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UNITED ENGINEERING FOUNDATION CONFERENCE RISK-BASED DECISIONMAKING IN WATER RESOURCES X

November 3 - 8, 2003
Santa Barbara, California

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**RISK-BASED DECISIONMAKING
IN WATER RESOURCES
X**

**Radisson Santa Barbara Hotel
Santa Barbara, California**

November 3 - 8, 2002

Conference Chair: Yacov Y. Haimés
University of Virginia

Conference Co-Chairs: David A. Moser, Eugene Stakhiv
US Army Corps of Engineers

Conference Liaison: Richard Fein

Local Coordinator: Antoinette Chartier

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Proceedings Editors: Yacov Y. Haimés, David A. Moser, Eugene Z. Stakhiv

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All meetings held in the *El Cabrillo Room* and all meals in *La Cantina*.

Sunday, November 3, 2002

- 17:30—18:30 CONFERENCE REGISTRATION
- 18:30—19:30 DINNER AND OPENING REMARKS—*La Cantina*

Monday, November 4, 2002

- 07:00—08:00 BREAKFAST BUFFET
- 08:15—08:30 **WELCOME REMARKS**—*El Cabrillo*
- Yacov Haimes, Conference Chair**
David Moser, Conference Co-chair
Dick Fein, UEF Conference Liaison
- 08:30—12:00 **SESSION 1—FIRST PLENARY SESSION**
Risks of Terrorism to the Homeland
- Chair: Yacov Y. Haimes, University of Virginia**
Rapporteurs: Kenneth Crowther, Bill Rowe
- **Yacov Y. Haimes, University of Virginia**
 - **Thomas Longstaff, Carnegie Mellon—Software Engineering Institute**
 - **Robert O'Connor, Pennsylvania State University/NSF**
 - **Joe Weiss, KEMA Consulting**
 - **Dan Willard, Indiana University**

Review of governmental activities starting with the President's Commission on Critical Infrastructures Protection (PCCIP) and the risks of terrorism to the homeland, focusing on the water resources system of systems.

- 10:00—10:30 COFFEE BREAK
- 10:30 **SESSION 1 RESUMES**
- 12:00—13:00 LUNCH
- 14:00—17:00 AD HOC SESSIONS and/or FREE TIME
- 17:00—18:00 SOCIAL HOUR—*La Cantina*
- 18:00—19:00 DINNER

19:00—21:30 **SESSION 2—The Vulnerabilities of the Homeland's Water Resources System of Systems**

Chair: S.K. Nanda, US Army Corps of Engineers

Rapporteur: Barry Ezell

- **Yacov Haimes, Jim Lambert**, University of Virginia
Reducing Vulnerability of Water Supply Systems to Attack
- **Joe Weiss**, KEMA Consulting
Technical Status of Cyber Security of Process Control Systems
- **Dan Willard**, Indiana University—Restoring the Everglades by Reducing the Potential Risk of Human Interference
- **Bob Patev**, US Army Corps of Engineers—Design and Planning of Infrastructure Projects Subjected to Extreme Events

The extent to which the Homeland's water resources system of systems is vulnerable to terrorism.

21:30—22:15 SOCIAL HOUR

Tuesday, November 5, 2002

07:00—08:00 **BREAKFAST BUFFET**

08:00—12:00 **SESSION 3—Lessons Learned from Experience Dealing with Risks of Extreme Events: Part I**

Chair: Jim Lambert, University of Virginia

Rapporteur: Ruth Didican

- **Jim Lambert**, University of Virginia—Infrastructure Terrorism Risks Characterized by the Superposition of Networks
- **David Bowles**, Utah State University
Extreme Events in Dam Safety Risk Assessment
- **Scott Person**, Applied Biomathematics
Terrorism's Implications for Uncertainty Calculi
- **Istvan Bogardi**, University of Nebraska
The Probabilistic versus Fuzzy Logic Paradigm in Risk Analysis
- **Thomas Longstaff**, Carnegie Mellon – Software Engineering Institute
Information Assurance and Cyber Security

What can the professional community learn from our past experience in dam safety, flood warning and evacuation, earthquake studies, and the management of risks of extreme events?

10:00—10:30 COFFEE BREAK

10:30 **SESSION 3 RESUMES**

12:00—13:00 LUNCH

14:00—17:00 AD HOC SESSIONS and/or FREE TIME

17:00—18:00 SOCIAL HOUR

18:00—19:00 DINNER

19:00—21:30 **SESSION 4—Lessons Learned from Experience Dealing with Risks of Extreme Events: Part II**

Chair: Robert O'Connor: National Science Foundation

Rapporteur: Joost Santos

- **John Saunders**, National Defense University—**A Dynamic Risk Model for Information Technology Security in a Critical Infrastructure Environment**
- **Pete Loucks**, Cornell University—**Quantifying and Communicating Model Uncertainty for Decisionmaking in the Florida Everglades**
- **Vicki Bier**, University of Wisconsin-Madison
Game-theoretic Models for Critical Infrastructure Protection
- **Stan Kaplan**, Food Safety and Inspection Service, USDA
On the Application of the General Theory of Quantitative Risk Assessment (GTQRA) to Combating Terrorism
- **Nick Matalas**, Hydrologist—**Perspectives on the Characteristics of the Vulnerability of Water Resource Systems to Nature and Terror**

Extreme and catastrophic events are often underestimated and commensurated in the risk assessment and management process with other more likely or less consequential events. Identify theory and methodology that can be adapted to address the risks of terrorism to the Homeland's water resources system of systems.

21:30—22:15 SOCIAL HOUR

Wednesday, November 6, 2002

07:00—08:00 BREAKFAST

08:00—12:00 **SESSION 5—The Interconnectedness and Interdependencies between the Water Resources System of Systems and Other Infrastructures**

Chair: Istvan Bogardi, University of Nebraska

Rapporteur: Ron Conner, USACE

- **Barry Ezell, Old Dominion University**
Vulnerability Assessment of Critical Infrastructures
- **Joost Santos, University of Virginia—Demand-Reduction Input-Output (I-O)**
Inoperability Modeling of Infrastructure Interconnectedness
- **Robert O'Connor, Pennsylvania State University/NSF—Belief Systems and Reducing Risks from Terrorism**
- **Dan Willard, Indiana University—Critical Infrastructures and Ecology**

How to model, assess, and manage the risks of terrorism to the homeland's water resources system of systems, focusing on the interconnectedness and interdependencies with other infrastructures.

10:00—10:30 COFFEE BREAK

10:30 **SESSION 5 RESUMES**

12:00—13:00 LUNCH

14:00—17:00 AD HOC SESSIONS and/or FREE TIME

17:00—18:00 SOCIAL HOUR

18:00—19:00 DINNER

19:00—21:30 **SESSION 6—Perspectives of Infrastructure Survivability**

Chair: Dave Moser: US Army Corps of Engineers

Rapporteur: John Saunders

- **Ron Conner, US Army Corps of Engineers**
Economic Consequences and Disaster Response

- **Lew Podolske, Office of Homeland Security**
Overview of Economic Consequences Policy Coordinating Committee on Economic Recovery Strategy for Large-Scale Disasters
- **David Bowles, Utah State University**
GIS Model for Predicting Dam Failure Consequences

Explore risk-benefit-cost justifications for the assurance of survivability of critical water resource infrastructures.

21:30—22:15 SOCIAL HOUR

Thursday, November 7, 2002

07:00—08:00 BREAKFAST BUFFET

08:00—12:00 **SESSION 7—Institutional and Organizational Restructuring**

Chair: Gene Stakhiv, US Army Corps of Engineers
Rapporteur: Scott Ferson

- **Lew Podolske, Office of Homeland Security**
Restructuring for Emergency Response to Large-Scale Disasters
- **Bill Rowe, Rowe Research & Engineering Associates, Inc.**
Vulnerability to Terrorism: Addressing the Human Variables
- **Ed Hecker, US Army Corps of Engineers**
Restructuring for Emergency Response to Large-Scale Disasters
- **Yacov Haimes, University of Virginia**
The Role of Modeling in the Assessment and Strategic Management of Risks of Terrorism to Our Homeland

Are current institutions and organizations at the federal, state, and local levels adequate to address the risks of terrorism to the Homeland's water resources system of systems? If not, what should be done?

10:00—10:30 COFFEE BREAK

10:30 **SESSION 7 RESUMES**

12:00—13:00 LUNCH

14:00—17:00 AD HOC SESSIONS and/or FREE TIME

17:00—18:00 SOCIAL HOUR

18:00—19:00 CONFERENCE CLOSING DINNER

19:00—21:30 **SESSION 8—Panel Discussion: Synthesis—
What Does It All Mean?**

Chair: Yacov Y. Haimes: University of Virginia
Rapporteur: Jim Lambert

- **Nick Matalas**, Hydrologist
- **Bill Rowe**, QURENT Systems, Inc.
- **Gene Stakhiv**, US Army Corps of Engineers
- **Stan Kaplan**, Food Safety and Inspection Service, USDA
- **Vicki Bier**, University of Wisconsin-Madison
- **Scott Ferson**, US Army Corps of Engineers
- **Yacov Haimes**, University of Virginia

21:30—22:15 SOCIAL HOUR

Friday, November 8, 2002

07:00—08:15 BREAKFAST BUFFET

08:30—9:30 SUMMARY and CONCLUSION OF CONFERENCE