

**NUCLEAR SCIENCE ADVISORY COMMITTEE  
to the  
U.S. DEPARTMENT OF ENERGY and NATIONAL SCIENCE FOUNDATION**

**PUBLIC MEETING MINUTES**

**DoubleTree Hotel by Hilton  
8120 Wisconsin Avenue, Bethesda, MD 20814**

**June 27, 2016**

**NUCLEAR SCIENCE ADVISORY COMMITTEE  
SUMMARY OF MEETING**

The U.S. Department of Energy (DOE) and National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) was convened at 8:30 a.m. EST on Monday, June 27, 2016, at the Bethesda North Marriott Hotel and Conference Center, Bethesda, Maryland, by Committee Chair David Hertzog.

Committee members present:

David Hertzog, Chair	Frederic Fahey	Suzanne Lapi
Paul Benny	George Fuller	Jeffrey Nico
Helen Caines	John Hardy	Filomena Nunes
Gordon Cates	Roy Holt	Mark Pitt
Abhay Deshpande	Cynthia Keppel	Martin Savage

Committee members participating by video:

Krishna Rajagopal

Committee members unable to attend:

Karsten Heeger, Kate Jones, Michael Lisa, Daniel Phillips, Michael Wiescher

NSAC Designated Federal Officer:

Timothy Hallman, U.S. Department of Energy (DOE), Office of Science (SC), Office of Nuclear Physics (ONP), Associate Director

Others present for all or part of the meeting:

Elizabeth Bartosz, DOE SC  
Sidney Cahn, Yale University  
Denise Caldwell, National Science Foundation (NSF)  
Leland Cogliani, Lewis-Burke Associates  
Gail Dodge, Old Dominion University  
James Dunlap, Brookhaven National Laboratory (BNL)  
Rolf Ent, Thomas Jefferson National Accelerator Facility (TJNAF)  
George Fai, DOE SC  
Donald Geesaman, Argonne National Laboratory (ANL)  
Jehanne Gillo, DOE SC  
Joe Glaser, DOE SC  
Rilla Hamilton, DOE / National Nuclear Science Administration  
Jim Hawkins, DOE SC  
Ken Hicks, NSF  
Calvin Howell, Duke University  
Bob McKeown, TJNAF  
Bogdan Mihaila, NSF  
Hugh Montgomery, TJNAF  
Berndt Mueller, BNL  
Allena Opper, NSF  
Robert Redwine, MIT

Lee Schroeder, Lawrence Berkeley National Laboratory (LBNL) / TechSource  
Brad Sherill, Michigan State University National Superconducting Laboratory (NSCL)  
Jim Sowinski, DOE SC  
Susan Seestrom, Los Alamos National Laboratory (LANL)  
Harry Wertz, ANL  
Scott Wilburn, LANL  
Joanne Wolfe, DOE SC

**JUNE 27, 2016**

## **OPENING REMARKS**

The U.S. Department of Energy (DOE) and National Science Foundation (NSF) Nuclear Science Advisory Committee (NSAC) was convened at 8:30 a.m. EST on Monday, June 27, 2016, by **Committee Chair David Hertzog**. The meeting was open to the public and conducted in accordance with Federal Advisory Committee Act (FACA) requirements. Attendees can visit <http://science.energy.gov> for more information about NSAC.

## **DOE OFFICE OF SCIENCE NUCLEAR PHYSICS OVERVIEW**

**Timothy Hallman**, Associate Director, DOE Office of Science (SC) Office of Nuclear Physics (NP), described NP's three thrust areas: Quantum Chromodynamics (QCD), Nuclei and Nuclear Astrophysics, and Fundamental Symmetries.

NP operates three national user facilities and draws guidance from the 2015 Long Range Plan (LRP). The 2007 LRP was used as an evaluative grade card and NP is doing well in supporting the community's vision for US nuclear science. Future goals are to capture the value of investments made, develop and deploy a U.S.-lead ton-scale neutrino-less double beta decay (NLDBD) experiment, construct a high-energy high-luminosity polarized electron ion collider (EIC), and invest in small- and mid-scale projects and initiatives to support research at universities and laboratories.

A step in fulfilling the 2015 LRP is the National Academies of Sciences, Engineering and Medicine (the National Academies) implementation of an independent assessment of the scientific justification for a domestic EIC facility. A panel lead by Kevin Jones will examine the priorities of accelerator R&D aimed at the development of the proposed electron ion collider. DOE and NSF are also looking to coordinate a peer review of proposals submitted to a funding announcement (FOA) to pursue NLDBD technology R&D. The FOA will emerge from DOE in the summer with an award made at the end of 2016.

The Fiscal Year (FY) 2017 budget request is \$635M, an increase of \$18M over FY16. The House and Senate have not conferred on the budget, and DOE is awaiting the House and Senate marks. Hallman believes that this budget request is at a good level for NP.

The Argonne Tandem Linac Accelerator System (ATLAS) facility will be the sole DOE-supported research facility for low energy SC research. It operates at a high rate of efficiency and is delivering well. The future in nuclear structure and astrophysics involves experimentation being developed at Argonne and the Facility for Rare Isotope Beams (FRIB). The continuous electron beam accelerator upgrade (CEBAF 12 GeV Upgrade) at Thomas Jefferson National Laboratory (TJNAF) is 97 percent complete. Completion will allow for sensitive searches and better understanding of the internal structure of the proton, as well as the search for exotic new

quark – anti-quark particles. TJNAF wants to continue progress towards implementing the MOLLER apparatus, having undergone a successful scientific review. The planned Solenoidal Large Intensity Device (SoLID) and the TJNAF concept for an electron ion collider could also advance NP goals.

The Relativistic Heavy Ion Collider (RHIC) facility discovered a new phenomenon called jet quenching. It is evidence that a new form of matter is being created. This new matter gives evidence of a perfect liquid. RHIC is working through the middle temperature range of the QCD. A future proposed initiative at RHIC is the sPHENIX detector.

Brookhaven National Laboratory is focused on the science that can be discovered with a proposed high-energy electron ion collider.

Hallman noted that the NP scope does not overlap with DOE High Energy Physics (HEP). One example is work in NLDBD for which NP is DOE's steward. Demonstration efforts are ongoing at the Sanford Underground Experimental Facility.

NP has been pursuing instrumentation R&D associated with the neutron Electric Dipole Moment (nEDM) experiment that would operate at the Fundamental Neutron Physics Beamline at the Spallation Neutron Source (SNS).

The Argonne National Laboratory has published a new limit on the measurement of the electric dipole moment of  $^{225}\text{Ra}$ .

The University of Washington is conducting Project 8 R&D to more directly measure neutrino mass by observing the cyclotron radiation of the decay beta from tritium in a magnetic field. The neutron lifetime experiment proposed by LANL is part of the scope of fundamental symmetries.

Nuclear theory underpins all nuclear physics experimental research. It poses new scientific questions and what is needed to understand results. Hallman described the new cohort of topical research collaborations.

The Isotope Program remains a central component of the NP, DOE and the Federal government. There are isotopes in short supply and DOE's efforts are not in competition with industry.

A challenge is increasing resource support for research. New tools are being built and are necessary, yet Major Items of Equipment (MIE) funding has decreased over recent years.

Hallman stressed that the nuclear physics community is intent on establishing U.S. leadership in the science of neutrino-less double beta decay. Another priority is growing the percentage of NP's budget set aside for research and projects.

## Discussion

**Mark Pitt** asked about the NP Major Items of Equipment's budget in FY2017. **Hallman** shared that it represents the Gamma-Ray Energy Tracking Array (GRETA) being installed at FRIB for precision measurements, and work starting on upgrading the stable isotope production facility at ORNL. The U.S. has not had a domestic capability to produce isotopes until FY 2017, when the Isotope Program launches the operations of the ESIPF (Enriched Stable Isotope Prototype Facility).

**Filomena Nunes** noted that nEXO has moved to NP. **Hallman** confirmed that there would not be a transfer of funds from HEP to NP. HEP will continue to support high-energy research but other facets will be conducted by NP and this will be an additional constraint to meet.

**Hallman** was unable to confirm for **Abney Deshpande** a specific funding amount for NLDBD work.

**Deshpande** asked about the National Academies study timeline. **Hallman** was unsure when the study panel will meet but expects results in 18 months. This is an independent research body.

**Roy Holt** asked about the evolution of RHIC. **Hallman** believes this evolution will happen naturally due to the emerging research from RHIC. Understanding the initial state is a gap. An EIC is needed to know how QCD is making this happen. There will be a natural convergence of communities around the EIC.

**Hallman** stressed that the FOA announcement for NLDBD will be coordinated with NSF. Emphasis was placed on getting this out in the shortest amount of time. **Allena Opper** shared that working this through DOE is the best opportunity to produce the FOA as quickly as possible.

## **NATIONAL SCIENCE FOUNDATION PHYSICS DIVISION OVERVIEW**

**Denise Caldwell**, NSF Division Director, Physics Division (PHY), reminded NSAC that colleagues Fleming Crim and Allena Opper shared budget and research investment data at the NSAC meeting in March 2016. For this meeting, Caldwell described the budgetary process and how it flows from top to bottom, assuming that predictions of a flat budget are met.

Another gravitational wave was detected by the Laser Interferometer Gravitational-Wave Observatory (LIGO) in May. The group is bringing the instrument to design sensitivity. It has roughly a factor of three to reach sensitivity. LIGO shows the value of taking a risk and avoiding naysayers to advance science.

NSF can be viewed as a hierarchy with budget development primarily taking place in the Office of the Director. Budget requests from PHY are fed vertically through the Mathematical and Physical Sciences Directorate. The NSF FY17 budget totals \$7,964M, of which Research and Related Activities are \$6,425M. The overall FY17 budget is 6.7 percent larger than in FY16. Facility construction comes from one line of the budget. Construction funding needs reductions in research areas to identify funds for planning and operations. NSF thinks very hard before investing in any facility and creating a facility from scratch. The NSF budget includes priority areas and these can get preferential treatment when the budget is conceived. The discretionary request for the Physics Division for FY17 for PHY is \$278M. The current status of what may come out of the budget is presently unknown.

Caldwell described the seven major sub-areas of PHY, which include both experimentation and theory. NSF has been criticized for what it supports in some areas of science. PHY responded by establishing a PHY Division Portfolio to examine program impacts in major scientific questions. Key cross-over areas covering no specific discipline are Computational Physics, Integrative Activities in Physics, the Physics Frontier Centers, and Major Facilities. A highlight is broadening multidisciplinary work within the Physics Frontier Centers. Others are strategies to increase diversity within the field, strengthen workforce development, and transition technologies to users.

PHY's portfolio approach led to Program Directors' identifying five cross-cutting emphasis areas. They are determining how funding can support key questions and deliver an impact in these areas. Caldwell shared key areas for Nuclear Physics at NSF. In FY15, funding was \$49.4M. Caldwell could not share FY16 details because it has not been finalized.

Investment in the PHY Experimental Program shows decreases in funding and in the number of proposals. The current success rate is less than 40 percent.

Plans are being made for PHY support for the National Superconducting Laboratory (NSCL) for the next five years. NSF signed an MOU to permit transfer of the NSCL to DOE. NSCL goals show an overlap with big science questions.

Looking ahead to FY17, the solicitation for program proposals will be revised. It has been reissued and includes details for proposals for large-scale investments to include mid-scale. The Physics Frontier Centers competition is underway with pre-proposals due on August 1. Details on the National Strategic Computing Initiative and associated opportunities will come soon.

Caldwell shared that when looking at PHY funding, proposers should look at opportunities through wider NSF programs.

Other NSF programs include Major Research Instrumentation (MRI), Software Infrastructure for Sustained Innovation, and the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE). NSF investment opportunities strive to bring communities together.

## Discussion

**Caldwell** clarified for **John Hardy** that the budget increase in Agency Operations and Award Management is partly due to creating NSF's new headquarters in Alexandria, Virginia.

**Hardy** asked what will happen to NP's budget when NSCL is transferred to DOE. **Caldwell** shared that previously a fraction of funding has gone into a program when facility operations have been phased. PHY is working hard to support the mid-scale program and things that a program cannot afford on its own. Some funding will benefit NP and possibly other programs. This funding will benefit the whole Division and support cross-cutting priorities such as Computational Physics.

**George Fuller** noted the separation between the Atomic, Molecular, and Optical Experimental Physics program (AMO-E) and Quantum Computation. **Caldwell** shared that this seems to be historical. At one time, Condensed Matter Physics was thought to be a smaller physics piece and less tightly connected to physics, hence it was situated in DMR. Since then, low temperature condensed physics has partly merged with AMO. Physics questions are directed to AMO-E.

**Nunes** asked about the status of the Computational Physics program with so much emphasis on computing. **Caldwell** would like to see funding grow. This is a priority area and is on target for some increases. Caldwell would put in money if it were available. PHY's budget was previously cut by 12.5 percent. The bulk of the cut fell on the programs.

**Pitt** asked if NP has leveraged INSPIRE. **Opper** shared that people can submit an interdisciplinary research idea to Program Directors. Those with potential are presented to Program Directors managing the relevant programs. After consideration by the Program Directors proposers may be invited to submit an INSPIRE proposal for internal review.

**Frederic Fahey** participates in the Society of Nuclear Medicine and Molecular Imaging. He reviewed historical accomplishments in research, achieved through collaboration between physics and medicine. Collaboration led to radioactive iodine and the first patient was treated in 1941. He is looking for advances in this community that can be linked to the medical community but has not seen evidence of this. **Caldwell** commented that PHY's Physics of Living Systems Program focuses on theory. It recently concluded a series of awards with Stand Up To Cancer to support cross-disciplinary work done by physicians on campuses and theoretical physicists. There are efforts in medicine at NSF to integrate with physics. **Hallman** added that DOE NP identifies interactions that show up in isotope research and nuclear data, respectively. The Small Business Innovation Program also reviews proposals with high societal

impact. These could be shown in an upcoming NSAC meeting. Detector R&D and other R&D is no longer funded but could be restarted.

**Jeffrey Nico** asked if NP budget figures include nuclear proposal support. Funding cuts for nEDM were listed separately. **Caldwell** shared that these are not separate. Mid-Scale funding is not separate. Proposals are reviewed in the scientific program and given only to those associated with programs seen as having important impacts. Mid-Scale could fund larger construction programs. The program helps provide needed tools without damaging other investments.

## **REPORT ON THE COMMITTEE OF VISITORS OF THE DOE OFFICE OF NUCLEAR PHYSICS**

**Gail Dodge**, Chair, DOE NP Committee of Visitors (COV), shared the review of NP covering the period of FY13 – FY15. In January 2016, the COV interacted with DOE staff and executed its review through three subcommittees.

The NP portfolio was judged to be world-leading in areas such as hot and cold QCD. Facility performance was viewed as excellent. The COV deemed that the goals of the 2007 LRP were fulfilled given budget constraints, and NP was deemed an effective steward of nuclear physics.

The COV determined that the Isotope Program is well organized and operating effectively.

The Comparative Research Review process was seen to be well managed and is a way to optimize the research portfolio. Continuing to review new proposals as a cohort with a competitive review is a good approach.

The COV reviewed NP staffing and current vacancies. Hallman has been in the Physics Research Division Director role as an Acting Director for five years. The COV recommended that NP use new tactics to identify candidates and fill the position. The COV saw this as NP's biggest need. NP should also fill the Program Manager (PM) position in the Physics Research Division. Not filling these positions is detrimental to long-term organizational health.

The COV recommended setting up ways to support proposal review to allow PMs to effectively and efficiently execute funding decisions. This could include installing more short-term people for reviews. Current processes are fine but PM workloads are excessive.

The Portfolio Analysis and Management System (PAMS) was reviewed. Its use is expanding and functionality is being added, yet NP should monitor community responsiveness to PAMS questions and act appropriately where needed. The PAMS COV module is incomplete, limiting COV access to all needed information. SC should make PAMS fully functional. With that, a database to track grants and demographic details should be implemented, based on feedback from this and previous COVs. An additional modification recommended is including more details within PAMS describing why a proposal was declined.

Diversity and the potential existence of biases in NP business processes was investigated. Diversity statistics are unavailable to PMs at this time from PAMS. The COV recognized that the main goal is to grow the participation of underrepresented groups in physics. The COV recommended creating a plan to promote diversity and inclusion in its full programs portfolio. The COV did not give specific actions but urged that NP work proactively in this area.

The Early Career Awards (ECA) Program was considered. The 2010 ECA grants are the only completed cohort.

The current COV reviewed the 2013 COV recommendations noting areas of completion and additional efforts needed. PAMS has limited completion of some recommendations. Overall, six of the 15 recommendations continue to require SC and NP's attention.

## Discussion

**Hertzog** complimented **Dodge** on the effectiveness with which the COV was conducted.

**Deshpande** noted that staffing concerns and solutions were not necessarily explained.

**Dodge** shared that impressions were formed around existing problems. A lack of community awareness is one. The timing of how people are hired is problematic, to include search period length and tying searches to funding. **Deshpande** noted that hiring periods are often open for a short time. **Hallman** shared that length is dictated by the Office of Personnel and Management (OPM). Putting effort into this without success is frustrating. There is not one answer. One modification was to revise the interview process and how NP is described to candidates. DOE protocol and alignment to OPM is another issue. Filling positions is a challenge when candidates have been selected but leave due to other opportunities with better incentives.

**Fahey** urged that hiring is a top priority and asked how often a candidate is selected but the process is not completed. **Hallman** shared that these processes can be extensive. Two previous attempts have taken nearly two years total. He does not know the Federal government hiring success rate but is aware that other agencies can encounter issues.

**Gordon Cates** highlighted a COV comment that a task force could be created in the community to address the need for a Physics Research Division Director.

**Pitt** noted the importance of recruiting and that community support could take burden off of the staff. **Dodge** clarified that a high-level committee somewhere in the community could be useful but did not talk about taking on filling PM position strategies specifically as these might be easier to fill.

**Dodge** reviewed the recommendation to fill PM positions. **Hertzog** reaffirmed **Cates'** comment that a community effort could give this the right feel. **Dodge** clarified that the COV did not discuss filling positions in a specific order. **Hertzog** brought up the idea of a detailee position or remote detailee option to fill these roles. **Dodge** noted a previous effort to support isotope program efforts through the use of an NNSA detailee. **Hallman** confirmed that DOE does make use of detailees and that there is flexibility on level of effort. Someone is needed who can devote enough attention to really to do the job well.

**Hardy** expressed concern around recommendations two and three. He urged that temporary people could be brought in to help with PM roles and the review processes, and help current PMs. **Hallman** confirmed that DOE has used this process.

**Nunes** called filling the PM positions critically important. While the discussion is focused on NP's research side, the facilities side has successfully filled vacancies. With a Physics Research Division Director in place, research vacancies could be successfully filled

**Deshpande** asked if new employees in these positions should be experts in their field. One could understand DOE and be expected to get up to speed. **Hallman** noted that a new employee may have to wait one year before making critical decisions about a field due to prior professional interests. There are also examples where people have filled positions and effectively performed without expertise in a particular portfolio. Subject matter knowledge is preferred.

**Helen Caines** noted that the 25 percent response rate to the PAMS questionnaire seems low. **Dodge** shared that the COV was told that this rate seemed high. **Cates** suggested that the feedback tool allows someone to proceed without responding. **Dodge** shared that the results do show if someone elected not to respond. **Hallman** added that there may be Federal rules that state that respondents cannot be forced to respond to demographic-relevant questions. **Opper**



added that NSF cannot require responses to demographic details but does strongly encourage researchers and students to respond to this survey.

**Dodge** shared with **Caines** that a respondent has a profile in PAMS. A student or other researchers listed by a PI receive a request to enter PAMS and submit demographic details.

**Hertzog** noted a small bit of data that showed that bias was not evident in decisions made about proposals in proposal review processes.

**Holt** noted that **Caldwell** shared that DOE and NSF work together to drive impacts. He suggested that both agencies could co-create a plan to improve diversity, in line with the COV recommendation for NP. **Dodge** shared that the missions are different but there could be space for collaboration. DOE might have to decide internally if they want to develop a plan.

**Caldwell** shared that PHY has a plan to meet diversity needs. The lack of data is a challenge. Investigators are asked to encourage students to respond to NSF's email to input demographic data or at least indicate that they do not wish to respond. An assessment of the responses would be helpful. This is one of PHY's hardest tasks. The email is sent from NSF just one time.

**Nico** asked how demographic information is acted on in the DOE. **Hallman** shared that reviews are conducted against details in the FOA. There can be program policy factors that can be added to that, but **Hallman** is unaware if diversity is added to the review as a metric.

**Pitt** noted that the recommendation is to increase participation but there is no data to show broader impacts due to a lack of data.

**Keppel** suggested that the email requesting self-identification data more clearly state why the information is needed. **Dodge** agreed and shared that in DOE's case, it should monitor what is happening and find ways to boost responsiveness. **Hertzog** suggested that it is important to indicate if one chooses not to report. He likes the idea of communicating this through a booth at American Physical Society meetings and the generation of multiple email reminders.

**Hallman** added that NP values diversity. It has tried to make progress. The recommendations provide a stimulus to do more. A recent report showed that double-blind proposal review processes can limit biases, and that a redoubling of efforts and creative approaches are needed.

**Donald Geesaman** wondered if a lack of response may be due to individual concern about how the information would be used. **Dodge** shared that NP has considered this. Tracking must be pursued vigorously and NP is aware that more effort is needed.

**Hertzog** opened discussion of specific comments on the text of the COV report.

**Suzanne Lapi** noted comments that describe the breadth of the isotope field and asked if there is strong feeling that more about it should be in the report. **Dodge** shared that the charge focused on nuclear science. **Hallman** shared that NP sees isotope research as part of nuclear science hence that may be a reason why it is not identified separately.

**Hertzog** shared a question from **Krishna Rajagopal** and his recommendation that the ECA panel membership differ from year-to-year and range from outside experts to internal reviewers. **Dodge** responded that it may not be useful to prescribe a specific approach based on her experience at NSF. PMs may have greater expertise as times depending on the topic. **Hallman** added that NP has discussed this. It can be challenging to form a panel. The most recent activity looked at combining applied and theoretical research. At times, outside applied research experts can be a minority and lead to bias against applied research proposals. There could also be instances when a very good proposal is overlooked due to insufficient expertise on the panel.

**Dodge** clarified for **Keppel** that the COV looked at accepted proposals and declinations.

**Hertzog** invited NSAC members to provide additional comments on the COV report and indicate their acceptance or declination of the report.

The COV report was accepted by the NSAC through an individual vote by each member.

**Hallman** shared that the report will be posted online NP is aware of the COV recommendations and is making efforts to address these concerns. Input from the community is being solicited to fulfill PM positions.

**Hallman** commented that diversity is a core priority for DOE and NP. Lab directors are asked every year about diversity plans at their facilities. In addition, DOE staff undergo training to identify diversity biases. Hallman has recommended that independent experts on barriers to diversity and inclusion be invited by the DNP to provide such information to the broader nuclear science community. Efforts are being made to remove diversity biases but more could be done to promote diversity. DOE needs workplace diversity to be successful.

## **PRESENTATION OF THE CHARGE TO NSAC ON MOLYBDENUM-99**

**Tim Hallman**, DOE SC NP, presented a charge to NSAC requesting an assessment of the reliability of the domestic medical isotope supply to include assessing the National Nuclear Science Administration's (NNSA) performance against its goals relative to Molybdenum-99 (Mo-99). A report from the NSAC is requested by October 31, 2016.

Hallman pointed out that this follows a statutory requirement to which the DOE Secretary must respond. Two previous reviews have been conducted.

### **Discussion**

**Fahey** commented that around 90 percent of medical studies are conducted using technetium. The U.S. is the top user of Mo-99 and gets material from overseas, mostly Canada. Operations in Canada will shut down in fall 2016 forcing the U.S. to acquire Mo-99 to acquire materials from Europe and Africa. **Fahey** shared with **Nico** that he believes that Canada's Chalk River facility will be shut down as Canada no longer sees the need to make isotopes. **Lapi** agreed with **Fahey's** assessment. **Hardy** confirmed that the reactor will be shut down within two years.

**Susan Seestrom**, NSAC Mo-99 Committee Chair, noted that Chalk River will keep processing capabilities in warm-cold operation for two years. The goal of the U.S. program is to develop an adequate domestic supply of Mo-99, hence this is about the supply and not necessarily about ensuring a new U.S. producer.

**Hallman** clarified for **Cates** that recent events that could affect the charge include market forces that may make the annual review less necessary. **Hallman** shared that there were efforts by NNSA to facilitate new production in the U.S. through cooperative agreements, as an example, and some may be far enough along to obviate the need for an annual review activity.

**Geesaman** asked **Rilla Hamilton** about delivery of the National Academies' study on Mo-99. **Hamilton** is the DOE and NNSA Moly-99 Program Director. The study findings are expected to be published in August. In addition, the Organization for Economic Co-Operation and Development (OECD) has assessed the global supply chain and published a report describing the current supply and global demand.

**Hallman** has shared that reduced use or elimination of the use of highly-enriched uranium is also a goal of the NNSA materials minimization program.

The NSAC discussed the next NSAC meeting date. **Seestrom** shared that a planning meeting for the Mo-99 Committee will be held this fall.

**Seestrom** confirmed for **Fahey** that the Mo-99 NSAC Subcommittee will be the same group that addressed the issue in 2015.

#### **OTHER BUSINESS**

**Martin Savage** reported on the DOE Advanced Scientific Computing Research (ASCR) meeting with NP to discuss joint planning through 2025. Important research priorities and scientific objectives were identified. The meeting looked at the computing and data needs of experimental programs. **Savage** clarified for **Geesaman** that computing needs is defined as the infrastructure needs and data storage, and the movement and data curation that ASCR will provide. The meeting findings will be summarized in a report due at the end of summer 2016.

#### **PUBLIC COMMENTS**

None

#### **CLOSING REMARKS AND ADJOURNMENT**

**Hertzog** adjourned the meeting at 1:56 p.m. EST.

The minutes of the U.S. Department of Energy and the National Science Foundation Nuclear Science Advisory Committee meeting held at the DoubleTree by Hilton in Bethesda on June 27, 2016 are certified to be an accurate representation of what occurred.

A handwritten signature in black ink, appearing to read 'D. Hertzog', written in a cursive style.

David Hertzog, Chair of the Nuclear Science Advisory Committee on (date).