

U.S. Consumer Product Safety Commission
LOG OF MEETING

2001 JAN 11 P 3:29

SUBJECT: Electrical-Related Product Safety Activities at CPSC, presented at the Sixth International Conference on Electrical and Electronic Products.

DATE OF MEETING: January 9, 2001

LOG ENTRY SOURCE: William H. King, Jr., ES *W.H.K.*

DATE OF LOG ENTRY: January 10, 2001

LOCATION: Greenbrier Hotel, White Sulphur Springs, WV

CPSC ATTENDEE(S): William H. King, Jr., ES

NON-CPSC ATTENDEE(S):

Carlos Hilado, Conference Director, Product Safety Corporation
Rolland Phillips, West Virginia Development Office
Raymond Dawson, Albemarle Corporation
Susan Landry, Albemarle Corporation
Wilber Powers, Southwire Company
Cynthia Lewis, Beveridge & Diamond P.C.
Wils Cooley, West Virginia University
Deborah Smith, Charleston Area Medical Center
Ronald Sheinson, Naval Research Laboratory
Gordon Gillerman, Underwriters Laboratories Inc.
David Yarbrough, Tennessee Technological University
Donald Olander, B.F. Goodrich Aerospace
Harold Gibson, Jackson County Office of Emergency Services
and other attendees at the conference (see attached list)

CPSA 6 (b)(1) Cleared

No. of Products Identified

Excepted by

Firms Notified,

Comments Processed.

SUMMARY OF MEETING: Mr. King was the session chairman for the Session on Electrical and Electronic Products (at the Sixth International Conference on Electrical and Electronic Products sponsored by the Product Safety Corporation). Mr. King provided remarks based on the report "Review of Federal Programs for Wire System Safety", dated November 2000, prepared by the National Science and Technology Council. A copy of the material presented is attached.

**Thirty-Second International Conference on Fire Safety
Fourteenth International Conference on Thermal Insulation
Sixth International Conference on Electrical and Electronic Products**

January 8 to 10, 2001

**The Greenbrier
White Sulphur Springs, West Virginia**

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PROGRAM

Registration at 8:30 a.m. each morning
Introduction of participants at 9:00 a.m. each morning
Sessions start at 9:15 a.m. each morning

Monday, January 8, 2001

Session on Buildings, Furnishings, and Plastics

Chairman: Gordon H. Damant, Inter-City Testing & Consulting Corporation

Recent Developments in Flammability of Furnishings

Gordon H. Damant, Inter-City Testing & Consulting Corporation

What Fire Statistics Tell Us About Our Building Codes for Housing and Small Buildings

Leslie R. Richardson, Forintek Canada Corporation
title to be announced

Sterling Lewis Jr., West Virginia State Fire Marshal

Application of Fire Safety Engineering in Europe

Bent-Erik Carlsen, BC-Consulting Inc.

Fire Safety of Polymeric Materials in Buildings and Furnishings

Giuliana C. Tesoro, Philadelphia University

Some Critical Parameters and Their Effect on Cigarette Ignition Propensity

Arthur M. Ihrig, Lorillard Research

e Safety in Industrial Parks

Jack D. Burlingame, Jackson County Development Authority

Mechanical and Flammability Properties of Virgin and Recycled Polymers

Masud K. Khan, Central Queensland University

Carlos J. Hilado, Product Safety Corporation

Rakesh K. Gupta, West Virginia University

Economic Impact of Fire Safety on the Supply Chain from Manufacturing to Retail

Harold E. Gibson, Jackson County Office of Emergency Services

Additional papers

Session on Thermal Insulation

Chairman: David W. Yarbrough, Tennessee Technological University

The Regulation of Asbestos-Containing Thermal Insulation Under the Clean Air Act

W. Leonard Womble, West Virginia Division of Environmental Protection

Practical Application of Insulation

Bud Turner, Prime Insulation

Current Issues in the Thermal Insulation Industry

Group Discussion

Additional papers

Tuesday, January 9, 2001

Session on Thermal Insulation (continued)

Chairman: David W. Yarbrough, Tennessee Technological University

Industrial Insulation for Savings and Safety

David W. Yarbrough, Tennessee Technological University

Thermally Insulating Carbon Foams

Darren K. Rogers, Touchstone Research Laboratory

New Applications for Intumescence

James Baker, B. F. Goodrich Aerospace

Additional papers

Session on Electrical and Electronic Products

Chairman: William H. King Jr., U.S. Consumer Product Safety Commission

Electrical Safety Activities at the Consumer Product Safety Commission

William H. King Jr., U.S. Consumer Product Safety Commission

Sustainable Fire Safety in Electrical and Electronic Equipment

Raymond B. Dawson and Susan D. Landry, Albemarle Corporation

Intumescent FR Polyolefin Technology in Electrical Applications

Michael J. Keogh, M. J. Keogh & Associates

Enhanced Non-Metallic Cables Used in Homes

Wilber F. Powers Jr., Southwire Company

International Environmental Regulatory Restrictions on Fire Retardants

Cynthia A. Lewis, Beveridge & Diamond P.C.

An Overview of the Activities of the Computer Science and Electrical

Engineering Department at West Virginia University

Wils. L. Cooley, West Virginia University

Performance Improvement Metrics for Safety

Deborah L. Smith, Charleston Area Medical Center

Additional papers

Session on Transportation

Chairman: to be announced

Shipboard Water Mist Fire Protection

Ronald S. Sheinson, Naval Research Laboratory

Additional papers

Wednesday, January 10, 2001

Session on Transportation (continued)

Chairman: to be announced

NASA Research in Aviation Fire Safety

Douglas A. Rohn, NASA Glenn Research Center

Royalite Plastics in Air and Ground Transportation

Nancy R. Concepcion, Spartech Plastics

UN/DOT Classification of Potentially Explosive and Self-Reacting

Substances for Transport: Tests and Criteria

James C. Mulligan, Chilworth Technology Inc.

An Overview of Railroad Safety

Ira P. Baldwin, West Virginia Public Service Commission

Preplanning of Water Supply for Fires on Elevated Highways

Thomas D. Miller, Sissonville Fire Department

Aircraft Rescue Technology for Post-Crash Fires

Joseph A. Wright, Federal Aviation Administration

Safety at Tri-State Airport

Jeffrey B. Hager, Tri-State Airport

Safety at Raleigh County Airport

Thomas R. Cochran, Raleigh County Airport

Safety at Greenbrier Valley Airport

Jerry O'Sullivan, Greenbrier Valley Airport

Pocket Plans for Dealing with Potentially Toxic Releases

William H. White, Kanawha County Department of Public Safety

Additional papers

This program is subject to change.

Continued on other side

Persons Whom You May Meet at the

**Thirty-Second International Conference on Fire Safety
Fourteenth International Conference on Thermal Insulation
Sixth International Conference on
Electrical and Electronic Products**

(List prepared on January 3, 2001)

James Baker, B. F. Goodrich Aerospace
Ira P. Baldwin, West Virginia Public Service Commission
Bobby Bush, Hickory Springs
Bent-Erik Carlsen, BC-Consulting Inc.
Thomas R. Cochran, Raleigh County Airport
Nancy R. Concepcion, Spartech Plastics
Wils. L. Cooley, West Virginia University
Gordon H. Damant, Inter-City Testing and Consulting Corporation
Raymond B. Dawson, Albemarle Corporation
Harold E. Gibson, Jackson County Office of Emergency Services
✓ Gordon Gillerman, Underwriters Laboratories
Carlos J. Hilado, Product Safety Corporation
Arthur M. Ihrig, Lorillard Research
Michael J. Keogh, M. J. Keogh & Associates
William H. King Jr., U.S. Consumer Product Safety Commission
Susan D. Landry, Albemarle Corporation
Cynthia A. Lewis, Beveridge & Diamond P.C.
Thomas D. Miller, Sissonville Fire Department
James C. Mulligan, Chilworth Technology Inc.
Donald E. Olander, B. F. Goodrich Aerospace
Rolland R. Phillips, West Virginia Development Office
Wilber F. Powers Jr., Southwire Company
Leslie R. Richardson, Forintek Canada Corporation
Jerry O'Sullivan, Greenbrier Valley Airport
Rudy L. Raynes, Assistant West Virginia State Fire Marshal
Darren K. Rogers, Touchstone Research Laboratory
Douglas A. Rohn, NASA Glenn Research Center
Ronald S. Sheinson, Naval Research Laboratory
David M. Smith, St. Francis Hospital
Deborah L. Smith, Charleston Area Medical Center
Elaine Thompson, Allied Tube and Conduit
Bud Turner, Prime Insulation
William H. White, Kanawha County Department of Public Safety
W. Leonard Womble, West Virginia Division of Environmental Protection
Joseph A. Wright, Federal Aviation Administration
David W. Yarbrough, Tennessee Technological University
Michael A. Zawadzki, Lorillard

Review of Federal Programs for Wire System Safety

**National Science & Technology Council
Committee on Technology**

Wire System Safety Interagency Working Group

Background

- Gore Commission Feb 1997 - Aging Wiring in Aircraft
- FAA/NASA/DOD initiate Aging Wire Programs
- NASA Shuttle Safety Report May 2000 - Aging Wiring and Issue Beyond Aviation
- OSTP Initiates NSTC IWG May 10 - Calls for the formation of Wire System Safety Interagency Working Group Under Technology Committee
- First WSSIWG Meeting June 2- 14 Agencies
- Terms of Reference Complete
- Report to the President November 2000
- National Wire System Safety Strategy March 2001

Wire System Safety Interagency Working Group

Consumer Product Safety
Commission

Department of Commerce

Department of Defense

Office of the Secretary of Defense

United States Air Force

United States Navy

United States Army

Department of Energy

Department of Transportation

Federal Aviation Administration

Federal Railroad Administration

Federal Transit Administration

US Coast Guard

Food and Drug Administration

National Aeronautics and Space
Administration

National Science Foundation

Nuclear Regulatory Commission

In addition, the following organizations are
represented on the WSSIWG:

Defense Nuclear Facilities Safety Board

Office of Management and Budget

Office of Science and Technology Policy

National Partnership for Reinventing
Government

National Transportation Safety Board
(observer)

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Organization of Report

- Introduction
- Potential Wiring Safety Issues
- Current Practices
- Current Science & Technology (S&T) Initiatives
- Analysis of Current Practices and S&T Initiatives
- Conclusions & Recommendations

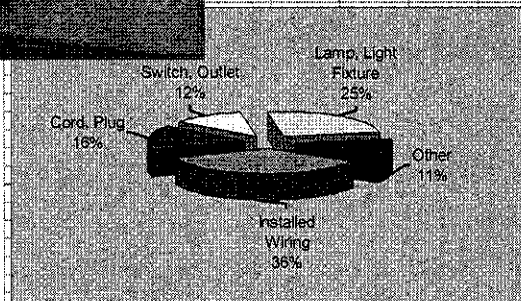
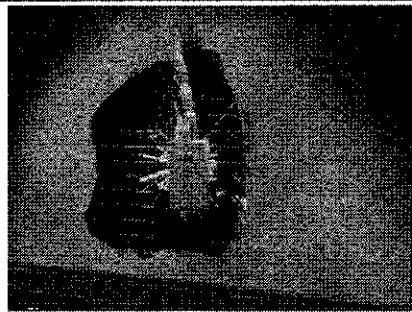
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Introduction

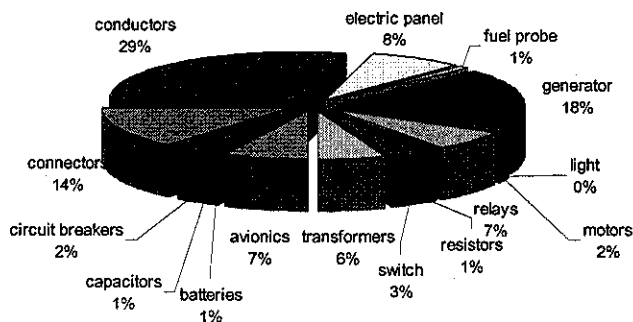
- Significance of wire system safety
- Background on aging of wiring systems issue
- Scope, membership, & mission of Wire System Safety Interagency Working Group (WSSIWG)

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In 1997 home wire systems caused over 40,000 fires which resulted in 250 deaths and over \$670 million of property damage.



Electrical components contributing to Air Force aircraft mishaps.



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Mission of WSSIWG

1. Define processes for federal agencies to collaborate on S&T initiatives in wire system safety.
2. Provide mechanisms for federal agencies to collaborate with industry, national laboratories, and academia.
3. Provide strategic direction for federal investment in wire system safety.
4. Accelerate development of advanced technology in wire system safety.
5. Ensure that the results of federal S&T initiatives are communicated in a timely way to facilitate their rapid implementation with the goal of improving public health and safety.

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Potential Wire Safety Issues

- Environmental Stress - Chafing, embrittlement, and corrosion
- Improper installation
- Mishandling of wiring during maintenance
- Accumulated damage as wire ages

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Current Practices

- Conformance with existing regulations, codes, and standards and revisions to them.
- Training of inspectors and mechanics.
- Inspection, assessment, and maintenance of wire.
- Engineering improvements.
- Safety investigations.
- Analysis of wire system data.
- Exchange of technical information.

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Current S&T Initiatives

- **Diagnostics:** non-destructive evaluation (NDE) techniques, inspection and detection technologies, and monitoring sensors for identifying wire system defects.
- **Failure Mechanisms:** causes and models of wire system failure and to analyze maintenance data.
- **Interconnection Technologies:** improved connectors, such as circuit breakers and in wire systems, training, management tools, and advanced distribution technologies, such as modular wiring, fiber optics, and wireless technologies.
- **New Materials:** new materials for wire system components, such as conductors and insulation including novel approaches for wire systems such as the application of microelectronic machine technology.

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Table 2. Current federal initiatives in wire system safety S&T.

Project Title	Sponsor(s)	Performers	Phase	Description of Project
Diagnostics				
Measurement of advanced NDE techniques for wiring	DOD (AFRL/MLSA)	AFRL/MLSA	2000	Initiate advanced NDE techniques for wiring to include most promising techniques.
Improvement of wire system integrity for legacy aircraft	DOD (ASCSMA)	AFRL/MLSA	2000-2002	Develop a prototype wire-testing system that can be used in the field to monitor wiring integrity and locate wire system failures.
Smart wire	DOD (ONR)	Naval Air Station (NAVAIR)	1999-2004	Develop an aircraft wire system with embedded diagnostic and prognostic capabilities to monitor the "health" of the aircraft wire system and allow corrective action to be taken prior to failure.
Develop condition-monitoring techniques for electrical cables	DOE and EPRI (joint management)	To be determined	2000-2001	Improve training of inspectors who perform visual and manual inspection of cables in nuclear power plants by developing cable specimens, whose aging has been accelerated, for use as training aids.
Task 2: Evaluate existing electrical NDE techniques	Ontario Power Generation Research Laboratory			Under simulated conditions, perform proof-testing of NDE method that uses ionized gas to provide a ground plane for unshielded cables. Perform proof-testing to determine if use of the test method can be expanded from detection of severe damage in wires to detection of partial damage and deterioration.
Task 3: Investigate molecular profiling and density measurements for cable polymer aging assessment	Florida National Laboratories			Determine correlation between microstructural measurements and mechanical degradation of nuclear jetted materials (polymers) and insulation.
Task 4: Compile condition-monitoring database	To be determined			Compile available condition-monitoring data from research organizations, universities and utilities. Identify sources of information and cost of obtaining information. The database would be used for comparison with cables in the field or those removed from service.

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Common Findings

- Faulty wiring poses a risk to public health and safety; it may lead to failure of essential functions and even to smoke and fire.
- Managing aging wire systems is expensive and time-consuming.
- Inspection, testing, and maintenance of wire systems is a technical challenge.
- Most diagnostic procedures can detect only “hard failures” that result in serious deterioration of electrical integrity.
- Our knowledge about how wire systems age and how they fail is limited.

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Common Findings

- There are limitations to our electrical codes and standards.
- Wire systems are becoming more complex with increasing computerization of operations and of information about those operations.
- Wire system maintenance is very expensive and it is difficult to get funding to address wiring issues before a system break down.
- Current practices flow from – and are limited by – the current state-of-the-art of wire systems technology in terms of design, installation, diagnosis and maintenance.

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Conclusion

Wire system safety is a national public health and safety issue that transcends government agencies.

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Recommendations

- Four basic strategies are necessary to improve wire system safety:
 - Altering the perception of wire systems.
 - Increasing collaboration between industry, academia, and the government.
 - Improving the management and functionality of wire systems.
 - Improving wire system technology.

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Altering the perception of wire systems.

- **Change the status of wire systems:**
 - Wiring is often treated as a “fit and forget” commodity rather than as an indispensable system.
- **Emphasize prevention of damage through prognostics and diagnostics:**
 - Damaged parts of a wire system must be located in a non-intrusive way, before the system fails to function properly or to function at all.

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Increasing collaboration among industry, academia, and the government

- **Improve data collection and sharing:**
 - It would be hard to over-emphasize the importance of good quantitative data. There is currently no common database across industry, academia, and the government and no common method for disseminating data.
- **Facilitate communication:**
 - A partnership between industry, academia, and the government is essential to develop synergy and to take advantage of the abundant experience and expertise in wire system safety.
- **Maintain a focused and disciplined approach:**
 - Identify the principal risks, develop priorities for addressing these risks, and evaluate methods for

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Improving the management and functionality of wire systems

- **Develop standardized design tools:**
 - These tools should alert those who design, maintain, and operate wire systems to conditions that may cause system failures or jeopardize system redundancy or increase the system's susceptibility to crossover voltage, (e.g., mixing power- and signal- carrying circuits).
- **Develop inspection and maintenance tools:**
 - These tools include improved prognostic and diagnostic technologies.
- **Develop procedures for response to malfunctions:**
- **Support training for installation, inspection, and maintenance of wire systems:**

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Developing advanced wire system technology

- **Promote proactive technology development and use:**
 - Wireless, micro-electronic, multiplexing, and fiber-optic technologies offer great promise in reducing reliance on multiple copper conductors.
- **Promote use of new technology.**
 - The government needs to remove obstacles and otherwise encourage its use.

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Next Steps

- Educate People of the Problem
- By March WSSIWG Meeting
 - National Wire System Safety Strategy
 - How we will implement the report
 - Communications and Coordination Plan
 - Between Federal Agencies
 - Government - Industry

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