

LOG OF MEETING

NEW TECHNOLOGIES TO PREVENT FIRES OF ELECTRICAL ORIGIN

SUBJECT: New Technologies to prevent electrical fires

PLACE: Consumer Product Safety Commission, Room 410B,
Bethesda, MD.

DATE OF MEETING: 21 April 1995, 9:00 A.M.

SOURCE OF ENTRY: Aaron Banerjee *AB*

COMMISSION ATTENDEES:

Aaron Banerjee	CPSC	(301)	504-0508x1393
Ed Krawiec	CPSC	(301)	504-0508x1297
Mai Ngo	CPSC	(301)	504-0508x1310
Bob Northedge	CPSC	(301)	504-0508x1302

NON-COMMISSION ATTENDEES:

Vince Baclewski	NEMA	(202)	457-8447
Robert Clarey	Cutler-Hammer	(412)	344-7571
Dave Dini	UL - Northbrook, IL	(708)	272-8800x42982
Frederick Franklin	PACE Inc, SCFP	(800)	722-3050
Ray Legatti	TRC	(813)	535-0572
Jim Pauley	Square D Co.	(606)	245-7923
Saul Rosenbaum	Leviton	(717)	631-6585
Jack Wells	Pass & Seymour/Legrand	(315)	468-8238
Sara Yerkes	NFPA	(703)	516-4346
John Young	Siemens E&A	(404)	496-8650

ATTACHMENTS:

1. Log of Meeting, Task Group on Innovative Technology, 11 Oct, 1994.
2. "Technology for Detecting and Monitoring Conditions that Could Cause Electrical Wiring System Fires", Copies of the transparencies used in Mr. Dini's presentation at the present meeting.

SUMMARY OF MEETING:

+ The purpose of this meeting was to discuss new technologies that are intended to prevent electrical fires.

CPSA 6 (b)(1) Cleared

7-25-98
AB
 No Mfrs/PrvtLbns or
Products Identified

Mr. Dini presented a report on several types of safety-related technologies. The presentation was adapted from work done for CPSC project # CPSC-P-94-1112. The technologies investigated included:

1. Arc detection
2. Circuit Breaker Trip Characteristic Enhancement
3. Innovate/Enhanced use of Ground Fault Protection
4. Supplemental Circuit Protection
5. Surge Protection

A discussion of the various technologies followed. With respect to arc detection, it was pointed out by Mr. Dini that it is very difficult to distinguish between "good" (reactive loads, contact closure, commutator arcing, etc.) and "bad" (due to a fault) arcs.

The details of Mr. Dini's presentation are given in attachment 2.

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Technology for Detecting and Monitoring Conditions that Could Cause Electrical Wiring System Fires

For U.S. Consumer Product Safety Commission

(CPSC-P-94-1112)

By Underwriters Laboratories Inc.

GANTT CHART - CPSC PROJECT CPSC-P.94-1112

TASK:	1994						1995					
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1 - Initial Meeting												
2 - Literature Search												
3 - Search for Unpublished Information												
4 - Acquisition of Specimens												
5 - Analysis of Products & Technology												
6 - Description & Assessment of Prod. & Tech.												
7 - Log Book & Monthly Reports												
8 - Final Report												
9 - Final Meeting												

CPSC TECHNOLOGY PROJECT PRODUCT DESCRIPTION

MFGR NO.	BRIEF DESCRIPTION
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ARC DETECTION TECHNOLOGY

+	#1	Arc Detection System for Home Wiring
✓	#2	Residential Circuit Breaker with Arc Detection Capability
✓	#3	Residential Circuit Breaker with Arc Detection Capability
✓	#4	Residential Circuit Breaker with Arc Detection Capability

CIRCUIT BREAKER TRIP CHARACTERISTIC ENHANCEMENT

✓	#5	Field Installable Circuit Breaker Module to Reduce Trip Time
+	#6	Internal Circuit Breaker Module to Reduce Trip Time

INNOVATIVE / ENHANCED USE OF GROUND FAULT PROTECTION

+	#7	30ma Ground Fault Circuit Interrupter for Home Use
✓	#8	Split-Bus Panelboard with Sub-Main Ground Fault Protection
✓	#9	Shielded Power Supply Cord with Ground Fault Protection

SUPPLEMENTAL CIRCUIT PROTECTION

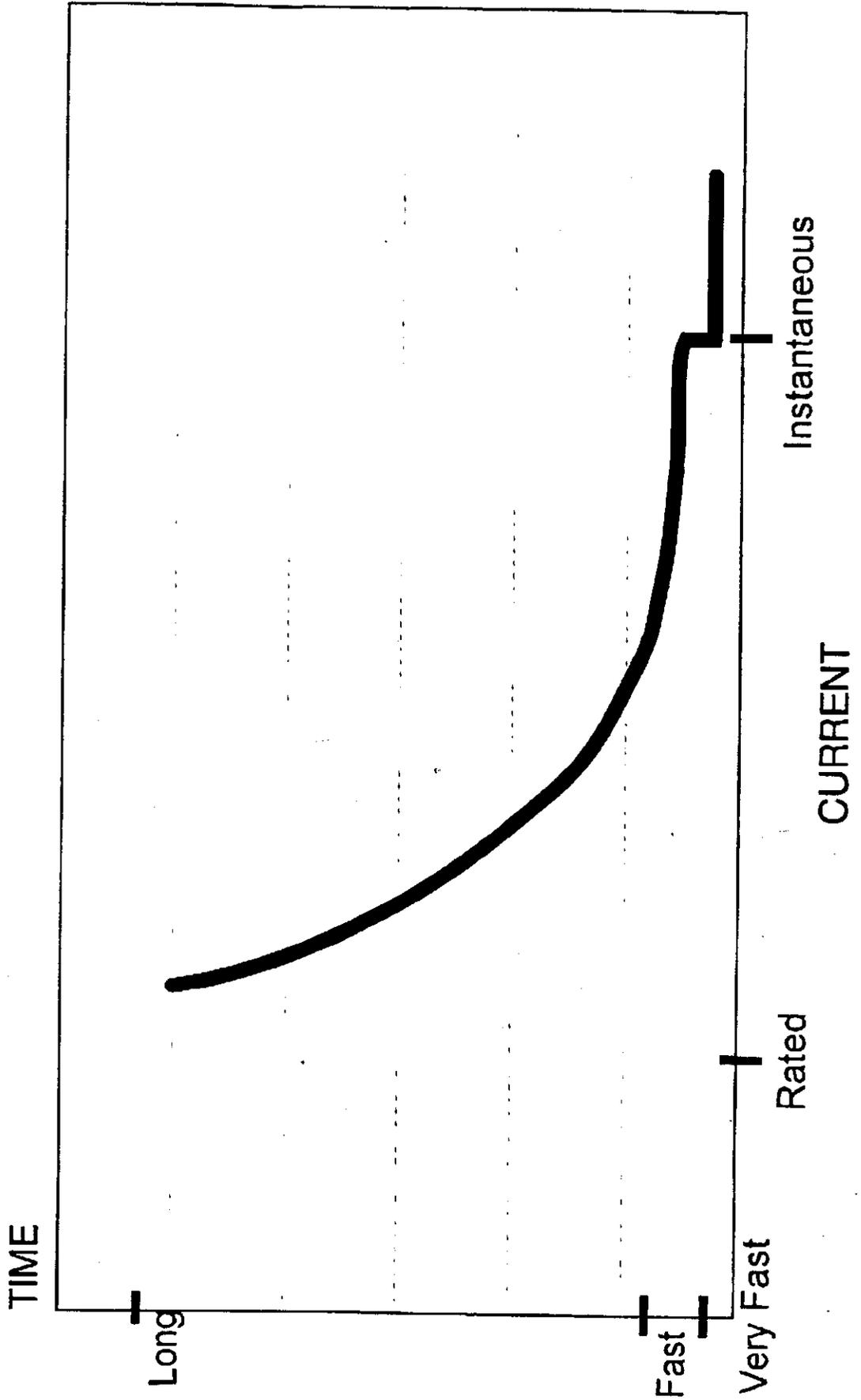
+	#10	Plug Adaptor with Overload Protection
+	#11	Receptacle Adaptor with Overload Protection
✓	#12	Fused Plug Adaptor

SURGE PROTECTION

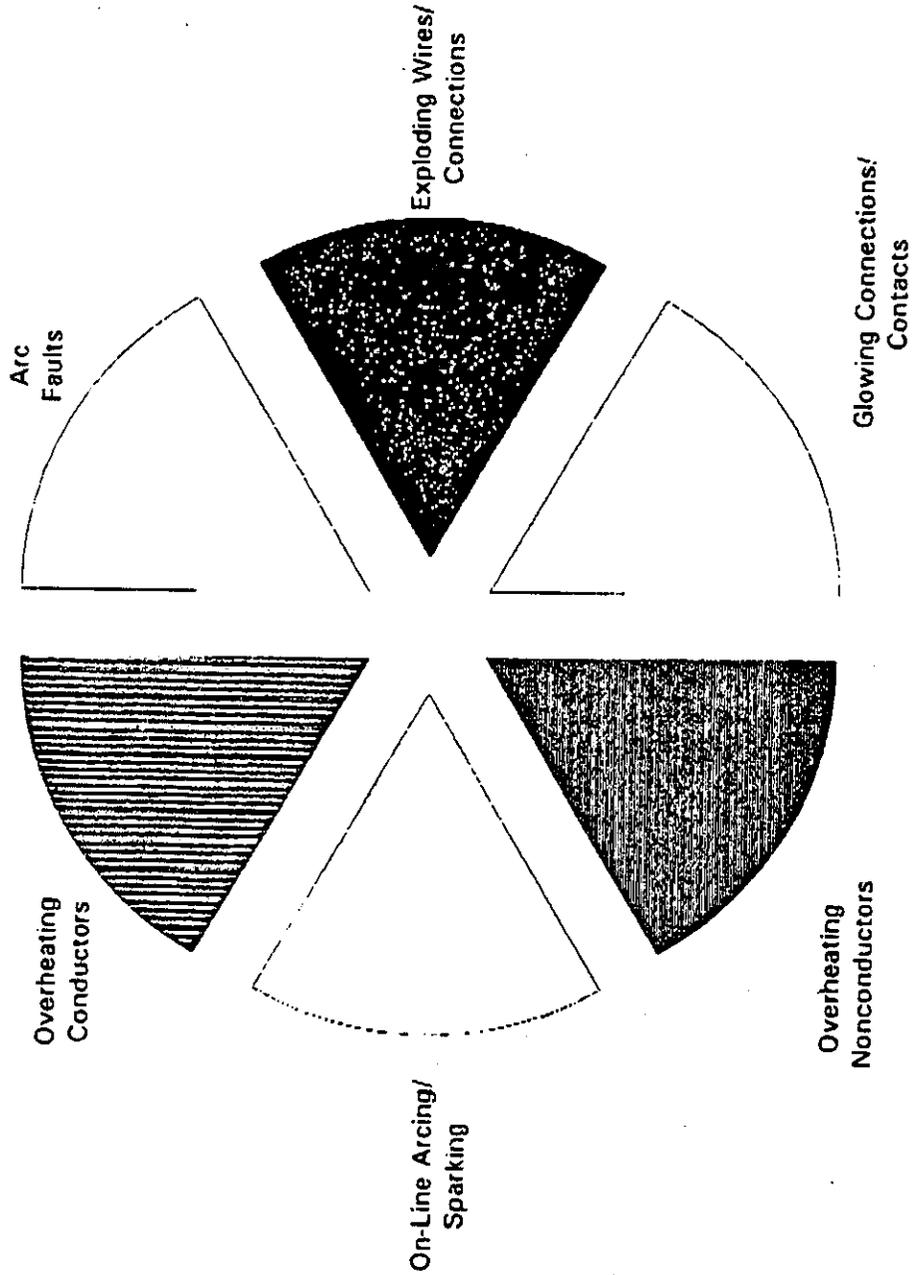
	#13	Whole-House Surge Protection
✓	#14	Meter Socket Adaptor with Surge and Overload Protection
	#15	Whole-House Surge Protection

✓ - Have Samples
+ - Samples Promised

OVERCURRENT PROTECTION TRIP CHARACTERISTICS



Electrical Distribution System Ignition Scenarios



How large is each slice of the "pie" ?

Task 5 - Analysis of products / technology

	Device No.														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Cost to Manufacture															
Ease of Installation & Maintenance															
Susceptibility to False Response															
Reliability															
Life Cycle Costs															
Efficacy															
Arc Faults															
Overheating Conductors															
On-Line Arcing/Sparking															
Glowing Connections/Contacts															
Exploding Wires/Contacts															
Overheating Nonconductors															

Arcing Faults

Series fault, across-the-line fault and ground fault

Fault current limited by circuit impedance

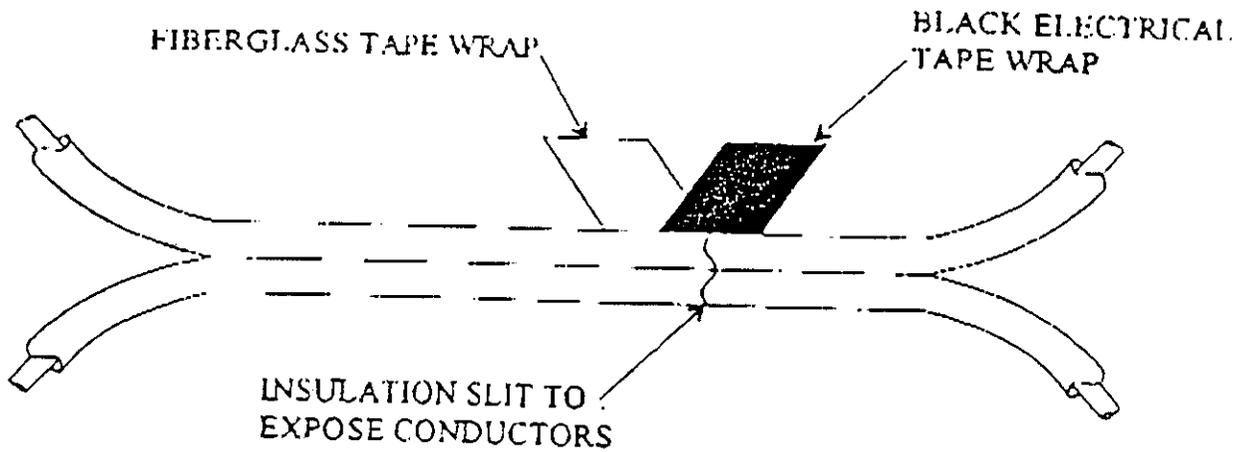
High arc temperatures are capable of igniting many combustibles

Three stages of development

- 1. Leakage (differential current)**
- 2. Tracking**
- 3. Arcing**

New technology may address a developing arc fault at any of the above stages

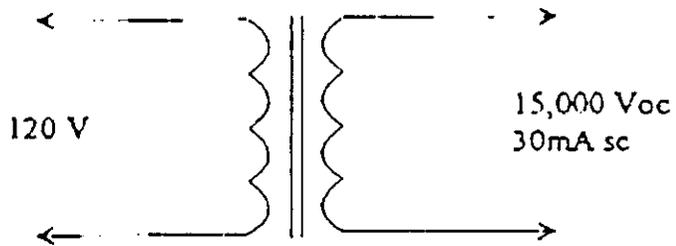
TEST SPECIMEN



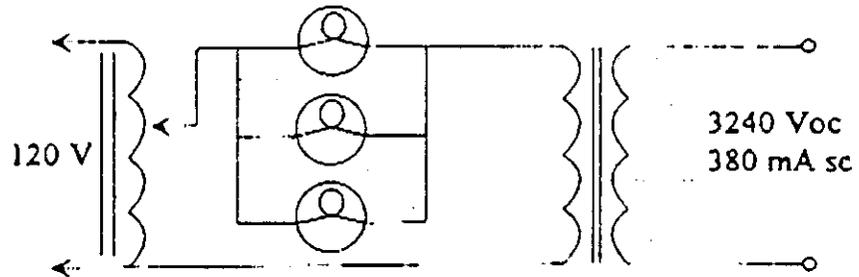
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16 AWG

MULTI-STEP METHOD OF PRODUCING A CARBONIZED PATH FAULT

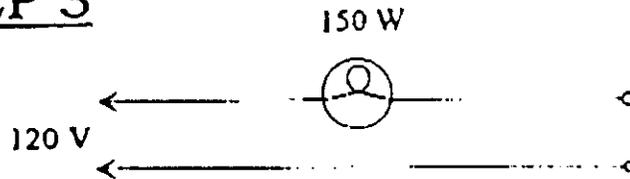
STEP 1



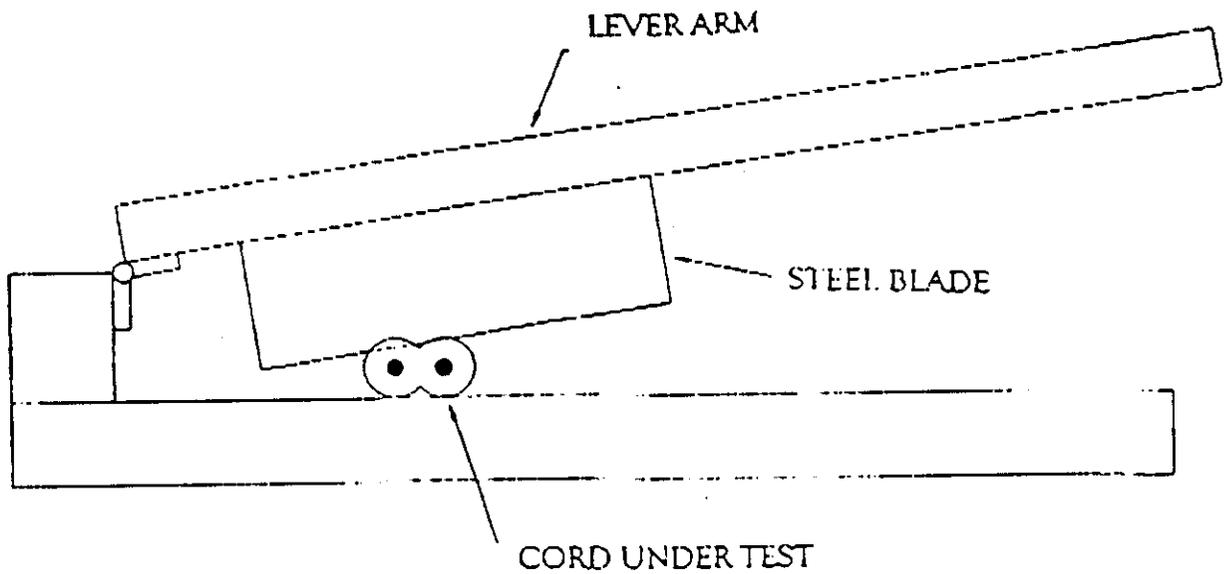
STEP 2



STEP 3



POINT CONTACT ARCING SHORT



LOG OF MEETING

DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: Task Group on Innovative Technology

DATE OF MEETING: October 11, 1994

PLACE: Room 410A, 4330 East West Highway, Bethesda, MD 20814

DATE OF ENTRY: December 10, 1994

SOURCE OF ENTRY: Dennis McCoskrie, ESEE 

COMMISSION ATTENDEES

- | | |
|------------------------|-------------------------|
| Bill King, ESEE | Larry Moskowitz, LSEL |
| Ed Krawiec, ESEE | Robert L. Northedge, ES |
| Dennis McCoskrie, ESEE | |

NON-COMMISSION ATTENDEES:

- Vladi F. Basch, Baltimore Gas & Electric Co.
- Edward S. Charkey, America Insurance Services Group
- Robert J. Clarey, Cutler Hammer
- Bob Dawley, Redtrol, Inc.
- David A. Dini, Underwriters Laboratories
- Robert Dunigan, National Assoc. of Electrical Distributers
- Michael F. Kliene, Mintz, Levin, Cohn, Ferris. Glovsky & Popeo
- Ray Legatti, Technology Research Corp.
- Terry Macalady, Cooper Industries, Bussman Division
- Jim Pauley, Square D Company
- Robert Petty, HouseMaster of America
- Saul Rosenbaum, Leviton Manufacturing Co., Inc.
- Steve Scully, National Association of Home Builders Research Center
- Nick Wakeman, Product Safety Letter
- John Young, Siemens Energy & Automation Inc., ITE

SUMMARY OF MEETING:

Mr. King opened the meeting by introducing Robert Northedge as the new project manager for the Home Electrical Systems Fires Project and announcing that he (Bill King) was resuming the Directorship of CPSC's Electrical Engineering Division.

Mr. Northedge identified the principal current components of the project:

- a. Rehabilitation Methods and Costs
- b. Encouraging Adoption of NFPA-73 (Residential Electrical Maintenance Code for One- and Two-Family Dwellings),
- c. Demonstration Rehabilitations of as Many as Four Typical Older Homes
- d. Innovative Technology (The subject of this meeting)

He stated that the principal effort to discover appropriate new technology was a research contract with Underwriters Laboratories and introduced the technical officer for the contract, Ed Krawiec.

Mr. Krawiec outlined the schedule and objectives of the contract and introduced David Dini, Research Engineer of Underwriters Laboratories. Mr. Dini reviewed the UL plan for executing the CPSC contract; a copy of the transparency/outline of his presentation is attached to this meeting log.

He entertained questions after presenting this review. Mr. Legatti asked for a technical definition of the active fault that a home wiring monitor should detect. Mr. Dini mentioned that experimentation with circuit-board materials had demonstrated ignition from 15-watt arcs. Others at the meeting stated that heat sources at power levels as low as 6 watts had ignited adjacent flammable materials.

Questions were raised as to the specific fire data that identified ignition sources that might have been detected by new devices. Mr. McCoskrie replied that no new specific analyses of residential system electrical fires had been conducted by CPSC since 1987.

Mr. Krawiec commented that an important characteristic of new residential system monitors would be whether periodic testing would be performed by the user or automatically by the device itself. He also reported that current investigations of circuit-breaker performance indicated that the majority of problems occur in the electro-mechanical portion of the system.

Mr. Northedge adjourned the meeting.

**Technology for Detecting and
Monitoring Conditions that Could
Cause Electrical Wiring System Fires**

For U.S. Consumer Product Safety Commission

(CPSC-P-94-1112)

By Underwriters Laboratories Inc.

Task 1

INITIAL MEETING

Technology for Detecting and Monitoring Conditions that Could Cause Electrical
Wiring System Fires

Task 2

Literature Search

Acquire relevant information regarding current technology for indication when conditions exist that could cause fires in household electrical wiring systems.

- Technical papers
- Foreign sources
- Patents

NERAC- Information Retrieval Service

Technology for Detecting and Monitoring Conditions that Could Cause Electrical Wiring System Fires

Task 3

Search for Unpublished Information

- **Manufacturers**
- **Trade Associations**
- **Inventors**
- **Researchers**

UL Client Database

Technology for Detecting and Monitoring Conditions that Could Cause Electrical
Wiring System Fires

Task 4

Acquisition of Specimens

Samples of products that show promise will be purchased or obtained from manufacturers.

Budget - \$3000

Task 5

Analysis of Products and Technology

- Analyze technical and product literature
- Consult with developers/inventors for relevant information
- Analyze most promising products in detail
 - Safety
 - Effectiveness
 - Technology innovation

Technology for Detecting and Monitoring Conditions that Could Cause Electrical
Wiring System Fires

Task 5 - Analysis of products / technology

	Device No.														
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Ease of Installation & Maintenance															
Susceptibility to False Response															
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Technology for Detecting and Monitoring Conditions that Could Cause Electrical Wiring System Fires

Task 6

Description and Assessment of Products and Technology

- **Describe principle of operation**
- **Describe the nature of the incident that the technology addresses**
- **Estimate benefit of the device**
 - **Fire source that the device may be able to detect**
 - **Cost-Benefit ratio**

Task 7

Log Book and Monthly Reports

- **Log Book**
 - Biweekly copies to CPSC
 - Given to CPSC at end of project
- **Monthly Reports**
 - Highlights
 - Progress reports
 - Significant developments
 - Budget reports

Task 8

Final Report

To contain reference to all material reviewed during the project, products and technologies evaluated, and people contacted.

CPSC to review draft report before finalized.

Task 9

FINAL MEETING

Technology for Detecting and Monitoring Conditions that Could Cause Electrical
Wiring System Fires

