

NSLS

INTRODUCTION

Michael Hart
NSLS Chairman

During FY 1997 Brookhaven National Laboratory celebrated its 50th Anniversary and 50 years of outstanding achievement under the management of Associated Universities, Inc. The National Synchrotron Light Source and its users' research record are part of that history and, appropriately, since research with light from synchrotron radiation has matured, the scene was set for a major national review of the D.O.E. synchrotron radiation provision.

In the second week of the Fiscal Year the charge was outlined and included both the expected items and the unexpected "What would be the consequences of the shutdown of one or more of the four DOE/BES synchrotron light sources?" A challenge indeed! Within a year the process had run to completion under the Chairmanship of Dr. Robert Birgeneau with a resounding clear message;

"The panel believes that all four D.O.E. synchrotrons are essential to the national scientific and technological enterprise."

"The most straightforward and most important conclusion of this study is that over the past 20 years in the United States synchrotron radiation research has evolved from an esoteric endeavor practiced by a small number of scientists primarily from the fields of solid state physics and surface science to a mainstream activity which provides essential information in the materials and chemical sciences, the life sciences, molecular environmental science, the geosciences, nascent technology and defense-related research among other fields. The user community at U.S. synchrotron facilities continues to grow exponentially, having reached more than 4000 on-site users annually in FY97. The research carried out at the four D.O.E. synchrotron sources is both very broad and often exceptionally deep.

"It is self-evident that research which requires very high brightness will be carried out overwhelmingly at the third generation sources. Nevertheless, most current synchrotron research requires high flux as opposed to high brightness and therefore can be carried out equally well at second and third generation sources.

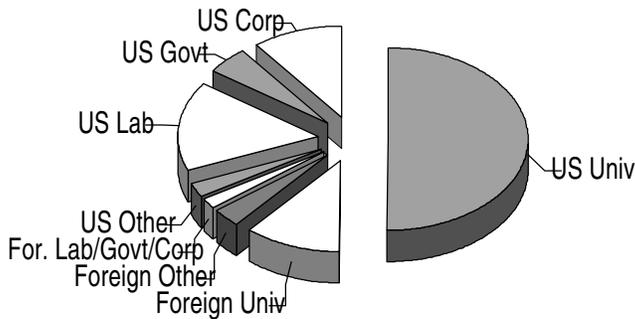
"The panel was very impressed by the outstanding performance of the second generation facilities (SSRL and NSLS), by the number of users they serve well, by their ability to renew and improve themselves, by their ability to continue cutting-edge research even though the storage rings themselves are not the most advanced, by their commitment to education, and by their abilities to engage new users and address new problems. Given the outstanding track record and clear vision demonstrated by these facilities, the panel expects these facilities to continue to thrive scientifically in a cost-effective manner. These centers are national resources and they should be adequately funded, upgraded and modernized in a timely fashion to serve better the national needs."

The path to at least another decade of outstanding research at NSLS was clearly laid out with appropriate funding recommendations which were accepted in full by the Basic Energy Sciences Advisory Committee (BESAC).

In addition to formal meetings and the collection of statistics, the review included a visit to NSLS at which staff and users had a well-used opportunity to convince the panel of the strength of our program. By the end of FY 1997 NSLS had welcomed its 7000th user. For each of the last five years more than 2200 users came to the light source; almost 800 new users in each year. The strength of their programs in terms of quality and quantity was made clear in the presentations to the panel and by the fact of over 4000 publications in almost 250 different Journals during the 1990s alone. As the bar chart shows, within almost constant total numbers the NSLS user community is not static but represents a thriving and evolving population. The pioneers of research with synchrotron radiation from the physical sciences continue in steady numbers but new communities in the biological and environmental sciences are growing rapidly with a four to five year doubling time. In FY 1997 one third of our users were under the age of 30 and less than one third were over 40. Although about one half come from US universities the whole of the national and international scientific and technological enterprise is strongly represented, as the pie-chart shows.

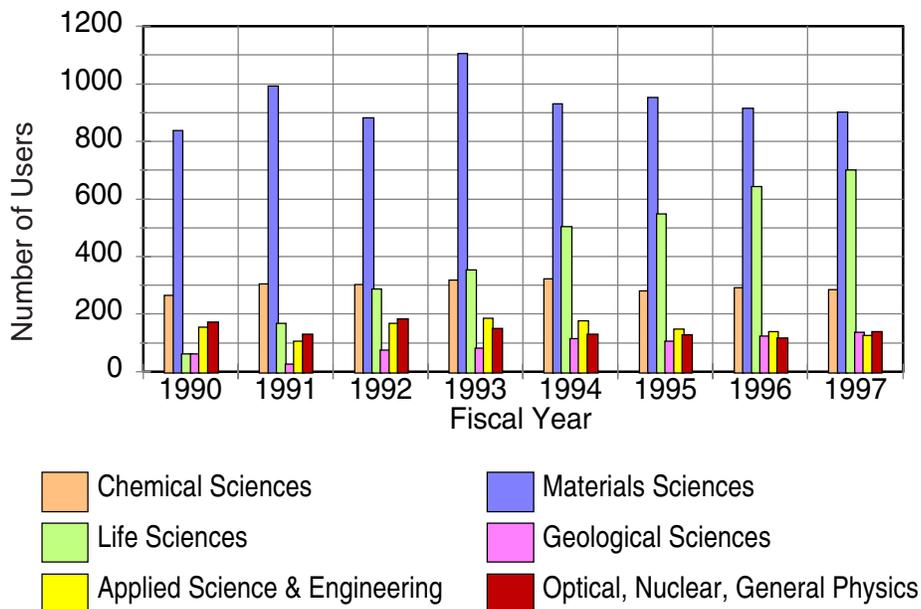
An outstanding year was overshadowed by the unprecedented early termination of the Associated Universities contract to manage the Brookhaven National Laboratory. The details are well known and some of these are outlined later in this Activity Report (page 1-4) . On 1 March 1998 Brookhaven Science Associates will take responsibility for setting the standards for the second half century of research at Brookhaven. ■

NLSL Users by Institution Type



Inst. Type	# Users	Percent
US Univ	1163	50.1
US Other	58	2.5
US Lab	369	15.9
US Govt	113	4.9
US Corp	240	10.3
Foreign Univ	258	11.1
Foreign Other	76	3.3
Foreign Lab/Govt/Corp	43	1.9
Total Users for FY 1997:	2320	100.0

NLSL Users by Field of Research



ENVIRONMENT, SAFETY AND HEALTH UPDATE

William Thomlinson

Associate Chairman for ES&H

There is no doubt about this past fiscal year being one of great accomplishments for the NSLS. But it has also been a year largely overshadowed by the chaos surrounding all of BNL with respect to management and ESH issues. Everyone knows that the combination of the discovery of the tritium plume from the spent fuel pool at the HFBR and the extremely negative Integrated Safety Management Evaluation of BNL lead to the current situation. By the time this is published, BNL will have a new contractor and hopefully some measure of stability and reason will be back in vogue. One result is that ESH at BNL, and the NSLS in particular, have taken on a heightened level of priority. At the NSLS, we have participated in all of the ESH activities, both on-going and new, and have overall been extremely pleased to find that our safety programs are solid. In general, we already meet all new standards and have performed in an exemplary fashion throughout all reviews. The coming year will clearly be spent adjusting to new requirements and completing existing initiatives.

The year started with an in-depth ESH Self-assessment. Our dedicated team of NSLS personnel studied key areas such as Training, ALARA, ESH communications, Quality Assurance and Conduct of Operations. A list of findings was developed and prioritized. Our formal report was made to the BNL Directorate and accepted. Some of the findings have been resolved, but we have a ways to go on others. The effort is continuing, but has clearly been hampered by the intense involvement that we have had to have with issues which have arisen this year. In particular, we had to expend a huge amount of resources during the DOE mandated Integrated Safety Management Evaluation through the winter and spring. Many man-months of effort, largely directed by our ESH Coordinator Nicholas

Gmür, resulted in the NSLS receiving very good reviews. Our Tier I safety assessments procedures and the tracking of findings developed by John Aloï were highlighted as outstanding procedures. In addition, our appointment of Mike Buckley as our Conduct of Operations Coordinator was timely and effective. The steady, professional safety operations directed by Tom Dickinson were clearly one of the strengths recognized by the assessment team. Some weaknesses in work planning were pointed out in our experimental reviews (corrected with our new experiment Safety Approval Form). Of course,

this year the good news was overshadowed by the bad. An electrical safety incident at the NSLS involving a Plant Engineering employee was one of the incidents pointed at by the ISME team in their extremely negative report. At the NSLS, we felt good

about how we fared in the evaluation and have already acted on correcting those legitimate weaknesses found during the review.

As a result of the ISME report and the cancellation of the AUI contract, all of BNL turned its attention to ESH and management issues. Directly affecting the NSLS operations has been a revision of the work planning for experiments at BNL. To our credit, we were largely exempt from that process since it was clear that we already are doing most of what is required. In fact, our review of the final standard developed shows that we have only had to formally designate Andrew Ackerman as our Experiment Review Coordinator and give some committee responsibility to our existing ESH Committee to be fully compliant. That is a clear indication that the NSLS continues to be in the forefront of ESH activity at BNL.

Based on some of the recommendations in the ISME report, we decided to modify our Safety Approval

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Form for experiments to better capture the safety measures being taken by the experimenters and to document the work control procedures that are agreed to by the NSLS staff and the users. At the same time, we were directly involved in the new Chemical Management System (CMS) at BNL in which all chemicals used at BNL are being logged into a database. At the NSLS we have a specific problem because of the large number of materials brought here by users. If purchased at BNL, the materials are automatically entered into the system and bar coded. However, if brought in from outside the Lab, we have a problem as to how to capture them in the system and how to assure the proper disposal. Andrew Ackerman worked closely with the CMS staff and made arrangements to exclude small quantities if brought to, and subsequently removed from, BNL by the user. That agreement makes it efficient for the users. In order to track those materials, however, we also had to change our Safety Approval Form (SAF).

A third issue recently arose which also impacted our redesign of the SAF. The DOE must receive certain data from the user facilities under its jurisdiction. Items such as user hours, institutional involvement, distribution of resources, etc. are necessary and must be reported. All facilities will uniformly report to DOE each year. At the NSLS, our best way to capture such information is through the SAF since every experiment must have one - whether it is performed on an NSLS or PRT beamline, or by General Users or PRT members. With all of these motivations, we worked rapidly this summer and produced the new, comprehensive and (we hope) more useful form for introduction on October 1, 1997. Our intent is to have a system in place by Spring of 1998 for electronic submissions of the SAF. That will make it very easy for users to submit the comprehensive information now required.

In addition, many new efforts are underway which involve our safety staff. Upgrades at the Accelerator Test Facility and the Source Development Lab require new safety documentation. The shielding of the VUV Ring and the upgraded X-Ray Ring shielding on the beamlines to accommodate 2.8 GeV operations are well underway. The latter is requiring a lot of effort by the users and the

NSLS staff. These efforts are being carried out and coordinated by Andrew Ackerman, John Aloï, Tom Dickinson and Nick Gmür with a lot of cooperation from our users and NSLS staff.

The year has not been without problems. A worker at a BNL construction site was killed in an industrial accident. BNL was ordered to stand down for several days, during which the NSLS staff and users met to discuss the general topic of safety in the workplace. I am sure that this was a useful exercise based on the wide range of issues covered and discussed. However, the length of the stand down and its impact on the operations of the rings for users certainly detracted from its full value.

At the NSLS we have had several reportable incidents due to safety issues at the facility. In evaluating these events, the general theme is one of lack of individual responsibility or attention to good work planning and execution. I should note that those are fundamentals of Work Smart Standards which will become pervasive within our operations over the next year. The incidents include the improper use of a coffee thermos as a cryogenic dewar (it exploded and slightly injured two workers), a piece of sheet metal improperly secured during shielding upgrade (it slipped and nearly severed the workers thumb) and untrained users etching material in a hood (the reaction was exothermic and filled the hood and part of the NSLS with acid fumes). Fortunately none of these incidents caused severe injury, but the potential was there in each case.

The NSLS cannot be responsible for training and behavior before a person comes to the facility and we cannot police everyone all the time. Users and staff must realize that their safety and that of their co-workers depend on their own behavior, training, work planning and good execution.

As the new year develops and the NSLS learns what measures it must take to continue to improve and be compliant with any new regulations and standards, the user community will be informed and will be participants with us. We must continue to improve our already outstanding safety program, but we must remain vigilant to ensure that whatever changes are made are in the best interests of, and efficient for, our user community. ■

NSLS USERS' EXECUTIVE COMMITTEE

Joel D. Brock
Cornell University
UEC Chair

The purpose of the Users' Executive Committee (UEC) is to promote communication between the user community and the NSLS Administration. To this end, the UEC conducts an annual user meeting and three public town meetings each year. The annual meeting serves several functions: to celebrate the scientific and technical accomplishments of the previous year, to obtain the latest news on the support of the U.S. Department of Energy for scientific facilities in general and the NSLS in particular, and to provide an opportunity to visit with old friends and colleagues. Although this year's annual meeting included six workshops and several invited scientific talks, the tone was dominated by the more political talks. The key-note address titled "Future Schlock" by Robert Park was lively and humorous, poking fun at predictions about the future and those who make them. The Interim Director of BNL and President of AUI, Lyle Schwartz then made some short remarks. The U.S. Department of Energy was represented by the Associate Director of Energy Research for the Office of Basic Energy Sciences, Patricia M. Dehmer. In response to Robert Park and Lyle Schwartz, she began her remarks by assuring the audience that during all the upheaval associated with BNL's problems there has been one constant: "the high regard" for the NSLS, its users, and the quality of their science.

The goal of the public town meetings is to provide a venue for discussions between users and to keep communication channels between the NSLS Administration and the users open. Typically, presentations by both the NSLS staff and the UEC on user issues are followed by opportunities for questions and discussion. On the day following the town meetings, the UEC meets with the NSLS and Brookhaven Laboratory staff and management to discuss relevant issues. The current membership of the UEC is listed in the caption of the accompanying photograph. Three general members of the UEC are elected each year at the annual meeting and serve two year terms. Each Special Interest Group (SpIG) also elects (by an e-mail election) a representative. After the general election, the UEC elects

one of its general members as Vice-Chair. The Vice-Chair is responsible for organizing the next annual meeting and then becomes the Chair in the following year.

During the past year, although the UEC has dealt with a large number of important issues, our focus was determined by the search for a new contractor to manage Brookhaven National Laboratory and by a review of all four of the DOE supported synchrotron facilities. We attempted, unsuccessfully, to contribute input to the Source Selection Board for use in the selection of a new contractor to manage Brookhaven National Laboratory. Copies of the letters sent by the UEC to the DOE's BNL Source Selection Board can be found on my web page — <http://www.msc.cornell.edu/~brock>. On the other hand, on June 25th and 26th, the users did assist with presentations to a review panel appointed by the Basic Energy Sciences Advisory Committee (BESAC) and chaired by Professor Robert J. Birgeneau of M.I.T. which reviewed the scientific and technical programs of the NSLS. This panel was charged with reviewing all four of the DOE synchrotron facilities (the ALS at Berkeley, the SSRL at Stanford, the APS at Argonne and the NSLS at BNL) and making recommendations for future funding priorities. The panel was explicitly requested to consider the ramifications of closing one or more of these facilities. Several of the staff and users of the NSLS were called on to discuss the impact synchrotron radiation has had on their particular field of science. It was a very impressive event to witness. In the short time available, leading experts from over a dozen distinct scientific fields presented the impact science done at the NSLS has had on their specific field. Although I have spent a considerable amount of time working on the NSLS X-Ray Ring floor, I got an education about the breadth of the work being done at the NSLS. These talks covered the usual areas associated with synchrotrons, materials science, surface/interface physics, magnetism, lithography, tomography, powder diffraction, macromolecular crystallography, infrared sources, imaging, and so on. But several other talks were given, such as the one by Dr. Barbara Illman (USDA, U. of Madison, and new UEC

member) on the applications of synchrotron radiation to forest science, which illustrated the enormous potential of synchrotron-based measurements to impact non-traditional synchrotron disciplines. The draft of the Birgeneau panel's report (See <http://www-als.lbl.gov/als/besac/index.html>) was released early this fall and was very favorable towards the NSLS. Patricia Dehmer responded to the report very quickly, releasing additional funds to hire NSLS user support staff and to upgrade user facilities. Due to the increase in funding resulting from the BESAC panel report, the NSLS has asked the UEC for input on how to distribute the additional capital equipment and personnel support funds. Although no less difficult than other issues, this is a welcome departure from the far more frequent request to help determine where to trim.

Looking ahead, now that a new contractor has been chosen to manage BNL, the UEC needs to forge a strong

and positive working relationship with the new laboratory management. This will take some time and effort on both sides.

1997 has been another year of very strong scientific output at the NSLS. A cursory look through the abstracts and publication lists in this Activity Report demonstrates the tremendous variety of high quality science being done at the NSLS. The users have come to expect excellent and continuously improving operations at the National Synchrotron Light Source. The NSLS staff have labored hard to ensure that the brightness, stability and reliability of the sources improved steadily over the years. Yet, it is the quality of the science performed by the users which ultimately determines the success or failure of the facility. I am quite optimistic that the NSLS will remain a vital facility long into the future. ■



Users' Executive Committee and Special Interest Group Representatives

(Front, from left to right)

Steven Whisnant (U. of So. Carolina), Malcolm Capel (NSLS-Biology), Elaine DiMasi (BNL-Physics), Joel Brock (Cornell U.), Eva Rothman (BNL-NSLS), and John Parise (SUNY @ Stony Brook).

(Back, from left to right)

Barbara Illman (U. of Wisconsin), G. Lawrence Carr (BNL-NSLS), Michael Dudley (SUNY @ Stony Brook), Peter Stephens (SUNY @ Stony Brook), Ian Robinson (U. of Illinois), D. Peter Siddons (BNL-NSLS), Peter Johnson (BNL-Physics), and Sanjeeva Murthy (AlliedSignal, Inc).

Absent from photo are Thomas Russell (U. of Massachusetts), Paul Stevens (Exxon Research and Engineering), Carl Zimba (MIT), Jon Levin (U. of Tennessee), and Luz Martinez-Miranda (U. of Maryland).