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FY11-FY41

April 2010

CPIBP - Corporate Physical Infrastructure Business Plan

Sandia National Laboratories

A Department of Energy National Laboratory

FY11-FY41

April 2010

CPIBP - Corporate Physical Infrastructure Business Plan

1 2041 narrative

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attachment G

mission gaps

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Sandia National Laboratories

A Department of Energy National Laboratory

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Sandia 2041

Exceptional service in the national interest will be a vision as true in 2041 as it is in 2010. Sandia National Laboratories (Sandia) highest goal remains "to become the laboratory that the U.S. turns to first for innovative, science-based, systems-engineering solutions to the most challenging problems"[1] that face the nation and the globe. As the Centers of Excellence for Non-Nuclear Design and Engineering and Major Environmental Testing, Sandia will operate within a smaller National Nuclear Security Administration (NNSA) security footprint. Given the broad nature of capabilities comprising these Centers, Sandia will balance facilities and infrastructure (F&I) between 'big' and 'small' sciences of both the simulated and physical variety.

At the core of these sciences and capabilities is a foundation rooted in nuclear security capabilities – stockpile stewardship, nonproliferation, counterterrorism and emergency response, and nuclear forensics. Further, national security capabilities such as bioengineering, global energy, water and climate change issues are tightly interwoven with Sandia's core nuclear weapons mission. To support nuclear and national security missions, Sandia research and development work environs have been designed to accommodate physical, virtual, and simulated collaborative spaces, as well as laboratory and test facilities for unique physical sciences such as pulsed power, electromagnetic environmental testing, and solar and environmental engineering. Advanced physical and virtual infrastructure and supercomputing resources and networks enhance Sandia's role as supercomputing center for national security and allow Sandia to collaborate domestically and internationally.

1 Sandia National Laboratories FY10 Strategic Plan

With the adoption of technological advancements in security management, offset by the mandatory use of sustainability and surety applications in the design and construction of modern F&I, a flexible and agile work environment is realized. Innovative approaches to security have eliminated the need for a physical security fence to delineate between open and closed portions of the campus. Technology is interwoven into net-zero energy facilities to instantly enable/disable electronic devices. Development is located with higher-security F&I concentrated within the interior of the site. Physical modifications required for site security reflect sensitivity to the needs of SMUs, user-friendliness of the site for visitors and temporary employees, and support for formal and informal interactions of staff, foreign nationals and visitors. The visual aspects of the site have been addressed to result in an image that is commensurate with a world-class engineering and science laboratory. Quality of life for all members of the workforce has been addressed by providing facilities and infrastructure that supports healthy lifestyles with convenient on-site services expected by new generation employees.

An integrated and comprehensive, on-going site development planning process continues to ensure that strategic site investments promote cost-effective and appropriate site and off-site investments. These investments continue to be designed to support mission needs and result in adaptive, sustainable work environments that will, in turn, support recruitment and retention of top talent and contribute to a stronger and more vital intellectual and research community. Non-traditional working arrangements (off-site offices, telecommunications, shared positions, flex schedules) are employed by specific SMUs and Divisions to undertake mission work more effectively and efficiently while reducing operation and maintenance costs, as well as carbon footprint.

To actualize this vision, Sandia, the Department of Energy (DOE), and the NNSA must consider the following planning assumptions as a given in the year 2041:

- Sandia is the premier Engineering and Scientific Laboratory supporting National Security
- Funding is available for both construction and disposition
- Policy arrangements are negotiated and implemented to improve the workflow and investment of non-Defense Program customers and tenants onsite
- Technological advancements in security are adopted and implemented
- Sandia is a global business with multiple locations
- Infrastructure enables increased collaboration and strategic partnerships with international customers and hosting foreign national employees
- An environmental liabilities program has been implemented to address remediation issues throughout Sandia
- Net-zero energy buildings are constructed in compliance with executive orders and continue to reduce the environmental impact from GHG emissions

Comments specific to Attachment G-1 and G-2 include:

In preparation of the following gap sheets, Sandia National Laboratories used several planning assumptions including the following:

- Projects (Top Band and Mid Band Facilities/Infrastructure) are grouped by capability to ensure the needs of the mission science are continued to be met
- Projects listed in the FY2011-2020 Ten-Year Site Plan Limited Update will be funded and executed
- Construction or renovation assumes LEED-Gold certification at a minimum

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Sandia National Laboratories Attachment G-1
Corporate Physical Infrastructure Business Plan (CPIBP)
NNSA Facilities and Infrastructure (F&I) Project Spreadsheet
FY 2021 - FY 2041 F&I Capital Acquisition Spreadsheet

Priority (1)	Fiscal Year (2)	Project Name (3)	Site Location (4)	Mission Dependency (5)	Mission Dependency Program (6)	Project Critical Decision (CD-0 - CD-4) (7)	Prior Year(s) Funding (8)	Funding Source						Project Comments (15)
								Alternative Financed Project (9)	RTBF (10)	FIRP (11)	Other NNSA (NA-20 - NA-70) (12)	Other DOE (IN, etc) (13)	Non-DOE DHS or IC (14)	
FY 2011 Projects - Projects Addressed As Part of ICPP and TYSP Process														
1	FY13	Integrated Weapons Engineering Transformation	SNL-NM	MD, MC	DSW	CD-0			$200M					Yellow Band (Buildings 892, 894) and Buildings 836, 835, 809, Appears on Attachment A-1
	FY14	Gravity Weapons Certification	SNL-NV	MC	DSW	CD-0			$15.8M					Attachment A-2 (see FY11 TYSP)
	FY14	Mission Support Complex	SNL-NM	MD	RTBF	CD-0		TBD	TBD					Cost $300M; Attachment A-2 (see FY11 TYSP)
	FY14	Telecommunications Utility Refurbishment	SNL-NM	MD	RTBF	CD-0			$34.5M					Attachment A-2 (see FY11 TYSP)
	FY15	TA-IV District Chilled Water	SNL-NM	MD	RTBF	CD-0			$30M					Attachment A-2 (see FY11 TYSP)
	FY15	National Cybersecurity Facility	SNL-NM	MD	IN	CD-0						$45M		Attachment A-2 (see FY11 TYSP)
FY 2016 Projects - Projects Addressed As Part of ICPP and TYSP Process														
	FY16	Site-wide Storm Drainage Improvements	SNL-NM	MD	RTBF	CD-0			$9.5M					Attachment A-2 (see FY11 TYSP)
	FY16	Non-Proliferation Research and Development (NRAD)	SNL-NM	MD	NN, NPV	CD-0					$100M			Attachment A-2 (see FY11 TYSP)
FY 2020 - FY2041 Projects - Capability Investments Addressed As Part of the CPIBP														
	TBD	Alternative Clean Energy Power Source	SNL-NM	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Responds to EO 13423, 13514 and EPAct 2005
	TBD	Building 827 Weapons Production Primary Standards Lab Asset Plan	SNL-NM	MC	DSW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Building 827)
	TBD	Building 840 Development Shop and Offices Asset Plan	SNL-NM	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Building 840)
	TBD	Buildings 890/891 Asset Plan	SNL-NM	MD	NPV	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 890/891)
	TBD	Climate Test Capability	SNL-NM	MD	NA	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Building 6630)
	TBD	Computing, Simulation, and Information Sciences Capabilities Investment	SNL-NM	MD, MC	ASC, RTBF	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 725, 880, 880A, 899)
	TBD	Defense Systems and Assessments Capabilities Investment	SNL-NM	MD	NPV	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Building 810) and Buildings 890, 868, 808, 750, 751, 752, 755, 758, 729, 770, MO324, MO325
	TBD	Energy Security and Defense Capabilities Investment	SNL-NM	MD	DNS, NA, NPV	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 821, 823, 895)

	TBD	Environmental Test Capabilities	SNL-NM	MC	DSW, ENG, RTBF	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Red Band (Buildings 860, 865) and Buildings 871, 888, 6539H, 6560, 6570, 6610, 6639, 6715, 6741, 6742, 6750, 9838, 9972
	TBD	Energetic Components Capabilities Investments		MC	DSW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Building 905)
	TBD	Material, Physical Chemical and Nano Sciences Capabilities Investments	SNL-NM	MD	DSW, SC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 701, 897) and Building 518 CINT
	TBD	Modern Threat Abeyance Center	SNL-CA	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	TBD	Multimodal Infrastructure Corridors	SNL-NM	NMD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	TBD	Neutron Generator Capabilities Investment	SNL-NM	MC	DSW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 857, 870, 878)
	TBD	Pulsed Power Capabilities Investment	SNL-NM	MD, MC	RTBF, DOD, DSW, ICF	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 960, 962, 963, 983, 986)
	TBD	Radiation Effects Sciences Capabilities	SNL-NM	MC	DSW, SCI	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 970,) 981
	TBD	Radiation Hardened Integrated Circuits Microelectronics Capability Investment	SNL-NM	MC	DSW, ENG, RTBF, Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Red Band (Buildings 858N, 858S, 858EL, 858EF) and Buildings 858C, 858E, 858G, 858H, 858I, 858J, 858K, 858L
	TBD	Sandia California Capability Investments	SNL-CA	MD	DSW, ASC, SC	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings C915, C915, C941, C942, C968) and Building C914
	TBD	Sandia California Infrastructure Investments	SNL-CA	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Infrastructure)
	TBD	Sandia California Security and Communications Infrastructure Investments	SNL-CA	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	TBD	Sandia New Mexico Infrastructure Investments	SNL-NM	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Infrastructure)
	TBD	Security Infrastructure Renovations and Upgrades	SNL-NM	MD	Other	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	TBD	Sounding Rocket and Suborbital Experimentation Capabilities Investment	SNL-HI	NMD	DOD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Hawaiian Facilities
	TBD	Tech Area V Capability Investment	SNL-NM	MC	DSW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Red Band (Building 6588) and Buildings 6580, 6586, 6587, 6590, 6591, 6578, 6581, 6582, 6592, 6593, 6594, 6595, 6596, 6597, 6598
	TBD	Tonopah Test Range Capabilities Investment	SNL-NV	MD	RTBF	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	TBD	Weapons Engineering, Product Realization and S&T Capabilities Investments	SNL-NM	MD	DSW	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	Yellow Band (Buildings 898 WIF-U, WIF-C)
	TBD													
	TBD													
Note: Prioritize for each Fiscal Year in sequential order by site for F&I projects/activities.														

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Alternative Clean Energy Power Source**
Site Location: **Sandia – New Mexico (SNL/NM)**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **Carter Ward,** FEMP
Contractor: **Jack Mizner**, Department Manager 04853

Federal and Contractor Advocates:
Federal: **Joe Estrada**, NNSA/SSO
Contractor: **Chris Evans**, 04853

Mission Gap:
SNL/NM is located on Kirtland Air Force Base (KAFB), at the base of the Manzano Mountains, adjacent to the City of Albuquerque, New Mexico. The site has approximately 6.3 million gross square feet (GSF) of existing facilities on 8,570 acres of land.

SNL/NM purchases electricity, natural gas, and water from external utility suppliers through an Interagency Support Agreement (IASA) with KAFB.

Over 80% of SNL/NM greenhouse gas (GHG) emissions and energy use is from grid electric power. Given the current Executive Orders (EO) and costs associated with energy, SNL/NM needs to generate and store a significant portion of this energy on-site using alternative energy power sources (i.e. solar, wind, geothermal, or other). This investment will meet various EOs and DOE/NNSA goals for Scope 1 and 2 greenhouse gas (GHG) emissions and support energy security requirements for mission critical facilities.

Sandia is undertaking further investigation through a Corporate Strategic Resource Management Plan to develop integrated energy infrastructure reinvestment strategies necessary to address this issue. The results of this investigation, including a recommended path forward, will be presented upon completion.

Program Requirements:
In order to comply with EO 13423, Strengthening Federal/Environmental, Energy, and Transportation Management, EO 13514, Federal Leadership in Environmental, Energy, and Economic Performance, and the Energy Policy Act (EPAct) 2005 requirements for reducing energy consumption and GHG emissions and generating energy using alternative energy sources by FY2020, this project must ensure that Sandia-NM meet the requirements outlined in each document.

Further, any investment strategies must position Sandia to support the growing energy demands required by evolving science capabilities and computing resource needs.

Alternatives Developed/Available to Meet Program Requirements:
SNL is considering a variety of options, including the following:

- Modernizing facilities and infrastructure systems that consume large energy resources
- Energy conservation initiatives
- Construction of alternative energy infrastructure
- Placing a contract for a third party financed PPA type project

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Building 827 Weapons Production Primary Standards Lab Asset Plan**
Site Location: **Sandia – New Mexico (SNL/NM), Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Building 827 (Primary Standards Laboratory – PSL) provides Primary Standards support for NNSA and WFO programs. The PSL develops and maintains primary standards traceable to national standards and calibrates and certifies customer reference standards. The PSL provides technical guidance, support, and consultation; develops precision measurement techniques; provides oversight, including technical surveys and measurement audits; and anticipates future measurement needs of the nuclear weapons complex and other Department of Energy programs.

The PSL provides calibration for Measurement and Test Equipment (M&TE) across the SNL/NM site. Calibration is required for M&TE used to: obtain reportable data or establish specifications associated with weapon activities; evaluate or test weapon material or systems; generate non-weapon data that are to be published; determine conformance to customer requirements; and generate environmental safety and health data. The PSL also helps industry, universities, and government agencies establish or verify new capabilities and products and improve measurement technology.

The Primary Standards Laboratory is accredited over a broad range of parameters by the National Institute of Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) as a calibration laboratory (Lab Code 105002). This accreditation validates the high level of technical competence achieved by the laboratory and its staff. The accreditation is based on national and international standards and the assessment covers a complete evaluation of the overall quality program of the PSL, as well as a detailed evaluation of the calibration procedures and measurement uncertainties of each calibration parameter. The accreditation represents a significant achievement for the staff of the PSL, which is recognized as one of the premier metrology laboratories in the U.S.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this important capability. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:
- Maintain existing technology to support the primary standards mission
- Provide new technology to advance the primary standards mission
- Provide building system support for advancement of the primary standards mission

- AC Electrical Lab
- Acceleration and Shock Lab
- DC Voltage Lab
- Gas Leaks Lab
- Humidity Flow Lab
- Mass-Force Lab
- Microwave Lab
- Nuclear Lab
- On-Site Calibration and Maintenance
- Optical Lab
- Primary Dimensional Lab
- Thermometry Lab
- Vacuum Lab

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new Standards Lab to meet program development and new technology

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Building 840 Development Shop and Offices Asset Plan**
Site Location: **Sandia – New Mexico (Sandia/NM), Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Building 840 has provided shop and development support to the National Nuclear Security Administration (NNSA), Nuclear Weapons (NW), and Work-for-Others (WFO) programs for 60 years. The shop and development functions have been discontinued and the building contents are in the process of being removed from Building 840. There are minor office occupancies that remain.

A study and funding plan are needed to decide the best and highest use of this asset. Lab and office space can be used to support the B61 uplift and other NW functions that are suited to a short-term occupancy of 5 – 10 years. The National Security Technologies & Systems Strategic Management Group has a WFO option to use some of the space. Other occupancies are being considered to make the best use of this asset until it is removed, including occupancies for other programs that would allow Sandia to remove other buildings.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this asset. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:
- Building 840 is an aging facility and is a candidate for reuse
- No funding is available for D&D
- No program revenue would be realized if the building were put on hold until D&D can occur
- Building 840 is a substantial structure that is located within the Tech Area I Limited Area and provides multiple occupancy opportunities in high bay, lab and office space
- The Building 840 chilled water plant is connected to Buildings 835 and 836 chilled water plants. Together these assets provide a chilled water loop that supports performance for all buildings and provides system redundancy. The removal or renovation of Building 840 is tied to the other assets
- Funding must be identified for any of the planning options being considered

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Run to Failure, Cold and Dark until D&D (with address of Chiller Plant) (There are costs associated with maintaining this asset as cold and dark)
- Renovate Existing – Repurpose, Renovate and Reuse
- D&D – funding is not in the foreseeable future

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Buildings 890/891 Asset Plan**

- Building 890 INST System Lab
- Building 891 Energy Technology Building

Site Location: **Sandia – New Mexico, Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Buildings 890 & 891 support several missions. Primary capabilities within Bldg 890 include the following:

- Telemetry & Software Systems (Design, integrate, test, and field all aspects of test telemetry systems to meet a wide range of flight and ground test telemetry needs)
- Space Mission Engineering (an information systems engineering capability that develops distributed information systems to solve a broad spectrum of problems of national importance. The program develops large, real-time information systems that process data from multiple U.S. satellite systems, performs research in information surety topics, and provides decision support systems to a broad range of Federal agencies)
- Monitoring Systems and Technology (activities associated with the general areas of weapons development and arms control including treaty verification, nonproliferation, counter proliferation, and cooperative monitoring).

Primary capabilities within Building 891 include the following:

- Micro & Electronics Products (develop, design, and provide product engineering for microsystems mixed signal electronics and definition, design, development, qualification, support and surveillance of interconnects used in nuclear weapons, satellite systems and other high reliability high consequence applications)
- Electronic Systems Center (provide space and flight electro-mechanical subsystems, microwave imaging systems, advanced radar system development, and weapon electronics & advanced RF systems)

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain these important capabilities. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:

- Maintain existing technology to support the mission
- Provide new technology to advance the mission

- Provide building system and site infrastructure support for advancement of the mission

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Climate Test Capability Investment**
- Building 6630

Site Location: **Sandia – New Mexico, Tech Area III**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Climate Test Lab is used by the Transportation and Environmental Safety Programs to run important research for waste transport packaging design and testing. That program has expanding space needs. A portion of the building is constrained by beryllium contamination in both building systems and existing equipment. The decontamination of the space is on-going and has been addressed in an incremental way. The full resolution of this constraint needs more investment to resolve. The building has high bay, light lab and office assets that are being underutilized.

Given the contamination of the facility, investing in a project to deal with the contamination of the facility sooner in the planning period, rather than later, would reduce escalating costs and the measures needed for controlling the contamination of the asset.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this asset. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine facilities and infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:
- Proceed with full decontamination plan
- Maintain existing technology to support the mission
- Provide new technology to advance the mission
- Provide building system and site infrastructure support for advancement of the mission

Alternatives Developed/Available to Meet Program Requirements:
- Do Nothing – Program Requirements will not be met and a portion of the asset is unusable
- Proceed with decontamination plan
- Major Renovation – Support program development and new technology
- New Construction – Create a new facility to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Computing, Simulation, and Information Sciences Capabilities Investments**

- Building 880 Computing Field Testing and Quality
- Building 880A Computing Annex
- Building 725 Super Computing Annex
- Building 899 Joint Computational Engineering Lab

Site Location: **Sandia – New Mexico, Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Computing, Simulation, and Information Sciences capabilities support all nuclear weapons security, national security missions, and enterprise computing at Sandia. Given the evolving nature of computing science, Sandia anticipates a constant need for on-going recapitalization in order to ensure the advanced physical and virtual infrastructure and national security computing resources and networks are continually available for mission support. The dynamic nature in computing advancements underscores the importance in sustaining a viable infrastructure and resource network in facilities that are modern, flexible, and adaptive to the robust nature of computing and information sciences.

Program Requirements:

Currently the national security computing, simulation, and information sciences capabilities at Sandia are one of the largest users of energy at the site. Reinvestments in the facilities and infrastructure that support these capabilities must consider the following:

- Make use of state-of-the art technology
- Improve energy efficiency
- Reduce the carbon footprint
- Utilize sustainable, renewable resources to strive for the development of a green data center

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing
- Renovate and expand existing facilities
- Build a new facility with a demolition component

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

1

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Note: Funding amounts shown are based on mid range of proposed overall project cost estimate range.

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Defense Systems and Assessments Capabilities Investments**

- Building 810 Center for National Security Arms Control (CNSAC)
- (Iincludes address of Buildings 890, 868,750,751,752,755,758,729,770, MO324, MO325)

Site Location: **Sandia – New Mexico, Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
This group of buildings is the core infrastructure supporting Sandia's Defense Systems and Assessment Strategic Management Unit (SMU). The DS&A SMU has been Sandia's fastest growing line of Work-for-Others (WFO) and currently represents over $700M of the total corporations revenues. The SMU supports a wide variety of national customers and constitutes a huge variety of technical solutions for other Federal agencies. It is expected that this line of business will remain critical both to the support of these agencies and to the ability of Sandia to maintain and grow the technical competencies which are also leveraged by our core Nuclear Weapons missions. The DS&A SMU will continue to develop strategies to invest in the facilities required to accomplish this work. Investment strategies will likely include a combination of GPP and Line Item projects as well as investment into the NNSA infrastructure by other Federal Agencies.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this asset. The current mission gaps will be considered as well as the future mission needs. The DS&A SMU will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:

- Information Operations for cyber Defense Technologies and Strategic Systems and Analysis
- Integrated Military Systems for the Missile Defense Program, Strike Systems, Target Characterization, Directed Energy and Intelligent Transformational programs
- Proliferation Assessment, Systems Integration & Technology Assessment and Advanced Technologies
- Remote Sensing and Verification and Nonproliferation R&D and USNDS programs
- Space Mission Advanced Systems and Engineering Programs
- Science & Technology Products, Warfighters, Information and Assessment programs
- Surveillance & Reconnaissance, Advanced RF and Sensors &Information Technology programs

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Space Consolidation, collocation and space utilization improvements
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities and infrastructure to meet program development and new technology

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Energetic Components Capabilities Investments**

- Building 905 Explosive Components Facility

Site Location: **Sandia – New Mexico (SNL/NM), Tech Area II**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Energetic Components Capabilities supports the integration of science and life-cycle engineering to deliver innovative products to Nuclear Weapons and other national security customers and to design energetic components for nuclear weapons, assure their performance, develop solutions for other national security challenges, and ensure measurement integrity for the nuclear weapons complex. The Energetic Components Capabilities also supports the Advanced Battery Abuse Test Lab. Sandia will continue to develop and refine the necessary facilities and infrastructure investments required to ensure the continued viability of these essential capabilities.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this asset. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:

- Maintain existing technology to support the primary standards mission
- Provide new technology to advance the primary standards mission
- Provide building system support for advancement of the primary standards mission

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new Energetic Components assets to meet program development and new technology
- Combined Renovation and New Construction

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Energy, Security and Defense Capabilities Investments**

- Building 821 Nuclear Safeguards and Security Lab
- Building 823 Systems Research and Development
- Building 895 Robotics Manufacturing Science and Engineering Lab
- (Includes address of Building 820)

Site Location: **Sandia – New Mexico (Sandia/NM), Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Energy, Security and Defense Technologies capabilities provide the research, development, and application of world class technologies to meet our nation's national security needs. The focus of the work in the division supports the laboratory mission efforts in energy and resource systems research and development, the nuclear fuel cycle, including nuclear power safety and repositories, improved environmental quality, reducing the global threat of terrorism and the proliferation of weapons of mass destruction, and the protection of nuclear and other vital assets. The programs performing these capabilities seek to provide innovative and cost-effective solutions to our nation's security problems.

New and emerging threats bring a constant pressure to keep advancing capabilities and program interfaces. New technology developments are expected in the next 30 years that will continue to place Sandia as an important partner in the address of national security needs for Energy, Security and Defense programs.

Program Requirements:
New space, computing systems, tools, technology and facility and infrastructure performance are needed to meet the program requirements Energy, Security and Defense capabilities.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this asset. The current mission gaps will be considered as well as the future mission needs. The National Security Technologies & Systems SMG will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities and infrastructure to meet program development

and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Environmental Test Capabilities Investments**

- Building 865 Aerothermodynamics Lab
- Building 860 Environmental Test Lab
- (Includes Buildings 888 and 871 in Sandia –New Mexico (SNL/NM) Technical Area (TA) I; Buildings 6526, 6539, 6539H, 6560, 6570, 6610, 6639, 6715, 6741, 6742, 6750 in SNL/NM TA-III; and 9838, 9972, in the SNL/NM Remote Areas)

Site Location: **SNL/NM, TA-I, TA-III and Remote Areas**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocate(s):
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Environmental Test Capabilities (ETC) at SNL/NM are essential to the enduring Nuclear Security Enterprise (NSE) mission as Sandia has been identified as the Center of Excellence for Major Environmental Testing Facilities (METF). Buildings 860 Environmental Test Lab and Building 865 Aerothermodynamics Lab have been identified by the CPIBP process as assets that need near-term attention. The capabilities contained in these and other TA-I facilities are essential for component and sub-system design, qualification and surveillance. Sandia has validated that both the programmatic and the facilities and infrastructure (F&I) assets in these facilities represent essential elements of the unique environmental testing capabilities at Sandia and need to be addressed to support the NSE mission. Failure to deliver these test capabilities will prevent Sandia from fully meeting selected Stockpile Life Extension Program (SLEP), Directed Stockpile Work (DSW), Advanced Simulation and Computing (ASC), and Campaign 6 requirements, and will jeopardize defense program mission testing budgets and schedules.
The work performed in the TA-I facilities is predominantly weapons related but is increasingly matrixed to Work-for-Others (WFO) partnerships that keep the weapons capabilities viable while enabling the nuclear security partnerships to be successful. This integrated partnership is essential to the maintenance and extension of the environmental test capabilities.

The component and sub-system design, qualification and surveillance capabilities in TA-I facilities are tied to the Major Environmental Testing capabilities in TA-III and remote area facilities in both capabilities for advanced testing and diagnostics and the leveraging of staff support. Interdisciplinary collaboration is at the heart of the future development of ETC that increase performance while reducing security requirements and staff safety exposure. The facilities are unique and must be maintained for stockpile certification.

At present, the Nuclear Weapons (NW) program is working to maintain a program investment in the environmental testing equipment and tools to keep Sandia engaged in current technology. The replacement, redevelopment and consolidation of these assets must be coordinated with all METF investments at Sandia to integrate the performance, capabilities and objectives of the weapons program.

Program Requirements:

- Investments must upgrade building systems to support the environmental testing program and address life-safety, accessibility and fire protection performance to comply with all applicable codes and standards
- Revitalize and enhance the ETC to address current and projected future DSW test, experimentation, and modeling activities. Provide mission-driven capabilities in time to meet SLEP and weapon development program milestones
- Integrate Sandia's NW enterprise experimentation and test capabilities to support weapons qualification, weapons development, and other research and science-based engineering activities DSW model development and validation programs
- Address environmental, safety, health, code compliance, and Secret Restricted Data (SRD) level security needs and deficiencies
- Integrate the project into on-going DSW test programs (e.g., LEP, ASC, and Campaign 6).
- Provide a 25-year facility economic life cycle for each test capability
- Studying phenomenology to support the development of constitutive relationships (model and simulation development)
- Characterizing materials properties and performance
- Measuring structural or system response to a test environment
- Development of diagnostics (i.e., technology needed to support model development to characterize the test environments that weapon systems are subjected to and to quantify weapon system performance)

Alternatives Developed/Available to Meet Program Requirements:
Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain these critical capabilities. The current mission gaps will be considered as well as the future mission needs. Sandia's NW Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion. Current strategies include the following:

- **Do Nothing** – Program Requirements will not be met
- **Renovate Existing** – Most of the current buildings are beyond the age of effective renovation
- **Build New** – The replacement, redevelopment and consolidation of these assets must be coordinated with all METF investments at Sandia to integrate the performance, capabilities and objectives of the weapons program

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Integrated Weapons Engineering Transformation (IET)**

- Building 892
- Building 894
- (Includes address of Buildings 836, 835, 809)

Site Location: **Sandia – New Mexico Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **Steve Goodrum – NA-12**
Contractor: **Directed Stockpile Work (DSW)**

Federal and Contractor Advocates:
Federal: **Patty Wagner SSO**
Contractor: **Carolyne Hart VP 2000, Mike Cieslak Director 2800**

Mission Gap:
The weapons engineering and stockpile surveillance work functions are currently executed in five widely-dispersed Cold War Era buildings at Sandia's Tech Area I, including Buildings 892 and 894. These buildings impact Sandia's ability to provide modern, integrated, systems-level weapons engineering and stockpile surveillance support and fail to provide the collaborative environment necessary to support effective non-nuclear design and engineering.
The existing mechanical and electrical building systems continue to deteriorate, impacting on-going operations and delivery of mission work. Not having an information infrastructure to manage input at our site and across the complex results in significant delays in assessing anomalies that can impact reliability, security and safety of the stockpile. Configuration options that support optimal implementation of advanced engineering management principles are non-existent. These facilities do not comply with current life safety and code standards, contribute to an increasing deferred maintenance liability, and are increasingly more costly to operate and maintain. Lastly, the scattering of these critical functions result in inefficiencies in space utilization that thwart NNSA's stated goal of footprint reduction.

Program Requirements:
Sandia is assigned the responsibility for all aspects of stockpile management for nuclear weapons, including weapon system engineering, system integration, integrated stockpile evaluation, tester design and development, surety and use control management, military liaison, quality assurance, and advanced research and development, component design, component production, and test/surveillance for power source technologies and components for all NW stockpile systems. These requirements derive from NNSA's science based Stockpile Stewardship Program (SSP) that emphasizes development and application of greatly improved technical capabilities to assess the safety, security and reliability of existing nuclear warheads without the use of nuclear testing.

Assumptions:
1.To support an integrated modern Weapons Engineering capability to meet current and future missions of nuclear stockpile maintenance and weapon development, the following capabilities are required:

- Adequately and properly configured space (laboratories, specialized storage, workspaces, meeting and collaboration areas) to support functional activities

- Co-located SNL/NM personnel who develop future weapon systems, maintain the enduring stockpile, and coordinate the interdependent efforts to successfully dismantle the cold war stockpile
- Achieve a modern, responsive capability to design, develop, test, and produce power source components for future systems and refurbishment programs.
- Embedded modeling and computational simulation into design and maintenance functions
- Functional integration, collaboration and teaming
- Secure environment for classified conversations, storage, computing, and videoconferencing
- Responsive telecommunication and data infrastructure
- Education and training of DoD and others about nuclear weapons
- Liaison between the nuclear labs, production agencies, NNSA, and DoD

2. Stockpile to Target Sequence requirements remain the same or are increased
3. Continue to need a system level surveillance and evaluation capability

Constraints:

1. Current facility capabilities and condition improvements cannot be met within current program resources.

Impacts:

- Unable to consolidate and integrate functions into an efficient and cost effective management structure.
- Risk the loss of one or more weapons engineering capabilities for a period of time if a current facility or several facilities reach a point of not being mission capable.

Lost opportunity to demolish up to 500,000 gross feet of sub-standard space and reducing the deferred maintenance backlog by over $40M.

Alternatives Developed/Available to Meet Program Requirements:

No Action:

- Unable to consolidate and integrate functions into an efficient and cost effective management structure
- Continued risk of loss of one or more weapons engineering capabilities for a period of time if a current facility or several facilities reach a point of not being mission capable
- Lost opportunity to demolish up to 450,000 GSF of sub-standard space and reducing the deferred maintenance backlog by over $40M

Proposed Actions:

- Design and build a new facility that will support system engineering and power source development and production for the current stockpile and the system design and development of weapon life extensions needed to sustainable the future deterrent

Main Benefit:

- Reduce operating cost of the Nuclear Weapons Complex by providing energy efficient consolidated space and removing substandard space

Current Proposed Schedule:

CD-0**:** **FY13**
NEPA: **FY13**
CD-1: **FY14**
CD-2: **FY15**
CD-3: **FY17**
CD-4: **FY18**

Estimated Funding Range:

The Total Project Cost estimate: **$200M**

The proposed funding profile for this project.**($K)**

Required	FY13	FY14	FY15	FY16	FY17
PE&D	2,000	16,000	8,000		
Construction			36,000	72,000	36,000
OPC	2,000	6,000	8,000	8,000	6,000

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Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:

Title: **Material, Physical, Chemical & Nano Sciences Capabilities Investment**

- Building 897 IMRL
- Building 701 PETL
- (Includes address of Building 518 CINT)

Site Location: **Sandia – New Mexico, TA-I and Eubank Land**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocate(s):
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Material Sciences
Capability objectives are satisfied by performing many science and engineering functions that include vulnerability assessments, failure analyses, measurement of unknown material properties, development of improved materials, the correlation of secondary evidence with aging processes (e.g., chemical signatures), the development and deployment of predictive, physical-based mathematical models, the characterization of specific material-aging processes, and the detailed analyses of suspect production processes. Sandia has specific expertise in gas/solid interactions and the aging and mechanical properties of ceramics, glasses and other brittle materials, inorganic materials, metals (including solders and brazes). Sandia provides this support to our customers during all phases of design, production, storage, use, and retirement.
Bioenergy
Sandia's Biosensors and Nanomaterials capability conducts research and development at the interface between biology, synthetic chemistry, and surface science to deliver prototype solutions in applications ranging from biodetection to photovoltaics. Sensor development includes discrete sensors and sensor arrays based on piezoelectric, fiber-optic, micro-optic, electrochemical, biochemical, and microimpedance devices. Microfluidic sample preparation prior to detection is a growing interest. Synthetic chemistry efforts include nanoparticle growth, surface functionalization, and molecular electronics. This work addresses needs for novel materials in addition to supporting the biosensor development effort. The Biological and Environmental Research (BER) program advances environmental and biomedical knowledge that promotes national security through improved energy production, development, and use; international scientific leadership that underpins the Nation's technological advances; and research that improves the quality of life for all Americans.
Nano Sciences
Capability objectives perform fundamental research in the areas of sensors and actuators, energy storage and delivery, energy conversion and harvesting, device integration and energy transport, solid state lighting, and the role of defects in all of these broad category areas. This work includes fundamental materials research focusing on the discovery, characterization and exploitation of properties and structures unique to the micro- and nanoscale. Ab Initio modeling, materials synthesis and leading-edge experimentation are all utilized to understand the behavior and performance of materials and devices at the micro- and nanoscale.

Program Requirements:
Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this important capability. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities and infrastructure to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Modern Threat Abeyance Center – M-TAC**
Site Location: **Sandia - California**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:

Historically, a strong nuclear deterrent prevented adversaries from striking the US with nuclear weapons. Sandia has proudly played a major role in this effort. However, with the rise of terrorist threats, Sandia is uniquely placed to provide solutions to keep these adversaries from striking us with a nuclear threat and to protect the United States' nuclear assets from absolutely any unauthorized use.

The Modern Threat Abeyance Center (M-TAC) is critical to our nation's security in responding to these types of threats, and in achieving overall fewer and more capable, more secure weapon systems. Investment is needed to assure a rapid and thorough technical response to identified threats against our nation's nuclear weapons and SNM.

A focal point for technical collaboration across the inter-government agencies is needed to look outward to an international surety impact. A strong, S&T presence within a classified facility is needed to drive the R&D base which is essential for our nations' security. A work environment is needed for open exchange of information and ideas within a highly secure combined with secure laboratory space to bring together Sandia's surety science and engineering skills with rapid prototyping capabilities.

There is a need to facilitate interchange and interplay of both needs and capabilities in a facility ready for the highest security requirements. Both physical and information security advantages will result from the co-location of this capability. Facilities maintenance, TSCM inspections, audits, etc. are all reduced by bringing separate, small, laboratory islands into one umbrella facility.

M-TAC will provide a different paradigm emphasizing the interdependence of weapon transportation, storage, deployment, state-of-health, retirement, and dismantlement risk reduction optimization. This cross-cutting need and responsibility is recognized by both NNSA and the weapon Physics Design labs and they are looking to Sandia to demonstrate substantive signs of mission ownership.

Program Requirements:

At the very core of Sandia's national security mission is potecting the USA from nuclear detonations. Historically, we did this by having a great deterrent. We then addressed the next threat – accidental nuclear detonation - by leading the charge to develop and incorporate profound nuclear safety into our warheads. In the post cold-war, post 9/11 era, our next major challenge is to make sure adversaries cannot use our own nuclear assets against us. MTAC will be the focal point of incorporating multidisciplinary, leading edge technologies into real solutions to address this critical nuclear issue.

M-TAC provides a point of integration for 21st Century S&T innovation, allowing for technical solutions to be brought "on-line" sufficiently ahead of changing threats. Specialty classified laboratories with advanced diagnostic equipment and tools will be integral within the building's capabilities and across academic disciplines. This includes state-of-the-art facilities for component prototyping / subsystem assembly and testing will include assurance / validation of critical technologies. M-TAC would be built to DCID 6/9 standards to allow for a wide range of collaborative handling of classified hardware / information, including Sigma 14, 15, and 20 and beyond.

Successful execution against evolving threats will require multiple, national agency involvement and will ultimately only be successful if executed in a highly collaborative, innovative environment. Co-location of critical assets, equipment and people, collectively represent the single key advantage in defeating the adversary. The future holds prospects for everything changing. The threat will change. The technology will change. The viable solution space will change. The U.S. response must change to keep pace!

It is likely that execution of the M-TAC concept will require out-of-the-box solutions, from sponsorship, to ownership, to construction, to operation. The future in this arena is anything but certain and agility will be a prime means of technical offence. The nation requires and demands a focused facility empowered to deal with the modern threat.

Alternatives Developed/Available to Meet Program Requirements:
Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this important capability. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

- Major Renovation
- Line Item – Design and build a new complex
- Third Party Financed (Alternative Financed)
- Lease

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range: **TBD**
The Total Project Cost estimate range:

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:

Title: **Multimodal Infrastructure Corridors**

Site Location: **Sandia – New Mexico**

Federal and Contractor Program Manager(s) or Sponsor(s):

Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:

Federal: **BD**
Contractor: **TBD**

Mission Gap:

In 2005, Sandia National Laboratories issued a study that examined the need for improving the connectivity between Technical Areas (TA) I, II, and IV. The study indicated that the investment of two multimodal corridors would improve access to science and capabilities by improving the flow of pedestrian and vehicular traffic. Given the large undeveloped tract of land within TA-II, the multimodal corridors would address two distinct gaps. The first corridor would extend a transportation thoroughfare and the utility and telecommunications infrastructure backbone from Hardin Boulevard to 9th Street in TA-II. This corridor would enable future clean energy development in TA-11 to "plug-in" and contribute energy resources to Sandia and potentially the entire grid. The second corridor would improve the pedestrian connectivity between TA-1 and TA-IV by installing the foundation for future non-motorized transportation capabilities such as electric rail, segway, bicycle, and so on. While Technical Area II provides a strategic benefit in future development for Sandia and the National Security Enterprise (NSE), the lack of infrastructure will result in piecemeal development and lead to a replication of scattered infrastructure development apparent in TA-I.

Program Requirements:

Completion of the multimodal infrastructure corridors must provide the utility and telecommunications infrastructure backbone for future TA-II development, provide improved connectivity between TA-I and TA-IV, and provide a pedestrian friendly corridor that encourages the reduction in automotive use. Opportunities for improving energy conservation or resource generation should also be examined.

Alternatives Developed/Available to Meet Program Requirements:

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this important capability. The current mission gaps will be considered as well as the future mission needs. Sandia will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

- Status quo
- Incremental development
- Utilize strategically planned documents and studies to advance the best interest of the corporation and the NSE

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Neutron Generator Capabilities Investment**

- Building 870
- Building 857
- Building 878
- (Includes address of buildings 700, 702 and 879)

Site Location: **Sandia – New Mexico Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Neutron Generator Production capability supports weapons systems for both nuclear weapons and national security missions and is responsible for providing Neutron Generators for the Nuclear Weapons Complex. Customer needs are met through integrated planning, lean manufacturing, testing, and certification of neutron generators.

The capability develops and maintains qualified product definition, supporting fielded products, and provides design support for products in production. Product testers are designed, developed, qualified, and installed to support production. Materials operations support production through purchase material engineering, materials planning, inventory management, and tooling design and development.

Through the readiness campaign new processes, technologies and capabilities are identified and developed to be responsive to current and future nuclear weapon design and production needs.

Program Requirements:
Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain this important capability. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities and Infrastructure to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Pulsed Power Capabilities Investments**

- Building 963
- Building 983
- Building 986
- Building 962
- Building 960
- (Includes address of Buildings 969 and 961)

Site Location: **Sandia – New Mexico, Tech Area IV**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:

Sandia applies research, development, and application of pulsed power science and technology to create, diagnose, and model extreme radiation, electromagnetic, and high energy density environments. Research areas include dynamic properties of shocked materials, radiation and electromagnetic effects on materials and systems, and inertial confinement fusion. The Pulsed Power Program also teams with universities, industry, international partners, and other Department of Energy (DOE) laboratories.

The Pulsed Power program also provides a core competency in electromagnetic environments and effects. Our testing environments include broadband RF/microwave, nuclear Electromagnetic Pulse (EMP), Electrostatic Discharge (ESD), simulated direct and nearby lightning, and high voltage.

As such, Sandia has begun studies to develop an integrated plan for reinvestment into this asset. The results of these studies, including a recommended path forward, will be presented upon completion.

Program Requirements:

Reinvestment in the Pulsed Power program must ensure that the facilities and infrastructure enable the program to continue performing high energy density physics (HEDP) experiments for stockpile stewardship and developing the basic science of HEDP while delivering a high-yield inertial confinement fusion (ICF) capability for application to weapons effects, weapons physics, and energy production. Study of the capabilities investment in pulsed power must also ensure that the F&I will continue to provide the necessary elements to perform the following:

- Develop, diagnose, and characterize x-ray and isentropic compression sources and use to evaluate primaries, secondaries, and hostile environments
- Diagnose and model HEDP environment in targets driven by intense x rays
- Validate driver and target requirements for z-pinch-driven high-yield concepts

- Develop diagnostics for and evaluate performance of National Ignition Facility targets
- Perform EM testing and evaluation
- Consult on requirements and best design practices
- Perform EM experimentation
- Develop and validate advanced EM and plasma physics modeling and simulation tools
- Perform analysis Perform applied research in EM

Additionally, Sandia has developed and applied a variety of simulation codes in contribution to national problems and issues that must be maintained.

- ALEGRA --(Arbitrary Lagrangian Eulerian General Research Application) purpose is to simulate behavior involving strong shock waves that are difficult or impossible for traditional codes to solve. The code uses an ALE algorithm on an unstructured finite element mesh that combines the features of modern Eulerian shock codes with modern Lagrangian solid dynamics codes.
- Spect3D -- A multi-D collisional-radiative spectral analysis code.
- Quicksilver -- A 3D electromagnetics and plasma physics code.
- Eiger™ -- A 3D electromagnetics and electrostatics code.
- Emphasis™ -- A 3D electromagnetics, plasma physics, magnetics and electrostatics code

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities and Infrastructure to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Radiation Effects Sciences Capabilities Investment**

- Building 981
- Building 970
- (Includes address of Building 720 Ion Beam Lab)

Site Location: **Sandia – New Mexico, Tech Area IV and Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Radiation Effects Science Campaigns and HEDP Theory capability covers electromagnetic theory, plasma science, electrical engineering, radiation effects, and shock physics. The capability spans a wide range of science including understanding basic electromagnetic theory and its applications, designing pulsed power devices from the wall plug, understanding the energy output for various sources, and developing new applications for pulsed power. In order to develop new advanced pulsed power concepts, an investment must support international collaboration in Pulsed Power Sciences in England, Germany, France, Russia, and Japan.

The Radiation Effects Science Campaigns conduct research, advanced technology development, and experiments in the fields of electromagnetics, pulsed power sciences, and magnetic fusion energy for Defense, office of science and Work for Others programs. Capabilities include advanced Pulsed Power technology and electron beam accelerator development, advanced code and analysis capabilities in electromagnetics and plasma physics, conduct of complex electromagnetics experiments, and containment of energetic plasmas for the US ITER program.

Program Requirements:
Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain these important capabilities. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

- Maintain existing technology to support the mission
- Provide new technology to advance the mission
- Provide building system and site infrastructure support for advancement of the mission

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Program Requirements will not be met
- Major Renovation – Support program development and new technology
- New Construction – Create new facilities to meet program development and new technology

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Radiation Hardened Integrated Circuits Microelectronics Capability Investment**

- Building 858N
- Building 858 EF
- Building 858EL
- (Includes address of Bldgs. 858S, 858C, 858E, 858G, 858H, 858I, 858J, 858K and 858L)

Site Location: **Sandia – New Mexico, Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Building 858N has been identified by the CPIBP process as an asset that needs near-term attention. The capability to produce semiconductor radiation-hardened integrated circuits, housed in Building 858N, is essential to the enduring Nuclear Security Enterprise (NSE) mission. Sustainment of the capabilities housed in building 858N requires long-term capital investments to ensure uninterrupted access to a trusted supply of radiation-hardened microelectronic components. The building is currently 24 years old (the design lifetime was 15 years) and consequently there is a high risk to delivery of components if the facilities and infrastructure are not upgraded or replaced in 10 to 15 years. At present, Sandia's NW Executive Leadership Team acknowledges the CPIBP recommendation to begin evaluating investments needed to address aging and performance concerns with 858N. As such, Sandia will initiate further studies to develop an integrated plan for reinvestment into this infrastructure. Results of these studies, including a recommended path forward, will be presented upon completion.

Note: Sandia's NW Executive Leadership Team has requested additional funding for recapitalization of MESA tooling ($100M over four years from RTBF Ops of Facilities) that is required immediately to meet deliveries for the B61 LEP and the next strategic reentry system LEP. The tooling recapitalization request does not address infrastructure issues and concerns and tool modernization that will be needed in 10 to 15 years.

Program Requirements:

- Ensure an uninterrupted trusted supply of radiation hardened microelectronic components for NW programs to support continued requirements for certification
- The capital investment in 858N infrastructure supports NA-10, NA-20, DOD, and other National Security agency requirements
- Retention and attraction of a highly-specialized, knowledge-based workforce by providing a viable work environments that are integrated into the trailing-edge microelectronics technology

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing – Run to failure
- Renovate Existing
- Build New
- Eliminate Capability

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Sandia California Capability Investment**
Building C914 Labs, Offices, Shops
Building C941 Integrated Manufacturing Technology Lab (C943 Utility bldg.)
Building C968 Chemical and radiation Detection Lab
Building C916 Labs and Offices (C9161 Utility bldg.)
Building C942 Integrated Manufacturing Technology Lab (C943 Utility bldg.)
Building C915 DISL

Site Location: **Sandia – California**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
These buildings are critical to the delivery of the Surety, Gas Transfer Systems, and Joint Test Assembly mission in partnership with LLNL. Repairs and improvements to the infrastructure are needed to keep the mission work viable and vigorous.

Program Requirements:
Preliminary examinations have resulted in several known requirements that must be included in any reinvestment to the facilities and infrastructure that support the capabilities at Sandia/CA. Given the age of the facilities and infrastructure Sandia anticipates that a major renovation of the mechanical and electrical systems will be necessary, as well as seismic upgrades.

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing
- Renovate Existing
- D&D and build new facilities

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **California Infrastructure Investments**

- Water
- Power including Alternate Energy
- Natural Gas
- Storm drain
- Sanitary Sewer
- Paving
- Chilled Water
- Landscaping
- Walkways

Site Location: **Sandia – California**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The site infrastructure is critical to the delivery of the nuclear weapons and national security missions. Repairs and improvements to the infrastructure are needed to keep the mission work viable and vigorous.

Program Requirements:
Water System:
The water distribution piping consists of a mixture of asbestos cement, ductile iron, cast iron, mild steel, and PVC. The age of the system varies from two years to 50+ years. Approximately 70% of the system is 50+ years. SNL's water is received from Lawrence Livermore National Laboratory (LLNL) by either a ductile iron line or an asbestos cement line that both cross the SNL site. Overall, the water distribution system condition ranges from good to poor depending on the age or material of construction. In the past, the system has been troubled with discolored water, sometimes accompanied by an odor, line breaks due to corrosion, rapidly plugging building water filters, lack of backflow prevention devices, and non-functioning underground zone isolation valves. In the last five years, backflow preventors were installed, approximately 1500 feet of potable water line was installed using PVC to replace either asbestos cement or metallic pipe, and three of the problematic isolation valves replaced. The improvements made over the last few years affect only a fraction of the overall system. The remaining asbestos cement and metallic pipe represent a water quality and reliability risk that can cause significant disruption to the site operation.

Power System:
High voltage loops and main feed are 15 years old and the remaining systems range from five to

mostly 35 years old. Restorations, renovations, and upgrades will have to implement and incorporate alternate energy and energy security technologies.

Natural Gas System:
The gas distribution piping consists principally of 4 inch and 3 inch diameter steel with some short runs to new lines made of plastic. The age of the system varies from 10 years to 50+ years. Approximately 70% of the system is 50+ years. SNL gas is received from LLNL. Overall, the gas distribution system condition is fair-to-poor.

Storm Drain System:
Approximately 50% of the storm drain system and appurtenances will need to be replaced and erosion abated in the next 30 years because the piping will have reached the end of its useful life and the damage from erosion will need to be repaired.

Sanitary Sewer System:
Approximately 90% of the sanitary sewer system and appurtenances will need to be replaced in the next 30 years because the piping will have reached the end of its useful life. The age of the system varies from 5 years to 50+ years. Approximately 70% of the system is50+ years. Te lines material vary from clay, iron, plastic, to Transite (asbestos cement) pipe. The system is currently problematic with soil and root intrusion, off-set lines, and low-points.

Paving:
Approximately 90% of the pavement will require overlay or complete reconstruction in the next 30 years.

Chilled Water System:
The chilled water utility system provides reliable and low-maintenance cooling systems for occupied space and equipment cooling. In recent years increased chilled water capacities and distributions have been installed to support increasing loads. The new systems have been located close to the point of use to minimize distribution systems. Now, with new regulations requiring dedicated chiller rooms for chillers using R123, existing chillers at SNL-CA may be required to be relocated or alternate solutions will have to be implemented. The condition of the chiller system is good to poor. Several chillers are only a five years old and there are several others that are 30+ years.

Landscaping / Irrigation:
The landscape and irrigation function to support a competitive workplace and presentable image to potential new employees, customers and current employees. It is a necessary system and attribute with growing importance. Replacement to the landscape system is an ongoing effort. Most of the trees and shrubs were planted in the last 20 years. By 2030 about 50% of the trees and shrubs will need to be replaced. Irrigation systems are built with longevity in mind. A typical system will need replacement after 20 to 30 years. Significant system rebuilds will also be needed by 2041. Landscape gravel eventually gets filled with sand, frequently blowing from the barren areas requiring large areas to be replaced which exceed the Maintenance Department's capabilities.

Walkways and Pedestrian Malls:
Approximately 70% of the walkways and pedestrian malls will need to be replaced in the next 30 years. The pedestrian malls and walkways are affected by their dual use as emergency response paths, intrusion from tree root systems, periodic maintenance activities (such as crack sealing)

that extend the life of the pavement, and concrete grinding when required.

Alternatives Developed/Available to Meet Program Requirements:

- As progress on the proposed Livermore Valley Open Campus progress, impacts to the infrastructure systems will require upgrades and investments that must be negotiated between Lawrence Livermore National Laboratory and Sandia National Laboratories
- Integrate with proposed investments in buildings and other site improvements to get some of the infrastructure needs addressed
- Create incremental projects to address infrastructure needs and demolition and removal of obsolete infrastructure

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

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Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Sandia California Security and Communications Infrastructure Investments**
(includes address of impacts from Livermore Valley Open Campus development)
Site Location: **Sandia – California**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Sandia will partner with Lawrence Livermore National Laboratory (LLNL) in the proposed creation of the Livermore Valley Open Campus (LVOC) by reconfiguring portions of both campuses with the ultimate objective of combining those pieces into a single, geographically contiguous site. This open research and development campus could be jointly managed by LLNL and SNL-CA establish new facilities, enable closer interactions with industrial, academic and other government agency partners, and allow broader collaboration with the scientific community. Sandia anticipates the new security classification will be general access area (GAA).

In addition to security issues pertaining to SNL-CA's role in the LVOC, a gap presents itself surrounding the footprint associated with security operations at SNL-CA. As the Nuclear Weapons program shrinks within the DOE/NNSA Complex, the future of security at the SNL-CA site must be examined. A major concern regarding physical security is that the infrastructure be in place when needed. Given the presence of Limited Areas (behind fencing or stand-alone facilities) throughout the site modification to the security perimeter may be extensive.

Program Requirements:

To implement the new classification, new physical and technical security features will be deployed. In conjunction with security developments, communication expansion and interface deployment will be required.

Sandia requires the infrastructure support in terms of guaranteeing our customers physical security, security for technical equipment, and information security.

Alternatives Developed/Available to Meet Program Requirements:

As the proposed LVOC develops and new technologies for security and telecommunications become available, Sandia anticipates additional alternatives will be examined.

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Note: Funding amounts shown are based on mid range of proposed overall project cost estimate range.

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Sandia New Mexico Infrastructure Investments**

Water
Power
Natural Gas
Storm Drain System
Sanitary Sewer System
Chilled Water Systems
Landscape and Irrigation
Pedestrian Walkways
Communications

Site Location: **Sandia – New Mexico**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The site infrastructure is critical to the delivery of the mission. Repairs and improvements to the infrastructure are needed to keep the mission work viable and vigorous. Investments in the infrastructure are needed.

Program Requirements:
Water System:

The water system for Tech Area 1 has been substantially improved over the last ten years. Several projects have been implemented to repair, replace, and correct problems through out Tech Area 1. Because of those projects the known system condition in Tech Area 1 is quite good. In general the water mains are in good condition the remaining cast iron mains require replacement in the next 10 years. The capacity of the system is good to excellent with only a few areas requiring improvement. The capacity of the system will need to be analyzed based on the location of future planned growth. The piping systems in TAIII, TAIV, and the Remote areas will reach the end of their useful life. Most of this piping will require replacement in the next 30 years.

Approximately 30% of the water distribution system piping and appurtenances in TAI and TA-IV will need to be replaced year FY 2020 – 2030 because it will have reached the end of its useful life.

The water distribution system piping and appurtenances in the remote areas will need to be completely replaced between the time period of 2011 to 2041. This includes the replacement of 200,000 linear feet of piping. The vast majority of the piping is asbestos cement piping that will reach the end of is design life FY 2020 – FY 2025.
The three water storage tanks will need new coatings applied in FY 2013 along with the installation of cathodic protection systems - estimated cost is 600K. These three tanks along with the pump station will need to be rehabilitated or replaced in FY 2025 the funding required is 5M.

Power System:

The High Voltage Infrastructure System consists of four major sub-systems: Transmission Systems (115 and 46 kV); Main Master Substation Systems (115 and 46 kV); Distribution Systems (15 and 5 kV), and the Stand-by generator system. Through the first three major sub-systems electrical energy is transported from Public Service Company of New Mexico's (PNM) service points to the individual end use loads that SNL operates on the Kirtland Air Force Base (KAFB) federal complex. Of SNL's current electricity consumption, approximately 99% is served via the 115 kV transmission and master substation systems, and 1% is served via KAFB's distribution system. The Stand- by generator system provides stand-by power to security and some programmatic loads in the event of a site wide power outage.

The 15kV electrical distribution system in TA I is in good condition with the completion of the New Master Substation Utility (NMSU) FIRP Line Item in June of 2007. NMSU provides sufficient feeder capacity for the additional projects planned for the remainder of the ten-year period including the TA II development plan. The current capacity is estimated at %60. The completion of the new 115kV/46kV Tech Area V Switching Station in June of 2007 and the completion of the rebuilding of the 46kV Feeder 2 replaces the aging 46kV transmission system to TA III and V. The 5 kV electrical distribution system in TA III and V is in fair condition. There are portions of the system that are approaching the end of their use-full life and will be in need of replacement. The overall capacity of the system is good and is estimated at 30%.

The 862 Standby generators will need to all be replaced by FY 2015 due to the end of its useful life.

Approximately 60% of the underground 12.47kV feeders and transformers, and 115kV/12.47kV Main Master Unit Substations in Tech Area 1 and Tech Area IV will need to be replaced by FY 2025-FY 2030 due to nearing the end of their useful life.

Approximately 80% of the 46kV/4.16kV Main Master Unit Substations in Tech Area III, V and remotes will need to be replaced by FY2020-FY2025 due to the end of its useful life. Approximately 40% of the underground feeders and transformers will need to be replaced in FY-2025-FY 2030.

It is anticipated that there will be future development and interface with site-wide alternative energy systems that will require a supporting investment in the power system.

Natural Gas System:

The GSU and HSM projects significantly upgraded the TA-I Natural Gas Distribution System. The regulator and meter station that supply natural gas to TA-I are both new and have sufficient capacity to cover the expected growth / demand for the next 30 years. The new HDPE gas piping has an expected life of 70+ years.

Approximately 6800 feet of steel natural gas distribution pipe in TA-I and TA-IV 2015 will need to be replaced year FY 2015-2025 because it will have reached the end of its useful life.

The main regulator and metering station for TA-III and TA-V will need to be replaced year FY 2012-2020 to update the meter components to the current technologies and bring the meter station up to SNL specifications. The current meter station configuration has no redundancy and no way of bypassing the meter through a regulated source for meter servicing.

The propane systems in the remote areas of TA-III will need to be replaced FY 2015-2030 to modernize them to meet the accepted code and SNL specifications. One option for doing this is to extend the current natural gas grid out to the remote facilities. This can be done by either using the regulating station at TA-V to supply the remote facilities or building a new regulating station to the south of TA-V that feeds off of the ITRI line. The total pipe length necessary for

this system upgrade is 8 miles. In addition to underground pipe, 20 metering and regulating stations will be necessary to put a station at each remote facility.

The propane systems in the remote areas of CTF will need to be replaced FY 2015-2030 to modernize them to meet the accepted code and SNL specifications. One option for doing this is to extend the current natural gas grid out to these remote facilities. This can be done by building a new regulating and meter stations in the CTF that feeds off of the ITRI line.

Storm Drain System:

Approximately 60% of the storm drain system and appurtenances will need to be replaced and erosion abated in the next 30 years because the piping will have reached the end of its useful life and the damage from erosion will need to be repaired.

The storm drain work is primarily in four categories: corrugated metal pipe replacement, PVC pipe replacement, older reinforced concrete pipe replacement, and erosion damage repairs. Most of the near-term work is needed for the corrugated metal pipes and erosion damage repairs. It is anticipated that within the next 15 years most if not all of the corrugated metal pipe will need to be replaced. It is anticipated that within the next 30 years most of the PVC piping will need to be replaced. It is anticipated that within the next 30 years only the older portion of the reinforced concrete pipe will need to be replaced. Reinforced concrete pipe can have a service life of 40 to 80 years and even more. Within the next 30 years, portions of the site will have reinforced concrete pipe that will be approaching 50-80 years of use, at the edge of its useful life, and will probably need replacement.

The corrugated metal pipe is found in isolated locations throughout the site. Likewise, the PVC pipe is found throughout the site. On the other hand, the older reinforced concrete pipe is found primarily in the older portion of Tech Area I and Tech Area V. The erosion repairs are primarily at the 6000 Igloos, the Manzano Mountains, Tech Area III, Tech Area II, and Tech Area IV.

Sanitary Sewer System:

Approximately 40% of the sanitary sewer system and appurtenances will need to be replaced in the next 30 years because the piping will have reached the end of its useful life. The sanitary sewer work is primarily in five categories: replacement of older clay pipe, replacement of isolated septic systems, replacement of older PVC, replacement of older building laterals, and replacement of lift stations. Most of the near-term work is replacement or repair of older clay pipe and older building laterals. Older building laterals were often made from cast iron pipe. It is anticipated that within the next 30 years some of the PVC piping will need to be replaced. PVC pipe can have a service life of 50 to 100 years and perhaps even more. Within the next 30 years, portions of the site will have PVC pipe that will be approaching 50 years of use, at the lower range of its useful life, and will probably need replacement. Please note that in some cases, relining will be preferred to replacement due to cost and disruption involved in replacement.

The clay pipe is found primarily in the older portions of Tech Area I. The septic systems are found in the more remote parts of the site. The older building laterals are found primarily in the older parts of Tech Area I, III, and V. The PVC pipe is found throughout the site.

Paving:

Approximately 1/3 of the paved roadway system and related appurtenances will be at or below a Serviceability Index of 40 and will require overlay or complete reconstruction. The SNL Pavement Maintenance Management Program utilizes a 50 yr design life for roadways. The design life is based on a periodic maintenance schedule of activities that extend the life of the pavement through maintenance activities such as crack sealing; seal coat application and overlays

when required.

It is anticipated that there will be a need to overlay or reconstructing these roadways and their related appurtenances such as striping, signage, curbs, gutters and walkways. Additionally, some parking lots will require overlays or reconstruction over the next 30 years and replacement of the running surface on the unpaved remote area roadways that Sandia is responsible for maintaining.

During the 30 year planning period it is likely that Sandia will have to rebuild F Ave., 20th Street, Hardin Blvd and 9th St. as well as investments in road in Areas II, III and the remote sites.

Chilled Water System:

The chilled water utility plays an essential role in providing reliable, energy-efficient, low-maintenance cooling systems for Sandia facilities. Its importance is growing in response to

- the increasing number of high-density server rooms at Sandia that require 24/7, highly reliable cooling systems
- the need for quick-turnaround facilities to support Sandia's Work-for-Others programs

The chilled water system has grown in a piecemeal fashion satisfying individual project demands, and its configuration is far from optimal. Projects are planned to improve the condition and expand the capacity of the utility. The chilled water utility will eventually concentrate cooling equipment in a few, selected utility buildings rather than utilizing equipment in individual office/lab buildings operating independently of each other. A centralized chilled water system will improve reliability and energy-efficiency while lowering the maintenance burden. The system consists of sixteen (16) separate "loops", each of which is a pressurized, closed-loop system. Liquid chillers and pumps located in either stand-alone Central Utility Buildings (CUBS) or mechanical rooms in major buildings produce and circulate chilled water in each loop.

Approximately 20% of the chilled water distribution system piping and appurtenances in TAI will need to be replaced year FY 2020 – 2030 because it will have reached the end of its useful life.

Replace Cooling Towers and associated Pumps Bldg. 894 CW CUB FY 13 and replace Cooling Towers and Associated Pumps Bldg 850 FY 12. Replace Chillers and cooling towers (existing CUBS) FY 2020 through FY 2030 and replace Chillers and cooling towers in (existing CUBS) FY 2030 through FY 2040.

New capability includes a Tech Area IV district chilled water system; plan a project for a new CUB and district cooling system for the northwest TAI $15M FY 2020; a new Thermal Storage System for Central TAI District Cooling System and piping in FY15-FY20; and extend Reclaim water systems for use in CUBs and/or cooling Tower Systems.

Landscaping / Irrigation:

The landscape and irrigation function to support a competitive workplace and presentable image to potential new employees, customers and current employees. It is a necessary system and attribute with growing importance. The current landscape system is rudimentary and generally considerably less than is provided at competitive facilities. The landscape and irrigation system exists on around 140 acres and consists of about 3,700 trees and 12,000 shrubs. The urban forest is managed to provide a diverse mix of tree types with a key goal of creating shade and reducing glare and visual blight. The program has received a Gold Leaf Award from the International Society of Arboriculture for "Outstanding Community Landscape Beautification". 65 acres are gravel surfaced, 24 acres are managed as native turf, and 60 acres are barren dirt. Only 2 acres are higher water type turf. The irrigation system and water use is managed by the Calsense Central Irrigation Control System. The barren areas are legacy areas that have no suitable

funding stream for their restoration. We have embarked on a strategy to allow and encourage native grasses to start growing in these barren dirt areas.

Replacement to the landscape system is an ongoing effort. Most of the trees and shrubs were planted in the last 20 years. By 2030 about 50% of the trees and shrubs will need to be replaced. Irrigation systems are built with longevity in mind. A typical system will need replacement after 20 to 30 years. Significant system rebuilds will also be needed by 2041. Landscape gravel eventually gets filled with sand, frequently blowing from the barren areas requiring large areas to be replaced which exceed Maintenance's capabilities.

If future growth and redevelopment is vertical, less land area is needed which results in less landscape needs. I believe the Long Range Development Framework confirms this direction.

Confirmed Deficiencies in the landscape system as per our Unresolved Facilities Needs List will add more investment over a 30 year timeframe.

Future systems design will need an Alternate Water Source. Roof water systems could provide a ready source of water and are included in new facilities. Typically these are a 'hard sell' as they are not competitive with current water costs. The future value of new water sources may be entirely different. Further, using roof water should eventually reduce storm drain needs. Integrating water harvesting in new buildings may entirely replace site drainage needs and related costs. Simply from being a 'community partner', water harvesting is a must. Larger regional water harvesting systems are anticipated which could capture more water and potentially augment water for cooling towers. Also, they could support reduction in pollutant discharges. One other alternate irrigation water source is cooling tower water and this is currently being explored.

Walkways and Pedestrian Malls:
Approximately half of the walkways and pedestrian malls will need to be replaced of the next 30 years. The use life of our pedestrian malls is affected by their dual use as emergency response paths, competition with Trees (particular their root systems), periodic maintenance schedule of activities that extend the life of the pavement through maintenance activities such as crack sealing, and concrete grinding when required.
New pedestrian malls, walkways and plazas will be needed to connect the redevelopment, infill and consolidation of the site in the 2020 – 2040 timeframe.

Alternatives Developed/Available to Meet Program Requirements:

- Interface with proposed investments in buildings and other site improvements to get some of the Infrastructure needs addressed

- Create incremental projects to address infrastructure needs

Current Proposed/Actual Schedule: TBD

Estimated Funding Range:
The Total Project Cost estimate range is still to be determined

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

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Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:

Title: **Security Infrastructure Renovations and Upgrades**

- Perimeter Fencing
- Stand-alone Facilities
- Internal Facility Upgrades

Site Location: **Sandia – New Mexico**

Federal and Contractor Program Manager(s) or Sponsor(s):

Federal: **TBD**
Contractor: TBD

Federal and Contractor Advocates:

Federal: TBD
Contractor: TBD

Mission Gap:

As the Nuclear Weapons program shrinks within the DOE/NNSA Complex, a gap presents itself surrounding the footprint associated with security operations at Sandia. A major concern regarding physical security is that the infrastructure be in place when needed. Given the presence of Limited Areas (behind fencing or stand-alone facilities) throughout the site (Technical Areas I, II, III, IV, and V) the upgrade to the security infrastructure would be extensive.

Program Requirements: (Required)

Sandia requires the infrastructure support in terms of guaranteeing our customers physical security, security for technical equipment, and information security.

Alternatives Developed/Available to Meet Program Requirements:

As part of both alternatives indicated below, the costs for the study, demolition of existing fencing, and the associated costs for personnel moves is assumed for each.

Alternative One: Assuming NNSA retains overall landlord responsibilities at the SNL-NM site, this project would verify the current security footprint to determine the extent to which a new security fence or other type of perimeter security technology would be required and replaced.

Alternative Two: Assuming a campus where NNSA work has been consolidated into a smaller footprint, upgrading and installing the smaller perimeter security fencing or other modern security infrastructure will be required.

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Note: Funding amounts shown are based on mid range of proposed overall project cost estimate range.

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Sounding Rocket and Suborbital Experimentation Capabilities Investment**
Site Location: **Sandia – Hawaii**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
The Hawaiian facilities (Kauai Test Facility and the Mount Haleakala, Maui facility) operated by Sandia support research and development activities including sounding rocket operations, suborbital co-experiments, as well as the remote communications air-to-ground facility for the Federal Aviation Administration (FAA). At this time, Sandia is aware that the future of the Hawaiian facilities is in question because National Nuclear Security Administration's (NNSA) mission need for the facilities and infrastructure is declining.

Program Requirements:
Provided the Hawaiian Facilities remain under NNSA tenancy, an investment in the facilities, infrastructure, and equipment will be needed to continue the R&D activities for both NNSA and national security mission activities.

Alternatives Developed/Available to Meet Program Requirements:

Currently, a memorandum signed by NA-10 in August, 2009, stated the Hawaiian facilities (KTF and the Mount Haleakala, Maui, facility) operated by Sandia do not support NNSA's direct missions and declared the Hawaiian facilities excess property. In partial response, Sandia has prepared two Preliminary Real Estate Plans (PREPs) for DOE/NNSA to negotiate the terms and conditions for vacating its tenancy of the Kauai Test Facility (KTF), Kauai, and the Mount Haleakala, Maui, facility and transferring overall landlord responsibilities to another customer, possibly the Department of Defense/U.S. Navy (DOD/Navy) and the FAA, respectively.

The PREPs recommend the formation of a transition team to discuss funding and environmental issues and to evaluate interested landlord customers. Notification has been made to the FAA regarding NNSA's plans to vacate the facility at Mount Haleakala. Until a new landlord customer has been found for KTF, and the FAA has approved the termination of the permit, the Hawaiian Facilities will remain under DOE/NNSA tenancy.

Upon clarification of the PREPs, a path forward will determine the types of investments required to either maintain or divest of the Hawaiian Facilities.

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Technical Area V Capability Investment**

- 6588 – Annular Core Research Reactor (ACRR)
- 6580 – Hot Cell Facility
- 6586 – Gamma Irradiation Facility
- (Includes Bldgs. 6587, 6590, 6591, 6578, 6581, 6582, 6592, 6593, 6594, 6595, 6596, 6597, 6598)

Site Location: **Sandia – New Mexico, Technical Area V**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Buildings 6588 Annular Core Research Reactor (ACRR), 6580 – Hot Cell Facility and 6586 – Gamma Irradiation Facility (GIF) have been identified by the CPIBP process as an asset that need near-term attention or caution is warranted. Building 6588 currently serves as the anchor facility in Technical Area V (TA-V) for the various mission capabilities essential to the enduring Nuclear Security Enterprise (NSE) mission. Sandia has validated that both the programmatic and the facilities and infrastructure (F&I) assets in TA-V, including Buildings 6588, 6580 and 6586 need to be addressed to support these mission capabilities. Maintaining the mission capabilities within TA-V over the long-term through 2041 will require substantial investments in F&I and programmatic requirements for a successful NSE mission.

Addressing the redevelopment of TA-V may include the disposition of ACRR and other facilities and will impact the supplemental mission capabilities that are integrated to the TA-V mission capability. An investigative study will examine the current mission for TA-V, the future mission and the repositioning of the mission. The study will also address and identify the remaining programmatic and F&I gaps, and will present options for redevelopment.

Sandia is undertaking this investigation to develop integrated infrastructure reinvestment strategies necessary to sustain the critical NSE mission capabilities located at Sandia – New Mexico TA-V. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives that will be shared at a later date.

Program Requirements:

- Reactor building for the Annual Core Research Reactor (ACRR)
- Radiation Metrology Laboratory
- Low Dose Rate Gamma Irradiation Laboratory
- Hot Cell Facility
- Reactor Operations Center
- Retention of critical facilities required for stockpile certification
- Retention of ~$200M of unique and no longer obtainable reactor fuel.

- Improved efficiencies in experimental operations and building operations & maintenance
- Disposition of Assets and Identify Future Mission

Alternatives Developed/Available to Meet Program Requirements:

- **Do Nothing** – Program Requirements will not be met.
- **Renovate Existing** – The current buildings are beyond the age of effective renovation.
- **Build New** – The collection of capabilities encompassed by the Area V is facilities are unique and must be maintained in any new construction for stockpile certification

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Tonopah Test Range Capabilities Investment**
Site Location: **Sandia – Nevada**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:

The Tonopah Test Range (TTR) is operated by the NNSA under a land use permit issued by the United States Air Force (USAF). The current role of TTR allows Nuclear Weapons (NW) and Work-for-Others (WFO) mission capabilities to conduct testing and certification of various mission capabilities. At present, the NNSA is generally responsible for environmental remediation costs. Sandia will continue to operate TTR per the NNSA Record of Decision dated December 19, 2008. While operations will continue, it is understood that the size of TTR will be reduced. Given that operations will continue, there will be a needed investment in the following three areas:

- Infrastructure
- Facilities
- Equipment

A reduction in the permit size will result in some costs to Sandia. As negotiations between Sandia, the United States Air Force (USAF), and the National Nuclear Security Administration (NNSA) occur, more clarification as to the future of the site will be developed.

Program Requirements:

Currently discussions among the Sandia, the Sandia Site Office (SSO), the USAF, and the NNSA are examining the following overarching objectives that affect operations at TTR today and into the future:

- Determining the optimal permit size without compromising the national security mission needs of NW and WFO customers
- Considering USAF requirements and environmental regulatory compliance issues
- Minimizing costs and effects on NNSA operations
- Ensuring both the USAF and the NNSA bear the appropriate costs for remediation

Alternatives Developed/Available to Meet Program Requirements:

Once negotiations regarding the size of the permit have been finalized, the scope of the investment will become clearer. Currently the FY2011-FY2020 Ten-Year Site Plan Limited Update lists known facilities that will be considered for demolition regardless of the final permit size.

Current Proposed/Actual Schedule:
Proposed Project Schedule: **TBD**

Estimated Funding Range:
The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								

Attachment G-2
Use for NNSA TYSP or CPIBP
Proposed Mission GAP Information Sheet

Mission Gap Title/Site:
Title: **Weapon Engineering, Product Realization and S & T Capabilities Investments**

- Building 898 Weapons Integration Facility – Classified
- Building 898 Weapons Integration Facility - Unclassified

Site Location: **Sandia – New Mexico, Tech Area I**

Federal and Contractor Program Manager(s) or Sponsor(s):
Federal: **TBD**
Contractor: **TBD**

Federal and Contractor Advocates:
Federal: **TBD**
Contractor: **TBD**

Mission Gap:
Sandia's Science and Technology and Research Foundations Division develops and delivers a full spectrum of differentiating capabilities, ranging from fundamental scientific discoveries to system-level engineering solutions, to support the Laboratory's mission needs. The Engineering Sciences Center provides measurements and evaluation (M&TE) capabilities that include laboratory-scale leading edge research and traditional environmental conditioning testing for Sandia-developed components, sub-systems and one-of-a-kind large scale tests supporting qualification and effects characterization. The Microsystems S&T & Components Center provides support for the Application Specific Integrated Circuit (ASIC) manufacturing program. Other areas of special focus in the Building 898 include: materials sciences and engineering; microsystems science and technology; supercomputer architectures and high performance computing modeling; and simulation-based engineering sciences.

Sandia is undertaking further investigation to develop integrated facilities and infrastructure reinvestment strategies necessary to sustain these important capabilities. The current mission gaps will be considered as well as the future mission needs. Sandia's Nuclear Weapons Executive Management team will continue to develop and refine infrastructure investment initiatives. The results of these investigations, including a recommended path forward, will be presented upon completion.

Program Requirements:

- Complex Microsystems Applications – Applying micro-electro-mechanical systems (MEMS) to systems constrained by unique volume function and power requirements.
- Mechanical Flight Hardware – Producing and certifying rugged, flight-qualified mechanical hardware package designs that protect and maintain operational performance within the thermal and radiation environments on orbit.
- Opto-Mechanical Design Engineering – Advanced mechanical hardware design, manufacture, integration and testing of space-qualified optical assemblies that hold nanometer level wave front distortions and micron level alignment and stability requirements in compact spaces.
- Surety Mechanisms – Designing and developing simple to complex, precise hand-held mechanisms that change state.
- Thermal Management – Designing and integrating active and/or passive management of subsystem heat loads. Active management involves thermal management systems to

control components to prescribed temperatures. Passive management involves designing heat transfer paths within subsystems to thermal interface features.

- Extreme Environment Devices – Engineering, designing, integrating, and field support of data recorder instrumentation used to characterize impact events and other harsh high-G environments to support specifications, design verification, and model validation.
- Initiation Subsystems – Designing and developing advanced electrical and optical components, ultra-miniature high voltage or optically-driven capacitive discharge units, and fully integrated fuzes and firing systems.
- Low-Power Sensor Systems – Designing and developing extreme low power and harsh environment survivable sensor systems capable of detecting, identifying, and communicating events of interest through local networks or long-range communications links.
- "Trusted" Systems – National security system design exhibiting integrity of the underlying hardware and software, and resistance to exploitation through Fail Safe Design Assurance and Anti-tamper methods.
- Advanced Flight Concepts – Integrating electrical and systems engineering, command and control electronics, telemetry systems, launch support and post-mission data reduction for flight test platforms, target objects and countermeasures.
- Communication & Instrumentation – Designing, developing, and field testing high-performance wireless networks, communication systems, and event sensors for specialized applications on space-based, airborne or ground-based platforms.
- Instrumentation Data Analysis – Providing cradle-to-grave telemetry system design support tools that empower engineers to efficiently and effectively extract the precise data they require.
- Systems Test & Integration – Integrating hardware and software components to verify system capability against system requirements through systematic, repeatable and disciplined analysis and testing methods accepted by the industry.
- Telemetry Systems – Designing, integrating, testing and fielding all aspects of test telemetry systems to meet a wide range of flight and ground test needs.

Alternatives Developed/Available to Meet Program Requirements:

- Do Nothing
- Renovate and expand existing facilities to meet emerging program needs (Bldg. 858 is a new facility. Renovation is the most likely in the next 30 years)
- Construct new facilities to support program development

Current Proposed/Actual Schedule:

Proposed Project Schedule: **TBD**

Estimated Funding Range:

The Total Project Cost estimate range: **TBD**

The proposed funding profile for this project.**($K)**

Required	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX	FYXX
PE&D								
Construction								
OPC								