Panel on Public Affairs Meeting
June 5th, 2009
529 14th Street, NW, Suite 1050, Washington DC

Members present:
D. Moore, V. Narayanamurti, M. Klein
B. Barish, W. Barletta, J. Browne, K. Budil, P. Coleman, G. Crabtree, J. Davis, F. Houle, R. Jaffe, W. Jeffrey (via teleconference), T. Kaarsberg, J. Onuchic, A. Sessoms, P. Zimmerman

Advisors/Staff present:
J. Franz, T. Johnson, K. Larsen, J. Lieberman, J. Russo, F. Slakey

Members Absent:
R. Socolow, J. Drake, D. Engel, H. Gao, L. Krauss

Call to Order

D. Moore called the meeting to order at 8:15 AM.

Welcome, Introductions, & Approval of Minutes

All members were asked to introduce themselves. D. Moore asked for comments on the February minutes. Members were asked to review minor edits provided by J. Franz. A motion to approve the minutes, with edits, was requested.

Action: J. Davis moved to approve the minutes of the February 6th, 2009 POPA meeting. Motion was seconded by V. Narayanamurti.

The motion to approve the minutes passed unanimously.

Energy & Environment Subcommittee

CO_2 Extraction Study
An overview was provided by T. Kaarsberg. The study committee's first meeting was held in March. At that meeting it was revealed that the co-chair, Dr. Bill Brinkman, was being considered for a position in the Obama Administration. It was assumed that it would be some time before Brinkman's confirmation, but the committee decided it would try to get as much accomplished with his participation lest his nomination preclude him from further contribution. In fact, Dr. Brinkman has had to recuse himself from the study earlier than anticipated. Dr. Arun Majumdar, a member of the study committee and a participant in the first meeting, was chosen to take Dr. Brinkman's place as co-chair. One member (Sibley) had to withdraw and another was added (Smit). It was decided that the committee would adhere to its original schedule and hold a second meeting on the West Coast. Web technology will be used to share chapter writing work for the study report. The outline of the report was drafted at the end of the first workshop. The second workshop will be held in late July, with final work on the report being done in

August/September. A copy of the draft report will be sent to POPA in advance of the October 2nd meeting, for review.

Commentary: J. Davis asked T. Kaarsberg if the study would look into the back-end of the problem, the storage issue, as it seemed to be a matter of high credibility. T. Kaarsberg replied that the committee did not intend to cover storage. Because this particular technology produces a stream of gaseous CO_2 very similar to what is seen in post-combustion or pre-combustion capture, the assumption is that storage considerations will be identical. She added that the committee will have to take a look at some of the storage aspects, but this isn't the major focus of the study. The study is focused on the first question, capture, and isn't really ready to ask the second question at this point. It's fair to say that the final report will have to address transport of captured CO_2. J. Davis thinks the report will have to indicate that the committee has addressed capture and transport, but that they haven't included sequestration. T. Kaarsberg mentioned that she is researching some biological capture capabilities. F. Slakey commented that the charter for the study indicated the committee was only going to look at non-biological capture capabilities. T. Kaarsberg clarified; they are including a small chapter that lists biological capture techniques to demonstrate that they are aware of the other ways to capture CO_2. F. Slakey said that, at the end of the March workshop, the consensus around the table was that there shouldn't be a dedicated program at DOE on direct capture. The concepts presented at the first meeting did not persuade the committee of their viability. Everyone seemed to agree that this issue wasn't compelling enough for a line-item program, but that it could be included in some manner in other projects that are focused on similar capture technologies. He asked if that was still the view of the committee. T. Kaarsberg responded that she hadn't heard any talk of whether there should be an R&D program at DOE and that she disagreed with the view that the committee felt that the concepts presented were not viable; there was skepticism, yes. She said that she thinks the final report won't present a definitive answer, one way or the other. But it has led the way forward in demonstrating how these sorts of issues need to be researched. The result will be a compilation of detailed information on the topic, which they hope to share via a website, hard copies, etc. D. Moore asked what the next procedural steps were, once the report has been reviewed by POPA. J. Franz said that the Executive Board needs to approve all POPA reports. There is normally a peer review procedure prior to presentation to the E. Board. POPA heads up the peer review, with the study committee left to suggest names of reviewers. The subcommittee, whose purview the study falls under, vets those names and weighs in on final selection. There should be 3 independent reviewers and their comments should be brought to the October meeting, along with the final draft report. The timetable might make this impossible, as the final product will be larger than a normal POPA report. T. Kaarsberg anticipates that it will run about 60 pages long. J. Franz said that, with or without comments from reviewers, something should be brought to the October meeting for POPA to review.

Scarce Elements Study

R. Jaffe reviewed a pre-proposal for a new study on scarce elements and provided background. Scarce elements are a matter of discussion when evaluating new energy technologies. Even elements like silver, which most people consider readily available, may become increasingly scarce as technology requirements make its use ever more necessary. Acceptable substitutes for elements that may run out are not currently recognizable. Some elements are intrinsically rare. Some elements are strictly imported – the U.S. produces none. There are some elements that are only available as a byproduct of the manufacture of something else. And there are elements that come from areas of the world that might raise political concerns should we need a supply. These major issues will be explored in relation to a handful of elements that the Study Committee chooses to research. The committee's goal would be to derive conclusions as to whether the concerns presented are valid and, if so, whether policy suggestions should be recommended. Other studies have focused on the present use of materials. This study would focus on projected use and the ramifications, as such. It would not be an energy focused study. F. Slakey and R. Jaffe have met with other societies (GSA, MRS, AGI, SME) to determine if they would like to participate and help fund the study. All are enthusiastic about participating. The anticipated budget is $50K, to be split by several societies. POPA will be represented on the committee (2 seats), but to a lesser degree than normal because we will collaborate with other organizations.

Commentary: J. Franz suggested that we include physicists on the committee panel so that the final product is a physics-focused report. She also cautioned that inclusion of other organizations means that we have to allow them to review the final product. R. Jaffe asked POPA for input on how to limit the study's scope. It was suggested that the study committee include a geologist, an economic geologist, resource people, a mineralogist, and others. It was agreed that modeling would prove difficult. The consensus was that case scenarios of different elements would be enough to raise awareness of the issue. J. Davis said the value of a report like this is that we would be able to make recommendations to an Administration that is reshaping itself. This would be a study about an issue that hasn't occurred to most. J. Franz and P. Zimmerman agreed that raising awareness of the issue is, in and of itself valuable. Embedding this topic in the energy conversation is also important. T. Kaarsberg suggested that anything we could do to solve the larger problem within the materials research community of having a thorough, accessible database on all materials would be valuable. W. Barletta suggested that the focus be on critical scalability issues. What are the set of materials that will face important scalability issues and what are the critical properties of those that make them so important? F. Slakey indicated that they will bring a proposal, that has been agreed upon by all participating societies, to the October 2nd POPA meeting for review. The intent is to begin in earnest in January of 2010.

Action: M. Klein made a motion to have the Energy & Environment subcommittee move forward with bringing a full proposal for a Scarce Elements Study to the October POPA meeting. R. Jaffe amended the action to include a complete description of how POPA and the other cooperating societies will interact, moving forward, within said proposal. M. Klein accepted the amendment.
Motion was seconded by R. Jaffe.

The motion passed unanimously.

Energy Grid Study

Background information was provided by G. Crabtree. This study has been under consideration for about a year. Grid issues are a hot topic. Everyone seems to be discussing energy efficiency, the smart grid, and renewable energy. J. Lieberman added that climate change policy mandates make the topic timely. One major issue being discussed is connecting renewable energy sources to the grid. Long distance transmission is a problem. The production centers, for solar and wind energy, are far from the demand centers located on the coasts. Solar is produced primarily in the Southwest and wind is produced in the northern Central region. Because of renewable energy's intermittency, another issue that needs to be addressed is how created energy will be stored. The stimulus bill provided $11 billion dollars to tackle grid issues. The Department of Energy's Office of Electricity (OoE) maintains stewardship of these funds. They have only 18 months to use the money, so there is concern about whether it will be spent well in such a short timeframe. The power/energy community is made up of many players; this includes the utilities, state and local governments, and other regulatory bodies. In order for far-reaching change to occur, buy-in from the entire community is necessary. The compartmentalized nature of this community, and its historically conservative attitude, will prove to be obstacles in effecting change.
G. Crabtree reported that he recently visited the OoE at DOE and the National Commission on Energy Policy (NCEP), with F. Slakey and J. Lieberman. They met with Debbie Haught and David Meier at the OoE. Both seemed to be well aware of the technical issues and understood the danger of quick funding decisions. They gave the impression that they are ready to engage. NCEP is the organization that R. Socolow suggested we speak with. Approaching NCEP for their opinion, and their financial support, proved successful. Tracy Terry provided $15K in funding and a promise to provide names of people the commission thinks should participate on the study committee. They are hoping that the APS will be the group to take a smart "disinterested" look at the grid. The action that the E&E subcommittee submits to POPA today is a request to reduce the scope of the study. Originally, the intent was to focus on two issues: (1) connecting renewables to the grid and (2) the stability of the grid. G. Crabtree said that they have already discovered that just handling the first issue, renewables, will be enough to occupy all of the committee's time.

> **Commentary**: J. Franz asked about how the study would handle renewables as they relate to the smart grid. F. Slakey commented that the legislative language that authorized the smart grid had 10 goals that are to be accomplished, one of which is "Enable more renewables." So the renewables discussion is consistent with the discussion of the smart grid.
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> **Action**: G. Crabtree moved that the scope of the Energy Grid Study charge be reduced from "renewables and stability" to just "renewables". J. Davis seconded the motion.
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> ***The motion passed unanimously.***

G. Crabtree continued the discussion with a request for names of those who should be invited to serve on the study committee. It was suggested that an economist be included, as well as a representative from the utilities, from the regulatory agencies, from state and local government and from academia. Caution should be taken in making sure that participants do not have a hidden agenda. In order for the report to have maximum impact, it should be finished by January of 2010. The study committee will hold 2 workshops between now and then.

National Security Subcommittee

Nuclear Verification Study

J. Browne provided an update on subcommittee activities. There is one study in progress, which POPA approved at the last meeting, focusing on steps that would enable global nuclear arsenal downsizing. This study was an outgrowth of a previous POPA study on U.S. nuclear weapons policy. It became clear, during the course of the first study, that as the number of weapons in a stockpile is reduced many other issues arise, some technical and others political. It was evident that an in-depth review of these issues was needed. The study committee, which is made up of 10 members, held its first workshop in April and will reconvene this month. International representation at the first workshop, which was requested by A. Sessoms at the last POPA meeting, was accomplished via video conference; both the IAEA and the University of Hamburg joined the group for discussion. J. Davis, study chair, outlined some of the issues the study group is working on. One of the items of concern is the Obama Administration's intent to have a new arms control agreement with the Russians by the end of the year. To address this, Phil Smith from DTRA was brought in to speak with the study group at the first workshop. He is in charge of all of the arms control inspections done with the Russians. He was asked whether there was any technical obstacle that would keep us from reducing our stockpile to 1,000 weapons. The good news: 15 years experience in arms control inspections with the Russians, together with our own stockpile stewardship program, has put us in a good position. Making the step to 1,000 weapons should be relatively easy operationally, doctrinally, and technically. The report will be structured in a way that will demonstrate the treaties and technologies needed to move from one level of stockpiling to the next. If reducing to 1,000 weapons is relatively easy now, what needs to be done to reduce further? Technological issues will be small in comparison to implementation issues. J. Davis said he is very optimistic about the utility of the final product of this study.

> **Commentary**: T. Kaarsberg asked if the study committee looked at the reprocessing issue? J. Davis said that they have always looked at the fuel cycle. J. Browne said it's a big issue, especially when you examine other countries that currently have the ability to pull usable nuclear fuel out of waste. J. Davis said that as the number of weapons in the stockpile is reduced, the accuracy of data on what is being extracted through reprocessing has to increase. More attention has to be placed on the fuel cycle as the number of weapons in the stockpile decreases. G. Crabtree asked what number of weapons we are coming from, if the goal is to drop down to 1,000. J. Davis said that, according to the Moscow Agreement, we have 1,700 – 2,200 deployed weapons and then a huge number of weapons in reserve.

PPC Update

W. Jeffrey provided an overview of PPC's last meeting, dividing the day into the sections listed below.

Informational

Dr. Lisa Porter, Director of the Intelligence Advanced Research Projects Activity (IARPA), came in to discuss how physicists could leverage IARPA and vice versa. Very few members of PPC had even heard of the organization, so it was good to have her address the group. She discussed what the organization has been working on and how they are reaching out to physicists, universities and industries to participate in unclassified, publishable research. One of the actions W. Jeffrey suggested we take is to spread the word about IARPA via a hotlink to their site from the APS webpage. J. Franz suggested that we ask her to write a "Back Page" column for *APS News*. W. Jeffrey encouraged everyone to become more familiar with IARPA.
PPC also heard from Paul Shawcross, Chief of the Office of Management and Budget's Science and Space Programs Branch, who provided an overview of where NASA and science are headed in this Administration. He offered a blunt and sobering overview of the entire federal budget, which was not encouraging for continued growth of discretionary funds. The vast majority of the budget goes to entitlement programs (Medicare, Medicaid, Social Security). The next portion goes to national security. The small, discretionary budget that's left supports NASA, NIST, NSF, the Department of Commerce, Education, etc. He then went over the NASA budget thoroughly. It is a 5 year plan that relies heavily on the Planetary Science Decadal Survey to determine budget priorities. NASA is relying on the Augustine Commission to provide options regarding manned-space flight prior to the appropriations cycle for 2010. This is an exceptionally optimistic goal. Norm Augustine was invited to address PPC regarding the Commission. He explained that the charter indicates that the Commission has 90 days to come up with these options (*not* recommendations) and the pros and cons of each. He indicated that the charter is limited; it is on human space flight *only* and any supporting robotics to human space flight. They were told to assume that the funding profile was fixed for the next 5 years and to try to live within that profile. They are tasked with looking into the shuttle program and whether it should continue, the gap in U.S. capabilities for human space flight if we transition from the shuttle program to something else, the international space station, the role of international partners, the Ares vs. the EELV programs, and missions beyond low earth orbit.

Near-term Opportunities

PPC invited Alan Chodos and a representative from the Optical Society of America in to discuss LaserFest. Next year is the 50th anniversary of the first operational laser and APS and OSA are planning public outreach to celebrate. The laser is a great example of how basic science, moving to applied science, can have a tremendous impact on the economic and national security of the nation. PPC wants to capitalize on this opportunity to insert a legislative agenda. Ideas on how to educate members of Congress and the Administration about how basic science affects the nation were discussed. The panel suggested that more concrete stories, one or two case studies, be developed to highlight how science affects the economy. Members suggested having science/laser related physical demonstrations on the Hill and holding an appropriations hearing at the same time. Industry, academia, and lab representatives could be invited to discuss basic/applied sciences and the need for funding. PPC is putting together a list of both House and Senate members who would be most receptive.

Visionary

PPC has created a Subcommittee on the Future of the Physical Sciences as a result of Cherry Murray's idea of forecasting what the physics enterprise will look like in 30 years. Rob Goldston is chairing the subcommittee. The *Rising Above the Gathering Storm* (RAGS) report really set the foundation and tone in Washington for how important innovation is. Overarching goals have been developed for the U.S. science & technology enterprise and a series of questions are being formulated. The objective is to clearly articulate a finite set of questions to encourage the Hill to look for a follow-on to the RAGS report, in the hopes of motivating legislators to ask the National Academy or another group to address the questions that have been posed. We could then tie this back into a legislative and executive strategy. The questions that are being developed may be placed on the APS website for input (or possibly answers) from membership and then this would be shared with the group that is tasked with addressing the questions. The idea of holding brainstorming sessions with APS sister organizations to sharpen the set of questions has also been considered.

National Research Policy Subcommittee

W. Barletta provided an overview of National Research Policy Subcommittee activities.

Statement on the U.S. Nuclear Complex

This was discussed at the last meeting and was prompted by the request of the Administration to consider moving NNSA activities out of the Department of Energy. Various options were being considered, including moving NNSA to the Department of Defense or separating it out to form another agency. A number of members were very concerned about these options and the residual effects of any such actions on the science community. A. Sessoms produced a draft statement following the last meeting, which was sent to the ad-hoc committee tasked with creating a statement for review. W. Barletta integrated their suggestions and then the statement was sent out via e-mail to POPA. This elicited a general response from members indicating that the statement would be more forceful if it was presented by the Society, as opposed to POPA. To move forward in that direction, wording changes were required. The statement was reworked and sent to APS President, Cherry Murray, for review. Her suggestions were integrated and then the statement was re-sent to POPA for a final vote. It passed and was then presented to the Executive Board & Council. They approved it, and it has been posted on the APS website.

> **Commentary**: J. Franz indicated that she wasn't sure if the statement was officially transmitted to the Secretary of Energy, Dr. Steven Chu. A letter from the APS President should accompany the statement.
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> **Action**: W. Barletta agreed to draft a letter and send it to Cherry Murray, to ensure that the statement is officially delivered.

Balancing Infrastructure Renewal in the Universities and National Laboratories

One of the topics that the subcommittee has been considering exploring is ways to reverse the general decline of the physical sciences infrastructure at major universities. The decline is derived from multiple causes. In the '50's and '60's, the infrastructure at major universities was built up at the behest of the Atomic Energy Commission and the military. Only institutions that were working on major research directly relevant to the mission of the military received funding. DOE and the NSF created facilities at many universities, including the synchrotrons at Cornell

University and the University of Wisconsin. In the '90's, these university-based facilities were reaching diminishing returns. The next generation of facilities for the physical sciences was built at the national laboratories. Because they were larger and more complex, they carried larger operating budgets. Funding shifted away from the universities a bit and moved towards the laboratories. More recently, with the stimulus, additional monies have been allocated to the national labs, which are understandably in need of upkeep. The question is whether there is an issue regarding the balance of the monies allocated to the labs vs. the funds received by research universities. Is this something worth investigating? It's hard to imagine that the current infrastructure is the one that will produce the best science and innovation for our country. Should a dispassionate review be conducted by POPA; by APS? Is this a topic that should be shared jointly between PPC and POPA? On the basis of the discussion today, POPA should decide whether a proposal needs to be drafted by the subcommittee for a study on this topic.

Commentary: M. Lubell said that the suggestion for this study is timely and appropriate. He passed around a graph that was generated at the request of Senator Schumer's (D-NY) office, which frames the question posed today in a budgetary fashion. It tracks the federal expenditures on the sciences from 1970 to 2007. The graph indicates a severe contraction in the early 90's of the physical sciences community's ability to conduct research. This mirrors W. Barletta's comments earlier. R. Jaffe commented that the process W. Barletta seems to have described is a move from "research for science's sake" to "research for mission's sake". This ties in very closely with the *Gathering Storm* point of view. Highlighting this and trying to find ways to spread funding back into the university environment would be positive. F. Houle indicated that private companies are backing away from conducting solid state research because the cost to do so has become astronomically high. There is an opportunity here to rethink the ways in which this type of research can be funded, both for private industry and the public. Perhaps there are research projects that have shared use. J. Davis said that he doesn't know how to address what the right balance is in the infrastructure if he doesn't understand the missions that the national labs are working towards. Maybe it is time to go back and take a look at those missions; who is doing what, and where? M. Lubell recommended that this issue be taken up as a joint activity between PPC and POPA.

Action: W. Barletta will write out a list of the ideas that came out of today's discussion and send it around to POPA for input, prior to going back to the subcommittee.

APS Education & Diversity Activities

D. Moore introduced Ted Hodapp, APS Director of Education & Outreach, to discuss education and diversity activities. On diversity, he referenced a report that came out in the fall of '08 called *Gender Equity*. The report was sent to the chairs of physics departments all across the nation. It alludes to the climate for women at different universities and how more women can be invited to become involved in programs at these institutions. He also mentioned the minority scholarship program offered by APS. Two dozen scholarships are awarded annually, and half of the recipients go on to receive their B.S. degree in physics. APS spends about $100,000.00 a year on this program and it has been running for over 30 years.

On education, T. Hodapp spoke about the Society's statement on doubling the number of undergraduate physics majors. The main goal is to increase the number of high school physics teachers. APS, along with AAPT and AIP, has worked towards changing the focus of university physics departments from "all research" to including preparation for majors who intend to go on to teach in the high school arena. The three physics organizations jointly launched the Physics Teacher Education Coalition Project (PhysTEC) to help U.S. universities prepare more highly qualified physics teachers and alleviate the nation's critical physics teacher shortages. Institutions participating in PhysTEC improve their teacher preparation programs by recruiting future teachers, hiring full-time master teachers from local schools to work with pre-service teachers, developing high-quality course and early teaching experiences, and mentoring program graduates. The National Science Foundation (NSF) and APS fund this project. The latest data shows that these efforts are paying off and that participating universities are producing double the amount of physics teachers, if not more, than they were prior to PhysTEC.
The Physics Teacher Education Coalition (PTEC) is a network of institutions committed to improving the education of future physics and physical science teachers. It is part of the PhysTEC Project and its goals are to build a network of institutions engaged in reforming physics teacher education; to promote and disseminate successful programs, methods, and ideas; and to advocate nationally for improving science teacher education. PTEC holds national and regional conferences and workshops to meet these goals and provides online resources and a newsletter publication for members.
T. Hodapp also spoke about the Nuclear Forensics Education Project. About a year ago, the POPA report on Nuclear Forensics was released and the APS Committee on Education came up with the idea to design educational materials to accompany it. Monica Plisch, APS Assistant Director of Education, worked with a team to design a high school curriculum module around the Nuclear Forensics Study. It includes 10 hours of classroom activities, student manuals, and a poster. They received funding from the Department of Homeland Security to support the project. This summer, the module will be released to schools for classroom testing in the fall.

Washington Update

M. Lubell provided an update on Congressional activities since the last meeting, beginning with budgetary items. The Washington Office worked on the stimulus package closely with Mike Telson, Burt Richter and Don Lamb. Science infrastructure was the focus of their efforts, which were met with success. Funding for infrastructure projects was incorporated into the American Recovery and Reinvestment Act of 2009. The recommended funding for DOE was accepted. NSF received 3 billion dollars. 2 billion dollars was set aside for grants. The stimulus money will serve to accelerate several DOE construction projects. Speaker of the House, Nancy Pelosi, was a great help in getting the stimulus passed. The Administration assumes that the economy will stabilize and recover sometime in early 2010. The bottom line for 2011 and 2012 will be flat, in relation to the 2010 budget.

M. Lubell remarked about major "wins" regarding the Energy Efficiency Report. Our recommendation for energy technology funding was $250 million; the Presidential request for 2010 funding was $238 million. This is evidence that the report's findings were taken seriously.

New Business

Physics & the Public Subcommittee

It was suggested by F. Slakey that we may want to reconsider our list of subcommittees. One subcommittee that we did not hear from today was Physics & the Public. Should we keep it? This is the subcommittee that, in the past, has overseen the intelligent design debate and civic engagement of scientists.

> **Commentary**: J. Franz stated that creationism is never going to go away. If there are members of POPA who are still interested in these issues then the subcommittee should remain. P. Zimmerman said that the subcommittee could remain in suspended animation until a topic comes up for them to research. He didn't think we should disband the subcommittee completely. D. Moore asked if there were any issues POPA members wanted to bring to this subcommittee. Nothing was offered. J. Onuchic also agreed that we should keep the subcommittee, but indicated that there needs to be a clearer definition of what topics it will handle. Discussion of changing the title of the subcommittee ensued. D. Moore suggested that the topic be sent back to the Physics & the Public Subcommittee and its chair, L. Krauss, to clearly define what it is they will be working on.

Next Meeting

The next POPA meeting will be held on **Friday, October 2nd, 2009.**

Adjournment

> **Action**: Members moved to adjourn the meeting at 2:09 PM.
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> ***The motion to adjourn the meeting passed unanimously.***