DOE Patent Clearance Granted

Council of Energy Engineering Research
Final Report

22 August 2003

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Office of Intellectual Property Law
DOE Chicago Operations Office10/3/03
Date

The Council of Energy Engineering Research (CEER) was founded in 1983 primarily under the impetus of Dr. Oscar Manley who was the first director of the Engineering Research Program (ERP) in Basic Energy Sciences of the Department of Energy.

The Engineering Research Program, a component program of the DOE Office of Basic Energy Sciences (BES), had been established in 1979 to aid in resolving the numerous engineering issues arising from efforts to meet U.S. energy needs.

The DOE Office of Basic Energy Sciences has the prime responsibility for providing the fundamental scientific base on which identification and development of future national energy options will depend. The major product of the program becomes part of the body of knowledge and data upon which the applied energy technologies are founded; the product is knowledge relevant to energy exploration, production, conversion and use.

Engineering research undergirds all of the programs in BES as the results of fundamental scientific research are transferred into energy technologies. The goals of the Engineering Research Program were the following:

1. to improve and extend the body of knowledge underlying current engineering practice so as to create new options for enhancing energy savings and production, for prolonging useful life of energy-related structures and equipment, and for developing advanced manufacturing technologies and materials processing with emphasis on reducing costs with improved industrial production and performance quality
2. to expand the store of fundamental concepts for solving anticipated and unforeseen engineering problems in the engineering technologies

Dr. Manley, following discussions with Prof. Joseph Kestin of Brown University and Dr. Richard Goldstein of the University of Minnesota asked Dr. Goldstein to form a Council to help in the planning of the Energy Research Program. A number of well-known individuals from industry, academia, non-profit groups and the Department of Energy served on the Council over the years. There was a significant flow of members into and out of Council membership covering areas of interest to ERP including Aeronautical Engineering, Electrical Engineering, Mechanical Engineering, Chemical Engineering, Civil Engineering and Applied Physics. A list of the members of the Council is shown in appendix A.

The Council met during this period first with Dr. Manly and, after his retirement, with Dr. Robert Price, who took over the management of the Engineering Research Program. The Council usually met twice a year. During these meetings members often visited laboratories supported by the ERP and helped review the activity of these groups with the director of the program. In addition, research groups not initially supported by the program were visited to see how they might fit into the goals of the Department of Energy.

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Over the years, the Council of Energy Engineering Research developed a number of surveys and reviews to help the ERP identify and outline important new research opportunities and interests. In doing this, a key goal was to report the state of knowledge in a given field and point out its need and importance to the Department of Energy. CEER examined areas that could be fruitfully explored by the Engineering Research Program through new initiatives and research grants.

CEER organized and conducted a number of workshops and sponsored reports describing areas of important engineering research and knowledge. These are listed in Appendices B and C. The workshops provided material to aid in developing the plans for basic engineering support by Department of Energy. Reports of these workshops serve the side purpose of being major summaries and compilations of the state of knowledge in important fields, and have found wide use by researchers. A number of them were published in major journals for worldwide distribution.

The Council also served as an important communication link with the engineering research community at large. Members of CEER were widely respected leading research engineering and scientists drawn from universities, government laboratories, and industry.

Eventually, the Engineering Research Program was folded into the Materials Division of the Office of Basic Engineering Sciences. This change followed the retirements of Dr. Manley and shortly afterward, Dr. Price. The areas covered in the Engineering Research Program were severely reduced. Thus, a program that had built up and supported a number of major research breakthroughs came essentially to an end. The directors of the program, Manley and Price, proved excellent at selecting young and relatively unknown researchers who eventually developed major skills and made major contributions. CEER tried to help them in this effort, and was, in general, successful. Following the demise of the Engineering Research Program, it is appropriate that CEER ended its program. Some of the members were taken up to a related, similar Council for the materials division, which continues some engineering research.

Respectfully submitted,

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Minneapolis, MN 55455

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Appendices:

- A. *Membership*
- B. *Workshops*
- C. *Books & Reports*
- D. *Meetings*

Council on Energy Engineering Research

Final Report

Appendices:

- A. Membership
- B. Workshops
- C. Books & Reports
- D. Meetings

Appendix A

CEER Membership 1983-2001

1983

Neal R. Amundsen
Richard E. Balzhiser
Stephen Ban
R.J. Goldstein
Michael J. Jefferies
Joseph Kestin
William C. Reynolds
H.H. Richardson
C.L. Tien
Alexander Zucker

1988

Jose B. Cruz, Jr.
Richard J. Goldstein
Myron Gottlieb
Fritz Kalhammer
Joseph Kestin
Herbert H. Richardson
Chang-Lin Tien
James Welty
Alexander Zucker

1989

Jose B. Cruz, Jr.
Richard J. Goldstein.
Myron Gottlieb
Thomas Hanratty
Fritz Kalhammer
Joseph Kestin
Herbert H. Richardson
Tom D. Schlabach
Chaing-Lin Tien
James Welty
Alexander Zucker

1991

James C. Coleman
Jose B. Cruz, Jr.
Dan Fredrick
Richard J. Goldstein
Myron Gottlieb
Thomas Hanratty
Joseph Kestin
Oscar Manley
John S. Maulbetsch
Herbert H. Richardson
Tom D. Schlabach
James Welty
Alexander Zucker

1992

H. Norman Abramson
Michael Carroll
Jose B. Cruz
Daniel Frederick
Richard J. Goldstein
Myron Gottlieb
Thomas Hanratty
Joseph Kestin
Richard T. Lahey
Oscar P. Manley
John S. Maulbetsch
Herbert H. Richardson
James Welty
Alexander Zucker

1993

H. Norman Abramson
James C. Coleman
Jose B. Cruz
Subhenda Datta
Richard J. Goldstein
Myron Gottlieb
Thomas Hanratty
Joseph Kestin
Oscar P. Manley
Shiro Matsuoka
John S. Maulbetsch
Herbert H. Richardson
Theresa Sullivan
James Welty
Alexander Zucker

1994

H. Norman Abramson
Andreas Acrivos
James C. Coleman
Jose B. Cruz
Subhenda Datta
Richard J. Goldstein
Myron Gottlieb
Thomas Hanratty
Oscar P. Manley
Shiro Matsuoka
John S. Maulbetsch
James Welty
Alexander Zucker

1995

H. Norman Abramson
 Andreas Acrivos
 Robert Boulard, Ex
 officio
 Dale W. Compton
 Jose B. Cruz
 Ernest L. Daman
 Elsa Garmire
 Richard J. Goldstein
 Myron Gottlieb
 Thomas Hanratty
 Oscar P. Manley
 Shiro Matsuoka
 John S. Maulbetsch
 James R. Welty
 Alexander Zucker

1996

H. Norman Abramson
 Andreas Acrivos
 Robert Boulard, Ex
 officio
 Dale W. Compton
 Jose B. Cruz
 Ernest L. Daman
 Elsa Garmire
 Richard J. Goldstein
 Myron Gottlieb
 Thomas Hanratty
 Oscar P. Manley, Ex
 officio
 Shiro Matsuoka
 John S. Maulbetsch
 James R. Welty
 Alexander Zucker

1997

H. Norman Abramson
 Andreas Acrivos
 Robert Boulard, Ex
 officio
 Dale W. Compton

Jose B. Cruz
 Ernest L. Daman
 Elsa Garmire
 Richard J. Goldstein
 Myron Gottlieb
 Thomas Hanratty
 Oscar P. Manley, Ex
 officio
 Shiro Matsuoka
 John S. Maulbetsch
 Bob Price, Ex officio
 James R. Welty
 Alexander Zucker

1998

H. Norman Abramson
 Andreas Acrivos
 Dale W. Compton
 Jose B. Cruz
 Ernest L. Daman
 A.B. Denison
 Elsa Garmire
 Richard J. Goldstein
 Myron Gottlieb
 Robert Goulard, Ex
 officio
 Thomas Hanratty
 Charles H. Kruger
 Arun Majumdar
 Oscar P. Manley, Ex
 officio
 John S. Maulbetsch
 Bob Price, Ex officio
 David Pui
 James R. Welty
 Alexander Zucker

1999

H. Norman Abramson
 Andreas Acrivos
 Bassem Armaly
 Dale W. Compton
 Jose B. Cruz

Ernest L. Daman
 Elsa Garmire
 Richard J. Goldstein
 Myron Gottlieb
 Thomas Hanratty
 John S. Maulbetsch
 Bob Price, Ex officio
 James R. Welty
 James T. Woo
 Alexander Zucker

2000

Bassem F. Armaly
 John Blair
 Dale Compton
 Ernest L. Daman
 Elisabeth Drake
 Patrick Eicker
 Elsa Garmire
 Richard J. Goldstein
 Thomas J. Hanratty
 Arun Majumdar
 Robert Price
 James R. Welty
 James T. Woo
 Alexander Zucker

2001

Bassem F. Armaly
 John Blair
 Dale Compton
 Ernest L. Daman
 Elisabeth Drake
 Patrick Eicker
 Elsa Garmire
 Richard J. Goldstein
 Thomas, J. Hanratty
 Arun Majumdar
 Robert Price
 James R. Welty
 James T. Woo
 Alexander Zucker

Appendix B: CEER Workshops

22-27 Sept	1985	Gaithersburg, MD	"International Workshop on Two Phase Flow Fundamentals"	Joseph Kestin & Michael Podowski
5-6 Dec	1985	Houston, TX	"Scoping Workshop"	Roger Eichhorn & Lary Witte
16-20 Mar	1987	Troy, NY	"International Workshop on Two Phase Flow Fundamentals"	Richard T. Lahey & Ralph Wood
22-24 June	1988	Salem, MA	"Novel Applications of High Temperature Superconductors"	
2-4 Nov	1988	Alexandria, VA	"Bioprocessing Research for Energy Applications"	Elmer L. Gaden Jr & Charles D. Scott
15-19 June	1992	London, England	"The Third International Workshop on TwoPhase Flow Fundamentals"	Prof. G.F. Hewitt
12-13 Oct	1992	Houston, TX	"Aging of Energy Production and Distribution Systems"	Michael M. Carroll
29-31 Oct	1993	Leesburg, VA	"Scoping Workshop on Energy Engineering Research"	James Welty
9 Aug	1997	Baltimore, MD	"Thermophysical Phenomena in Microscale Sensors, Devices and Structures"	A. Majumdar
27-28 Oct	1997	Minneapolis, MN	"Instrumentation and Measurement Issues for Nanometer Particles"	David Pui
26-28 Feb	1998	Santa Barbara, CA	Institute for Multifluid Science and Technology	A. Majumdar
13-14 June	1998	Albuquerque, NM	2 nd Microtherm Workshop and Tutorial	B. Chen, C.C.Wong, A.Majumdar & C.L. Tien
18-20 Mar	1999	Santa Barbara, CA	Second Annual Meeting of the Institute of Multifluid Science and Technology	T. G. Theofanous
12-15 Sept	1999	Santa Barbara, CA	First International Symposium on Turbulence & Shear Flow	Sanjoy Banerjee
12-14 Mar	2000	Santa Barbara, CA	Second Annual Meeting of the Institute Of Multifluid Science & Technology Preparation	T.G. Theofanous
4-5 Aug	2000	Berkeley, CA	"Nanotechnology"	A. Majumdar
19-20 Jan	2001	Clemson, SC	"Bioengineering Information and Data Processing Systems"	James J. Hickman

Appendix C

Books & Reports

"Multiphase Science and Technology," Volume Three, Edited by Hewitt, G. F., Delhay, J. M., Zuber, N., Foreword by Kestin, J., Hemisphere Publishing Corporation Incorporated with Springer/Verlag, 1987, (Report on Proceedings of the International Workshop on Two Phase Flow Fundamentals of 1986).

"International Workshop on Two-Phase Flow Fundamentals," January 1986, Kestin, J. and Podowski, M., Report Number DOE/ER/13056-1.

"Diagnostic Techniques in Thermal Plasma Processing," Part I and II, February 1986, Boulos, M., Fauchais, P., and Pfender, E., Report No. DOE/ER-0279.

"Basic Research in Energy Engineering," August 15, 1986, Witte, L. C., and Eichhorn, R., Report No. UHME-58970-86-1.

"Multiphase Science and Technology," Volume Five, Edited by Hewitt, G. F., Delhay, J. M., Zuber, N., Foreword by Kestin, J., Taylor and Francis/Hemisphere Corporation, 1989, (Report on Proceedings of the International Workshop on Two Phase Flow Fundamentals of 1987).

"Multiphase Science and Technology," Volume Six, Edited by Hewitt, G. F., Delhay, J. M., Zuber, N., Foreword by Kestin, J., Taylor and Francis/Hemisphere Corporation, 1991, (Report on Proceedings of the International Workshop on Two Phase Flow Fundamentals of 1987).

"International Workshop on Two-Phase Flow Fundamentals," October 1987, Lahey, T. and Wood, R.T., Report No. CONF-870320.

"Bioprocessing Research for Energy Applications," April, 1987, Scott, C.D., Gaden, E.L., Humphrey, A.E., Carta, G., Kirwan, D.J., Report No. ORNL/TM-11054.

"Basic Research in Energy Engineering," Report of a Scoping Workshop on Energy Engineering Research, 1995.

"Thermophysical Phenomena in Microscale Sensors, Devices, and Structures," Baltimore Hilton & Towers, August 9, 1997. Microscale Thermophysical Engineering, Vol. 1, pp. 267-274, 1997.

"Instrumentation and measurement issues for nanometer particles: Workshop summary," University of Minnesota, Minneapolis, MN, 5-7 December 1997. Journal of Nanoparticle Research, pp. 103-112, 2000.

Report of Second Microtherm Workshop and Tutorial, Albuquerque, NM, June 13-14, 1998. Microscale Thermophysical Engineering, vol 2, pp. 215-243 (1998).

"Institute for Multifluid Science and Technology (ImuST): Proceedings of the Third Annual Meeting," Santa Barbara, CA, March 12-14, 2000, to be published February 2001.

Report on Nanoengineering Workshop, University of California, Berkeley, CA, August 4-5, 2000, to be published soon.

"A Report on the Evolution and Management of the US Department of Energy Office of Basic Energy Science Engineering Research Program, 1979-1996," by Oscar Manley

Appendix D: CEER Meetings

2-3	June	1983	Gaithersburg, MD	Marriott Hotel
5-6	December	1983	Cambridge, MA	MIT
9-10	May	1984	Cambridge, MA	MIT
1-2	November	1984	Minneapolis, MN	U of Minnesota
13-14	May	1985	Washington, D.C.	NAE
11-12	November	1985	Oak Ridge, TN	ORNL
5-6	May	1986	Urbana, IL	U of Illinois
19-20	November	1986	Berkeley, CA (<i>unofficial meeting</i>)	US - Berkeley
16-17	July	1987	Alexandria, VA	Old Town Holiday Inn
21-22	January	1988	Boulder, CO	NBS
29-30	June	1988	Irvine, CA	NAE
12-13	January	1989	Gainesville, FL	U Centre Hotel
27-28	June	1989	Gaithersburg, MD	Gaithersburg Marriott
18-19	January	1990	Santa Barbara, CA	Santa Barbara, CA
12-13	July	1990	Washington, D.C.	The River Inn
17-18	January	1991	LaJolla, CA	Sea Lodge, UC-San Diego
25-26	July	1991	Idaho Falls, Idaho	Shilo Inn - INEL
16-17	January	1992	Phoenix, AZ; <i>The Pointe at Squaw Peak</i>	AZ St. U.
23-24	July	1992	Washington, DC	Embassy Square Suite
14-15	January	1993	Albuquerque, NM	Albuquerque Marriot Hotel
13-14	July	1993	Pleasanton, CA	Sandia Natl. Laboratories
13-14	January	1994	San Antonio, TX	SW Research Institute
8-9	August	1994	Minneapolis, MN	U-of Minnesota
20-21	February	1995	Santa Monica, CA	U of California - LA
10-11	August	1995	Washington, D.C.	ASME Washington Office
1-2	February	1996	Tucson, AZ	University of Arizona
11-12	July	1996	Washington, D. C.	George Washington U
20-21	January	1997	La Jolla, CA	University of San Diego
10-11	July	1997	Gaithersburg, MD	Hilton Hotel
8-9	February	1998	Palo Alto, CA	Stanford University
9-10	July	1998	Annapolis, MD	Wyndham Garden Hotel
28-29	January	1999	Santa Monica, CA	Georgian Hotel
15-16	July	1999	New York, NY	The Holiday Inn Hotel
27-28	January	2000	Gaithersburg, MD	Hilton Hotel
7-8	August	2000	Berkeley, CA	Radisson Hotel Berkeley Marina
22-23	January	2001	Oak Ridge, TN	Garden Plaza Hotel
6	August	2001	Gaithersburg, MD	Hilton