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Title: The Importance of LANSCE to Nuclear Weapons
Stewardship and National Scientific Capabilities

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Intended for: NNSA



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**The Importance of LANSCE to Nuclear Weapons
Stewardship and National Scientific Capabilities**
Don Brown, Robert Little, Chris Morris, and Kurt Schoenberg

The Los Alamos Neutron Science Center (LANSCE) plays an integral role in weapons stewardship, including enhancing the knowledge of nuclear performance, dynamic materials performance and materials and manufacturing. In addition to discussing LANSCE's contributions to weapons science and science in general, efforts to revitalize the LANSCE accelerator and its scientific facilities to help maintain LANSCE as a prominent science facility are discussed. The LANSCE Refurbishment (LANSCE-R) project will update some of the out-of-date hardware of the accelerator to extend the accelerator's lifetime by at least another decade.

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The Importance of LANSCCE to Nuclear Weapons Stewardship and National Scientific Capabilities

Presentation to NNSA

*Don Brown, Robert Little, Chris Morris,
and Kurt Schoenberg*

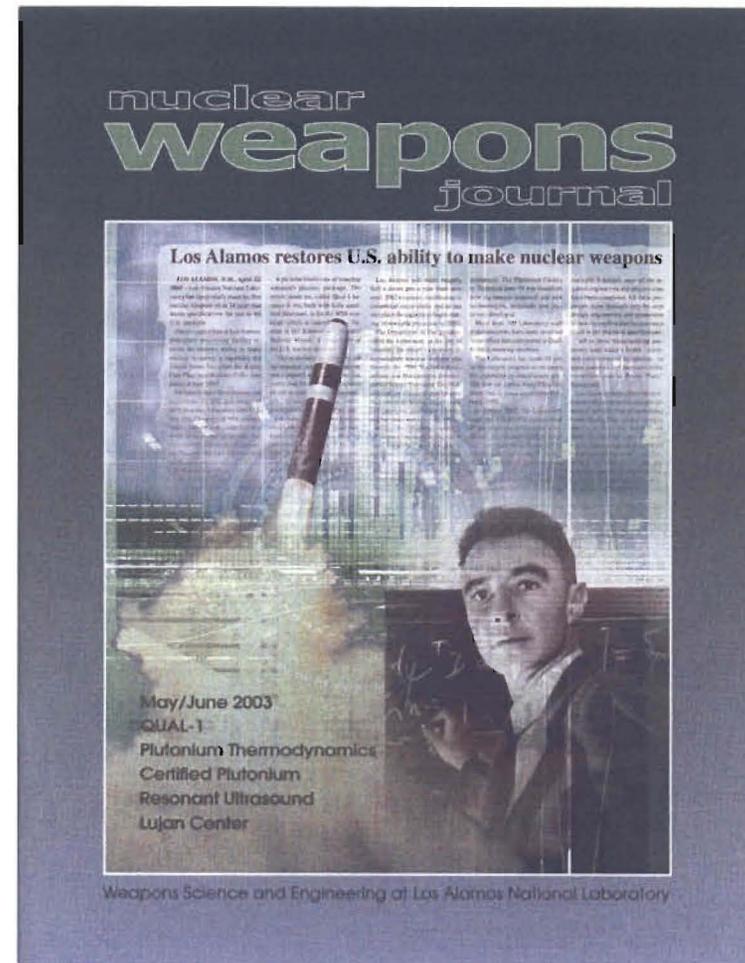


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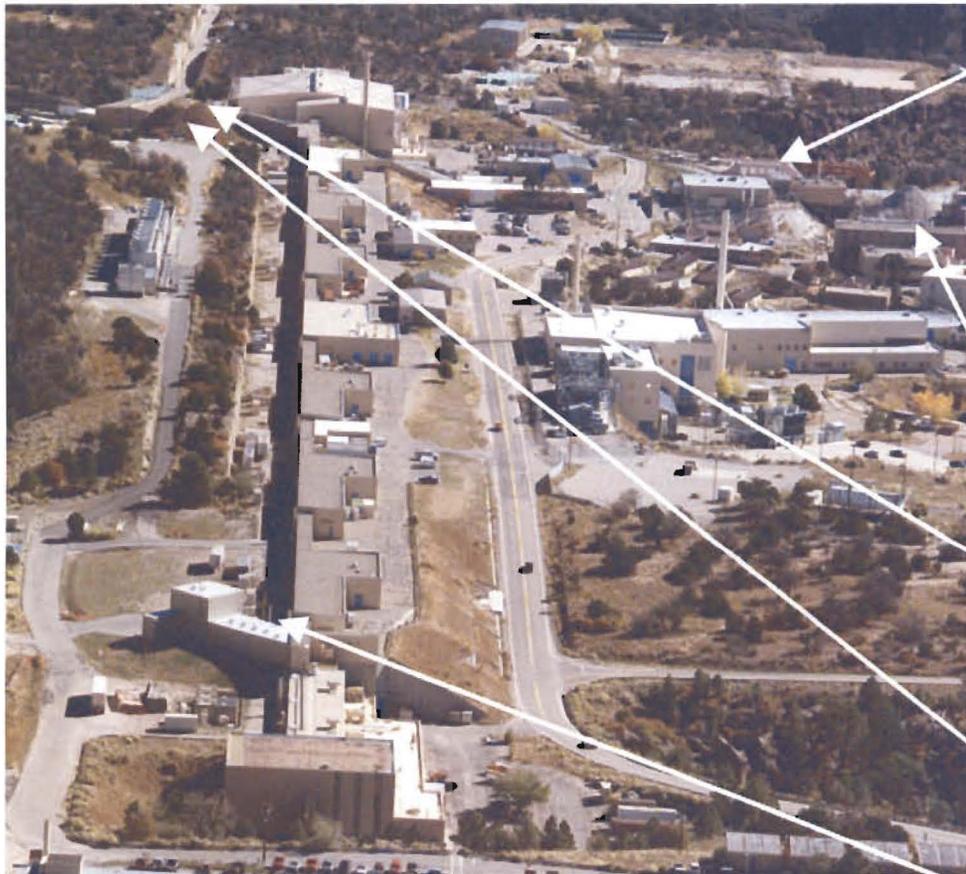


Outline

- Overview of LANSCE facilities, capabilities, and value to weapon stewardship
- Examples of LANSCE-based research in weapons science and certification:
 - nuclear performance
 - dynamic materials and HE performance using pRad
 - materials and manufacturing



LANSCCE presently provides a unique and diverse set of premier research facilities for addressing complex challenges facing our Nation



Unique, highly-flexible beam delivery to multiple facilities 6 mo/yr @ 24/7 with 1200 user visits

Lujan Center

- *Materials science and condensed matter research*
- *Bio-science, nuclear science*
- *National security research*
- *A National BES user facility*

WNR

- *Nuclear national security research*
- *Semiconductor irradiation*

Ultra-cold Neutron Facility

- *Fundamental Nuclear Physics*

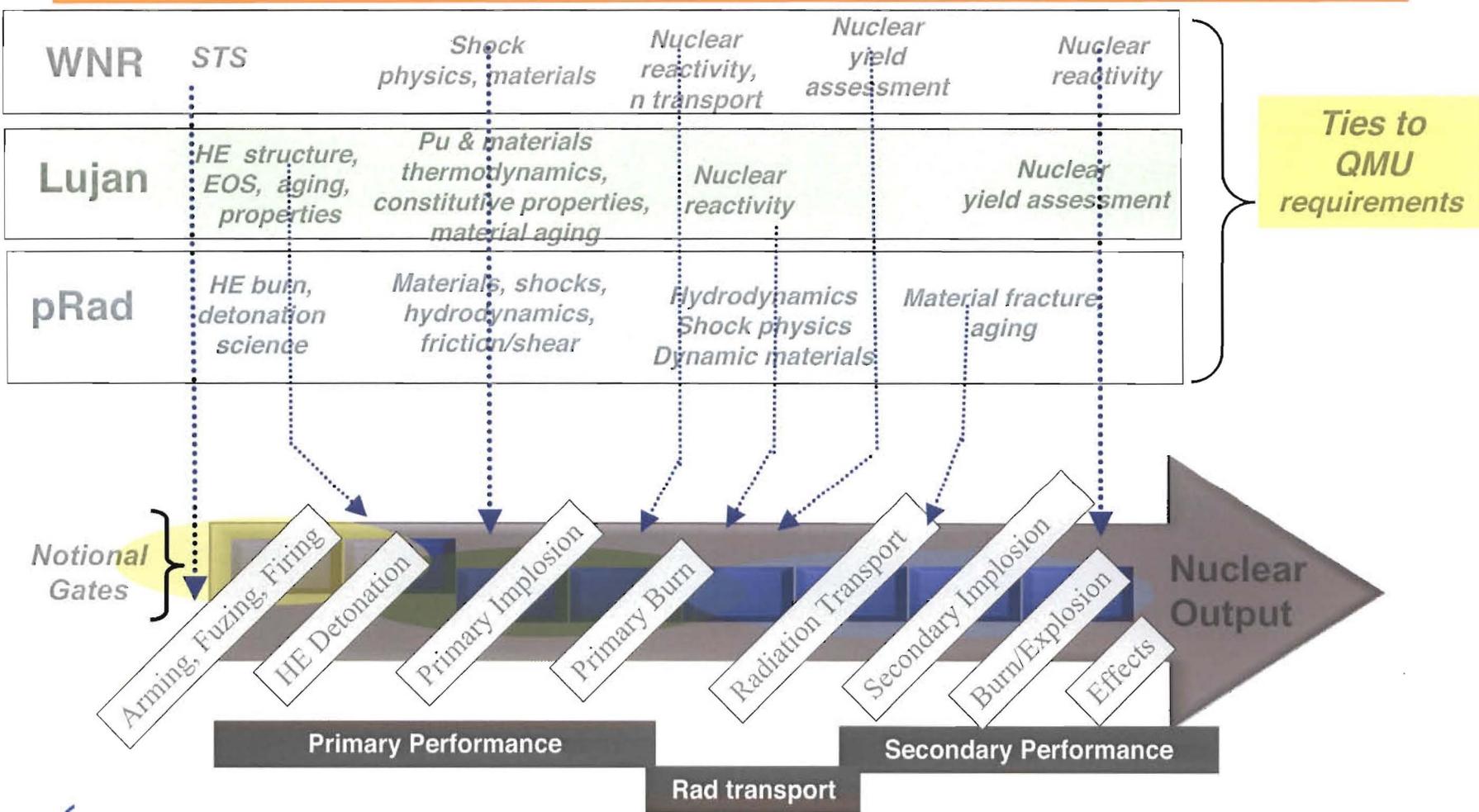
Proton Radiography

- *HE science, dynamic materials science, hydrodynamics*

Isotope Production Facility

- *Nuclear Medicine*
- *Research isotope production*

LANSCCE facilities are unique and support developing the broad science-based predictive capabilities required for future certification



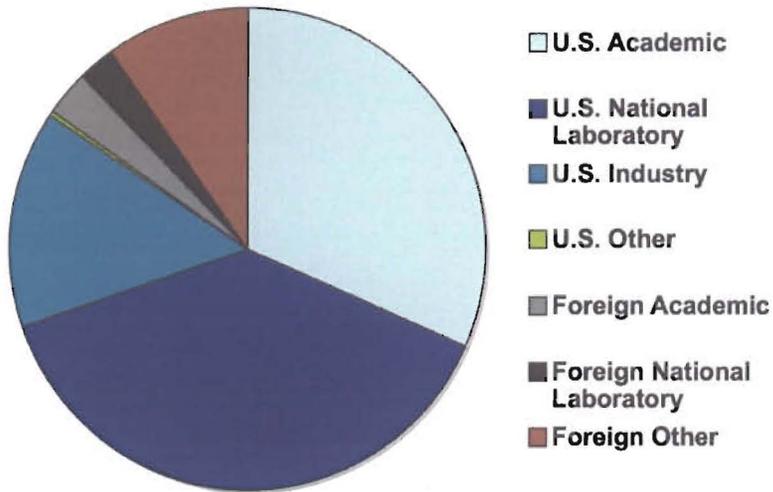
Understanding the performance metrics drives the research requirements

EST. 1943

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LANSCe continues to successfully operate for the benefit of Laboratory and National missions



	Scheduled Hrs	Reliability %
Lujan	3255	81.2
WNR	3227	87.1
pRad	754	95.1
IPF	3629	80.2
UCN	982	86.1



LANSCCE Facility Governance is unique in the DOE

The programmatic responsibility for LANSCE was transferred from ER to DP in FY 1997

In FY 2001, the Deputy Secretary of Energy formally reassigned Defense Programs with responsibility for LANSCE

- *“Assign ... Defense Programs... with corporate responsibility and accountability for strategic integration of all three program offices using LANSCE. This approach applies both to the short-term objective of facilitating IPF construction and the long-term goal of reliable accelerator operations.”*
- Deputy Secretary of Energy to the NNSA Administrator 12/21/2000

FORM 64 (7/14)
GSA
5010-104

file: LANSCE MOA DP/ER

United States Government Department of Energy

memorandum

DATE: **NOV 24 1996**
REPLY TO: DP-13 (T. Beville/J-8251)
AUTH OF:
SUBJECT: Memorandum of Agreement for the Transfer of Programmatic Responsibility of the Los Alamos Neutron Science Center

TO: Distribution

Attached is the Memorandum of Agreement (MOA) for the transfer of programmatic responsibility for the Los Alamos Neutron Science Center (LANSCE) from the Office of Energy Research (ER) to Defense Programs (DP). Beginning in Fiscal Year 1996, DP agreed to fund operations at LANSCE in order to provide programmatic support for its continuing stockpile stewardship effort and to begin research and development of tritium production options. It is the intention of this MOA to better define, at the program level, management and funding responsibility for the LANSCE consistent with the future programmatic missions of both ER and DP. As outlined in the MOA, ER will continue to support the operation of the Manuel Lujan Jr. Neutron Scattering Center and fund research at this facility as dictated by ER mission and as the facility is available.

Any comments or questions concerning this MOA should be directed to Tim Beville at (301) 903-8251. It is Defense Programs' intent to work cooperatively with ER to carry out and enhance the missions of both programs.


Robin Staffin
Deputy Assistant Secretary
for Research and Development
Defense Programs

Attachment

U.S. GOVERNMENT PRINTING OFFICE: 1992 O-250-200

The replacement value of LANSCE is ~\$1.5B - with proper investment and maintenance, the facility has no practical lifetime limit



The beam is produced by an injector and accelerated to 0.75 MeV



A Drift-Tube Linac Increases the Energy to 100 MeV



A Side-Coupled Linac Further Increases the Energy to 800 MeV



Control Room

Recent and ongoing GPP and FIRP investments (~\$25M) have strengthened the Facility Infrastructure



- The Radioactive Liquid Waste plant has been replaced and clean up of the old lagoons is complete
- Three cooling towers have been replaced with two modern units that provide greater efficiency and improved chemistry control
- The >30 year old chilled water plant was replaced in FY04

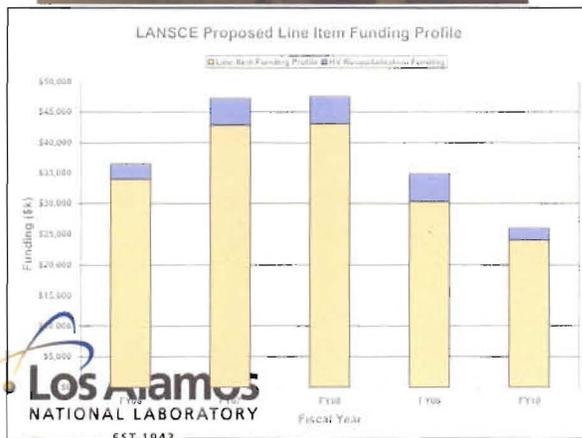


- FY07 FIRP funding (~\$6M) replaced Sector B water and power systems, the Sector M hot water system and the 1L ventilation system

In 2003, with G. Peter Nanos at the helm, the Laboratory defined the LANSCE refurbishment strategy



- Nanos wanted the refurbishment as a line item project “we’re going to re-gun LANSCE”
- The initial project scope identified 142 projects that represent a combined planned investment of \$175M over 5 years from FY06 through FY10, without contingency.
- This process engaged NNSA (NA-10: Beckner) and other partners through the Executive Council.
 - Significant iterations on scope were tied almost exclusively to ongoing NNSA mission need.
 - NNSA mission need was strongly weighted by Proton Radiography requirements
 - Mission need was vetted at several NNSA sponsored workshops and the Overski study in 2006

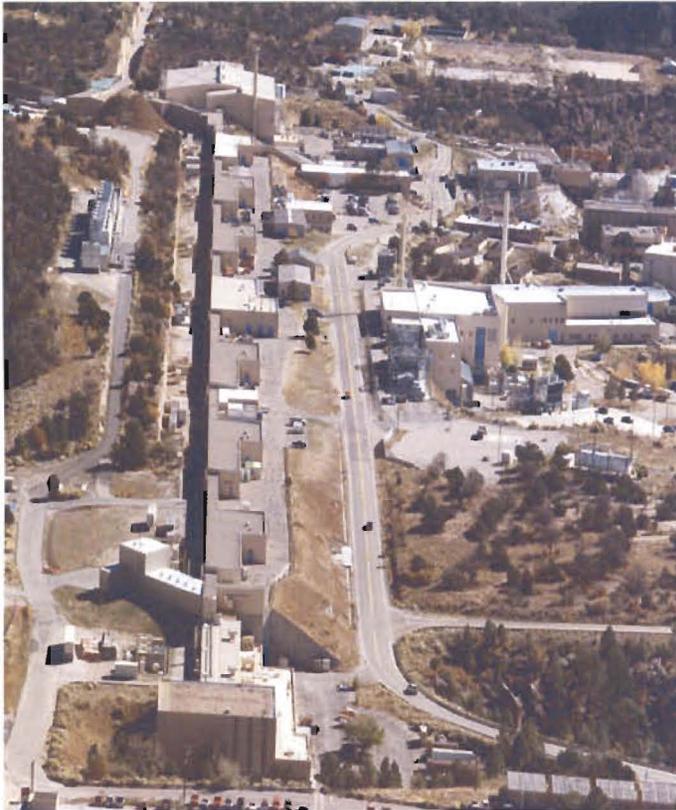


Present LANSCE-R scope will meet the NNSA mission need into the 2020s.

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LANSCCE-Refurbishment Project Status



**LANSCCE-R is a 5 year project
integrated with continued user
program operations**

- The LANSCCE-R project is working towards a 2015 completion schedule and expects CD-1 approval from NNSA in 4QFY09.
- The project is working closely with LANSCCE management to strengthen integration with operations and other programmatic activities
- To derive maximum benefit from the investment in LANSCCE-R, LANS is developing a funding plan for sustainable operations of the LANSCCE facility.
- LANSCCE-R is on the “Critical Pathway” to future mission critical research using LANSCCE facilities. It is also a prerequisite for MaRIE.

The LANSCE whole is much more than the sum of the parts—and the parts are each scientifically and programmatically significant

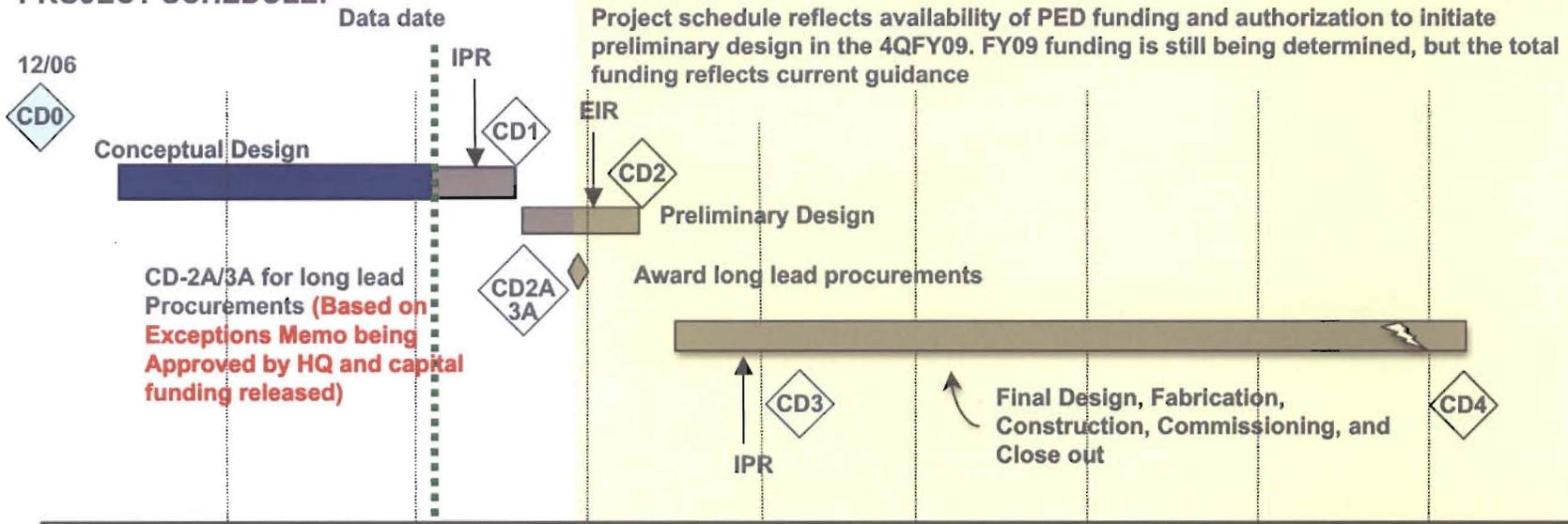
- **Capabilities support, and are adapted to, US national security missions**
 - National security research environment
 - Leveraging other LANL indigenous capabilities
- **Interplay of basic and national security missions is unique and provides unique opportunities for innovation**
 - Invention, rapid exploitation of pRad; classified, sample environment capabilities at Lujan; scientists simultaneously involved in basic, applied research at LANSCE....
 - Strong coupling of LANSCE to key mission-driven LANL materials strategies
- **Lujan will provide both capacity and important complementary capabilities for US neutron scattering in the SNS era**
 - Continued innovation and special capabilities

LANSCE-R ensures LANSCE reliably operates to meet our national security mission well into the 21st century

BACKUP

LANSCCE Refurbishment Project

PROJECT SCHEDULE:

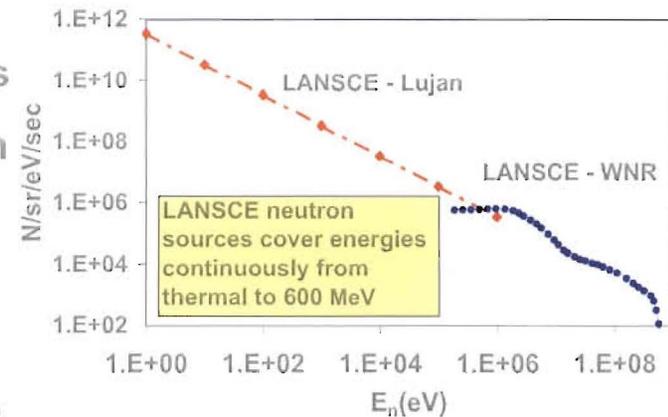
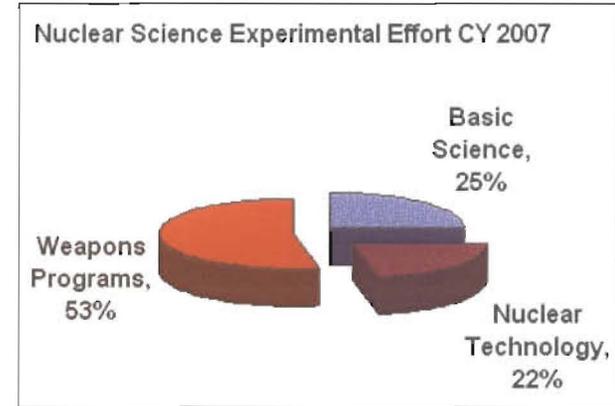


PLANNED PROJECT FUNDING:

	Dollars in Millions							
	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14
PED	0	0	TBD	Out-year budget profile will be determined at CD-1				
OPC	0.85	2.4	TBD	Out-year budget profile will be determined at CD-1				
Total	0.85	2.4	6.0	30.0	40.0	40.0	30.0	9.0
Rescission:	None							
Reprogramming:	None							
ICPP:	0.9	2.0	6.0	30.0	40.0	40.0	30.0	9.0

Nuclear research at LANSCE uniquely addresses important national security issues

- Measurements on Am and Pu isotopes that enable the ΔA and ΔP diagnostics to be stringent tests of weapons performance
- Measurements of ${}^6\text{Li}(n,t)$ that are required for accurate calculations of thermonuclear reactions
- Precision measurements of fission properties of nuclear fuel (fission cross-sections, product cross-sections, fragment energy, neutron/gamma outputs, multiplicity & energy, isomeric states...)
- Support of the NNSA boost effort by providing measurements of crucial neutron induced reactions
- Measurements that enable us to extract information from early- and late-time radchem diagnostics
- Measurements of transient effects in electronic circuits of weapons (Supports Sandia QASPR and W76 certification)
- Development of neutron radiography as a stockpile surveillance tool (getters, SFI's...)



Only LANSCE has the spectral range to address the full suite of DP issues