Exceptional service in the national interest

Sandia National Laboratories

Twenty-Five-Year Site Plan

FY 2013

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Sandia National Laboratories (SNL) is a U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA)-owned national security laboratory, managed and operated by Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation that provides science, technology, and engineering (ST&E) expertise to ensure the security of our nation. SNL continues to play a central role in the design, development, and stockpile life of the U.S. nuclear arsenal.

To most Americans, national security has meant defense against foreign military threats; however, over time the threats to our nation have become increasingly varied and complex. Our security is now challenged by economic as well as military action, by rogue groups and foreign states, and by efforts to control the global distribution of energy, information, transportation, and other vital resources and infrastructure. Sandia works in partnership with the federal and state governments, universities, and industry to protect and enhance the security, prosperity, and well-being of the country.

Sandia's mission capability rests on its world-class workforce, its collective knowledge of corporate policies, practices, and procedures, and its physical assets, which consist of facilities, equipment, and infrastructure at several locations. The facilities and equipment provide the capability to perform research and experiments that lead to new technological developments or confirm continuing functionality. Many experiments can be performed only in specially constructed and outfitted facilities. In addition, a substantial and increasing reliance on high-performance computational techniques underscores the importance of computing and data communication capabilities. Finally, the site and utilities infrastructures are necessary for the other major elements to function. The availability of an appropriate set of facilities is clearly requisite for Sandia to perform its mission.

This *FY 2013 Twenty-Five-Year Site Plan* (TYSP) describes the integrated program of site, facility, and infrastructure plans and investments required for Sandia to meet its mission objectives, support the NNSA's Program of Record, and effectively execute stewardship of its real property assets from FY 2013 through FY 2037.

Sandia continues to innovate and pursue engineering excellence as it strives to become the laboratory the United States turns to first for ST&E solutions to the most-challenging problems that threaten peace and freedom for our nation and the world.

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Acronyms and Definitions

Acronym	Definition
ACRR	Annular Core Research Reactor
ACI	Asset Condition Index
AF&F	Arming, Fuzing, and Firing
ALT	Alteration
ARG	Accident Response Group
AUI	Asset Utilization Index
B&T	Buildings and Trailers
CA	California
CAS	Condition Assessment Survey
CBFI	Capability-Based Facilities and Infrastructure
$CHIP^2$	Center for Heterogeneous Integration Packaging and Processes
CMOS	Complementary Metal Oxide Semiconductor
CO	Contractor-Operated
CW	Chilled Water
CWG	Construction Working Group
D&D	Decontamination and Demolition
DM	Deferred Maintenance
DOD	Department of Defense
DOE	Department of Energy
DOS	Department of State
DSA	Defense Systems and Assessments
ECIS	Energy, Climate, and Infrastructure Security
ETG	Explosives Technology Group
F&I	Facilities and Infrastructure
FCI	Facilities Condition Index
FFRDC	Federally Funded Research and Development Center
FIMS	Facilities Information Management System
FIRP	Facilities and Infrastructure Recapitalization Program
FMOC	Facilities Management and Operations Center
FY	Fiscal Year
FYNSP	Future Years Nuclear Security Plan
GBD	Global Burst Detector
GO	Government-Owned
GPP	General Plant Project
GPS	Global Positioning Satellite
GSF	Gross Square Feet
HE	High Explosive
IAW	Interagency Work

Acronym	Definition
IBL	Ion Beam Laboratory
IGPP	Institutional General Plant Project
IHNS	International, Homeland, and Nuclear Security
IPB	International Programs Building
IPL	Integrated Priority List
IT	Information Technology
JTOT	Joint Tactical Operations Team
KTF	Kauai Test Facility
LEED®	Leadership in Energy and Environmental Design
LEP	Life Extension Program
LI	Line Item
LRDF	Long-Range Development Framework
LVOC	Livermore Valley Open Campus
MC	Mission Critical
MDNC	Mission Dependent/Not Critical
MESA	Microsystems and Engineering Sciences Applications
MR	Major Renovation
NG	Neutron Generator
NM	New Mexico
NNSA	National Nuclear Security Administration
NSE	Nuclear Security Enterprise
NW	Nuclear Weapons
O&M	Operations and Maintenance
OPUS	Overland Palletized Unit Shippper
OSF	Other Structures and Facilities
OST	Office of Secure Transportation
POR	Program of Record
PSL	Primary Standards Laboratory
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
RTBF	Readiness in Technical Base and Facilities
S&S	Safeguards and Security
S&T	Science and Technology
SALSA	System Analysis Lab for Simulation and Assessments
SCIF	Sensitive Compartmentalized Information Facility
SGT	SafeGuards Transporter
SMU	Strategic Management Unit
SNL	Sandia National Laboratories
SPARC	Short-Pulse Accelerator and Reactor Center
SRRF	Sandia Research Reactor Facility
SSP	Site Sustainability Plan

Acronym	Definition
SSPP	Strategic Sustainabilty Performance Plan
SSRP	Security System Replacement Program
STE	Science, Technology, and Engineering
TA	Technical Area
TTR	Tonopah Test Range
TYSP	Twenty-Five-Year Site Plan
UFN	Unresolved Facilities Need
WEF	Weapons Engineering Facility
WIPP	Waste Isolation Pilot Plant
WMD	Weapons of Mass Destruction

1.0 Executive Summary

Sandia National Laboratories (SNL, Laboratories) is a United States (U.S.) Department of Energy (DOE)/National Nuclear Security Administration (NNSA) multiprogram, national security laboratory managed and operated by Sandia Corporation (Sandia), a wholly owned subsidiary of Lockheed Martin Corporation.

Sandia's multiprogram requirements span across nuclear weapons and related defense systems and have evolved to provide technologies to protect the nation's infrastructure including its transportation, energy, telecommunications and financial networks; ensure clean, abundant, and affordable energy and water; reduce the proliferation of weapons of mass destruction (WMD); help maintain U.S. military systems superiority; and defend our nation against terrorist attacks. The diversity of Sandia's missions is directly related to the current and emerging national security environment consistent with government and DOE/NNSA policies that authorize special access to the Laboratories' unique capabilities.

In its FY 2012–2016 Strategic Plan, Sandia articulated its mission and vision:

> *Rendering "exceptional service in the national interest" has been Sandia's core purpose since 1949. The Labs' original mission, to provide engineering design, systems engineering, and integration for the non-nuclear components of the nation's nuclear weapons, continues today. The nuclear weapons mission is our reason for being; it is what makes the organization unique and it creates a foundation from which we leverage our capabilities and provide support to address other national security challenges.*
>
> *On behalf of our nation, we anticipate and solve the most challenging problems that threaten security in the 21st century. When we achieve this vision, we are widely recognized as a national leader in preventing technological surprise, anticipating threats, and providing innovative, science-based system engineering solutions to our nation's most challenging national security problems.*

As a multidisciplinary national laboratory and Federally Funded Research and Development Center (FFRDC), Sandia accomplishes tasks integral to the mission and operation of its sponsoring agency by ensuring the following:

- *Anticipating and resolving emerging national security challenges;*
- *Innovating and discovering new technologies to strengthen the nation's technological superiority;*
- *Creating value through products and services that solve important national security challenges; and*
- *Informing the national debate where technology policy is critical to preserving security and freedom throughout our world.*

Figure 1.1 Ion Beam Laboratory

During FY 2011, Sandia's collaborative approach to mission support and pursuit of research, development, test, and evaluation (RDT&E) excellence in engineering and science has resulted in numerous noteworthy accomplishments including those of particular interest to NNSA:

B53 Weapon System Dismantlement Team: Awarded the 2011 Secretary of Energy's Achievement Award for dismantling the last B53 a year ahead of schedule.

Ion Beam Laboratory (IBL): Received the Secretary of Energy's Achievement Award for completion six months ahead of schedule and $5.5 million under budget (Figure 1.1).

Weapon Evaluation Test Laboratory at the Pantex Plant: Sandia personnel executed more than 1,000 surveillance tests, including 59 weapon system tests, more than doubling recent test rates.

B61 Life Extension Program (LEP): Completed Phase 6.2 and 2A weapon-development activities operating on a compressed schedule with concurrent changes in scope.

Transportation Safeguards and Surety Program: Received NNSA's Award of Excellence for completing design qualification of the overland palletized unit shipper (OPUS) project hardware that supports weapon transportation in the SafeGuards Transporter (SGT).

Combustion Research Computation Visualization Facility and IBL: Both received the Leadership in Energy and Environmental Design (LEED®) Gold certification for new construction.

Sandia continues to pursue a "capability-based" approach to site stewardship that is both responsive to the mission needs of its diverse customer base and fiscally responsible for the multibillion-dollar federal investment in real property assets. Sandia's FY 2012–2016 Strategic Plan articulates and further emphasizes the basis for its real-property management strategy, which will provide mission-enabling infrastructure to address and support Sandia's five Strategic Objectives:

1. Deliver with excellence on our commitments to the unique nuclear weapons mission.
2. Amplify our national security impact.
3. Lead the Complex as a model 21st-century government-owned/contractor-operated national laboratory.
4. Excel in the practice of engineering.
5. Commit to a learning, inclusive, and engaging environment for our people.

To align its resources for effectively managing its diverse suite of national security programs, Sandia has organized around four Strategic Management Units (SMUs), as described in Table 1.1. Depending on the customer and the work area, the SMUs plan program strategy and secure work and funding from either external or internal customers. Tasks and funding are then distributed to particular divisions, where the work is performed, project by project.

Table 1.1 SMU Descriptions

Strategic Management Units	
Nuclear Weapons (NW)	Manages the nation's nuclear weapons stockpile, provides our customers with research, development, and testing services, and manufactures specialized non-nuclear products and components for national defense and security applications.
Defense Systems and Assessments (DSA)	Supports the military, assessment, and nonproliferation community by applying the Laboratories' engineering, science, and technology capabilities to develop innovative systems solutions for the toughest national security challenges.
Energy, Climate, and Infrastructure Security (ECIS)	Provides knowledge and solutions for the nation's most challenging problems in energy, climate, and infrastructure. ECIS capitalizes on the cyber competencies and synergies within these three areas to create unique solutions for the nation and champions the Energy Security corporate strategic Cyber and nuclear security corporate strategic thrusts.
International, Homeland, and Nuclear Security (IHNS)	Focuses on the protection of nuclear assets, nuclear materials, nuclear emergency response, nonproliferation, counterterrorism, and arms control. IHNS champions and integrates many of Sandia's counter-WMD (chemical, biological, radiological, nuclear, and explosives threats) programs, enabling high-level customer engagement and leveraging the development of lab capabilities to support this mission.

1.1 Current State and Near-Term Approach

Proactive stewardship of the Facilities and Infrastructure (F&I) of the institution is the key to achieving these objectives. Over the next decade, Sandia will face the following challenges to stewardship:

- Sandia is expected to lead efforts to maintain U.S. military systems superiority through the NNSA LEPs beginning with the B61 LEP and continuing with the W88 ALT and W78/88 LEP.
- Sandia does not expect sufficient capital funding for facilities construction to support F&I revitalization in time to meet mission needs.
- Sandia must fund the Silicon Fabrication Revitalization (SSiFR) project, revitalize the Tonopah Test Range (TTR), and make improvements for operations at the Annular Core Research Reactor (ACRR) facility to deliver on LEP activities. This will consume any additional resources within weapons funding for the foreseeable future.
- Sandia also recognizes similar challenges for the other national security mission programs that comprise roughly half of Sandia's work.

Sandia's *Five-Year F&I Plan* addresses short-term, required investments by adopting the principles and employing the strategies depicted in Figure 1.2. The plan includes efforts to increase productivity, reduce long-term operational costs, reduce energy intensity, and demonstrate a fiscally responsible approach to ensure adequate cost control for customers.

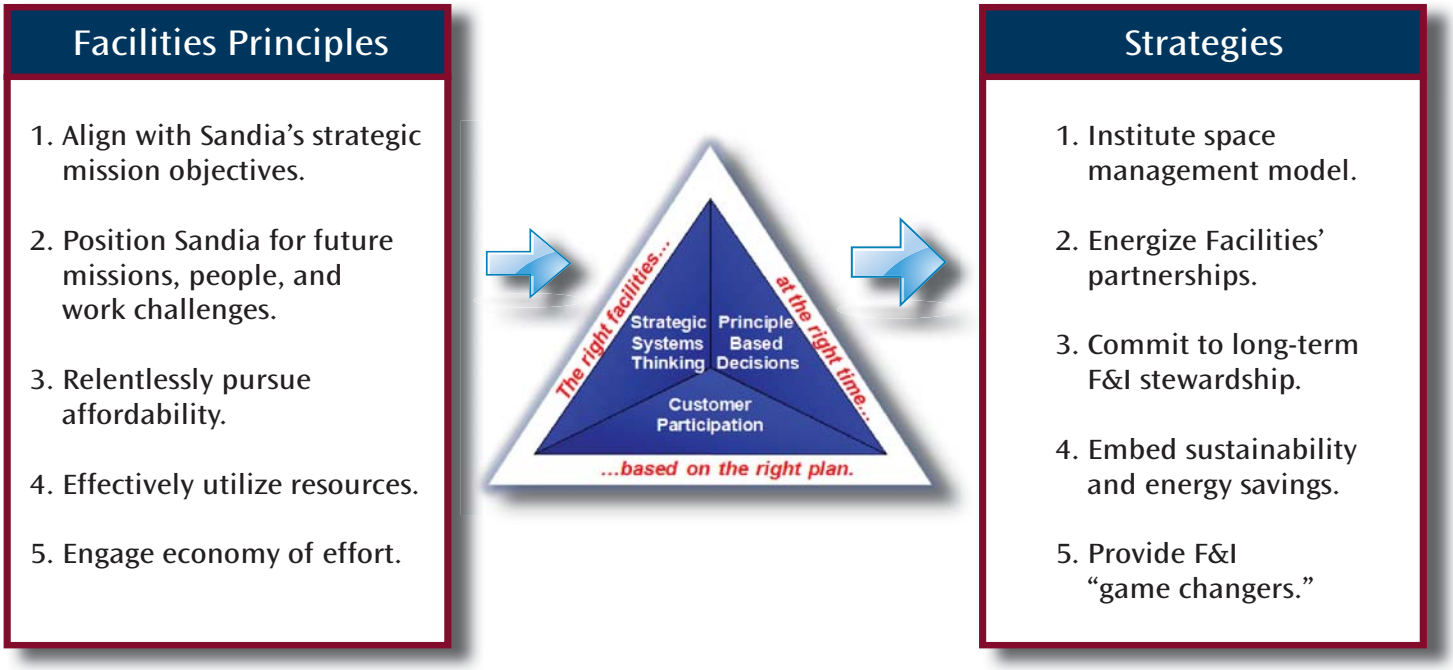


Figure 1.2 Sandia Executive Leadership-Approved Principles and Strategies

Sandia established the following objectives to guide its planning and prioritization:

- Remove or remodel substandard space.
- Improve productivity of mission through collocation and improvements to space quality.
- Improve the Facility Condition Index (FCI) by reducing deferred maintenance (DM).
- Increase space utilization for office, laboratories, and storage.
- Explore the feasibility of nontraditional funding strategies such as third-party financing.

Using its indirect budget, Sandia intends to construct several small institutional general plant projects (IGPPs) consistent with the first two strategies, and maintain capabilities to support the NW LEP efforts, other national security programs, and mission-support work through the end of the decade.

Figure 1.3 SNL/NM Building 892

Implementation of the IGPP strategy allows Sandia to remove from service a 60-year-old facility that presently supports multimission delivery and mission-support functions (SNL/New Mexico (NM) Building 892, shown in Figure 1.3).

Building 892, which currently requires $25M in DM, has been targeted for decontamination and demolition (D&D) by the NNSA. Estimates for full renovation of the facility have been greater than $110M. Sandia will reuse existing space and create new IGPP space to accommodate 310 employees and approximately 70,000 gross square feet (GSF) of laboratory, high-bay, and storage space. While over 200 employees will be relocated in the IGPP turn-around space, many will ultimately be colocated in the NNSA Weapons Engineering Facility (WEF).

1.2 Future State and Long-Term Approach

Over the extended planning period, Sandia has proposed many F&I projects in response to the requirements established in NNSA's Program of Record (POR) and anticipated, new technologies and capabilities. Sandia's F&I Strategic Planning flow is tied to and derived from the POR as depicted in Figure 1.4.

Figure 1.4 SNL F&I Strategic Planning Flow

However, the future state of SNL is more than a collection of individual projects, just as Sandia is more than a collection of programs and organizations. Building on the foundation established by the *Twenty-Five-Year Site Plan* (TYSP) and DOE Order 430.1B, *Real Property Asset Management*, Sandia has been formally implementing master-planning principles that are currently embedded in its internal *Long-Range Development Framework* (LRDF). The LRDF is a planning tool that provides the overall framework and guidance for land and infrastructure development through the application of high-level principles and strategies.

Further, it provides a sound strategic framework for decision making pertaining to capital investments in real property assets and site infrastructure. Customer, land use, transportation, security, environmental and sustainability considerations, when considered together, will enable Sandia to shape the design of development projects in ways that benefit project customers, the work force, the company, the nation, and the environment.

Sandia addresses the following specific strategies in its planning process:

- Sustainability
- Overall growth
- Land use and development
- Internal circulation and interaction
- Gateways and approaches
- Security and safety
- Surety

Sandia recognizes that, as its F&I are aging and its recapitalization needs are growing, NA-10 Defense Program's resources will be level, at best, and funding for capital investments across the Nuclear Security Enterprise (NSE) will become more difficult to obtain. Because SNL is a multiprogram laboratory, it continues to struggle with the challenge of securing the necessary capital to invest in non-NW-related F&I.

Sandia's vision is to provide a smaller, safer, more secure, and less expensive enterprise that leverages the scientific and technical capabilities of the workforce and meets national security requirements. Sandia must analyze trade-offs to ensure that each new investment:

- Represents optimal long-term use of land and capital
- Improves the synergy of campus and community (Figure 1.5)
- Provides the capacity and agility to meet current as well as future missions
- Maximizes efficiency/effectiveness and minimizes long-term operations and maintenance
- Contributes to a stronger and more vital intellectual and research community
- Enhances the quality of the environment and quality of life for those employed at SNL
- Preserves and enhances the legacy of landscape and architecture

In the upcoming decade, Sandia will face challenges to meet its commitments to the NSE and other national security mission work, which also benefit the NW program. NNSA and Sandia continue to evolve strategies seeking alternative approaches to fund capital investments to further advance the NSE science, technology, and engineering base along with interagency work (IAW). SNL facilities and enabling infrastructure are aging. Support for NNSA core capabilities and future mission-related deliveries are at risk, requiring significant recapitalization at the same time the pressure to reduce the federal budget is increasing. This may result in the lack of agility to reliably support the POR and other envisioned national security mission growth. To build a sustainable future, Sandia must work closely with NNSA/DOE on innovative capital investment and reinvestment strategies to support both the NNSA and broader national security missions.

Figure 1.5 SNL/NM Campus and Community, Looking North

2.0 Site Overview and Snapshot

Sandia captured the essence of its history and evolution in its FY 2012–2016 Strategic Plan:

> *Sandia National Laboratories' roots trace back to World War II's Manhattan Project and the development of the first atomic bombs. It became an independent laboratory in 1949, with responsibility for nuclear weapon ordnance engineering and production coordination. Our 62-year history reflects the evolving national security needs of postwar America.*
>
> *Throughout the Cold War, Sandia played a pivotal role in ensuring the safety, security, and reliability of the nation's growing nuclear arsenal. We developed unique expertise in systems engineering with responsibility for the research, design, and development of more than 90 percent of the approximately 6,500 non-nuclear components of a modern nuclear weapon. These components have included security systems, arming and fuzing mechanisms, safety systems, neutron generators, gas transfer systems, and instrumentation.*
>
> *In 1992, Sandia faced new challenges when the United States stopped producing new warheads and halted nuclear testing, the ultimate guarantee of reliability and performance. The era of science-based stockpile stewardship required new predictive capabilities to certify performance of aging weapons and ensure the weapons would remain safe and effective following any redesign or component replacement. We used our advanced computer capabilities to simulate weapon performance and created new facilities to conduct acute non-nuclear tests of whole weapons systems to validate the computer simulations. One such facility is Sandia's Z machine, the worlds's most powerful X-ray source, which is used to study the physics involved in nuclear reactions and survivability issues related to the nuclear stockpile. Recent challenges include the W76 and B61 Life Extension Programs (LEPs), which involve the redesign and replacement of numerous aging components to ensure the weapons remain safe, secure, and reliable for the foreseeable future. Today's highly specialized electrical, microelectronic, and electromechanical weapons components can have more than 200 parts in a volume the size of a cellular telephone.*
>
> *Sandia has evolved into a multiprogram national security laboratory that provides technologies to protect the nation's infrastructure, including its transportation, energy, telecommunications, and financial networks; ensure clean, abundant, and affordable energy and water; reduce the proliferation of weapons of mass destruction; help maintain U.S. military systems superiority; and defend our nation against terrorist attacks.*

Sandia National Laboratories conducts systems engineering of nuclear weapons, performs research, design, and development of non-nuclear components, manufactures non-nuclear weapons and components, including neutron generators of the stockpile, provides safety, security, and reliability assessments of stockpile weapons, and conducts high-explosives research and development (R&D) in environmental testing. SNL is the center of excellence for non-nuclear design and engineering and for major environmental testing. SNL's mission is enhanced by (1) using the microelectronics and engineering science applications (MESA) complex as an engineering magnet, (2) conducting major weapons environmental testing using TA-III and other New Mexico facilities, (3) performing energetic devised R&D using the Explosives Test Facility, and (4) using its neutron generation design and manufacturing facilities.

In FY 2011, Sandia managed a total operating budgeting of just over $2.4 billion and a workforce approaching 12,000 for all locations. Figure 2.1 provides a funding breakdown by source and Figure 2.2 provides a funding breakdown by Strategic Management Unit (SMU).

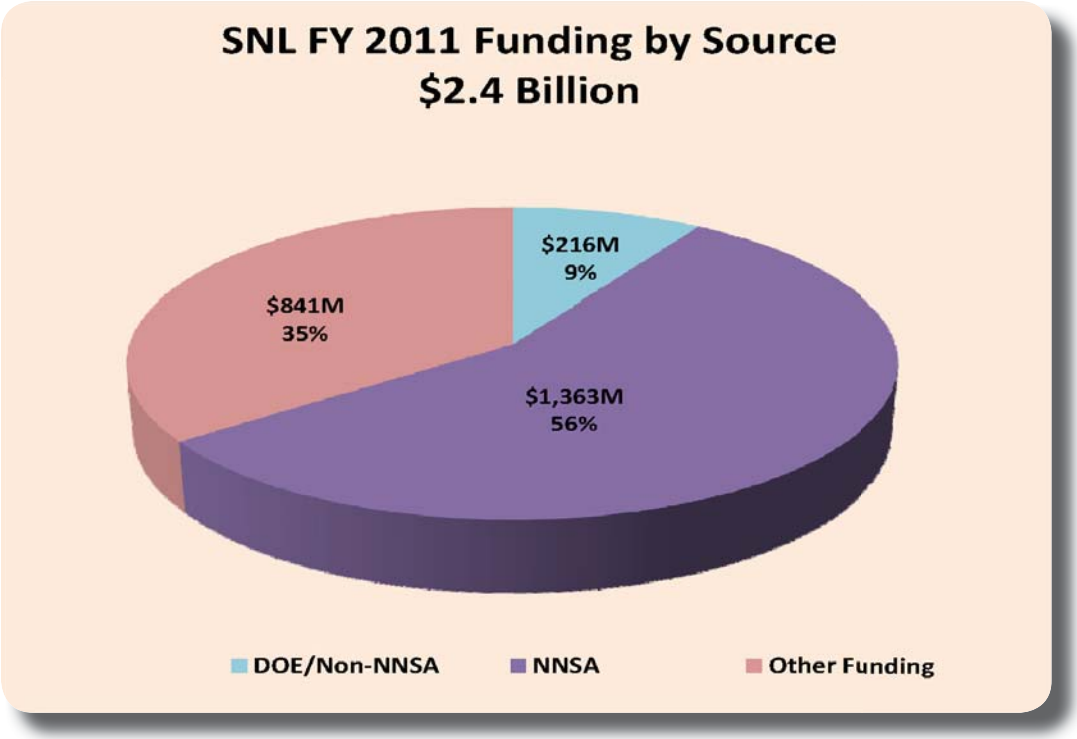


Figure 2.1 Funding by Source

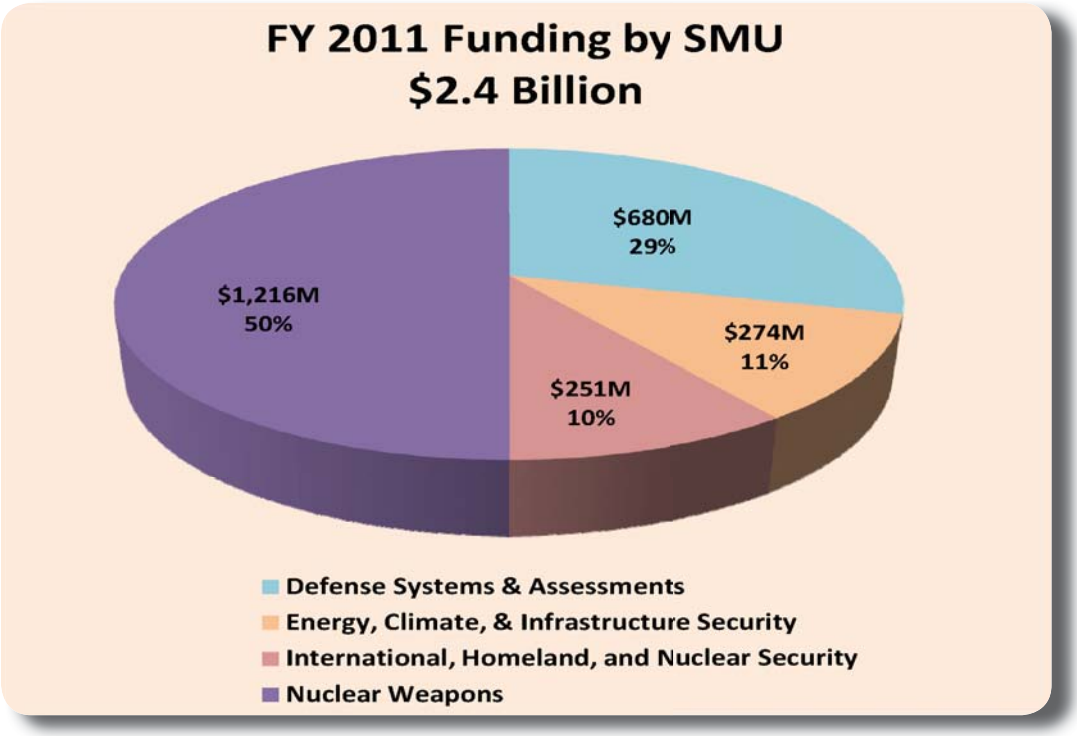


Figure 2.2 Funding by SMU

Sandia's six "core capabilities," as established by NA-10, are identified in Table 2.1.

Table 2.1 Core Capabilities

Core Capabilities	
C1	Design, Certification, Testing, Experiments, Surveillance, and STE Base
C5	High Explosives
C6	Non-Nuclear
C10	Enabling Infrastructure
C11	Counterterrorism and Counterproliferation
C12	Support of other Mission/Program Capablity

Table 2.2 provides an overview of real property distribution at Sandia's primary locations. Sandia also maintains offices and facilities at offsite locations in Albuquerque and Carlsbad, New Mexico; Livermore, California; Point Barrow, Alaska; Shoreview, Minnesota; Washington D.C.; and the Pantex Plant, Texas.

Table 2.2 Real Property Distribution at SNL

Location/Facility	Acres	No. of Buildings	Gross Square Feet
New Mexico	13,766	849	5,863,526
California	413	71	885,703
TTR, Nevada	179,200	98	127,422
KTF, Hawaii	133	56	58,064
Leased Space		18	399,672
Totals	193,514	1,093	7,334,389

In aggregate, these sites comprised more than 7.3 million GSF of real property assets (owned, permitted, and leased space), distributed in 1,100 buildings, on nearly 200,000 acres of land, with a calculated Replacement Plant Value in excess of $4.4 billion, as shown in Figure 2.3.

Workforce and Funding
Onsite Workforce: 11,935
Regular SNL Employees: 9,125
Gross Payroll: $943M
Total Funding: $2,420M

Real Property—Owned and Leased
Acres: 193,514
Replacement Plant Value: $4,428M
Buildings and Trailers: 1,093
Gross Square Feet: 7,334,389
- Active and operational: 6,932,641
- Nonoperational: 2,076
- Leased: 399,672

Figure 2.3 Snapshot Overview - End of FY 2011

3.0 Assumptions

Development of this TYSP included the following assumptions:

1. Nuclear weapons-related work will continue as Sandia's fundamental and foundational national security mission and its role in the NSE will serve as SNL's strategic planning cornerstone.
2. Although SNL is a multisite, multiprogram laboratory with numerous customers, it is managed and operated as a single, integrated, and unified organization dedicated to the advancement of national security. Sandia is singularly "all missions, all sites." Figure 3.1 provides an aerial view of the SNL/CA campus.
3. NNSA's NA-10 (Defense Programs) retains primary responsibility for NW-related F&I and serves as Sandia's multiprogram site's Lead Program Secretarial Office.
4. Sandia must maintain the capability to rapidly develop new technologies or novel uses for existing technologies in response to unanticipated national security threats. Especially crucial will be robust new design and production technologies applicable to the current and future mission work for NNSA and other governmental agencies.

Figure 3.1 SNL/CA Campus, Looking South

5. Sandia's workforce and F&I will be sized to meet its NNSA and IAW programmatic objectives, within budgetary constraints.
6. Sandia is anticipating growth in terms of funding and required staffing for both its NW and IAW work. This increase will place considerable pressure on already constricted amounts of available office and laboratory space.
7. Sandia will reduce its NW footprint as mission activities and associated F&I are consolidated over the planning period in the southeast quadrant of TA-I.
8. The CBFI program is assumed to receive its initial funding in FY 2013.
9. Several of Sandia's LI projects dealing with enabling infrastructure were approved by NNSA's Construction Working Group (CWG) and assigned to CBFI for execution as expense funded projects. Funding for these projects is assumed to be "in addition" to Sandia's presumed annual operating budget.
10. It remains NNSA's intent and Sandia's plan to divest itself of management and operations responsibilities for its facility at Mount Haleakala, Maui. NNSA is looking to eliminate its landlord role at the Kauai Test Facility (KTF).
11. Sandia will identify the amount of funding required for it to sustain its current compliance with Readiness in Technical Base and Facilities (RTBF) space-management milestones associated with aggregate FCIs.
12. Sandia will continue to utilize its "current space bank" and have access to NNSA's "space bank" as required to offset the GSF associated with its new construction and maintain compliance with the DOE's "one-up/one-down" mandate regarding facility size/footprint management.
13. Sandia has several candidate facilities for disposal and assumes adequate D&D funding will be available to support-related activities, possibly through the new NNSA Facilities Disposition Program.

4.0 Changes from Prior Year TYSP

The items listed below represent the most significant changes from Sandia's FY 2012 TYSP.

1. Current information will be considered as end of FY 2011/beginning of FY 2012. Information regarding SNL facilities will come from the FY 2011 Facility Information Management System (FIMS) official, end-of-FY "snapshot."
2. Information and discussion will be addressed in two separate planning horizons:
   - **Tactical** will be forward looking and provide some detail for the next ten years (FY 2013 through FY 2022).
   - **Strategic** will be addressed in broad strokes over a 15-year period (FY 2023 through FY 2037).
3. Sandia is actively exploring third-party financing options for its Mission Support Consolidation and Livermore Valley Open Campus (LVOC) projects (Figure 4.1). These projects support NNSA's strategic objectives to help modernize the NNSA infrastructure.

Figure 4.1 Livermore Valley Open Campus

4. As part of NA-10's process to develop a long-term strategy for identifying and constructing its next generation "large-scale" experimental science facilities, Sandia has proposed the following three projects:
   - Center for Heterogeneous Integration Packaging and Processes (CHIP^2)
   - System Analysis Lab for Simulation and Assessments (SALSA)
   - Short-Pulse Accelerator and Reactor Center (SPARC)
5. Funding and NNSA direction for Sandia to fully ramp-up programmatic activities to support the B61 LEP was provided in early to mid FY 2012 and will affect facilities across the major SNL locations.
6. In its FY 2012 Five-Year F&I Plan, Sandia commits to a strategy to remove Building 892 from service; this will allow the removal of 238,575 GSF and $25M in deferred maintenance. This work will begin with the FY 2012 design/build construction of Building 704, the first of three IGPP general office and light laboratory buildings (Figure 4.2).

Figure 4.2 Rendering of Building 704

5.0 Future Vision and Core Capabilities

Sandia realizes that our nation's security depends not only on its NW stockpile but also its energy and infrastructure assurance; nonproliferation and assessment; control of and defense against WMD; and other defense and intelligence activities. Developing these missions in one multisite laboratory has produced an integrated network of capabilities and matrixing of personnel who share knowledge and scientific insights between the NNSA and its IAW partners.

Sandia's long-term objectives reflect its philosophy of developing applications of new knowledge and its intent to make increasingly greater contributions to the nation, now and in the future. Committed to "science with the mission in mind," Sandia creates innovative, science-based systems-engineering solutions that achieve the following:

- Sustain, modernize, and protect our nuclear arsenal.
- Prevent the spread of weapons of mass destruction.
- Provide new capabilities for national defense. Defend against terrorism.
- Protect our national infrastructures.
- Ensure stable sources of energy and other critical resources.

Figure 5.1 provides an overview of Sandia's research disciplines and capabilities.

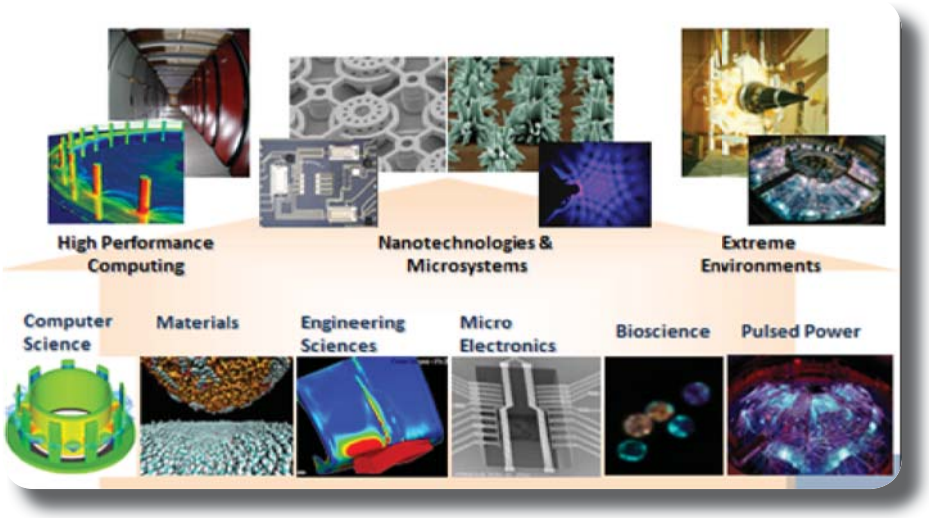


Figure 5.1 Overview of Sandia's Research

Although the focus of Sandia's mission remains national security, Sandia recognizes that the definition of "national security" is changing and will become increasingly comprehensive. As a formally designated FFRDC, Sandia provides engineering and science for the security of the nation and implements its diverse programs through its SMUs. Figure 5.2 depicts Sandia's evolving national security mission.

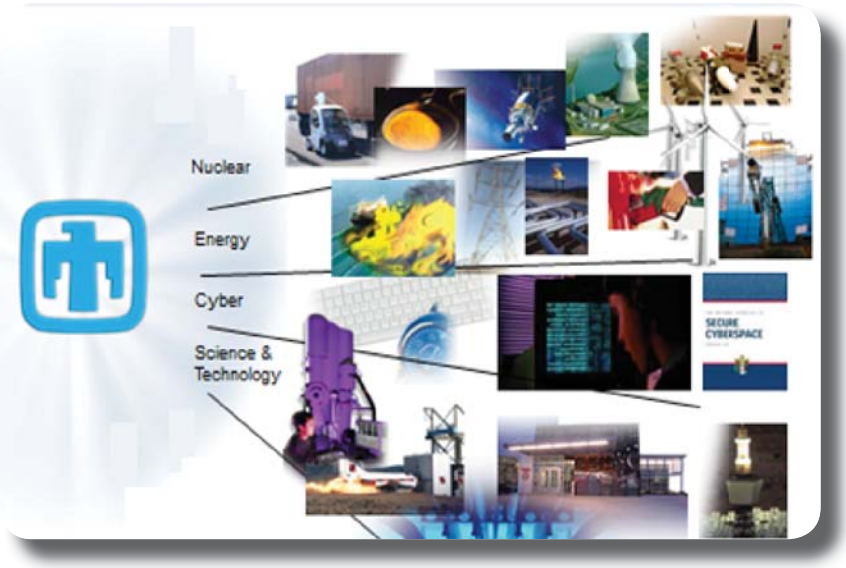


Figure 5.2 Sandia's National Security Mission

The NNSA accomplishes its mission in managing worldwide nuclear threats by helping to ensure that the U.S. maintains a safe, secure, effective, and reliable NW stockpile and deterrent. Similarly, NNSA assists in reducing worldwide threats by helping to prevent the proliferation of WMD. Sandia supports both aspects of NNSA's principal mission. Because Sandia's customers also include the DOE; other federal agencies; state, local, and foreign governments; industry; and universities, Sandia's strategic and budgetary plans include all constituencies consistent with its mission assignments and technology base. Sandia is a diverse multiprogram laboratory whose objectives, goals, and FY milestones represent major efforts and activities rather than individual programs.

As stated previously, Sandia's FY 2012–2016 Strategic Plan articulates and emphasizes the basis for its real property management strategies, which will provide mission-enabling F&I to address and support all five of its strategic objectives:

1. Deliver with excellence on our commitments to the unique nuclear weapons mission.
2. Amplify our national security impact.
3. Lead the complex as a model 21st-century government-owned/contractor-operated national laboratory.
4. Excel in the practice of engineering.
5. Commit to a learning, inclusive, and engaging environment for our people.

Proactive stewardship of the Laboratories' F&I is central to achieving these objectives; however, Sandia's stewardship will face many technical challenges, competing interests, and severely constrained resources over the upcoming quarter of a century.

Regardless of funding source, SMU, core capability, mission, or customer, the F&I supporting Sandia's technology base will require revitalization, continued renewal and replacement of aging infrastructure, replacement and modification of buildings and utility systems, refurbishment of fire protection systems, and improvement or installation of modern telecommunications systems to meet increasingly stringent security and data-transfer demands. F&I investment and recapitalization are integral to mission support and require management vigilance and stewardship discipline.

The remainder of this section will provide an overview of SNL's F&I vision and plans utilizing the "core capabilities" identified in Table 2.1.

5.1 Design, Certification, Testing, Experiments, Surveillance, and Science, Technology, and Engineering Base

Since its founding more than 60 years ago, NW work has defined Sandia National Laboratories. Figure 5.3 represents Sandia's NW SMU Integrated Planning Framework. Sandia provides the foundation for success with the following essential capabilities:

- Major environmental test
- Radiation-effects science
- Computational simulation
- Microelectronics and microsystems
- Material and process science
- Engineering science

These capabilities represent the Science, Technology, and Engineering (STE) base that supports design, development, production, qualification, surveillance, assessment, and certification necessary for the sustainment and modernization of the stockpile. Sandia is NNSA's designated Center of Excellence for Major Environmental Testing.

NW surety — systems performance, reliability, safety, and security — is a key mission assignment for Sandia and integral to Sandia's role in transforming the NW stockpile. Sandia continues to pursue a long-term strategy to

consolidate common, collaborative program and technical work utilizing a "district approach." For NW mission work, the consolidation will occur around the MESA facility. Sandia intends to utilize the MESA complex as an engineering magnet for consolidating NW operations.

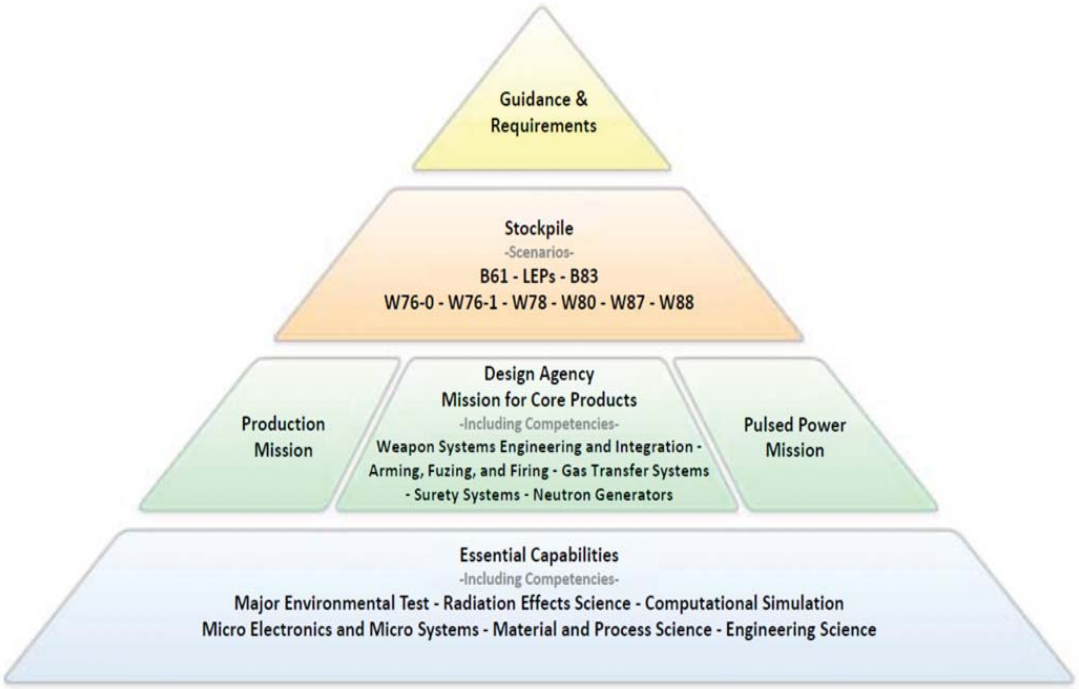


Figure 5.3 NW SMU Integrated Planning Framework

In recent years, two significant capital investment LIs have been implemented, consistent with the consolidation of environmental testing activities: the IBL, completed at the end of FY 2011 and the Test Capabilities Revitalization project, Phase II, scheduled for completion in FY 2014, components of which are shown in Figure 5.4.

Figure 5.4 Test Capabilities Revitalization, Phase II

Over the next 25 years the F&I supporting these capabilities will require the revitalization of SNL's normal/abnormal environment testing capabilities, improved and expanded computer support, microsystems development and fabrication, testing range maintenance, and additional high-bay and storage space along with a continued aggressive maintenance program.

F&I initiatives during the tactical planning horizon (next ten years) include the following:

Tonopah Test Range (TTR) Revitalization: Incremental, increased investment intended to sustain and update the core real property assets aligned with mission work at TTR.

IGPP Strategy: Construct three IGPP office/light laboratory facilities using corporate indirect funding to provide support for the decommissioning of Building 892 until WEF is operational. After that, these building will serve as turn-around space for a series of major renovation projects intended to extend the lives of a number of existing major structures in TA-I.

Primary Standards Laboratory (PSL): Execute a number of critical recapitalization projects in support of the PSL mission in TA-I.

Building 867, 892, and C927 D&D: Complete D&D and removal of buildings that have outlived their useful lives.

Building 983: Construct a new support facility dedicated to the Z-machine.

Buildings C910 and C912 Renovation: Execute a series of renovation projects to revitalize and extend the service lives of these two SNL/California (SNL/CA) facilities (Figure 5.5).

Figure 5.5 SNL/CA Buildings C912 and C910

TA-III Classified Solid Waste Landfill: Complete the characterization, assessment, development, and implementation of a long-term remediation solution for this legacy NW issue.

The following F&I initiatives are included within the strategic planning horizon (FY 2023 to FY 2037):

Weapon System Qualification and Certification Project: Replaces core facilities at TTR that are rapidly eclipsing their service lives and preserves the location's unique testing and certification capabilities.

Sandia Research Reactor Facility (SRRF): Replace the facility housing the ACRR with a modern facility, significantly reducing the risk to reactor capability for testing in experimental environments that are critical to the development, qualification, and assessment of the stockpile in order to meet military hostile and fratricide operational requirement (Figure 5.6).

Mission Support Science and Technology Laboratory: Integrate existing and emerging science and technology with Directed Stockpile Work by providing materials science research in the areas of gas transfer systems, surety core products, power systems, and stockpile materials.

Robust Secure Communication Laboratory: Provides an expanded, novel, and integrated research facility for robust and secure communication development and testing using advanced labs designed to offer disruptive testing, jamming, and harsh or hostile environments.

Consolidated Environmental Test Facility: Upgrade, modernize, and consolidate environmental testing capability at SNL/NM in support of LEP activities and limited-life components associated with the enduring stockpile.

Short-Pulse Accelerator and Reactor Center (SPARC): Next-generation experimental science facility for conducting advanced, high-energy density physics and environmental testing. SRRF and SPARC could potentially be integrated into a single initiative if enacted in the same time period.

Figure 5.6 Annular Core Reasearch Reactor (ACRR)

System Analysis Lab for Simulation and Assessments (SALSA): Next-generation experimental science facility for conducting robust, multidimensional environmental testing.

5.2 High Explosives

The NNSA's Final Complex Transformation Supplemental Programmatic Environmental Impact Statement, dated October 2008, and accompanying Record of Decision identified the Explosives Technology Group (ETG) at SNL as the high explosives (HE) and energetic materials R&D center for non-nuclear explosive components for the NW complex. ETG facilities include office space, laboratories, and several remote test sites.

ETG has mission leadership responsibility (cradle-to-grave) for non-nuclear explosive components that are used within current NW stockpile systems and planned for future LEPs. Fundamental to meeting this mission assignment is sustainment and growth of Sandia's advanced HE and energetic materials R&D core capability and competencies. Energetic materials R&D include the following activities:

- Handling and storage of explosives
- Measuring material responses
- Developing qualification testing
- Developing computational tools
- Developing validation methods
- Developing advanced diagnostics for dynamic measurements
- Developing an understanding of the response of explosives within weapon systems when subjected to abnormal or hostile environments

NNSA's planned LEPs have increased the demand for advanced technologies in the near term that will meet new requirements for enhanced safety, reliability, and performance of SNL's non-nuclear explosive components and subassemblies. This demand requires that Sandia continue to explore the science basis behind its designs and components requiring the ETG to expand its R&D capability by investing in additional personnel and infrastructure.

The ETG has already begun to increase its science and engineering staff, pushing its office and laboratory occupancy and utilization beyond capacity. The organization is expecting continued growth with an additional 30 technical and support personnel by FY 2013, requiring new building construction with additional supporting infrastructure. With the closure of the SNL/NM machine shop in TA-I, the ETG has expanded its remote explosive machining capability to include machining and fabrication of nonexplosive classified parts in support of explosive component design and development. This expanded scope will require additional space to house and operate these machines, which are currently in storage. One of ETG's facilities supports NW-based explosive R&D through performance testing. This facility has been identified as critical to support the LEPs and will require refurbishment of its underground test chamber.

An outgrowth of NNSA's investment in Sandia's HE and energetic materials R&D that addresses national security needs has resulted in growth in areas that include nuclear nonproliferation, counterterrorism, and emergency response. Future growth is expected in the area of developing the science and technology (S&T) base to respond to the threat of dispersal devises that couple explosives with biological, chemical, or radiation elements. This planned growth is consistent with the HE and energetic materials R&D core capability fundamental to the ETG and NW mission.

F&I initiatives during the tactical planning horizon (next ten years) include **an addition to Sandia's Explosive Components Facility located in Building 905 in TA-II and three upgrades to explosives training facilities in the remote areas.**

5.3 Non-Nuclear

Non-nuclear components of a weapon comprise three broad categories: mechanical, electrical, and energetic-material components. Examples of components in each of these categories include: mechanical, such as safety mechanisms, strong links, and launch sensors; electrical, such as arming, fuzing, and firing components, including radiation-hardened integrated circuits and transistors; and energetic components, such as neutron generators, thermal batteries, detonators, ignitors, actuators, spin rocket motors, and impact fuzes. In each of these component categories, major changes are occurring in both their manufacturing processes and the materials used. The movement of many manufacturing companies overseas has affected the size and number of suppliers willing to undertake the manufacturing of the components, given the significant quality requirements for these parts. As commercial industry drives the technology of components, many of the legacy component manufacturing technologies and materials previously used to produce these components are being replaced or simply made obsolete. This causes programs requiring new or replacement components to identify new suppliers, train these new suppliers to operate to the necessary levels of quality required of NW components, and establish different or significantly modified manufacturing processes to realize these components. Furthermore, changes in production processes because of environmental regulations and concern about the health and safety of workers further alter the legacy manufacturing processes used for component production. Given all these changes, it is essential that the component designers adequately characterize and model component performance, construction component designers adequately characterize and model component performance, construction materials, and construction and productions processes to assure that these new components meet stockpile requirements related to safety, security, longevity, and performance with adequate margin.

SNL is responsible for designing and developing many of the non-nuclear components that are external to the nuclear explosive package to support maintenance, life extension, and the safety, security, and use-control modernization of the stockpile. Production of these components is done in concert with the Kansas City Plant and SNL production facilities or is outsourced under the oversight of the responsible NNSA site.

Both the design and production responsibility for neutron generators and custom radiation-hardened microelectronics are the responsibility of SNL. Production of neutron generators for the W76 and W78 has been very successful, with historically high reliability and high manufacturing yield. The upcoming challenge will be the requirement to redesign and produce generators for the remainder of the stockpile in the next decade.

The resulting overlap of both design and production deliverables across multiple systems over the next several years has driven SNL to develop and deploy several formal systems to ensure the most efficient allocation of resources for product development and physical production. It is also important to note that the neutron generator design and production business models, in which a single organization is responsible for the entire product life cycle for neutron generators, has been key to bringing the necessary resources to bear on design and production problems in an efficient way via seamless integration of science and technology, design, and production assets.

In conjunction with modernizing manufacturing capabilities, maintenance and recapitalization of other production and support activities across the Nuclear Security Enterprise are essential. Recapitalization of major science and experimental facilities will be required both to qualify and certify LEPs without returning to underground testing and to support the Surveillance Program. Recapitalization of the equipment for microelectromechanical systems and radiation-hardened microelectronics must also take place within the next four years because the current generation of equipment can no longer be maintained and replacement parts are unavailable. These components and this capability are vitally important to the LEPs and provide a degree of assurance of supply chain security that is not otherwise available.

Sandia operates and maintains numerous facilities dedicated to the development, design, evaluation, qualification, certification, and surveillance of its non-nuclear components; however, Sandia also has and executes a production mission associated with radiation-hardened microelectronics and neutron generators (NG).

The MESA complex (Figure 5.7) provides capabilities for the design, prototyping, and fabrication of trusted, radiation-hardened microelectronics and microsystems integral to NW performance. MESA also provides capabilities for S&T packages for national security partners that include the Department of Defense (DOD), the intelligence community, and S&T programs in other government agencies. MESA leverages the trusted radiation-hardened capabilities to address joint programs while remaining ready for LEPs and other NW mission requirements.

Figure 5.7 MESA Complex

Sandia recently completed a study to modernize the physical infrastructure of the MESA complex over the next 30+ years. This study determined that sustainment of the facilities would fall within one of four broad categories:

1. F&I rehabilitation programs that can be completed while the facility is occupied
2. Construction of new facilities to replace old facilities that have reached the end of their design life and cannot be renovated while in use
3. Major renovation (MR) or reconstruction requiring closure of the facility to complete the work
4. Repurposing a major facility for microelectronics or a new or emerging program or partnership

In addition to major capital investments in these four categories, a continual program of tooling investments is essential to keep the MESA complex current with developments in microelectronics technology. This annual investment would allow Sandia to leverage technology costs to keep its capabilities on the "trailing edge" of the industry. This substantial investment in the MESA complex over the next 25 years will enable Sandia to continue to meet its essential mission, ensuring that the U.S. nuclear arsenal is safe, secure, reliable, and fully capable of supporting the nation's deterrence policy.

Sandia's NG-production capability supports weapons systems for NW and other national security missions. Customer needs are met through integrated planning, lean manufacturing, testing, and certification of NGs. Sandia's capability develops and maintains qualified product definition, supporting field products, and provides design support for products in or near production. Materials operations support production through purchase material engineering, materials planning, inventory management, and tooling design and development.

F&I initiatives of particular interest during the tactical planning horizon (next ten years) include the following:

Weapons Engineering Facility (WEF): LI investment to enable weapon systems engineering, advanced power sources, and stockpile surveillance work to be consolidated into one modern facility.

Sandia Silicon Fabrication Revitalization (SSiFR): Upgrades to facilities and capital equipment to modernize and replace outdated fabrication processes in the MESA complex.

Building 840 Renovation and Reuse: Modifications and occupancy construction for NW and IAW customers (Figure 5.8).

Building 894 Renovation: Implement several critical recapitalization projects to extend the useful life of Building 894 until WEF is ready for occupancy.

Figure 5.8 Building 840

NG Program Recapitalization: Execute critical recapitalization projects in support of the NG production mission in TA-I.

F&I initiatives during the strategic planning horizon (FY 2023 to FY 2037) include the following:

Rad-Hard Foundry: LI investment that replaces Building 858N and sustains the microelectronics-trusted foundry capability in critical support of microsystems S&T for NNSA and IAW.

Modern Threat Abeyance Center: Focuses and consolidates the surety engineering mission at SNL/CA and its related R&D capabilities and supporting infrastructure.

Center for Heterogeneous Integration Packaging and Processes (CHIP^2): Next-generation experimental science facility for "beyond CMOS" microelectronics RDT&E and production. Rad-Hard Foundry would be subsumed within CHIP^2 if enacted in the same time period.

5.4 Enabling Infrastructure

Ensuring that core capabilities are able to perform at optimal levels requires a balanced, realistic strategy that addresses the F&I that support mission work across SNL operating locations. Often considered secondary to facilities in which mission work is performed, utilities and other support facilities are integral to and enable successful mission performance in mission critical space.

Much of Sandia's current work takes place in facilities and uses infrastructure originally built to support Cold War NW programs and are either at or nearing the end of their designed service lives of roughly 50 years. Future mission work will be defined by flexible, modular, system architectures that support the evolving nature of mission requirements and constrained funding.

In light of this fact, Sandia needs to upgrade and recapitalize existing enabling infrastructure to support current missions and provide for and anticipate future NW and IAW requirements. Programs like the Facilities and Infrastructure Recapitalization Program (FIRP) and its follow-on, CBFI, are vital to Sandia's success. The scattering of critical functions amongst many dispersed and deficient facilities results in inefficiencies in space utilization that impede NNSA's stated transformation goal of reducing the size and associated costs of the NSE. Sandia's vision for helping resolve this gap is fundamental to the planning principles identified earlier in this section, namely, through consolidation of mission work into concentric districts with facilities and enabling infrastructures providing similar capabilities and collaborative possibilities. Consistently applying and executing Sandia's planning principles over the next 25 years would yield the following results:

- Reduced overall development, DM, and associated operating costs
- Improved efficiencies within and across missions
- Reduced NNSA footprint
- Improved sustainability in the siting, construction, and operation of facilities
- Enhanced work environment quality and experiences for the workforce

Many of Sandia's missions and associated programs are heavily dependent upon state-of-the-art information technology (IT) applications and capabilities. Most of these capabilities are well established at the Labs, although they require frequent updating and renewal to reflect the latest advances in IT and requirements for increased responsiveness.

Programs that will require renewal of IT infrastructure to avoid technological obsolescence include the following:

- High-speed computational R&D
- Modeling and simulation for weapons and nonweapons design and testing
- Advanced test capabilities for model validation and system certification
- Microsystems and related technology R&D, design, and applications
- Nanotechnology R&D, design, and applications
- Analysis of advanced-materials properties and behavior
- High-energy density physics experimentation
- Enhanced surveillance and surety technologies
- Chemical and biological sensor detection for national security applications
- Engineering and technology solutions to security issues and threats

All these programs will require sustained investment and reinvestment in F&I and equipment to maintain the advanced R&D, design, and application of technology leadership Sandia has established. Further, high-speed, secure connectivity within and between SNL locations will be required to realize NSE transformation goals.

From an infrastructure perspective, communications technology is rapidly evolving to wireless and optical technologies that have already begun to supplant copper-based hard-wired technology and will eventually replace it as a standard in the workplace. This evolution will require an investment in core communications infrastructure to support and sustain future mission needs. Although it is difficult to predict the technologies of the future with precision, there will undoubtedly be new discoveries in Sandia's many fields of R&D that will necessitate an investment in enabling infrastructure to support their advancement.

F&I initiatives during the tactical planning horizon (the next ten years) include the following:

Emergency Operations and Response Center: LI investment to enable Sandia to provide emergency-incident management from a modern facility that serves and supports both local and national response teams and promotes the protection and emergency response for Sandia assets from accident, attack, or natural phenomenon.

TA-IV District Chilled Water (CW) Loop: Establishes a district CW system for TA-IV that provides life-cycle cost savings through energy consumption and operating cost avoidance associated with providing facility cooling "economies of scale."

Knowledge, Innovation, and Collaboration Center: Establishes a multipurpose hub for the LVOC with a multipartner academic alliance, administrative and badging offices, library, and café combined with collaborative workspace for unclassified energy and cyber security programs (Figure 5.9).

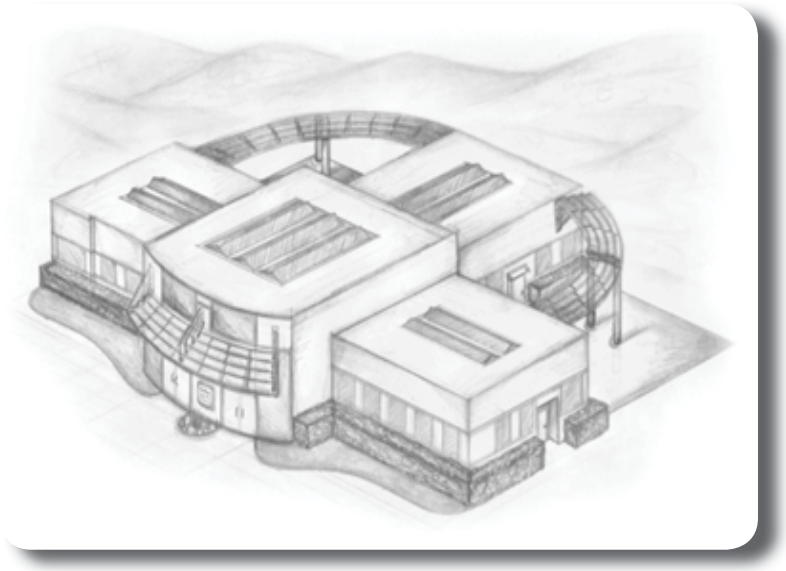


Figure 5.9 Knowledge, Innovation, and Collaboration Center

Storm Drainage and Sanitary Sewer Improvements: Address and mitigate site-wide issues associated with excessive erosion and its damage to existing sewer lines.

Livermore Valley Open Campus (LVOC) Infrastructure Development: Joint-lab project for Lawrence Livermore National Laboratory and SNL to plan and install utility infrastructure trunks, vehicle circulation, and site-development improvements to create a dynamic, open environment to facilitate broader partnerships and engagement with academic, industry, and international collaborators.

F&I initiatives during the strategic planning horizon—FY 2023 to FY 2037—include the following:

Telecommunications Utility Infrastructure: Replaces the existing underground, copper-cabling communications system with a fiber-optic backbone throughout TAs II, III, IV, and V; and the remote areas.

Mission Support Consolidation: LI investment that provides a new complex of buildings to replace old, inefficient buildings in TA-I that house mission-support functions (Figure 5.10).

Reshaping NNSA Security Perimeter: Moves the current limited area and Kirtland Air Force Base boundaries to improve opportunities for site development with higher security in select areas and reduce Sandia's overall security footprint, enhance collaboration opportunities, improve vehicular access, and extend sustainable site development.

Figure 5.10 Rendering of the Mission Support Consolidation Project

5.5 Counterterrorism and Counterproliferation

For nearly 50 years the NNSA Office of Nonproliferation R&D (NA-22) and its predecessors have been supporting the nation's nuclear proliferation detection and nuclear detonation-detection missions. Throughout this period Sandia has played significant roles in advanced R&D to meet the evolving mission requirements from multiple stakeholders in the Departments of State (DOS), Defense (DOD), and Energy (DOE) along with other federal agencies. Although the technological advancements span a wide variety of environments, none has been more enduring than the space-based assets. Beginning in the 1960s, Sandia has designed, developed, and supported the launch of over 100 payloads into space for national security and scientific missions with many more planned for the near future.

As stated in NNSA's goals, objectives, and requirements planning for the satellite program, it is imperative for the national laboratories to provide technical leadership and leverage their collective S&T heritage, experience and expertise, and F&I for future space-related mission support. As is also true for the NW programs and LEPs in particular, product-realization processes in support of the satellite programs are conducted in buildings that are over 40 years old and at capacity for this type of work. Due to the excessive loads, the building systems are approaching the end of their useful service lives more quickly than originally intended.

New threats and direct attacks on U.S. space-based assets are a serious concern. In order to anticipate and adapt to these threats, NNSA needs to modify the technology and operational posture of its future space programs. Sandia is proposing the planning, design, and construction of a modern facility to promote and conduct the required technologically advancing work. In addition to the global burst detector (GBD) payloads, future missions will include the development of new NNSA R&D and demonstration/validation payloads, collaboration with other federal agencies, and rapid development and deployment of small space payloads.

The International Programs Building (IPB), leased space in Research Park, is a key asset in Sandia's work on international nonproliferation and cooperative threat reduction initiatives. As Sandia's programs in this field grow, with increased support from the U.S. DOS, the IPB allows Sandia to house and communicate with individuals from all over the world, especially sensitive countries. This facility provides secure access to the Sandia Restricted Network while also allowing visitors and staff to use open networks and communication for large and small meetings (Figure 5.11).

The Nuclear Incident Response Program at SNL supports the NNSA's Accident Response Group (ARG) and the arming and firing element of the Joint Tactical Operations Team (JTOT). Both the ARG and JTOT access and leverage Sandia's NW expertise and capabilities in its planning, provisioning, and training to respond to NW- and WMD-related accidents and acts of terrorism. Currently, the ARG and JTOT rely on system engineers and specialists from SNL NW programs to ensure the viability of their respective programs.

Figure 5.11 International Programs Building

F&I initiatives of particular interest during the tactical planning horizon (next ten years) include pursuit of the **Nonproliferation Research and Development** LI investment required to consolidate activities, provide modern production space, and support operational and technologically required change.

5.6 Support of Other Mission and Program Capabilities

Sandia provides engineering and design support for the NNSA Office of Secure Transportation (NA-15/OST) with its underlying "mission to provide a capability for the safe and secure transport of nuclear warheads, components, and materials that will meet projected DOE, DOD, and other customer requirements."

As the design agent for OST, Sandia supports the program through risk assessment, vulnerabilities characterization, engineering design development, and demonstration of innovative solutions for cyber, physical, and communications safety and security in a high-consequence mission environment. The next generation OST SGT represents a significant advancement in technology, materials, and performance.

Investments in supporting F&I will be required to prepare for the anticipated changes in workflow associated with this technological advancement.

As a result of Sandia's recognized expertise in support of OST and secure transportation technologies, several opportunities within the NSE and transportation initiatives within the federal government are being pursued and developed.

As previously discussed, SNL F&I support NW, other NNSA, other DOE, and several non-DOE programs making SNL a true multiprogram national laboratory focused on national security. In FY 2011, half of Sandia's operating funds came from non-NW activities with programmatic growth, evolution, and diversification expected across all SNL SMUs.

Sandia will continue to support counterterrorism, homeland security, and non-nuclear DOD initiatives by making the interchange of capabilities and expertise between the NSE and partners in the DOD, Department of Homeland Security, intelligence agencies, and law-enforcement communities to further national security mission work. Such synergistic work strengthens Sandia's capabilities and makes cost-effective use of existing federal investments at SNL's locations.

The capabilities developed through these non-NW activities have established expertise not found in industry or other government agencies. These opportunities to contribute technological solutions to agencies other than DOE/NNSA help to solve national security needs in addition to helping maintain Sandia's abilities to perform and further NNSA missions.

Sandia's DSA; Energy, Climate, and Infrastructure Security (ECIS); and IHNS SMUs will continue to respond to increased federal, state, and local government-agency interest in homeland defense-related applications for Sandia's security and surety technologies and systems. These initiatives cover their F&I costs through corporate site-support charges assessed to the funding programs. It is notable that all SNL organizations, including those that support IAW programs, pay space-chargeback fees based on the space they occupy. Space-chargeback fees are intended to recover the cost of landlord services such as F&I maintenance and utility consumption.

Sandia continues to examine current methods of cost-sharing and is looking for opportunities to improve full-cost recovery and transfer of landlord responsibilities where appropriate.

Although IAW work is critical to SNL's vitality, synergy, and national security diversity, there is a higher degree of funding uncertainty associated with many of these programs, which has implications for planning and resultant project execution. Attributes to building the underlying relationships associated with non-NW work include having the necessary resources to apply to a changing environment and provide the flexibility needed in the F&I for both NNSA and other mission work. Sandia executive management is continuing to pursue opportunities to build these relationships in accordance with the NSE's complex transformation.

Sandia and NNSA will continue working together to explore and develop improved approaches for federal oversight of facilities and operations in support of the total mission of SNL.

F&I initiatives during the tactical planning horizon (next ten years) include the following:

National Cyber Security Facility: LI investment to develop and provide a Sensitive Compartmented Information Facility (SCIF) with high-performance computing capability.

DOE Energy Surety Engineering Research and Technology: Complex of complete energy laboratories that use Sandia's capabilities in surety, reliability, and complex systems integration with a vision to solve difficult energy problems, conduct leading-edge research, and provide agile experimental facilities that can adapt to future problem solving.

SCIF Spaces: Facility modifications to provide SCIF space in existing buildings.

Building C905, Combustion Research Facility: Several facility modifications, one in particular, to achieve seismic upgrades (Figure 5.12).

TA-III, TA-V, and Remote Sites Renovations: Remote facility modifications, to maintain strong engineering testing capabilities including nuclear reactor, pressure, and solar-energy testing.

Figure 5.12 Building C905

6.0 Real Property Asset Management

Comprehensive site master planning at SNL is advanced through recognition that the "only constant is change" and application of Sandia's two strategic planning principles that guide future site development:

- Preserve the investment in the current campus while transforming it for new and expanding missions in a sustainable manner: optimization of land use and minimization of the overall development footprint for efficiency, cost savings, and environmental purposes.
- Locate new development where it is supported most advantageously by current or new infrastructure: greater utilization of the campuses' land resources by intensifying development through infill development, use of space between existing structures for new structures or programmed activities, and consideration of multistory megastructures.

These planning principles translate into the following three investment strategies that serve as the foundation for Sandia's F&I planning and execution:

1. Renovate and reuse when possible.
2. Remove unneeded facilities from service.
3. Use capital investments in major facility construction and building improvements.

6.1 Site Footprint: Current and Future

Table 6.1 provides a current overview (end of FY 2011) of Sandia's facilities focusing on mission dependency, facility use, Facility Condition Index (FCI), and Asset Utilization Index. Over the next decade Sandia will face the following challenges to its F&I stewardship:

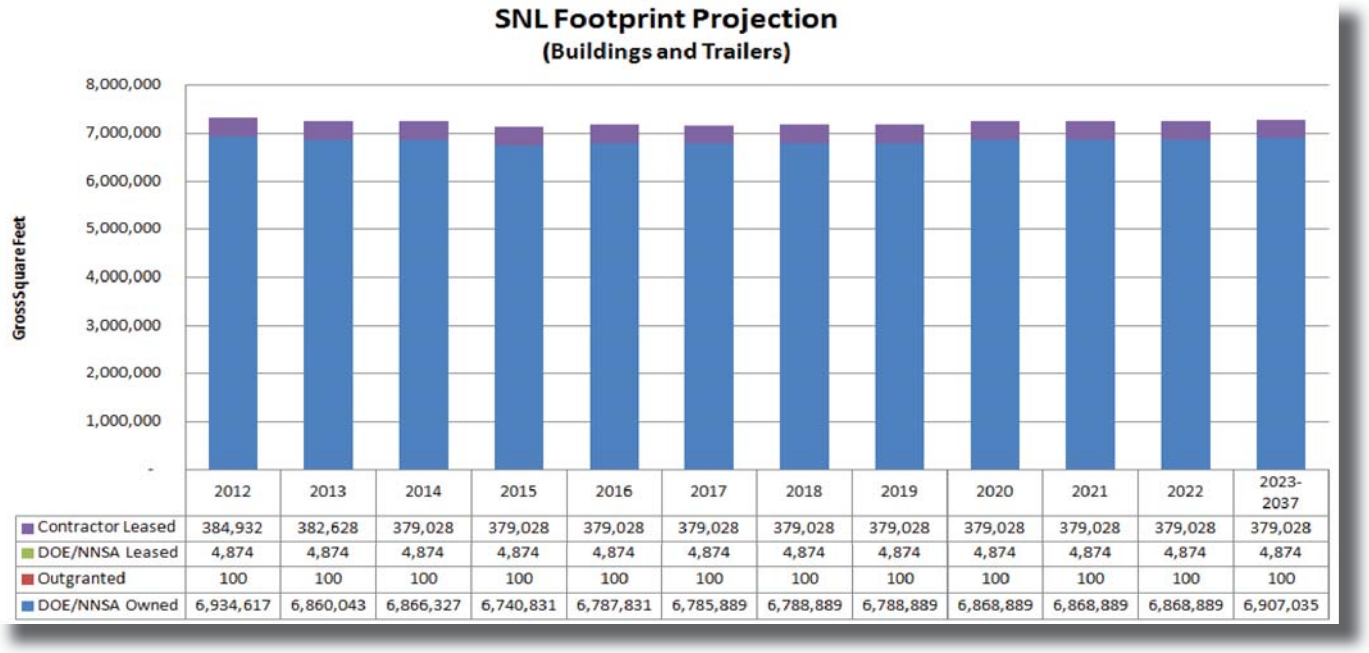
Table 6.1 Overview by Mission Dependency and Facility Use for End of FY 2011

			Replacement Plant Value (RPV)			$4,428 Million
			Total Deferred Maintenance (DM)			$326 Million
			Sitewide Facility Condition Index (FCI)			7.4%
		Facility Condition Index (B,T,& OSF) (FCI)	Asset Condition Index (B, T, & OSF) (ACI)	Asset Utilization Index (B & T) (AUI)	Number of Assets (B&T)	Thousands of Gross Square Feet (KGSF) (B&T)
Mission Dependency	Mission Critical	3.95%	96.05%	100.00%	40	1,399
	Mission Dependent	7.39%	92.61%	99.93%	229	4,440
	Not Mission Dependent	12.56%	87.44%	99.96%	824	1,495
Facility Use	Office	7.90%	92.10%	100.00%	218	1,742
	Warehouse	4.14%	95.86%	100.00%	500	414
	Laboratory	5.73%	94.27%	99.93%	370	5,168
	Housing	0.00%	100.00%	100.00%	5	10

- Sandia is expected to lead efforts to maintain U.S. military systems superiority through the NNSA LEPs beginning with the B61 LEP and continuing with the W88 ALT and W78/88.
- Sandia does not expect sufficient capital funding for facilities construction to support F&I revitalization in time to meet mission needs.
- Sandia must fund the SSiFR project, revitalize Tonopah Test Range (TTR), and make improvements at the ACRR facility to deliver on LEP activities; this will consume any additional resources within weapons funding for the foreseeable future.
- Sandia also recognizes similar challenges for the other national-security mission programs that currently comprise roughly half of Sandia's work.

Sandia's *Five-Year F&I Plan* addresses short-term, required investments and includes efforts to increase productivity, reduce long-term operational costs, reduce energy intensity, and demonstrate a fiscally responsible approach to ensure adequate cost control for customers. Sandia established the following objectives to guide its planning and prioritization activities:

- Remove or remodel substandard space
- Improve productivity of mission through collocation and improvements to space quality
- Explore the feasibility of nontraditional funding strategies such as third-party financing.
- Improve FCI by reducing DM
- Increase space utilization (e.g., office, laboratories, and storage)



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023-2037
Contractor Leased	384,932	382,628	379,028	379,028	379,028	379,028	379,028	379,028	379,028	379,028	379,028	379,028
DOE/NNSA Leased	4,874	4,874	4,874	4,874	4,874	4,874	4,874	4,874	4,874	4,874	4,874	4,874
Outgranted	100	100	100	100	100	100	100	100	100	100	100	100
DOE/NNSA Owned	6,934,617	6,860,043	6,866,327	6,740,831	6,787,831	6,785,889	6,788,889	6,788,889	6,868,889	6,868,889	6,868,889	6,907,035

Figure 6.1 SNL Projected Footprint

Sandia is currently experiencing appreciable growth in terms of funding and required staffing for both its NW-related work associated with the B61 LEP and several of its IAW programs. This increase will place considerable pressure on already constricted amounts of available office and laboratory space. Using internally generated funds from its mission work, Sandia intends to construct several, small Institutional General Plant Projects (IGPPs) and maintain capabilities to support the NW LEP efforts, other national security programs, and mission-support work through the end of the decade. Figure 6.1 presents Sandia's anticipated change in its overall site footprint.

Sandia plans to dispose of the following major real property assets within the tactical planning period (next ten years) to eliminate substandard space, consolidate missions, and provide "banked space" for new construction:

- Mt. Haleakala Remote Communication Facility
- Select facilities at KTF
- Excess facilities at TTR
- MO324 and MO325
- Building C916
- Building C927 (Figure 6.2)
- Building 809
- Building 835
- Building 836
- Building 867 (Figure 6.3)
- Building 868
- Building 892
- Building 894

Figure 6.2 Building C927

Figure 6.3 Building 867

The demand for modern technical space is presenting a challenge for SNL F&I. Numerous facilities at all SNL locations require concentrated maintenance attention and major renovation in order to provide infrastructure capability to support the mission work in a responsive time frame. Many buildings throughout SNL are at capacity and approaching the end of their planned service lives. Figures 6.4 and 6.5 provide a building age overview for SNL/NM TA-I and SNL/CA, respectively.

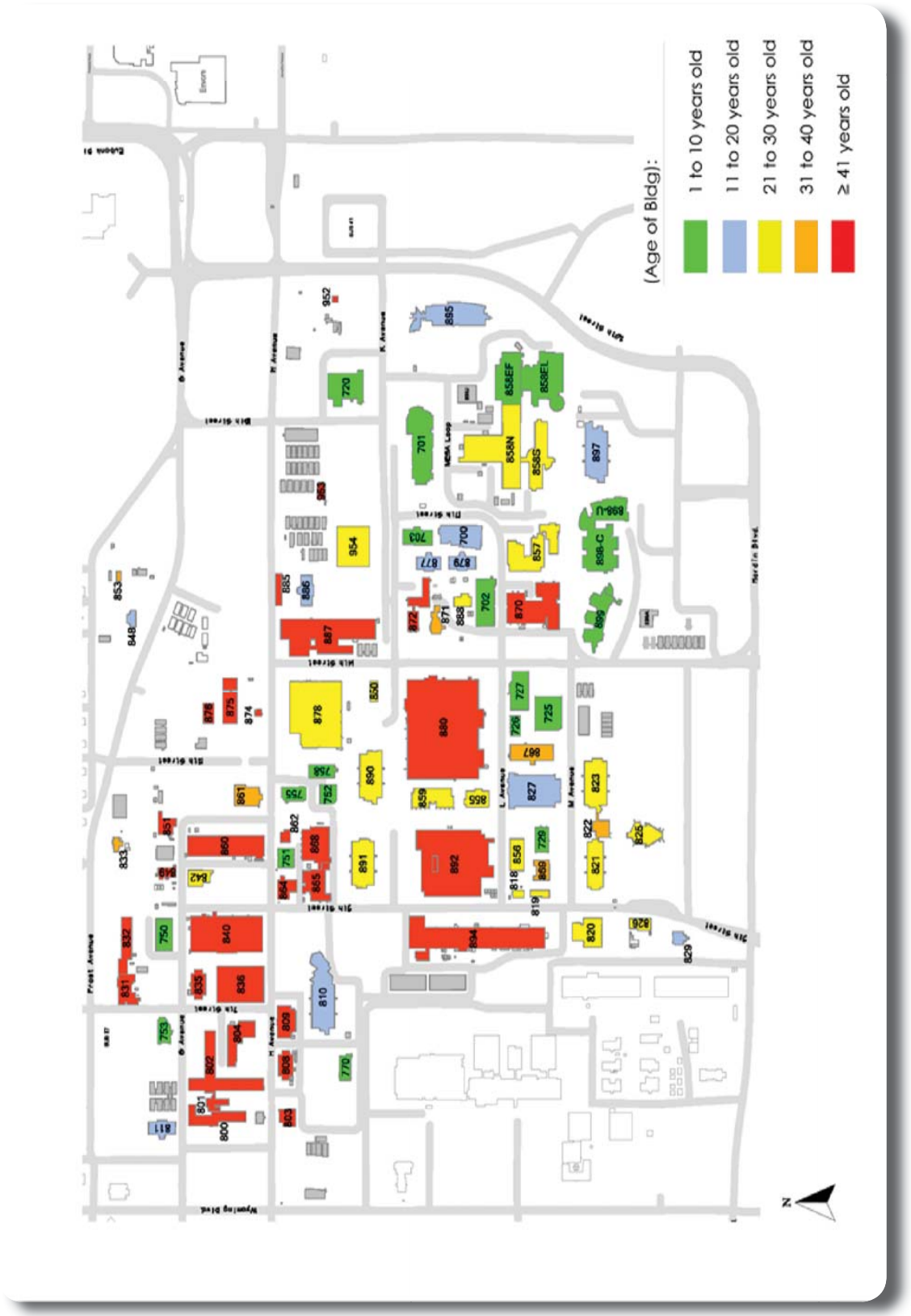


Figure 6.4 SNL/NM TA-I Building Age Overview as of FY 2012

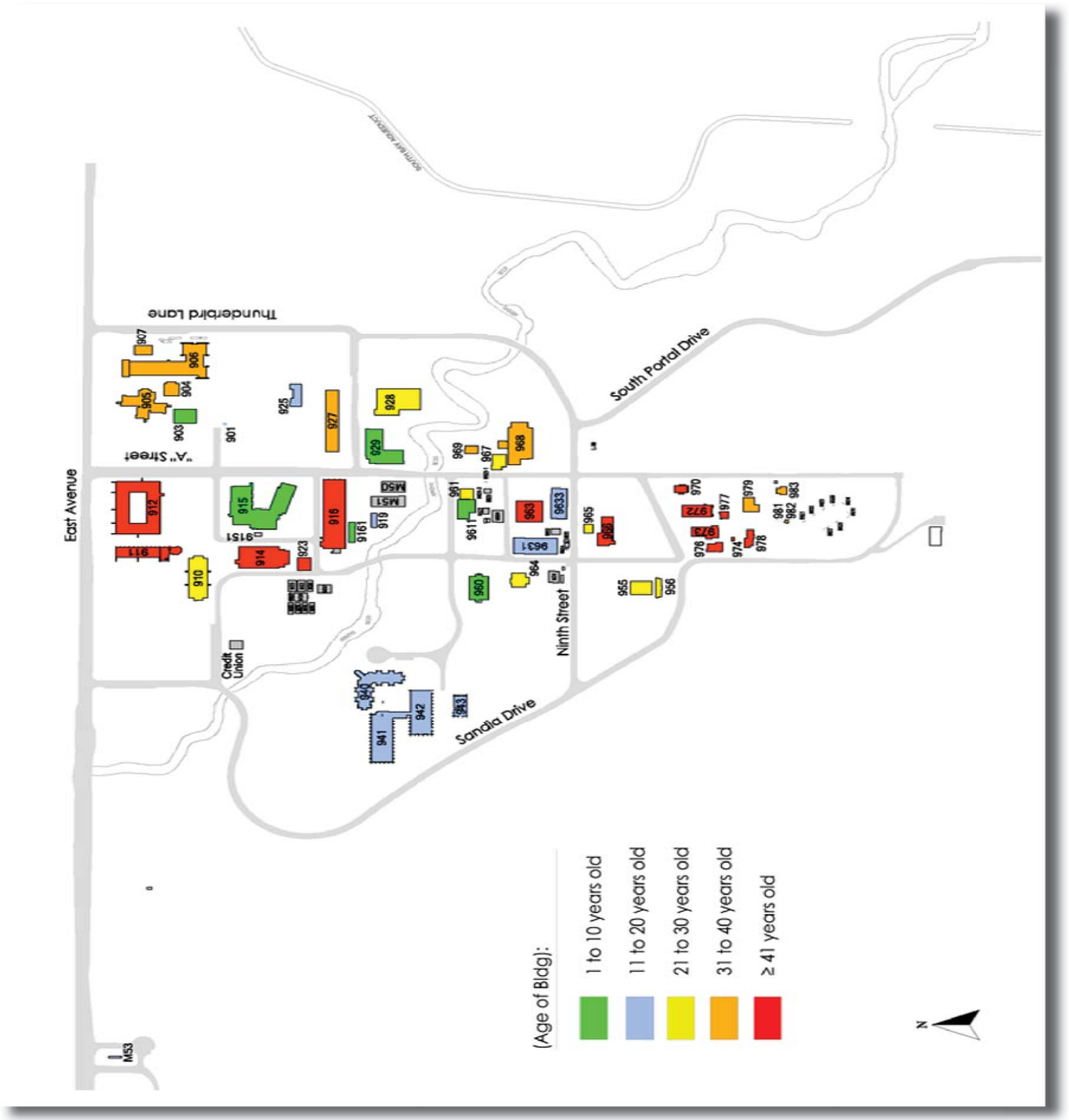


Figure 6.5 SNL/CA Campus Building Age Overview as of FY 2012

6.2 Facility Condition and Deferred Maintenance Reduction

The maintenance management program at SNL establishes the activities, processes, and associated performance measures to ensure that DOE/NNSA property is maintained in a manner that promotes operational safety, worker health, environmental compliance, property preservation, facility performance, and overall cost effectiveness. The maintenance management program at SNL uses a graded approach to maintain assets in a "fit-for-mission-use" condition to support customer-driven mission requirements. This is accomplished through a building and work-control prioritization methodology, proactive maintenance, a reliability-centered maintenance program, and a work-control system. The maintenance of programmatic property and capital equipment at SNL is a program responsibility and is assigned to the appropriate line organization. SNL physical infrastructure is managed by the Facilities Management and Operations Center (FMOC), using an approach that identifies key, vital F&I and then focuses resources on the most critical systems and equipment in a prioritized manner.

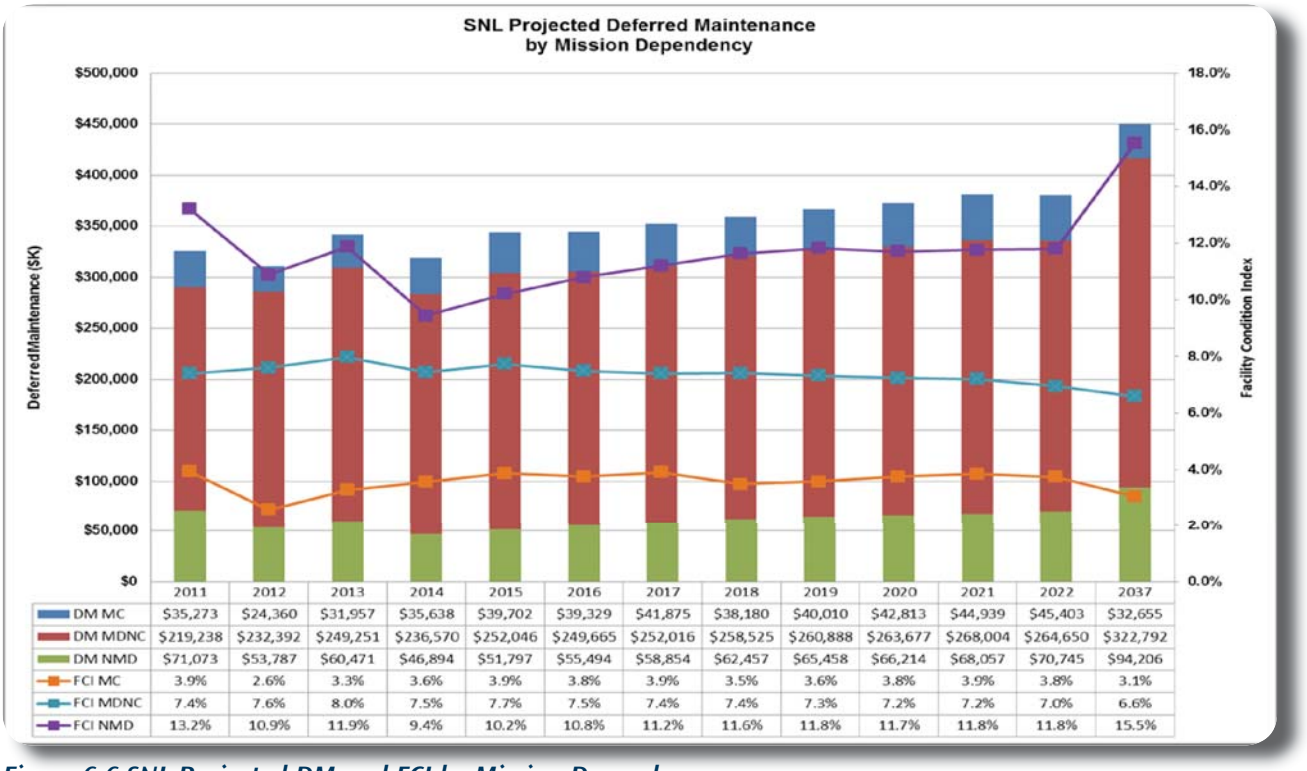
FMOC's Operations and Maintenance (O&M) funding requests are based on maintaining facilities in a fit-for-mission-use condition, the size and trend of the maintenance backlog, historical funding data, DM estimates, and provision of timely maintenance services in accordance with established response-time requirements and other commitments. O&M funds are collected through Sandia's corporate space-chargeback process previously discussed.

Condition Assessment Survey (CAS) inspections identify the required maintenance for a facility or other structure by optimal fiscal year. CAS inspections for mission critical (MC) and mission dependent/not critical (MDNC) are conducted on a five-year cycle. Maintenance needs are identified and tracked as Unresolved Facilities Needs (UFNs). Maintenance that was required by the end of any given fiscal year but was not performed constitutes DM.

FCI targets and DM reduction are factors considered in the prioritization and scheduling of maintenance and projects. DM growth and reduction estimates for future years are based on projected deficiencies, projected funding, and historical averages. For planning purposes, Sandia estimates it will have to retire or prevent on average $40 million in DM annually during the tactical planning horizon (next ten years) and $45 million in DM annually during the strategic planning horizon (years 11 through 25). DM reduction is accomplished through four activities:

1. Expenditure of the corrective, preventive, and predictive maintenance budgets and performance of the associated work
2. Disposition and elimination of substandard and excess F&I
3. Completion of capital projects including LIs, GPPs, and IGPPs
4. Completion of expense-funded initiatives including MR, restoration, and DM projects

Sandia will identify the amount of funding required to sustain its current compliance with space-management milestones associated with aggregate FCIs for MC facilities (FCI < 5%) and MDNC (FCI < 8%). Programs like FIRP have been instrumental in previously managing DM growth. This funding will now come from the RTBF, CBFI, and D&D programs, and Sandia's corporate indirect and space-chargeback mechanisms. Figure 6.6 presents Sandia's projected DM and resulting FCI by mission dependency.



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2037
DM MC	$35,273	$24,360	$31,957	$35,638	$39,702	$39,329	$41,875	$38,180	$40,010	$42,813	$44,939	$45,403	$32,655
DM MDNC	$219,238	$232,392	$249,251	$236,570	$252,046	$249,665	$252,016	$258,525	$260,888	$263,677	$268,004	$264,650	$322,792
DM NMD	$71,073	$53,787	$60,471	$46,894	$51,797	$55,494	$58,854	$62,457	$65,458	$66,214	$68,057	$70,745	$94,206
FCI MC	3.9%	2.6%	3.3%	3.6%	3.9%	3.8%	3.9%	3.5%	3.6%	3.8%	3.9%	3.8%	3.1%
FCI MDNC	7.4%	7.6%	8.0%	7.5%	7.7%	7.5%	7.4%	7.4%	7.3%	7.2%	7.2%	7.0%	6.6%
FCI NMD	13.2%	10.9%	11.9%	9.4%	10.2%	10.8%	11.2%	11.6%	11.8%	11.7%	11.8%	11.8%	15.5%

Figure 6.6 SNL Projected DM and FCI by Mission Dependency

6.3 Space Utilization and Consolidation

Over the 25-year planning period, Sandia anticipates that LI, GPP, and IGPP investments will add new space; the D&D program will remove substandard space; and Sandia will continue to lease appropriate amounts of offsite space to support its missions. FMOC works with the leaders of Sandia's SMUs, divisions, and center representatives to understand mission capability needs and assess space requirements. The primary goal is to develop strategic space plans to best accommodate growth, consolidation, and relocation while ensuring appropriate use of existing space, maintaining space, and developing opportunities to eliminate substandard space.

Sandia continues to analyze opportunities and will develop strategies to resolve current and future gaps in space needs. All options are reviewed and evaluated based on criteria such as cost to the government (initial and life-cycle), effectiveness in supporting mission requirements, and longevity of solution. These evaluations include developing a business case to ensure that the space-acquisition costs are equal to or less than other options, or that they generate revenues to offset any cost increases. Other criteria include space availability, funding availability, compatibility with Sandia's planning principles, compatibility with Sandia's space-offset requirements, and flexibility for future use.

Sandia currently leases space at several locations including Albuquerque and Carlsbad, New Mexico; Washington, D.C.; Alaska; California; and Minnesota. Most lease space is primarily acquired on a short-term basis, and each lease is evaluated based on need and space-availability criteria for the amount of space requested. Onsite leased space at SNL/NM includes mobile offices (MOs) and office space in TA-I, TA-III, the Burn Site, and office and workshop space in TA-IV. Various off-site leases in the Sandia Science and Technology Park include the Innovation Parkway Office Center, IPB, Computational Sciences Research Institute, and the Cyber Engineering Research Institute. As consolidation efforts continue, new leased-space needs should diminish, although mission work often requires new space before long-term solutions or facilities can be provided. These needs must be promptly met for work to be accomplished.

6.4 Security Infrastructure

As a key component of the NSE, Sandia is tasked to manage, operate, and successfully accomplish its mission work while ensuring the protection of its people, physical plant, environment, and national security assets. Sandia's Safeguards and Security (S&S) program has responsibility for overall site security and manages the security infrastructure for facilities that contain or encompass Protective Force alarm stations, gates, satellite offices, and storage locations. The program also manages the security infrastructure in facilities used by its mission-support functions including technical security systems, physical security, emergency management, and material control and accountability.

Sandia's S&S program has taken a leadership role in the NNSA effort to reform security requirements with the NNSA Administrative Policy, which replaces the existing, governing DOE directives within the NSE. This reform aims to produce a concise, cost-effective set of security requirements while maintaining the appropriate protection strategy and practices commensurate with risk. Implementation of the new Program Planning Management requirements will impact Sandia's Classified Matter Protection and Control, Operations Security, security of Special Access Programs, and Technical Surveillance Countermeasures.

Sandia's S&S program is currently wrapping up the implementation of the Security System Replacement Program (SSRP), which comprises several projects that updated the alarm system and integrated the access-control system. Further, nearly all Closed Areas have been converted to the new Diamond II system.

6.5 Sustainability and Energy

The SNL *Site Sustainability Plan* (SSP) is prepared annually to support the DOE *Strategic Sustainability Performance Plan* (SSPP) and the NNSA sustainability goals and broader sustainability program. Accordingly, the content of the SSP covers the SNL contributions toward meeting the DOE sustainability goals cited in the DOE's SSPP, as well as the DOE requirement to comply with Executive Orders 13423 and 13514.

As stated in its FY 2012 SSP, Sandia's vision is to lead "the DOE complex, the nation, and the world in innovative, large-scale institutional transformation to a sustainable, carbon-neutral environment while increasing mission effectiveness, resource reliability, and resource security."

Sandia's SSP elaborates the proposed strategies for achieving SSPP sustainability goals by reducing its energy consumption, emission of greenhouse gases, and water usage through the following means:

- Reducing current demand; use less
- Eliminating current demand; turn off or remove
- Using resources efficiently; use fewer resources for the same task
- Managing future demand
- Migrating to non carbon-emitting energy sources
- Reducing transportation fossil-fuel use
- Delivering resources to mission-critical activities reliably and securely
- Providing metering and control systems to track and trend performance
- Showcasing SNL related R&D activities
- Promoting a sustainable business model
- Improving partnerships with external resource providers and collaborators

Sandia's plan further recognizes that "Effectively managing future demand is critical if Sandia is to meet its objectives. Sandia's first priorities are mission performance and effectiveness. Mission growth, with associated growth in energy and water use, is anticipated over the planning period. Planning for mission growth before it occurs and managing growth during program implementation will increase the probability of sustainability success."

7.0 Summary

In the upcoming decade, Sandia will face challenges to meet its commitments to the NSE and other national security mission work, which also benefit the NW program. NNSA and Sandia continue to evolve strategies seeking alternative approaches to fund capital investments to further advance the NSE science, technology, and engineering base along with interagency work. SNL facilities and enabling infrastructure are aging. Support for NNSA core capabilities and future mission-related deliveries are at risk, requiring significant recapitalization at the same time the pressure to reduce the federal budget is increasing. This may result in the lack of agility to reliably support the POR and other envisioned national security mission growth. To build a sustainable future, Sandia must work closely with NNSA/DOE on innovative capital investment and reinvestment strategies to support both the NNSA and broader national security missions.

Exceptional service in the national interest

Sandia National Laboratories

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SAND2012-8721 P