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University of Nevada, Las Vegas Advanced Accelerator Applications University Participation Program: Quarterly Report First Quarter (March-May 2001)

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Quarterly Report

First Quarter (March to May 2001)

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

July 30, 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 Office of Nuclear Energy, Science and Technology (DOE-NE) as defined in the UNLV AAA Proposal¹.

The foundation of the UNLV AAA University Participation Program started as a grassroots effort in the late 1990s among community members and local, state, and federal representatives to encourage research and development of technical alternatives to direct disposal of used nuclear fuel which had been targeted since the early 1980s for Yucca Mountain, Nevada. A fiscal year 2001 \$3 million Congressional appropriation (42 U.S.C. § 2117) gave the University the funds needed to develop and establish the UNLV AAA Program.

The UNLV AAA University Participation Program consists of three components: Program Administration, Research Infrastructure Augmentation, and Student Research. The UNLV AAA Program director implements the Program Administration using staff from the Harry Reid Center for Environmental Studies to ensure that work conducted under the UNLV AAA UPP meets program objectives. The HRC Program Administration also plays the role of clearinghouse for UNLV Program record-keeping and deliverable production and dissemination including the assembly and distribution of quarterly progress reports and annual technical reports. In addition to conferences, progress reports, student theses, and technical papers, activities and results of the UNLV AAA UPP is available on the <<http://aaa.nevada.edu>> website for dissemination.

1.1 Chronology of Events

December 12, 2000	Initial proposal to establish the UNLV AAA University Participation Program submitted to DOE-NE.
January 17-19, 2001	DOE, Los Alamos, and Argonne East and West National Laboratories visitation to UNLV.
January 18, 2001	AAA Mini-Workshop held at UNLV. About 25 UNLV Faculty and Staff participate and interact with personnel from DOE, LANL, ANL, and ANL-West.
January 29, 2001	UNLV AAA UPP Proposal Revision 1 submitted to DOE-NE.
February 2, 2001	UNLV AAA UPP website < aaa.nevada.edu > launched.
February 5-6, 2001	UNLV AAA UPP concept presented at AAA Program Quarterly Review at Los Alamos National Laboratory.
February 7, 2001	UNLV AAA UPP Proposal Revision 2 submitted to DOE-NE.
March 6, 2001	Final UNLV AAA UPP Proposal Revision 3 submitted to DOE-NE

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.

	and accepted.
March 6, 2001	Statement of Work for First Quarter submitted to DOE/Albuquerque.
March 13, 2001	AAA Seminar presented at DOE Nevada Operations Office, Anthony Hechanova (UNLV)
March 19, 2001	UNLV AAA UPP recruitment planning meeting with Graduate College dean
March 29, 2001	Call for Proposals and supporting documents distributed
March 29-April 1, 2001	UNLV AAA UPP Recruiting Booth at ANS/HPS Student Conference
April 2, 2001	Position announcement for Research Scientist A (TEM Specialist) posted
April 4, 2001	UNLV AAA UPP Intercollegiate and International Program Coordinators establish offices at UNLV.
April 6, 2001	UNLV AAA Infrastructure Committee meeting
April 12, 2001	National Laboratory Visitation: LANL-Transmuter Group
April 12, 2001	AAA Seminar, Ning Li (LANL)
April 17, 2001	Seven proposals submitted to DOE for review and prioritization
April 20, 2001	Interview, Research Scientist B (Materials Chemist)
April 26, 2001	UNLV AAA Finance Advisory Committee meets and recommends four proposals for funding
May 1, 2001	Four final proposals submitted to DOE/HQ for final approval
May 1, 2001	Statement of Work for Second Quarter submitted to DOE/Albuquerque
May 8, 2001	UNLV AAA Infrastructure Committee meeting
May 11, 2001	DOE/HQ approves the four final proposals
May 15, 2001	UNLV AAA University Participation Program meetings and presentations in Washington, DC with congressional staffers
May 16, 2001	AAA Seminar, Dale Perry (LBNL)
May 18, 2001	ADTF Presentation at DOE Nevada Operations Office, Denis Beller (LANL)
May 23, 2001	Funding documents for FY01 grant received in full at UNLV
May 24, 2001	Four final proposals received funding to start research

1.2 Overall Program Schedule

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

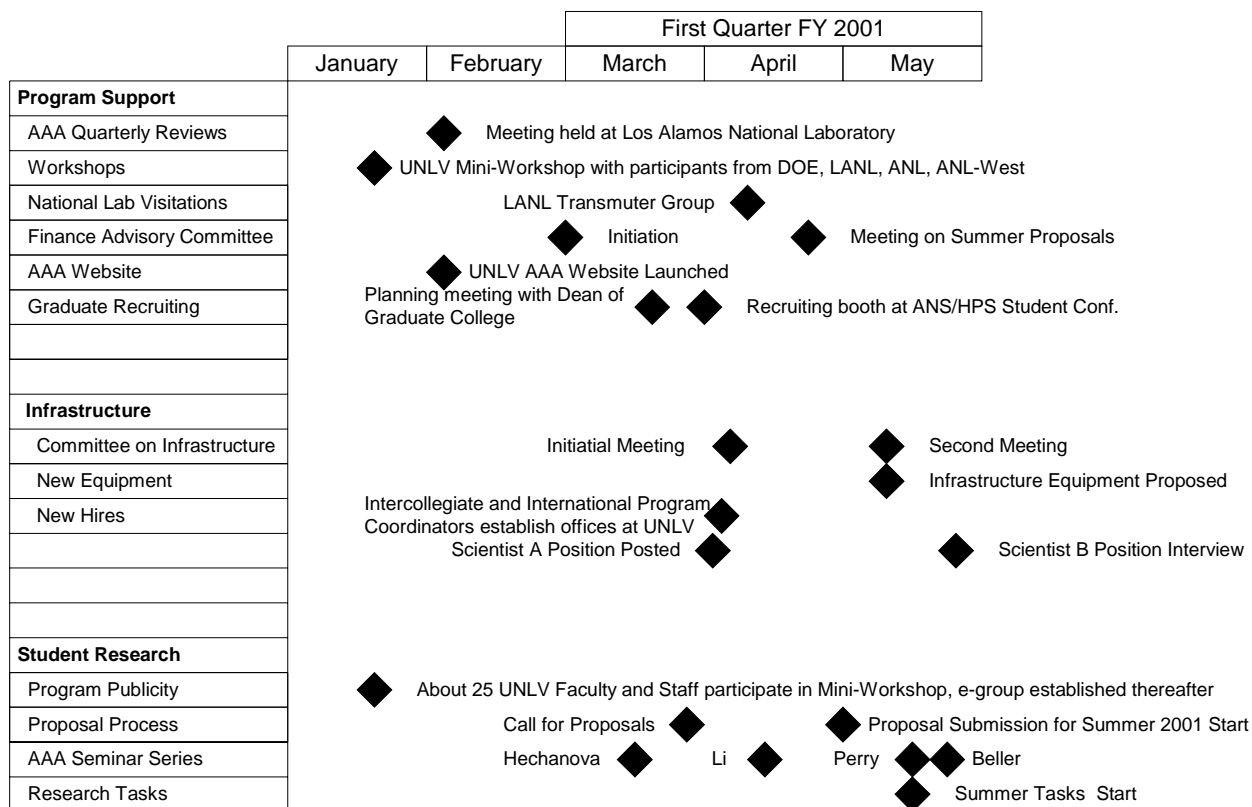


Figure 1. First Quarter Schedule of the UNLV AAA University Participation Program.

2. PROGRAM ADMINISTRATION

The primary deliverables for the Program Administration component are quarterly and annual reports. These reports will detail the progress on each task and the milestones and deliverables generated during the appropriate period. 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 Committees

The following committees were formed during the First 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 on April 26, 2001 and recommended four of seven proposals to be funded starting Summer Term 2001. These are listed in Section 4.1.

Information Management Committee:

Dr. Anthony Hechanova, Chair
 Dr. Gary Cerefice
 John Knoten

Weekly meetings were held to maintain and update the UNLV AAA UPP website at <<http://aaa.nevada.edu>>.

Search Committees:

Research Scientist A, Harry Reid Center — the position was opened and the advertisement posted on April 2, 2001:

Description: The Harry Reid Center for Environmental Studies at the University of Nevada, Las Vegas, is seeking a research scientist with a strong background in material science and engineering. In addition to participating in collaborative research on a variety of projects, the research scientist will also be responsible for the development of a new materials characterization user laboratory at

UNLV. Applicants must have a highly developed proficiency (Ph.D. or equivalent) in material science, material science engineering, or a closely related field. Successful applicants will also have experience with materials characterization equipment (particularly TEM), good communications skills, and the ability to work with and educate students.

Among the projects on which the research scientist will be working is the Advanced Accelerator Applications program (AAA). The UNLV AAA University Participation Program, administered by the Harry Reid Center, brings significant opportunities for researchers at UNLV to participate in the national program to develop this new technology for the economically and environmentally sound refinement of spent nuclear fuel as part of the accelerator-driven transmutation program. Work on collaborative research related to this program will be a primary responsibility of the research scientist.

The Search Committee will convene in the Second Quarter to discuss candidate selection.

Research Scientist B, College of Sciences — The Search Committee has been established and the position was one of two faculty positions (including this one to be co-funded by the UNLV AAA UPP) currently in the interview process. One candidate was interviewed by UNLV AAA UPP staff on April 20, more will be interviewed in the Second Quarter.

Research Scientist C, College of Engineering — The Search Committee has completed its task. The dean of the College of Engineering and the Chair of the Mechanical Engineering Department decided to fill this position as an Associate Research Professor. The successful candidate was Dr. Ajit Roy, an expert in material sciences and metallurgy, who will be joining the UNLV staff in July 2001.

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 Infrastructure Committee met on April 6, 2001 to establish the committee and define its purpose, goals, and structure. The Committee met on May 8, 2001 to discuss the Material Science and Engineering (MSE) equipment request for the UNLV AAA UPP user facility including \$200,000 requested by the Mechanical Engineering Department for their funded graduate student AAA projects. The decision was made to move forward on procuring specifications and quotes for MSE equipment and to bring in an expert in Transmission Electron Microscopy (TEM) to meet with UNLV faculty and staff and explore the options for bringing a TEM to campus.

2.2 Workshops and Conferences

Mini-workshops for each focus area (Accelerators, Fuels, Separations, Systems, and Transmuter) were originally scheduled for the First Quarter, however, due to funding delays, travel could not be arranged. Instead, national laboratory visitors from most of the focus areas from the national laboratories plan to visit UNLV in the First and Second Quarters to help enhance communication networking and develop collaborative graduate student research projects.

Completed and scheduled AAA Project national laboratory staff visitations:

April 12, 2001	Los Alamos National Laboratory – Transmuter Group
June 21-22, 2001	Argonne National Laboratory-West – Fuels Group
June 28-29, 2001	Special UNLV AAA UPP Workshop for DOE/NE visit
July 2-3, 2001	Argonne National Laboratory – Separations Group
August 1-2, 2001	Los Alamos National Laboratory – Accelerator Group

2.3 UNLV AAA UPP Website and Information Management

The UNLV AAA UPP website was established in the First Quarter (actually launched on Feb. 2, 2001) and made accessible to the public at <<http://aaa.nevada.edu>>. This website contains: Introductory-level summary of the AAA project, All UNLV AAA UPP proposal instructions and other documents, Relevant Multi-Media information, Links to DOE, university, and other sites of relevance. The website is being maintained by UNLV student webmaster John Knoten.

A new AAA Library was established during the First Quarter and is part of the HRC Nuclear Science and Technology Group libraries. Available references are listed on the UNLV AAA UPP website and can be checked out from the HRC Nuclear Science and Technology Group.

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.

3.1 New Hires

UNLV AAA Intercollegiate Program Coordinator — Denis Beller of the Los Alamos National Laboratory was appointed to this position by the AAA Project Director. His office was relocated from Los Alamos to UNLV in early April 2001 and his full salary will be covered by the UNLV AAA UPP through a contract with the University of California.

UNLV AAA International Programs Coordinator — This position is held by Ning Li of Los Alamos

National Laboratory. Although no funds were requested for salary compensation in the First Quarter, his travel to UNLV was covered by the UNLV Program. In the future, a small percentage of his salary may cover his time spent on the UNLV AAA UPP through a contract with the University of California.

Research Scientist A, Harry Reid Center — The hiring process for Research Scientist A was initiated. This included the completion of the Position Description Questionnaire for the position that was subsequently approved by UNLV. The position was processed through UNLV Human Resources. Advertisements for the position were distributed and the search officially began during the First Quarter. The formal search committee for this position will be formed in the Second Quarter and will begin reviewing candidates. If acceptable applicants are identified, the position should be offered at the end of the Second Quarter or beginning of the Third Quarter.

Research Scientist B, College of Sciences — A faculty position is open in the Chemistry Department and candidates are being interviewed. The position is expected to be filled in FY02.

Research Scientist C, College of Engineering — Search completed and top candidate offered the position. Offer has been accepted. The dean of the College of Engineering and the Chair of the Mechanical Engineering Department decided to fill this position as an Associate Research Professor. The successful candidate was Dr. Ajit Roy, an expert in material sciences and metallurgy, who will be joining the UNLV staff in July 2001.

3.2 New Equipment

As discussed in Section 2.1, above, the Infrastructure Committee met on May 8, 2001 to discuss the Material Science and Engineering (MSE) equipment requested for the UNLV AAA UPP user facility including the \$200,000 request by the Mechanical Engineering Department contained in their funded graduate student projects. The decision was made to move forward on procuring specifications and quotes for MSE equipment and to continue to explore the options for bringing a Transmission Electron Microscope (TEM) to UNLV.

3.3 New Facilities

The laboratory bay for a new Material Science and Engineering User Facility has been vacated of previous equipment and stored material in preparation for remodeling. A TEM Expert will be consulted before remodeling commences. All remodeling work will be approved by the UNLV AAA UPP Infrastructure Committee.

4. STUDENT 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. The expenses for faculty-supervised, student-conducted research started in the Second Quarter. The costs for the following scope of work are

covered under the Program Administration request since these tasks are accomplished by the UNLV AAA UPP administrators.

4.1 Student Research Proposal Solicitation and Development

The formal call for student research proposals to the UNLV AAA UPP was issued on March 29, 2001 using e-group databases for the faculty of the College of Sciences and College of Engineering.

The following supporting documents for the call for proposals were completed and issued via posting on the UNLV AAA UPP website:

- Instructions to UNLV researchers for submitting proposals,
- Proposal Evaluation process and criteria (criteria for UNLV review only),
- Templates for research proposal and budget,
- Instructions for preparing the budget documents,
- Sample Proposal

Seven proposals were submitted for graduate student research starting Summer Term 2001. All seven proposals were accompanied by letters of support from their National Laboratory partners.

No.	Title	UNLV Researchers	Collaborators	Requested Funds
01-1	Design and Testing of Mobile Robot for a Hot Cell Environment	G.F. Mauer	S.A. Maloy (LANL)	\$101,788
01-2	Precision Controller Designs and Validation based on Dynamic Modeling & Simulation of an Ion Beam Current Source	S. Singh, L. Gewali, W. Yim, J. Karmarkar	D. Schneider, T. Zaugg, T. Figueroa (LANL)	\$299,984
01-3	Design and Analysis for Melt Casting Metallic Fuel Pins Incorporating Volatile Actinides	Y.-T. Chen, D.W. Pepper, R. Clarksean	M.K. Meyer, S.L. Hayes (ANL-West)	\$145,718
01-4	Modeling, Fabrication, and Optimization of Niobium Cavities	R.S. Schill, M.B. Trabia, Y.-T. Chen	K.C.D. Chan (LANL)	\$161,148
01-5	Determination and Validation of Failure Processes in the Lead Bismuth Eutectic (LBE)/Stainless Steel System	J.W. Farley, D. Perry	N. Li (LANL)	\$138,165

01-6	Hydrogen-Induced Embrittlement of Candidate Target Materials for Applications in Spallation-Neutron-Target Systems	B.J. O'Toole, A.K. Roy, Z. Wang, D. Hatchet	N. Li (LANL)	\$110,367
01-7	Metallurgical Characterization of Candidate Target Materials for Accelerator-Driven Waste Transmutation Applications	B.J. O'Toole, A.K. Roy, M. Trabia, Z. Wang	S.A. Maloy (LANL)	\$106,862

The following four proposals covering 9 graduate students, 6 undergraduates, for a total cost of \$598,508 were approved for funding by the UNLV AAA UPP Finance Advisory Board and the DOE Office of Nuclear Energy, Science and Technology:

Yitung Chen, Darrel Pepper, and Randy Clarksean, "Phase I: Design and Analysis for Melt Casting Metallic Fuel Pins Incorporating Volatile Actinides," 2 graduate students (Xialong Wu and 1 to be determined (TBD)), 1 undergraduate, allocated first year funds: \$141,437

Robert Schill, Jr. and Mohamed Trabia, "Modeling, Fabrication, and Optimization of Niobium Cavities – Phase I," 3 graduate students (Quin Xue and 2 TBD), 2 undergraduates (Greg Lull and Myong Holl) allocated first year funds: \$161,147

John Farley and Dale Perry, "Experimental Investigation of Steel Corrosion in Lead Bismuth Eutectic (LBE): Characterization, Species Identification, and Chemical Reactions," 2 graduate students (Dan Koury and Brian Hosterman), and 2 undergraduates (Denise Parsons and Ginger Street), allocated first year funds: \$150,165

Brendan O'Toole and Ajit Roy, "Hydrogen-Induced Embrittlement of Candidate Target Materials for Applications in Spallation-Neutron-Target Systems," 2 graduate students (Raymond Kozak and Mark Jones), 1 undergraduates (TBD), allocated first year funds: \$145,759

4.2 Student Recruitment

Graduate student recruitment efforts were initiated with the aid of the UNLV Graduate College and the UNLV academic departments. UNLV AAA program administrators met with Paul Ferguson on March 19, 2001 to introduce the AAA program and discuss recruiting strategies. Before successful proposals are funded they must identify by name the graduate students supported by the research project. A UNLV AAA UPP recruiting booth was staffed by two UNLV undergraduate students at the American Nuclear Society/Health Physics Society Student Conference held March 29 to April 1, 2001 at Texas A&M in College Station, Texas. A student recruitment poster was professionally printed and displayed at the Student Conference and is reusable for other such opportunities. The

Graduate College and UNLV Administration provided brochures to prospective students.

4.3 Seminar Series

The UNLV AAA UPP monthly seminar series was initiated in the First Quarter. The following are seminars given either at UNLV or by UNLV AAA staff:

- “An Alternate Energy Concept: Accelerator-Driven Transmutation Technology,” Anthony Hechanova (UNLV), AAA Seminar presented at the DOE Nevada Operations Office, Las Vegas, Nevada, March 13, 2001.
- “Advanced Accelerator Applications R&D: Issues in Materials Science and Engineering,” Ning Li (LANL), AAA Seminar presented at the Barrick Museum Auditorium, UNLV, April 12, 2001.
- “Advanced Accelerator Applications,” Anthony Hechanova (UNLV), UNLV AAA UPP meetings and presentations to Congressional staffers, Washington, DC, May 15, 2001.
- “Lead and its Chemistry,” Dale Perry (LBNL), AAA Seminar presented at the Barrick Museum Auditorium, UNLV, May 16, 2001.
- “Advanced Accelerator Applications,” Denis Beller (LANL), AAA Presentation at DOE Nevada Operations Office, Las Vegas, Nevada, May 18, 2001.