



Department of Energy

Washington, DC 20585

January 9, 2003

Dr. Keith O. Hodgson
Director, Stanford Synchrotron Radiation Laboratory
Department of Chemistry
Stanford University
Stanford, CA 94305

Dear Keith:

The four DOE synchrotron light sources serve the Nation's structural biology and biomedical research community, providing x-ray beams of extreme brightness that enable forefront research in areas from basic understanding of how proteins function to drug discovery. DOE's Office of Biological and Environmental Research (BER) supports design, construction, operation, and user support on beam lines at all of the current-generation synchrotron facilities operated by DOE's Office of Basic Energy Sciences.

Advances in accelerator technologies and in devices for production of synchrotron radiation, many of which were supported by DOE, now make it possible to design and build next-generation synchrotron sources with unprecedented radiation characteristics that far exceed those currently available, including e.g., x-rays with extremely short pulses, high peak brightness and transverse coherence.

As the Nation's major steward of synchrotron sources, DOE is considering what characteristics of next generation machines are important for the scientific user communities' light source needs in the coming 10-20 years, and enable them to continue to make breakthrough discoveries. Detailed engineering and design (PED) is about to begin on an x-ray free electron laser (called LCLS) and feasibility studies are underway on other so-called linac based x-ray light sources (e.g., the energy recovery linacs), so these questions are timely.

DOE BER plays a significant role, in partnership with NIH, in the stewardship of the current complement of synchrotron beam lines. In addition, aspects of the Genomes to Life program will require additional synchrotron access and the development of new atomic resolution x-ray imaging technologies. Thus, input from BERAC, reflecting more broadly the biological research and user community, is important in our planning.

I realize that BERAC has a current charge to address the role that BER should continue to play in nurturing structural genomics research, including user facility support and development, technology development, and computation, given the sizable investments being made by NIH's Institute of General Medical Sciences. I would like BERAC to expand that charge to include the following questions:



What characteristics of the next generation x-ray light sources (e.g., their extremely short femtosecond time scale x-ray pulses; high average or peak brightness; coherence) are most important in enabling science, from determination of physical structures to biological functions, for the biological community in the coming 10-20 years? What are the areas of biological sciences most likely to be impacted? What is the anticipated demand for such resources? You should also consider information that has already been developed from other sources such as the recent BioSync and Hodgson-Lattman reports.

- What role should DOE play in the emerging National program in structural genomics and what are the opportunities for continued partnership with NIH in this area? What is the role of next generation x-ray light sources in this endeavor?

What are the most important considerations in strategic planning for the light sources that will impact the long term success and scientific productivity of the structural biology and biomedical research community?

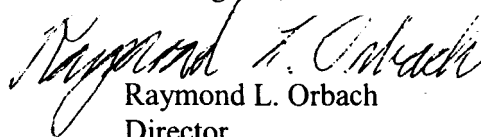
The BER portfolio also includes research in the environmental sciences that is already benefiting from access to our synchrotron sources. BERAC's recommendations on questions similar to those presented above, but with respect to the environmental sciences, would also be very valuable.

The Basic Energy Science Advisory Committee (BESAC) will separately be providing advice to the Office of Science on the future of the light sources as part of our twenty-year facilities review. I urge you to discuss this charge with them, and use any information they may have already developed, including reports and subcommittee activities, as you find appropriate.

Please develop a draft report for me on these issues by late February. I would like to have a final report from BERAC prior to but no later than the Committee's next full meeting on April 30 – May 1, 2003.

Thank you and your Committee for your continuing help and support in advising and planning for the future of BER and the important role of biology in the DOE portfolio.

Best regards,



Raymond L. Orbach
Director
Office of Science