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# Y-12 Ten-Year Site Plan

## FYs 2014–2023

Y-12 NATIONAL SECURITY COMPLEX

YGG 12-0283R

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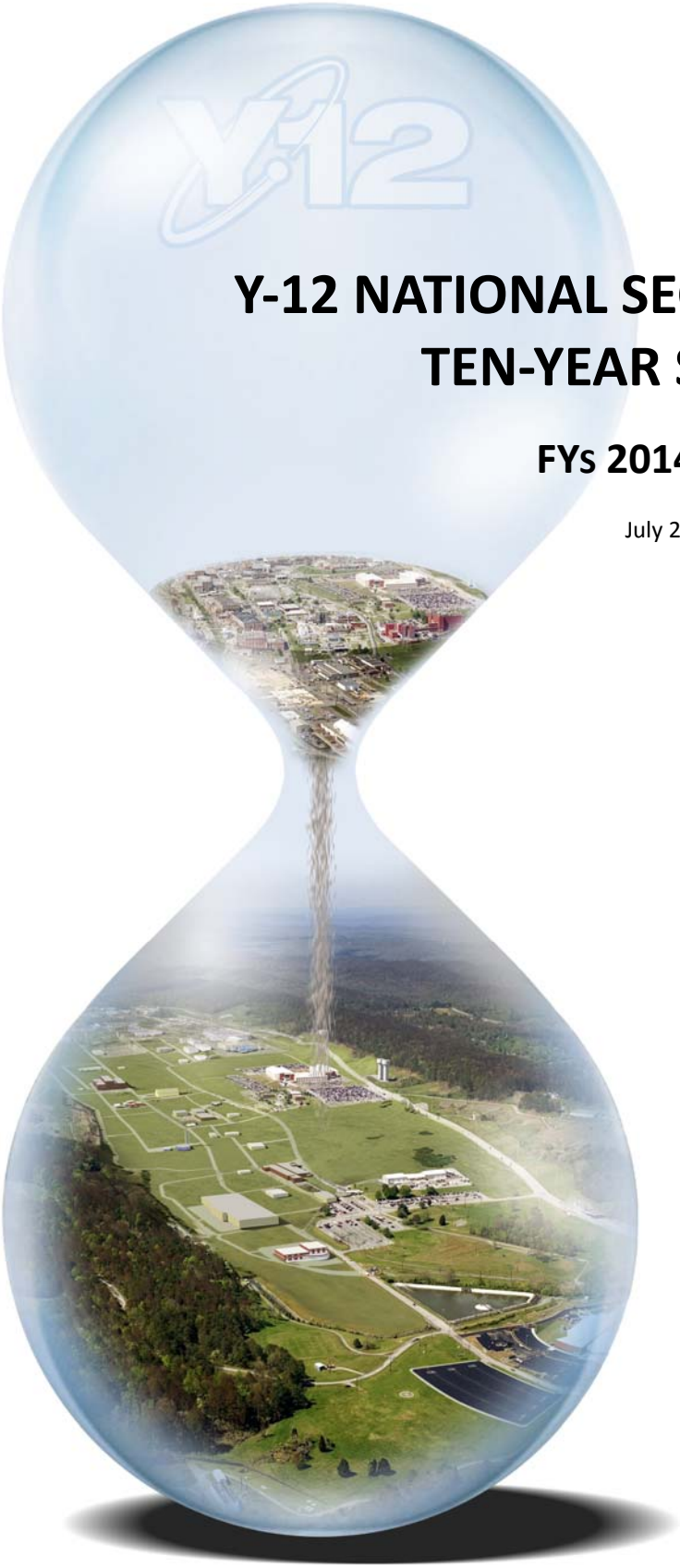

# Y-12 NATIONAL SECURITY COMPLEX TEN-YEAR SITE PLAN

## FYs 2014–2023

July 2013

Prepared by
Babcock & Wilcox Technical Services Y-12, LLC
Management & Operating Contractor
for the
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# ACRONYMS

| | |
|---|---|
| CAS | Central Alarm Station |
| CMC | Consolidated Manufacturing Complex |
| D&D | deactivation and demolition |
| DM | deferred maintenance |
| DOE | U.S. Department of Energy |
| DSW | Directed Stockpile Work |
| EISA | Energy Independence and Security Act |
| EM | Office of Environmental Management |
| EU | enriched uranium |
| FCI | facility condition index |
| FIRP | Facilities and Infrastructure Recapitalization Program |
| FY | fiscal year |
| FYNSP | Future Years National Security Program |
| GSF | gross square feet |
| GTRI | Global Threat Reduction Initiatives |
| HEU | highly enriched uranium |
| HEUMF | Highly Enriched Uranium Materials Facility |
| LEP | Life Extension Program |
| LEU | low enriched uranium |
| MAA | material access area |
| NN | nuclear nonproliferation |
| NNSA | National Nuclear Security Administration |
| NPO | NNSA Production Office |
| O&M | operation and maintenance |
| PA | Protected Area |
| PIDAS | Perimeter Intrusion Detection and Assessment System |
| ROD | Record of Decision |
| RTBF | Readiness in Technical Base and Facilities |
| SCIF | Sensitive Compartmented Information Facility |
| SNM | special nuclear material |
| TYSP | Ten-Year Site Plan |
| UPF | Uranium Processing Facility |
| WEPAR | West End Protected Area Reduction |
| Y-12 | Y-12 National Security Complex |

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# 1. Executive Summary

The Y-12 National Security Complex (Y-12) serves as the National Nuclear Security Administration's (NNSA's) Uranium Center of Excellence. The primary Y-12 missions are: maintaining the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; providing nuclear propulsion feedstock for the U.S. Navy; and reducing the global threat posed by nuclear proliferation and terrorism.

This Ten-Year Site Plan (TYSP) presents the fiscal years (FYs) 2014–2023 facility and infrastructure plans to maintain progress in achieving the overall transformation vision for the Y-12 site. The requirements expressed herein are consistent with the Future Years National Security Program (FYNSP) targets for Y-12. The long-range vision is consistent with multiple Records of Decision (RODs), the 2010 *Nuclear Posture Review*, and the 2014 *Stockpile Stewardship and Management Plan*.

The preferred alternative from the 2008 Complex Transformation ROD that addressed uranium operations established the following Y-12–specific goals:

- a 90% reduction in the high-security area,
- a 60% reduction in the nuclear operations footprint, and
- a 50% reduction in the total building footprint.

## 1.1 Current State

Most of Y-12's mission-critical facilities are more than 60 years old (Fig. 1). To address this situation Y-12 has been consolidating operations, modernizing facilities and infrastructure, and reducing the legacy footprint for more than a decade. These actions are consistent with and supportive of NNSA enterprise transformation planning. Through modernization projects, deferred maintenance (DM) reduction, enhanced security measures, technology enhancements, infrastructure reduction, and innovative business practices, Y-12 is becoming a more responsive and cost-effective enterprise (Fig. 2), as evidenced by the infrastructure accomplishments presented herein.

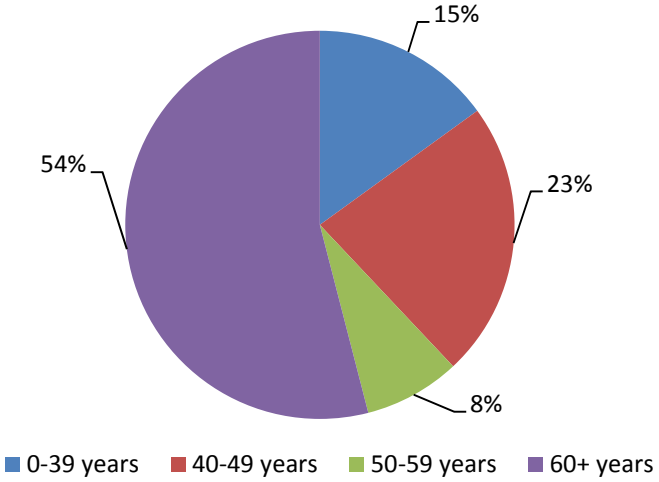


**Fig. 1. Age of Y-12's mission-critical facilities.**

**Fig. 2. Depiction of significant Y-12 transformation activities.**

## 1.2 FUTURE STATE AND ACCOMPLISHMENTS

The following four major elements define the planned physical transformation activities at Y-12 over the 10-year horizon and beyond. Accomplishments toward these elements from the past year are provided.

### *1. Replacement/Revitalization*

When all phases are fully completed, the Uranium Processing Facility (UPF) will replace all highly enriched uranium (HEU) production functions for the Y-12 site. UPF and the Highly Enriched Uranium Materials Facility (HEUMF), both designed for security, will combine all special nuclear material (SNM) operations into a smaller Protected Area (PA) and reduce security operations and maintenance costs (Fig. 3).

Accomplishments

- Y-12 is completing a major replanning effort to implement a phased UPF deployment, prioritizing the Building 9212 functions. The project team is preparing the elements of the Critical Decision-2 submittal package.
- NNSA and the U.S. Army Corps of Engineers have awarded contracts for the initial UPF site readiness activities.
- UPF delivered the Preliminary Safety Design Report to NNSA and received NNSA's approval in the Preliminary Safety Validation Report.

### *2. Security Downsizing and Consolidation*

Once all phases of UPF become operational, the site's PA can be reduced to approximately 20 acres—a major reduction from today's 150-acre PA. The West End Protected Area Reduction (WEPAR) subproject of UPF will construct a new Perimeter Intrusion Detection and Assessment System (PIDAS) leg and facilitate a 70-acre reduction to today's PA. Additionally, SNM consolidation activities continue to complete final loadout of HEUMF and consolidate SNM into fewer areas. Phases 2 and 3 of the UPF project, relocating enriched uranium (EU) functions from Buildings 9215 and 9204-02E, have been deferred, and completion dates are uncertain at this time.

**Fig. 3. Depiction of HEUMF (left) and UPF (right).**

A Lithium Production Facility, proposed during the FYNSP period, would allow lithium operations to be moved from an oversized facility from the 1940s to sustain this vital mission capability. Subsequently, a Consolidated Manufacturing Complex (CMC) would replace other non-EU production capability.

Accomplishments

- The Security Improvements Project successfully completed the last two Central Alarm Station (CAS) consoles, doubling the capability for alarm monitoring. Construction activities were completed for Post 8 access control.
- Deinventory continued of Area 5; material was moved from Buildings 9212, 9215, and 9204-02E into HEUMF.

#### *3. Enduring Facilities*

In addition to facility replacement, Y-12 is actively consolidating functions into fewer existing facilities and reducing the operating footprint. A number of "enduring facilities" must remain operational throughout the long-term horizon. A facility's categorization as enduring is a factor in the prioritization of repairs and maintenance. Facility assessments, facility risk reduction initiatives, DM analyses, and funding prioritization ensure these facilities will continue to operate. While buildings like 9212 are not considered enduring, the critical nature of their function demands appropriate risk reduction.

Accomplishments

- The Nuclear Facility Risk Reduction project team completed installation of:
    - new piping for a cooling tower water system;
    - new high-efficiency particulate air filter units, fans, motors, and controls; and
    - replacement transformers, breakers, and ground detection units.
- Two new air-handling units were installed in Building 9201-05N.
- The Roof Asset Management Program replaced the roofs on Buildings 9115, 9116, 9731, and 9103.

#### *4. Legacy Facility Deactivation and Demolition*

Since 2002, Y-12 has demolished more than 1.4 million sq. ft of excess facilities. The new NNSA Facilities Disposition Program is under development and will identify and evaluate excess assets, prioritize their disposition, and propose the budget resources required for their disposition. This program, in concert with the U.S. Department of Energy (DOE)-Environmental Management (EM) deactivation and demolition (D&D) program is vital to future site management. Without a commitment to eliminate excess facilities, the NNSA sites will continue to use limited resources to safely maintain those facilities that no longer have a mission use.

Accomplishments

- Personnel and functional consolidations have resulted in four vacated facilities (Buildings 9744, 9808, 9111, and 9112), totaling approximately 42,000 sq. ft.
- Y-12 has completed all American Recovery and Reinvestment Act tasks, which included legacy material disposition, demolition, and mercury remediation.

## 1.3 CHANGES

Since issuance of the last TYSP, Y-12 has continued to refine details associated with the UPF deployment strategy to focus on replacing the Building 9212 functions in UPF and deferring replacement of the Buildings 9215 and 92014-02E functions to a later date. Associated changes in construction and security strategies are being finalized.

Following a July 2012 security incident, replannning has occurred for the implementation of physical security improvements, PA reduction, and corresponding site impacts.

## 1.4 CHALLENGES

Due to extended schedules for replacement facilities and infrastructure, new risk mitigation and sustainment strategies are needed to ensure continued mission capability.

With many aging facilities being declared excess to NNSA mission needs, a viable DOE/NNSA program needs to be implemented to disposition legacy facilities and materials. There are currently more than 1 million sq. ft of NNSA facilities at Y-12 available for D&D.

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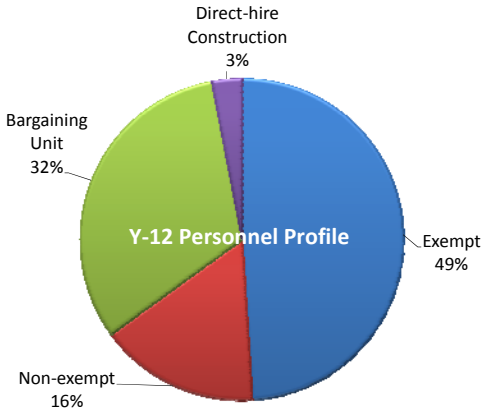
# 2. Site Overview and Snapshot

**Location:** Oak Ridge, Tenn.
**Type:** Multi-Program Site
**Web site:** http://www.y12.doe.gov/

**Contractor Operator:** B&W Y-12
**Responsible Field Office:** NPO Y-12
**Site Manager:** Steven C. Erhart

**Site Overview:**

The Y-12 National Security Complex is a 3,018-acre site in Oak Ridge, Tenn., operated by B&W Y-12 for the NNSA. Since 1943, Y-12 has played a key role in strengthening our country's national security. The primary Y-12 missions are: maintaining the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; providing nuclear propulsion feedstock for the U.S. Navy; and reducing the global threat posed by nuclear proliferation and terrorism. The site's long-range vision (Fig. 4) is consistent with multiple RODs, the 2010 *Nuclear Posture Review*, the 2011 *NNSA Strategic Plan*, and the 2014 *Stockpile Stewardship and Management Plan*.




**Capabilities**

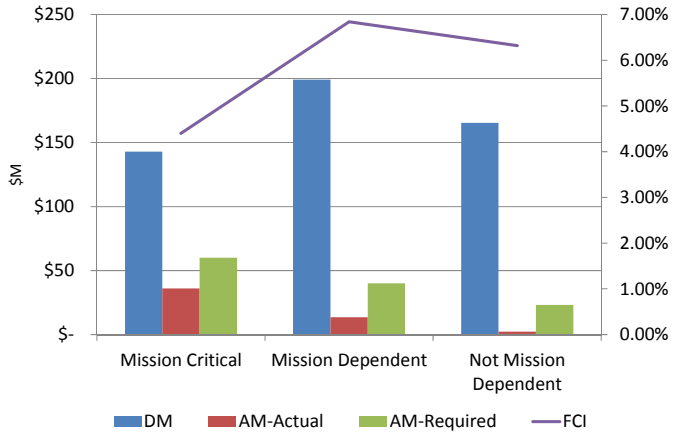
C3—Uranium
C9—Special Nuclear Material Accountability, Storage, Protection, Handling and Disposition
C10—Enabling Infrastructure
C11—Counterterrorism and Counterproliferation
C12—Support of Other Missions/Program Capability

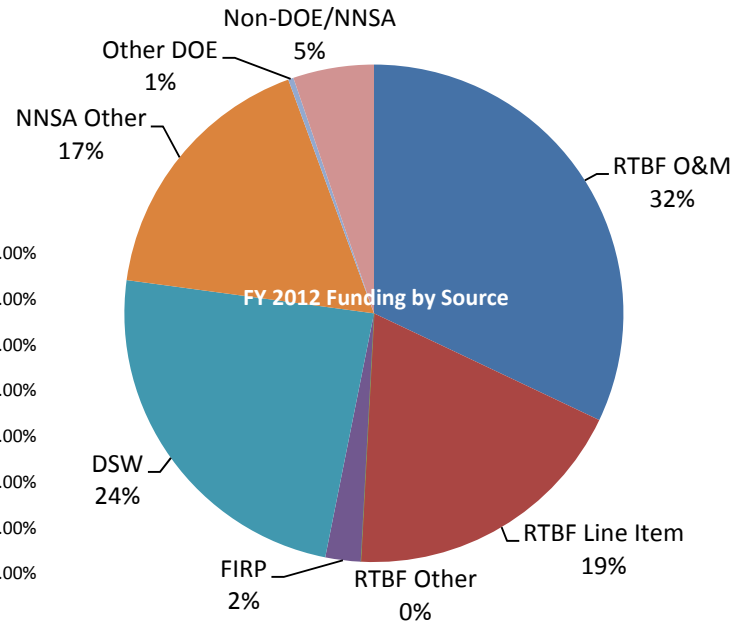
**Real Property**

- 3,018 Acres (Owned)
- 337 Buildings/Trailers
  - 4,023,132 GSF Active and Operational
  - 1,123,080 GSF Nonoperational
  - 772,141 GSF Leased
- Replacement Plant Value: $ 8,743.9M
- Deferred Maintenance: $ 510M
- Facility Condition Index:
  - Mission Critical: 4.5%
  - Mission Dependent: 6.8%
  - Asset Utilization Index (Overall): 76.11%

**FY 2012 Funding by Source ($M)**

- FY 2012 Total Site Operating Funding $1,041.3
- FY 2012 Total NNSA Funding $983.2
- FY 2012 Total DOE (Non-NNSA) Funding $3.6
- FY 2012 Total Other Funding $54.5



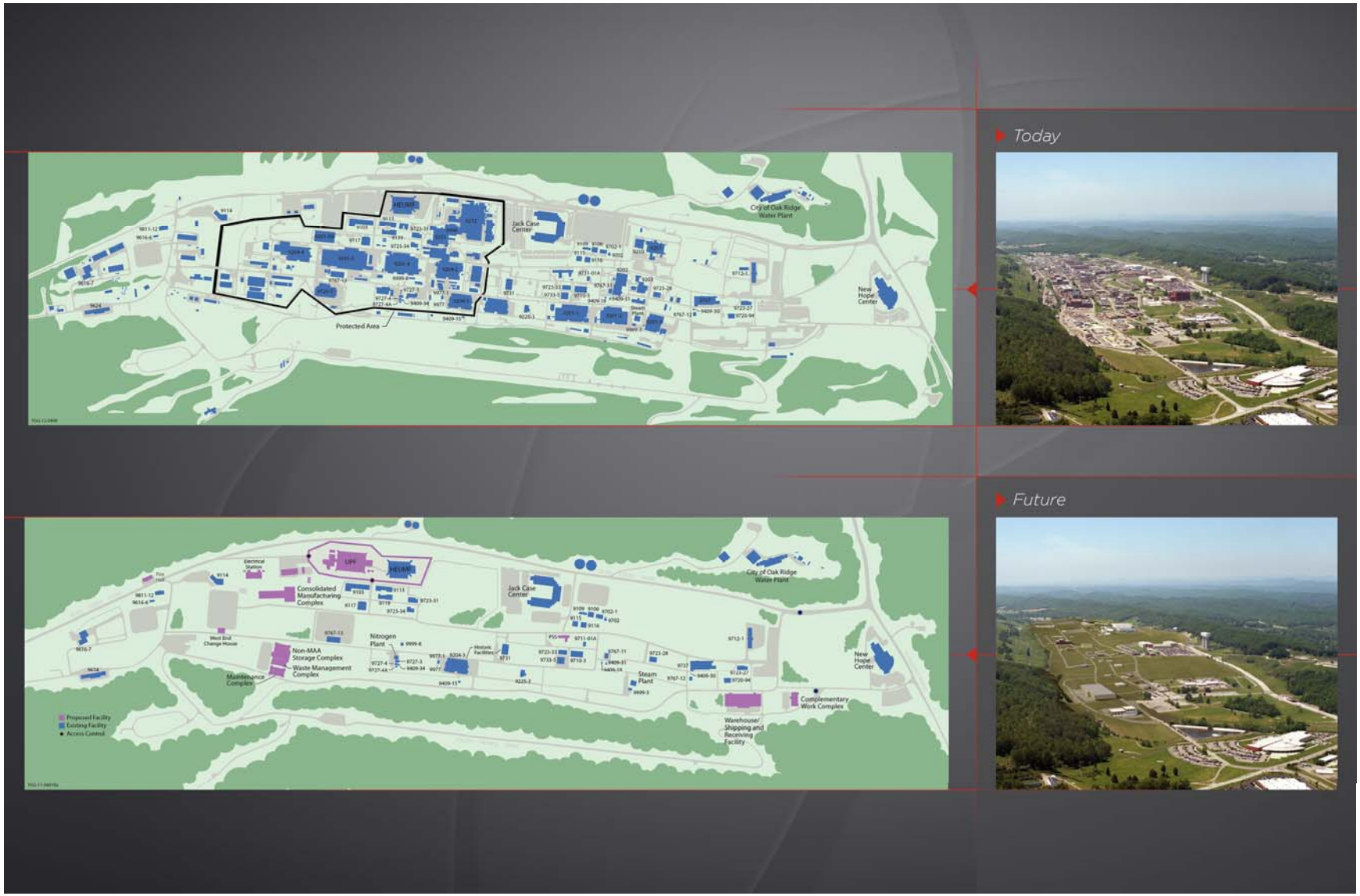



**Fig. 4. Y-12 today and in the future.**

# 3. ASSUMPTIONS

Y-12's planning documents are based on assumptions concerning mission deliverables, capabilities, capacity, and infrastructure. This TYSP is consistent with the 2014 *Stockpile Stewardship and Management Plan* and Y-12's recognition as NNSA's center of excellence for uranium manufacturing and research and development. Significant investment will be required to implement transformation while continuing to meet annual programmatic deliverables safely, securely, and effectively. Only through the continued reconfiguration of Y-12 can the required security, safety, and operational cost goals be achieved.

The following assumptions concern Y-12's future workload:

- Life Extension Program (LEP) production will remain steady around current levels or will be adjusted as directed by NNSA schedules.
- The production of joint test assembly units will be sustained at current levels.
- Quality evaluation (surveillance) rates will remain steady around current levels.
- Dismantlement will sustain the high-throughput levels established in recent years.
- Naval Reactor work will remain steady.
- Work associated with global security and interagency initiatives and NNSA's nonproliferation mission will increase.
- HEU disposition work will decrease over the next 5–10 years as the surplus inventory is dispositioned. Research reactor supply of low enriched uranium (LEU) downblended from HEU will increase to a steady state.

The following are planning, project, and facility and infrastructure assumptions:

- Land requirements will generally remain stable. Y-12 will continue to require security and emergency response buffers that preclude release of any real estate for public use.
- The highest scope priority for the UPF project is early transition of Building 9212 operations with transition of operations from Buildings 9215 and 9204-02E being deferred to a future date.
- New line-item starts supported by the NNSA Construction Working Group's Integrated Priority List during the FYNSP period are the Emergency Response Center (2015), the Fire Hall (2016), and the Lithium Production Facility (2016).
- The Security Improvements Project will complete current scope, including Post 8 access control. New scope to provide intrusion detection and access control for 11 buildings west of H Road is proposed as additional scope using existing funding. Other improvements involving security will be proposed as new projects.
- DOE-EM will provide for the D&D of more than 3.8 million sq. ft of NNSA, Office of Nuclear Energy, Office of Science, and EM excess facilities.
- A transition to a smaller, more responsive Y-12 will require most mission-critical facilities to be operated and maintained beyond design life.
- The initiative to remove 70 acres from the Y-12 PA will be accomplished as the WEPAR subproject within the UPF line-item project.

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# 4. CHANGES FROM PRIOR YEAR TYSP

Since issuance of the last TYSP, Y-12 has continued to refine details associated with the UPF deployment strategy to focus on replacing the Building 9212 functions in UPF and deferring replacement of the Buildings 9215 and 92014-02E functions to a later date. Associated changes in construction and security strategies are being finalized.

Following a July 2012 security incident, replanning has occurred for the implementation of physical security improvements, PA reduction, and corresponding site impacts.

Y-12 supported the development and plans for the NNSA Facilities Disposition Program by providing site maps, excess facility information, excess facility risks, site priorities, and preliminary D&D cost ranges. This program, in concert with DOE-EM programs, will be vital to legacy facility disposition.

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# 5. Future Vision and Core Capabilities

NNSA has a number of core capabilities that are required to perform its primary missions. Table 1 crosswalks the capabilities and missions applicable to Y-12.

**Table 1. NNSA Capabilities and Missions Applicable to Y-12**

| Capability | Applicable NNSA Missions | | | | | |
|---|---|---|---|---|---|---|
| | **M1. Managing the Stockpile** | **M2. Preventing Proliferation** | **M3. Powering the Nuclear Navy** | **M4. Emergency Response** | **M5. Continuing Management Reform** | **M6. Recapitalizing Our Infrastructure** |
| 1. Design, Certification, Testing, Experiments, Surveillance and ST&E base | | | | | | |
| 2. Plutonium | | | | | | |
| **3. Uranium** | **X** | **X** | **X** | | | **X** |
| 4. Tritium | | | | | | |
| 5. High Explosives | | | | | | |
| 6. Non-nuclear | | | | | | |
| 7. Weapons Assembly/ Disassembly | | | | | | |
| 8. Transportation | | | | | | |
| **9. Special Nuclear Material Accountability, Storage, Protection, Handling and Disposition** | **X** | **X** | **X** | | | **X** |
| **10. Enabling Infrastructure** | **X** | **X** | **X** | **X** | | **X** |
| **11. Counterterrorism and Counterproliferation** | | **X** | | **X** | **X** | **X** |
| **12. Support of Other Missions/Program Capability** | | **X** | **X** | **X** | **X** | **X** |
| 13. Federal Management and Oversight | | | | | | |
| 14. Reserve Real Property Assets | | | | | | |

## 5.1 URANIUM (C3)

The Directed Stockpile Work (DSW) program provides resources to perform maintenance and retrofit activities on stockpile weapon systems. LEPs require the production of refurbished, replaced, and/or redesigned weapons components; activities include producing War Reserve materials and parts, supporting direct manufacturing specifications and procedures, and training personnel to meet steady-state production rates. LEPs depend on Y-12's capability to sustain and refurbish all nuclear weapons in the active and the active-reserve stockpile. In addition to the LEP effort, DSW work includes Stockpile Systems (quality evaluation and joint test assembly production), Dismantlement and Disposition, and Stockpile Services. The full suite of Y-12 uranium capabilities are required to support this mission.

Material recycle and recovery activities are integral to DSW and include the recycling/recovery of EU from the production, dismantlement, or quality evaluation of weapons parts; performing chemical conversion of lithium; and storing in-process materials until they can be further processed for long-term reuse, storage, or disposition. For example, high uranium content materials, such as HEU oxide and liquids, are recycled and low uranium content salvage materials such as slag, ash, filters, and combustibles are processed for off-site disposal.

**Tactical Planning Horizon (FYNSP of President's Budget + 5 years)**

Y-12 currently anticipates LEP work to support the W76, B61, the Cruise Missile, and the W78/88-1 within the next 10 years. The major facilities for uranium processing are Buildings 9204-02E, 9212, and 9215, and the major facilities for non-EU component processing that support secondary builds are Buildings 9204-02, 9225-03, 9201-01, 9201-05 N/W, and 9998. Material recycle and recovery will operate wet chemistry, the oxide conversion facility, and reduction to produce purified uranium metal in support of national security needs. Additional significant processing efforts will center on support of dismantlement initiatives, lithium processing, and backlog reduction.

When UPF is in final design/start of construction stage, sustainment projects will be a focus for the EU-processing buildings and production systems within these buildings for the next 10 years; efforts need to ensure these Cold War–era buildings and systems are able to safely support the critical mission until UPF is operational (Fig. 5). In addition to sustainment activities, process transformation activities (e.g., microwave casting, calciner, electrorefining) are being investigated and pursued as a means to reduce safety risk and to improve the productivity and longevity of the EU mission.

**Fig. 5. The Uranium Processing Facility.**

**Strategic Planning Horizon (FYNSP of President's Budget + 20 years)**

Once all phases are completed, the newly constructed UPF will replace all HEU production operations at Y-12. UPF will be a modern manufacturing facility that is designed and constructed for health, safety, security, and operational efficiency. Built to today's codes and standards and designed to ensure safe nuclear operations, the facility will leverage new technologies and provide life-cycle cost savings. UPF will be located to the west of HEUMF and will be contained within a much smaller PA to achieve a 90% reduction in the security footprint. UPF is currently planned to be completed in three phases; in the first phase, the full UPF building will be constructed, and the functions currently performed in Building 9212 will be initiated in UPF. The goal is to complete the main UPF structure by FY 2019 and bring the first phase of UPF into operation in 2025. Phases 2 and 3 of UPF have been deferred but will replace other HEU-production functions (machining, assembly, disassembly, quality evaluation) when they are completed. While awaiting authorization for UPF Phases 2 and 3, sustainment efforts will ensure these capabilities remain viable in existing facilities. Figure 6 illustrates the diverse application of uranium processing that UPF will support.

Building 9212 will be available to be transitioned to EM for demolition around 2028.

A proposed Lithium Production Facility will relocate vital DSW mission functions for the aging 9204-02 building; this facility is currently planned for a project start during the FYNSP period with completion during the strategic planning horizon. At some later time, CMC is proposed to replace depleted uranium, general manufacturing, and other production support functions. Sustainment efforts will be required to ensure non-SNM production capabilities are maintained until these new facilities are available.

**Fig. 6. UPF will support a variety of America's uranium processing needs.**

## 5.2 SPECIAL NUCLEAR MATERIAL ACCOUNTABILITY, STORAGE, PROTECTION, HANDLING AND DISPOSITION (C9)

At Y-12, SNM consists of Category I and II EU that requires vault or closed area storage in material access areas (MAAs). This material is primarily stored in three locations. Eventually all MAA-SNM will be consolidated into HEUMF.

Stored materials are managed by the Nuclear Materials Management and Storage Program to ensure timely support of Defense Programs missions such as replacement of limited-life components for the stockpile, Naval Reactors program requirements, and foreign and domestic research reactors. The program also ensures safe, secure, and compliant storage of the nation's strategic reserve of HEU. Y-12 is designated as DOE's national repository for HEU.

**Tactical Planning Horizon (FYNSP of President's Budget + 5 years)**

Since HEUMF became operational in FY 2010 all canned subassemblies from long-term storage areas, with the exception of a small working inventory, have been relocated into HEUMF. Now the focus is on the movement of EU materials from interim and in-process storage into HEUMF. The deinventory of EU materials from interim and in-process storage is managed by the Area 5 Deinventory Program. The Area 5 Deinventory Program's priority is the deinventory of the interim and in-process storage areas during this timeframe to facilitate the closure of Building 9212 and the transition to UPF. In many cases, the materials in the interim and in-process storage areas will require some type of processing to meet long-term storage requirements. Canned subassemblies awaiting dismantlement will continue to be stored at their current locations.

**Strategic Planning Horizon (FYNSP of President's Budget + 20 years)**

During these years, all MAA-SNM will be stored in HEUMF. UPF will house only limited quantities of interim and in-process storage. Specific plans will be affected by final plans for Phases 2 and 3 of UPF. HEUMF is built for a 50-year life and will be the only long-term MAA-SNM storage facility at Y-12. The location of UPF was chosen to facilitate logistics for interoperability with HEUMF. The PA will eventually solely contain the HEUMF and UPF complexes.

## 5.3 ENABLING INFRASTRUCTURE (C10)

Y-12 has approximately 1.5 million sq. ft of infrastructure support facilities that house operations supporting mission-critical and Complementary Work programs. Although this support space is only about 25% of Y-12's total floor area, support infrastructure houses more than 80% (~3500) of workers. Support facilities serve a variety of functions including administrative, security, warehousing, emergency management, maintenance, development laboratories, waste management, and information technology.

Many of these support facilities were constructed during the 1940s and 1950s and are extraordinarily expensive to operate and do not meet current codes. Several facilities, such as the Plant Laboratory, Maintenance Operations, and the Plant Shift Superintendent's office, require major modernization or replacement.

The construction of the Jack Case and New Hope centers has largely met future needs for technical and administrative support space.

Multiple facilities, totaling approximately 143,000 sq. ft, store a variety of nuclear and nonnuclear materials primarily associated with defense missions; these non-MAA materials include depleted uranium, low-equity EU, lithium, mercury, and heavy water. Non-MAA storage also provides compliant long-term storage for classified materials required for Defense Programs missions. Non-MAA uranium materials (depleted uranium and low-equity EU) were consolidated into Building 9720-05 in FY 2011 to address security requirements, operational efficiencies, and transformation goals and objectives. Current non-MAA storage space at Y-12 is aging and is in need of replacement. Mercury stored at Y-12 will be relocated to another site once DOE makes a final decision on consolidated mercury storage.

Several security initiatives, including the Security Improvements Project, are planned or under way to enhance physical security systems and support a reduction inside the PA.

The site's production decisions regarding program requirements and modernization of facilities drive the planning decisions for future utilities. To achieve the goals, the existing utility infrastructure must be modernized through an investment program of maintenance, repair, and capital improvement consisting of general plant projects, plant equipment projects, and line-item construction projects to meet the utilities services requirements today and in the future. Steam, compressed air, and potable water systems have benefitted from recent upgrades.

**Tactical Planning Horizon (FYNSP of President's Budget + 5 years)**

A proposed Emergency Response Center will replace the current Plant Shift Superintendent's operation and the technical support center that provides on-site emergency response. The current facility was constructed in the 1940s and is not suitable for sustained emergency management support. This project is expected to begin in 2015.

A proposed new fire hall will replace today's 1940s-era station, which is confined within the PA and located in close proximity to EU and other hazardous operations. This project is planned to begin during the FYNSP period.

The Security Improvements Project is the leading initiative to upgrade Y-12's aging security systems. The project has successfully installed Argus access control and alarm management systems in the CAS, the Secondary Alarm Station, and the Jack Case Center in FY 2013. The remaining activities to be completed by FY 2014 are the conversion of HEUMF to Argus; the integration of alarm management and access control; and the installation, testing, and turnover of Post 8.

The UPF WEPAR subproject will install a new PIDAS leg along H Road; it will include barriers, access control, sensors, and alarms that use modern technology. These upgrades will enable a reduction of the PA by approximately 70 acres. The area west of H Road in the PA will become a Property Protection Area, which will result in improved access, increased productivity, and reduced cost.

Additional security improvements and technology are under consideration to replace obsolete or aging equipment and to reduce operating and maintenance costs.

**Strategic Planning Horizon (FYNSP of President's Budget + 20 years)**

The Materials Receiving and Storage Facility will support consolidation of non-EU materials staged in multiple deteriorating buildings and the disposition of an off-site leased facility where the bulk of Y-12 procurements and supplies are received. It will consist of two facilities: the Warehouse/Shipping and Receiving Facility on the east end and the Non-MAA Storage Complex on the west end.

- The Warehouse/Shipping and Receiving Facility will be a new, on-site warehouse with shipping and receiving and storage capabilities. A small number of general storage facilities will provide additional space in various locations around the site.
- The new Non-MAA Storage Complex will be designed to accommodate the various non-MAA storage needs (including low-equity EU that does not require MAA security, depleted and normal/natural uranium, enriched lithium, and heavy water) and will be sized for these needs after the completion of ongoing aggressive disposition campaigns. The Non-MAA Storage Complex will be built for a 50-year life and will be the only long-term Y-12 non-MAA storage facility.

Once all three phases of UPF are complete, three previously proposed security line-item projects will still be needed to allow full realization of the total cost savings associated with consolidation of nuclear operations. The projects are PIDAS Sensor Modernization, UPF Entry Control Facilities, and CAS Relocation. The schedules and scope for these projects are updated to be consistent with the revised planning for UPF.

Other longer range proposed projects include an Applied Technologies Laboratory to support continued uranium research and development activities, and a Maintenance Complex to replace an oversized facility that was constructed in 1944 and to consolidate other satellite maintenance facilities with one modern and efficient location.

## 5.4 COUNTERTERRORISM AND COUNTERPROLIFERATION (C11)

As the NNSA Uranium Center of Excellence and a crucial link in providing a safe and secure U.S. nuclear deterrent, Y-12 comprises facilities, processes, materials, and expertise that are vital to preventing the proliferation of nuclear materials and technology. The nuclear nonproliferation (NN) programs at Y-12 include Global Threat Reduction Initiatives (GTRI), through which Y-12 develops and produces high-density uranium fuels for the conversion of HEU-fueled research reactors, removes vulnerable weapons-usable nuclear materials from around the globe, and provides expertise and training to protect nuclear and radiological material, both domestically and abroad. At the site's Nuclear Detection and Sensor Testing Center, researchers test new technologies to detect nuclear materials with relevant quantities of SNM. Y-12 supports nonproliferation and international security verification and controls programs with HEU experts as transparency monitors in Russia, the Next Generation Safeguards Initiative with safeguards expertise, and policy initiatives on future arms verification activities. Y-12 continues to support the NNSA Office of International Material Protection and Cooperation by providing subject matter experts who serve on teams and provide training workshops for Russians in all areas of nuclear material security and control.

The HEU Disposition Program continues to be Y-12's largest NN program. This program ensures the downblending of surplus HEU and supports the supply of LEU to ensure that foreign research reactors have a reliable fuel supply instead of developing their own capabilities or resorting to using HEU again.

Several Y-12 facilities, both active and excess, are used for these significant programs. For example, uranium materials for NN programs are prepared in Buildings 9212 and 9215, GTRI Alarm Response Training is conducted in Building 9706-02, international material protection workshops are held in Building 9201-03, and the Nuclear Detection and Sensor Testing Center activities take place in nuclear facilities.

As long as individuals, organizations, or rogue states continue to want to threaten the U.S. with nuclear terrorism, Y-12 facilities and expertise will be needed to combat their aims. Y-12 production and support facilities are required to support nuclear forensics, emergency response, nuclear counterterrorism, and related initiatives. Facilities required for this support include many Y-12 applied technology facilities and production areas, Sensitive Compartmented Information Facilities (SCIFs), Special Access Program facilities, Radiological Assistance Program team facilities, emergency response centers, and various training venues.

**Tactical Planning Horizon (FYNSP of President's Budget + 5 years)**

NN programs at Y-12 will continue to need uranium processing capabilities, uranium analysis capabilities, and nuclear detection activities. HEUMF and other storage facilities will continue to store removed uranium material and to archive samples for nuclear forensics activities. Training will be conducted in several buildings across the Y-12 site. A new facility for GTRI Alarm Response Training is under consideration as part of a larger Global Security Training Campus. Other existing east-end buildings will be needed for NN research and development and detection projects and the development of nonproliferable reactor fuels. General infrastructure areas and support facilities also will continue to be needed.

Counterterrorism programs at Y-12 will need a variety of Y-12 facilities for development, analysis, forensics, and nuclear detection. Training will continue in some buildings until they are required to be demolished under facility disposition plans. A Global Security Training Campus is under consideration to support global security and counterterrorism missions. Many other Y-12 facilities and general infrastructure areas will provide support to counterterrorism efforts.

**Strategic Planning Horizon (FYNSP of President's Budget + 20 years)**

During these years, Y-12 will need both MAAs and non-MAA uranium processing facilities to support NN initiatives. UPF will provide the MAA uranium processing needs, and CMC and the new Applied Technologies Laboratory will provide the non-MAA uranium processing and manufacturing needs for NN. Lithium production and processing facilities are needed for nuclear material detectors as the shortage of helium-3 worsens. Training and laboratory facilities will be essential as the NN and global security programs increase at Y-12.

Both proposed and existing buildings will support counterterrorism programs, and continued training and modern laboratory facilities will be necessary.

## 5.5 SUPPORT OF OTHER MISSIONS/PROGRAM CAPABILITY (C12)

Y-12 processes HEU for use by the Naval Reactors program. Y-12's support of the Naval Reactors program began in FY 2002 and is planned through FY 2050 and beyond. Feed material for Naval Reactors is processed and packed for shipment. The Analytical Chemistry Laboratory analyzes samples used to certify material properties. Following transfer to HEUMF for interim storage, the material is shipped to the Naval Reactors customer. Material may be stored at Y-12 for a number of years.

As part of the nuclear security enterprise, Y-12 supports interagency efforts to counter threats to U.S. national security. Federal agencies supported by Y-12 for these efforts include the Department of Homeland Security, Department of Defense, Federal Bureau of Investigation, Environmental Protection Agency, Nuclear Regulatory Commission, and Office of Personnel Management to support the removal, detection, and protection of materials, facilities, technologies, and information that could be used for weapons of mass destruction or other nuclear terrorism related activities.

Y-12 production and support facilities are required to support nuclear forensics, nuclear detection, consequence management, infrastructure security, and other interagency initiatives. Several Y-12 facilities are required for this support, including storage and production facilities, SCIFs, Special Access Program facilities, and various training venues.

**Tactical Planning Horizon (FYNSP of President's Budget + 5 years)**

These programs at Y-12 will continue to need numerous facilities across the site for manufacturing, development, analysis, forensics, and nuclear detection. Existing buildings will be used for training until they are demolished in accordance with facility disposition plans. As noted, a Global Security Training Campus is under consideration that will be available to support this mission.

During this period, Naval Reactors work scope is expected to remain constant.

**Strategic Planning Horizon (FYNSP of President's Budget + 20 years)**

During these years, proposed and existing facilities will be needed to provide support to these programs. There will be a continued need to have training and laboratory facilities as well as some specialized facilities.

It is anticipated that Naval Reactors work will remain constant.

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# 6. Real Property Asset Management

Key decisions regarding the future of Y-12 are reflected in *Complex Transformation Supplemental Programmatic Environmental Impact Statement* (DOE/EIS-0236-S4), October 2008, and the ensuing ROD on December 19, 2008. As a result of those decisions, it was determined that Y-12 will undergo a consolidation, downsizing, and revitalization effort to achieve a future state that is modern, more responsive, and cost effective while providing the most efficient responses for health, safety, and security requirements. Over the past several years these decisions have been further defined in NNSA's 2014 *Stockpile Stewardship and Management Plan*.

The four major elements that define Y-12's physical transformation are:

1. replacement/revitalization of key facilities and infrastructure,
2. consolidation of SNM and SNM facilities and the downsizing of the high-security footprint,
3. site consolidation and sustainment of "enduring" facilities, and
4. D&D of legacy facilities as they are declared excess to Y-12 missions.

## 6.1 Site Footprint

The Y-12 plan for a smaller, more responsive, sustainable, and cost-effective enterprise is supported by the following site-specific goals for Y-12:

- 90% reduction in the high security area,
- 60% reduction in the nuclear operations footprint, and
- 50% reduction in the total building footprint.

Table 2 provides facility condition and asset utilization details about the Y-12 site collectively.

**Table 2. Y-12 Site (NNSA) Facility Condition Index and Asset Utilization Index by Category**

| | | | | | | |
|---|---|---|---|---|---|---|
| **Replacement Plant Value** | | $8,743.9 | | Million | | |
| **Total Deferred Maintenance** | | $510 | | Million | | |
| **Site Wide Facility Condition Index** | | 5.8% | | | | |
| | | **Facility Condition Index (%)** | **Asset Condition Index (%)** | **Asset Utilization Index (%)** | **No. of Assets** | **Buildings and Trailers (GSF in thousands)** |
| **Mission Dependency** | **Mission Critical** | 4.50 | 95.5 | 90.760 | 23 | 2,104 |
| | **Mission Dependent** | 6.80 | 93.2 | 93.99 | 149 | 1,882 |
| | **Not Mission Dependent** | 6.20 | 93.8 | 45.84 | 183 | 2,839 |
| **Facility Use** | **Office** | 5.02 | 94.9 | 95.4 | 27 | 736 |
| | **Warehouse** | 8.71 | 91.3 | 99.44 | 67 | 524 |
| | **Laboratory** | 68.89 | 31.11 | 100 | 14 | 1,268 |

### 6.1.1 Current Site Footprint

The Y-12 site has multi-program facility ownership with a site presence for the NNSA and DOE offices of Nuclear Energy, EM, and Science. Table 3 shows facility ownership by square footage for each program and leased facilities.

**Table 3. Y-12 Facility by Program**

| **No. of Buildings** (does not include trailers or sheds) | **Program** | **Gross Square Feet** |
|---|---|---|
| 336 | National Nuclear Security Administration | 5,146,212 |
| 1 | DOE Office of Nuclear Energy | 255,656 |
| 15 | DOE Office of Environmental Management | 578,463 |
| 15 | DOE Office of Science | 895,110 |
| 9 | Leased | 772,141 |
| **376** | **TOTAL** | **7,647,582** |

NNSA is by far the primary occupant at Y-12 and is responsible for day-to-day management and operations. In support of site transformation and directives for more efficient facility management, personnel are being relocated and consolidated to minimize square footage. During FY 2012, several buildings were vacated in preparation for eventual demolition. These facilities were beyond design life and were beginning to experience costly failures. Additionally, B&W Y-12 had employees located within Building 9204-03, an Office of Nuclear Energy facility. The employees were relocated, and the management responsibility for the facility was returned to Oak Ridge National Laboratory. Although the site continues to consolidate activities, the site footprint has increased because of the transition of the security forces contract. As a result, the Central Training Facility is now included in the NNSA square footage for Y-12.

The Office of Nuclear Energy has management responsibility for Building 9204-03. It has been vacated and will be placed in cold standby; this facility is designated a National Historic Landmark.

EM has responsibility for landfills and waste removal activities at Y-12. Buildings 9213, 9401-02, and 9201-04 are shutdown, awaiting cleanup and demolition. The remaining facilities managed by EM are active facilities supporting the EM mission.

The Office of Science continues to actively pursue shutdown of their facilities at Y-12. Building 9201-02 is being readied to disconnect the power to major portions of the facility in preparation for eventual demolition. Building 9204-01 was vacated in 2010 and is now cold and dark. The Biology Complex has been cold and dark for several years and awaits a funded demolition program. Once management responsibility for Building 9401-01 is transitioned back to the Office of Science, it will also be readied for demolition. In total, more than 800,000 sq. ft of space is available for demolition. These facilities have no future mission relevance to the Oak Ridge National Laboratory and will be transitioned to EM.

### 6.1.2 Future Site Footprint

Over the next 10 years and beyond, Y-12 will continue to consolidate personnel and processes in support of the long-range footprint reduction. The smaller Y-12 proposed in the transformation vision will eliminate many of the World War II-vintage operations buildings that currently house the nuclear operations. This effort will reduce the operational footprint from approximately 2.3 million sq. ft to 900,000 sq. ft (production and storage complex)—a 60% reduction. The 25-year plan envisions a smaller future site, which represents about 2.7 million sq. ft of building space and comprises the following new capable, responsive, and sustainable facilities.

***Projects initiated during FYNSP period:***

- Emergency Response Center,
- Fire Hall, and
- Lithium Production Facility.

***Projects initiated after the FYNSP period:***

- West End Change House,
- Applied Technologies Laboratory,
- CMC,
- Maintenance Complex,
- Non-MAA Storage Complex,
- Warehouse/Shipping and Receiving Facility, and
- Waste Management Complex.

The transition plan will provide for a smaller footprint that is more energy-efficient and has technologically capable facilities to fully support the ongoing mission for the site.

The existing contractor-leased facilities will remain largely intact for the foreseeable future. The UPF project will transition from off-site leased space to on-site construction trailers once the project migrates from design to construction activities. The Jack Case and New Hope centers are long-term leased facilities that will continue to house administrative functions for the site. The off-site shipping and receiving warehouse will remain in place until a new, on-site warehousing facility can be constructed; the off-site records storage warehouse has a long-term lease that will continue for the 10-year horizon.

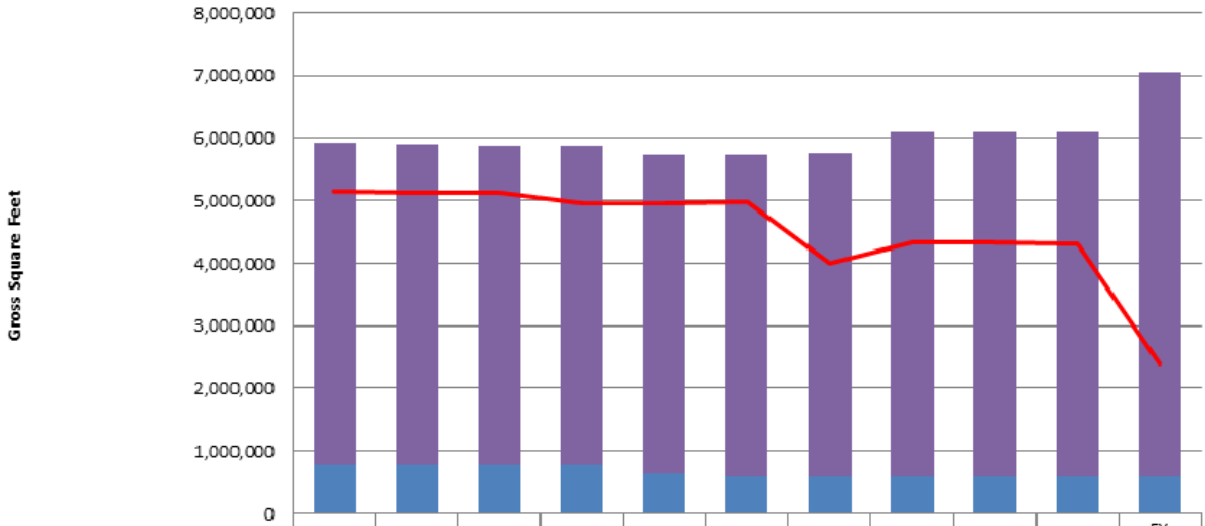
Y-12 fully supports the demolition and new construction off-set requirements established for both the 2003 banking memo and the 2012 Freeze the Footprint initiative. Table 4 depicts Y-12's "banked" square footage by program.

**Table 4. Y-12 Banked Square Footage**

| Program | Disposition | New Construction | Waivers | Banked Square Footage |
|---|---|---|---|---|
| National Nuclear Security Administration | 1,204,975 | 443,179 | 250,000 | 1,011,796 |
| Office of Environmental Management | 18,919 | 0 | 0 | 18,919 |
| Office of Science | 118,927 | 0 | 0 | 118,927 |
| **Total** | **1,342,821** | **443,179** | **250,000** | **1,149,642** |

The Freeze the Footprint initiative places an emphasis on warehousing/storage and office facilities. For the next 3-year span, the site does not have any plans to build or acquire new square footage in these categories.

As noted in Fig. 7, the site footprint will remain fairly stable until UPF is constructed. It should be noted that footprint is available for D&D during that period, but funding is uncertain.




| | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | FY 2022 | FY 2023-2038 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NNSA Owned | 5,146,212 | 5,120,009 | 5,112,469 | 5,117,392 | 5,117,392 | 5,141,392 | 5,155,392 | 5,505,392 | 5,505,392 | 5,505,392 | 6,467,022 |
| Outgranted | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DOE/NNSA Leased | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Contractor Leased | 772,141 | 772,141 | 772,141 | 767,218 | 621,430 | 592,630 | 592,630 | 592,630 | 592,630 | 592,630 | 592,630 |
| With funded dispostion Plan | 5,146,212 | 5,116,164 | 5,116,164 | 4,950,929 | 4,944,914 | 4,968,696 | 3,997,471 | 4,343,414 | 4,334,603 | 4,317,481 | 2,399,526 |

**Fig. 7. Y-12 footprint projection (buildings and trailers).**

## 6.2 FACILITY CONDITION

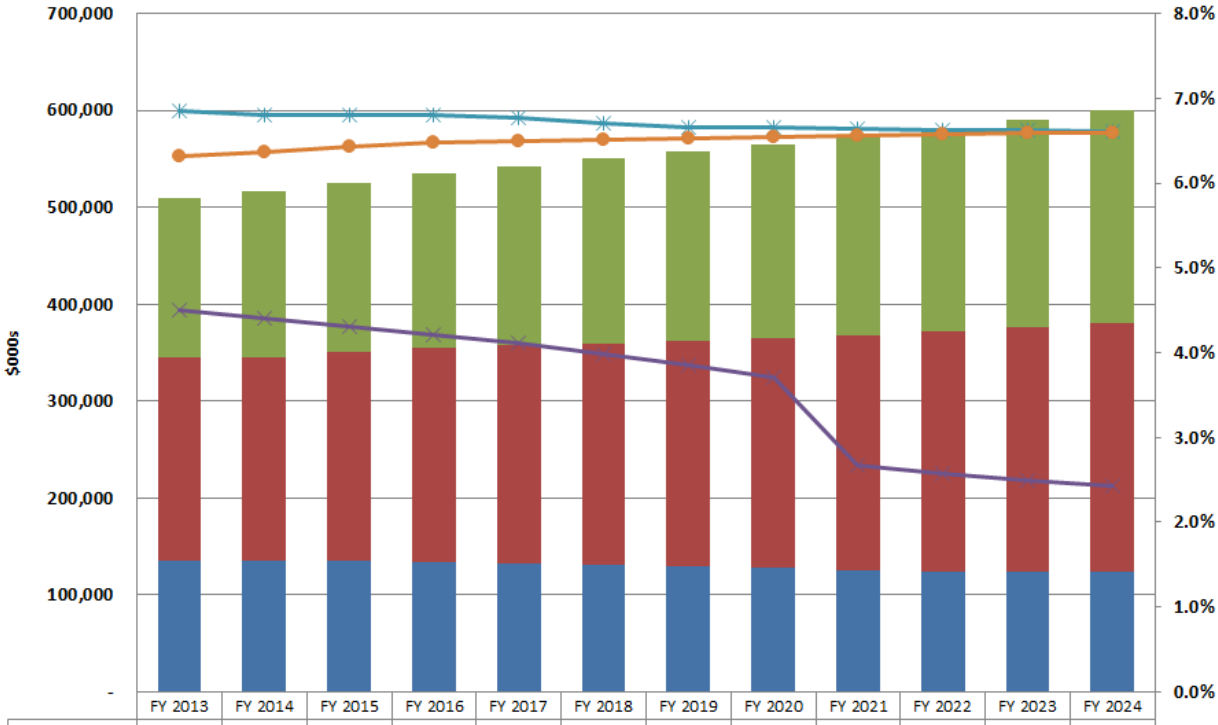
Mission-critical operations are scattered across multiple 40- to 60-year-old facilities. The facilities are oversized, contain technologically obsolete equipment of low reliability, and require excessive maintenance to maintain minimum capability. Much of the critical infrastructure is approaching or is beyond the expected design life. New construction and recent initiatives for life-cycle replacement and maintenance, such as the Nuclear Facility Risk Reduction project, have resulted in an improved condition for these facilities. Projections beyond 2020 reveal that with planned construction activities, the condition of mission-critical infrastructure will remain constant or improve. The facility condition index (FCI) for mission-critical facilities is already below the 5% threshold established by NNSA. Y-12 fully expects this FCI to remain less than 5% for the foreseeable future and to then further improve when UPF is operational. The continued investment in equipment and facility improvements for the aging mission-critical infrastructure is necessary to prevent a potential decline in condition for select facilities. As an example, Building 9204-02 and the mission-critical capability it provides will be needed to support production operations for another 10—15 years. Life-extension investments in facilities like Building 9204-02 must be a priority.

The FCI for mission-dependent, not critical facilities is less than 8% and will remain fairly stable for the near-term. As facilities are consolidated and excessed, continued life-cycle sustainment efforts will further improve the facility condition. Much-needed facility and utility infrastructure upgrade projects would ensure the future viability of Y-12 operations.

### 6.2.1 Deferred Maintenance Reduction

The Condition Assessment Survey program has been incorporated at Y-12 to support the DM reporting requirements of DOE Order 430.1B Chg 2, *Real Property and Asset Management*. Condition Assessment Survey inspections are performed on a 3-year cycle and include integration from the facility and operations managers. The resulting DM data are annually reported to the Facility Information Management System.

Figure 8 provides an out-year projection of the anticipated changes in DM and associated FCI. Without a specific funding mechanism to buy-down DM and demolish unneeded infrastructure, the DM and FCI are expected to increase steadily. Future new construction and renovation activities could have an impact on the FCI, but DM as a whole is expected to remain fairly stable or slightly increase over the next 10 years. The long-range condition in mission-critical facilities will significantly improve as facilities are constructed.




| | FY 2013 | FY 2014 | FY 2015 | FY 2016 | FY 2017 | FY 2018 | FY 2019 | FY 2020 | FY 2021 | FY 2022 | FY 2023 | FY 2024 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DM NMC | 165,292 | 170,426 | 175,602 | 180,815 | 185,362 | 190,014 | 194,773 | 199,642 | 204,532 | 209,443 | 214,372 | 219,317 |
| DM MDNC | 209,506 | 210,840 | 215,340 | 220,038 | 224,096 | 228,401 | 232,945 | 237,716 | 242,605 | 247,598 | 252,686 | 257,859 |
| DM MC | 134,987 | 134,923 | 134,742 | 134,427 | 133,067 | 131,514 | 129,763 | 127,807 | 125,535 | 124,084 | 123,372 | 123,325 |
| MC FCI | 4.5% | 4.40% | 4.3% | 4.2% | 4.1% | 4.0% | 3.8% | 3.7% | 2.7% | 2.6% | 2.5% | 2.4% |
| MDNC FCI | 6.84% | 6.8% | 6.8% | 6.8% | 6.8% | 6.7% | 6.7% | 6.7% | 6.6% | 6.6% | 6.6% | 6.6% |
| NMC FCI | 6.32% | 6.4% | 6.4% | 6.5% | 6.5% | 6.5% | 6.5% | 6.6% | 6.6% | 6.6% | 6.6% | 6.6% |

**Fig. 8. Y-12 planned real property expenditure by mission dependency.**

### 6.2.2 Space Utilization and Consolidation

A Y-12 site consolidation team evaluates and prioritizes all site space requests, requirements for demolition and construction, and consolidation activities against long-term transformation plans. An intensive effort to verify existing office space began during FY 2012 and has continued this year with an expansion into storage and warehouse space. In concert with the master site planning effort, space type and utilization information was loaded into the Y-12 Area Mapping System, a geographical information system. Data is extracted from the site-wide personnel database each night to allow real-time assessment of usage. This effort allows the team access to information for each facility, including available office space, storage capacity by type, and specific details regarding size and technical capability for each area. Buildings are evaluated based on current use, occupancy, and long-term viability and are incorporated into site-wide consolidation or renovation planning.

As the system matures, the site is evaluating the potential for implementing a space charge-back system and application of space standards. The Y-12 Area Mapping System is being used for master site planning to evaluate areas for future renovation, impact of site changes, and location of surge space during transition and to identify organizational use of space.

## 6.3 SUSTAINABILITY/ENERGY

Y-12 is meeting or has exceeded 14 of the 20 sustainability goals; several of the remaining goals are on track and are fully expected to be met prior to the established deadlines. Some ongoing Y-12 initiatives that have had a significant impact on the sustainability at the site and have helped reduce energy and water intensity during the past few years include:

- energy savings performance contract projects,
- pollution prevention and recycle/reuse programs,
- infrastructure reduction,
- American Recovery and Reinvestment Act,
- site-wide consolidation and transformation, and
- the Energy Modernization and Investment Program.

Recent initiatives that demonstrate significant progress toward the sustainability goals are the following:

- Achieved High Performance and Sustainable Building status for the Jack Case Center (30.1% energy reduction)
- Supported Energy Independence and Security Act (EISA) 438 compliance: pervious pavement; solar crosswalk; 3.3 acres of soil reused; LED lighting; native plants
- Met 100% of EISA evaluation requirements
- Installed two new air-handling units in Building 9201-03 (5-million gal water saved)
- Reduced high pressure steam; “right-sized” for application (gas/fuel savings)
- Installed low-flow restroom fixtures (171,000-gal water saved)
- Installed two new air-handling units in Building 9201-05N
- Consolidated personnel to vacate four facilities (523,501 kwh/yr savings)
- Reduced 12,857 MT $CO_2$ (2,741 equivalent pine tree acres)
- Repaired condensate pumps at Building 9204-02; 26% of savings for ECM 7.1, Condensate Return
- Received Federal Energy and Water Management Award for steam plant
- Received Environmental Excellence Award for Y-12's Sustainability Team
- Received 2012 Federal Electronics Challenge Gold Level Award
- Received 2012 DOE Sustainability Awards: “Reaching Beyond—Y-12 Sustainability Outreach” and “Y-12 Targeted Excess Materials”
- Implemented more than 100 pollution prevention initiatives that eliminated more than 25.5 million lb of waste

During FY 2013, the site will continue to focus on employee awareness and incorporation of sustainability into maintenance efforts and modernization planning. This focus will further enable site progress towards meeting the goals.

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