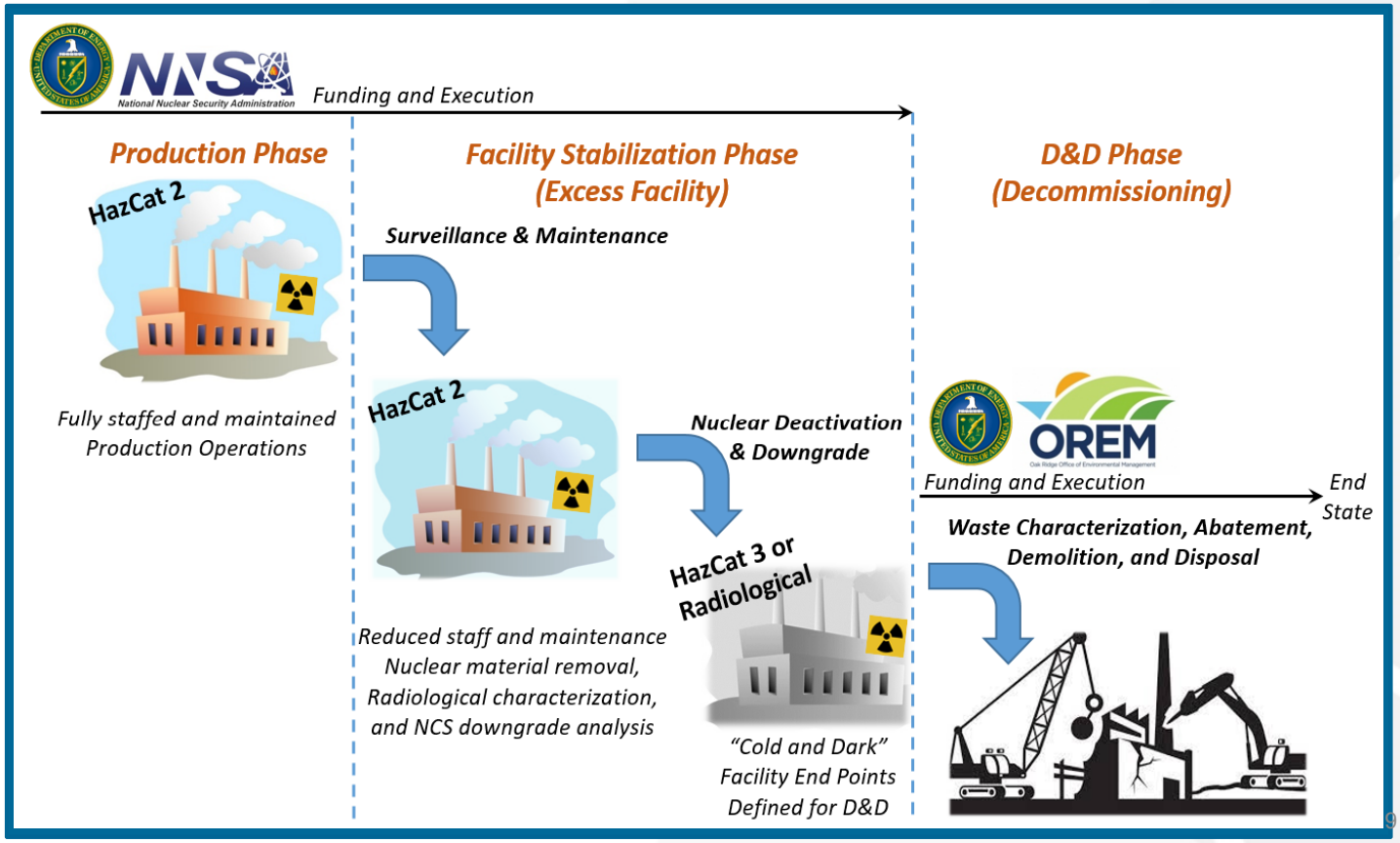
- **Established 2000**
- **Enhances national security through military application of nuclear science**
- **Assumed responsibility of nuclear enterprise and associated infrastructure**

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

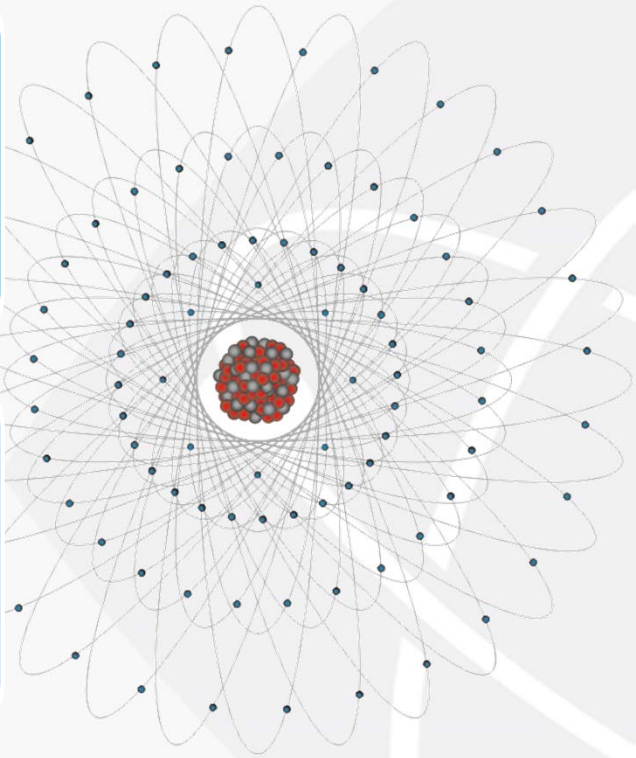
Steps of Nuclear Criticality Deactivation and Downgrade Strategy

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)

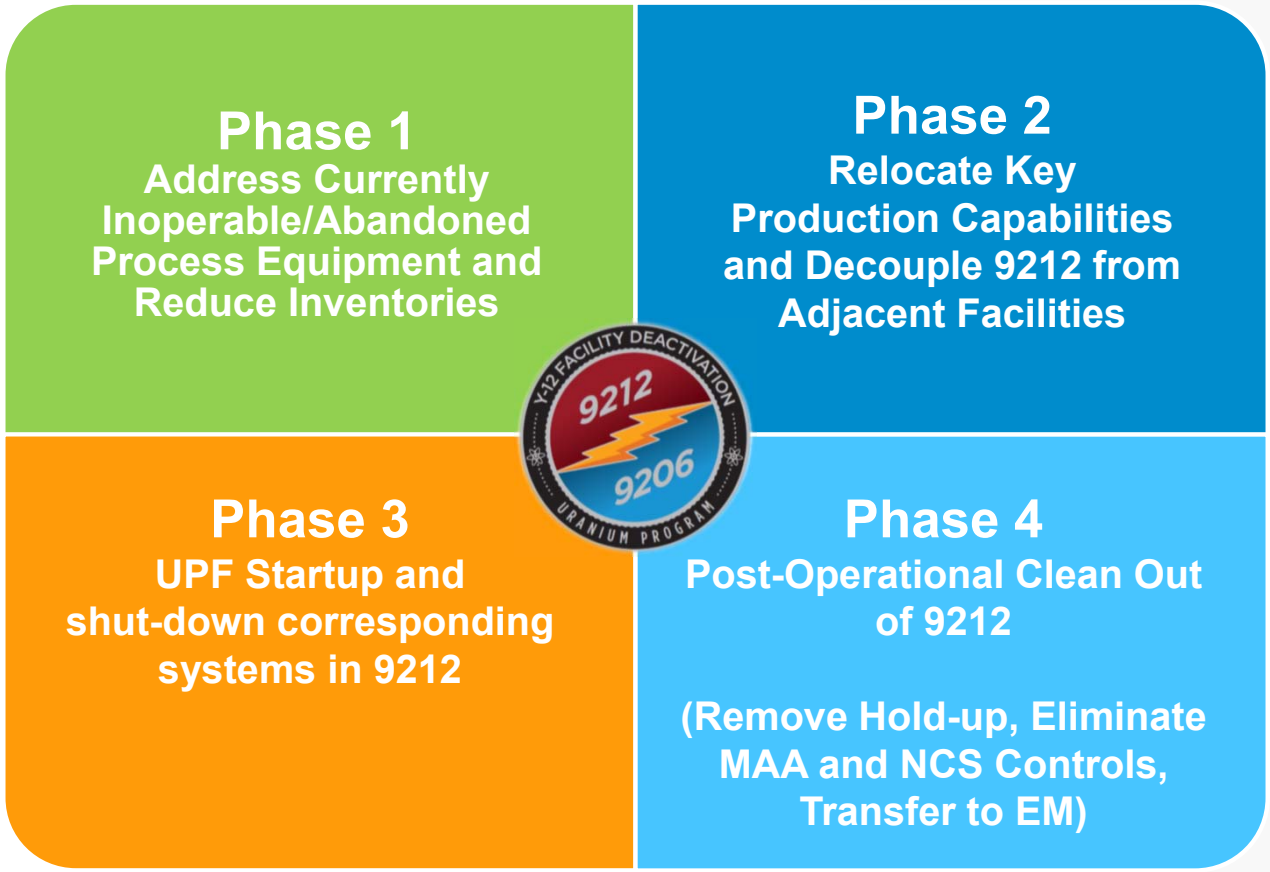
Forging a Transition Strategy for Building 9212

- 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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