

2-6-2003

## University of Nevada, Las Vegas Transmutation Research Program: Quarterly Report, Second Quarter Year 2 (June 2002 to August 2002)

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Quarterly Report  
Second Quarter Year 2 (June 2002 to August 2002)

University of Nevada, Las Vegas  
Transmutation Research Program

February 6, 2003

**Prepared by:**

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This work is funded through the University of Nevada, Las Vegas, Transmutation Research Program administered by the Harry Reid Center for Environmental Studies (U.S. Department of Energy Grant No. DE-FG04-2001AL67358).

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## ACRONYMS

AAA	Advanced Accelerator Applications
ADTTA	Accelerator-Driven Transmutation Technology and Applications Conference
AFCI	DOE Advanced Fuel Cycle Initiative program
AMUSE	Argonne Model for Universal Solvent Extraction
ANL	Argonne National Laboratory
ANS	American Nuclear Society
ASME	American Society of Mechanical Engineers
BNL	Brookhaven National Laboratory
CE	Civil and Environmental Engineering
COE	UNLV College of Engineering
DCC	Dose Conversion Coefficients (refer to UNLV Task 7)
DOE	U.S. Department of Energy
DOE-NE	DOE Office of Nuclear Energy, Science, and Technology
ECE	Electrical and Computer Engineering Department
EENF	Environmental Evaluation Notification Form
EH&S	Environmental Health and Safety
EMIL	Electron Microanalysis and Imaging Laboratory
FAC	UNLV Finance Advisory Committee
FEI	Transmission Electron Microscope Vendor
FY02	Fiscal Year 2002
HRC	Harry Reid Center for Environmental Studies
IAC	ISU Idaho Accelerator Center
IAEA	International Atomic Energy Agency
ICAPP	International Congress on Advanced Nuclear Power Plants
INPE	Institute of Nuclear Power Engineering, Obninsk, Russia
IYNC	International Youth Nuclear Congress
IPPE	Institute of Physics and Power Engineering, Obninsk, Russia
ISTC	International Science and Technology Center
ISU	Idaho State University
JEOL	Transmission Electron Microscope Vendor
KRI	Khlopin Radium Institute, St. Petersburg, Russia
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LBE	Lead Bismuth Eutectic
LBNL	Lawrence Berkeley National Laboratory
LEDA	Low Energy Demonstration Accelerator
MCNPX	Monte Carlo Neutron Photon with extremely high-energy libraries code
MMAG	Molten Metal Advisory Group
MNE	Materials and Nuclear Engineering
MSE	Material Sciences and Engineering

NEPA	National Environmental Policy Act
NERAC	Nuclear Energy Research Advisory Committee
QTR	Quarterly Technical Review
SEM	Scanning Electron Microscope
SLLF	State Legislative Leaders Foundation
SMC	Student Mini-Conference
SOW	Statement of Work
TC	Target Complex
TEM	Transmission Electron Microscope
TRP	Transmutation Research Program
UC	University of California
UCB	University of California, Berkeley
UNLV	University of Nevada, Las Vegas
UPP	University Participation Program
URHPPA	Utilization and Reliability of High Power Proton Accelerators
USC	University of South Carolina
VPR	Vice Provost for Research
WBS	Work Breakdown Sheet

## 1. INTRODUCTION

This Quarterly Report is a primary deliverable from the University of Nevada, Las Vegas (UNLV) Transmutation Research Program (TRP) Director to the U.S. Department of Energy (DOE) as described in the UNLV Advanced Accelerator Applications (AAA) proposal<sup>1</sup>, and AAA FY02 Work Package<sup>2</sup>. Note: during this quarter, the AAA national program changed names to the Advanced Fuel Cycle Initiative (AFCI) and the UNLV AAA University Participation Program changed its name to the Transmutation Research Program. The new names will be used in future references.

The TRP Director implements the program's administration using staff from the Harry Reid Center for Environmental Studies (HRC) to ensure that work conducted under the TRP meets program objectives. The TRP program consists of four components: Program Support, Research Infrastructure Augmentation, International Collaboration, and Student Research. Further information about the activities and reports discussed in this document can be viewed on the TRP program's website at <<http://aaa.nevada.edu>>.

### 1.1 Chronology of Events

June 3, 2002	UNLV AAA Director tours and holds meetings on potential collaboration at UC Berkeley and LBNL
June 3, 2002	AAA discussion with Frank Avignone (USC), UNLV Dean of the College of Sciences and Department of Physics Chair

June 4, 2002	UNLV director tours and holds meetings on potential collaboration at UC Davis Crocker Nuclear Laboratory
June 5, 2002	LBE Infrastructure Subcommittee Conference Call
June 5, 2002	LANL provides Hazard Control Plan and the Operating Procedure for the LANL DELTA loop to UNLV for help in developing UNLV facility
June 5, 2002	Materials Performance Laboratory Open House, MPL officially completed
June 5, 2002	Task 9 Third Quarter Report submitted to UNLV AAA Director
June 6, 2002	LBE Infrastructure Subcommittee meeting with UNLV Facilities Management and Construction Planning office
June 6, 2002	Task 9 submits robot animations to UNLV AAA Director
June 7, 2002	UNLV May Actual Expenditures and Completion Percentage submitted to DOE
June 10, 2002	LBE Infrastructure Subcommittee submits time schedule for LBE Facility
June 12, 2002	Task 9 Principal Investigator submits request for international travel to Cadarache, Marcoule, Karlsruhe and the Lingen fuel manufacturing plant
June 13, 2002	FEI personnel conduct TEM site survey at UNLV
June 14, 2002	LBE Infrastructure Subcommittee Meeting
June 14, 2002	UNLV AAA Director submits four new proposals for research beginning fall term 2002 to DOE Program Advisory Committee for prioritization
June 17, 2002	Task 4, 8, and 10 Performance Self-Evaluations submitted to UNLV AAA Director
June 20, 2002	LBE Infrastructure Subcommittee Conference Call
June 21, 2002	UNLV purchases FEI TEM
June 24-25, 2002	LBE Infrastructure Subcommittee EH&S members visit LANL to tour Delta Loop
June 25, 2002	Task 4 Annual Report submitted to UNLV AAA Director
June 26, 2002	TEM Infrastructure Subcommittee meeting with UNLV Facilities Management and Construction Planning office
June 26, 2002	Task 1 PI management meeting with UNLV AAA Director
June 27, 2002	UNLV organizes special Yucca Mountain Tour for UNLV students and faculty
June 27, 2002	UNLV AAA Director presents invited seminar on Transmutation to the Clark County Yucca Mountain Nuclear Waste Advisory Committee
June 28, 2002	TEM Infrastructure Subcommittee meeting with UNLV Facilities Management and Construction Planning office and Architects
July 1, 2002	UNLV officially changes UNLV AAA UPP program name to the UNLV Transmutation Research Program (TRP) in light of changes in national program policy
July 1, 2002	AFC DOE-NE/UNLV Program Conference Call
July 1, 2002	AFC Program Conference Call
July 1, 2002	Task 2, 4, and 8 PI management meetings with TRP Director
July 1, 2002	Task 2 Annual Report submitted to TRP Director
July 1, 2002	Task 8 Report distributed: "Development of a Systems Engineering Model

	of the Chemical Separation Process” to be presented at ICAPP02
July 1, 2002	Roadmaps for undergraduate and graduate academic programs in Nuclear Engineering provided to the College of Engineering faculty for consideration
July 2, 2002	Task 3 Annual Report submitted to TRP Director
July 2, 2002	Task 1 Annual Report submitted to TRP Director
July 2, 2002	Task 1 Report distributed: “Development of a Model for Induction Heating”
July 2, 2002	Task 2 Performance Self-Evaluation submitted to TRP Director
July 2, 2002	Task 3, 9, and 10 PI management meetings with TRP Director
July 2, 2002	Task 9 submits two thesis abstracts to TRP Director
July 5, 2002	Task 8 Third Quarter Report submitted to TRP Director
July 5, 2002	Task 8 Performance Self-Evaluation submitted to TRP Director
July 5, 2002	Task 5 PI management meeting with TRP Director
July 8-11, 2002	UNLV director visits Washington, DC, for meetings with DOE-NE and AFC directors and with congressional science advisers and other principals
July 9, 2002	Task 5 Third Quarter Report submitted to TRP Director
July 13, 2002	Task 6 PI management meeting with TRP Director
July 13-Sept. 2002	Two UNLV graduate students from Task 13 conduct summer internship with LANL LBE oxygen sensor group
July 15, 2002	Task 7, 11 and 12 PI management meetings with TRP Director
July 16, 2002	LANL Chemistry Division visit with UNLV faculty
July 16, 2002	College of Engineering faculty meeting to discuss development of Materials and Nuclear Engineering Program proposal
July 17, 2002	AFC Program Management and Controls Conference Call
July 18, 2002	UNLV director and HRC Executive Director visit LANL to tour facilities and meet with administrators
July 19, 2002	TRP Director submits Baseline Change Proposal for FY02 to DOE to realign fiscal years and reschedule work packages
July 22, 2002	UNLV June Actual Expenditures and Completion Percentage submitted to DOE
July 24, 2002	TRP Finance Advisory Committee meets and recommends renewal of seven tasks for second year funding and two new tasks of the four new proposals submitted for funding
July 29, 2002	AFC DOE-NE/UNLV Program Conference Call
July 29, 2002	AFC Program Conference Call
July 29, 2002	DOE-NE approves UNLV’s Baseline Change Proposal and new work packages
July 29-Aug. 2, 2002	IPPE LBE scientists visit UNLV and review LBE plans and test ISTC Target for overpressure, determine overpressure is intact
July 31, 2002	UNLV organizes special Yucca Mountain Tour for International Molten Metal Advisory Group and UNLV students and faculty
Aug. 1-2, 2002	UNLV hosts International Molten Metal Advisory Group meeting, Wacław Gudowski (Chair) and Anthony Hechanova (Co-Chair)

Aug. 5, 2002	AFC DOE-NE/UNLV Program Conference Call
Aug. 5, 2002	AFC Program Conference Call
Aug. 5, 2002	Task 7 and 10 Third Quarter Reports submitted to TRP Director
Aug. 12, 2002	UNLV July Actual Expenditures and Completion Percentage submitted to DOE
Aug. 12, 2002	AFC DOE-NE/UNLV Program Conference Call
Aug. 12, 2002	AFC Program Conference Call
Aug. 13, 2002	College of Engineering faculty meeting to review plan for development of Materials and Nuclear Engineering Program and decide next steps
Aug. 15, 2002	DOE-NE formally approves the proposals recommended by the UNLV Finance Advisory Committee – nine tasks for \$1,219,454 worth of annual funding starting fall term 2002
Aug. 15, 2002	Idaho Accelerator Center (ISU) staff visit UNLV to meet with faculty and discuss collaboration in Task 14
Aug. 16, 2002	Task 14 submits status report to UNLV TRP Director and LANL Collaborator
Aug. 16, 2002	LBE Infrastructure Subcommittee meeting with UNLV Facilities Management and Construction Planning office
Aug. 20, 2002	KRI submits Progress Report #2 to Task 6 PI
Aug. 20, 2002	TRP Special Workshop and Tour for DOE-NE visitors at UNLV
Aug. 20, 2002	Luncheon meeting between UNLV Pres. Harter and DOE-NE Dir. Magwood
Aug. 21-30, 2002	TRP Director participates in Frederic Joliot and Otto Hahn Reactor Physics Summer School on transmutation technologies
Aug. 23, 2002	ISTC Target pressure test report submitted to insurance company
Aug. 27, 2002	Call for infrastructure equipment requests distributed to UNLV TRP faculty
Aug. 30, 2002	Task 2 First Quarter Year 2 Report submitted to TRP Director

## **1.2 Overall Program Schedule**

The Second Quarter Year 2 milestones and deliverables for the UNLV Transmutation Research Program are shown in Figures 1 to 4.



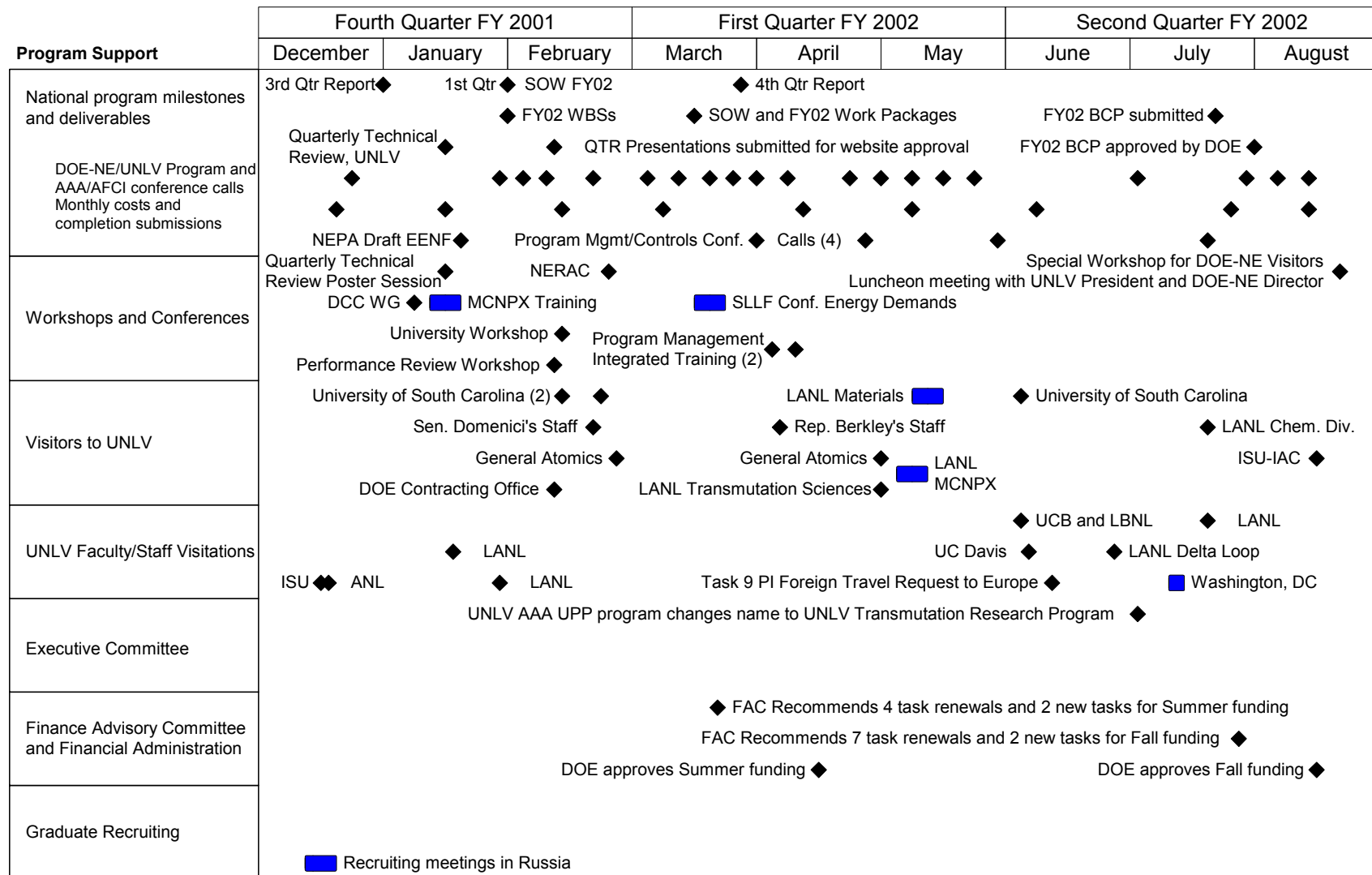


Figure 1. Milestones and Deliverables of Program Support for the UNLV Transmutation Research Program through the Second Quarter Year 2.

Infrastructure Augmentation	Fourth Quarter FY 2001			First Quarter FY 2002			Second Quarter FY 2002		
	December	January	February	March	April	May	June	July	August
Committee on Infrastructure		Meeting to discuss TEM path forward ♦	♦ VPR meeting Meeting to recommend expenditures ♦ Meeting to discuss machining equipment ♦						Call for infrastructure requests ♦
Administrative Meetings		♦ International Employees Office							
LBE Loop Steering Comm			Interim Facility Subcommittee Meetings and Conference Calls ♦			♦ ♦	♦ ♦ ♦		
		Draft Research Plan Submitted ♦		♦ Draft Research Plan Submitted				♦ UNLV EH&S Delta Loop visit	
				ISTC Target arrives at UNLV ♦			♦ Time Schedule Submitted		
			LANL provides Hazard Control Plan and Op Procedures for Delta Loop				♦	ISTC Target Pressure Report ♦	
TEM Subcommittee	JEOL reps ♦	Seminar, FEI ♦		♦ Faculty visit to FEI demonstration site				♦ FEI conducts site survey	
	Seminar, JEOL ♦ ♦	Seminar, Hitachi		♦ Faculty visit to JEOL demo site				♦ UNLV purchases FEI TEM	
	Pres. to Infrastructure Committee ♦			Seminar, JEOL ♦					
New Hires	♦	EMIL Scientist Interview ♦ ♦	♦ ♦ EMIL Scientist Interview						
	TEM Scientist Position Filled			♦ ECE Position Interview					
				♦ ECE Position Interview					
New Facilities				Materials Performance Lab officially completed ♦					
			Meetings (2) with UNLV Planning and Construction on LBE Loop Facility ♦						♦
				Meetings (2) with UNLV Planning and Construction on TEM User Facility ♦ ♦					

Figure 2. Milestones and Deliverables of Research Infrastructure Augmentation for the UNLV Transmutation Research Program through the Second Quarter Year 2.

Student Research	Fourth Quarter FY 2001			First Quarter FY 2002			Second Quarter FY 2002		
	December	January	February	March	April	May	June	July	August
Program Publicity and Student Activities	UNLV ANS Student Section formed ♦			♦ UNLV ANS Meeting/Speaker			♦ Yucca Mountain Tour		
Administrative Meetings	Paul Newman visits UNLV ♦			♦ UNLV ANS Meeting/Speaker			♦ Task 1 ♦ ♦ Task 5		
	Electrical and Computer Eng ♦			Physics ♦			♦ Task 6		
	Physics ♦			Roadmap for nuclear engineering academic programs submitted to Dean ♦			♦ Tasks 2, 4 and 8 ♦ ♦ Tasks 7, 11 and 12		
Proposal Process	Draft proposals submitted for Summer ♦			Call for Proposals for Fall 2002 ♦			♦ Summer Tasks Start ♦ COE (2) ♦ MNE program		
TRP Seminar Series	UNLV FAC recommends renewals and two new tasks ♦			♦ Proposals Approved			♦ Four new proposals submitted to DOE for prioritization		
	Culbreth ♦			Task 6 Seminar ♦ ♦ Task 11 and 12 Seminar			♦ Hechanova		
	McGill ♦			Task 7 Seminar ♦ ♦ Task 5 Seminar			♦ Leung		
Research Tasks milestones and deliverables	Tasks 4 and 10 Seminar ♦			Salvatores ♦ ♦ Task 8 Seminar			♦ Task 9 submits robot animations		
	♦ Task 6 KRI Subcontract signed			Task 1 distributes two conference papers ♦			♦ Task 8 conference paper		
	Task 11 Report ♦			Task 1 Report ♦			Task 14 Status ♦		
	Task 6 Prospecturs Presentation ♦			Task 9 submits two thesis abstracts ♦♦			♦ Task 2 Self Eval		
	Task 9 submits two thesis abstracts ♦♦			Task 8 Self Eval			Task 8 Self Eval		
Task Quarterly and Annual Reports	Task 7 Second Qtr ♦			♦ Task 3 Second Quarter			♦ Task 9 Third Quarter		
	Task 9 1st and 2nd Qtrs ♦			♦ Tasks 11 and 12 First Quarters			♦ Task 4 Annual Report		
	♦ Task 7 First Quarter			Task 2 Third Quarter ♦			♦ Task 2 Yr 2 Qtr 1 Report ♦		
	Task 10 Second Quarter ♦♦			♦ Task 6 First Quarter			♦ Task 1 and 3 Annual Reports		
	Task 1 Third Quarter ♦			♦ Tasks 11 and 12 Second Quarters			♦ Task 8 Third Quarter		
	Task 8 Second Quarter ♦			♦ Task 5 Third Quarter			♦ Task 5 Third Quarter		
	Task 6 Second Quarter ♦			Tasks 7 and 10 Third Quarters ♦					

Figure 3. Milestones and Deliverables of Student Research Tasks for the UNLV Transmutation Research Program through the Second Quarter Year 2.

International Collaboration	Fourth Quarter FY 2001			First Quarter FY 2002			Second Quarter FY 2002		
	December	January	February	March	April	May	June	July	August
UNLV Faculty/Staff Visitations	◆ Karlsruhe Lead Laboratory (Germany) ◆ IPPE and INPE ◆ Moscow ◆ KRI and St. Petersburg State Institute of Technology ◆ Trip Report: Russia								
Visitors to UNLV	Khlopin Radium Institute ◆ Institute for Nuclear Power Engineering (Obninsk, Russia) ◆ Austrian Research Center and IAEA ◆								
International Conferences	International Youth Nuclear Congress 2002, Daejeon, Korea ◆ URHPPA International Workshop, Santa Fe, NM ◆ Frederic Joliot and Otto Hahn Reactor Physics Summer School ◆								
ISTC Target and Molten Metal Advisory Group	IPPE LBE scientists test ISTC Target over-pressure ◆ ISTC Target TC-1 arrives at UNLV ◆ Yucca Mountain Tour ◆ International MMAG meeting at UNLV ◆								
Student Task Collaborations	◆ KRI Subcontract signed ◆ KRI Progress Report 1 submitted (Task 6) KRI Progress Report 2 submitted (Task 6) ◆								

Figure 4. Milestones and Deliverables of International Collaboration the UNLV Transmutation Research Program through the Second Quarter Year 2.

## 2. PROGRAM SUPPORT

The primary deliverables for the Program Support component are quarterly and annual reports. These reports 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 for the First Quarter Year 2 are the following:

- UNLV Transmutation Research Program Revised Statement of Work for the First Quarter, FY02, March 18, 2002.
- UNLV Transmutation Participation Program Fourth Quarter Report, March 26, 2002.

The following are the individuals involved in the day-to-day administration of the TRP during the First Quarter Year 2.

### TRP 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

### TRP Affiliates:

Pattie Baldwin (HRC)	Director of Finance
Denis Beller (LANL)	TRP Intercollegiate Programs Coordinator
Ning Li (LANL)	TRP International Programs Coordinator
Thomas Ward (DOE)	Senior Science Adviser
John Knoten (HRC)	Webmaster

## **2.1 TRP Meetings and Committees**

This section describes the motions of committees that were active during the First Quarter Year 2.

### **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.

The Finance Advisory Committee met March 20, 2002 to discuss and recommend proposals starting summer term 2002. Eleven proposals were submitted, four of the proposals were second-year renewals and seven of the proposals were new. Denis Beller representing the DOE-NE Program Advisory Committee gave a briefing of the DOE-NE program mission prioritizations. The four renewals and two new proposals were recommended for funding. DOE-NE approved the recommendations on April 15, 2002.

### **Infrastructure Committee:**

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

The Infrastructure Committee is responsible to advise the Executive and Finance Committees on matters related to the development of user laboratories and the hiring of AAA faculty and staff. The Committee met April 24, 2002 to discuss three requests. Their recommendations were as follows:

- \$31,000 to purchase flow visualization equipment for Prof. Robert Schill, Jr. and Prof. Mohamed Trabia's niobium cavity project (TRP Task 3).
- \$50,000 in support of Dr. Biswajit Das's (Electrical and Computer Engineering) startup package (Fall 2002 potential start date) with another \$50,000 provided using FY03 funds if they are available.

- \$69,000 contribution to support machining capability on campus. These funds will be available to an ad hoc committee commissioned by the UNLV administration to identify and procure machining equipment to address the needs of the campus research community.

## **LBE Loop Steering Committee**

### **Subcommittee to Develop a Research Plan**

Prof. Samir Moujaes, Chair (College of Engineering, Department of Mechanical Engineering)

Dr. Gary Cerefice (Harry Reid Center)

Prof. John Farley (College of Sciences, Physics Department)

The LBE Loop Steering Committee established a subcommittee to develop (in collaboration with potential collaborators) a research plan to help in the design of the facility. A draft LBE Experimental Plan with input from collaborators at LANL was submitted to the TRP Director on March 19, 2002.

### **Subcommittee to Develop an Interim LBE Facility**

Dr. Anthony Hechanova, Chair (TRP Director)

Dr. William Culbreth (Associate Dean, College of Engineering)

Prof. Samir Moujaes, (College of Engineering, Department of Mechanical Engineering)

Dr. Gary Cerefice (Harry Reid Center)

Prof. John Farley (College of Sciences, Physics Department)

Mr. Courtney Kerr (UNLV Environmental Health & Safety)

The LBE Loop Steering Committee forms the basis of a subcommittee to develop (in collaboration with potential collaborators, mainly at LANL) an interim LBE facility to house the ISTC Target and allow preliminary LBE research to be conducted while a long-term facility is being investigated by the UNLV administration. The Subcommittee met three times (May 2, 17, and 22) including two conference calls with collaborators at LANL to prepare UNLV to accept the ISTC Target that arrived May 28, 2002 from LANL. The ISTC Target had two accelerometers on it that indicated sideways motion greater than 6 g when it arrived at UNLV. In the future, the Subcommittee will work with LANL and the insurance company to resolve this situation.

### **TEM Steering Committee – [put into Other Committees]**

Dr. Donald Baepler

Dr. Anthony Hechanova, Chair (TRP Director)

Dr. Gary Cerefice (Harry Reid Center)

Dr. Longzhou Ma

### **Other Committees:**

Conference Committee: Anthony Hechanova (Chair) and Kathy Lauckner (Co-Chair) worked with Denis Beller to plan UNLV's participation in national conferences. The two conferences that will be supported by TRP are the AccApp03 embedded topical meeting (June 1-5, 2003) in San Diego, CA and the ANS Student Conference/AAA University Workshop (April 2-5, 2003) in Berkeley, CA.

Finance Oversight: HRC Finance Director Patricia Baldwin and Anthony Hechanova provided timely monthly actual expenditure reports to DOE/BREI and participated in monthly Program Management and Controls conference calls (last Thursday of each month).

Information Management Committee: Anthony Hechanova (Chair), Gary Cerefice, and John Knoten. Weekly meetings were held to maintain and update the TRP website at <<http://aaa.nevada.edu>> and the AAA library.

#### Search Committees:

- Research Scientist B, College of Sciences (Dean Frederick Bachhuber, Point of Contact) – The offer to the top candidate was not accepted by the candidate and the position was not filled. A new search is anticipated during fall term 2002.
- Research Scientist D, Department of Geosciences (Rod Metcalf, Dept. Chair, Point of Contact) – Two candidates were interviewed by TRP directors and an offer was made to the top candidate. The candidate, Dr. Robert Fairhurst, accepted the offer and is anticipated to start June 1, 2002.
- Professor, Electrical and Computer Engineering Department (Rama Venkat, Dept. Chair, Point of Contact) – Two candidates were interviewed by TRP directors and an offer was made to the top candidate. The candidate, Dr. Biswajit Das, accepted the offer and is anticipated to start fall term 2002 or spring term 2003.

## 2.2 Workshops, Conferences, and Collaboration Meetings

**State Legislative Leaders Foundation Conference, March 14-17, Las Vegas, Nevada** – The conference was titled “Under Our Own Power: What States Can Do to Ensure Stable, Secure, and Affordable Energy” and included legislative leaders from 22 states as well as corporate and congressional leaders. The purpose of the meeting was to inform state legislators (who are predominantly untrained in technical matters) about energy issues. Marvin Fertel gave the presentation on nuclear energy.

**International Youth Nuclear Congress, April 16-20, Daejeon, Korea** – UNLV has been an active participant with the IYNC since it was founded in 1998. The IYNC meetings give students and



young nuclear professionals an opportunity to network and learn about global nuclear issues. UNLV students and professors gave two papers on AAA projects Task 1 and Task 5.

**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:

- Argonne National Laboratory: Massimo Salvatores (April 9, 2002)
- Los Alamos National Laboratory: Kemal Pasamehmetoglu (May 1, 2002), Eric Pitcher (May 6-8, 2002), and Ning Li (May 7-8, 2002)
- Lawrence Berkeley National Laboratory: Ka-Ngo Leung (May 28, 2002)
- Congresswoman Shelley Berkley's Staff: Legislative Director visit to UNLV (April 5, 2002)
- Austrian Research Center: Christian Schmitzer (May 24, 2002)
- DOE-NE and UNLV Directors' Conference Calls: March 4, 11, and 18; April 1, 8, 22, and 29; and May 6, 13, 20, telephone conferencing between John Herczeg and staff and Anthony Hechanova; followed by telephone conferencing with AAA program representatives.

### **2.3 TRP Website, Information Management, and Seminars**

The TRP website <<http://aaa.nevada.edu>> was maintained in the First Quarter Year 2 by HRC 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 First Quarter Year 2:

- “Hydrogen-Induced Embrittlement of Lead in Spallation-Neutron-Target Systems” and “Development of a Mechanistic Understanding of High-Temperature Deformation of EO-823 for Transmutation Applications” Research team of Profs. Ajit Roy and Brendan O'Toole, UNLV Mechanical Engineering Department, AAA Student Seminar, March 12, 2002.
- “Neutron Multiplicity Measurements of AAA Target/Blanket Materials,” Steven Curtis, UNLV Health Physics Department, AAA Student Seminar, March 19, 2002.
- “Nuclear Criticality Analyses for the Transmuter Fuel Fabrication and Reprocessing Process” and “Radiation Transport Modeling of Beam-Target Experiments for the AAA Project” Research team of Prof. William Culbreth, UNLV Mechanical Engineering Department, AAA Student Seminar, April 2, 2002.
- “Physics of Radioactive Waste Transmutation,” Massimo Salvatores, Argonne National Laboratory, April 9, 2002.
- “Development of a Systems Engineering Model of the Chemical Separations Process” Research team of Prof. Yitung Chen, UNLV Mechanical Engineering Department, AAA Student Seminar, April 16, 2002.
- “Development of Dose Conversion Coefficients for Radionuclides Produced in Spallation Neutron

Sources” Research team of Prof. Mark Rudin, UNLV Health Physics Department, AAA Student Seminar, April 23, 2002.

### **3. RESEARCH INFRASTRUCTURE AUGMENTATION**

The goal of the Research Infrastructure Augmentation component of the TRP 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 — Dr. Longzhou Ma began December 1, 2001. All of Dr. Ma’s time is devoted to AAA and his principal responsibilities are the design, development, and establishment of a Transmission Electron Microscopy User Facility.

Research Scientist B, College of Sciences — The search committee has completed their process and their top candidate was offered a faculty position, however, the candidate turned down the offer. The position was not yet filled by the end of the First Quarter Year 2; a new search will commence probably during fall term 2002.

Research Scientist C, College of Engineering — Dr. Ajit Roy began July 1, 2001. Half of Dr. Roy’s time is devoted to AAA and he is a principal involved in developing a Materials Performance Laboratory.

Research Scientist D, Department of Geosciences and Harry Reid Center — The search committee for a SEM technician has been completed and an offer was made and accepted by the top candidate Dr. Robert Fairhurst. The candidate is expected to begin June 2002.

Research Professor, College of Engineering — The TRP was involved in the search of a new faculty member in the Electrical and Computer Engineering Department. The search was completed and an offer was made and accepted by the top candidate Dr. Biswajit Das. The candidate is expected to begin fall term 2002 or spring term 2003.

#### **3.2 New Equipment and Facilities**

Four new user facilities are under development in the First Quarter Year 2.

**Materials Performance Laboratory (MPL):** This facility is under development in existing space in the College of Engineering complex. About \$230,000 of equipment for AAA tasks is being set up in the facility, which is expected to be complete by mid-year 2002.

**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 was to hire a TEM expert, Dr. Longzhou Ma (Research Scientist A, see Section 3.1) to aid in the selection of a TEM, and the design, development, and operation of the new TEM User Facility. Last quarter a number of TEM vendors visited UNLV to meet with faculty and staff to determine the most appropriate system for UNLV's infrastructure needs. This quarter UNLV faculty and staff visited the sites of two candidate vendors: FEI and JEOL (March 6 and March 25, respectively).

**Lead Bismuth Eutectic Loop User Facility:** The LBE Loop Steering Committee's Subcommittee submitted a revised draft research plan on March 19, 2002. The ISTC Target was accepted at UNLV on May 28, 2002 and is in a safe holding area while insurance issues are resolved (the two accelerometers were out of position, indicating acceleration greater than 6 g in two directions). A second Subcommittee was formed to set up an interim facility in the College of Engineering Complex while a permanent and tailor-made facility is designed and developed as part of the Harry Reid Center for Environmental Studies. The Molten Metal Advisory Group will meet next quarter to discuss and recommend future direction for the ISTC Target and LBE facility.

**Electron Microscopy and Imaging Laboratory (EMIL):** The TRP program at the recommendation of the Infrastructure Committee financially supports already existing facility within the College of Sciences that contains optical microscopes and a Scanning Electron Microscopy (SEM) by paying for some service contracts. In addition, the TRP cost-shares Dr. Robert Fairhurst (newly hired as Research Scientist D) with the UNLV Geosciences Department. Dr. Fairhurst's responsibilities will include operation and maintenance of the SEM and TEM facilities.

#### 4. RESEARCH PROJECTS

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

The following 14 tasks comprise the student research component of the TRP. 4 tasks began in the summer term 2001, 8 tasks began in the fall term 2001, and 2 new tasks began in summer term 2002. Quarterly progress reports from the tasks are included as appendices.

Task	Title	UNLV Department National Collaborator Annual Cost (# of Students)	Technical Area
1	Design and Analysis for Melt Casting Metallic Fuel Pins Incorporating Volatile Actinides	Mech. Engineering Dept Argonne National Laboratory \$141k (2 Grads)	Fuels
2	Modeling, Fabrication, and	Electrical & Comp Eng Dept	Accelerator

	Optimization of Niobium Cavities	Los Alamos National Lab \$161k (3 Grads)	
3	Experimental Investigation of Steel Corrosion in Lead Bismuth Eutectic: Characterization, Species Identification, and Chemical Reactions	Physics Department Los Alamos National Lab \$190k (2 Grads)	Transmutation Sciences
4	Hydrogen-Induced Embrittlement of Candidate Target Materials for Applications in Spallation-Neutron-Target Systems	Mech. Engineering Dept Los Alamos National Lab \$146k (2 Grads)	Transmutation Sciences
5	Modeling Corrosion in Oxygen Controlled LBE Systems with Coupling of Chemical Kinetics and Hydrodynamics	Mech. Engineering Dept Los Alamos National Lab \$109k (2 Grads)	Transmutation Sciences
6	Neutron Multiplicity Measurements for AAA Target/Blanket Materials	Harry Reid Center Los Alamos National Lab \$140k (1 Grad)	Transmutation Sciences
7	Develop Dose Conversion Coefficients for Radionuclides Produced in Spallation Neutron Sources	Health Physics Department Los Alamos National Lab \$160k (2 Grads)	System Integration
8	Development of a Systems Engineering Model of the Chemical Separations Process	Mech. Engineering Dept Argonne National Laboratory \$150k (2 Grads)	Separations
9	Design and Evaluation of Processes for Fuel Fabrication	Mech. Engineering Dept Argonne National Laboratory \$87k (1 Grad)	Fuels
10	Development of a Mechanistic Understanding of High-Temperature Deformation of Alloy EP-823 for Transmutation Applications	Mech. Engineering Dept Los Alamos National Lab \$99k (1 Grad)	Transmutation Sciences
11	Nuclear Criticality Analyses of Separations Processes for the Transmutation Fuel Cycle	Physics and Mech Eng Dept Argonne National Laboratory \$110k (2 Grads)	Separations
12	Radiation Transport Modeling of Beam-Target Experiments for the AAA Project	Mech. Engineering Dept Argonne National Laboratory \$110k (2 Grads)	Transmutation Sciences
13	Developing a Sensing System for the Measurement of Oxygen Concentration in Liquid Pb-Bi Eutectic	Electrical an Mech Eng Dept Los Alamos National Lab \$146k (2 Grads)	Transmutation Sciences
14	Use of Positron Annihilation Spectroscopy for Stress-Strain Measurements	Mech. Engineering Dept Argonne National Laboratory \$120k (2 Grads)	Transmutation Sciences



## 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. Hechanova, A.E., "UNLV AAA University Participation Program: Program Administration," AAA FY02 Work Package Form, July 25, 2002.