GENERAL GUIDELINES
FOR THE
SANDIA-UNIVERSITY RESEARCH PROGRAM (SURP)
Manager, Marie L. Garcia

(Revised 3/2007)

For many years Sandia National Laboratories has funded the cooperative Sandia-University Research Program (SURP) to provide "seed" research funding support to beginning faculty researchers at strategic universities. The objectives of this joint program are to offer an opportunity, involving relatively uncomplicated procedures, for new faculty members to begin active collaborative research endeavors with Sandia counterparts. Program funds will be used to support both new and continuation proposals.

ELIGIBILITY

The program is designed to aid new faculty members in beginning their sponsored research.

"New" faculty means tenure track faculty with no more than four years at the sponsoring university, and no more than eight years past terminal degree.

In order to address DOE's concerns that a foreign national is eligible (in lawful immigration status) to be in the United States (DOE Order 142.3), proof of VISA status (H1B work authorization form, F1, J1, etc., expiration date, country) for each foreign national (faculty and/or student) must be included with their proposal. Proposals will not be considered for funding unless the required documentation is included with the proposal. The Sandia PI must obtain all necessary foreign national form approvals. If a foreign national joins the project mid-year, notification to Sandia SURP program must be made at that time and approvals obtained by the Sandia PI.

SURP projects should be of high relevance to Sandia's research interests and mission needs and should complement **Sandia's Nuclear Weapons Capabilities and Research Foundations (see Appendix A).** Projects may also include technology maturation and/or commercialization research support of technologies being developed at Sandia (see a description of Sandia's Science and Technology Capabilities at: **http://www.sandia.gov/mission/ste/index.html.** The manner in which the proposed research would mesh with Sandia's interest should be explained in the proposal.

DURATION OF AWARD

Awards in a minimum amount of $40,000 ($25,000 from SURP and a minimum of $15,000 from your Sandia collaborator) are made for a one-year period (October 1 to September 30). An option exists for additional funds to be applied to the SURP project by the line organization, so long as the additional amount is specified and justified in the proposal, collaborator's letter of support, and detailed in the proposal budget. Continuation awards for one additional year can be requested toward the end of the first year utilizing the same format of the original proposal and including a progress report on milestones met during the first year. Requests for renewal funding will compete with other new proposals.

As agreed upon by the three NM universities, the maximum university overhead rate on SURP contracts will be 10%.

PROCEDURES

In order that the proposal-to-award task may be eased and that long-term research collaboration is initiated, the university principal investigator should:

1. **Develop points of contact or collaborators at Sandia** who work in the same or similar fields of interest as those of the principal investigator and can provide helpful support and assistance regarding collaborative research of interest to Sandia. Furthermore, such individuals are **required to provide a minimum of $15,000** in support of the project. Additional funds may be applied to the SURP project by the line organization, so long as the additional amount is specified and justified in the proposal, collaborator's letter of support, and detailed in the proposal budget. It should be noted, however, that the final decision for funding a proposal rests with the SURP Proposal Review Committee.

2. **Prominently identify their Sandia collaborator(s)** on the cover sheet of their proposal and be certain that their project and its research direction meets with the approval of their Sandia collaborator(s) (see cover sheet template, Appendix B).

3. **In the proposal, include a letter of support from the Sandia collaborator(s)** expressing the relevance of the intended research to Sandia's research interests and mission needs and their willingness to support the project with a minimum of $15,000 of collaborative funding.

4. **In the proposal, include a letter of support from the university department chairperson.** The letter of support should express the rationale for the proposed research vis-à-vis the department and its research interest.

PROPOSAL PREPARATION AND SCHEDULED REVIEW PROCESS

1. Proposals must include a Project Summary of the proposed activity suitable for publication, not more than one page in length. It should not be an abstract of the proposal, but rather a self-contained description of the activity that would result if the proposal were funded **(see SURP Proposal Criteria)**.

2. The main technical content of the proposal should be limited in length to no more than **eight** pages, excluding the abstract, references, and support letters **(see SURP Proposal Criteria).**

3. The university will establish its own internal review process for the proposals.

4. The university will forward its **recommended and ranked** proposals to Marie L. Garcia, Chairperson for Sandia's SURP Proposal Review Committee, by **July 1**. **Five** copies of each recommended proposal and attachments described above in #2 are to be forwarded to Sandia along with an electronic file containing the same data formatted in Microsoft Word. Excel is acceptable for budgets.

5. Sandia announces its award decisions and issues contracts to the university in time to permit initiation of contract work effective October 1. Sandia will notify the university of its decisions at the earliest possible date in order that researchers' schedules may be adjusted if necessary.

6. **Renewal requests**
   Principal investigators should submit complete proposals in the same format as the original proposal, with status reports on what has been accomplished to date, what is expected to be accomplished during the balance of the first year's research, and a description of the research in the second year. Requests for renewal funding will compete with other new proposals.

7. **The PI of a funded proposal is required to submit a brief year-end report of research progress** to his/her Sandia Collaborator(s) and to Marie L. Garcia, Chair, SURP Proposal Review Committee. The PIs must complete their work within the contract period of performance. This report must be

submitted no later than October 31st (see attached report template, Appendix C). The report should include the following:

- Project title
- Sandia and University PI names
- Description of accomplishments
- Any breakthroughs
- Any change in research direction due to results
- Description of any follow-on work/patents/additional funding obtained
- Copies of any Journal articles/refereed publications
- Conference proceedings/presentations

BUDGET PREPARATION AND LIMITATIONS

1. SURP budgets may not be exceeded. Individual budgets should not exceed $40,000 or the amount specified in the proposal budget, whichever is greater. When submitting budgets, furnish a detailed estimate of costs. Itemize expenditures by month for the proposed contract. It is imperative that Sandia know exactly when and how the budget will be spent. ***Awardee should be made aware that money from one fiscal year's contract may NOT be carried over to the next fiscal year.***

2. Use of Sandia computing facilities must be justified in SURP proposals. Such justification must contain an estimate of the amount of computer resources desired.

3. Sandia will not provide secretarial or clerical assistance.

4. Purchase of equipment, materials, and supplies should be restricted to **expendable items only**. No personal use equipment, such as computers, laptop computers, calculators, recorders, cameras, or other similar equipment, will be approved for funding.

5. When submitting budgets (or revisions thereto), furnish a detailed estimate of the costs. Do not include items, such as "one lot misc., $2,500." Break down the "misc., $2,500" item-by-item. Furnish Sandia with **five** (5) copies of the budget or revisions (this should also be included on the electronic file formatted in Microsoft Word or Excel).

6. "Minor" budget revisions do not require Sandia approval provided:
   a. There is no change in the contract value
   b. No permanent equipment is being procured

7. Furnish with each budget or revision a realistic estimate of billings by month for duration of the proposed contract. Note: Simply dividing the balance of dollars in the budget by the number of months over which it will be spent does **not** constitute a "realistic estimate."

8. Student support (tuition/stipends) is allowed. Such amounts must be detailed in the proposal budget.

TRAVEL

Travel for the PI is considered an allowable cost and must be detailed in the proposal and budget submissions. Contract-related travel might include: travel to Sandia, attending a conference, presenting a paper, or collecting specimens or data. No foreign travel is allowed. Advance written authorization from Sandia for travel is not required provided the travel is detailed in the budget. Costs accrued during travel must fall within the guidelines of both the university procurement and Sandia procurement policies.

QUESTIONS

Questions concerning any matter pertaining to the SURP may be directed to the appropriate point of contact at each university:

New Mexico State University:
Laurie Churchill, Ph.D.
Special Assistant to the Vice President for Research
New Mexico State University
MSC 3RES, Box 30001
Las Cruces, NM 88003-8001
Phone: 505-646-4015
Fax: 505-646-5717
ljchurch@nmsu.edu

New Mexico Tech:
Stephany Moore
Research Services Manager
New Mexico Tech
Research and Economic Development Office
801 Leroy Place
Socorro, NM 87801
Phone: 505-835-5690
Fax: 505-835-5649
smoore@admin.nmt.edu

University of New Mexico:
Denise Wallen, Ph.D.
Director, Research Development and Initiatives
Office of Vice President for Research and Economic Development
1717 Roma NE, MSC05 3180
1 University of New Mexico
Albuquerque, NM 87131
Phone: 505-277-2256
Fax: 505-277-5567
wallen@unm.edu

APPENDIX A

Nuclear Weapons Capabilities

Nuclear Weapons (NW)
Develop ideas for a transformed stockpile in the future using science and technology to explore high risk and technically revolutionary ideas in support of weapons systems, components and fabrication capabilities.

Enable Predictive Simulation (EPS)
Building the knowledge base and the capabilities necessary for predictive simulation of complex problems.

Nanoscience to Microsystems (NTM)
Understanding and manipulating matter across atomistic to micro scales in order to exploit unique properties and create complex systems.

Science of Extreme Environments (SEE)
Creating new knowledge that enables revolutionary advances in the areas of energy, pulsed power and electromagnetics, high energy density physics and radiation effects sciences for National Security needs.

For more information regarding the Plan for Transformation of the National Nuclear Security Administration Nuclear Weapons Complex, go to:
http://www.nnsa.doe.gov/docs/newsreleases/2007/PR_2007-2-2_NA-07-03.htm

Research Foundations

Sandia addresses technical issues of critical national importance. To assure that the solutions we provide are both innovative and sound, we sustain areas of scientific depth that provide technical excellence in various disciplines. This ensures each discipline a "critical mass" of experts to test new ideas and attract new talent to Sandia. These research foundations, which differentiate Sandia from universities and many other federal laboratories, are

- materials and process science, including **nanoscale materials**
- computational and information sciences,
- microelectronics and photonics sciences,
- engineering sciences, and
- pulsed power sciences.

Materials and Process Science

Sandia's research foundation in materials and process science provides the scientific basis for technical options and decisions about polymers, ceramics, and metals and the interfaces among these material combinations in nonnuclear components for the stockpile. We estimate times for component replacement, choose replacement materials, and determine the means of manufacturing replacement components. We synthesize and process materials and select methods for controlling the resultant microstructure and chemical composition. We fabricate piece parts using geometries and properties that fully satisfy design intent and allow us to predict how these properties change with time.

Three major types of research subprograms support this research foundation: scientifically tailored materials, materials processing, and materials aging and reliability.

The scientifically tailored materials subprogram addresses the need for materials with specific properties or performance characteristics for use in the stockpile. We seek to understand how the materials' properties depend on composition and microstructure. **We also explore the scientific principles governing the properties and performance of nanoscale materials**.

The materials processing subprogram seeks to understand new and existing processes critical for DOE Defense Programs' current and anticipated needs. Emphasis is on the means of processing, reduced process/product development cycles through scientific model-based processing, and fabrication of parts with fewer defects and at lower cost.

The materials aging and reliability subprogram quantifies the chemical and physical mechanisms that cause materials properties to change with time and identifies the modes of failure. Mechanisms involve both intrinsic thermodynamic drivers associated with the materials and extrinsic environmental drivers. This subprogram provides the scientific basis for quantitative prediction of component reliability as a function of time in the stockpile.

Computational and Information Sciences

Sandia's research foundation in computational and information sciences develops technology to revolutionize scientific studies and engineering practices. We need tremendous increases in supercomputing power to analyze complicated accident scenarios, monitor and assess weapons components and systems, predict the aging of key stockpile materials, and design replacement components. We are developing technology to support the Accelerated Strategic Computing Initiative and other weapons programs that will ensure the safety and reliability of the nuclear stockpile under the aegis of the DOE Science-Based Stockpile Stewardship Program.

Research areas include new mathematical methods, algorithms, and software; new parallel solvers for linear and nonlinear systems of equations; new methods to solve highly nonlinear optimization problems; and tools to handle the results of large-scale computations. Such research has led to national awards, major patents, and numerous commercial licenses.

Research is under way in the area of scalable commodity (i.e., using commercially available components) supercomputing and distributed computing over long-distance networks. We emphasize high-speed networking, storage systems, encryption, and scalable operating systems. Sandia's initiative in distributed computing is providing technology for next-generation, high-performance cluster computing. Such computing systems will make greater use of high-volume commodity building blocks and will be constructed over greater lengths of time, leading to more heterogeneous systems than we had in the past. Within the DOE Distance Computing and Distributed Computing ($DisCom^2$) Program, Sandia is now implementing such a computational plant (known as Cplant□), portions of which are located in New Mexico and California.

Other research foundations are providing the technology to support the Distance Computing and Distributed Computing Program and are developing the scalable systems and applications software needed for program success. A primary concern is the need to provide tools that continue to operate properly as the system is degraded by one or more component failures.

Creating software for such environments has produced significant advances in the creation of component-based software environments. Sandia is designing component-based software architecture and associated frameworks to enable interoperability between modeling tools and other engineering software.

A broad range of massively parallel applications is being developed within this research foundation to address important areas for the Science-Based Stockpile Stewardship Program, including chemically reacting flows, shock physics, electromagnetics, and material design and aging. New programs in systems-level simulation and web-based delivery of analytical tools are delivering modeling capabilities to the desktop of weapon component and system engineers. Simultaneously, initiatives in evolutionary computing are advancing our ability to simulate the entire nuclear weapons defense decision-making structure and to optimize strategy, tactics, and designs.

Microelectronics and Photonics Sciences

Sandia's research foundation in microelectronics and photonics provides the underlying science and technology to ensure state-of-the-art implementation of Sandia's electronics systems. This research foundation includes activities ranging from fundamental solid-state physics to the design and fabrication of radiation-hardened integrated circuits and integrated microsystems. It includes the complete computer-aided design, fabrication, testing, packaging, and reliability infrastructure necessary to transition research concepts into qualified products. Continued advancement of radiation-hardened technologies, microelectromechanical systems, sensors, and optoelectronics remains a driving element of our microelectronics and photonics sciences.

In 1996, Sandia identified a major strategy for creating the small, low-power, high-functionality devices called integrated microsystems. These devices use integrated circuit fabrication technology to put many functions (including processing electronics, sensors, communication devices, and microelectromechanical systems) on a single substrate or in very small multichip modules. An external review committee of experts in microtechnologies from industry, universities, and other federal laboratories reviewed Sandia's microtechnology capabilities in April 1998 and concluded that we have unique capabilities to realize integrated microsystems and are recognized leaders in this emerging field. Consequently, Sandia's microelectronics and photonics sciences are organized to support the major technologies for integrated microsystems (silicon microelectronics, sensors, and compound semiconductor devices), along with the associated infrastructure.

Engineering Sciences

Sandia's research foundation in engineering sciences supports core research, development, and applications that ensure the highest caliber of experiments, theory, and computations in support of Sandia's missions. Engineering sciences support Sandia program elements such as weapons performance and safety; underground transport of contaminants; and the design, fabrication, and performance of microelectromechanical systems for weapons applications. In addition, Sandia provides national leadership in the engineering sciences community commensurate with our strong engineering identity. Activities range from participation in national review boards (such as those for the TWA Flight 800 crash and the USS *Iowa* gun turret accident) to organizing national and international conferences.

The engineering sciences research foundation fosters diverse, mission-oriented activities. Research includes experiments, physical model development, and new computational capabilities in aerosciences, fluid mechanics, thermal sciences, reactive processes, solid mechanics, material mechanics, structural dynamics, computational technologies, uncertainty quantification, and electrical engineering/electromagnetics.

The engineering sciences research foundation and the Accelerated Strategic Computing Initiative integrate experiments and computation to develop validated, predictive, science-based simulation capabilities to support Sandia's missions. We develop and apply advanced diagnostics for experimental discovery of physical phenomena and constitutive behavior that provide a basis for development of computational models. In addition, we use spatially and temporally resolved experimental data to validate all levels of model integration—from submodels within a given discipline to integrated multiphysics capabilities bridging multiple disciplines. These science-based computational capabilities will permit us to design and certify Sandia products more rapidly, cost-effectively, and (most important) with greater confidence from a more thorough understanding of the governing physical phenomena.

Pulsed Power Sciences

Sandia's research foundation in pulsed power sciences applies innovative technological advances to problems of national importance in conjunction with other DOE laboratories, US industry, and universities. Our fast (submicrosecond) pulsed power research supports DOE's Stockpile Stewardship Program by providing x-ray radiation environments to certify the survivability of strategic systems in the nation's nuclear weapon stockpile and by contributing to DOE initiatives such as the Stockpile Life Extension Program and the Inertial Confinement Fusion Program. The large-volume, high-temperature, high-energy-density environments unique to our z-pinch implosions are key contributors to weapon science research and experimentation in collaboration with Lawrence Livermore and Los Alamos national laboratories. Our pulsed power capabilities are especially critical to certify weapon survivability and perfomance in the absence of underground nuclear testing. Our goal with pulsed power in the laboratory is to achieve high yield that will substantially enhance our capabilities in radiation effects, weapons physics, and inertial fusion energy.

Pulsed power sciences make substantial contributions to six of DOE Defense Programs' weapon science campaigns: Primary Certification, Dynamic Materials Properties, Advanced Radiography, Secondary Certification/Margins, Certification in Hostile Environments, and Inertial Confinement Fusion High Yield. Pulsed power sciences also contribute to the science and technology programs of other federal agencies. Advances in x-ray power output and repetitive, high-average-power accelerator technology in the last few years have led to several new applications. The common element in these advances is efficient conversion of stored electrical energy into a short pulse of x rays or charged particles. Our new pulsed-power endeavors include

- generating a high-brightness, compact radiographic source to support stockpile certification;
- obtaining accurate material equation-of-state data for simulation codes;
- interpreting spectra from astrophysical objects;
- assessing electron beam heating and supersonic flow in a wind tunnel for the Air Force,
- detecting land mines for the Army; and
- developing technologies to evaluate short-pulse, high-voltage wiring in aging aircraft for the Federal Aviation Administration.

In partnership with industry and universities, we also use our pulsed power expertise for surface modification of materials, electronic pasteurization of food and pharmaceuticals, and sterilization of medical instruments and medical wastes.

Sandia's pulsed power sciences research foundation balances experimental innovation with theoretical and computational guidance. An extensive set of time- and space-resolved diagnostics and a suite of design and simulation codes have been developed for this purpose. Pulsed power will continue to provide critical and cost-effective capabilities for application stockpile stewardship, basic science, industry, and (potentially) energy production.

3/2007

Appendix B

Title Page

Sandia-University Research Program (SURP) Proposal
To Sandia National Laboratories

By (name of university)

Title of Proposal: **(indicate if this is a first-year or second-year proposal)**

PI Name/Title/Department:

Sandia Collaborator (Name/Division/Phone/E-Mail):

Duration of Award: **October 1, 200X – September 30, 200X**

SUBMITTED BY:	**APPROVED BY:**
Name:	**Name:**
Signature:	**Signature:**
Citizenship:	**Univ Office:**
Telephone:	**Telephone:**
E-Mail:	**E-Mail:**
Fax:	**Fax:**
Date:	**Date:**

Appendix C

Year-end Report of Research Progress
Sandia-University Research Program (SURP)
between
Sandia National Laboratories
and
<<Your Name, Department, and University>>

DUE: October 31, 200X

Submit year-end report in Word format, graphics in a separate file and also embedded in the Word report

Project title:

Sandia collaborator (name and organization):

Abstract of work (succinctly state the problem, the background, describe scientific field, and impact of problem on field): *(100 words, maximum)*

Description of research accomplishments: *(500 words, maximum)*

Examples of breakthrough research (if any): *(250 words, maximum)*

Description of change in research direction due to findings, if any. Please describe the reason for the change and the new direction: *(250 words, maximum)*

Description of follow-on work and additional funding (NIH grants, additional work for other institutions, etc.), if any: *(250 words, maximum)*

Citations for conference proceedings/presentations; journal articles/refereed publications; technical advances, patents (use accepted academic format):

Please submit the completed report by October 31, 200X to:
Yolanda Moreno, ymoreno@sandia.gov