DOE/AL/85832--T6

Amarillo National Resource Center for Plutonium

GOVERNING BOARD SCHEDULE

Tuesday April 18, 1995 Heritage Room - 9th Floor
Bank One Building, 600 S. Tyler

Agenda

2 P.M.	Meeting called to order
2:00 - 2:05 P.M.	Minutes of March meeting
2:05 - 2:25 P.M.	Long-term planning discussion/Discussion of action items from morning meetings
2:25 - 2:35 P.M.	Report on Russian meeting - Dale Klein, Lee Peddicord
2:35 - 2:55 P.M.	Report on educational activities - Fred Bryant -Training - Visitors Center - Technology Transfer
2:55 - 3:25 P.M.	Review and discussion of education Letter of Intent and proposal deadlines
3:25 - 3:30 P.M.	Update on DOE reporting protocol - Dale Klein
3:30 - 3:40 P.M.	Break
3:40 - 4:10 P.M.	Review of Grant/Contract conditions
4:10 - 4:20 P.M.	Agriculture projects recommended for funding under fissile materials
4:25 - 4:30 P.M.	Update on Senior Technical Review Group and External Advisory Committee- Lynne Bowers
4:30 - 4:45 P.M.	Discussion of electronic archives
4:45 P.M.	Adjourn

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MINUTES
April Meeting
18 April 1995

Revised and accepted 10 May 1995

Amarillo National Resource Center for Plutonium
Governing Board Meeting
Center Conference Room, 600 S. Tyler, Suite 800, Amarillo, TX

The agenda and agenda materials distributed for the meeting will be attached to the file copy of these minutes.

The meeting was called to order by Dale Klein at 1:00 p.m. The minutes of the March 1995 meeting were revised and approved.

The Board discussed the need for an informal long-range planning meeting to be held in Austin on May 30. Martin Goland and Bill Spencer as well as someone identified by Fred Bryant, Lee Peddicord, and Lynne Bowers will be asked to join in the discussion.

Fred Bryant reported to the Board on his benchmarking trip to Idaho to view the education and training program. Dr. Bryant was most impressed with the Idaho program and explained to the board the type of planning, organization and staff required for such a program. Dr. Bryant also provided the Board an update on the technology transfer meeting he was facilitating for Mason&Hanger.

The Board discussed the Letter of Intent that was submitted by Texas Tech University for the education proposal. The full proposal is due postmarked no later than May 15. Fred Bryant asked that the review of the proposal be expedited. Lynne Bowers was asked to expedite the review and to provide the Governing Board with the review team's recommendations by conference call at 9:30 a.m., May 19.

Lynne Bowers provided the Board with an update on the education and training initiative planned by Amarillo Area Office of DOE and Mason&Hanger. Because of their introduction to the INPO model (Institute of Nuclear Power Operations) by Dale Klein, the Area Office is primarily looking to the Center to develop graduate education opportunities at this time.

The Board reviewed the revised reporting protocol distributed by George Werkema, Albuquerque Operations Office, and decided additional actions were not needed.

The Board discussed the need to have opinion articles written by a technical writer experienced in nuclear issues. It was decided to contract for these services on a trial basis with Jim Beckham, Potomac Communications Group, Inc., Houston, Texas.

Julia DeRanek briefed the Board on the format for financial reports to the Board and DOE. An updated financial report will be provided to the Board at each meeting.

Lynne Bowers reported to the Board on the printing of a Center newsletter. It was decided that the newsletter would be produced quarterly.

The meeting was adjourned at 5:15 p.m.

Action items were circulated following the meeting and will be attached to the file copy of these minutes.

Amarillo National Resource Center for Plutonium

Governing Board Schedule

Wednesday May 10, 1995	Heritage Room - 9th Floor Bank One Building, 600 S. Tyler
10 a.m. - Noon	Meeting with Mason&Hanger and DOE
Noon - 1 p.m.	Working Lunch Presentation by Dr. Judy Oskam and her students Mass Communications Department, Texas Tech University
1 p.m. to 4:15 p.m.	Governing Board meeting

Agenda

1 p.m.	Meeting called to order
1 p.m. - 1:05 p.m.	Minutes of April meeting
1:05 p.m. - 1:20 p.m.	Report on trip to Washington, D.C - Wales Madden, Jr.
1:20 p.m. - 1:40 p.m.	Report on trip to Russia - Dale Klein, Lee Peddicord
1:40 p.m. - 1:50 p.m.	Review of budget and expenditures
1:50 p.m. - 2:00 p.m.	Discussion of possible funding by DOE, Defense Programs
2:00 p.m.- 2:10 p.m.	Discussion about overtures being made by Waste Control Specialists - Dale Klein
2:10 p.m. -2:20 p.m.	Press Release Policy
2:20 p.m. - 2:30 p.m.	Op-Ed Articles
2:30 p.m. - 2:40 p.m.	Announcement of Education funding
2:40 p.m. - 2:50 p.m.	Break
2:50 p.m. - 3:05 p.m.	Nuclear proposals

3:05 p.m. - 3:20 p.m. Agriculture proposals

3:20 p.m. - 3:25 p.m. Raman Spectroscopy Funding - West Texas A&M University, Dr. John Holy

3:25 p.m. - 4:00 p.m. Center business issues - Fred Bryant

4:00 p.m. Meeting adjourned

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MINUTES

Amarillo National Resource Center for Plutonium
Governing Board Meeting
Center Conference Room, 600 S. Tyler, Suite 800, Amarillo, TX

10 May 1995

The agenda and agenda materials distributed for the meeting will be attached to the file copy of these minutes.

The meeting was called to order by Dale Klein at 1:00 p.m. The minutes of the April 1995 meeting were revised and the revised copy placed in the Center's file.

It was agreed that Lynne Bowers should draft a letter from the Board to Judy Oskam and her mass communications students. Dr. Oskam and her students presented public information plans for the Center to the Board prior to the meeting.

Wales Madden, Jr. reported to the Board on his recent trip to Washington. Dale Klein and Lee Peddicord reported on their trip to Russia.

Julia DeRanek reported on highlights of the Cooperative Agreement training completed during May. The Board asked for clarification and documentation of the September 1996 change to treatment in the cost principals for graduate student research assistants.

Program-to-date financial reporting, based upon The University of Texas at Austin Statement of Accounts, was provided to the Board. It was discussed and understood that this reporting was incomplete due to changes in coding at the University level. The Governor's Office is awaiting program-to-date expenditure detail before submitting SF-269 report to the Department of Energy.

Overtures made to the Center by Waste Control Specialists were discussed. It was agreed that the Center could not presently get involved in new initiatives such as the one proposed by Waste Control Specialists. Lynne Bowers would attend an informational meeting in Austin on May 11 to clarify Center's position.

Dale Klein asked board members to review draft of press release policy and submit comments to Lynne Bowers. Dr. Klein reminded Lynne Bowers that the Board previously discussed the need to have opinion articles written by a technical writer experienced in nuclear issues. It was decided to contract for these services on a trial basis with Jim Beckham, Potomac Communications Group, Inc., Houston, Texas.

Board members were reminded of the conference call scheduled for May 19 to review the recommendations of the review team and staff regarding funding of the education proposal.

The timeline and method for prescreening and review of the nuclear proposals was discussed.

Lynne Bowers advised the Board that she would submit her written resignation on May 11 and thanked the Board for the opportunity they had provided to her.

The meeting was adjourned at 5:15 p.m.

Action items were circulated following the meeting and will be attached to the file copy of these minutes.

Amarillo National Resource Center for Plutonium

Revised Governing Board Schedule

Thursday June 15, 1995
8 a.m. - 11 a.m. Governing Board Meeting
Center Offices - 8th Floor

Agenda

8 a.m.	Coffee and rolls available
8:15 a.m.	Meeting called to order
8:15 - 8:20 a.m.	Minutes of May meeting
8:20 - 8:25 a.m.	Introduction of new staff member
8:25 - 8:35 a.m.	Review of budget and expenditures
8:35 - 9:00 a.m..	Discussion of amendment to cooperative agreement
9:00 - 9:15 a.m.	Review of education projects 1. Unfunded 2. Budgets for Funded
9:15 - 9:30 a.m.	Update on review of nuclear proposals
9:30 - 9:45 a.m.	Agriculture proposals
9:45 - 10:00 a.m.	Raman Spectroscopy Funding - West Texas A&M University Dr. John Holy
10:00 - 10:20 a.m.	Update on staffing - Dale Klein
11:00 a.m.	Meeting adjourned

MINUTES

Amarillo National Resource Center for Plutonium
Governing Board Meeting
Center Conference Room, 600 S. Tyler, Suite 800, Amarillo, TX
15 June 1995

Revised and accepted 13 July 1995

The agenda and agenda materials distributed for the meeting will be attached to the file copy of these minutes.

The meeting was called to order by Dale Klein at 8:00 AM. Those present were:
Dr. Fred Bryant, Texas Tech University
Dr. Dale Klein, University of Texas at Austin
Dr. Lee Peddicord, Texas A & M University
Lynne Jordan Bowers, Amarillo National Resource Center for Plutonium
Lois Cook, Amarillo National Resource Center for Plutonium
Julia DeRanek, Amarillo National Resource Center for Plutonium

The minutes of the May 1995 meeting were approved as presented.

Lynne Bowers introduced new staff member Lois Cook to the Board. Lois will be the recorder for all future Board meetings.

Julia DeRanek reported that the statement of accounts for May is out. As of April, $1 million of the available $4.3 million funds were not yet allocated.

The Board discussed the FY95 budget and decided to allocate more money in order for funds to be spent and carried over into FY95-96. Discussion ensued regarding the money already awarded by the Center. Lynne Bowers was asked to draft a letter to Tommy Stotts and Roger Mulder indicating the Center's current financial obligations. This letter will also address the Center's intention of needing more funds to make additional obligations in the near future. Discussion followed regarding the agreements between Amarillo National Resource Center for Plutonium and the State of Texas.

The next item was the Cooperative Agreement. The Board discussed the amendments made in the agreement that have been agreed to by the State. As of this meeting, the University of Texas had not yet accepted these changes.

The Board discussed the Center's financial report which was due on May 1. Lee Peddicord suggested the primary concern should be submittal of the FY96 Continuation Application to Tommy Stotts by July 1. Fred Bryant suggested that the May 1 report also is high priority, because Mr. Stotts needs this report.

The Board received the rebuttal comments from the Principal Investigators concerning the external review of the Electronic Archives Task. The members are going to ask Mason & Hanger's Bob Barton for his comments in writing. The project was tabled until Fred Bryant reviews the revised task plan and make recommendations to the Board by the June 20, 1995, meeting.

The next item was the budget for the previously funded Education/Outreach proposal. A letter of explanation and justification was reviewed from Phil Nash, who addressed the differences between funded amounts and the revised request. The Governing Board revised the budget and approved an increase in funding. The new, approved amount for the 5 tasks (Program Management, K-16 Education, Graduate Education, Academic Intervention, Public Outreach) is $482,079. The initial budget did not include indirect costs on subcontracts, funds for TTU involvement in the K-16 Education, and funds to adequately

support Program Management. Furthermore, the Board approved $5,000 for the Amarillo Technical Sciences Academy. Thus the need for the revised budget. The following is a list indicating the changes:

AREA	Original Amount	New Amount
Project Management	$30,000	$98,483
K-16	100,000	128,787
Academic Intervention	83,000	96,647
Graduate Education	57,000	59,109
Public Outreach	94,000	99,053
Total	**$364,000**	**$482,079**

The Board approved the increase in dollar amounts pending the receipt of work plans and revised budgets for the 5 tasks above.

Lynne Bowers reviewed action items from the June 6 meeting with Mason & Hanger. She was unable to attend but received a fax from Tony Walterman.

The T-Bone Project was the next item discussed. Lynne Bowers briefed members on the current status of the project to provide the capability for all institutions to offer courses in Amarillo. Lynne Bowers is assisting Jane Armstrong in finalizing a proposal to the U.S. Department of Commerce which is due June 21.

The Amarillo Independent School District has initiated a Technical Sciences Academy with an award from the National Science Foundation. Courses taken during the student's junior and senior years in high school will be accepted for college credit at area colleges and universities. Lynne Bowers serves on the NSF advisory committee for the Academy and asked the Board to underwrite a course at the Academy to guarantee course availability no matter how many students are enrolled. The Board approved the underwriting, as mentioned earlier, of the course pending it's inclusion in the Academic Intervention section of the Education Proposal. Lynne Bowers will contact Therese Jones at Amarillo College regarding this matter.

The next item on the agenda was the agricultural proposal. Lynne Bowers has solicited names of appropriate reviewers from Dr. Bob Stewart. Lynne Bowers would like to have mail-in reviews. It was suggested that a copy of the proposal be sent to Randy Charbeneau to ensure that the efforts were not being duplicated.

Raman Spectroscopy Funding was discussed. Dr. John Holy indicated West Texas A&M has the machine and would like to be included in the testing part of Grant Willson's proposal. Following discussion, the Board agreed not to approve the Raman Spectroscopy proposal for funding in FY95. It was agreed that this project was not a priority for FY95 funding.

Dale Klein briefed the Board on staffing issues. Discussion followed during the review of the resumes collected by the staff.

Lynne Bowers updated the Board on the nuclear review team's comments.

The Board agreed that each member would take a copy of the "Pantex Technology Transfer Program" flyer for distribution. A copy will be included in the July meeting packet.

The board voted to fund the Support of Russian Studies, in the amount of $333,264, and Administrative and Technical Information Support for Nuclear Group Activities, in the amount of $198,774.

The Board voted to establish a $500 blanket honorarium for individuals solicited to review Center proposals. A copy of the letter will be included in July's meeting packet.

The meeting was adjourned at 11:45 AM.

MINUTES

Amarillo National Resource Center for Plutonium
Governing Board Meeting June 20, 1995
Austin, TX

Attendees:

Board Members:

Dale Klein
Lee Peddicord
Fred Bryant

Others:

Paul Nelson
Bill Harris

1. Paul summarized the proposal from the nuclear group. The board discussed the proposal and the comments of the reviewers, and approved the following awards:

Approved funding as proposed for:

Russian Joint Studies	$260,000.00
New Consolidated Storage Facility	
Robotics	$400,000.00
Monitoring	$300,000.00

The Board approved partial funding for the following proposals, a portion of which is a planning grant to fund additional planning, to prepare direct responses to the reviewers' comments and to prepare revised plans taking into account the reviewers' comments. The balance of this partial funding is to begin implementation of the projects.

Water Reactor Options	$275,000.00
Immobilization Studies	$125,000.00
Transportation of MOX	$150,000.00
Nondestructive Assay for Safeguards	$ 75,000.00
Radiation Damage and Microstructural Changes	$100,000.00

The board asked Paul to advise them of his recommendations on how these awards should be divided between planning grants and implementation, and asked that they receive responses to the comments and the revised plans by August 1, 1995.

They asked that the plan for each project include a clear statement 1.) of the need for or value of this project, b.) of how this work will be integrated with other related projects that are under way, c.) that this is not duplicating work which has been or is being done by others, and d.) where applicable, of how it supports the Russian Joint Studies.

In addition, they asked that the Transportation of MOX project articulate the impact on Texas state and local interests, what issues are associated with MOX transport but not with fresh uranium fuel transport, and identify which issues have already been addressed and which still need to be addressed.

These approvals total $1,685,000; the new plan should also include 45% of $25,000 for each of two sub-contracting actions for an additional $22,500, making the total $1,707,500.

After reviewing the revised plans, the Board will amend the awards as appropriate.

2. The July visit of representatives of the Moscow Institute of Physics was discussed, and a tentative schedule was set for them to be in Lubbock on July 12 and Amarillo on July 13.

3. The board discussed the proposal for electronic archives for plutonium information, approved the proposal, and noted that in addition there is an item in the 1995 budget of $25,000 for retaining outside expertise for this project.

4. The importance of submitting the continuation application to DOE by July 1, 1995 was discussed and Bill Harris was asked to work with Lynne Bowers to prepare these documents.

DRAFT

27 June 1995

Review of the Long-Range Research and Development Plan U.S. Department of Energy Fissile Materials Disposition Program

Senior Technical Review Group
Amarillo National Resource Center for Plutonium

June 1995

Senior Technical Review Group

John F. Ahearne
Sigma Xi, The Scientific Research Society

Floyd L. Culler, Jr.
Electric Power Research Institute

Paul M. Doty
Harvard University

E. Linn Draper, Jr.
American Electric Power

Shirley A. Fry
Oak Ridge Institute for Science and Education

Norman Hackerman
Rice University

Richard T. Kennedy
Independent Consultant

Myron B. Kratzer
Independent Consultant

John W. Landis
Public Safety Standards Group

I. Harry Mandil
MPR Associates

Lewis Manning Muntzing
Morgan, Lewis and Bockius

Paul Nelson
Texas A&M University

Wolfgang Panofsky
Stanford Linear Accelerator Center

Genevieve S. Roessler
University of Florida

Glenn T. Seaborg
Lawrence Berkeley Laboratory

John Taylor
Electric Power Research Institute

Kenneth L. Woodfin
Independent Management Consultant

Introduction

In response to a Presidential Initiative that called for a comprehensive approach to the growing stock of fissile materials from dismantled nuclear weapons, the U.S. Department of Energy (DOE) developed a screening process to consider potential options for: (1) Long-term storage of strategic reserve and surplus weapons-usable fissile materials, and (2) Disposition of surplus weapons-usable fissile materials determined excess to national security needs, presently estimated in the U.S. to include approximately 50 metric tons of plutonium and a greater quantity of surplus highly-enriched uranium. The quantities of surplus plutonium and highly-enriched uranium in Russia are similar or greater than that in the U.S. In developing the screening process, DOE obtained public input on screening criteria to be utilized and options to be evaluated.

In February 1995, the DOE Office of Fissile Materials Disposition drafted a preliminary report that described this screening process and the results of the first phase of the screening. Prior to distribution of the screening report, the Center was asked by DOE's Office of Fissile Materials Disposition to review the preliminary report. An expert review group, the Senior Technical Review Group, was assembled to comment on the screening process and the options delineated in the report. This Group includes a Nobel laureate and six members of the National Academies of Sciences and Engineering. An annotated list of the Senior Technical Review Group members appears below.

A report of the findings and recommendations of the Senior Technical Review Group were forwarded to the DOE Office of Fissile Materials Disposition: *Review of the Draft Summary Report of the Screening Process to Determine Reasonable*

Alternatives for Storage and Disposition of Weapons-Usable Fissile Materials. Both this review and the DOE *Summary Report of the Screening Process to Determine Reasonable Alternatives for Long-Term Storage and Disposition of Weapons-Usable Fissile Materials* were released in March 1995. A copy of both reports is available upon request by contacting the Center at the phone or address shown on the cover of this report.

The recommendations put forth by the Senior Technical Review Group in the March 1995 report were based on the immediacy of the threat to national and international security posed by excess weapons-grade plutonium in some countries. From the ten options evaluated in the DOE summary report (see Appendix A), the Senior Technical Review Group pointed out that three of these options appear to have the greatest potential for immediate development and use for the timely disposition of weapons-grade plutonium as follows:

(I-3) Immobilization with radionuclides in new Borosilicate glass vitrification plant or facility, with ultimate repository disposal

(R-2) Burning in existing light water reactors, with ultimate repository disposal (In the event that R-2 fails, R-2A can be pursued, that is, instead of using existing reactors completing and using partially completed light water reactors.)

(R-6) Burning in CANDU Heavy Water Reactors, with Spent Fuel Disposal by Canadian Utility

Additionally, the Review Group noted that another option, option R-1, transfer to the EURATOM market for mixed-oxide (MOX) fuel reactor burning, technically

offers the most rapid way to carry out the disposition option since MOX fabrication facilities and MOX burning reactors are already in operation in Europe. However, international agreements would have to be reached, overseas shipments of plutonium and possibly spent fuel would be required, and an equivalent amount of commercial separated plutonium would have to be stored, which could counter the timing advantage.

The comprehensive review of disposition alternatives which is underway by the DOE Office of Fissile Materials Disposition will form the basis for an announcement in August 1996 of the Record of Decision regarding the disposition alternatives that will be developed for implementation. A key element of DOE's review of alternatives is the formulation of a Long-Range Research and Development Plan (R&D Plan) that defines the research and development activities needed prior to implementing the disposition alternatives under consideration. The first draft of this R&D Plan was forwarded to the Center's Senior Technical Review Group for review and comment. The comments of the Review Group appear below.

Overview of the Review Process

The Senior Technical Review Group received the R&D Plan prior to a meeting in Dallas, Texas on 8 June 1995. At that meeting, the Group received valuable input from Howard R. Canter and Andre I. Cygelman, technical director and deputy technical director, respectively, DOE Office of Fissile Materials Disposition. Group members formulated the following recommendations.

Summary and Principal Recommendations

The oral briefing provided by DOE staff to the Senior Technical Review Group on 8 June 1995 was well organized and well received by Group members. However, this was not found to be the case for the written R&D Plan. DOE staff explained that the preliminary document reviewed was not the final R&D Plan but the data which was collected in order to produce an R&D Plan. A large portion of the preliminary document will be archived. The Review Group concurred with the points made by DOE staff during the oral presentation regarding fiscal austerity, prioritization of alternatives, international issues and the intention to seek assistance from the international community including the Russians.

In light of the above, the Senior Technical Review Group made the following recommendations:

(1) It is recommended that DOE strive for greater clarity and focus and less redundancy in the final draft of the R&D Plan before it is released so that it reflects the ongoing narrowing of options. It is the Review Group's view that urgency of disposition is a major driving force for the R&D program; the lead time for disposition alternatives with the greatest potential for immediate development may be shortened if expenditure of R&D funds is accelerated to develop them now.

(2) It is recommended that cost projections include confirmatory costs of the Nuclear Regulatory Commission. These costs will be a part of the implementation costs.

(3) It is recommended that consideration be given to assembling an external review group to study institutional issues related to the alternatives under study. For example, if a MOX fuel alternative is selected, what level of understanding is required for this alternative to be accepted by the public, the management of electric utilities, and Russian officials. Institutional issues may prove to be far more onerous than technical issues for the most reasonable alternatives. In addition to a technical R&D Plan, there may be a need for a non-technical plan. How will technical issues be merged with political realities?

(4) It is recommended that an estimation of technical risk be included for each alternative considered.

(5) It is recommended that the management issues be addressed for the R&D program. Strong R&D people should be designated as project leaders.

(6) It is recommended that greater consideration be given to international issues including international participation in the R&D program.

(7) It was recommended that DOE staff provide the Senior Technical Review Group with timely information on developments in Canada related to the CANDU heavy water reactors.

Annotated List of Senior Technical Review Group Members

John F. Ahearne, Executive Director, Sigma Xi, The Scientific Research Society, formerly vice president and senior fellow of Resources for the Future, served as member of numerous committees, boards and commissions related to nuclear energy including chairman of the National Research Council Committee on the Future of Nuclear Power Development and Committee on Risk Perception and Communication, Fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences.

Floyd L. Culler, Jr., President Emeritus, Electric Power Research Institute, member of the National Academy of Engineering, Fellow of the American Institute of Chemists, American Nuclear Society, and the American Institute of Chemical Engineers, recipient of numerous awards including E.O. Lawrence award and the Robert E. Wilson award of the American Institute of Chemical Engineers.

E. Linn Draper, Jr., Chairman, President and Chief Executive Officer of American Electric Power, is a member of the National Academy of Engineering, and serves on the boards of the Nuclear Energy Institute and the Institute of Nuclear Power Operations. He served on the faculty and administration of the University of Texas where he was director of the Nuclear Engineering program. He holds a doctorate in nuclear science and engineering from Cornell University.

Paul M. Doty, Professor Emeritus, Department of Biochemistry and Molecular Biology and Director Emeritus, Center for Science and International Affairs, Harvard University, member of the National Academy of Sciences, member of National Academy's Committee on International Security and Arms Control.

Shirley A. Fry, Oak Ridge Institute for Science and Education (ORISE), Physician/Epidemiologist, formerly Assistant Director, Medical Sciences Division and Director of the Division's Center for Epidemiologic Research, ORISE; member of medical teaching staff, Radiation Emergency Assistance Center/Training Site, ORISE; member of national and international groups studying the acute and long-term health effects of ionizing radiation.

Norman Hackerman, President Emeritus, Rice University, Chairman of the Scientific Advisory Committee, Robert A. Welch Foundation, member of the National Academy of Sciences. Recipient of distinguished achievement awards from numerous scientific societies and government bodies; most recently in 1993

received the National Medal of Science and the Vannevear Bush Medal of the National Science Board.

Richard T. Kennedy, Ambassador at large (retired), commissioned as Ambassador at large and special advisor to the Secretary of State on nonproliferation and nuclear energy policy from 1982-92, appointed Under Secretary of State in 1981 and served as representative to the International Atomic Energy Agency, 1981 to 1993. A fellow of the American Nuclear Society and recipient of the ANS/ENS Beckhurst Award. Commissioner of the U.S. Nuclear Regulatory Commission, 1975 - 1980.

Myron B. Kratzer, Deputy Assistant Secretary of State for Nuclear Energy (retired), serves on the American Nuclear Society special panel on plutonium, recipient of the Atomic Energy Commission's Distinguished Service Medal. Chemical engineer who served the Atomic Energy Commission from 1958-71, including Assistant General Manager for International Activities.

John W. Landis, Chairman, Public Safety Standards Group, member of the National Academy of Engineering, past-president and Fellow of the American Nuclear Society, Fellow of the American Society of Mechanical Engineers, retired president of General Atomics and Stone & Webster International, recipient of DOE Exceptional Public Service Award and numerous other awards, has served on 27 government advisory committees.

I. Harry Mandil, President (retired), MPR Associates, in charge of reactor engineering under Admiral Rickover, served on former Secretary of Energy Watkins advisory committee.

Lewis Manning Muntzing, Attorney, Morgan, Lewis and Bockius, Washington, D.C., President, ADTECHS Corporation, past-chairman of the International Nuclear Societies Council, past-president of the American Nuclear Society, past-chairman of Council of Scientific Societies Presidents.

Paul Nelson, Professor of Computer Science, Nuclear Engineering and Mathematics, Texas A&M University, editor of *The Journal* of *Transport Theory and Statistical Physics*, past-chair of the Mathematics and Computation Division of the American Nuclear Society.

Wolfgang Panofsky, Professor and Director Emeritus, Stanford Linear Accelerator Center, member of the National Academy of Sciences, member of the National Academy's Committee on International Security and Arms Control and chair of the Weapons Plutonium Management and Disposition Study Committee. Recipient of National Medal of Science and Lawrence and Fermi Awards of the Department of Energy.

Genevieve S. Roessler, Associate Professor Emeritus, University of Florida, Fellow, past-president and past-editor of the Health Physics Society, 1994 advisory committee chair for the Health and Safety Research Division, Oak Ridge National Laboratory, also served on scientific review committees for U. S. Department of Energy (1984-88), and Rocky Flats (1980-82).

Glenn T. Seaborg, Chairman, Lawrence Hall of Science, received Nobel prize for Chemistry in 1951 and was original chairman of the Atomic Energy Commission, co-discoverer of over 16 elements and isotopes including plutonium. Holds distinguished achievement awards from numerous scientific societies and countries; most recently received the National Medal of Science (U.S. 1991) and the Royal Order of the Polar Star Sweden (1992).

John Taylor, Vice President (retired), Nuclear Power Division, Electric Power Research Institute, formerly Vice President and General Manager of the Water Reactor Business Unit of Westinghouse Electric Corporation, engaged in nuclear power development for naval propulsion and electricity generation for 31 years, member of the National Academy of Engineering, Fellow of the American Association for the Advancement of Science and the American Nuclear Society.

Kenneth L. Woodfin, Rear Admiral (retired), independent Management and Financial Consultant, expertise in the areas of logistics, acquisition and financial management, senior business assistant to Admiral Rickover in the Naval Nuclear Power Program, former assistant administrator of NASA, and senior vice president with Burns and Roe, international architectural engineers.

Appendix

List of plutonium disposition options selected as reasonable by the DOE during the first phase of their screening process*

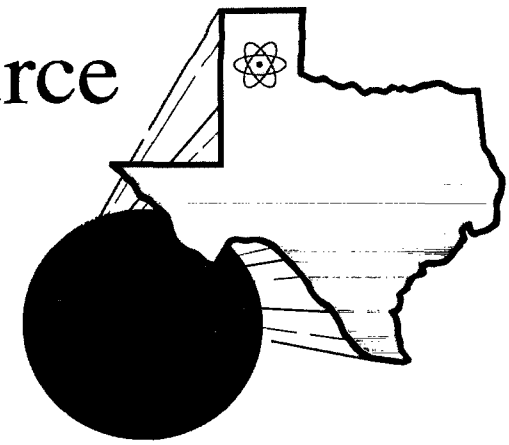
(D-2/3)	Emplacement in Very Deep Boreholes (either directly or immobilized without radionuclides, which were initially separate options)
(I-3)	Immobilization with Radionuclides in New Borosilicate Glass Vitrification Plant or Facility, with Ultimate Repository Disposal
(I-4)	Ceramic Immobilization with Radionuclides, with Ultimate Repository Disposal
(I-5)	Metal Immobilization, with Ultimate Repository Disposal
(I-6)	Borosilicate Glass Oxidation/Dissolution/Immobilization with Radionuclides, with Ultimate Repository Disposal
(R-1)	Transfer to the EURATOM Market for Mixed-oxide (MOX) Fuel Reactor Burning
(R-2)	Burning in Existing Light Water Reactors, with Ultimate Repository Disposal
(R-2A)	Burning in Partially Completed Light Water Reactors, with Ultimate Repository Disposal
(R-3)	Burning in Evolutionary or Advanced Light Water Reactors, with Ultimate Repository Disposal
(R-6)	Burning in CANDU Heavy Water Reactors, with Spent Fuel Disposal by Canadian Utility

*See *Summary Report of the Screening Process to Determine Reasonable Alternatives for Storage and Disposition of Weapon-Usable Fissile Materials*, March 1995

Amarillo National Resource Center for Plutonium

A Higher Education Consortium consisting of the Texas A&M University System, Texas Tech University, and The University of Texas System

May 1995



Board Members Meet with Russian Delegation

Center Governing Board members Dale Klein and Lee Peddicord, both nuclear engineers, traveled to Russia in April 1995 to develop linkages with Russian scientists and engineers who will be involved in a year-long study with U.S. scientists and engineers. The joint work with the Russians is being facilitated by the Center. Drs. Klein and Peddicord obtained the names of technical team leaders from the Russians during their visit, an accomplishment that removed what had heretofore been an impediment to initiating the joint work.

During a January 1995 meeting at Los Alamos National Laboratory, US and Russian delegates agreed to conduct joint scientific and technical investigations in eight technical areas to support reasonable alternatives for the long term disposition of plutonium resulting from the dismantlement of nuclear weapons. This historic meeting was a result of the nonproliferation statement issued in Moscow on January 14, 1994 by the Presidents of the United States and the Russian Federation.

Technical Demonstration Project Begun

The dismantlement of nuclear weapons results in a stockpile of materials formerly in the weapons such as uranium, plutonium, finely machined metal parts, high explosives, and other materials including some precious metals. A major task of the Center's research program is to determine the most technically sound and environmentally sensitive ways to handle, store, and where appropriate, reuse these materials. The Pantex Plant is presently permitted to open-pit burn high explosives removed from these weapons but is interested in determining if other uses can be found for this material, thus converting a waste product into a resource.

Grant Willson, professor of chemistry and chemical engineering at The University of Texas at Austin is convinced that the high explosives material can be used for purposes other than blowing things up. According to Dr. Willson, "The explosives are made of an extremely interesting molecule from a chemists point of view, one that is deserving of much more study than it has received to date."

With funding from the Center, Dr. Willson has put together a research team that includes two engineers from Texas Tech University, Javad Hashemi and Darryl James; a team of scientists and technicians from the Pantex Plant led by Tony Woltermann and Bill Faubion of Mason & Hanger; and scientists from the China Lake Naval Weapons Laboratory in California.

Agricultural Scientists Meet to Advise Center

The passenger count of the Amarillo International Airport increased by over 55 on Thursday and Friday, February 2-3 1995 as 106 agricultural scientists from across the state of Texas engaged in a one-day work session with Pantex scientists. In welcoming the group to the West Texas A&M University campus Friday morning, Gerald Johnson, manager of the U.S. Department of Energy Amarillo Area Office, noted the importance of dismantlement to world peace and the equally important need to protect the water and agriculture of the Panhandle. "Your work in determining how to best monitor, Pantex, the cleanest DOE site in the country, will be technically challenging but at the same time you will be building the expertise in the U.S. for other less clean sites."

According to the lead facilitator for the event, Dr. G.B. Thompson, Director, Agricultural Research and Extension Center Amarillo, every agriculture entity in the state of Texas was represented at the meeting including the Texas Agriculture Experiment Station, Texas Agriculture Extension Service, Texas A&M University, Texas Tech University, West Texas A&M University and the U.S. Department of Agriculture Agricultural Research Service. Managers and scientists of Battelle Pantex, Mason&Hanger and The University of Texas at Austin briefed the group on ongoing environmental monitoring at the Pantex site.

Senior Technical Review Group To Advise On Plutonium Disposition Options

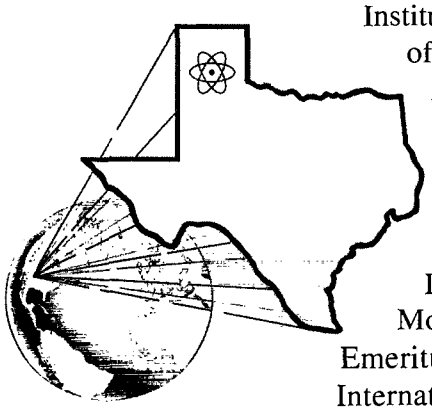
The Amarillo National Resource Center for Plutonium assembled a Senior Technical Review Group to evaluate the disposition options for fissile materials including plutonium developed by the U.S. Department of Energy and the process by which DOE developed these options. The membership of the Senior Technical Review Group includes a Noble Laureate, a former U.S. Ambassador and six members of the National Academies of Science and Engineering.

In announcing the formation of this senior review group, Governing Board member, Wales Madden, Jr., pointed out the importance of "recruiting top-level experts in science, engineering, industry, public health, and foreign policy to review policies of critical importance to our nation and the international community."

Group members include:

John F. Ahearne, Executive Director, Sigma Xi, The Scientific Research Society, formerly vice president and senior fellow of Resources for the Future, served as member of numerous committees, boards and commissions related to nuclear energy including chairman of the National Research Council Committee on the Future of Nuclear Power Development and Committee on Risk Perception and Communication, Fellow of the American Association for the Advancement of Science and the American Academy of Arts and Sciences.

Floyd L. Culler, Jr., President Emeritus, Electric Power Research Institute, member of the National Academy of Engineering, Fellow of the American Institute of Chemists, American Nuclear Society, and the American Institute of Chemical Engineers, recipient of numerous awards including E.O. Lawrence award and the Robert E. Wilson award of the American Institute of Chemical Engineers.



Paul M. Doty, Professor Emeritus, Department of Biochemistry and Molecular Biology and Director Emeritus, Center for Science and International Affairs, Harvard University, member of the National Academy of Sciences, member of National Academy's Committee on International Security and Arms Control.

E. Linn Draper, Jr., Chairman, President and Chief Executive Officer of American Electric Power, is a member of the National Academy of Engineering, and serves on the boards of the Nuclear Energy Institute and the Institute of Nuclear Power Operations. He served on the faculty and administration of the University of Texas where he was director of the Nuclear Engineering program. He holds a doctorate in nuclear science and engineering from Cornell University.

Shirley A. Fry, Oak Ridge Institute for Science and Education (ORISE), Physician/ Epidemiologist, formerly Assistant Director, Medical Sciences Division and Director of the Division's Center for Epidemiologic Research, ORISE; member of medical teaching staff, Radiation Emergency Assistance Center/ Training Site, ORISE; member of national and international groups studying the acute and long-term health effects of ionizing radiation.

Norman Hackerman, President Emeritus, Rice University, Chairman of the Scientific Advisory Committee, Robert A. Welch Foundation, member of the National Academy of Sciences. Recipient of distinguished achievement awards from numerous scientific societies and government bodies; most recently in 1993 received the National Medal of Science and the Vannevear Bush Medal of the National Science Board.

Richard T. Kennedy, Ambassador at large (retired), commissioned as Ambassador at large and special advisor to the Secretary of State on

nonproliferation and nuclear energy policy (1982-92), appointed Under Secretary of State (1981) and served as representative to the International Atomic Energy Agency.

Myron B. Kratzer, Deputy Assistant Secretary of State for Nuclear Energy (retired), serves on the American Nuclear Society special panel on plutonium, recipient of the Atomic Energy Commission's Distinguished Service Medal. Chemical engineer who served the Atomic Energy Commission from 1958-71, including Assistant General Manager for International Activities.

John W. Landis, Chairman, Public Safety Standards Group, member of the National Academy of Engineering, past-president and Fellow of the American Nuclear Society, Fellow of the American Society of Mechanical Engineers, retired president of General Atomics and Stone & Webster International, recipient of DOE Exceptional Public Service Award and numerous other awards, has served on 27 government advisory committees.

I. Harry Mandil, President (retired), MPR Associates, in charge of reactor engineering under Admiral Rickhover, served on former Secretary of Energy Watkins' advisory committee.

Lewis Manning Muntzing, Partner, Morgan, Lewis and Bockius, Washington, D.C., Chairman of the International Nuclear Societies Council, serves on the editorial advisory board of Progress in Nuclear Energy International Review Journal, recipient in 1974 of the U.S. Atomic Energy Commission's Arthur S. Fleming Distinguished Service Award, past-president of the American Nuclear Society.

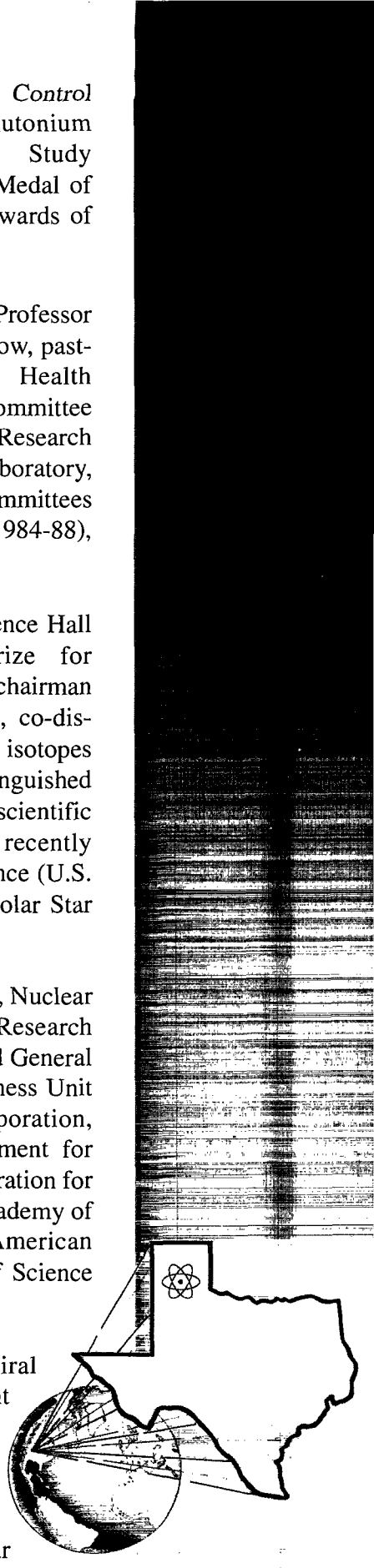
Paul Nelson, Professor of Computer Science, Nuclear Engineering and Mathematics, Texas A&M University, editor of The Journal of Transport Theory and Statistical Physics, past-chair of the Mathematics and Computation Division of the American Nuclear Society.

Wolfgang Panofsky, Professor and Director Emeritus, Stanford Linear Accelerator Center, member of the National Academy of Sciences, member of the National Academy's Committee on International Security and Arms Control and chair of the Weapons Plutonium Management and Disposition Study Committee. Recipient of National Medal of Science and Lawrence and Fermi Awards of the Department of Energy.

Genevieve S. Roessler, Associate Professor Emeritus, University of Florida, Fellow, past-president and past-editor of the Health Physics Society, 1994 advisory committee chair for the Health and Safety Research Division, Oak Ridge National Laboratory, also served on scientific review committees for U. S. Department of Energy (1984-88), and Rocky Flats (1980-82).

Glenn T. Seaborg, Chairman, Lawrence Hall of Science, received Nobel prize for Chemistry in 1951 and was original chairman of the Atomic Energy Commission, co-discoverer of over 16 elements and isotopes including plutonium. Holds distinguished achievement awards from numerous scientific societies and countries; most recently received the National Medal of Science (U.S. 1991) and the Royal Order of the Polar Star Sweden (1992).

John Taylor, Vice President (retired), Nuclear Power Division, Electric Power Research Institute, formerly Vice President and General Manager of the Water Reactor Business Unit of Westinghouse Electric Corporation, engaged in nuclear power development for naval propulsion and electricity generation for 31 years, member of the National Academy of Engineering, Fellow of the American Association for the Advancement of Science and the American Nuclear Society.



Kenneth L. Woodfin, Rear Admiral (retired), Independent Management and Financial Consultant, expertise in the areas of logistics, acquisition and financial management, senior business assistant to Admiral Rickhover in the Naval Nuclear Power Program, former assistant administrator of NASA, and senior vice president with Burns and Roe, international architectural engineers.

Mass Communications Students Take on Center Project

Senior students at Texas Tech University who plan to work in mass communications after they graduate and their professor, Judy Oskam, believe in hands-on experience. This group of 35 senior-level students formulated public information plans for the Center and four team leaders presented the plans to the Governing Board.

"The students will be able to include their plans in their experience portfolio. Prospective employers want to know what they can do," says Dr. Oskam.

"These Tech students are part of a broad-based educational and public information program that is being developed by Texas Tech University in coordination with Amarillo College, Texas State Technical College and West Texas A&M University " according to Governing Board member Fred Bryant.

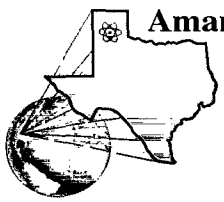
AISD Technical Sciences Academy

The Center contributed $5,000 toward an environmental technology course to be offered to highschool students attending the Technical Sciences Academy of the Amarillo Independent School District. Mutually beneficial interactions between the Center and the Technical Academy are planned including: (1) faculty who are working on Center projects in Amarillo, visiting Academy classes as guest lecturers, (2) Academy students, where possible, will be involved in actual research projects in Amarillo and as summer interns at campuses across Texas. (3) Center faculty will serve as resource people for Amarillo teachers who are developing curriculum for the Technical Sciences Academy.

The Amarillo Independent School District received a three-year award of over $600,000 from the National Science Foundation to develop the Technical Sciences Academy within the Amarillo Scientific Arts Academy. This program will provide enhanced engineering, technical, science and mathematics courses for students from all Amarillo area high schools and some middle school and two-year college students.

Amarillo National Resource Center for Plutonium Governing Board:
Fred C. Bryant, Assistant Vice Provost for Research, Texas Tech University
Dale E. Klein, Associate Dean for Research and Administration, College of Engineering, The University of Texas at Austin
Wales H. Madden, Jr., Co-Chair, Panhandle 2000
Kenneth L. Peddicord, Associate Vice Chancellor for Strategic Programs, Texas A&M University System

Staff:
Lynne Jordan Bowers, Deputy Director • Julia P. DeRanek, Administrative Associate



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