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University of Nevada, Las Vegas Advanced Accelerator Applications University Participation Program: Quarterly Report, Second Quarter (June to August 2001)

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Quarterly Report

Second Quarter (June to August 2001)

University of Nevada, Las Vegas Advanced Accelerator Applications University Participation Program

October 25, 2001

Prepared by:

**Anthony E. Hechanova
Director, UNLV AAA UPP**

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1. INTRODUCTION

This Quarterly Report is a primary deliverable from the University of Nevada, Las Vegas (UNLV) Advanced Accelerator Applications (AAA) University Participation Program (UPP) Director to the U.S. Department of Energy (DOE) as described in the UNLV AAA proposal¹.

The UNLV AAA UPP Director implements the program's administration using staff from the Harry Reid Center for Environmental Studies (HRC) to ensure that work conducted under the UNLV AAA UPP meets program objectives. The UNLV AAA UPP consists of three components: Program Administration, Research Infrastructure Augmentation, and Student Research. The activities and reports of the program can be reviewed on the <http://aaa.nevada.edu> website.

1.1 Chronology of Events

June 8, 2001	UNLV Public Relations Meeting: AAA Launch and Magwood Visit
June 12, 2001	Executive Committee Meeting: decision to pursue ISTC Target
June 18, 2001	LANL visit to UNLV: Ning Li (LANL) meets with UNLV faculty
June 19, 2001	Candidate Interview for Research Scientist B: David Shuh
June 20, 2001	UNLV Public Relations Meeting with the Provost: AAA Launch and Magwood Visit
June 21, 2001	AAA Seminar, Mitchell Meyer, ANL
June 21-22, 2001	UNLV AAA Director visits UC Berkeley and LBNL
June 26, 2001	UNLV AAA staff William Culbreth visits LANSCE facility
June 28, 2001	Finance Meeting with DOE-ALB: Sam Espinosa
June 29, 2001	UNLV AAA Special Workshop and Tour for DOE-NE visitors
June 29, 2001	MOU Signing Ceremony: UNLV Pres. Harter and DOE-NE Dir. Magwood
July 2-3, 2001	ANL visit to UNLV: James Laidler and George Vandegrift (ANL) held meetings and gave presentations to UNLV faculty
July 5, 2001	Infrastructure Committee Meeting: Materials Performance Equipment
July 9, 2001	Research Scientist C Position Filled: Associate Research Professor Ajit Roy
July 16, 2001	10 proposals are submitted for graduate student projects beginning fall term
July 18-20, 2001	International Visitation: IPPE Obninsk, Russia, facility tour and presentations by UNLV AAA Director
July 18-20, 2001	International Conference Participation: IPPE Obninsk, Russia visit by UNLV AAA staff Anthony Hechanova and Samir Moujaes
July 19, 2001	Graduate Student Recruitment meeting with students from the Youth Department of the Russian Nuclear Society
July 19, 2001	ANL visit to UNLV: Ray Klann (ANL) meets with UNLV faculty
July 25, 2001	Finance Advisory Committee Meeting: recommended Fall 2001 proposals

August 2, 2001	UNLV Vice Provost for Research officially requests ISTC Target
August 2, 2001	IPPE proposes collaboration with UNLV AAA UPP
August 3, 2001	UNLV AAA program meeting with Chemistry Department faculty: Discussed interest in separations research
August 6, 2001	UNLV AAA Director visit and presentation: Amarillo National Research Center
August 9, 2001	UNLV AAA program meeting with the College of Sciences Dean: SEM facility to be supported by UNLV AAA UPP
August 10, 2001	UNLV AAA program meeting with the Harry Reid Center Executive Director: Space allocation for UNLV AAA UPP
August 13, 2001	Materials Performance Equipment price quotes submitted to Infrastructure Committee
August 14, 2001	Eight final proposals were submitted for graduate student research projects starting Fall 2001
August 15, 2001	Third Quarter Statement of Work submitted to DOE
August 23, 2001	DOE-NE approves the 8 Fall 2001 final proposals
August 27, 2001	Fall academic term begins, fall projects start
August 27, 2001	UNLV AAA program meeting to discuss space allocation for Materials Performance User Facility
August 28, 2001	LANL visit to UNLV: Dominic Chan (LANL) held meetings and gave a presentation to UNLV faculty
August 29, 2001	UNLV AAA program meeting with the College of Engineering Associate Dean for Research and Information Technology
August 30, 2001	AAA Seminar, Denis Beller, LANL/UNLV-HRC
August 31, 2001	Infrastructure Committee Meeting: Expenditures approved
August 31, 2001	Candidate Presentation and Interview, Research Scientist A: Longzhou Ma,

1.2 Overall Program Schedule

The Second Quarter schedule for the UNLV AAA University Participation Program is shown in Figure 1.

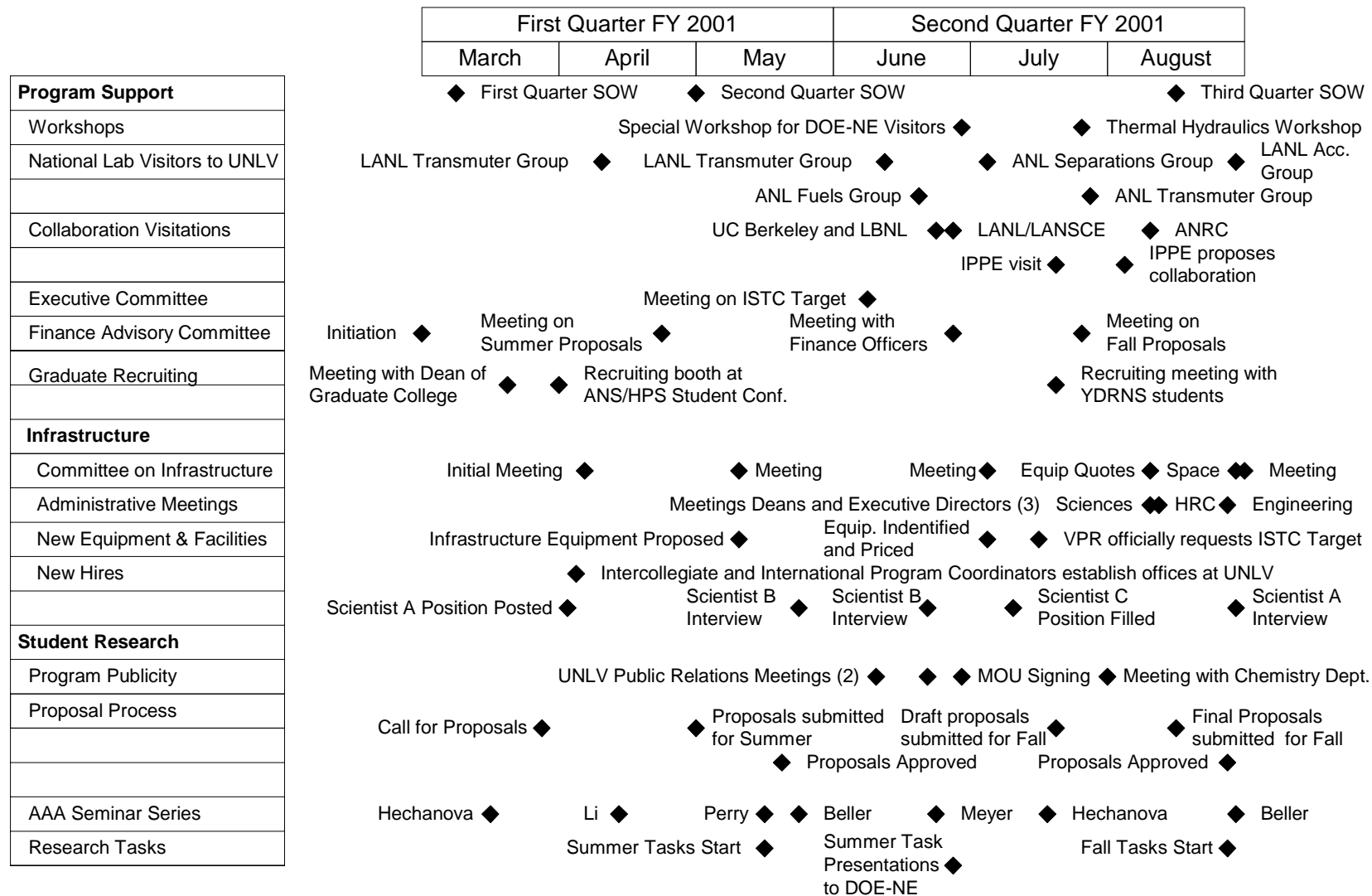


Figure 1. Schedule of the UNLV AAA University Participation Program through the Second Quarter.

2. PROGRAM ADMINISTRATION

The primary deliverables for the Program Administration component are quarterly and annual reports. These reports will detail the progress on each administrative task and the milestones and deliverables generated during the appropriate period. Other than this report, the only other documents provided to DOE this quarter are the following:

- Memorandum of Understanding between the University of Nevada Las Vegas and the U.S. Department of Energy Office of Nuclear Energy, Science and Technology², June 29, 2001.
- Proposal for use of the ISTC Lead-Bismuth Target at UNLV³, August 2, 2001.
- UNLV AAA University Participation Program Statement of Work for the Third Quarter⁴, August 15, 2001.

The following are the individuals involved in the day-to-day administration of the UNLV AAA UPP.

UNLV AAA UPP Executive Committee:

Anthony Hechanova	Director
Gary Cerefice	Deputy Director (Harry Reid Center for Environmental Studies)
Malcolm Nicol	Deputy Director (College of Sciences)
William Culbreth	Deputy Director (College of Engineering)

UNLV Student Support Staff:

Christina Crossan	Undergraduate, Health Physics Department
Demian Gitnacht	Undergraduate, Health Physics Department
Cheryl Gustafson	Undergraduate, Kinesiology Department
Ingrid James	Undergraduate, School of Social Work
John Knoten	Undergraduate, Civil and Environmental Engineering

UNLV AAA UPP Affiliates:

Pattie Baldwin (HRC)	Director of Finance
Denis Beller (LANL)	AAA UPP Intercollegiate Programs Coordinator
Ning Li (LANL)	AAA UPP International Programs Coordinator

2.1 UNLV AAA UPP Meetings and Committees

This section describes the motions of committees that were active during the Second Quarter.

Finance Advisory Committee:

Dr. Anthony Hechanova, Chair
Dr. Gary Cerefice (Harry Reid Center)
Prof. Malcolm Nicol (College of Sciences)
Prof. William Culbreth (College of Engineering)
Dean Paul Ferguson (UNLV Administration)
Vice Provost for Research Stephen Rice (UNLV Administration)

The Finance Advisory Committee met July 25 to discuss and recommend proposals starting fall term 2001. Ten proposals were submitted and eight were recommended for final submission to DOE-NE.

Ad Hoc Committee on Infrastructure:

Dr. Anthony Hechanova, Chair
Dr. Gary Cerefice (Harry Reid Center)
Prof. Malcolm Nicol (College of Sciences)
Prof. Allen Johnson (Chemistry)
Prof. Dennis Lindle (Interface Science Center)
Prof. William Culbreth (College of Engineering)
Prof. Robert Schill (Electrical and Computer Engineering)
Prof. Brendan O'Toole (Mechanical Engineering)
Dr. Mark Pippenger (Electrical and Computer Engineering)

The committee met July 5 to discuss equipment to be purchased for a new AAA Materials Performance User Facility at the College of Engineering. It was decided that Profs. Roy and O'Toole would be tasked to identify equipment and obtain price quotes. The equipment list and price quotes were submitted on August 13. A meeting was held between UNLV AAA administrators and Profs. Roy and O'Toole to discuss space allocations for the Materials Performance User Facility. The decision was made to conduct immediate experiments at the HRC while the permanent User Facility was being developed in the College of Engineering complex. The committee met on August 31 to discuss the status of the Materials Performance User Facility among other expenditure requests and recommended the following four items for funding in FY01:

- \$230,000 for Materials Performance User Facility equipment
- \$35,000 from FY01 in support of Carter Hull's neutron multiplicity project
- \$42,000 per year for service contracts for JEOL optical microscope, SEM, and EDS
- Remaining infrastructure augmentation funds to be used for TEM facility

Other Committees:

Public Relations: The UNLV AAA UPP Director Anthony Hechanova met with several members of the UNLV administration on June 8 and June 20 to discuss the public launching of the program including the potential for a visit by the Director of the DOE Office of Nuclear Energy, Science and

Technology (DOE-NE) and a signing ceremony with UNLV President Carol Harter. Press releases and other efforts were initiated. A Memorandum of Understanding³ between UNLV and DOE-NE was signed on June 29 by Pres. Harter and Dir. Magwood.

Executive Committee: Anthony Hechanova (Chair), Gary Cerefice (Harry Reid Center), Malcolm Nicol (College of Sciences), and William Culbreth (College of Engineering) met on June 12 to discuss the concept of bringing the International Science and Technology Center (ISTC) Lead Bismuth Eutectic Target to UNLV as suggested by DOE-NE and Los Alamos personnel. The committee endorsed the concept. On August 2, the Vice Provost for Research Stephen Rice sent a letter³ to the DOE-NE AAA Director John Herczeg indicating UNLV's interest in procuring the ISTC Target and developing a Lead Bismuth Eutectic User Facility at UNLV.

Finance Oversight: HRC Finance Director Patricia Baldwin, Gary Cerefice, and Anthony Hechanova, met with DOE Albuquerque Office contract officers Sam Espinosa and Melissa Thomas to discuss matters related to the UNLV grant on June 28.

Information Management Committee: Anthony Hechanova (Chair), Gary Cerefice, and John Knoten. Weekly meetings were held to maintain and update the UNLV AAA UPP website at <<http://aaa.nevada.edu>>. A library was also started that contains materials supplied by the national laboratories and other sources related to the AAA. These materials are listed on the website and are made available to the UNLV program.

Search Committees:

- Research Scientist A, Harry Reid Center (Anthony Hechanova, Chair) – Fourteen applications were submitted for this position. Four candidates made the short list. One candidate was interviewed on August 31. Other interviews are to follow in the Third Quarter.
- Research Scientist B, College of Sciences (Dean Frederick Bachhuber, Point of Contact) – A second candidate for this position was interviewed on June 19. An offer has been made and acceptance conditions were still under negotiation during the Second Quarter.
- Research Scientist C, College of Engineering (Dean Ronald Sack, Point of Contact) – The College of Engineering completed their search and their top candidate accepted the position starting on July 9.

2.2 Workshops, Conferences, and Collaboration Meetings

UNLV AAA UPP Workshop, June 29, Las Vegas, Nevada – The purpose of the workshop was to help launch the new UNLV AAA program by highlighting the four research projects that started over the summer. On hand were several members of the national AAA program including the DOE-

NE Director William Magwood IV. Tours of UNLV's facilities were given and UNLV President Carol Harter and Director Magwood signed a Memorandum of Understanding between UNLV and DOE-NE with respect to the AAA program.

10th International Meetings of the Working Group on Advanced Nuclear Reactors Thermohydraulics, July 17-19, Obninsk, Russia – Two UNLV faculty attended the meeting to discuss issues related to the ISTC target and benchmarking type experiments. The meeting took place at the Institute for Physics and Power Engineering (IPPE). Several tours of the IPPE facility were given to the UNLV faculty and the potential for collaboration was discussed. On August 2, the Director of the IPPE Nuclear Power Plant Department submitted a written proposal for collaboration between IPPE and UNLV.

Research collaboration meetings are encouraged and arranged to help enhance communication networking and develop collaborative graduate student research projects. Research collaboration meetings were held between UNLV faculty and the following groups:

- Los Alamos National Laboratory Transmuter Group, June 18, visit to UNLV by Ning Li
- Lawrence Berkeley National Laboratory and UC Berkeley, June 21-22, visit to Berkeley by Anthony Hechanova
- Argonne National Laboratory Fuels Group, June 21, visit to UNLV by Mitchell Meyer
- Los Alamos National Laboratory Accelerator Group: June 26, visit to LANL by William Culbreth; August 28, visit to UNLV by Dominic Chan
- Argonne National Laboratory Separations Group, July 2-3, visit to UNLV by James Laidler and George Vandegrift
- Institute for Physics and Power Engineering, July 18-20, visit to IPPE by Anthony Hechanova and Samir Moujaes
- Argonne National Laboratory Fuels Transmuter Group, July 19, visit to UNLV by Raymond Klann
- Amarillo National Research Center, August 6, visit to ANRC by Anthony Hechanova and Denis Beller

2.3 UNLV AAA UPP Website, Information Management, and Seminars

The UNLV AAA UPP website <<http://aaa.nevada.edu>> was maintained in the Second Quarter by UNLV student webmaster John Knoten. This website contains relevant information for internal UNLV communications, networking with outside groups, and for general public access. A library housed at the HRC was maintained that contains materials supplied by the national laboratories and other sources related to the AAA.

The following seminars were presented during the Second Quarter:

“Fuel Development for Transmutation of Higher Actinides,” Mitchell Meyer, Argonne National Laboratory, June 21, 2001.

“Advanced Accelerator Applications,” Anthony Hechanova (UNLV), UNLV AAA UPP presentations to Obninsk officials and IPPE personnel, Obninsk, Russia, July 17, 2001.

“The AAA National Program and University Participation,” by Denis Beller, Los Alamos National Laboratory, UNLV AAA Intercollegiate Programs Coordinator, August 30, 2001.

3. RESEARCH INFRASTRUCTURE AUGMENTATION

The goal of the Research Infrastructure Augmentation component of the UNLV AAA UPP is to augment the research staff and facilities at UNLV to increase the ability of the university to perform AAA research. The following sections describe progress made in infrastructure augmentation.

3.1 New Hires

Research Scientist A, Harry Reid Center — Fourteen applications were submitted for this position. Four candidates made the short list. One candidate was interviewed on August 31. Other interviews are to follow in the Third Quarter. The position should be offered in the Third Quarter.

Research Scientist B, College of Sciences — The search committee has completed their process and their top candidate was offered the position. Negotiations over the conditions of the hire between the college and the candidate were not completed by the end of the Second Quarter. The faculty position is anticipated to start fall term 2002.

Research Scientist C, College of Engineering — The College of Engineering completed their search and hired Dr. Ajit Roy in a newly created Associated Research Professor position on July 1. Half of Dr. Roy’s time will be devoted to AAA and he will be a principal involved in developing an AAA Materials Performance User Facility.

3.2 New Equipment and Facilities

Four new user facilities are under development in the Second Quarter.

Materials Performance User Facility: This facility is to be built in existing space in the College of Engineering complex. Prof. Ajit Roy was hired July 9 and one of his tasks is to assist in the design and operation of the facility. About \$230,000 in equipment has been identified and the Infrastructure Committee has approved the expenditure. The facility is anticipated to be opened in the Third Quarter.

Transmission Electron Microscopy (TEM) User Facility: This facility is to be built in existing space at the Harry Reid Center. The first step in the development of the facility is to bring TEM experts to UNLV to help decide the optimal system for UNLV’s needs. The hiring of Research Scientist A has the purpose of bringing TEM expertise to UNLV. The position is expected to be filled in the Third Quarter.

Lead Bismuth Eutectic Loop User Facility: This concept is in the early stages of investigation. A unanimous consensus has been made amongst UNLV AAA UPP principals that this is the type of facility the UNLV should pursue using FY02 funding. The Vice Provost for Research has sent a letter to DOE-NE indicating UNLV's interest and the administration's support. A steering committee will be formed in the Third Quarter to direct this new effort.

Materials Characterization Facility: The UNLV AAA UPP will assist in the maintenance of an already existing facility within the College of Sciences that contains optical microscopes and a Scanning Electron Microscopy (SEM). Without the assistance of the UNLV AAA UPP, this facility could potentially have to close down for lack of financial support. Because of this support, UNLV AAA UPP projects will have proportional access to the equipment which is already being used by several AAA graduate student research projects.

4. RESEARCH PROJECTS

The Student Research component is the core of the UNLV AAA UPP with steadily increasing funds as the program evolves and capability expands.

4.1 Student Research Proposals

10 proposals starting fall term 2001 were submitted to the UNLV Finance Advisory Committee on July 16. Eight proposals were recommended for funding by the UNLV Finance Advisory Committee on August 14. The 8 proposals were approved by DOE-NE on August 23. The final proposals and amounts requested using FY01 funding (9 months) for student research are the following:

The following eight proposals covering 13 graduate students for a total first-year cost of \$964,375 were approved for funding by the UNLV AAA UPP Finance Advisory Board and the DOE Office of Nuclear Energy, Science and Technology:

“Modeling Corrosion in Oxygen Controlled LBE Systems with Coupling of Chemical Kinetics and Hydrodynamics,” Principal Investigator Samir Moujaes, Mechanical Engineering Department, FY01 requested funds: \$75,861

“Neutron Multiplicity Measurements for AAA Target/Blanket Materials,” Principal Investigator Carter Hull, Harry Reid Center, FY01 requested funds: \$110,030

“Develop Dose Conversion Coefficients for Radionuclides Produced in Spallation Neutron Sources,” Principal Investigator Philip Patton, Health Physics Department, FY01 requested funds: \$101,296

“Development of a Systems Engineering Model of the Chemical Separations Process,” Principal Investigator Yitung Chen, Mechanical Engineering Department, FY01 requested funds: \$109,587

“Design and Evaluation of Processes for Fuel Fabrication,” Principal Investigator Georg Mauer, Mechanical Engineering Department, FY01 requested funds: \$46,820

“Development of a Mechanistic Understanding of High-Temperature Deformation of Alloy EP-823 for Transmutation Applications,” Principal Investigators Ajit Roy and Brendan O’Toole, Mechanical Engineering Department, FY01 requested funds: \$82,122

“Nuclear Criticality Analyses of Separations Processes for the Transmutation Fuel Cycle,” Principal Investigator William Culbreth, Mechanical Engineering Department, FY01 requested funds: \$69,496

“Radiation Transport Modeling of Beam-Target Experiments for the AAA Project,” Principal Investigator William Culbreth, Mechanical Engineering Department, FY01 requested funds: \$69,082

4.2 Student Recruitment

The UNLV AAA UPP Director made presentations to students of the Youth Department of the Russian Nuclear Society (YDRNS). In addition, instructions for international students interested in applying to UNLV and receiving funding from the UNLV AAA UPP have been posted on the UNLV AAA website and are distributed as opportunities become available.

The UNLV AAA UPP Intercollegiate Programs Coordinator has also distributed UNLV graduate student recruitment information at the University of South Alabama, the University of Texas-Austin, and UC Berkeley.

REFERENCES

1. Hechanova, A.E., “Proposal to Establish an Advanced Accelerator Applications University Participation Program at the University of Nevada, Las Vegas,” Rev. 3, March 6, 2001.
2. Magwood, W., and C. Harter, “Memorandum of Understanding between the University of Nevada Las Vegas and the U.S. Department of Energy Office of Nuclear Energy, Science and Technology,” June 29, 2001.
3. Rice, S.L., “Proposal for use of the ISTC Lead-Bismuth Target at UNLV,” memorandum sent to John Herczeg, DOE-NE AAA Director, August 2, 2001.
4. Hechanova, A.E., “UNLV AAA University Participation Program Statement of Work for the Third Quarter,” August 15, 2001.