Minutes of the Meeting of the
Department of Energy and National Science Foundation
Nuclear Science Advisory Committee
Radisson Hotel, Arlington, Virginia
July 26, 2007

Members Participating:

Robert Tribble, Chairman
Douglas Bryman
David Dean
Charlotte Elster
Rolf Ent
Thomas Glasmacher
Ulrich Heinz
Xiangdong Ji
I-Yang Lee
Naomi Makins
Richard Milner
Guy Savard
Thomas Ullrich
John Wilkerson
William Zajc

Members Absent:

Roy Lacey
Michael Ramsey-Musolf
Ubirajara van Kolck
Heino Nitsche
Susan Seestrom

Others Participating:

Eugene Beier
Joseph Dehmer
Eugene Henry
Calvin Howell
Bradley Keister
Dennis Kovar
Robert Janssens
James Symons

Presenters in Order of Appearance:

Eugene Henry
Joseph Dehmer
Dennis Kovar
Jonathan Kotcher
Glenn Young

About 25 others were in attendance during the course of the meeting.

Chairman **Robert Tribble** called the meeting to order at 8:05 a.m. He introduced Eugene Henry, NSAC Designated Federal Officer, to address a question that had been put before the DOE General Counsel: May special government employees appear before Congress to discuss advisory-committee business? The general answer is no, although this restriction does not preclude members from telling Congress about other matters of interest to them. Zajc asked if members could go before Congress to support the budget requests. Henry asked for a finely honed expression of that question that could be taken to the General Counsel.

Joseph Dehmer was asked to report on the status of nuclear high-energy physics at the NSF. Nuclear physics is extremely healthy today with three flagships: Relativistic Heavy Ion Collider (RHIC), the Thomas Jefferson National Accelerator Facility (JLab), and the National Superconducting Cyclotron Laboratory (NSCL).

He thanked the subpanels that have been working during the past months. The Neutrino Science Advisory Group (NuSAG), Dark Matter Science Advisory Group (DMSAG), and others are making significant contributions.

The selection of the Homestake site for Deep Underground Science and Engineering Laboratory (DUSEL) will be reviewed later at this meeting by Jon Kotcher. The NSF is now looking forward to this underground infrastructure of global utility and scope to extract as much science from an underground environment as possible. The site will be open to all agencies and countries. Collaboration will be open, and safety will be a critical element. It will be an international laboratory. NSF will need a new program officer to deal with underground-laboratory issues.

The joint vision of NSF and the DOE offices of High Energy Physics (HEP) and Nuclear Physics (NP) is working well. DOE/HEP is leading the International Linear Collider (ILC). DOE/NP is leading the effort for a Facility for Rare Isotope Beams (FRIB) [formerly the Rare Isotope Accelerator (RIA)]. NSF is supporting the science activities of all of these efforts. In a similar fashion, NSF is leading the effort for an underground laboratory, and it is anticipated that DOE offices will support science activities there.

The budgets for FY08 and beyond are promising, but the process is not over. In the physical sciences, the NSF Physics Division is up 6%, on track to double in 10 years. The FY08 budget, which has passed the House and Senate, it would be up 8%. In FY07, was up $4 million to $18 million for Large Hadron Collider (LHC) computing and management and operating (M&O). In FY08, NSF it will hold an open competition for the Physics Frontier Centers. The long-term goal is eventually to have about 20 such centers with annual competitions.

The United States needs a university-based accelerator physics program. The intent at NSF is to launch such a program as part of AAPI: Accelerator Physics and Physics Instrumentation. Perhaps in FY09 there will be sufficient funds to launch; by 2030, that program could be $40 million per year.

In FY08, the President's budget request contains support for the start of construction of the advanced Laser Interferometer Gravitational Wave Observatory (LIGO).

In recent years there has been a rise in non-accelerator particle physics activities. This is a remarkable time in terms of several projects reaching significant milestones. The Very Energetic Radiation Imaging Telescope Array System (VERITAS) has begun operating and is the most sensitive gamma-ray telescope in the world. Auger is operating, although not yet complete. Borexino is now operating after a 3-year delay for environmental reasons. The Cryogenic Dark Matter Search (CDMS) is maintaining the frontier of cosmic-ray physics. And IceCube has about one-third of its strings installed; 12 to 13 strings are added each year. The hope is to start taking data this year.

The Physics Division is looking for two program directors, one for DUSEL and one in nuclear physics. A program for midscale instrumentation ($2 to 30 million) is needed; it would form the second component of AAPI. The maximum request in the Major Research Instrumentation (MRI) will increase from $2 million to $4 million in FY08.

Ji asked what the implications of the funding plans were for nuclear theory. Dehmer noted the recent increases to theory of 5%/year, and also cited the opportunity for funds via NSF-wide cyberinfrastructure initiatives.. Money would also come from MPS and will leverage that funding. That money will be mainstreamed in future budgets. He also

noted that the biggest demand for computer-science services are quantum chromodynamics and general relativity. These funds from these new initiatives are for the people that use the computers, not for computer time.

Dean asked how Scientific Discovery Through Advanced Computing (SciDAC) fitted in. Dehmer responded that he did not know; SciDAC is a DOE program. NSF's Cyber Discovery and Innovation (CDI) Program is funded at $40 million in FY08.

Bryman asked if DUSEL were being coordinated with other underground laboratories around the world. Dehmer replied affirmatively. A meeting specifically for that purpose is being held soon. The intent is to form a community of underground laboratories and have strong bonds among these laboratories. DUSEL is to be participatory and collaborative.

Tribble asked what the nuclear physics budget increase was. Dehmer said that he did not have that amount of broken out. The Division has covered the NSCL ramp-up. Nuclear Physics has not been flat. Particle and Nuclear Astrophysics is a new area of funding. A holistic analysis would probably show an increase of 6% a year for the past 10 years. Tribble said that he would estimate it at less than that. Dehmer said that they would check this and report about it at the next NSAC meeting.

Dennis Kovar was asked to report on the status of nuclear physics at DOE.

The FY07 appropriation for the Office of Science (SC) is about $200 million over the FY06 appropriation but $305 million less than the request. The FY07 appropriation for NP is $422.8 million. This is $55.7 million over the FY06 appropriation but about $31 million less than the request. The cuts from the NP request are $9.7 million for research, $16.3 million for facility operations, $2.4 million for construction, and $2.9 million for stewardship. In FY07 there was a big increase in construction funding. NP is increasing at the rate of cost-of-living for research but at less than the cost-of-living overall. The FY07 budget restores most of the funding lost in FY06. RHIC is funded for 20 weeks of running, and the Continuous Electron Beam Accelerator Facility (CEBAF) is funded for a 34-week schedule with funds redirected to the 12-GeV upgrade project.

The Office of Science FY08 request was about $300 million over the FY07 request; it is now about $600 million over the FY07 appropriation. NP is up 11%. The House and Senate and marked up the bill, and there will be a conference committee. A 12% increase in research and 9% in facility operations and a growth in construction are in the offing. There are increases in university, national laboratory, SciDAC, and rare-isotope R&D. A lot of instrument projects are funded [e.g., GRETINA(the Gamma-Ray Energy Tracking Array), HI LHC (Heavy Ions at the LHC), and capital equipment].

The university and national-laboratory research efforts are essentially brought back to FY05 levels. User facilities will operate at near-optimum levels. The 12-GeV CEBAF upgrade project will complete the project engineering design. A solicitation for the pre-conceptual design/site of a rare-isotope beam facility is planned for FY08. R&D that addresses next-generation capabilities is supported.

FY08 is a very important year, setting the trajectories for future years. The question is, whether the agencies will get back on the original doubling trajectory. In FY07, the first year of the American Competitiveness Initiative (ACI), SC developed a plan to implement a world-class program in nuclear science with guidance from NSAC and the long-range plan (LRP). This planning gets re-examined each year, and everything

depends on changing out-year projections, new projects, new high priorities established by the administration, and advisory-committee input.

The funding profile shows the expected funding to be near the "comfort" threshold of the 2006 NSAC report. If that funding comes through, two major research facilities will be able to be supported.

The NP Office is planning solicitations for its university grant solicitation with a deadline of November 1, the general solicitation, outstanding junior investigator, Presidential Early Career Award for Scientists and Engineers (PECASE), generic rare-isotope beam, pre-conceptual design for FRIB, and rare-isotope beams for forefront research. Last year there was an advanced fuel cycle solicitation, but there was no money for that under the continuing resolution; it will be funded in FY08 if money comes through.

NSAC is expected to deliver the Rare Isotope Beam (RIB) Task Force report in July, the LRP in December, and evaluations and revisions of NP milestones in December.

In the Office, positions for a program manager for instrumentation and a detailee for low energy were filled. The low-energy program-manager position will be advertised along with three other positions. There are also two unfilled detailee positions.

Heinz asked if the FY08 budget was subject to presidential veto. Kovar replied that the appropriation is 9 to 10% greater than the presidential request. The administration feels strongly that this is not a good idea. The House and Senate bills differ widely where they put the money; these differences have to be resolved. In FY06, both the House and Senate had given NP a good increase that did not occur in the continuing resolution.

Bryman asked what the order of magnitude was of the funding for rare isotope investments proposals. Kovar responded that the budget totals $50 million. A $50 million proposal would have to walk on water.

Tribble noted that two reports have been submitted to NSAC, those of NuSAG and the RIB Task Force. **Eugene Beier** was present to answer questions on the NuSAG report, which has been approved by the High Energy Physics Advisory Panel (HEPAP). Tribble polled the Committee about the members' reactions to the report. Bryman said that the report, as modified, is excellent. Makins was happy with it. Dean and Elster said that it was a good report.

Ent noted that, in the recommendations, the fourth recommendation is more related to the conclusions than was the third recommendation and asked why they were not swapped. Beier replied that they were of equal value, just supporting different technologies. The optimum configuration of the water Cerenkov detector is not known. The other technologies referred to in the fourth recommendation need much more R&D. They were ordered this way for technologic and strategic reasons. The location of the site may also dictate which technology is selected. The critical thing is whether the mass hierarchy can be discerned.

Glasmacher supported the report. Ji said that he liked the report and asked if the 300-kt water detector is feasible in an underground laboratory. Beier responded that there has to be some geo-mechanical work done on making such a large cavity, but it is considered doable.

Milner said that he believed that putting so much liquid argon underground seemed unsafe and asked if anyone was working on the safety issues. Beier responded, no. An analysis at the Waste Isolation Pilot Plant (WIPP) worked out a solution there.

Lee said that this is important physics and that he liked the report very much.

Zajc said that the third and fourth recommendations seemed different to him. Water Cerenkov is a known technology. The costs for liquid argon seemed optimistic. The safety issues of liquid argon are quite significant. Beier replied that the costs of liquid argon have to be reduced by a factor of 10 in order for the technique to be economical. Ullrich and Heinz liked the report. Savard had no problems with the report.

Tribble complimented NuSAG and its members and noted that the sense of the committee was to approve the report. He presented the transmittal letter that he had drafted, which had been previously distributed the committee. He asked for suggested changes. There were no concerns with the letter as drafted.

A break was declared at 9:31 a.m. The meeting was called back into session at 10:04 a.m. Tribble inaugurated a discussion on the RIB Task Force report. **James Symons** was asked to field questions about the report. Tribble once again polled the sense of the Committee. Savard was happy with the report.

Heinz was confused by the discussion relating the RIB program to the discussion of national security and homeland security. He noted that it would be clearer if the discussion of homeland security were omitted. Symons replied that a broader discussion of homeland security relationships (nanogram targets) was edited out, leaving the relationship unsupported. The homeland-security people are interested in this issue, and he agreed that that interest should be made clear.

Heinz requested that the "key nuclei" referred to one page 27 be made more explicit. Symons said that one cannot identify those nuclei at this point, but this *is* a serious topic, as is discussed in Figure 2 and Figure 1. Heinz said that that importance needs to be pointed out and also why these nuclei are important. They are the very-neutron-rich nuclei. Symons said that that could be looked at. Given the currently available beam intensities, not all of this work can be done. Heinz said that the reader needs to know what the most important nuclei for discovery potential are. He was concerned with how the report justifies additional funding for equipment. The statement noting that additional funding was part of the ongoing budget precess is weak. The existing funding for the projecte is put in jeopardy in the way that statement is expressed, also. The case needs to be made that significant science will be performed even if no additional equipment funding is forthcoming. Symons said that the truth is somewhere between the extreme possibilities for additional equipment funding (none and lots). Some expensive components can be developed by extending current devices. Another argument is that one should invest in the detectors to make the most efficient use of the beams being built. One does not want a facility coming on line 10 years from now that will not be doing cutting-edge research. Heinz replied that that the cost of those detectors should be included in the cost of the project. Dean noted that moving existing equipment is already in the budget. Heinz warned that one should not fill the budget envelope with the main facility, implying that the envelope can be expanded for detectors later on. That weakens the funding argument. One should say that more money may be needed for detectors. Symons said that that portion of the report could be revisited.

Ullrich said that it might be worthwhile compiling current capabilities in one place. Further, there are too many quotations from the RISAC [Rare Isotope Scientific Assessment Committee of the National Academy of Sciences (NAS)]. Symons pointed out that the Task Force's report is written by an inside group. The RISAC had a lot of

external members, so its conclusions validate the insiders' views. Ullrich noted that the report lists all of the world's facilities, but comparisons to those facilities are spread all over the report. There should be a summary that pulls all these comparisons together at the end of Section 4. Symons said that the difficulty is that there is no one measurement to compare. Rather there are ten themes and dozens of different measurements that one would like to make. Some summary would be good, but it would be difficult to do this in a fair, meaningful way. Ullrich said that the different places in sections 2 and 4 need to be pulled together and compared.

Wilkerson said that, overall, the report is fine. How to present the budget is problematic. The statement in the Executive Summary that "cost estimates can be used with some confidence" is vague and disconcerting. Symons reassured him that these estimates have been thoroughly done. However, the issue of the detectors is not in there.

Zajc suggested that the statement of importance of nuclei near the drip line should be made more meaningful to the non-insider. The statement of the importance of the facility should mention the need for detectors. Day-1 physics will require the presence of detectors. Symons agreed that that could be strengthened.

Lee endorsed the recommendations.

Milner pointed out that, currently, there are the facilities at Michigan State University, ATLAS, and others. In 2017, this driver is wanted. The report needs to show how the field evolves from the current state to that future state. The report needs to show who the uses of these facilities would be. Symons responded that the Task Force is not the user community or the RISAC. There is an understanding that there would be a broad community of users, particularly from the universities. That is a good point.

Ji said that the task force has done an excellent job of answering the charge. Glasmacher also endorsed the report.

Ent pointed out that the date on the report varies from copy to copy. Symons said that a lot has happened on this report, and the date of the most recent version has changed accordingly. Ent noted that Appendix C. refers to a discussion of RHIC that does not appear in the report. Symons said that the Task Force will fix that. Ent said that there should be a table comparing the different facilities with common units. Finally, on page 8, the report refers to existing state-of-the-art equipment that could be used. A statement that identifies that equipment should be included.

Elster stated that the equipment of today can and will be used, but the equipment referred to on page 8 should be listed. Symons agreed. Elster said that the introduction on page 3 should identify the world-class results that will be produced and why this will be a world-class facility. Its niche must be identified.

Dean approved of the document.

Makins suggested that, in Section 6.2, the words unique and complementary should be used. Also the drop in energy as the beam current increases was never explained in the essential choice of a (linear accelerator) heavy-ion driver as the key technology. Symons replied that that isn't exactly true. There is a graph that shows the performance of the machine. There is a limit to which the physics reach can be pushed. The number of cavities and power supplies is determined by the gradient. If the gradient could be doubled, the situation could change. Already the driver is configured to have multiple charge states put through it.

Bryman said that the report is excellent. It is likely to be greeted with skepticism because of historic issues. The cost of the day-one program must therefore be specified completely. Symons replied that the task force needs to talk about this issue and address these concerns.

Tribble called for public comment on the issue of equipment and a day-one science program. Glasmacher noted that, if NSCL were upgraded, it would have a world-class program. Its detectors are good; the gamma-ray detector will be eclipsed by GRETA. Tribble noted that, if only the yellow and blue rings at RHIC had been built, the facility would not have a world-class program. Savard commented that the world-class instruments are in hand for the next 5 to 10 years. If something new comes up tomorrow to do world-class science, it will be implemented at Argonne. One has a world-class program when one realizes what one has in the detector and makes appropriate adjustments.

Janssens commented that there will be world-class detectors at that time.

Kovar stated that about $3 million per year will go for equipment at current facilities that will not be running sometime in the future, and those instruments and money will be available. What will be available is greater than the 20% cited in the report. One has to look at the investment in current facilities to see if they are optimized for the FRIB program.

Tribble asked if the task force could make the requested changes by the afternoon session of the current meeting. Symons said that he did not see how that could be done. Tribble asked if approval should be deferred until those changes were made. Heinz said that he could not vote for accepting the report as it is written. Symons suggested that NSAC could put qualifications in the transmittal letter. Tribble added that the Committee could approve the report with requests for changes, send it back to the Task Force, or accept it with reservations.

The consensus of the group was that the report requires changes. A list of changes was to be prepared and presented to the Task Force. The Task Force was to consider those requested changes during the meeting's lunch break, and consideration of the transmittal letter was deferred to the afternoon session.

A list of new assignments to review sections of the LRP was circulated. The current contributions to the LRP need to be edited down, a uniform style has to be enforced, and jargon has to be made understandable. Some agreement on length has to be determined. Several sections have new drafts on the way. The timeline calls for the drafts to be completed by September 1, 2007. The language should be pitched at the readers of *Physics Today*. Different sections (body, sidebars, and Executive Summary) should contain different levels of detail and be aimed at different levels of understanding. The structure has been well defined. The style of expression of past achievements needs to be determined.

The people present agreed to take on the assigned tasks; backup coordinators were to be recruited by the coordinators from within their groups. The LRP should be published in December. Figures and budget numbers will need to be submitted at or near the September 1 deadline. Suggestions for sidebars can be solicited from the entire group. A master e-mail list will be distributed to the coordinators.

The current coordinators summarized the statuses of their sections. A section needs to be added on the Electron-Ion Collider.

A break for lunch was declared at 11:43 a.m. The meeting was called back into session at 1:03 p.m.

Jonathan Kotcher was asked to review the recent events regarding DUSEL, a joint initiative within NSF among the divisions of Physics, Engineering, and Geosciences with Biology serving in an advisory capacity. It is a broad, evolutionary, and multidisciplinary scientific program that offers a new opportunity for growth, diversity, and interdisciplinary research. It is intrinsically a strong program for education and outreach that is well matched to the NSF mission. It addresses a recognized, worldwide need for extensive space at depth for all programs over multiple decades and will enable new, long-term partnerships among disciplines and organizations. DUSEL is the centerpiece of the increase in the NSF Physics Division's investment in the U.S. underground science program and the number-one priority for a new project start in the Physics Division. It has been the subject of a large number of community planning activities.

DUSEL will investigate life at depth: the aseptic environment; subsurface biosphere; isolated underground life forms; life at high temperature and pressure (extremophiles); microbial activity at low respiration rates; and associated genomic features. It will form a platform to drill deeper, to 12,000 ft (120° C). It will study rock formation at depth, large-scale rock mechanics and slippage mechanisms, scale/stress dependence of rock properties, seismic transmission with a closer approach to earthquake conditions. It will study fluid flow and transport at depth, and the knowledge gained will have applications to the stability of water supplies, hazardous waste disposal, and remediation of contaminated groundwater. It will study the rock/water interface underground at high pressure and temperature. And it will study mineral resources and environmental geochemistry.

It will provide a very-low-level counting facility and experiments with low background, underground physics, cosmogenics, and applications to homeland security. It will support science, technology, and engineering innovation with novel microorganisms, analytic techniques for geomicrobiology, drilling and excavation technology, environmental-remediation techniques, subsurface imaging, creation of pure crystals without cosmic-ray-induced "impurities," basic research in underground and mining safety, and techniques for excavation of very large stopes at depth (to support a megadetector).

It will allow the study of neutrinoless double-beta decay, solar neutrinos, CP violation in long-baseline experiments, neutrino mixing angles, nuclear astrophysics with low-cross-section measurements, dark-matter searches, proton decay, and supernovae neutrino observations.

DUSEL will have surface buildings, an intermediate campus, and a deep campus so people can study what they are interested in. It will be much larger than any other underground laboratory in the world.

A three-tier process was conducted. A site-independent study was funded at $400,000 and conducted to determine the potential need for an underground laboratory. It recommended a strong cross-agency deep science initiative, and the construction of a flag-ship deep underground science and engineering laboratory for the US to complement the nation's existing assets in underground science. A second solicitation asked for a site-specific proposed design. There were eight proposals, and two conceptual designs were selected to move forward with designs and funded at $500,000 apiece in September 2005.

Site specific designs were delivered to NSF and reviewed by a panel in August 2006. The third solicitation was held (twice) due to the reconsideration process. Four proposals were received. The chosen site (the Homestake Mine in South Dakota) will receive up to $5 million per year for 3 years. The S-3 selection process included a broad panel of experts reviewed the proposals very carefully and thoroughly. A cost consultant was also used to review the cost, schedule, contingency, risk, cost and schedule methodology, time of performance, etc. as input to the selection panel.

The selection panel held meetings and a series of site visits to each of the proposing sites. It evaluated the intellectual merit, broader impacts, site suitability, facility design, and strength of proposing teams. In a secret ballot, the Homestake site was unanimously selected on the basis of the published criteria for having the greatest potential for development, best cost/risk value, and highest science and engineering enablement. The third-solicitation selection constitutes commitment to a site and design team only. The award is intended to prepare DUSEL for major research equipment and facilities construction (MREFC) consideration. To be decided later in the process are the management organization; further needed development, R&D, and project planning; and construction and operation plans. This award is not a commitment to construction but an award to prepare DUSEL for MREFC. Site selection was intense and focused. After careful consideration of the panel input, the DUSEL Program Directors concurred with the conclusion of the panel and forwarded the Homestake proposal to the NSF for funding. It was reviewed in detail by the NSF Director's Review Board, and a public announcement was made on July 10, 2007.

Planning can now take on a focused approach, and formal agreements can be sought with sister agencies. A town meeting will be held, another solicitation will elicit proposals to develop project plans for the initial suite of experiments, and MREFC will be sought for infrastructure and instrumentation. The NSF Physics Division encouraged submission of DUSEL-related R&D proposals this year, DOE HEP and NP put out a call for proposals for DUSEL-related R&D in October 2006, proposals were submitted to both agencies and reviewed by a joint DOE/NSF panel in March 2007, and awards are in the process of being announced. The NSF Geomechanics and Geotechnical Systems Program is also funding DUSEL-related R&D. Proposals were reviewed in April 2007, and awards are being finalized. R&D topics suggested included dark matter detection, neutrinoless double-beta decay, nuclear astrophysics, cross-section measurements, neutrinos, and creating large underground cavities at depth.

The DUSEL operations funding plan is being developed and discussed within the Physics Division. NSF encourages all of the research communities to actively participate in the planning and development of this new and unique research opportunity, especially the fourth solicitation.

Wilkerson noted that the Homestake facility is a private operation and asked how that will complicate experimentation. Kotcher replied that the decision on experiments will need to be made before MREFC funding. However, NSF has funded experiments in private or foreign locations many times. As long as the safety requirements are met, there should be no showstoppers. Wilkerson asked when the Science Board would review the DUSEL package for MREFC and if one year was a likely scenario. Kotcher answered that a year is overly optimistic.

Milner asked what the estimated operations budget was. Kotcher responded that it is not well understood, yet. This effort will ramp up over many years. It will be in the tens of millions of dollars.

Lee asked if the requirements of the other sciences (like rock science) for drilling and blasting would interfere with the basic program. Kotcher replied that the issue had been looked into and it was found that coordination will be needed. Most of the fourth solicitation's money will go to physics experiments.

Heinz asked whether foreign countries will be required to participate in construction costs. Kotcher said that they will not be required to contribute, but offers of participation will not be turned down.

Ent asked if the five basic review criteria categories were weighted. Kotcher responded that the panel made a matrix and weighted each criterion in its own way and then rated each proposal.

Bryman asked what was unique about DUSEL. Kotcher pointed to the heterogeneity of the rock, the historical coring samples, the available space at depth, and the intrinsically multidisciplinary nature of the research.

Tribble asked who will own the mine. Kotcher responded that the deed to the Homestake Mine has been turned over in perpetuity to the South Dakota Science and Technology Authority (SDSTA), which cannot do any mining for profit.

Glenn Young was asked to report on performance measures and milestones. The charge to the Subcommittee on Performance Measures asked that they gauge the progress toward NP's goals and recommend revised long-term goals and metrics for the program in the context of the new LRP.

The previous report proposed four performance measures. It gave 41 milestones, grouped into five major areas, as means of measuring progress in terms of the four performance measures. Performance measures are defined by the Office of Management and Budget (OMB) (1) to determine if the program actually has long-term performance measures to guide program management and budgeting and (2) to promote results and accountability. The Subcommittee is trying to see if the selected measures are salient. There must also be two or three specific, easily understood program-outcome measures that directly and meaningfully support the program's purpose. "Long term" is generally defined as 5 to 10 years and is consistent with the periods used for strategic goals in the strategic plan.

The 2003 long-term performance measures addressed (1) hadronic physics; (2) physics of high-temperature and high-density hadronic matter; (3) nuclear structure and nuclear astrophysics; and (4) neutrinos, neutrino astrophysics, and fundamental interactions. A two-tier grading scheme was used, with each tier having enumerated physics goals. The timeframe extended to 2015. The OMB has requested that grading go to a four-element resolution (excellent, good, fair, and poor) with specific characterization for each level. There is to be an expert review every 5 years.

Milestone definitions include

- Indicators of key steps towards achieving performance measures,
- An emphasis on a representative set that is not unnecessarily binding on specific facilities, and
- Some input on budget assumptions about facilities and personnel.

The Subcommittee will review whether the milestones through 2007 were met, evaluate progress, and revise those that need to be changed. Any changes must be documented, reflecting the dynamic nature of scientific research. The added part of the job is evaluating midterm progress. The Subcommittee needs to document what was achieved with respect to the milestones for 2005–2007. Several sources for evaluating the research output against the 2003 list of milestones already exist. The Subcommittee should be able to provide sample references where it claims that a milestone was fully met. Several future milestones have already been partially met. There are also some changes in the landscape.

The plan forward is to hold Subcommittee discussions and to hand out assignments. Input will be sought from colleagues, the LRP writing groups, and NSAC. The first draft of the evaluation and revised measures/milestones should be ready in 2 to 3 months, perhaps at the American Physical Society's Division of Nuclear Physics (DNP) meeting.

Tribble said that a good deadline to complete the report would be the December NSAC meeting.

Heinz asked how the Subcommittee would solicit input from colleagues. Young replied that it will ask members to speak with colleagues. Tribble warned that one would not want this to be a scattershot process. Young replied that the Subcommittee wants to make sure that the theory community is included. It expects to approach the user groups.

Wilkerson asked whether or not this effort should be tied to the LRP. Young answered that one then gets too many measures.

Makins said that this exercise seems to be a summary of the LRP and asked what reports were already done. Young pointed to reports of program reviews and other such reports.

Dean pointed out that the field had experienced 18 to 24 months of unfavorable funding and asked whether that would impact the grading. Young replied affirmatively. There will be a need to explain performances.

Heinz commented that one cannot put up milestones for new ideas. Young pointed out that there has to be specificity; these items have to be measurable things. Henry commented that he viewed these measures as being very important, but they do not define a program. Also, the program gets into areas that do not fall under these categories.

Tribble steered the discussion back to the RIB Task Force report. Discussions had been held at lunch time. Symons pointed out that because it was written awhile ago, the report was a little stale. Some issues that were raised are perennials, so it is unlikely that changes will be made in those areas. However, some suggestions will lead to improvements. Some changes were proposed.

The statement about homeland security will be clarified. On page 27, examples should not be put in summary sections, but the main text will be improved. On page 28, the text will be expanded. "Some confidence" will be changed to "confidence." A basis of comparison will be decided on. On page 3, the text will be improved. The comment on overall vision cannot be dealt with in the short term.

Heinz asserted that the statement that the equipment is there for world-class science should be included. "Additional" should be replaced with "continued."

Bryman cautioned that the discussion of "reach" is dangerous and could be left out.

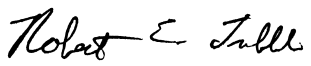
Tribble asked if these changes satisfy the concerns expressed earlier. The Committee members said that these changes satisfied them. The transmittal letter was discussed. Changes in the text were agreed upon.

Tribble called for public comment. Howell asked if the page-number limitations on the LRP contributions are inclusive of sidebars. Tribble said that they are, but the inclusion of extra sidebars is flexible.

The next meeting of NSAC will be December 3 and 4, 2007. The meeting was adjourned at 2:55 p.m.

Respectfully submitted,
Frederick M. O'Hara, Jr.
Recording Secretary
July 31, 2007

These minutes of the Nuclear Science Advisory Committee meeting held at the Radisson Hotel Reagan National, Arlington, Virginia, July 26, 2007, are certified to be an accurate representation of what occurred.



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Robert Tribble, Chair
Nuclear Science Advisory Committee
September 10, 2007