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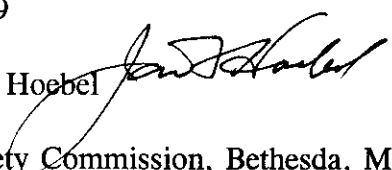
## LOG OF MEETING

**SUBJECT:** Fire Protection Research Foundation  
Research Advisory Council on Fire Detection & Alarm Futures

**DATE OF MEETING:** March 4, 1999

**DATE OF LOG ENTRY:** March 19, 1999

**PERSON SUBMITTING LOG:** James F. Hoebel



**LOCATION:** U.S. Consumer Product Safety Commission, Bethesda, MD

**CPSC ATTENDEE(S):** James F. Hoebel, Engineering Sciences  
Margaret Neily, Engineering Sciences

**NON-CPSC ATTENDEE(S):**

- Rick Mulhaupt, Chair, president, Fire Protection Research Foundation
- Frederick Conforti, Pittway Systems Technology Group
- Robert Elliott, Factory Mutual Research Corporation
- Daniel Gottuk, Hughes Associates
- Raymond Grill, Rolf Jensen & Associates
- Issac Papier, Underwriters Laboratories
- Gregory Turner, Honeywell

**SUMMARY OF MEETING:**

This second meeting of the Advisory Council was called to order at 8:50 am by Mr. Mulhaupt. The meeting is summarized in the attached draft, prepared by Mr. Mulhaupt.



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**FIRE DETECTION & ALARM FUTURES**

***Research Advisory Council Meeting***

at

U.S. Consumer Product Safety Commission  
Bethesda, MD

March 4, 1999

***Minutes***

Present:	Rick Mulhaupt, chair	Raymond Grill
	Frederick Conforti	James Hoebel
	Robert Elliott	Isaac Papier
	Daniel Gottuk	Gregory Turner

Margaret Neely of CPSC was a guest.

8:50 AM. Call to order.

Mr. Mulhaupt welcomed the Council and thanked Mr. Hoebel and CPSC for hosting the meeting. Unfortunately, a snowstorm in the Northeast had caused some Council members' flights to be cancelled. Notwithstanding, Mr. Grill arrived in the afternoon.

Meeting objectives were to review suggestions that had been submitted, to discuss the new CPSC detector performance initiative, to discuss The Foundation's new nuisance & false alarm study, and to begin to write recommendations.

Mr. Conforti moved acceptance of the minutes of the November 24, 1998 Council meeting with Council members' written submittals incorporated, and removing the "c" from Dr. Gottuk's name. Mr. Turner seconded, and the minutes were unanimously accepted.

Mr. Hoebel updated the Council on the Consumer Product Safety Commission's planning of a fire test program to evaluate the ability of detectors to respond to fires, currently nicknamed "Indiana Dunes II". CPSC has this in its FY2000 budget request. Its aim is to juxtapose modern fire alarm technologies and modern fire scenarios. CPSC wants to do a careful job of planning to adequately address issues that have lingered since the Indiana Dunes tests, and to minimize issues lingering after the CPSC tests. CPSC engineer Julie Ayres is heading the project. There are three planning task forces. Linda Smith of CPSC leads one on Fire Data & Analysis to help answer, among other questions: What kind of fires should the detectors be subjected to? All fires? "Serious" fires? Elizabeth Leland of CPSC leads the Technology task force, answering the questions: What types of alarms should be evaluated? Current technology? Near-market new technology? Julie Ayres leads the Test Method task group: How much should be done in small scale? How much in large scale? What's to be measured? What instrumentation? How many tests? As to next steps, the task groups are each to decide if/when to meet next. A possible additional task group would deal with tenability questions.

Mr. Papier urged several cautions about any test program. There are many more variables to account for now than were addressed in Indiana Dunes. Slow-building (smoldering to flaming transition) fires, and cold smoke particulate transport are among the major issues. He said that, typically, "detectors don't get heated" which indicates that thermally driven smoke is not typical.

Mr. Turner cautioned against getting pinned to comparisons between the new tests and Indiana Dunes. The crucial question will be how the new tests correlate with the real world. Conversely, it is very difficult to account for real world phenomena with "rules" and simulation models.

Dr. Gottuk said that there is a definite need to do a better job of characterizing fires. He asked what manufacturers are doing to identify and sense different particulates.

Mr. Conforti said that manufacturers' approach is to identify smoke constituents, rather than particulates. "Good" and "bad" combustions have many similarities, so it's very challenging to discriminate between good and bad. Steam, condensation and dust can be sorted out. Some thermal balance technology in combination with gas detection looks promising.

Mr. Turner agreed, adding that there is, as yet, nothing conclusive using good and bad particulates as markers for good and bad fires.

Mr. Conforti said the main motivator to developing and implementing new technology is litigation, and high-profile events such as Chicago's CO episodes. Manufacturers need relief from litigation exposure, and to break the bounds of listing requirements that do not encourage improvement.

Mr. Papier said fire safety needs a better understanding of, and consensus on the meaning of, tenability.

Dr. Gottuk agreed, saying this is a performance-based problem. He suggested there should be a database of hazardous conditions. He noted work by David Purser (BRE/FRS) on tenability and incapacitation to reach an exit, reported at The Foundation's symposium on suppression and detection. Mr. Turner asked what Dr. Purser is looking at. Mr. Mulhaupt said that Purser's work and a new International Standards Organization Standard (13571) are to shift emphasis from the effects of toxic asphyxiants, to toxic irritants and obscuration which impede reaching an exit or point of refuge.

Mr. Conforti said he didn't know of any failure-to-activate lawsuits where current alarm codes were adhered to (i.e., one at every level, one by every sleeping area). Dr. Gottuk asked: Is that statement independent of whether they're ionization or photoelectric? Mr. Conforti said yes, that the lack of thermal buoyancy in smoke is far more important than differences in sensing technology in virtually all fire tests.

Mr. Papier said there has been much criticism of detection, particularly ionization detectors. Actually all types of detection do a very good job, he said.

Mr. Conforti said there is much implied, unquantified liability for not being perfect. There are probably 100 million detectors in service. Maybe 30-40 lawsuits. It is a very rare event when a detector doesn't do what it was intended to do. Historically, batteries have been identified as the problem in most cases.

Mr. Hoebel noted that smoke alarms are THE fire safety response in virtually everyone's mind.

Mr. Turner said that "the thermal model" is neither a typical nor comprehensive description of real world phenomena. But there is nothing to replace it with yet. Yet performance-based evaluation and codes are driving use of such models.

Mr. Mulhaupt discussed the Foundation's and NFPA's planning for a nationwide nuisance and false alarm study. It is apropos of Mr. Kirby's letter to him noting the need to get past perception regarding numbers and rates. John Hall and Marty Ahrens of NFPA will provide technical direction. The intention is to seek detailed data from companies and government agencies -- lodging, health care, university, GSA, VA are prospects -- who have strong infrastructures allowing comprehensive reporting regarding systems and events for one year. Thus, while sampling scope will be limited to the reporting institutions, it is intended to be comprehensive as to the systems studied, rather than relying principally on sampling and estimating techniques.

Mr. Turner suggested an additional goal of institutionalizing the data types (i.e., data sought) in NFIRS.

Mr. Conforti urged the use of the terms Unwanted, Nuisance and False. Unwanted is the broad term for unwanted with the sub-categories of False (no cause found) and Nuisance (reacted to an event, but not a dangerous fire). Mr. Mulhaupt said these and a more detailed typology were being planned.

Mr. Turner noted that large companies such as Dupont are very good at this, with thorough follow-up on events such as this. He added that insurance companies have thorough reporting on actual fires above certain dollar loss thresholds. It would be good to access that information.

Mr. Elliott said yes, but there is typically little on detection in such reporting because not much credit is given smoke detectors in industrial loss prevention. Also the data would likely be biased toward old systems. However, FMRC could deploy a questionnaire through its network of some 2000 field engineers.

The Council discussed possible biases in the study.

Mr. Hoebel suggested there be a follow-up mechanism to learn about the sources who report on events, and also to verify what is reported.

Mr. Conforti cautioned that there are application-related factors independent of alarm systems which could overwhelm the numbers, such as work areas and proxi-

mate equipment. Mr. Mulhaupt said that the effect of smoke-free buildings (or not) on cleanliness and nuisance alarms had been cited at the project planning meeting.

Mr. Turner noted that there may be different nuisance alarm tolerances and definitions of nuisance alarms associated with occupancy type and use.

Council members discussed the question of whether the nuisance and false problem is improving. Consensus was that the numbers may be increasing, but the rate -- compared to the great increase in the number of systems -- is decreasing.

Mr. Conforti urged thought regarding keeping data providers motivated. In the Naperville study, his company worked with participants to affirmatively help with nuisance alarms. Sometimes this involved fixing the cause rather than the system.

Council members expressed the desire that there be ongoing communication between it and the CPSC and Foundation projects.

Messrs. Conforti, Gottuk, and Mulhaupt reviewed The Foundation's Fire Suppression & Detection Research Application Symposium's detection-related papers.

The Council turned to developing recommendations.

Mr. Conforti said that to encourage improved and new technologies, there must be a method of measuring, demonstrating improvement. Current evaluation methods that have an impact are the listing standards. They don't measure "better" technology. He suggested that areas where technology is, could be, improving are nuisance, sensitivity, flame, dust, humidity. Tests must be constructed so as to evaluate improvements outside "the box". He suggested the first priority should be tests that evaluate performance vs. nuisance sources. He said that independently demonstrated improvements in reliability is the advantage to manufacturers.

Mr. Turner said there needs to be economic/market incentive. Mr. Conforti said reliability is enough for his company.

Mr. Papier said that a reliability standard is in development in the security alarm industry. They have developed a false alarm reduction standardized test that is moving through ANSI. Systems passing the test will receive a special label. This puts pressure on installers to only install such systems.

There was Council consensus in favor of Mr. Conforti's diagram of "the box" and beyond, and there was consensus for giving priority to research that addresses nuisance alarms first. Several Council members suggested that the NEMA Signaling Section would be the best place to begin such an initiative.

Mr. Turner said that the National Nuisance & False Alarm Research Project will provide the most credible indicators of directions for improvement.

Mr. Conforti said standardized nuisance test protocols could be developed, for example, for steam, dust.

Mr. Gottuk said Hughes Associates, Inc. has been tasked to develop a nuisance alarm test. This is far more difficult than developing a fire detection test. The properties of nuisances are sometimes very close to those of the fires one wants detected. Conversely, nuisance sources and nuisance behaviors are very diverse.

Mr. Papier said that probably 200-250 million detectors have been installed. Probably 50% are obsolete or out of any reasonable performance/design expectation range. It's reasonable to estimate that, at 10 years old, 85% are outside of performance range.

Mr. Hoebel noted that in the 1994-1996 CPSC Smoke Detector Study, in the vast majority of cases of failure-to-operate, the reason was power-related, not detector technology-related.

Mr. Conforti said that both a longevity standard and a failure tolerance standard are necessary.

The Council developed a tentative consensus for the following recommendations to be developed in 1-2 page concept descriptions by the persons named in parentheses. A recommendation was not necessarily initiated by the person writing it up.

Concepts to be developed:

- What's to be done to move technology beyond "The Box"? (Mr. Conforti)
- Tenability: Performance Goals and occupant responses (Dr. Gottuk)
- Foundation Nuisance & False alarm Research Project (Mr. Turner)
- CPSC evaluation of alarm performance (Mr. Hoebel)
  - including evaluation of spacing models
  - to help expand current industry test standards (i.e., "The Box")
- Develop improved detector response models (Mr. Turner, Mr. Nelson)
  - include smoke, especially non-thermal, modeling
- System reliability measures (Mr. Grill)

Next steps:

- Submit draft recommendations by April 2
- Redistribute to Council for comment
- Meet to review, finalize

**The next meeting is scheduled for June 2, 1999, 10:00 AM - 5:00 PM, Baltimore Airport.**

Mr. Mulhaupt asked if there were anything further to be discussed. There was not.

4:00 PM. Adjournment.