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Technology Transfer for the U.S. Department of Energy's Energy Storage Program

Volume 2—Appendices

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L. L. Fassbender, Project Manager

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APPENDIX A

OFFICE OF ENERGY STORAGE AND DISTRIBUTION
ENERGY STORAGE PROJECTS

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FOREWORD

This document contains the appendices to Technology Transfer Recommendations for the U.S. Department of Energy's Storage Program (PNL-6484, Vol. 1). These appendices are a list of projects, publications, and presentations connected with the Energy Storage (STOR) program.

In Volume 1, the technology transfer activities of the STOR program are examined and mechanisms for increasing the effectiveness of those activities are recommended.

TECHNOLOGY TRANSFER FOR THE
U.S. DEPARTMENT OF ENERGY'S
ENERGY STORAGE PROGRAM

Volume 2 - Appendices

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Richland, Washington 99352

APPENDIX A

OFFICE OF ENERGY STORAGE AND DISTRIBUTION ENERGY STORAGE PROJECTS

ELECTROCHEMICAL RESEARCH

Lead Center: Lawrence Berkeley Laboratory

Project: Technology Base Research Project Management

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: F. R. McLarnon

Exploratory Research

Project: Molten Salt Cell Research

Performing Institution: Argonne National Laboratory, Argonne, IL

Principal Investigator: T. Kaun/L. Redey

Project: Capacity Decline in FeS₂ Electrode in Lithium Iron Sulfide High-Temperature Batteries

Performing Institution: Gould Research Center, Cleveland, OH

Principal Investigator: G. Barlow

Project: All-Inorganic Ambient-Temperature Lithium Battery

Performing Institution: Duracell International, Inc., Needham, MA

Principal Investigator: A. N. Dey

Project: Study of High-Energy Cathodes and Anodes for Molten Salt Batteries

Performing Institution: University of Tennessee, Knoxville, TN

Principal Investigator: G. Mamantov

Project: Research on Materials Relating to the Sodium Heat Engine

Performing Institution: Ford Motor Company, Dearborn, MI

Principal Investigator: T. K. Hunt

Project: Lifetime Improvement of the Hollow Fiber Sodium/Sulfur Cell

Performing Institution: Dow Chemical Company, Walnut Creek, CA

Principal Investigator: P. E. Pierini

Applied Science Research

Project: Advanced Electrode Research

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: E. J. Cairnes/F. R. McLarnon

Project: Semiconductor Electrochemistry Approach to the Study of Oxide Films
Performing Institution: SRI International, Menlo Park, CA
Principal Investigator: M. Madou

Project: Spectroscopic Studies of Zincate Solutions
Performing Institution: Argonne National Laboratory, Argonne, IL
Principal Investigator: V. A. Maroni

Project: Zinc/Nickel Oxide Battery Membrane Separator Studies
Performing Institution: Brigham Young University, Provo, UT
Principal Investigator: D. N. Bennion

Project: Cell Separators for Alkaline Zinc Batteries
Performing Institution: Pinnacle Research Institute, Cupertino, CA
Principal Investigator: J. L. Morris

Project: Aluminum Anode Research
Performing Institution: SRI International, Menlo Park, CA
Principal Investigator: D. D. MacDonald

Project: Surface Morphology of Metals in Electrodeposition and Dissolution
Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA
Principal Investigator: C. W. Tobias

Project: Dendritic Zinc Deposition in Flow Batteries
Performing Institution: Illinois Institute of Technology, Chicago, IL
Principal Investigator: J. R. Selman

Project: Zinc Electrode Morphology in Acid Electrolytes
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: J. McBreen

Project: Transport in Aqueous Battery Systems
Performing Institution: Lawrence Livermore National Laboratory, Livermore, CA
Principal Investigator: D. Miller

Project: Fast Ion Conduction in Lithium Glasses
Performing Institution: Massachusetts Institute of Technology, Cambridge, MA
Principal Investigator: H. Tuller

Project: Research on the Principles of Superionic Conduction
Performing Institution: Massachusetts Institute of Technology, Cambridge, MA
Principal Investigator: B. Wuensch

Project: Glass Electrolytes and Advanced Cell Concepts
Performing Institution: Argonne National Laboratory, Argonne, IL
Principal Investigator: I. D. Bloom

Project: Microcrystalline (Amorphous) Metal/Alloy Coatings Resistant to Molten Sulfur/Polysulfide Environments

Performing Institution: Argonne National Laboratory, Argonne, IL

Principal Investigator: R. Varma

Project: Improved Al_2O_3 Electrolyte through Transformation Toughening

Performing Institution: Rockwell International, Thousand Oaks, CA

Principal Investigator: F. Lange

Project: Electrochemical Properties of Solid Electrolytes

Performing Institution: Lawrence Berkeley Laboratory, Berkeley

Principal Investigator: L. C. Dejonghe

Project: Polysulfide Containment Materials

Performing Institution: Argonne National Laboratory, Argonne, IL

Principal Investigator: A. P. Brown

Project: New Lithium-Based Battery Materials

Performing Institution: Stanford University, Palo Alto, CA

Principal Investigator: R. Huggins

Project: Corrosion-Resistant Coatings for High-Temperature, High-Sulfur Activity Applications

Performing Institution: Illinois Institute of Technology, Chicago, IL

Principal Investigator: J. R. Selman

Project: Spectroscopic Studies of Passive Films on Alkali and Alkaline Earth Metals in Nonaqueous Solvents

Performing Institution: Case Western Reserve University, Cleveland, OH

Principal Investigator: D. G. Scherson

Project: Surface Layers on Battery Materials

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: R. H. Muller

Project: Raman Spectroscopy of Electrode Surface in Ambient-Temperature Lithium Secondary Battery

Performing Institution: Jackson State University, Jackson, MS

Principal Investigator: H. Tachikawa

Project: Polymeric Electrolytes for Ambient-Temperature Lithium Batteries

Performing Institution: University of Pennsylvania, Philadelphia, PA

Principal Investigator: G. Farrington

Project: Metal Couples in Nonaqueous Electrolytes

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: C. W. Tobias

Project: Exploratory Cell Research and Study of Fundamental Processes in Solid State Electrochemical Cells

Performing Institution: University of Minnesota, Minneapolis, MN

Principal Investigator: W. Smyrl

Project: Corrosion, Passivity, and Breakdown of Alloys Used in High-Energy-Density Batteries

Performing Institution: Johns Hopkins University, Baltimore, MD

Principal Investigator: J. Kruger

Project: Analysis and Simulation of Electrochemical Synthesis and Energy Storage Systems

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: J. Newman

Project: Engineering Analysis of Electrolytic Gas Evolution

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: C. W. Tobias

Air Systems Research

Project: Research and Development of Bi-Functional Oxygen Electrode

Performing Institution: Energy Research Corporation, Danbury, CT

Principal Investigator: M. Klein

Project: Electrocatalysts for Oxygen Reduction and Generation

Performing Institution: Case Western Reserve University, Cleveland, OH

Principal Investigator: E. Yeager

Project: Electrode Kinetics and Electrocatalysis

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: P. N. Ross

Project: Electrical and Electrochemical Behavior of Particulate Electrodes

Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA

Principal Investigator: J. W. Evans

Project: Research on Zinc/Air Battery Systems

Performing Institution: Pinnacle Research Institute, Cupertino, CA

Principal Investigator: L. Morris

Project: Aluminum/Air Power Cell Research and Development

Performing Institution: Lawrence Livermore National Laboratory,
Livermore, CA

Principal Investigator: A. Maimoni

Project: Reformer Kinetics and Mechanisms

Performing Institution: Los Alamos National Laboratory, Los Alamos, NM

Principal Investigator: N. Vanderborgh

Project: Membrane Characterization and Modeling
Performing Institution: Los Alamos National Laboratory, Los Alamos, NM
Principal Investigator: C. Spirio/S. Srinivasan

Project: Proton Exchange Membrane Electrode Optimization
Performing Institution: Los Alamos National Laboratory, Los Alamos, NM
Principal Investigator: J. Huff

Project: Electrode Fabrication and Fuel Cell Evaluation
Performing Institution: Los Alamos National Laboratory, Los Alamos, NM
Principal Investigator: J. Huff

Project: Alloy and Redox Catalysts for Phosphoric Acid Electrochemical Systems
Performing Institution: United Technologies Corporation, South Windsor, CT
Principal Investigator: J. A. Bett

Project: New Membrane and Catalyst for Solid Polymer Electrolyte System
Performing Institution: Hamilton Standard Electrochemical, Windsor Locks, CT
Principal Investigator: J. F. McElroy

Project: Materials for Fuel Cells
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: J. McBreen

Project: Effects of Heat Treatment and Microstructure on Electrocatalyst Performance
Performing Institution: University of Virginia, Charlottesville, VA
Principal Investigator: G. Stoner/C. Kroen

BATTERY DEVELOPMENT AND TESTING

Lead Center: Sandia National Laboratories

Project: Exploratory Battery Development and Testing Project Management
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: R. Diegle

Battery Technology Development

Project: Zinc/Bromine Core Technology Development
Performing Institution: Energy Research Corporation, Danbury, CT
Principal Investigator: A. Leo

Project: Zinc/Bromine Load Management Battery
Performing Institution: Johnson Controls, Inc., Milwaukee, WI
Principal Investigator: M. Eskra

Project: Sodium/Sulfur Core Technology
Performing Institution: Chloride Silent Power, Limited, Runcorn, U.K.
Principal Investigator: M. McNamee

Project: Hydrogen/Nickel Oxide Battery Development
Performing Institution: Johnson Controls, Inc., Milwaukee, WI
Principal Investigator: R. Beauchamp

Project: Zinc/Redox Core Technology Development
Performing Institution: Lockheed Missiles and Space Company, Palo Alto, CA
Principal Investigator: R. P. Hollandsworth

Project: Aluminum/Air Technology Development
Performing Institution: Eltech Systems Corporation, Fairport Harbor, OH
Principal Investigator: E. Rudd

Battery Technology Improvement

Project: Materials Durability in the Zinc/Bromine System
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: C. Arnold, Jr.

Project: Advanced Membrane Development for the Zinc/Bromine System
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: C. Arnold, Jr./R. Assink

Project: Beta"-Alumina Electrolyte Failure Analysis
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: E. Beauchamp

Project: Beta"-Alumina Electrolyte Development
Performing Institution: Ceramtec, Inc., Salt Lake City, UT
Principal Investigator: J. Rasmussen

Battery Technology Evaluation

Project: Sodium/Sulfur Cell Component Stress during Freeze/Thaw Cycling
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: J. W. Braithwaite

Project: Sodium/Sulfur Battery Cathode Container Chrome Plating Study
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: W. D. Bonivert

Project: Advanced Battery Testing and Evaluation
Performing Institution: Argonne National Laboratory, Argonne, IL
Principal Investigator: W. DeLucca

Project: Advanced Battery Systems Performance
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: J. M. Freese/P. C. Butler

Project: Laboratory Testing of Zinc/Bromine Batteries
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: P. C. Butler/J. M. Freese

Project: High-Voltage Zinc/Bromine Battery Testing
Performing Institution: Johnson Controls, Inc., Milwaukee, WI
Principal Investigator: M. Eskra

Project: Laboratory Testing of Sodium/Sulfur Cells
Performing Institution: Sandia National Laboratories, Albuquerque, NM
Principal Investigator: P. C. Butler/J. M. Freese

Project: Post-Experimental Evaluations of Sodium/Sulfur Cells
Performing Institution: Argonne National Laboratory, Argonne, IL
Principal Investigator: J. Smaga

Project: Wind/Battery Field Test Experiment
Performing Institution: University of Hawaii, Honolulu, HI
Principal Investigator: R. Neil

THERMAL ENERGY STORAGE

Lead Centers: Oak Ridge National Laboratory, Oak Ridge, TN
Pacific Northwest Laboratory, Richland, WA

Diurnal Thermal Storage

Project: Diurnal/Industrial Thermal Energy Storage Program Management
Performing Institution: Oak Ridge National Laboratory, Oak Ridge, TN
Principal Investigator: J. Tomlinson

Project: Evaporative Heat Transfer
Performing Institution: University of Tennessee, Knoxville, TN
Principal Investigator: R. V. Arimilli

Project: Slurry Heat Transfer
Performing Institution: Argonne National Laboratory, Argonne, IL
Principal Investigator: K. E. Kasza

Project: Heat of Mixing with Conjugating Binary Systems
Performing Institution: Polytechnic University of New York, Brooklyn, NY
Principal Investigator: L. I. Stiel

Project: Incorporation of PCMs into Building Construction Materials
Performing Institution: University of Dayton Research Institute, Dayton, OH
Principal Investigator: I. O. Salyer

Project: Effects of Dopants on Solid State PCMs
Performing Institution: University of Nevada, Reno, NV
Principal Investigator: D. Chandra

Project: Mixed Polyalcohol Solid State Phase Change Materials
Performing Institution: Solar Energy Research Institute, Golden, CO
Principal Investigator: D. Bensen

Industrial Thermal Storage

Project: Solid State Radiative Heat Pump
Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA
Principal Investigator: P. H. Berdahl

Project: Thermochemical Conversion and Storage Using Small Particles as the Heat Exchanger and Catalyst
Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA
Principal Investigator: A. J. Hunt

Project: Development of a Complex Compound Chill Storage System
Performing Institution: Rocky Research, Inc., Boulder City, NV
Principal Investigator: U. Rockenfeller

Project: Composite Media Development/Evaluation
Performing Institution: Institute of Gas Technology, Chicago, IL
Principal Investigator: R. Petri

Project: Composite Phase Change Media Evaluation
Performing Institution: Oak Ridge National Laboratory, Oak Ridge, TN
Principal Investigator: M. Taylor

Project: Packed Bed Thermal Model
Performing Institution: Mississippi State University, Starkville, MS
Principal Investigator: G. A. Adebiyi

Project: TES Media Evaluation and Field Testing
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: J. Bates

Project: Salt-to-Air Direct-Contact Heat Exchanger
Performing Institution: Solar Energy Research Institute, Golden, CO
Principal Investigator: M. Bohn

Seasonal Thermal Storage

Project: Seasonal Thermal Energy Storage Project Management
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: L. D. Kannberg

Project: Deep Aquifer Test
Performing Institution: University of Minnesota, Minneapolis, MN
Principal Investigator: M. Hoyer

Project: Chill ATES Regional Flow Control Field Evaluation
Performing Institution: University of Alabama, University, AL
Principal Investigator: C. E. Brett

Project: Methods to Counter Regional Flow Effects on ATES
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: L. W. Vail

Project: Electric Resistivity ATES Monitoring (Seismo-electric Probe)
Performing Institution: Lawrence Berkeley Laboratory, Berkeley, CA
Principal Investigator: C. Tsang

Project: Geochemical Dynamics of ATES
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: E. A. Jenne

Project: ATES Expert System
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: L. W. Vail

Project: Numerical Modeling of ATES
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: L. W. Vail

Project: Microbiologic Assessment of ATES
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: J. K. Fredrickson

Project: Technical Assessment of Thermal Energy Storage Technologies
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: D. R. Brown

Project: Impact Assessment of Thermal Energy Storage Technologies
Performing Institution: Pacific Northwest Laboratory, Richland, WA
Principal Investigator: R. O. Weijs

CHEMICAL/HYDROGEN SYSTEMS

Lead Center: Brookhaven National Laboratory, Upton, NY

Project: Chemical/Hydrogen Energy Systems Project Management
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: A. Mezzina/M. Bonner

Project: BNL In-House R&D Support to Chemical/Hydrogen Systems Projects
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: A. Mezzina/C. Linkous

Project: Cold Storage of Hydrogen on Activated Carbon
Performing Institution: Syracuse University, Syracuse, NY
Principal Investigator: J. A. Schwartz

Project: High-Temperature Water Vapor Electrolysis
Performing Institution: Westinghouse R&D Center, Pittsburgh, PA
Principal Investigator: N. J. Maskalick

Project: Hydrogen Production with Photoactive Semiconductor Catalysts
Stabilized by Metallized Plasma Polymer Coatings
Performing Institution: Battelle Columbus Laboratories, Columbus, OH
Principal Investigator: R. E. Schwerzel

Project: Hydrogen Technology Evaluation Center
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: P. D. Mertz

Project: International Energy Agency (IEA) Support
Performing Institution: Brookhaven National Laboratory, Upton, NY
Principal Investigator: A. Mezzina/M. Bonner

APPENDIX B

OFFICE OF ENERGY STORAGE AND DISTRIBUTION
ENERGY STORAGE PUBLICATIONS

APPENDIX B

OFFICE OF ENERGY STORAGE AND DISTRIBUTION

ENERGY STORAGE PUBLICATIONS

TECHNOLOGY BASE RESEARCH PROGRAM

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APPENDIX C

OFFICE OF ENERGY STORAGE AND DISTRIBUTION ENERGY STORAGE PRESENTATIONS

APPENDIX C

OFFICE OF ENERGY STORAGE AND DISTRIBUTION

ENERGY STORAGE PRESENTATIONS

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