

Minutes of the Meeting of the
Department of Energy and National Science Foundation
Nuclear Science Advisory Committee
Crystal City Marriott, Arlington, Virginia
December 3–4, 2007

Members Participating:

Robert Tribble, Chairman
Douglas Bryman
David Dean
Charlotte Elster
Rolf Ent
Thomas Glasmacher
Ulrich Heinz
Xiangdong Ji
Roy Lacey

Naomi Makins
Richard Milner
Michael Ramsey-Musolf
Guy Savard
Susan Seestrom
Thomas Ullrich
Ubirajara van Kolck
John Wilkerson
William Zajc

Members Absent:

I-Yang Lee

Heino Nitsche

Others Participating:

Larry Cardman
Tony Chan
Eugene Henry
Bradley Keister

Jonathan Kotcher
Jehanne Simon-Gillo
Raymond Orbach
Steven Vigdor

Presenters in Order of Appearance:

Jehanne Simon-Gillo
Tony Chan
Bernard Sadoulet

Jonathan Kotcher
Raymond Orbach
Glenn Young

About 30 others were in attendance during the course of the two-day meeting.

Chairman **Robert Tribble** called the meeting to order at 8:38 a.m. He introduced **Jehanne Simon-Gillo**, the new Acting Director of the Office of Nuclear Physics, and asked her to present the news from that Office.

The Department of Energy (DOE) still does not have an appropriation. The FY08 budget request for the Office of Nuclear Physics (NP) is a good one (\$471.3 million); it includes university and laboratory research efforts brought back to FY05 levels, user facilities operating near optimum levels, important new and continuing instrumentation projects, the 12-GeV Continuous Electron Beam Accelerator Facility (CEBAF) Upgrade's last installment for project engineering design, a solicitation for the design and site selection of a rare-isotope beam facility, and R&D that addresses next-generation capabilities.

The budget request represents a substantial increase over FY07: 11% for NP, 28% for construction, and 9% for facility operations. Specifically, the rare isotope R&D sees an increase of 5%, and laboratories see an increase of 7%. Of particular interest are requests of \$0.5 million for the Cryogenic Underground Observatory for Rare Events (CUORE), \$1 million for the PHENIX (Pioneering High Energy Nuclear Interaction eXperiment) nose-cone calorimeter, and \$1.4 million for the PHENIX forward vertex detector.

Currently, the Department is operating under a Continuing Resolution. Both the House of Representatives appropriation and Senate markup provide the President's request for NP. The Continuing Resolution is currently funded through December 14, 2007. The facility operations are negatively impacted by the Continuing Resolution, reducing CEBAF operations about one week per month, reducing Holifield Radioactive Ion Beam Facility (HRIBF) operations by one week, and delaying the transition to 7 day per week operations at HRIBF and ATLAS [Argonne Tandem-Linac Accelerator System]. There are no new project starts at CUORE and PHENIX, and the restoration of funding for the Electron Beam Ion Source is delayed under the Continuing Resolution. In addition, a solicitation for theoretical topical collaborations will also be delayed.

In FY07, the Office of Science (SC) developed a plan that assumed a doubling of funding in 10 years. This plan allowed NP to implement a world-class program:

- completing the CEBAF 12-GeV Upgrade
- upgrading the luminosity of the Relativistic Heavy Ion Collider (RHIC)
- developing forefront programs at ATLAS and HRIBF
- constructing a facility for rare-isotope beams
- participating in heavy-ion studies at the Large Hadron Collider (LHC)
- starting studies with GRETINA [the first stage of GRETA (the Gamma-Ray Energy Tracking Array)]
- starting measurements of fundamental neutron properties at the Spallation Neutron Source (SNS)
- participating in neutrinoless double-beta decay measurements
- using leading-edge computers
- performing accelerator R&D or next-generation nuclear-physics research

This plan is revisited each year as part of the budget-formulation process.

DOE has had two healthy budget requests but has yet to see a healthy appropriation. But in FY06, NP experienced a devastating 9.4% reduction, which significantly reduced facility operations. In FY07, the Administration announced the American Competitive Initiative, doubling funding for the physical sciences over 10 years. That trend has not begun yet, and the current budget request sets the stage for the next 5 years.

Recently, the Office completed reports of two significant DOE reviews, one on facility-operation efficiencies and one on the low-energy laboratory research program. Office staff participated in the Office of Science and Technology Policy's (OSTP's) Physics of the Universe (POU) High-Energy-Density Physics (HEDP) Taskforce. The Organisation for Economic Cooperation and Development (OECD) Global Science Working Group on Nuclear Physics held its fourth and final meeting November 5-6, 2007, in Paris.

Seven solicitations are planned in FY08: the annual university grant solicitation, outstanding junior investigators, generic rare isotope beam R&D, notice of interest in the Deep Underground Science and Engineering Laboratory (DUSEL), theoretical topical collaborations, the design and site for the facility for rare isotope beams (FRIB), and pre-proposals for rare-isotope-beam investments. The Advanced Fuel Cycle R&D solicitation was held last year; the hope is to move forward on this in FY08.

An initiative will allow U.S. researchers to participate in forefront rare-isotope-beam studies while the FRIB is being constructed. About \$50 million is anticipated over 8 years. NP will issue a solicitation for pre-proposals in FY08 and a proposal solicitation in FY09. The criteria will be based on traditional considerations plus whether there is some particular outstanding scientific opportunity afforded by the facility and U.S. investments, there is the opportunity for significant roles to be played by U.S. participants, and the relevance for the planned U.S. FRIB facility and program.

The solicitation for the FRIB is confidential. It is anticipated that a funding opportunity announcement (FOA) for the facility will be issued in FY08. This approach follows the overall approach of the successful FOA for the GTL BioCenters: the proposal request and contents were specified, merit review criteria were identified, and the peer-review process was identified. A single award is anticipated in FY08, but it does not carry any FY08 funding, it just identifies a site that can proceed with facility establishment. A website will be available to manage questions related to the FOA process.

The current major NP projects are GRETINA Major Item of Equipment (MIE), which is at critical decision (CD) 2b/3b; heavy Ions at the LHC MIE, which is at CD1; CUORE, which is at CD0; and the 12-GeV upgrade, which is at CD2.

During the next year, reviews will be conducted for the rare-isotope-beam R&D, High-Intensity Gamma-Ray Source Facility, Small Business Innovation and Research, LHC Electromagnetic Calorimeter, Advanced Fuel Cycle Initiative, California Rare Ion Beam Upgrade (CARIBU), Outstanding Junior Investigator proposals, Solenoidal Tracker at RHIC (STAR) Heavy Flavor Tracker science, and heavy-ion laboratory research.

In terms of staff, Dennis Kovar is now the acting director of the Office of High Energy Physics (HEP). Simon-Gillo is the acting associate director of NP. A technical advisor position will be advertised in FY08. Three detailee positions have been recently filled.

Heinz asked how the Continuing Resolution may affect a Nuclear Theory Center solicitation. Simon-Gillo replied that the Office needs to get a budget first before it can formulate that solicitation.

Tribble announced the retirement of Sidney Coon and thanked him for his long service to DOE's Theory Program.

Tony Chan was asked to report on the status of nuclear physics at the NSF. There is a long history of cooperation and partnership between NSF and DOE. DOE takes the lead in the FRIB, and NSF takes it in DUSEL. Generally, the partner agency provides principal investigators (PIs) and instruments.

Major changes have occurred during the past six months: The FY08 budget is in conference, and the agency is operating under a Continuing Resolution. The FY09 budget request has been submitted to the Office of Management and Budget (OMB). The Directorate has a new OMB examiner, Joel Parriott. The America Competes Act was passed. The third DUSEL solicitation (S3) was awarded to Homestake/University of California Berkeley. A town meeting was held on November 2-4. S4 is to be issued soon. Workshops on gender and underrepresented-minority issues were held in the various NSF directorates. Committees of visitors (COVs) were concluded for the Division of Chemistry and Division of Mathematical Sciences. COVs for the Division of Materials Research and the Division of Astronomical Sciences were scheduled for 2008. Two senior staff members were added to the Directorate for Mathematical and Physical Sciences (MPS).

There has been a call for reinvestment in science, technology, engineering, and mathematics (STEM) education in the *Rising Storm* report and the America Competes Act, signed by the President in August.

NSF has embarked on new multi-year initiative known as Cyber-enabled Discovery and Innovation (CDI). Its purpose is to broaden the nation's capability for innovation by developing a new generation of computationally based discovery concepts and tools to deal with complex, data-rich, and interacting systems. It will have three broad focus areas:

- From data to knowledge
- Understanding complexity in natural, built, or social systems
- Building virtual organizations

The first solicitation was issued in September 2007 for \$50 million; the MPS investment will be \$10 million. The plan is to increase the budget by \$50 million per year for the next 5 years.

The overall budget for NSF is up 7% in the FY08 President's request and up 7.7% for NSF's research and related activities (R&RA). The budget request for MPS for FY 08 is \$1.253M, an increase of 8.9% from FY 07 and the changes from FY07 to FY08 are:

Organization*	FY08 Request (in millions)	Change (%)
BIO	633.00	4.1
CISE	574.00	9.0
ENG	683.30	8.7
GEO	792.00	6.3
MPS	1253.00	8.9
SBE	222.00	3.9
OCI	200.00	9.6
OISE	45.00	10.8
OPP	464.90	6.1
OIA	263.00	13.7
USARC	1.49	2.8
Total R&RA	4234.82	7.7

* Directorate for Biological Sciences; Directorate for Computer and Information Sciences & Engineering; Directorate for Engineering; Directorate for Geosciences; Directorate for Mathematical and Physical Sciences; Directorate for Social, Behavioral and Economic Sciences; Office of Cyberinfrastructure; Office of International Science and Engineering; Office of Polar Programs; Office of Integrative Activities; U.S. Antarctic Resource Center

The 10-year funding history shows constant increases for all programs.

MPS has a new advisory committee in the areas of physics and astronomy.

NSF has seen a steady increase in the number of proposals it receives and a decline in success rates (17% for first-time proposers). There also has been extended discussion about a perception that NSF is too conservative in its funding decisions. A recent National Science Board (NSB) action addressed this issue by adding a component to the Intellectual Merit Review Criterion that focuses on potentially transformative research.

The broader-impact criterion is still not yet well understood by the community. Broadened participation and international competition versus collaboration are being pushed.

NSF has a number of major projects operating and is looking forward to several more (DUSEL, solar telescopes, light sources, etc.) in the near future:

- The Atacama Large Millimeter Array (ALMA) in Chile is going well. It is a huge program. Three antennas have now been constructed. The United States is providing \$500 million, Japan is providing \$300 million, and the European Union and others are also contributing. Operations are to start soon.
- The operation of IceCube is overlapping with its construction. 22 strings are in place and will be increased to 80.
- Construction of the Advanced Laser Interferometer Gravitational Wave Observatory (LIGO) will begin in FY08.
- The LHC is coming online soon.
- The State of South Dakota has invested \$10 million in DUSEL. S4 for the initial suite of instruments will be coming out soon.
- The National Academy of Sciences Decadal Survey of Astronomy and Astrophysics will start next year.
- The Advanced Technology Solar Telescope (ATST) is facing some nonscientific challenges.
- The NSF is planning to convene a panel to plan its role in light sources.
- The International Linear Collider (ILC) is a big question of costs and schedule.

The challenges involved with major facilities include costs (ALMA has a cost that is greater than \$1.3 billion), the funding process [which goes from R&D to major research equipment and facilities construction (MREFC) to management and operations (M&O)], the need to strike a balance between core programs and facilities' M&O, the determination of who pays for facility operations (the steward or the user), and competition (both within MPS and with other directorates) for funding.

Dean noted that there will be a tension between transformative and normal research and asked what NSF will do about that. Chan replied that one can have different modalities of funding proposal and take a little more risk in funding proposals under the transformative research rules.

Ramsey-Musolf asked what the operating costs of DUSEL are expected to be and where the money would come from. Chan replied that there are no vetted numbers. Ramsey-Musolf asked how DOE and NSF would work out who pays for DUSEL projects. Chan said that DOE is supporting R&D experiments, and NSF will build the laboratory, pay for instruments, and open the laboratory as an international user facility. Ramsey-Musolf noted that there are two experiments on Majorana and solar neutrinos and asked how the costs would be shared. Kotcher said that that is not known at the moment. Zajc commented that it is an important consideration

because it bears on how the agencies will work together; he asked if there was a plan in place. Chan replied that there have been discussions.

Milner noted that the number of physics students has increased at a time when university funding has been constrained. Faculty are already judged by their transformative research. The backbone of research needs to be supported. Chan replied that NSF wants to protect the investigators. It does not want the funding ratio to go below 50% for core research.

A break was declared at 10:03 a.m. The meeting was called back into session at 10:15 a.m., and **Jonathan Kotcher** was asked to act as interlocutor for **Bernard Sadoulet**, who joined the meeting via telephone to report on the DUSEL town meeting that was held at the National Academy of Sciences (NAS) on November 2 and on the workshop that was held on November 3 and 4.

A new phase of the DUSEL project was entered with the publication of the S1 report and the selection of the Homestake site. About 175 people attended the town meeting, and 195 participated in the workshop. A follow-up meeting was held at OSTP/OMB on November 5.

The town meeting gave a description of the DUSEL opportunities, its history, and international aspects. The S1 recommendations were presented, and agencies spoke about what they were interested in. The partnership between the State of South Dakota and the federal government was described, and the S3 process was outlined.

The S1 report gave a series of findings:

- Underground science is an essential component of the research frontier in many disciplines, with strong benefits for society.
- There is a chronic need for underground space worldwide.
- The United States should strengthen its underground research and call for a cross-agency multidisciplinary initiative optimally using facilities both in the United States and around the world. As soon as possible, it should construct a DUSEL. The United States should complement the nation's existing assets with a flagship world-class underground laboratory providing access to very great depth (6000 meters water equivalent) and ample facilities at intermediate depths.

The workshop recommended that the \$500 million be split evenly between facilities and experiments. There is strong enthusiasm for the science, especially for dark matter, neutrinoless double-beta decay, and geo-microbiology. Momentum is building for the excavation of a cavity for a 100-kT module as R&D for proton decay/neutrino oscillation. International collaboration is likely. There is some interest in n-nbar. White papers are coming in. The estimated cost of the superset of projects proposed by the working groups totals \$650 million, a very rough estimate. The initial suite will consist of a subset of these experiments; nevertheless, the NSF cannot do it alone. Other agencies and international partners are needed. Some difficult choices lie ahead. At least there is clear evidence that there is a need for such a facility.

In the present program, the MREFC proposal is to be ready by December 2008 for a March 2009 National Science Board (NSB) decision and funding in FY11. This would allow significant access to the 4850-ft level in 2013 and access to the 7400-ft level in 2015. If we insist on having the science at the same time with the facility, the science program has to be defined by December 2008, leading one to ask if the requirements of MREFC (a preliminary design report, which is equivalent to a CD2 Lehman-type review) can be fulfilled.

The NSF preconstruction planning process proceeds from conceptual design to preliminary design to final design to construction to operations, corresponding to DOE's CD0, CD1, CD2, CD3, and CD4.

A science program needs to be defined by December 2008. A number of difficulties are apparent: It is impossible to do this at the required level (a preliminary design report) with most experiments (there is more than \$500 million of experiments to baseline). It does not make any sense to fix now what will be installed in 2013 and 2015. Advantage should be taken of an experiment construction time that is shorter than that of the facility to take into account input from previous experiments to maximize the scientific output. Compatibility must be maintained with the Science Advisory Group process. Time is also needed to raise the additional \$300 to \$400 million. One possible solution is to define an "initial scientific program" by determining as accurately as possible a scientific envelope costing for a representative set of initial experiments, making assumptions about other contributions, adding contingency, and making room for new ideas, and then living within this scientific envelope. Contingency should be shared by all experiments. Some flexibility could be injected by adapting the MREFC to this specific case.

The underground community is mobilizing to put forward a credible scientific program for an MREFC on a very short time scale. The emerging organization consists of working groups by subfields developing a scientific strategy. It is in the middle of self selection of overall coordinators to pull together the scientific component of the proposal. Cross-cutting working groups are looking at common functions and are eager to implement the synergies inherent to DUSEL. The NSF has to push pre-DUSEL science while balancing the short term and the long term. We must begin to realize the other promises of DUSEL as soon as possible, such as the multidisciplinary aspects and interagency and international cooperation by establishing a virtual laboratory, a Center for Deep Underground Science and Engineering.

Ramsey-Musolf asked if there will be a breakdown of the \$500 million superset funding. Sadoulet responded that it is on the website.

Wilkerson noted that Sadoulet wanted to submit something by December 2008, which does not leave much time for reviews. Sadoulet agreed that a costing of these experiments is coming too late, but that is the date that must be accommodated. Zaic commented that this need needs to be communicated to the community, and a group has to work very hard to meet the December 2008 deadline. In addition to the meeting in April, another will be needed in July.

Dean asked if these were startup costs for the occupancy at one year from now. Kotcher pointed out that, in the longer term, should DUSEL be approved and built, operating costs for the Sanford Underground Science and Eng Lab will likely have to be taken over and borne by NSF at that time. This would have to be part of the MREFC proposal.

Bryman pointed out that planning for the experiments and their costs (half of all the funding) needs to be done early on. He asked whether the current plan to put off decisions for up to 7 years is viable. Sadoulet responded that the conceptual design report has to be finished by 2010. Kotcher noted that the experiments would be chosen from the superset of experiments.

Savard asked whether construction or experiments would be done in 2015. Sadoulet replied that that would depend on the experiment and on the extent of access that the experiment requires. If it requires full access, it may be delayed to 2017.

Ray Orbach was invited to describe the budget and facilities of DOE's Office of Science (SC). In 2003, SC issued a 20-year facility outlook based on a budgetary outlook. We are now about 25% of the way through the planning period. Congress had asked SC to prioritize its plans.

Some major changes have been made in SC. The director disappears at noon, January 20, 2009. The strength of the organization lies with the career employees, and that infrastructure needs to be robust. DOE has instituted a Deputy Director for Science Programs (Patricia Dehmer). She will act for the Director in the absence of a director. George Malosh is Deputy

Director for Field Operations, and John Alleva is the Acting Deputy Director for Resource Management. There is no intention to go back to a joint NP-HEP office. Harriet Kung has taken over as Acting Director of Basic Energy Sciences (BES). Dennis Kovar is Acting Director of HEP, and Simon-Gillo is Acting Director of NP.

A continuing resolution requires lots of complications to be taken care of. FY06 was a catastrophic budget. The President's Request for FY07 increased the SC budget by 7%, but in actuality \$305 million was lost because of the continuing resolution. For FY07, no new construction was funded in order to preserve funding for personnel. The gamble was to make up construction funding in FY08. Construction costs have risen in the meantime. The presidential request for FY08 represents an 11.5% increase over the FY07 actual appropriation. An informal conference is considering the budget now, and that budget has a substantial increase for SC. However, it is not known if that increase will be upheld in the omnibus bill. The President's Request is a remarkable investment in nuclear physics and science in general.

The *Facilities for the Future of Science* plan depends critically on that budget outcome. The advisory committees laid out the costs and schedules of the priority facilities. SC added the fixed costs and a 4% per year cost of living increase. What could be afforded with the resulting amounts was considered, and the 28 priority facilities were selected. The America Competes Initiative tracked DOE assumptions very closely. Subsequent funding has tracked the program outlined in 2003 very well. There have been some glitches. Advances in technology have also produced some surprises. As a result, the National Synchrotron Light Source upgrade has changed from a midterm to a near-term priority. Also, the Biological and Environmental Research Advisory Committee (BERAC) believed that bioenergy was ripe for development but that the analytical machines were not available in microbial genomics. However, that technology (e.g., tagged proteins) advanced very rapidly, so one can now do what is needed to be done. A competition was held, and three bioenergy centers grew out of that competition. They start up in FY07.

The budget currently under debate holds several promises for NP:

- The 12-GeV Upgrade at CEBAF will maintain unique capabilities in polarized-electron beam studies of the quark structure of the nucleon beyond the next decade.
- Modest upgrades to two major detectors, STAR and PHENIX, continue.
- A future upgrade of RHIC will provide a ten-fold increase in beam luminosity; the pace of R&D suggests that the RHIC II project will be in a position to start construction within the next 5 years.
- An FOA for FRIB is expected to be announced in FY08.

The European Strategy Forum on Research Infrastructures (ESFRI) also developed a facility roadmap but did not prioritize the items. It is hoped that the Japanese, Chinese, Indian, and Brazilian governments will also develop such plans so that synergies can be identified, as was done with International Thermonuclear Experimental Reactor (ITER), which now has a governing international Council. The European Roadmap for Research Infrastructures includes astronomy, astrophysics, nuclear physics, and particle physics. It expresses interest in the European Extremely Large Telescope (ELT), the Facility for Antiproton and Ion Research (FAIR), the Underwater Neutrino Observatory (KM3NET), the Square Kilometer Array (SKA), and the rare-isotope radioactive-beam facility SPIRAL2.

The U.S. FRIB will be able to do things that no one else can do. Our collaborations will continue.

In summary, the new draft NSAC Long-Range Plan explicitly recognizes the need for five facilities:

- FRIB,
- CEBAF upgrade,
- double-beta decay underground detector,
- RHIC II, and
- Electron-Ion Collider.

These prospects are exciting but depend on the size of the budget envelope. The funding increase from FY06 to FY07 (actual) was 15.2%. The funding increase from FY07 (actual) to FY08 (requested) is 11.5%. If the President's Request is not funded in the FY08 budget, these construction projects will not be able to go forward. NSAC's LRP is tremendously helpful.

Dean asked if Advanced Research Projects Agency–Energy (ARPA-E) impacts SC. Orbach replied that it will affect all of us, but it is not defined. The President does not back funding for an ill-defined ARPA-E. ARPA-E would have 72 staff members under the America Competes Act. A robust definition is needed for what ARPA-E is and what it should address. A policy statement will be forthcoming from the Secretary on the technology-transfer aspects of ARPA-E.

Bryman asked if DOE were supporting DUSEL. Orbach answered that DOE would like to do it and is working on instrumentation for DUSEL. There will be an underground laboratory and R&D on double-beta decay.

Ji asked what Orbach's view was on the ILC now. Orbach replied that the ILC is very important. What is going to be built is still unknown. One must wait for the LHC results to see if there is a science case. The United States is positioning itself to move forward when the science is known. DOE believes that the ILC is the future for U.S. physics. One thing that needs to be known is whether the RF cavities can be built.

Heinz asked if Orbach had any advice on how NSAC could get the money on the table. Orbach answered that he could not say that legally. Each NSAC member has the right to urge Congress to support the President's Request.

A break was declared at 11:45 a.m. The meeting was called back into session at 11:55 a.m. Tribble initiated a discussion of the LRP.

Elster said that some sections are longer than others. Tribble commented that the existence of sidebars is what generally influences the length of a section.

Ent did not see questions addressed in some sections and said that some sections describe inappropriate qualities.

Ji asked if there were a deadline for changes. Tribble said that the deadline was the next day. Ji noted that the fundamental-symmetry section is succinct.

Wilkerson pointed out that some language had disappeared on how DUSEL experiments will be funded, fundamental symmetries, and (in chapter 7) neutrinos and fundamental-symmetry experiments.

Ramsey-Musolf expressed concern about the balance in the list of accomplishments. The section on fundamental symmetry is also thin on figures.

Makins noted that the draft mentions the doubling of the budget. That statement should be qualified as being the currently planned course, as called for in the President's Request.

Tribble said that the Committee should all agree on the wording of the Overview and Recommendations. The Preface seems to be agreed upon. The Overview and Recommendations was considered, and questions of balance among neutrinos, fundamental symmetries, and the big questions of science were discussed. Acronyms need to be spelled out the first time they are

used, and terms like “standard model” need to be standardized. Points of clarity of expression (such as “predominance of visible matter,” “mathematical,” “origin of matter,” and “pseudoquarks”) were raised.

A break for lunch was taken at 12:35 p.m. The meeting was reconvened at 1:50 p.m.

Glenn Young was asked to present a progress report for the Performance Measures Subcommittee.

The charge to the Subcommittee was to evaluate NP activities against established long-term performance goals for SC’s Nuclear Physics program, to gauge progress towards these goals, and to recommend revised long-term goals and metrics. OMB wants meaningful and easily understood performance measures to guide program management and budgeting and to promote results and accountability.

In 2003, performance measures were developed that address four areas: hadronic physics; high-temperature and high-density hadronic matter; nuclear structure and nuclear astrophysics; and neutrinos, neutrino astrophysics, and fundamental interactions. Those performance measures had a two-level grading scheme, used a timeframe that extended to 2015, and called for expert review every 5 years.

The revised rating scheme adds definitions for what the measure means, notes why the measure is important, extends the grading scheme to four levels, and again calls for expert review every 5 years to rate progress.

Milestones that are indicators of key steps toward achieving performance measures currently exist for a representative set of programs, but they necessarily imply a selection from a broader range of results. The Subcommittee is evaluating midterm progress toward those milestones for the period 2005 to 2007, taking into account any changes in the landscape since 2003.

The first thing the Subcommittee did was to develop two milestone grading guides, one for past milestones and one for future milestones. For past milestones, a grade of excellent indicated that the milestone was achieved as written and additional results were produced. A grade of good indicated the milestone was achieved as planned. A grade of fair indicated that the milestone was not accomplished on time but the bulk of the planned research was completed and progress was made toward addressing the physics goals. A grade of poor indicated that the milestone was not met and the work is not likely to be completed in the foreseeable future. A similar grading scheme was developed for programs with future milestones.

These grading schemes essentially ask: (1) What has been accomplished toward the milestone, (2) what has been learned from the information gathered, and (3) what remains to be done to complete the original milestone as written? The replies must be documented. If the work is still under way, the grading scheme also asks, what additional or new information is required to address the underlying scientific question? From the answers to these questions, a bottom-line status assessment is derived.

Progress is rated on each of an area’s milestones. When a milestone is finished ahead of time and extra work is done, a new milestone may be suggested. This process has been carried out for all the fields. Some of the evaluations need to be revisited (e.g., when there are mitigating circumstances that have delayed the production of results). The specificity varies quite a bit from field to field. When an unexpected result occurs, changes to the milestones may be suggested. A summary table is prepared for each field. New milestones are being written as the result of facility upgrades or budget changes. Foreign programs are evaluated if there is significant U.S. participation. The intended end result for this exercise is to develop specific performance measures for each area that define the terms of “excellent,” “good,” “fair,” and “poor.”

The Subcommittee may want to make modifications to performance measures to reflect new milestones and opportunities but has not done so, yet. Evaluations will be based on the currently defined milestones. The plan is to produce a first draft of a report by the end of January 2008.

Simon-Gillo commented that it looked like the Subcommittee had made a good start. The office would like these evaluations in time for the budget discussions. It might be helpful for the Subcommittee to look at the performance evaluations performed by other SC offices.

Elster said that every proposal should relate to the milestones. Young stated that, if the Subcommittee is missing major areas of the field, it needs to know that. Henry pointed out that there *are* gaps; however, these are guidelines, not rules or procedures.

Ent commented that these milestones are not well known in the community and need to be better known so they can be used in proposal evaluations. Young replied that most people are familiar with the milestones but not the performance measures themselves.

Zajc stated that there must be uniformity in how these performance measures are applied. These evaluations may be used to make programmatic decisions. Young noted that the Subcommittee had not assigned all the grades. After it does, it will need to go back and make sure the evaluations are uniform in application. In addition, one can encounter bumps in the road and still attain the milestones in time.

Milner commented that it seems that the students are doing the grading here. There has to be a grading scheme. He asked what these grades were used for. Young said that he did not know where these go next. Simon-Gillo said that there is a website for all of the Program Assessment Rating Tool (PART) forms for all agencies. It would be helpful for the Subcommittee to look at that website. OMB uses several factors to judge the effectiveness of a program and how well they are doing in making progress on long-term goals.

Cardman commented that the appropriate scale is what would be helpful to get from NSAC.

Tribble suggested that the Subcommittee look at the referenced sources and come back to the Committee with an iterated grading scheme and a report in six to eight weeks. He directed the discussion back to the draft LRP and continued the review of the Overview and Recommendations of the Plan. Questions of emphasis in the text were addressed.

Ramsey-Musolf proposed that a new paragraph be added on precision electroweak studies. He agreed to write something up for consideration on the following day.

Ent suggested making the Research and Operations section less inclusive. He was assigned the task of editing down the section and presenting a revised narrative on the following day.

Wilkerson agreed to rewrite a sentence about DUSEL.

A break was declared at 3:34 p.m. During the break, the members were to review pp. 151-162 for possible changes.

The meeting was called back into session at 4:01 p.m. Henry and Keister recognized the members of the Committee whose terms were about to expire. A certificate was presented to each of these members: David Dean, Thomas Glasmacher, Roy Lacey, Guy Savard, Susan Seestrom, and William Zajc. Tribble added his thanks and appreciation.

Milner took on the task of rewriting the first sentence on p. 157.

The issue of the order of the chapters and their sections was raised. It was decided that discussions of quantum chromodynamics (QCD) were to be kept together in the text. No one suggested reordering the chapters.

A question was raised about the selection of the "overarching questions" on p. 15. The consensus was that the selection was made early on, that sufficient time for debate on this selection had occurred, and that it was too late to change these questions at this time.

The replacement of colored lines with dashed, dotted, etc. lines was suggested to make figures more comprehensible by color-blind readers.

Makins questioned the completeness of the description of unpolarized cross-sections. She agreed to write an additional sentence for insertion.

The sidebar on lattice QCD was found to be very difficult to understand. Ent and Ji volunteered to review it overnight and return with a modification.

A simplification of Fig. 4 (p. 26) was seen as needed. Ullrich was asked to attempt that simplification.

Ramsey-Musolf noted that the caption on the figure on page 30 was not correct and volunteered to rewrite it.

Placement of the sidebars in the Applications section was discussed, but no reason to change the placement was put forward.

“Poetic” language was deleted at the suggestion of Ullrich.

Those who had written or edited science sections were asked to review overnight their figure captions to make sure they were self-sufficient.

A suggestion for modification of the first sentence of the Overview section of Nuclei: From Structure to Exploding Stars was made by Ramsey-Musolf. A question was raised about the location of the sidebar that appeared on p. 59. The sidebar was seen to support the section it was embedded in. A new Fig. 2 on p. 69 was found to be desirable. Elster was asked to look into it. Savard was asked to reword the bullet on fundamental symmetries and that on the search for physics beyond the standard model.

The floor was opened to public comment. There being none, the meeting was adjourned for the day at 6:58 p.m.

Tuesday, December 4, 2007

Chairman Tribble called the meeting back into session at 8:35 a.m. and continued the review of the draft LRP, picking up partway through the Science section (Chapter 2). Typographic errors, methods of expression, and punctuation, inter alia, were corrected on a page-by-page basis. Missing elements (e.g., figure legends and acronym definitions) were pointed out and supplied. Issues of balance (i.e., between text and graphics and in the length of text devoted to different products) were discussed and resolved, generally by affirming the appropriateness of the extant text. Issues related to the clarity of expression of illustrations, equity in mentioning institutions, meaningfulness of the selection of photographs and illustrations (graphics), and word choice were also addressed and resolved by consensus.

A break was declared at 11:36 a.m. The meeting was called back into session at 11:56 a.m. The sections of the report rewritten by the Committee members during the previous evening were critiqued and incorporated into the draft text. Some of the editing of the rewrites was left to the discretion of the Chairman.

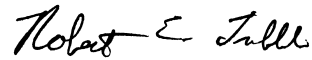
An additional sidebar on DUSEL was suggested. It had been in an earlier draft of the document but deleted. The narrative about DUSEL was reviewed and critiqued on-screen and approved by the Committee.

The transmittal letter was reviewed and critiqued on-screen and approved by the Committee. The Table of Contents was still missing. An acronym list was needed. A list of NSAC members needed to be added. Supporting white papers are to be put on the NSAC website. The chairman asked for additional agenda items. There were none. He opened the floor for public comment.

There was none. The next meeting will probably be in early March. The next draft of the LRP will probably be finished within a week. The hope is to get it edited shortly thereafter and to get it to the DOE and NSF by early January.

The meeting was adjourned at 1:24 p.m.

These minutes of the Nuclear Science Advisory Committee meeting held at the Crystal City Marriott, Arlington, Virginia, December 3-4, 2007, are certified to be an accurate representation of what occurred.



Robert Tribble
Chairman
Nuclear Science Advisory Committee