

Managing BER Scientific Focus Area (SFA) Programs At the DOE National Laboratories

Purpose of the SFA Structure

Encourage, facilitate, and effectively manage integrative and collaborative programs at the DOE National Laboratories to achieve scientific research and solutions of the highest quality in support of BER strategic goals.

Initial Setup of National Laboratory Programs within BER

BER is improving the approach to funding research at the National Laboratories. Rather than funding individual, single investigator projects, BER will now fund integrated research programs at the National Laboratories. This new approach is a recognition that the National Laboratories are structured for conducting coordinated, team-oriented research in a manner that is distinct from, but complementary to, research conducted via Financial Assistance (10 CFR Part 605) at other institutions such as Universities or the private sector.

BER's SFA approach challenges the National Laboratories to build and sustain integrative team-oriented research programs based on their unique scientific capabilities and administrative resources to meet BER strategic goals. The intent is to take advantage of the National Laboratories' distinctive strengths in conducting collaborative, coordinated and sustained research programs. With this shift National Laboratories will have more direct managerial control and responsibility over the research programs they develop. The National Laboratories will have considerable freedom to evaluate their current research portfolios and budgets to craft holistic, integrated programs that build on the strengths of each National Laboratory to meet BER strategic goals. The research performed within each SFA program must be more than a loose collection of individual projects directed by separate investigators. Rather, SFA programs must be coherent and cohesive programs that reflect coordination and collaboration among individual researchers and teams of investigators, across National Laboratory divisions and among others institutions, when applicable. Additionally, as BER's strategic goals change, the National Laboratories will be expected to reconfigure programs to meet these changing research needs.

It will be the responsibility of the National Laboratories to craft and sustain an integrated SFA program. It will be the responsibility of BER Program Managers to provide clear goals and strategic guidance, both initial and ongoing, to enable the National Laboratories to build integrated and coherent research programs structured to meet BER strategic goals.

As a first step, and at BER's discretion, SFA Program plans and SFA Science plans are solicited from National Laboratories that already have a significant funded presence within BER programs. BER will first ask for high-level Program plans (Appendix A) that outline the overall strategic scientific focus, research objective(s) and management structure of the proposed SFA program from each National Laboratory. The Program plan should contain a broad but concise view of the proposed research program and should be no more than 8 pages in length. Program plans are a high-level outline of a larger Science plan that may be submitted subsequently. The

Program plan will be reviewed by BER program managers as part of a dialog between BER and the individual National Laboratories on how best to structure SFA programs to meet BER strategic goals. If agreement is reached between BER and a National Laboratory on an acceptable Program plan, the National Laboratory will be invited to submit a longer and more detailed Science plan which will be evaluated by peer review. The Science plan (see Appendix B) is a scientifically detailed version of the Program plan that addresses one of the BER SFAs listed below.

BER Scientific Focus Areas

- **Genomics: GTL Foundational Science**
Genomics: GTL has the mission goal of developing the science, technology, and knowledge base to harness microbial and plant systems for cost-effective renewable energy production, carbon sequestration, and environmental remediation. The Foundational Research activity supports fundamental research and technology development that underpins all microbial and plant research conducted in the Genomics: GTL program overall and in the GTL Bioenergy Research Centers. GTL Foundational Research also develops the robust computational infrastructure needed to understand, predict, and ultimately use the genomic potential, cellular responses, biological regulation, and behaviors of complex biological systems of interest to the DOE mission.
- **Genomics: GTL – Biofuels**
GTL biofuels research will contribute towards biotechnology solutions for production of two biofuels: hydrogen and ethanol. Hydrogen is the ultimate carbon-free energy carrier that can be converted efficiently to energy in fuel cells with water as the only chemical by-product. Cellulosic ethanol is a carbon-neutral fuel that can already be used within today's energy infrastructure. This activity supports innovative systems biology research specifically directed towards scientific issues and challenges unique to biological hydrogen and ethanol production.
- **Low Dose Radiation**
Low Dose Radiation Research focuses on determining health risks from exposures to low levels of ionizing radiation; information critical to adequately and appropriately protecting individuals, and to making more effective use of our national resources. Information developed in this program will provide a better scientific basis for making decisions with regard to remediating contaminated DOE sites and for determining acceptable levels of human health protection, both for cleanup workers and the public, in the most cost-effective manner.
- **Ethical, Legal and Societal Issues (ELSI)**
ELSI research focuses on Office of Science issues in bioenergy, synthetic biology, and nanotechnology, including exploration of, and communication of, the societal implications arising from these programs. The ecological and environmental impacts of nanoparticles (including nanotracers) resulting from nanotechnology applied to energy technologies will be studied.
- **Radiochemistry and Instrumentation**

Imaging sciences supports fundamental imaging research, maintains core infrastructure for imaging research and development, including innovative imaging technology with respect to new radiochemistry and radiotracer methodologies for precise and dynamic metabolic imaging of biological organisms. This research will provide the capability to visualize plant and microbial metabolic networks and regulatory systems underlying cellular differentiation, specialization, and interactions with the environment.

- **Environmental Remediation Sciences Research**
Environmental remediation sciences research addresses questions of fundamental environmental remediation science at the interfaces of biology, chemistry, geology, and physics. The research provides the scientific foundation for the solution of key environmental challenges within DOE's cleanup mission at scales ranging from molecular to the field-scale, including issues of fate and transport of contaminants in the environment; novel strategies for *in situ* remediation; and long-term monitoring of remediation strategies. The program funds research to: 1) understand the chemical nature of DOE-relevant contaminants; 2) understand the physical, chemical and biological processes that affect contaminant mobility in the subsurface; 3) detect the extent of contamination in the environment; 4) model and predict the mobility of contaminants in the subsurface, and; 5) devise remediation methods to remove or immobilize contaminants in the subsurface.

Climate Change Research:

Funding for BER's Climate Change Research is provided through four SFAs as described below. BER requests that National Laboratories with one or more SFA in Climate Change Research develop a single Climate Change Research Program plan (Appendix A) and a single Climate Change Research Science plan (Appendix B) that demonstrates integration within and across the individual Climate Change Research SFAs that comprise each National Laboratory's portfolio. These single Climate Change Research Program and Science plans should describe the National Laboratory's theme and approach to climate change research as a system. Individual SFA's should be included as parts of integrated research activities within the National Laboratory's overall plan that apply the resources and capabilities of each National Laboratory to Climate Change Research.

In future triennial reviews (Appendix E) BER will conduct a single integrated review of the Climate Change research program at each National Laboratory. For purposes of SFA program development, the Division Director for Climate and Environmental Sciences will be the overall point of contact for National Laboratories with Climate Change Research programs. Technical questions specific to a given SFA should be directed to the BER Program Manager identified for each SFA.

Climate Change Research SFAs:

- **Climate Change Forcing**
Climate forcing research leads to understanding and quantification of natural and human-induced forcing and feedbacks of the climate system and the processes that affect such forcing and feedbacks, including the role of clouds, water vapor, aerosols, and carbon

cycling. This includes process models and test-bed applications to transfer the knowledge to the coupled modeling research.

- **Climate Change Modeling**
Climate change modeling research leads to the development, testing and application of fully coupled climate and Earth system models needed to project the likely response of the climate system to natural and human-induced climate forcing.
- **Climate Change Response**
Climate change response research leads to the understanding and ability to predict the response of ecological and human systems to ongoing and projected future changes in climate and atmospheric composition associated with energy production.
- **Climate Change Mitigation**
Climate change mitigation research leads to the development of potential strategies or technologies for modifying or managing terrestrial systems to enhance their carbon sequestration capacity.

This document addresses the setup and management of SFA-based research programs at the National Laboratories. Not all BER-funded research is part of an SFA. BER user facilities and Bioenergy Research Centers are not considered SFAs since they already have well defined processes and criteria for review and funding.

Science plans prepared for BER will be reviewed by a panel of experts. Review criteria and potential outcomes of the review process for Science plans submitted to BER are described in Appendix C. Funding of SFA Science plans is dependent on the results of the peer review process. A timetable for SFA actions and due dates for preparing Program Plans and Science plans are found in the table below.

Timetable for SFA Actions and Due Dates

August 2008	Roll-out of SFA setup and review process. BER preparation of initial Fin Plan guidance to the National Laboratories for FY 2009. <i>NOTE:</i> Common language will be provided and used in the initial guidance for introducing/describing general SFA processes. Program Managers will provide specifics on budget and science.
October 2008	BER provides initial FY 2009 SFA Guidance (Fin Plan) to the National Laboratories
December 9, 2008	National Laboratories provide SFA Program plans (8 pg. max.) to BER for BER staff review. Program plans will be a broad overview of the BER SFA program at a National Laboratory and are meant to initiate a formal dialog on development of a peer-reviewed Science plan BY each Lab for each SFA.
February 2009	BER provides formal feedback to the National Laboratories on SFA Program plans.
Spring 2009	National Labs submit FY2010 FWP's for approved SFAs.
May 5, 2009	National Labs submit SFA Science plans to BER for external panel review. Peer review panels meet between June and September 2009.
September 2009	BER provides formal feedback and peer review comments to the National Laboratories on their SFA Science plans and prepares a schedule for triennial on-site reviews of SFA programs.
October 2009	BER provides initial FY 2010 SFA Guidance (Fin Plan) to the National Laboratories.
2009 – 2012	Initiate triennial on-site reviews of National Laboratory SFAs.

Oversight of BER National Laboratory Programs

Under this new funding approach National Laboratories are challenged to craft and sustain science programs of the highest quality that meet BER strategic goals. BER is responsible for providing oversight of National Laboratory management of BER programs and coordinating the Academic and Private Sector components of BER programs with the science being conducted at the National Laboratories. In this oversight role BER will require, at a minimum, formal annual program management and performance reporting for each SFA at a National Laboratory and formal triennial scientific and program management reviews of each SFA at a National Laboratory. The general content of these management reports and the structure of the triennial reviews are outlined below.

Annual SFA Program Management and Performance Reporting

BER will annually require National Laboratories to provide a report on the status of each SFA program. The intent of the annual reporting is to provide BER with information on SFA program progress and to foster formal communication between the National Laboratories and BER Program Managers on SFA program status and plans. This annual report will provide documentation of program progress, management, budget allocation, communication and program evolution for each SFA at each National Laboratory. The report should be submitted to the identified BER Program Manager for each National Laboratory SFA program. A detailed description of the annual report is provided in Appendix D.

Triennial Scientific and Program Management Review of BER SFA Programs

Scientific and program management review of SFA programs will be an important element of BER oversight of National Laboratory SFA programs. At a minimum, individual National Laboratory SFA programs will be reviewed by on-site review panels composed of external reviewers once every three years. Local DOE site office personnel will be invited to attend the review. Panelists will review revised Science plans for future work submitted to BER by each

National Laboratory SFA program. Panelists also will review progress of SFA research at the National Laboratory and overall program vision as presented by SFA program management and technical staff at the on-site review. Additionally, since a team-oriented approach to science will be a defining feature of National Laboratory research, review panels will evaluate the integration and cohesiveness of the SFA program. BER will rely primarily on the assessment of external reviewers to gauge scientific quality, relevance, cohesiveness, progress and the appropriateness of future directions for the science conducted within the SFA program. BER will review relevance to BER needs. A general structure for the triennial review and review criteria are in Appendix E.

Timing of Triennial Scientific and Program Management Reviews

Triennial reviews will be scheduled to provide sufficient time for BER to review the results of the reviews and prepare any funding adjustments in time for the next fiscal year.

Triennial Scientific and Program Management Review Outcomes

The National Laboratories are challenged to develop integrative, scientific programs of the highest quality to meet BER's strategic goals. The triennial review by external reviewers is the primary mechanism whereby BER will gauge the scientific performance of National Laboratory programs and adjust program funding. Budgetary outcomes resulting from a triennial review include:

- 1) Increase in program budget
- 2) Continuation of program within current budget
- 3) Redirected effort within budget
- 4) Decrease in budget (up to program elimination)

BER program management decisions regarding adjusted funding levels resulting from triennial reviews will be communicated to the National Laboratories upon notification of the review outcomes to the National Laboratories. The timing of the implementation of adjusted funding levels to an SFA programs is at the discretion of BER.

Outlook for BER Science within National Laboratory SFA Programs

The BER management and review process is intended to challenge the National Laboratories to craft and sustain integrative science programs of the highest caliber in support of BER strategic goals. By relying on a formal external review process for not only “standing up” National Laboratory programs under this new funding approach but also for managing National Laboratory SFA programs in a consistent manner, BER intends to foster an environment at the National Laboratories that encourages high quality science in an integrative, team-oriented manner. Additionally, with these changes, BER will have a more uniform set of procedures to document scientific progress, review outcomes, and track overall National Laboratory program management. These procedures are key to fostering cohesiveness within BER and improving communication of BER science and accomplishments within SC, DOE, and the larger scientific community.

Appendix A

Scientific Focus Area (SFA) Program Plan Guidelines

The purpose of this section is to provide general information for developing SFA Program plans for BER programs at the National Laboratories.

Program Plan

The purpose of an SFA Program plan is to outline a vision for a proposed BER SFA program at a National Laboratory over a three year period. The Program plan is a starting point for a discussion between National Laboratories and BER Program Managers on initiating an SFA research program. A Program plan should outline the SFA being addressed, the overall research objective(s), the approach to accomplishing the research objectives, the key personnel involved and an organizational and management structure for the proposed SFA program at a National Laboratory. The Program plan should be a broad but concise view of the proposed research program and should be no more than eight pages in length. Program plans are a high-level outline of a larger, more detailed Science plan (see Appendix B) that may be submitted subsequently.

The Program plan will be reviewed by BER program managers as part of a dialog between BER and the individual National Laboratories on how best to structure SFA programs to meet BER strategic goals. If agreement is reached between BER and a National Laboratory on an acceptable Program plan, the National Laboratory will be invited to submit a longer and more detailed Science plan which will describe the research to be performed over the next three years.

Program plans should include the following elements:

1. Title, National Laboratory, Laboratory Research Manager and Technical Co-Managers (if applicable)
2. The BER SFA being addressed
3. Overall research objectives and hypotheses.
4. Overall approach to accomplishing the research objectives and investigating the hypotheses.
 - a. Proposed program milestones over the next three years.
5. Key personnel involved in the SFA program
6. Organizational structure for the SFA program
7. Proposed management plan to ensure program integration and coordination.

Program plans are essentially white papers describing the overall elements of a proposed SFA research program. National Laboratories that have been asked by BER to prepare Program plans are encouraged to meet with BER Program Managers to discuss these plans and ensure that both parties understand and agree on the essential components of the proposed SFA programs.

Appendix B

Scientific Focus Area (SFA) Science Plan Guidelines

The purpose of this section is to provide general information for developing SFA Science plans for BER programs at the National Laboratories.

Science Plan

The purpose of an SFA Science plan is to provide a vision of the National Laboratory's strategic direction for its research program over a three-year period. **The SFA process requires each Laboratory to restructure and integrate existing BER research programs and projects to take advantage of each National Laboratory's unique expertise and capabilities in ways that advance fundamental science and further the BER strategic goals.**

The Science plan should:

- identify the specific BER SFA that is being addressed, describe the SFA program research objectives, and indicate clearly how these objectives are designed to meet BER strategic goals,
- define and describe the BER mission-relevant problem(s) that is (are) being addressed under the research objectives and identify critical knowledge gaps,
- propose specific hypotheses (science questions) and approaches to resolve the knowledge gaps identified above,
- describe datasets, as appropriate, to be utilized to test hypotheses,
- emphasize, build on, and extend the Laboratory's distinguishing capabilities relevant to the SFA,
- emphasize and encourage interdisciplinary science, and
- achieve synergy through collaboration (e.g., involve specialized expertise from Universities, institutes, industry, and other National Laboratories; and employ unique DOE user facilities).

Additionally, each SFA Science Plan should have clear long-term objective(s) with demonstrable annual milestones for the program over a three-year period. Progress toward the objective(s) should be tracked by the annual milestones.

Science Plan Format

The SFA Science Plan should include the following sections:

- A. Abstract (limited to 250 words, must be stand alone and suitable for posting on BER websites, include title, National Laboratory and contact information of Laboratory Research Manager for the SFA and/or Technical Co-Managers [see below])
- B. Executive Summary - include the long-term objective(s), the hypotheses (science questions) being tested, the proposed experimental design, and the names of all

investigators and their affiliations (Approx. 3 pages, suitable for posting on BER websites)

- C. Narrative (up to 40 pages or as specified by the relevant BER program manager)
 - 1. Background and Justification
 - 2. Progress (since the last triennial review – up to 10 pgs. This does not count towards the narrative page limit)
 - 3. Research Plan
 - 4. Management and Team Integration
 - 5. Personnel
 - 6. Facilities and Resources (including capital equipment needs over the next 3 years)
- D. Bibliography
- E. Budget
- F. Budget justification
- G. Curriculum vitae (2 pages maximum) for each key investigator.
- H. Listing of all proposed external collaborations.

Curriculum vitae should be submitted in a standard format. Inclusion of additional material should be discussed with the relevant BER program manager before the plan is submitted. Items A, B, D, E, F, G and H do not count towards the 40 page limit.

Background and Justification

This section provides a description of the specific BER strategic goals that will be the focus within the SFA program, the knowledge (or data) gaps that prevent advancement in these areas, and the anticipated impact of scientific advances in these areas on DOE's mission(s).

Progress (since the last triennial review)

Labs should provide a concise summary on scientific progress since the last SFA review.

Research Plan

This section will present the overall program objectives, research approach, and expected milestones. This section should describe specific DOE problems and plans to advance basic science in ways that help to resolve those problems. The research plan could be supported by one or more Tasks (depending on the lab and the size of its program). A clear connection should be made between the overall objective(s) of the National Laboratory's SFA and the supporting Tasks. For the purposes of the Science plan, each Task should be described briefly (emphasizing the role it plays in the overall SFA).

Management and Team Integration

An overview of the organizational structure should be provided. This should include where the SFA program resides within the National Laboratory organization (e.g. is it within a department, or shared among departments?) and the leadership structure of the SFA and how it relates to

leadership within the National Laboratory. This section also should describe a plan for internal interactions within the National Laboratory.

A staffing and organizational structure chart for the overall SFA should be provided. Each National Laboratory is expected to name a Laboratory Research Manager for each SFA program. In some cases, National Laboratories may also name a Technical Co-Manager; however, the designated Laboratory Research Manager is expected to have overall responsibility for the SFA program. If the National Laboratory proposes co-managed leadership, the responsibilities of and relation between these two positions should be specified.

National Laboratory SFA programs are expected to communicate and interact extensively within their institution as well as with other national laboratories, with BER-funded University PIs and with the science community in general. The Science plan should identify key interested parties/stakeholders and an approach for communicating/interacting with those interested parties/stakeholders.

Personnel

The National Laboratory should also detail the capabilities of the key staff involved in the SFA program and/or if additional expertise is necessary to carry out specific tasks. The National Laboratory should delineate the anticipated time commitment for all proposed staff (i.e., percent FTE). The SFA also should identify key anticipated collaborators – funded and unfunded – both within and external to the National Laboratory. Key external collaborations should also be discussed where appropriate. As mentioned above a two-page curriculum vitae for each key member of the research team should be provided.

Facilities and Resources

Each National Laboratory should describe their capability to provide appropriate types of major analytical instrumentation and facilities to support the fundamental research activities proposed to be conducted within the Science plan. Specifically, a description of major analytical and computational capabilities and the existing physical infrastructure is requested. Particular attention should be given to unique capabilities that distinguish the National Laboratory (e.g., national scientific user facilities, specialized computing clusters) and how those capabilities will be incorporated into the SFA program.

National Laboratory resources that are associated with this Science plan also should be described. This could include, for example, LDRD initiatives, infrastructure rehabilitation/upgrades to accommodate SFA research activities, adjunct faculty appointments with expertise in science areas relevant to the SFA, joint programs with one or more local DOE user facilities, or a non-local user facility.

Bibliography

It is expected that all Science plans, similar to any science proposal to BER, will be well grounded in the most currently available scientific literature and relevant general knowledge. Pages devoted to listing bibliographic references are exclusive of the narrative page limit.

Budget and Budget Justification

The SFA Science plan should include a budget breakdown and explanation of variable costs using the DOE budget forms available at <http://www.science.doe.gov/grants/budgetform.pdf>. Pages devoted to budget and budget justification are exclusive of the narrative page limit. Budget information should be provided at the program level and include:

- staff salaries and benefits,
- travel,
- materials and supplies,
- computational costs,
- subcontracts (e.g., universities or National Laboratories)
- indirect costs

Review of Science Plans

Science plans prepared by National Laboratories will be submitted to BER for review by an external panel of experts. The criteria used by panelists to evaluate submitted Science plans are outlined below.

Appendix C

SCIENCE PLAN MERIT REVIEW CRITERIA

Review of BER National Laboratory Science Plans

National Laboratory Science plans will be evaluated by external panelists using the criteria set forth below. Reviewers should have a clear understanding of the BER SFA being addressed by the Science plan before reviewing the Science plan. Brief descriptions of each SFA are provided in the introductory material of this document. Included within each review criterion listed below are the detailed questions that reviewers should consider during the review.

1. Does the Science plan address the identified BER Scientific Focus Area (SFA)?
 - Does the Science plan identify critical knowledge gaps within the scientific focus area that the proposed research will address?
 - Will filling these knowledge gaps make a significant contribution toward meeting the BER goal(s) of this scientific focus area?
 - Are the science questions or hypotheses well posed?
 - Will the proposed research have a significant effect on the scientific discipline and does it have the potential to make contributions outside the immediate research topic(s)?
 - Is the proposed research innovative? Unique to the National Laboratory?
2. Appropriateness of the proposed methods or approaches.
 - Are the proposed research methods (or approaches) appropriate to answering the science questions?
 - Are there critical weaknesses in the proposed methods (or approaches)?
 - If applicable, does the Science plan seek to make use of the advanced/unique capabilities of the National Laboratory's user facilities?
3. Management and performance documentation.
 - Is there a sound management strategy for coordinating the research within the larger SFA program?
 - Is there a clear organizational structure? If so, how well does it align with the proposed research efforts?
 - Are performance indicators evident in the Science plan that would enable management to communicate the scientific and budgetary (FTEs, personnel, shifts in funding within the program, new hires, publications, etc.) status of the program?
4. Competency of the program personnel and adequacy of the proposed resources
 - Do the program's key research personnel have a proven record of scientific research (and research management) in the disciplines needed for success in this program?
 - Does the program staff have a proven record of scientific experience and expertise in the research disciplines required for program success?

- Does the Science plan include appropriate external collaborations with University, other National Laboratories, or private industry researchers?
- Does the National Laboratory have the required major instrumentation and/or facilities needed to successfully carry out the research identified in the Science plan?
- If applicable, is there a plan for recruiting additional scientific and technical personnel?
- Is there a plan for scientific and managerial succession? Are there mechanisms for turnover of staff both to insure “fresh blood” in the program, but also to alter staffing as research directions evolve over time?

5. Reasonableness and appropriateness of the proposed budget

- Is the proposed budget (and staff time) consistent with and appropriate for the proposed research?
- Are there components of the program where the budget could be modified (increase or decrease) based on a modification in the scope of research identified in criteria 1 - 2?

6. To what extent does the Science plan demonstrate a team-oriented, collaborative program that takes advantage of the unique scientific capabilities and administrative resources of the National Laboratory?

Criteria 1-5 are largely designed to evaluate the scientific and technical merit of the proposed research program. In addition, National Laboratory SFA programs must be distinguished from large versions of their university counterparts. The National Laboratories have been challenged to develop integrative research programs that are greater than the sum of their parts. Please assess whether the Science plan demonstrates a fully integrative program or simply a collection of individual projects.

- Is it evident that scientific staff within the program communicate and coordinate research results among each other? Does SFA management facilitate this communication and coordination?
- Does the scientific output of the program appear to be directed towards attaining results that are greater than the sum of individual research contributions?
- Does SFA management proactively manage overall program direction towards an integrated scientific goal?
- Do individual PIs within the program take the initiative to contribute to a larger integrated scientific goal?

Reviewers will evaluate National Laboratory Science plans and assign the following adjectival and/or numerical rating:

Descriptor

Definition

EXCELLENT [9-10]

The proposed Science plan and overall SFA program are very likely to produce BER-relevant science of the highest quality

over the next 3+ years; the plan addresses key knowledge gaps in the indicated scientific areas and has readily understandable and scientifically relevant goals, milestones and/or major research questions; the team members are of the highest caliber of researchers in the field; the program has a very effective management structure and, highly motivated and collaborative scientific staff; the program clearly demonstrates a fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. No significant weaknesses.

VERY GOOD [7-8]

The proposed Science plan and overall SFA program are likely to produce BER-relevant science of the highest quality over the next 3 years; the plan addresses key knowledge gaps in the indicated scientific areas and has understandable and scientifically relevant goals, milestones and/or major research questions; the team members are high caliber researchers within the field; the program has an effective management structure and, motivated and collaborative scientific staff; the program demonstrates a fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. There are a few notable minor weaknesses but no significant weaknesses.

GOOD [5-6]

The proposed Science plan and overall SFA program may produce BER-relevant science of the highest quality over the next 3 years; the plan addresses identified knowledge gaps in the indicated scientific areas, but the significance of the identified knowledge gaps is questionable; the plan has understandable goals, milestones and/or major research questions, but again the relevance is questionable; the team members are quality researchers within the field; the program has a management structure, but it is not clear how management and the scientific staff interact; the scientific staff appear motivated and collaborative, but the research focus of the program appears uncoordinated; the program is a less than fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. There are several minor weaknesses and some significant weaknesses.

POOR [0-4]

The proposed Science plan and overall SFA program are of questionable relevance to BER and therefore may not produce BER-relevant science of the highest quality; the identified knowledge gaps are questionable and the overall focus is scientifically lacking in one or more significant areas; the goals and milestones are not clearly defined; there is little program integration or coordination among the scientific staff towards advancing the proposed science under the indicated SFA. There are numerous minor weaknesses and several significant identified weaknesses in the program.

Merit Review Results and Recommendations

Reviewers will be asked to identify specific areas within the program requiring revision and/or omission and/or added program emphasis. Reviewers will provide detailed comments to justify their recommendation(s). Based on the results of the merit review process BER will either *Accept*, *Accept with Revisions*, *Partially Accept* or *Reject* the Science plan as follows:

Accept – BER funds the SFA program under the proposed Science plan as budgeted after written responses to any BER comments/concerns are addressed. BER funds the FWP from the National Laboratory.

Accept with Revisions – BER funds the SFA program after specified revisions have been incorporated into the proposed Science plan and written responses to BER's comments/concerns are adequately addressed. BER funds the FWP while National Laboratory works to revise and implement changes to the program.

Partially Accept – A specified portion of the Science plan is approved and funded. The proposed Science plan (and/or budget) is modified to reflect only the approved portion.

Reject – BER does not fund the SFA program.

Field Work Proposals

Each National Laboratory will receive feedback from the peer review process as well as from the BER Program Managers. Pending favorable results of the peer review, the Science plans will be revised (if needed) and an outline of the accepted Science plan (i.e., the Program plan) will become the basis for a Field Work Proposal (FWP). Once established, SFA programs at the National Laboratories will be required to report annually on SFA program progress and be subject to a rigorous triennial merit review process as outlined in Appendix D and E.

Appendix D

Annual SFA Program Management and Performance Reporting Criteria

In addition to the FWP process, which needs only to include a brief outline of the SFA program (i.e., Program plan) and budget information, BER will require National Laboratory to provide a detailed annual progress report. The intent of the annual reporting is to provide BER with information on SFA program progress and to foster formal communication between National Laboratories and BER Program Managers on SFA program status. A formal report provides documentation of SFA program progress, management, budget allocation, and program evolution. Documentation in this annual management report should address the following elements:

- 1) Program overview highlighting relevance to the BER SFA and strategic goals
- 2) Outline of scientific objectives or scientific questions under investigation
- 3) National Laboratory program structure with management and scientific personnel identified
 - a. Assignments of key team members to specific task areas. Identify scientific and management roles.
- 4) Performance milestones and metrics toward accomplishing the program objectives.
 - a. Review of scientific progress toward achieving program objectives including:
 - i. Brief review of scientific progress within each task toward objectives/milestones in the context of the larger program
 - ii. Science highlights (including publications) presented in the context of program objectives
 - iii. Analysis of where (what journals) scientific results are published
 - b. Future scientific goals, vision and plans toward meeting program objectives
 - c. New scientific results that may shift current research focus areas and/or identified knowledge gaps in the program
 - d. Collaborative research activities with external researchers in pursuit of program objectives
- 5) Staffing and budget summary
 - a. Funding allocation by program element (task) and individual researcher.
 - i. Present funding
 - ii. Document changes in funding allocations to program elements
 - b. Funding allocation to external collaborators (if any)
 - i. Status of external collaborations with Universities and/or private sector
 - ii. Status of external collaborations with National Laboratories
 - c. Personnel actions and procedures
 - i. New hires
 - ii. Anticipated future hires (and when)
 - iii. Releases
 - iv. Procedures for encouraging participation of (and funding for) new and/or young investigators

- d. National Laboratory investment in the program (i.e., LDRD, discretionary funds, facility improvements, equipment etc.)
 - i. Staffing/expertise needs
 - ii. Facility/infrastructure changes and/or needs
- e. Capital Equipment needs (future)

Appendix E

Triennial Scientific and Program Management Review of BER SFA Programs

General Format

BER will notify the National Laboratory at least 12 months in advance of its intent to conduct a triennial scientific and program management review of the BER SFA program. The triennial review is expected to be an on-site review. All panelists attending the on-site triennial review will receive copies of the most recently funded Science plan and a new, proposed Science plan for future research under the SFA. The proposed Science plan should be made available to BER at least 3 months prior to the review date. Reviewers will supply an initial critique of the proposed Science plan and provide an initial rating prior to arriving for the on-site triennial review.

At the on-site triennial review, the SFA Laboratory Research Manager and /or Technical Co-Manager(s) will present an overview of the SFA program including the scientific objectives and milestones, the key research tasks and personnel, major accomplishments, a summary of progress over the past three years towards the stated milestones, and future directions for the National Laboratory SFA program. Planned future research should generally be accomplished within program budget, but Laboratory Research Managers should also point out future planned projects that may require additions to the overall National Laboratory SFA program budget.

Additional detailed presentations from SFA personnel investigating key research components of the overall program would follow the opening presentations and present past progress attained in each area of research, placing the results in the context of the overall SFA, and how the proposed future research efforts build on and integrate with the larger SFA program. There will also be an opportunity for reviewers to meet with researchers individually during the review (i.e., poster session, one on one discussions, etc.). Upon completion of the detailed presentations and individual meetings, the SFA Laboratory Research Manager and/or technical Co-Manager(s) will have the opportunity to make a closing and/or summary presentation, reiterate program goals, objectives and vision and provide an opportunity for additional questions from reviewers.

After the SFA presentations the review panel will meet in closed session with BER program managers to discuss the relative merits of the proposed scientific efforts under the new, proposed Science plan.

Merit Review Criteria for Triennial Review of SFA Programs

SFA programs will be reviewed by an on-site panel of external reviewers. Reviewers will be supplied with the most recently funded Science plan, a summary of progress over the past three years and a new, proposed Science plan for future research under the SFA program. Reviewers will prepare an initial critique and rating of the proposed Science plan prior to attending the on-site review. The proposed Science plan will be reviewed for scientific and technical merit in the context of past program performance and future scientific vision for the program. Specific items that reviewers should consider when providing commentary on the proposed Science plan are provided below. It is anticipated that reviewers may not be able to fully comment on all review criteria (such as items 4 and 7) prior to the on-site visit. There will be ample opportunity for reviewers to update/revise all comments at the on-site review.

1. Scientific and/or technical merit of the proposed Science plan
 - Please provide your assessment of the overall quality of the science proposed by considering the following:
 - Does the proposed Science plan identify critical knowledge gaps within the scientific focus area that the research will address?
 - Will filling these knowledge gaps make a significant scientific contribution within the scientific focus area?
 - Are the science questions or hypotheses well posed?
 - Will the proposed research have a significant impact on the scientific discipline? Are there implications for the research outside the immediate research topic area?
 - Is the proposed research innovative? Unique to the National Laboratory?
2. Appropriateness of the proposed methods or approaches
 - Please assess the overall scientific approach to the research by considering:
 - Are the proposed research methods (or approaches) appropriate to answering the science questions?
 - Are there critical weaknesses in the proposed methods (or approach)?
 - If applicable, does the Science plan seek to make use of the advanced capabilities of the National Laboratory's user facilities?
3. Progress and Performance
 - Please provide an assessment of the overall scientific progress and performance over the past three years in this program by considering:
 - Has the program made significant progress towards BER's strategic goals within the indicated scientific focus area (SFA)?
 - Has there been a sustained and appropriate output of SFA program results published in the peer-reviewed literature?
 - Has the scientific output made a significant contribution to the primary scientific field(s) of investigation? Other scientific areas?
 - Are the program's external collaborations productive?

- If applicable, has the program made adequate use of user facilities?
4. Management and performance documentation
- Is there a sound management strategy for coordinating the research within the larger SFA program?
 - Is there a clear organizational structure? If so, how well does it align with the proposed research efforts?
 - Are performance indicators evident that enable management to communicate the scientific and budgetary (FTEs, personnel, additional funds, new hires, publications, etc.) status of the project?
5. Competency of the applicant's personnel and adequacy of the proposed resources
- Please assess the competency of the personnel performing the research by considering:
 - Do the program's key research personnel have a proven record of scientific research (and research management) in the disciplines needed for success in this program?
 - Does the program staff have a proven record of scientific experience and expertise in the research disciplines required for program success?
 - Does the Science plan include appropriate external collaborations with University, other National Laboratories, or private industry researchers?
 - Does the National Laboratory have the required major instrumentation and/or facilities needed to successfully carry out the research identified in the Science plan?
 - If applicable, is there a plan for recruiting additional scientific and technical personnel?
 - Is there a plan for scientific and managerial succession? Are there mechanisms for turnover of staff both to insure "fresh blood" in the program, but also to alter staffing as research directions evolve over time?
6. Reasonableness and appropriateness of the proposed budget
- Please assess the reasonableness of the proposed budget research by considering:
 - Is the proposed budget (and staff time) consistent with and appropriate for the proposed research?
 - Are there components of the program where the budget could be modified (increase or decrease) based on a modification in the scope of research identified in criteria 1 - 3?

In addition to review of the scientific and technical quality of the proposed Science plan, reviewers also will be asked to comment on the integration of the research components into a cohesive SFA program that is greater than the sum of its component parts. This is of considerable importance to BER and to the DOE in general. Panelists will not only provide

critiques and recommendations for the scientific and technical direction of the research but of the overall integration and cohesiveness of the entire SFA program. This is a critical feature of the triennial review.

7. To what extent does the proposed Science plan demonstrate a team-oriented, collaborative program that takes advantage of the unique analytical and administrative capabilities of the National Laboratory?

- Criteria 1-6 are largely designed to evaluate the scientific and technical merit of the proposed SFA program. In addition, National Laboratory SFA programs must be distinguished from large versions of their University counterparts. The Labs have been challenged to develop integrative research programs that are greater than the sum of their parts. Please assess the extent to which the proposed new Science plan demonstrates a fully integrative, team-oriented program rather than simply a collection of individual projects by considering the following:
 - Is it evident that scientific staff within the program communicate and coordinate research results among each other? Does SFA management facilitate this communication and coordination?
 - Does the scientific output of the program appear to be directed towards attaining results that are greater than the sum of individual research contributions?
 - Does SFA management proactively manage overall program direction towards an integrated scientific goal?
 - Do individual PIs within the program take the initiative to contribute to a larger integrated scientific goal?

The following scale will be used by panelists in assigning an adjectival and/or numerical rating to the proposed Science plan:

Descriptor

Definition

EXCELLENT [9-10]

The proposed Science plan and overall SFA program are very likely to produce BER-relevant science of the highest quality over the next 3+ years; the plan addresses key knowledge gaps in the indicated scientific areas and has readily understandable and scientifically relevant goals, milestones and/or major research questions; there has been significant scientific progress over the past 3 years and significant scientific contributions to the major science disciplines within the program; the team members are of the highest caliber of researchers in the field; the program has a very effective management structure and, highly motivated and collaborative scientific staff; the program clearly demonstrates a fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. No significant weaknesses.

VERY GOOD [7-8]

The proposed Science plan and overall SFA program are likely to produce BER-relevant science of the highest quality over the next 3 years; the plan addresses key knowledge gaps in the indicated scientific areas and has understandable and scientifically relevant goals, milestones and/or major research questions; there has been very good scientific progress over the past 3 years and some important scientific contributions to the major science disciplines within the program; the team members are high caliber researchers within the field; the program has an effective management structure and, motivated and collaborative scientific staff; the program demonstrates a fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. There are a few notable minor weaknesses but no significant weaknesses.

GOOD [5-6]

The proposed Science plan and overall SFA program may produce BER-relevant science of the highest quality over the next 3 years; the plan addresses identified knowledge gaps in the indicated scientific areas, but the significance of the identified knowledge gaps is questionable; the plan has understandable goals, milestones and/or major research questions, but again the relevance is questionable; there has been good scientific progress over the past 3 years but few identified important scientific contributions to the major science disciplines within the program; the team members are quality researchers within the field; the program has a management structure, but it is not clear how management and the scientific staff interact; the scientific staff appear motivated and collaborative, but the research focus of the program appears uncoordinated; the program is a less than fully integrated, team-oriented approach towards advancing the proposed science under the indicated SFA. There are several minor weaknesses and some significant weaknesses.

POOR [0-4]

The proposed Science plan and overall SFA program are of questionable relevance to BER and therefore may not produce BER-relevant science of the highest quality; the identified knowledge gaps are questionable and the overall focus is scientifically lacking in one or more significant areas; the goals and milestones are not clearly defined; there has been some scientific progress over the past 3 years, but the results are of minor scientific significance; there is little program integration or coordination among the scientific staff towards advancing the proposed science under the indicated SFA. There are numerous minor weaknesses and several significant identified weaknesses in the program.

Overall Recommendation

Also, reviewers will be asked to individually recommend to BER program managers to either *Accept*, *Accept with Revisions*, *Partially Accept* or *Reject* the proposed new Science plan and SFA program. All reviewers will be asked to take into account their comments and ratings on the

proposed Science plan, the presentations by the SFA management and scientific staff and individual discussions with scientific staff during the review process when preparing this recommendation. Reviewers will be asked to identify specific areas within the program requiring revision and/or omission and/or added program emphasis. Reviewers should provide detailed comments to justify their recommendation(s). The consequences of these recommendations are as follows:

Accept – BER funds the SFA program under the proposed Science plan as budgeted after written responses to any BER comments/concerns are addressed. BER continues to fund the FWP from the National Laboratory.

Accept with Revisions – BER funds the SFA program after specified revisions have been incorporated into the proposed Science plan and written responses to BER’s comments/concerns are adequately addressed. BER continues to fund the FWP while National Laboratory works to revise and implement changes to the program.

Partially Accept – A specified portion of the Science plan is approved and funded. The proposed Science plan (and/or budget) is modified to reflect only the approved portion.

Reject – BER does not fund the SFA program.