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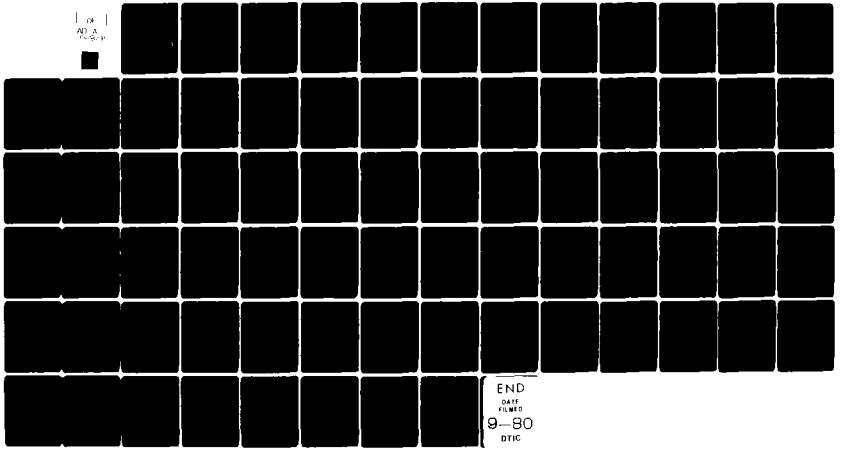

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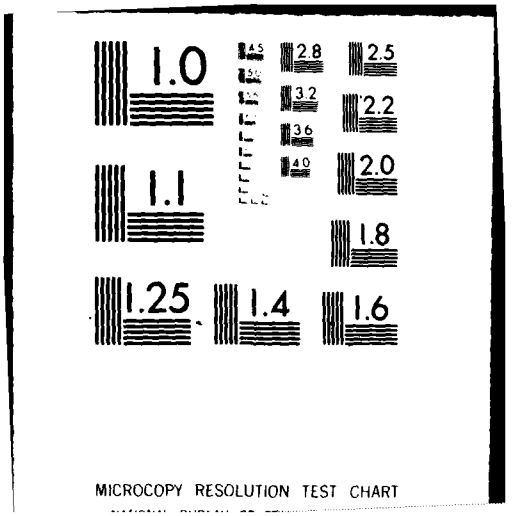
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July 1980

Proceedings Of The 1979 Hazardous Materials Conference At Emmitsburg, Maryland

FINAL REPORT

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The objective of this hazardous materials conference was to obtain input from government agencies to help establish priorities for FEMA-sponsored research in the hazardous materials area.

Participants in the two-day conference divided into four workshops to discuss instrumentation, short-term needs, long-term needs, devices,

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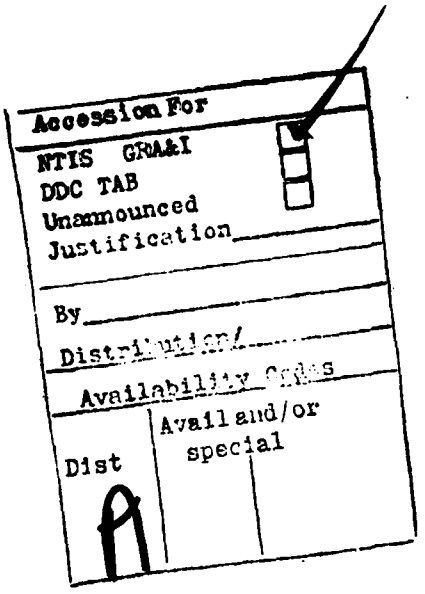
technology, hardware, and prevention and cleanup. Problems and research needs were identified and discussed.



(DETACHABLE SUMMARY)

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PROCEEDINGS OF THE 1979 HAZARDOUS MATERIALS CONFERENCE AT EMMITSBURG, MARYLAND

edited by
J.V. Zaccor, H.L. Hsu, and C. Wilton

for
Federal Emergency Management Agency
Washington, D.C. 20472
Contract No. DCPA01-79-C-0239, Work Unit 2321C
James W. Kerr, COTR

FEMA REVIEW NOTICE:

This report has been reviewed in the Federal Emergency Management Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Federal Emergency Management Agency.

Scientific Service, Inc.
517 East Bayshore, Redwood City, CA 94063

(DETACHABLE SUMMARY)

THE 1979 HAZARDOUS MATERIALS CONFERENCE
at Emmitsburg, Maryland

This conference was sponsored by the Defense Civil Preparedness Agency (now part of the Federal Emergency Management Agency) in order to obtain input from other interested government agencies to help establish priorities for FEMA-sponsored research activities in the hazardous materials area. The meeting was attended by 38 representatives of 21 Federal and local government agencies and 6 DCPA contractor representatives who, after an opening keynote session, divided into four workshops dealing with Short-Term Needs; Long-Term Needs; Devices, Technology, Hardware; and Prevention and Cleanup. A concluding session on the second day involved reports from the workshops and a general discussion by all participants.

While instrumentation was the major focus of the conference, discussions were not limited solely to problems solvable by means of better instrumentation/equipment. In fact, problems faced by first responders were discussed in general, with emphasis on conflicts between the emergency, or "acute", phase and the long-term, non-emergency phase.*

Specific Concerns of First Responder in Acute Situations That Were Discussed

- o Accidental fires and explosions, concurrent with the hazardous materials problem.
- o Lack of necessary technology or the time to apply the technology in an emergency.
- o Material identification: Need for a means to identify the material to classify the problem and tie an appropriate control response to

* Ed. Note: Implicit in this difference is the possibility that the emergency response can aggravate the long-term problem, and conversely, that concern with long-term consequences may inhibit the most effective emergency response.

it. Instrumentation approach: — a portable detection unit on every fire truck; alternative — a system for labeling.

- o Material identification: elimination of conflicting information from different sources — need for coordination geared to local level.
- o Lines of responsibility: Who's in charge?
- o Variation in expertise and information at local levels — a function of experience, hence frequency of incidents; small-town fire departments may handle many types only once every couple of years.

Specific Long-term, Non-emergency Concerns That Were Identified

- o Need for management coordination.
- o Jurisdictional disputes — who has prime responsibility — local, State or Federal?
- o Material identification — example of cannister in a dump with undecipherable or missing labels: how to sample and identify.
- o Ultimate disposal — how to dispose of material once it has been cleaned up.
- o Data collection — need for, and applications of, feedback from incidents; how to ensure accuracy and completeness of data collected.
- o Need to simplify identification analyses to reduce testing to a manageable level.
- o How clean is clean: What are acceptable levels of risk?
- o Data-centered management approach to facilitate better deployment of manpower and equipment — how to implement? (A jurisdictional or political question.)

General Concerns

- o Two levels of instrumentation appear needed — one for first responders, another for later sampling and monitoring.

- o How to get instrumentation developed and into users' hands (the latter a marketing and training issue).
- o Adequate protection for the first responder and for the research technician who goes in to take samples in non-emergency situation.

At the conclusion of the conference, participants were asked to complete a questionnaire. The questionnaire asked first for the statutory or other authority of the agency to conduct hazardous materials programs and the resources committed to such programs, then for information on R & D, planning, or programs on hazardous materials either currently being conducted or needed, and for comments on additional issues and on the conference itself. A detailed summary of the responses to the latter questions is included in the report.

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J.V. Zaccor, H.L. Hsu, and C. Wilton

for
Federal Emergency Management Agency
Washington, D.C. 20472
Contract No. DCPA01-79-C-0239, Work Unit 2321C
James W. Kerr, COTR

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517 East Bayshore, Redwood City, CA 94063

ACKNOWLEDGEMENTS

This conference could not have taken place without the effort of a great many people — too many to mention everyone by name.

At the outset we should like to thank all the participants, who came to the conference on fairly short notice and contributed so enthusiastically.

Special thanks should go to Jim Kerr, the real motivating force behind the organization and operation of the conference; to Joe Clark, who provided the all-important site-liaison; and to Cliff McLain, for the enabling financial and moral support.

We wish to express sincere appreciation to the Fire Academy staff at Emmitsburg for their very capable logistics planning, excellent hospitality, and a most pleasurable conference site.

Finally we are indebted to Evelyn Kaplan and Larue Wilton for an heroic effort at translating and consolidating from tapes and from handwritten notes, outlines, and summaries.

Whatever oversights, errors, or omissions that participants find in this document are the sole responsibility of the editors. We sincerely hope none of the important points raised by any of the participants has been lost.

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INTRODUCTION

This report summarizes the proceedings at a hazardous materials conference held at the National Fire Academy in Emmitsburg, Maryland on June 25 and 26, 1979. The meeting was sponsored by the Defense Civil Preparedness Agency; thirty-eight representatives of twenty-one Federal and local government agencies and six DCPA contractor representatives attended.

Since the conference, the Defense Civil Preparedness Agency has become part of the newly organized Federal Emergency Management Agency (FEMA), which also includes the United States Fire Administration (USFA), the Federal Insurance Administration (FIA), the Federal Disaster Assistance Administration (FDAA), and the Federal Preparedness Agency (FPA).

DCPA's purpose for holding the conference was to obtain input from other interested government agencies to help establish initial priorities for FEMA-sponsored research activities in the hazardous materials area. Thus, the conference provided basic input to a planning document that was distributed to all attendees.*

The material here comprises background information compiled from notes and tape recordings of the proceedings, and a summary of the answers obtained from a questionnaire.

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* See SSI Report No. 7911-6, "Planning Document for Hazardous Materials Research," by J.V. Zaccor and C. Wilton, Scientific Service, Inc., Redwood City, CA, July 1980.

OPENING SESSION

June 25, 1979

10:15 a.m. Joe Clark — Logistics and Orientation

10:20 a.m. J. Moreland — Welcome to the National Fire Academy

10:25 a.m. C. McLain — Keynote Address

FEMA's long range goal is to be useful to local emergency preparedness organizations; i.e., to support the States in their efforts to serve the local constituency. The aim of this meeting is primarily instrumentation. At the end of the meeting, we would like to be able to put together a program.

At present there is no instrumentation in the hazardous materials area comparable to radiological instrumentation. Yet, firefighting (and associated work) is the single most hazardous occupation. Firefighters are on the front line daily and need field threshold hazardous environment detection instruments. Before this conference, a number of organizations were contacted, including the National Bureau of Standards and the U.S. Army. No appropriate equipment was available.

The aim of this conference is to determine:

- The requirements for hazardous material instrumentation.
- The feasibility of developing such instrumentation, considering technical and operational requirements, and cost.
- The extent of the false alarm problem. What are the consequences of false readings, both false safe and false unsafe?

Keep in mind that there are three time frames of emergencies:

Short — Spills

Long — Months or years are available to clean up and dispose of the materials

Time Bomb — No problems now, but may become a serious problem someday.

A number of items should be discussed, including:

- o Data on the health effects of individual hazardous materials, and the lack of data on mixtures of hazardous chemicals.
- o The need to translate the readings on existing and new instrumentation to a health or environmental hazard rating (without the need for other documentation).
- o The problem of what an acceptable level of risk is, since the cost of complete removal of a hazard is high.
- o *The need for work on siting of hazardous material facilities* and on classification of hazardous materials.

FEMA hopes to come out with a meaningful program and fund four to five instrumentation development programs of approximately $100,000 each.

11:10 a.m. Louis Blair (Intergovernmental Science Engineering and Technology Advisory Panel)

For funding, there is talk of $600,000,000/year to clean up dump sites, but no money yet. The Office of Science and Technology Policy (OSTP) is basically concerned with political issues. The Environmental Protection Agency is regulatory, with research keyed to ensuring compliance. ISETAP conducted an assessment of state, county, and city governments via workshops to establish needs in dealing with hazardous wastes. These needs are:

1. Monitoring and Assessment —
   What's there? How to detect it?

2. Response –
   Short term; long term
3. How to monitor for an emergency problem (threshold quantities)?
4. How to assess unknown, but containerized (cannistered), hazardous material?
5. Institutionally, how to get developed instrumentation into use?
6. Maintenance standards
7. Response patterns vs thresholds
8. Dealing with mixtures –
   Little known according to Science Advisors meeting
   Synergistic problems
9. Acceptable levels of risk –
   How to deal with/define this?
10. Need scheme for classifying waste –
    E.g., dumps vs level of hazard or risk
11. Geology (repository risk problem) –
    Ground water; faults

We need to let Office of Science and Technology Policy know we want status reports and a list of priority problems.

11:35 a.m. Jim Kerr

The establishment of research and development programs for hazardous material emergency management is the end; brainstorming is the means. This is the current R & D list:

1. Evaluate and report on commonality between nuclear and FEMA preparedness response, etc. (National Academy of Sciences)
2. Tracking of hazardous materials in a geographical region (Jackson/Multnomah)

3. Evaluate parallel in hazardous materials emergency management to Fire Administration emergency management
4. Planning for emergency (Army at Fort Monmouth, and Rockwell)
5. Local government planning for evacuation
6. What has infra-red to offer? (LOCUS, Inc/State College of PA)
7. Hazardous materials in relation to civil preparedness (Scientific Service, Inc.)

We need to discuss hangups; e.g., hazardous materials vs hazardous substances. We also need to ignore semantics, terminology, turf problems in this effort. While studying the question of the possibility of hardware vs the need for research, we ran into a five-dimensional matrix and decided we needed a conference. Is the discussion of management and technology inappropriate now? We must wind up with functional requirements. Perhaps we can start with detecting thresholds of hazards. We want to end up with a research agenda. Keep an open mind! Don't exclude satellite-based detectors. Hurricanes can be detected via satellite. The requirements are probably different for threshold determination, but it is not inconceivable that satellites can be used. Arson investigation — there is a need to detect the existence of initiators. Insurance companies may have data.

One final note:

1. Take care with questionnaires — don't let ideas go down the drain; turn in questionnaires tomorrow.
2. Take notes — don't lose anything through the cracks.

WORKSHOP 1 — SHORT-TERM NEEDS

Chairman: Charles Loucks, Department of Transportation
Assistant: Fredie Kay, U.S. Conference of Mayors
Recorder: C. Wilton, Scientific Service, Inc.

INTRODUCTION

For the purpose of this workshop, short-term or "acute" incidents are hazardous material incidents that require immediate action to prevent injury to people or the environment. Typical examples are: transportation accidents involving toxic or hazardous materials, fires that release toxic or hazardous smoke and gases, and radiation problems such as the recent Three Mile Island incident.

A summary of Workshop 1 is an outline developed by Fredie Kay of the Conference of Mayors. This outline, which is presented below, addresses the problem and the research needed to deal with the problem. Following the outline are several pages of taped dialogue and notes taken during the session.

OUTLINE

I. The Problem
   A. Hazard Assessment
      1. Material Identification
         a. Quantity
         b. Toxicity
         c. Flash point
         d. Mixture
      2. Hazard Identification — that is, assess hazard, but it may not be necessary to positively identify material.
      3. Local Environment

B. Response

1. Definition of Authority/Coordination
   a. Police
   b. Fire
   c. Local – State – Federal
2. Tactics — General consensus that many problems exist in the tactics area, including planning, training, equipment.

II. Research Needs

A. Instrumentation to Measure:

1. Flammability
2. Toxicity
3. Corrosiveness
4. Radioactivity
5. Mixtures

B. Rapid Identification (may be a documentation problem)

C. Training

D. Planning — at local, State, Federal, and interjurisdictional levels

1. Authority (who is in charge)
2. Operational Planning (Locals, get your act together)
3. Coordinated Federal Assistance

E. Equipment

1. Assessment of Currently Available Equipment
   a. Reliability
   b. Adaptability
2. Research/Development (including standards)
   a. Air packs
   b. Special protection equipment
   c. Sampling equipment
   d. Community equipment (built-in, short range)
   e. Hazardous material response vehicles

F. Research Study of Intervention Strategies (i.e., tactics)

1. Attack Scenarios for Groups of Hazardous Materials
   a. To go in or pull out
   b. If you go in, when do you pull out.

EDITED TAPES FROM WORKSHOP 1

Rundown of Agencies and People Interested in Short-Term Response

Fredie Kay, U.S. Conference of Mayors – An important political aspect was brought up this morning; i.e., mayors are very concerned that their cities can cope and are able to respond adequately to hazards.

Irwin Benjamin, National Bureau of Standards – We're interested in the very short term; e.g., fires and explosions. We are particularly interested in what can be done to develop standards, defense systems, prevention systems, etc. NBS frequently does consulting work for other governmental agencies, such as FRA. We're conducting a project right now involving railroad cars, as a result of a couple of explosions, and we're also doing some work on oil spills, with the aim of establishing standards. We're extremely interested in toxicity problems developing out of fires that create or involve hazardous materials — anything having to do with the result of fire and explosion on any of the types of materials that are used in transport.

D. Manno, National Fire Academy – Two of my responsibilities, as a fire education specialist, are our operational risk analysis program and a program that we're developing on disaster planning and preparedness. I represent the operational part of the service; I am very interested in the short term as a result of my experiences in handling several emergency incidents with hazardous material fires and explosion spills.

Warren Stevens, Montgomery County Operational Fire and Rescue Services – I am representative of those individuals who are called on as first responders to hazardous spills incidents. There are some definite problems we are faced with: we don't really have the necessary technology, or the time to employ that technology at the scene, so we're looking for very simple, systematic methods for handling a hazardous materials incident. There is some mention of the response systems that EPA and others have. These things are fine, but past experience has shown me that there are problems. With the

bureaucracy, after five o'clock or on weekends or holidays, you can run into a problem when you're trying to handle a hazardous material incident. Instrumentation is another area where firefighters need any help they can get. They can't rely on their technical expertise because it's literally impossible for them to be that technically capable in every aspect of all hazardous materials that are currently stored or in transit. Material identification is a real problem to the fire service. We're talking about handling short-term emergencies. You can't handle emergencies until you know what the material is. You've got to identify the problem. As previously mentioned, there are eight or nine different methods or systems of identifying the material, so you can imagine the problem that the average firefighter is faced with when he receives a call; it doesn't come in as a hazardous material problem, it comes in as a fire or as an auto accident. He has to immediately determine whether it is a fire or an incident involving hazardous materials. Anything we can come up with in the next day or two would make the operational fire service more than happy.

Don Richitt, U.S. Customs Service safety manager — Our big concern is with remote land ports rather than sea ports. We have some remote land crossings where there is high traffic in railroad and trucks coming through, and usually the water crossings are removed from the towns.

Hank Crisman, Jackson County Planning Commission — We are under contract to develop a local government hazardous materials information and control system for DCPA.

Discussion

C. Loucks (DOT): I am very happy to see FEMA established and I hope that Congress and the bureaucrats involved in this go ahead and fund this activity. As I see it, short-term response has to be geared to the local level. What we're talking about is the first five minutes — or the first five hours. Within that five-hour period you may be able to get to a Ph.D. some place, or the guy who manufactured the material, and he may be able to tell you something. But somehow, at the local level, there has to be some

expertise or enough information readily available to allow these folks to be able to handle almost any kind of catastrophe. I hope FEMA, with the assistance of DOT and the other agencies represented in this room, can support this kind of training and a method of disseminating adequate information to the people who have got to handle this thing. We need to do everything possible so that they are prepared. To depend upon the Federal bureaucracy to keep a fireman or a city out of trouble when it's so far removed from the hazards is just unrealistic. We're really doing everybody a disservice if we think we can use a hotline to tell the guy in Waverly, Tennessee not to move that tank car more than two feet because, if you move it the third foot, you'll probably stress it enough so that it'll blow sooner or later. Some of my concern is based on a limited amount of military experience I have had.

Manno [giving example of a hazardous materials incident]: The Coast Guard there, they were no problem. The Captain got there with a couple of his guys and saw that the bulldozer had the stream cut off. He said, "Put the fire out and I'll be back." We went on about our business. An EPA man gets there from Atlanta, and late in the afternoon he tells us we're all going to die. He called us to back away; so we backed off and had a little conference. He had his little book out and said we were all going to die. Of course, it was coincidence that we had all the breathing apparatus on. We used all the air we had, and the Captain said, "Well, nobody is dead yet." He told EPA very seriously just to go back to Huntington, and we'd call when we needed the EPA, and we went back to our business.

One of the tank cars was cut in the top, it was leaning over. Did we have a flammable mixture inside? Well, how could we know? "Well, there's air in the tank car now, so there's got to be a flammable mixture," some of us said. "It's all in the tank car and the hole is in the top; it's too rich to burn." So we just ended up wetting a blanket and a tarp — at least we'd cut that off and seal it to a certain extent.

We had a lot of problems handling a simple incident in the middle of the --- ---- hills with nobody around. It's always stuck in my mind that

if the same thing happened today right in that same spot, the exact same thing would happen. We'd have people, different Federal people, all looking in their different books, all coming up with different answers, and I think that's a short-range problem that really needs looking into. Who's going to talk to you? Who has the authority? Now, I know that the EPA and the Coast Guard are really working well together, and that guy was probably a new man, and that was a specific incident. But those are problems that I faced as incident commander. Everyone goes through his own training. You know when you're in charge; you know that, if there is a fire, I'm in charge. The Coast Guard Captain shows up at the scene and says "Hey man, that's contaminating the water!" I say, "Hey listen Jack, I got the fire to worry about, and this stuff is leaking from the dam and the fish are dead." And he says, "You're right, and I'm getting out." These are problems that are real, and I see a need that we're trying to address in the Academy by getting people together and saying: What is my role, from a National Fire Academy standpoint? What do the other Federal agencies want their role to be? Who can they expect to see on the scene initially or an hour from now, or who can they expect to get a phone call from, or whom should they call?

———— : Each agency plans a disaster response according to its own specific expertise or area. When you get out to the actual incident, it sometimes requires a coordination of all these agencies, because you can get involved with the run-off; or it may involve water or that type of thing. Maybe one of the things we want to take a look at is a program that coordinates disaster planning, not from any specific field, but from the local and State and Federal level combined.

———— : Isn't that the whole reason for FEMA? To coordinate all activities relative to emergencies?

Fredie Kay: It sounds as if you had a problem with whose information is accurate. But in other areas it sounds as if you were dealing with different types of information, all to handle the same problem, and you have to decide whom to believe.

Manno: Do you have a book with you? The hazardous materials guide. We call CHEMTREC and they look it up and tell us it's a poison. It says wear protective breathing apparatus, it's one of the high hazard materials — it's in the book — acrylonitrile . . . . Now here's our problem: We got the conductor and he had his bill of lading, and we had our blue books. We looked it up and it said just what it says today: "flammable when spilled"; that's right. "Container may explode"; it did. The stuff is so flammable that we did not need generators and lights because the pools of it that were in the water burned 16 hours, so light that it just lit up the creek for us and we watched from the creek.

[Side comment: "That's the way to get rid of it too; just burn it off."]

"Contact may cause burns to skin and eyes"; we had no burns to skin and eyes. "Run-off may pollute water"; it did. It killed fish, just like that, 300 yards downstream. We just happened to have a volunteer who was a contractor — he got his bulldozer, and it couldn't have been better if I had planned it.

Does your [book] say, "Wear protective breathing apparatus"? So does ours. We wore it and we ran out of air. People were around who weren't wearing any, and they looked all right. I kept watching for different kinds of symptoms — nausea, headache, sweat, anything. None, okay? It says it's poisonous. We had a light breeze — up to this day, I don't know why none of us was poisoned.

———————: Were you downwind?

Manno: We tried to make sure that we weren't. We didn't have a city nearby so we didn't have to evaucate. Even when we were working in and around the cars, there was some leaking and burning. We did not have enough breathing apparatus or enough reserve air. At this point we had been exposed the whole --- ---- day anyhow, might as well just go ahead and take care of the incident and worry about the health problems later; so we did.

There was conflicting information. The book said it was poisonous. How big a leak did it have to be before it got to be a real poisonous problem?

Obviously, in the quantities that we were talking about, or maybe because we had tremendous combustion that took the poisonous potential away, I don't know why, but no one was poisoned. Even after we had the fire and explosion, we still had a tank car that was open, with acrylonitrile that was not burning.

———— : The interesting point here, from my area of background, is exactly that — the technical problem. Do you realize 40 parts per million of acrylonitrile in air could kill a little old lady in an hour, but a guy like you could stand it for eight hours. There are technical problems. How do you know where 40 parts per million are? How do you know that, if you stand on that side of the creek, you'll die in a half hour, but if you stand on the other side of the creek, you'll live to be a 100. Again, you are right; you cannot rely on anybody out there — I don't care who — standing there with a little book to give you that information. What you've got to do is what you did. Use your instincts and your common sense. You don't stand downwind of a spill or, if there is a fire, you don't get too close because it's probably poisonous smoke. Nobody could quote a book to tell you anything, except, "Watch out, this is bad stuff; don't stand in it." If we can identify that as a short-range problem and start working on it, that would be a help.

————: I'm surprised that any Federal agency would assume that they had direct authority.

————: The EPA man and the Coast Guard Captain had a real conversation by themselves.

————: All emergency plans I have ever seen presume that State and local have primary responsibility. That's the written word — that is part of the national contingency plan itself. The State and local officials definitely have the word on evacuation and response procedures, and the Federal people should keep out of the way. The Federal people are there as advisors, and sometimes they'll help. If the individual Federal person on the scene does not go home, that's his problem.

———: Well, it's a good theory. I think it all depends on the particular state. In New Jersey, we have had incidents where the State runs the show with the help of the EPA, the Coast Guard, and the technical advisor. In other states they just say, "Hey, give me help!" and before you know it the Feds are on the scene and they're running the show. Many state contingency plans are nothing more than a telephone list of Federal people. Calfiornia's nuclear plan is that way.

———: The Coast Guard is a peculiar animal. They're the only ones, as far as I know, within DOT who have any overall jurisdiction. In the water pollution proposition, they can take over. From a Federal standpoint, if they are not satisfied with what's going on, the EPA also has this authority. It's not too clearly defined in some cases, but EPA has authority on the Federal pre-emption aspect. The military on occasion will pre-empt. If the material belongs to the Department of Energy, then we can pre-empt. There have been some jurisdictional fights on occasion, when it happened to be military munitions or military property even though military personnel were not involved. They have, on occasion, pre-empted and done some rather peculiar things. There is no question that it is a problem.

———: NRC, if you can believe it, had all kinds of munitions sources in downtown Louisville, which never lit up. The one we had out in the boondocks lit. . . . Anyhow, the railroad people were there and they had their little book, which said to dam it. "That's what this says, so you have to build a dike." The operations chief looked around and said, "With all this concrete, you dam it and I'll flush it and whoever wins is whoever gets started first. I'm gonna dump it into the sewer, then I'm gonna call the metropolitan sewer district and let them worry about it." They also had the problem where the guy said, looking in his book, "Well, this is no worse than gasoline." The assistant chief looked at him and said, "Have you ever seen 50,000 gallons of gasoline burn?" It was a question of policing versus the business district of Louisville, Kentucky; and they decided "We're gonna flush it" and that's what they did. They kept it

moving right along until they got down to the bottom. Then they patched it and righted it, and the railroad people came in to do all that neat stuff like they did at Waverly. But I see a real need for identifying clear lines of responsibility and authority for technical assistance on site.

I think the one-call idea used in the National Response Center is good. The fire service and most emergency services are now to the point where they have the same books that CHEMTREC has. When I call CHEMTREC, I read just what he's telling me, and I say, "Well, that's the same thing I got." He says, "Well, you know another thing I can do for you is call the shipper." And I say, "Good, because if it's something special, you can get special help." If the National Response Center information is not going to do anything more than just reading this back, don't bother. Really, the emergency services are getting a little bit better, and most of them are capable of dealing with a substance they know about; and if they are not, they call CHEMTREC, who reads them this.

The problem is more than that initial identification. We're making some strides. We hope we don't have many more Kingmans, where they attack a propane tank with water instead of letting it burn out. It was tragic, and the people in Arizona that I know feel that, ------, they didn't do the job because the book says attack with water. What it should say is attack with cooling streams on the tank shell, which, to a fireman, means that you can set the nozzles down and get to hell away and get your camera ready and go out and make a lot of speeches once she blows. It didn't say that, and the firefighters thought they were doing a good, tough, macho thing for the top attack. They were in there and it wasn't doing much good and it was a tragic accident when it blew up.

Better initial information is needed, plus some kind of onsite instrumentation. You said 40 parts per million; I'm not really sure what that means. Does it mean I just smell a little bit? If you look up hydrogen cyanide, the book says it has the smell of bitter almonds. Well, other people say if you can smell it, it's too --- ---- late!

————: The other problem is, when that 40 parts per million of acrylonitrile burns, you have a whole new set of compounds and different toxins, and 40 ppm no longer means anything. Your book and my computer won't tell you that it all depends on the conditions.

————: What I was worried about in that incident was that they were also carrying coke to the steel mills in Ashton. A car of red-hot coke went down, and I had a full one with a crack in the top sitting of top of that, cooking. I didn't know if it was going to vaporize and go, or whatever. We had streams, so we kept putting water on them. If you're incident commander, that's where you're going to get grey hair. There's nobody to tell you anything, you gotta make a gut decision. We said, "Well, you can't just let it keep heating," so we started putting water on it. We have a great big hot bath of steam there. We were just lucky, no professionals.

————: All the experiences that you're talking about you've obviously had firsthand. You probably have as much information as other firefighters. I want to know how much the Federal government is tapping into that information. How much are you able to use the information to update either that book or the Coast Guard book to ensure a continual flow of information? Every time you get an incident like that, people are learning. New questions, new problems, and new ideas about how to deal with it come up. However, we have no way of calibrating it.

————: We've tried to get information from our people on the scene. We ask them what happened, and all they can say is, "I don't know." All they can say is the fire happened, and they don't know whether it was spark-caused, or whether static electricity caused it. It's difficult to use, statistically, the experiences of people on the scene.

MISCELLANEOUS COMMENTS FROM WORKSHOP 1

- Pesticides — There are two general types, and a different instrument is required to identify each type.

- Marking — On a pharmaceutical truck marked DANGEROUS, 35 firemen were treated for inhalation injuries, and the truck was in an open field.

- Equipment needs to be standardized and extremely simple to operate.

- Most of the hazardous spills are handled by small-town fire departments. This indicates that a particular fire department may handle only one every couple of years.

- Some fire departments are well trained, some are not. First priority should be to bring all up to an acceptable baseline level, and then improve the baseline.

- Strike teams such as those in Maryland might be the best alternative.

- Since many materials can be grouped by hazard and response, marking systems should be reviewed to see if materials should be marked according to response, rather than just identification.

WORKSHOP 2 — LONG-TERM NEEDS

Chairman: Myra Lee, Multnomah County Office of Emergency Services
Recorder: Joe Clark, Federal Emergency Management Agency

INTRODUCTION

"Chronic" hazardous situations involve long-term exposure to health or environmental hazards. Non-emergency responses are required. The hallmarks of chronic hazards are:

1. Time (duration)
2. Concentration
3. Agency response

Examples of long-term hazardous situations are: Love Canal, chemical dumps, secondary contamination from floods.

There are more management problems than technological problems.

OUTLINE

I. Nature of the Problem
   - A. Management Coordination Needed
     1. Protocol: Should Feds or State/local take lead?
     2. Intergovernmental Policy
     3. Operational Plans
        - a. Economics
        - b. Politics
        - c. Citizen involvement (media relations)
   - B. Management/Technical Relationship
     1. Technical Assistance

2. "Problem-focused Research Summaries"
3. Technological Information Transfer

C. Technological Problem
1. Access to Unidentified Material
2. Other (May appear during attack on management problems)

II. Response Strategies

A. Prevention

B. Detection

C. Notification

D. Assessment — Risk Analysis

E. Control/Stabilization

F. Containment/Neutralization

G. Disposal/Destruction

H. Recovery

I. Mitigation

RECORDER'S SUMMARY OF WORKSHOP 2

This group discussed long-term exposures, long-term hazards, and struggled to a considerable degree with a definition of a "long-term" hazardous situation. The Love Canal is clearly recognized as the ultimate, the quintessential example, but the difference between the Love Canal and many other hazardous situations was not quite clear. So, there was a lot of discussion to figure out what differentiates the l ıg-term hazardous situation from the shorter-term situation. We agreed to use the terms "chronic" and "acute" — acute being shorter-term exposure, and chronic being the longer-term. We specified three hallmarks for a chronic hazard:

- The time — the duration of the incident
- The concentration, or level, of the hazardous material
- The agency response.

The definition we actually wrote down, and I think there is a need for a better definition, is: A chronic hazard is a long-term exposure, a risk that results in a long-term hazard to health or environment, and requires a non-emergency response.

Now the fact that it requires a non-emergency response, I think, is the critical difference between chronic and acute. In the Love Canal, for example, it was possible to take a sample and ship it to some distant point. You did not need, in a matter of hours, to make an identification of the material or its characteristics.

Solutions to these chronic hazards were broken down into three categories. The first category was management approaches. We said there were more management problems and management solutions than there were technical problems. The second category was partly management and partly technical; for example, technical assistance. Third, there were a few exceptional cases with technical problems that might be solved by instrumentation or devices.

Some of the management approaches or problems that we discussed were the need for coordination within the Federal agencies, within the States, within the local jurisdictions, and also among the Federal, State, local, and intergovernmental organizations. Policy is needed to determine who — Federal, State, or local folks — should take the prime responsibility, or take leave, in a particular incident. Finally, there was clearly a need for better operational plans; that, I guess, is almost a "motherhood" statement.

In the area between management and policy problems, and technical or technological problems, fall the areas of technical assistance, technology transfer, and the concept of problem-focused research summaries. Clearly, there is a need for the transfer of technical information from the technical community to those less technically inclined. Finally, one exceptional problem that was identified was access to unidentified material. For example,

if you have a drum sitting there half-buried and you can't read the label, or maybe it is unlabeled, or the label has gotten to the point where it is useless, you're really not sure whether you should go over and bang on it with a hammer, or drill into it with a drill, to find out what's inside. This is bound to be disconcerting if you suspect it is a hazardous material. So, there may be a need for some high technology to help assess material within containers. There was also a feeling that other technical problems might be identified and would probably evolve during the attack on the management problems, and the interface of management and technical problems.

All these things were seen as response approaches. Discussion led to a set of response strategies, which we think are important to record because they may provide a framework for further work that goes on. We struggled with the fact that there did not seem to exist a good framework in which one could rationally say, "Hey, we're talking about subject A, not subject B." We found that to cause a considerable difficulty. We think we may have made a start toward developing a framework. The set of response strategies identified in our discussion were: prevention, detection, notification, assessment, control, containment, disposal, recovery — and somebody felt we should add mitigation to that.

WORKSHOP 3 — DEVICES, TECHNOLOGY, HARDWARE

Chairman: Fred Clarke, National Bureau of Standards
Recorder: Jim Kerr, Defense Civil Preparedness Agency

INTRODUCTION

Local decision-makers require information when faced with an immediate hazardous material threat. Type of material and the proper response must be determined. We assume that proper identification leads to proper action. Proper identification must be a part of management systems, which include standard operating procedures (SOP), training, and organizational and operational considerations that enable optimizing action.

OUTLINE

I. Information Needed
   - A. Type of Hazard
     1. Toxic
     2. Explosive
     3. Flammable
     4. Radioactive
   - B. Type of Response
     1. Extinguish
     2. Smother
     3. Neutralize
     4. Dilute
     5. Isolate
   - C. Information Can Be Used in a Matrix
   - D. Identification of Hazard vs Identification of Substance
     1. First Responder
     2. Backup Units

II. Devices, Hardware, and Technology

A. Requirements
   1. Simplicity
   2. Ruggedness
   3. External Calibration
   4. False Alarm Sensitivity

B. Where Needed
   1. Transportation
   2. Commercial Occupant
   3. Industrial

C. Types
   1. Fixed Sensors
      a. Threshold detectors
      b. Alarm sounders
   2. Field Monitors — Work Needed in
      a. Plutonium
      b. Toxic substances

D. Table of Feasible Hardware
   1. All Items are Within State of the Art (Only need engineering before widespread use)
   2. Type vs Location/User

E. "Trained Nose"

F. Backup Sources

RECORDER'S SUMMARY OF WORKSHOP 3

We started talking about the information requirements for instruments, but it took us a while to get around to the hardware as such, and to establishing the working relationships. The information is needed, of course, by local decision makers, the people on the scene, although some decisions are made at other levels. We had a working assumption that proper identification of the substance in question would lead to proper action. Now that presupposes that the other three groups supplied a lot of good management and training and operational considerations. A lot of ingrained habits will have to be changed; e.g., the idea of rolling up to the burning

truck and poking around to see what might be in there. There has to be modification of that type of behavior when there is reason to believe hazardous materials are in the burning truck. So we need the identification embedded in a better system of operational and management considerations than we now have. I think we can, starting with proper identification and given the proper training and management, expect to be successful. But how do we get the proper identification? That's where the hardware can help out.

We assigned the hazards to four groups: toxic, explosive, fire, and radiation. These can be matched up with the five basic responses, which are: extinguish, smother, neutralize, dilute, or isolate. By arranging this information in a matrix, one could lay out a training agenda and see which response is relevant to which hazard. Responses for which basic technology exists could be identified. Considerable conflict develops over the need to identify the actual substance versus the need to identify the hazard. Although there is some clustering of substances, mere identification of the nature of the hazard may not always be adequate. Eventually, somebody does have to identify the substance precisely, although perhaps not at the scene of the event.

There is a great wealth of technology waiting to be applied. There is hardware that could be put on every fire truck. A more sophisticated set could be allocated one per county, or whatever, and really complex backup gear, say one per State or geographical area. We counted on the other groups to call out the need for hand portability versus helicopter transportability or the need for fixed laboratories. Generally, we felt that engine companies' gear must be simple, rugged, idiot-proof, and need no extra calibration. The false alarm sensitivity depends to a certain extent on the locality and application. A hydrocarbon sniffer might be used several times a day in Houston, but only two or three times a decade out in the boonies somewhere. Maybe the reliability and the calibration considerations would vary with the location. We felt it appropriate to note that false negatives are more dangerous to the people at the scene than false positives.

Different types of instruments are needed. We thought of fixed sensors, which have a role in plants, pipelines, and transportation routes. They are special detectors. Depending on where you set the threshold and what your SOP means, they actually sound an alarm and make operational decisions. Of course, initially, an individual makes the decision to set the sensor at a certain level to ring the alarm. Thereafter, if the plant rules say to evacuate when the alarm bell rings, then the sensor has made the operational decision for you.

Where are devices needed? One tends to focus on transportation incidents — they get the headlines, are noteworthy, and tend to be anomalies in many areas. If you are in Houston and there is an incident with a petrochemical, it's just routine. But, a big old tanker some place where you never see a big old tanker gets the people's attention. We keep thinking about hazardous material incidents involving transportation, and that's shortsighted. Commercial occupancies, dry cleaners, nurseries, not to mention industries, use and store hazardous materials that can cripple forever, so we really have to keep our terms of reference broad and not just focus on what to do about a truck that seems to be leaking. That is not to say we should ignore them — the plea is simply to think broadly and cover the total problem.

I was reading in the paper this morning about an event that involved an unmarked hazardous material truck. It caught fire in a metropolitan area. Its driver at least had the guts to confess that it was illegally loaded with toxic materials and explosives. So here was a situation with sophisticated response organizations setting up perimeters, keeping people downwind, and so on. And then, because the accident was close to the county line, somehow the alarm went over yonder and a local volunteer company with a 25-year-old pumper and five guys in rotten gear came roaring up. They didn't stop at the perimeters — they just rolled right up, almost against the burning truck, hopped out without any breathing apparatus, and had the fire out in nothing flat. Naturally, they got all sorts of heroes' awards, and a check for $10,000. The governor asked the chief what he was going to do with the $10,000, and he said, "First off, we're going to get the brakes fixed."

Our group agreed that itemized radiation gear is in an advanced state of the art. It is generally available, and anybody who wants to buy it probably can. However, field monitoring to determine what a person has ingested is a capability that needs much more work. In other words, geiger counters to lay out the perimeters of radioactive contamination are very well in control, but the only ingested material that we feel confident in identifying is tritium. Plutonium is particularly hazardous, and there is no good way to check on the uptake there. The threat posed by toxic materials getting into the water system is both acute and chronic. Monitoring a toxic substance spill requires that we see what the effects are on the water system. The equipment required is not the same as on-the-scene type fire department response hardware. You can send a water sample off to the lab and get whatever information you need, but for anything short of that, there doesn't seem to be hardware available.

What about the technology that is available and that could be exploited? We felt there was virtually nothing that requires any scientific or intellectual work to bring it farther down the line — nothing left to do but engineering. The engineering required is basically packaging rather than research.

In the following table I think the group could probably debate about which column to put the X's in, so consider the possibility that we have different priorities here and there. Hydrocarbon sniffers of various types, pH monitors, and perhaps a biochemical sensor could be put on every fire truck. The human nose backed up by proper training is a potential tool for firemen on the engine; an educated nose is a different matter. But getting back to the hardware question, those simple devices could all be on every fire truck. If you want to move up to the department or county level, then certainly all the above could be available, plus portable gas chromatographs, biochemical sensors, emission spectrometers, and a tunable laser with a sensor for the products of the result of the impact with the laser. One of each of those could be available per county. Getting to a higher level of the emission spectroscopy, quite sophisticated equipment is available that might be placed at the state level and not at county, and

certainly the more advanced infra-red would be another echelon to add. Ideally, we would get into portable satellite communication apparatus, perhaps with automatic readout of onsite sensors, but certainly with transmission and communication. The more complex gadgets generally have to be coupled to a microprocessor of some sort for remote terminal processing of data. This is all within the state of the art.

TABLE OF POTENTIAL/FEASIBLE ARRAY OF HARDWARE

Item or Type	Location or User		
	Every Fire Truck	One per County	State or Zone
Hydrocarbon "Sniffer"	X		
Other sniffers	X		
pH detector	X		
IR sensor	X	X	
Gas chromatograph		X	X
Biochemical sensor	X	X	
Emission spectrometer		X	X
Telemetering capability		X	X
Microprocessor backup		X	X
Tunable laser plus ionization potential readout		?	X
Readout for satellite sensors (many types)		?	X
Trained human nose	X		
Interferometer	?	X	
Application of military (war gas agent) hardware	?	?	X

The best course of action, we feel, would be to initiate a study now, and as I told you yesterday, we have one program adapted for this purpose. The study would cover the ground that this working group covered yesterday, would look at the tabulation of equipment and distributions, and recommend by the end of the fiscal year nominations for research that would fill the more than one, less than ten, places Cliff McLain mentioned to put $100,000 per project.

Deployment is a hurdle that must be described at the outset, or it is unlikely to be cleared later. User education, to generate a market, must be part of the total program, or the great inventions will gather dust in the museum of prototypes.

A word about the "trained nose". Promiscuous sniffing can be dangerous to one's health, but there is a real place for educated analysis by trained people. The most frequently shipped chemicals are known (e.g., see the Oil Paint and Drug Reporter listing). The weird, obscure substance is relatively rare, so concentration on easily identifiable items can lead to early spotting of the majority of transport hazards. Tank size and shape give clues that a clever person will incorporate into his training, hence into his field capabilities. He can thus proceed to eliminate threats one by one, narrowing down the field of possibilities, then use hardware, if needed, for the final decision.

Part of the higher level backup can be a central library, possibly on a floppy disc, of the most common substances showing basic descriptions, e.g., spectral response. Then such data must be made routinely and widely available. Spectral response is a good example, for hardware to sense it is not difficult to make or use.

Now that's about as far as we got. I should note that one of the members of our group said that he almost didn't come to this conference because it was so close to Three Mile Island.

WORKSHOP 4 — PREVENTION AND CLEANUP

Chairman: Joseph Lafornara, Environmental Protection Agency
Recorder: James Zaccor, Scientific Service, Inc.

INTRODUCTION

Prevention and cleanup of hazardous material incidents is a management problem that requires continued evolution of information, equipment, and procedures. The development of a hazardous materials incident data base would help:

- o Establish the magnitude of the problem and track changes for better or worse
- o Determine the causal factors, response protocols, and consequences
- o Define priorities in developing response equipment, tactics training, procedures

Based on hard data, equipment and procedures for surveillance, response, and cleanup could be systematically developed.

OUTLINE

I. Develop Hazardous-Materials Event, Storage, and Disposal (Dump) Data Base and Construct a Management Information System

A. Survey Hazardous Material Users/Spill Events to Determine:

1. Incidents by End Use in Terms of
   a. Frequency of occurrence and quantity of spills
   b. Causal factors
   c. Response actions
   d. Consequences
2. Total Hazardous Materials Handled as a Function of
   a. Application or end use (e.g., by Standard Industrial Classification, SIC, Code)
   b. Ultimate disposal (disposal amount vs disposal method, etc.)

c. Safety record (incidents)
d. Geographical distribution

B. Define and Develop Management Information System from Data Base

1. Catalog Response Procedure vs Results (good and bad)
2. Estimate Impacts
   a. Economic
   b. Environmental
   c. Socio-political
   d. Public health and safety
3. Deployment of Manpower and Equipment
4. Rank Priorities for Incident Prevention and Control (e.g., Tactics Training, Instrumentation Development)
5. Quality Control of Data

II. Response/Cleanup/Surveillance

A. Establish Limitations on Protective Suits and Equipment

B. Develop:

1. Supersuit
2. Remote Control Assessment Vehicle
3. Instrumentation Requirements
4. Training Programs
5. Response/Cleanup Procedures
6. Disposal After Cleanup

C. Cleanup Needs

D. Related Topics to Consider

RECORDER'S SUMMARY OF WORKSHOP 4

The discussions of this workshop revolved around two areas: 1) the development of a hazardous materials incident data base to establish the magnitude of the problem, determine the causal factors and consequences of the incidents, and catalog the response actions taken, and 2) the development of equipment and procedures for surveillance, cleanup, and response. Detection instrumentation was not addressed.

The data base could be developed by soliciting fire department and

civil defense agency reports on their responses to hazardous materials incidents. The U.S. Fire Adminstration has been collecting data, in this manner, on fires and explosions. A simple data form containing the date, time, and location of an incident, the material, mode of transport or type of fixed facility, the causal factors, the equipment involved, procedures and tactics used, and consequence involved should be developed. In addition, a request for a short narrative description of the incident and actions taken should be included. The system developed should also have a built-in incentive for local government to participate. It was decided to leave the detailed questionnaire to the implementing organization.

The ultimate tool for hazardous materials management and control would be a system that tracked all hazardous materials from inception until dissolution or neutralization. Practical intermediate tools can and should be developed. For example, hazardous-materials-use data and a spill event model could identify exemplary safety records as well as less-than-adequate records — by industry and by company — to pinpoint storage and handling remedial actions both by location and nature. In addition, a hazardous materials input/output model could pinpoint disposal problems by regions, industries, and even companies within regions.

A data bank is necessary to develop management tools. If information on response actions and consequences of each incident were available, incidents involving similar hazardous materials in similar circumstances could be compared to pinpoint effective and ineffective response procedures. Data could be compiled to estimate the impact of incidents on the economy, environment, social and political attitudes, and public health and safety. With facts on frequency and type of incident by geographic region, manpower and equipment could be deployed rationally. If a particular type of incident were occurring frequently in one area, that area could be supplied with additional resources. By documenting the nature and magnitude of the hazardous materials problem, priorities could be ranked for research in prevention and control. For example, should tactics training take precedence over instrument development? Should resources be devoted to prevention programs before dump cleanups? Answers to these questions may become more

clear when more information on the problems becomes available.

The quality of data needs to be considered. What are the problems of having partial data? How can duplicate and multiple recordings be prevented? What about unreported incidents? How will these problems affect the usefulness of the data bank?

Visibility seems to affect the likelihood of an incident being reported. Insured risks don't report the one and two sprinkler fires because it will drive up their premiums. A survey designed to protect respondent anonymity produced a 60% response to the question of one and two sprinkler events. Maybe we need to consider ways of completing our data without respondents worrying about repercussions.

The discussion of response procedure development dealt mainly with the protection of the responder and actions he could take to contain and dispose of hazardous materials. We agreed that, whatever the approach, the local first responder needs to be trained in the limitations of his safety and response equipment.

Workshop 4 recommends that a "supersuit" be developed to protect a responder from the most toxic materials. No one material exists now that forms a barrier to all hazardous toxic liquids and vapors. The need is for an impervious, tear-resistant, heat-sealable, teflon-like material or multi-layered material. The "supersuit" would temporarily protect someone going into a hazardous area to sample or define the hazard.

An alternative approach to sampling is the use of remote-controlled vehicles equipped with appropriate instrumentation. The design of one such vehicle is being sponsored by the EPA. A funding supplement could ensure that a prototype is built.

Our limited discussion on detection instrumentation centered on ways to reduce the number of analyses to a manageable level. It was pointed out that, if an incident requires the sampling and analysis of 40,000 drums

of material, and each sample takes one hour to run (as is often quoted by laboratories), then it will take 5,000 days, or 20 work-years, to complete the laboratory work. This points out the need for an effective method of sample compositing. An alternative approach is the use of statistics to reduce the number of samples taken.

Proper training is critical to effective response. Workshop 4 recommends that a course similar to the "Pesticide Spill Control Course" now offered by the National Fire Academy be developed and presented. This proposed course should include response procedures for all hazardous chemical emergencies, and should stress the proper use of existing local resources — firefighting equipment, building and earth-moving equipment, third-party spill cleanup and containment contractors, etc.

Once hazardous materials are cleaned up, how should they be disposed of? EPA is doing some regulatory work now on defining proper disposal for certain materials.

Cleanup needs could be defined with the aid of a data bank. The need for cleanup includes dumps, hence there is a need for complete neutralization to achieve ultimate disposal. The data base should include not just spills, but quantity and rate of accumulation in dumps, by region. Contingency plans are needed to deal with cleanup problems. To design better approaches, local response agencies need to develop data and response options. Sampling may be a problem after cleanup. How should the number and location of samples be determined?

RELATED TOPICS TO CONSIDER

- o Forecasting Management Problems:
    1. Accumulation of materials, incipient disposal problem
    2. How to define "clean" — what technology is needed
    3. Impact of new materials and burgeoning delivery routes — game and risk assessment
- o Dump locations
- o Licensing or permit system for hazardous waste disposal
- o Compliance techniques
- o Satellite monitoring for unauthorized dumping
- o Emergency response may aggravate long-term problem
    1. "Band-aid" response
    2. Program to reduce after-effects.

CLOSING SESSION
June 26, 1979

INTRODUCTION

The meeting participants reconvened on the last day of the conference. Reports from the workshops were heard, Cliff McLain of DCPA made some closing comments, and an open discussion followed.

OUTLINE

I. Workshop Highlights, Conclusions, and Suggestions
   - A. Highlights
     1. Short-term vs long-term criteria
     2. Emergency response strategy
     3. Long-term hazardous materials scenarios
   - B. Conclusions – Requirements for long-term hazardous materials management
     1. New equipment is not urgently needed
     2. Data base is needed by the emergency manager
     3. Tools for analysis of economic impact of emergency management decisions are needed
   - C. Questions and Suggestions

II. Cliff McLain's Closing Comments
   - A. Proposed FEMA steering group
   - B. Examples of FEMA's projects
     1. Department of Consumer Affairs
     2. Department of Energy
   - C. Plans for future conferences

III. Open Discussion

A. FEMA's role in hazardous materials management

B. Instrumentation needs

C. FEMA funding

D. Funding priorities

E. Hardware marketing

F. Instrumentation limitations

G. False alarms

H. Detection devices and sampling problems

I. Need for uniform nomenclature and guides

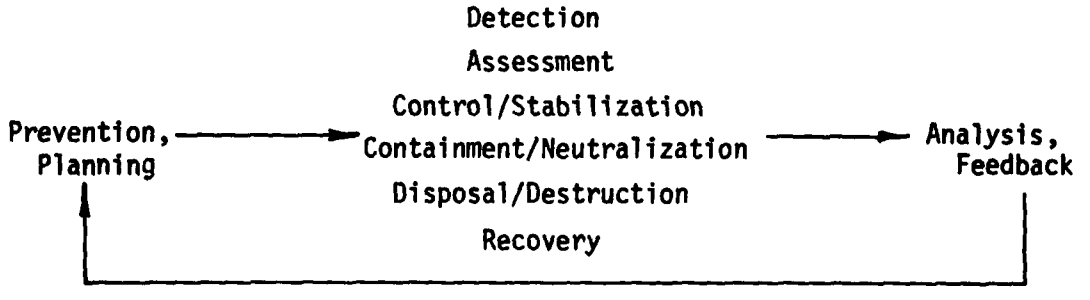
WORKSHOP HIGHLIGHTS, CONCLUSIONS, AND SUGGESTIONS

Highlights

1. Short-term vs long-term problem criteria

Short-term	Long-term
"Acute"	"Chronic"
Hours	Days/weeks/years
High contaminant levels	Low contaminant levels
No time for citizen reactions to play a role in emergency actions	Citizen/political reactions an important issue in emergency action

2. Emergency response strategy:



FEMA needs to consider whether Federal attention is required throughout the entire emergency response. EPA, NIOSH, and OSHA can provide aids in detection and assessment, and, through regulatory powers, prevention.

3. Long-term hazardous material scenarios:

Chemical dumps: legal — local monitoring may be helpful
illegal — ? ? ?

Secondary contamination, due to hurricanes, floods, fires, and other disasters.

Conclusions — Requirements for long-term hazardous materials management

1. No new equipment is needed on urgent basis. With a long-term problem, there is enough time to use available laboratory techniques or specialized equipment from EPA, OSHA, etc. State and local laboratories, universities, colleges, and private industrial laboratories can provide assessment and recovery management services. However, new, simple, compact equipment could be useful.

2. An up-to-date, complete information base on available assessment laboratories, services, and equipment is essential to allow the emergency manager to use the resources efficiently in the long-term hazardous materials problem.

3. Tools for local and regional economic impact analysis need to be developed and made available to the emergency manager and local political leadership to allow estimation of the economic impact of emergency management decisions.

Questions and Suggestions

- FEMA participation on advisory panels, research
- More training provisions are needed
- Determine whether hardware is already available
- If instruments are available, a training/product marketing effort may be the answer. Users need to be made aware.

- o Is Federal subsidy necessary to sweeten the pot?
- o Are Federal regulations or "carrots" needed to encourage the market?
- o Instrumentation requirements need to be matched to time line of disaster scenario
- o Evaluate any work on microbiological sensors for general toxic substance — should be a good basis for further study
- o Information is needed on device types. Everyone in audience should relay information to FEMA on known devices.
- o Gadgets — have to fit the emergency management context
- o The first responder to an incident needs a means of "problem identification" — Is it toxic? explosive? etc.
- o Masks, some protective clothing, and breathing apparatus exist, but might not be used as a high priority item as yet throughout hazardous material/firefighting community
- o Information on resources is needed in handling hazardous material incidents
- o Hazardous Material Information System (USCG run)— expansion of CHEMTREC — FEMA should track this closely
- o Communication is important, but must recognize limits of current information providing systems as a substitute for onsite autonomous capability (i.e., simple assessment instrumentation plus local onsite information capability)
- o Hazardous material manual from DOT.

CLOSING COMMENTS — C. McLAIN

We should talk about the whole series of conclusions or findings or observations we have come up with from the separate workshops. I think the conference has generated enough food for action. I think we have accomplished enough here to propose, and to start, some work in this area. It was suggested — and I think it's a good idea — that if we start a program we ought to have a steering group. I believe it's always good to have a body to act as a sounding board against which you can test ideas and things that you're doing. I presume we have a general interest in a formal FEMA steering group to help us get started. Perhaps a few other agencies could be represented in it. This could be beneficial. As a basic tenet of FEMA operational policy, I would urge that the principle of leverage always be considered. FEMA should always work diligently to

start something and to get some seeds going where there are new ideas. Many times this is just what is needed.

For example, this past year we were working with the Department of Consumer Affairs and the Department of Energy. You may ask why an agency with 100 million dollars is going to give some money to one with 100 billion dollars. Well, often to make a 100-billion dollar program fly with Congress, you must put strict boxes around how you're going to use that money. You'd be surprised, even with 100 billion, it is sometimes hard to do certain things; you're afraid somebody is going to come around and say, "What in the world are you doing with that?" So, we gave just a little money to the Department of Consumer Affairs. This was to do some funny things with energy development — to look at the relationship of energy to the survival of the country.

One of the things that was done was a movie about solar energy. That movie won a gold medal at a film festival that the DOE and private industry hold for special film processes. So now the DOE is crowing. You can do some outstanding things that don't cost very much, $25,000. The film is about solar energy's potential for fulfilling local energy requirements and about energy self-sufficiency. You know, if you start to think about survival and problems of nuclear war, you realize that, with a distributed energy capability, you are not dependent on an enormous power grid, which may be knocked out easily, and that's very important. It certainly won't do FEMA any harm to have the DOE working on problems such as this. So, if you do it right, you can get a lot of leverage in solving some of your problems for a very small initial investment.

An interesting related situation exists in New England, which has an extensive low-power water supply. In the 1860's during the Civil War, New England (New Hampshire, Vermont, Maine, and Massachusetts) was an enormous center of textile and clothing manufacturing. The factories all used water power because they were right along the river. Well, those dams are still up there — but the water that goes over them isn't being used. To generate power they don't even have to build dams, just put some

turbines in there. A lot of little communities up in New England are beginning to think seriously about this. You know, when New York browns-out, somehow or other New England suddenly has a power shortage. That's the reason some people up there are interested in nuclear power. Although Seabrook, New Hampshire, is having a lot of trouble, New Englanders concede the need to run on their own.

I think we now have enough food for thought to put together a program, and we want all of you who are here representing agencies to participate. We are looking for real participation and discussion, so if you don't come back personally, perhaps you can send someone from your office. I recommend that we get back together this fall to take a look at what we develop out of this conference and see whether you like it or not. I think it would be a good idea to get back together after some additional thought, to see what happens. To keep things going, and to refresh our memories, we'll count on one of our contractors here to provide a summary of this meeting for all of us to work from — and we'll expect to hear from you.

All too often we get together and review something and throw bricks at the poor guy that's trying to tell us about some idea or system, but very seldom does it happen that anything comes of this. I think such groups would be more effective if participants saw serious intent to make decisions based on their discussion and input. One way to demonstrate that intent is to invite them to come back and review the program plan jointly developed. So, I am going to do everything I can to see that we build on what we have started here, that we really do something. I'd like to get the same group together again some time in September or October, or whenever we have some funds available, to look at things that we think are inadequate, and fix them. I think I can promise that much, even though I don't know what I might be doing in three months.

I think we can make this approach work. If we follow through, it would be more satisfying to everybody — you know, we're spending the taxpayers' money here, and we ought to give them more for it than just a few

pieces of paper. I am very pleased so far, and I thank you all very much for your efforts.

Now you can throw any bricks that you want, and let's get on with putting a good program together.

OPEN DISCUSSION

————: Say Cliff, you're talking about using this audience as a sounding board or steering committee for FEMA . . .

McLain: All for hazardous materials management. I think we need to do this with other subjects as well.

————: I think that's a fine idea. I suggest that FEMA be represented on the R & D committee for the National Response Team; there's a committee that meets periodically . . .

McLain: That's a good suggestion. I don't think we have wormed our way into that yet.

Kerr: I think we have to check on all similar such boards from the FEMA viewpoint, Cliff, because some of us are on different advisory and technical panels, and these comprise quite an interlocking system. So, I think it would be worth spending a little while figuring out where we stand.

Board Rep. ?: If you'd like, you can name somebody, and at the next meeting I could at least inform that party that there is a meeting, "So come on down."

————: Before that "get-together" in the fall, if the program is in written form, we should send it out ahead of time.

McLain: I believe there are a lot of things we aren't a member of yet

that we should consider. Since FEMA will, in itself, be a White House agency, it would be more logical for us to work as, and even offer to be, an arm of the OSTP, or to further the implementation policy they might want to see in the emergency area.

Have we made any progress? I saw a listing of instrumentation approaches that I could recognize, but it didn't seem that you'd decided on any one of them as useful for detecting life-threatening materials. Is this correct?

Kerr: I guess we didn't get that far.

McLain: Okay, that's an important issue. Although it seems that, essentially, engineering development and invention are what we agree is required, rather than any basic science, I still feel that it is important at an early date to decide if there might be any practical approaches to generalizing detection instrumentation into a single, simple package. I look at the instruments we listed as desirable, and to me every one of them was clearly applicable and they don't seem that hard to engineer, but can we make them applicable to detecting a broad range of hazardous materials?

Kerr: Well, substances do tend to fall into certain hazard groups.

McLain: Can that be demonstrated?

Kerr: I believe so; although they don't necessarily cluster from the standpoint of identification, they certainly are classifiable from the standpoint of hazard.

McLain: Chuck mentioned the matter of cost. I must admit I hadn't thought much about it. Somebody asked me how much money I thought we were going to put into this, and I said $800,000. The only reason I said it was that I could look at the DCPA budget and see that this would probably be possible. At this stage of the game with the FEMA organization, I think that's a reasonable estimate.

McLain: Did any of you feel this figure was ridiculously low? I felt a little apologetic about it myself, because I would certainly increase that by an order of magnitude if I could. But suppose we call in a bunch of inventors this fall and tell them we're interested. Do any of you have an idea as to how much ante you ought to put on the barrel head? What do you think? There is the aspect of the marketing potential. Perhaps an effort should be put into creating a market, instead of FEMA just buying the stuff for Federal handout.

Talking about cost brings up the point that there are a lot of other aspects to discuss. In the session I sat in on, we wound up with everything but instrumentation. What about these other areas, what priorities do you think they should have? Training, for example; what do we do there?

————: I think data is the cornerstone to starting out.

Fredie Kay: I suggest training in hazardous materials handling for local fire departments. The first people on the scene are your local officials, your local fire department, or the police. We need to know that there's at least a certain level of competence across the country. There are enough techniques and enough knowledge now that local people can be trained. This is the starting point.

McLain: I've been told that there is a lot of instrumentation that will become available on the market, and some already available that might fulfill some of these requirements. Most of the devices for toxic substances might be more suitable at the moment for laboratory technicians' use, but maybe others can be trained to use them. I must admit that my knowledge of available instrumentation is limited, based on trade magazines, friends, and talks with a few companies that make instruments. I don't know how you do a thorough search of the market.

Kerr: Our group (Workshop 3) felt that the technology is there, but any scheme has to involve more than just the hardware and development. A

deployment scheme that involves the training necessary to allow the users to profit by it is needed. Maybe this should start with a market generating approach. If the people who need to use the hardware don't even know it's there, and don't have any means of getting smart about it, and don't have any subsidy, then the stuff just sits on the shelf and the manufacturers lose interest awfully fast. So I think the hardware solution has to be a total package: the deployment scheme, education, and everything else, not just hardware alone.

J. Clark: I'd just like to reinforce a point that I heard both Fredie and Jim making. The market relies on the users, and this technologically oriented group here can define potential solutions until the cows come home; if the economics, or the color, or something else makes it unacceptable to users, regardless of what we come up with, it's not going to go anywhere. User involvement somewhere along the line would be very useful.

Lafornara: A lot of the marketing has been aimed at the occupational health and departmental people, and not at the local fire departments. There's really no magic in these things; anybody can be trained to use them.

————: Equipment can be made very simple to use.

————: How would you get the instrumentation used — force the States to use it?

McLain: Well, that's interesting. How might we do that? We don't really tell States; i.e., the President doesn't tell States he's going to throw the governor in jail if he throws out the 55 mile an hour speed limit. Instead, the governor doesn't get nine Federal bucks for one State dollar, and other Federal aid is turned off. Just like the Federal flood insurance program — if you don't accept flood insurance, that's okay, but you don't get Federal aid.

————: Getting back to the issue of testing, I'm convinced that we

have the technology to sample things on the moon and do all kinds of things, but you must know what you are going to test for. Now,if you want to test for calcium carbonate, you can come up with a test device that will tell you whether or not you've got calcium carbonate; but when you start talking about the broad scope of things that you might have in any smoke or any vehicle or any fire, you've got a real problem there. We have not been able to locate appropriate devices, although we've gone to many instrument companies and said, "Hey, what do you have?" They say, "We've got a gizmo here and if you have a 6 x 6 truck that will carry 10,000 lbs, and if you can get two technicians, we can test for all kinds of things." But a black box that you can stick in your pocket is very specific as to what it will check. We have this problem with pesticides. You've got maybe half a dozen different pesticides that might be present in a sample, but you can't use just one prong or one device for determining which of those pesticides you have. Finding a universal meter that even the educated fire marshal or fire chief is going to be able to read is unlikely.

In talking about the cost of instrumentation, we're really talking about a time line. Immediately after an incident, we can use some crude instrumentation that is also cheap. As we go farther down the time line, we need more sophistication. So, when you talk about investing, you're talking about investing in two levels of instrumentation — that which is going to be first on the scene, and that with which you want to sample later on. Both types are within the state of the art.

McLain: That's an interesting thought. Matching the instrumentation requirements to the time line of the urgency fits it with Workshop 2's observations. For long-term testing, we have lots of sensitive specialized instrumentation that is practical.

————: On the long time line, you're talking about a very expensive investment. For the on-the-scene detection and assessment, you're not asking for the precise identity of the substance, you're asking whether or not it's going to blow up. Pesticides fit as an example: you need half a dozen probes to tell which pesticide it is, but a little bit of

fungus or fish stuck in the water might tell you whether it's killing or not.

McLain: Did any of you come up with any animal-related sensors?

Lafornara: Mr. Silvestri has done quite a bit of work on polarized enzymes.

Silvestri (?): The Army now has certain types of alarms and devices that work on a base of enzyme systems.

McLain: Well, that's a good example.

————: There was a study done with the Boston Fire Department to determine the concentration of noxious gases in a fire.

Lafornara: I don't think we have to determine the concentration precisely, we just want to know if there is enough stuff there to be a problem. In trying to define the niceties and the details, the problems are almost insurmountable.

Kerr: Well, the objective of this study was simply to describe the hazards the firefighter is confronted with, so the conditions are slightly different from what we're talking about. The data are there. The problem, of course, is that the normal combustion products of the house match just about anything you want to think of. So, even wood burning is going to cause the firemen to keel over.

————: Not at a distance, though.

Kerr: In these incidents though, there isn't necessarily a fire there to start with, so identification of a potentially hazardous substance is not always inhibited by combustion problems.

McLain: Anyone have any ideas on false alarms?

————: We decided if you have a false alarm that failed to indicate something bad, that was serious. But if you have an alarm that falsely indicates a hazard, that wasn't so serious.

McLain: What do you think the tendency would be? Can you estimate the seriousness of the false alarm problem?

Kerr: It depends on where the false alarm occurs. If you are in Houston and have ten alarms a day involving chemicals, a false alarm may be more routine and statistically less serious. However, if you're somewhere out in the boonies and have hydrocarbon sensing problems twice in a decade, a false alarm is a different ball game.

McLain: With a detection machine, a false alarm can be very serious.

————: A calibration is one way of checking them. My guess is that most people that run alarm systems eventually become indifferent to false alarms. Frequent occurrence of false alarms results in contempt for the alarm system. If you get too much of that sort of thing, people will shut off the alarm. Also, in some instances people ignore an alarm. That has occurred with pilots and their altimeters just before they fly into a mountain.

But the kind of false alarm I was thinking about was — Here I am managing a hazardous material incident, and I need some equipment to tell me whether I should go in there and attempt to shut off valves, or stay out. In this case a false negative is unacceptable, whereas a false positive is acceptable.

————: However, if you were an on-scene manager using a detecting device, changes in the environment would change the hazards. You would be detecting alarms one after another; a false negative really wouldn't affect you too much because you would be getting many positive alarms. Changing the subject, I think it might be a good idea if we go away and

send back to you or to Mr. Kerr all of the references that we can on detection devices.

McLain: We need support to develop something. It would be a good idea to have an idea of what is available. In the industrial field, many industries do have instrumentation.

Wilton: Cliff, our group agreed that it's neat to make a gadget and teach everybody how to run it; but unless that device fits into an overall plan for dealing with spills, it really is not going to be effective. Just because you've got one on the truck doesn't mean the problem is solved. Instrumentation needs to be fixed in a management context.

Warren Stevens: Firefighters need a means of identifying the nature of the problem.

Lafornara: There's currently a remote control vehicle being designed by EPA research to assess a hazardous situation and to telemeter or cable-broadcast the data back to the command post or perimeter. An assessment can be made that way. Whatever the approach, the first responder needs to be trained in the limitations of the safety and response approach. We recommend a broadened course, similar to the pesticide spill control course that's given here at the Academy, be developed and given. The course should stress the proper use of existing local resources — firefighting equipment, building and earth-moving equipment, third party spill cleanup contractors, and other available equipment. The first responder must know how to use this equipment to effectively minimize the after-effects of the incident. Our group (Workshop 4) had a limited discussion on sampling analysis during cleanup. It was clear that you may need to take samples to analyze a large number of areas. For example, we were involved in a waste disposal facility in New Jersey that has a sampling analysis problem. They have 40,000 drums of unidentified material. Forty thousand drums must be sampled, and the best estimate is that it'll take an hour per sample to make a very limited identification. Simple arithmetic will tell you that it will take 5,000 days — that's 20 work-years — to complete

just the laboratory work. We need a valid approach that either helps reduce the number of samples that have to be analyzed or drastically speeds up the analysis. Perhaps some of Jim's devices will help in this regard.

Combs(DOE): Devices are one problem — the existing response guidebooks are another. If you look up "unsymmetrical dimethyl hydrazine" you won't find it, but you will find "dimethyl hydrazine, unsymmetrical." Once you find it in a guide, that guide will give the basic information you need, and you won't have to call CHEMTREC. Now, if you need additional information, CHEMTREC and the Coast Guard are still there. What we hear from many firemen is that they want to know absolutely what the proper shipping name of this material is. An additional problem is that there are about 60 guides to all the possibilities. A material is combustible; a material is flammable and toxic; a material is flammable, toxic, and corrosive; a material is flammable, toxic, and water reacting — we have all these possible situations, plus 60 possible guidebooks, AND we hope this will help some of you. Not a cure-all.

McLain: Well, I appreciate your vigorous participation in this discussion. We plan on developing a draft program soon.

Kerr: Chuck will be giving us an unedited draft in the next two weeks. As soon as Cliff and Joe and I massage it a bit, I propose handing it to everyone who is here. Incidentally, I think we should not just thank the people who are here, but apologize to them for asking them to do something absolutely impossible. The questions that were proposed to you yesterday in the workshops were worth about 250 pages each, and we asked you to give us the answers in four hours. I think we owe you a great debt.

Thank you all exceedingly for your time and efforts in coming here. I assure you that we will not, if it is at all within our power to do so, let this important subject drop into a crack.

QUESTIONNAIRE SUMMARY

A questionnaire distributed to all participants at the outset of the conference sought information on:

- Statutory or other authority of the agency to conduct hazardous materials programs
- Resources committed to such programs
- Current and/or planned R & D, planning, or other programs in hazardous materials
- Needed R & D, planning, or other programs in hazardous materials
- Additional facts, issues, questions, or comments that might be helpful to FEMA in establishing hazardous materials programs
- Reactions to the conference itself

Responses were received from 18 individuals representing: FEMA (2); NFA (2); EPA (2); DOT (1); OSHA (1); FPA (1); U.S. Environmental Hygiene Agency (1); Chemical Systems Laboratory, Aberdeen Proving Ground (1); U.S. Conference of Mayors (1); two counties (Multnomah, OR and Montgomery, MD); and three contractors (LOCUS, Rockwell, Systan). Not all respondents answered every question. Most preferred to concentrate on current, planned, or needed programs in hazardous materials, on comments and questions on FEMA's role, or on the conference itself.

Statutory or other authority listed by those responding to the first question included: public laws (6 agencies); executive order (2); inter-agency agreement (1); state/local laws (1). Responses to the second question on resources committed were too varied in nature or too sketchy to allow a useful compilation. A detailed summary of the responses to the remaining questions follows.

Questionnaire Summary

Question 3: Please list any R & D, planning, or other programs on hazardous materials

Current:

Courses

"Disaster Planning" for fire service (NFA)

"Decision Making Process for Handling Hazardous Materials" (Montgomery County, MD)

Segments of other courses are related to hazardous material identification (Montgomery County, MD)

Training course development (DOT)

Monitoring/Detection

Chemical and biological detection and warning (Chemical Systems Lab., Aberdeen Proving Ground)

Environmental monitoring (Rockwell)

Management/Planning

Development of an HM management system that incorporates a risk analysis; accesses an information retrieval system; establishes a response vehicle; and coordinates a training program (Multnomah County, OR)

Countywide disaster plan for instant implementation (Montgomery County, MD)

Risk assessment, economic and environmental impact analysis, hazard classification (DOT)

Equipment/Packaging/Containers

HM packaging/containers; component failure analyses, tank truck and tank car integrity (DOT)

Development and demonstration of new or improved equipment, devices and systems for the prevention, detection, identification, containment, control, removal, cleanup and disposition of spills or acute releases of oil and hazardous polluting substances (EPA)

Respirator (SCBA) programs (with NIOSH) (OSHA)

Safety

Safety factors affecting pipelines in severe environments (arctic, offshore, deep water) (DOT)

Accident analysis, HM emergency response information (DOT)

Questionnaire Summary

Question 3: (contd) Please list any R & D, planning or other programs in hazardous materials

Other

Liquefied energy gases (DOT)

Grain dust investigations (with National Academy of Sciences) (OSHA)

Planned:

Courses

Need for 20 courses in areas of hazardous materials (NFA)

Monitoring/Detection

Continuation of present programs (Aberdeen, Rockwell, et al.)

Management/Planning

Development of an appropriate hazardous materials ordinance and enforcement program (Multnomah County, OR)

Update all contingency planning (Montgomery County, MD)

Utilize intergovernmental resources in coordinated effort (Montgomery County, MD)

Equipment/Packaging/Containers

Continuation of present DOT programs (DOT)

Storage facilities and containers for hazardous materials (OSHA)

Other

Continued efforts with dust explosions (OSHA)

Measurements of hazardous environments in confined spaces (OSHA)

Adaptation of spill technology for application to hazardous materials waste problem at abandoned industrial disposal sites (dump sites) (EPA)

Questionnaire Summary

Question 4: Please list any R & D, planning or other programs that should be conducted by your agency or other Federal agencies. (List or number in order of priorities if possible)

Of the 18 questionnaires received, five had no response to this question, and two referred to the report from Workshop 4 in their responses. Responses took two forms: 1) listing of programs (generally already existing) that should be with a particular agency — e.g., DOT responsible for transportation safety — and 2) listing of programs that are needed (i.e., generally not now existing) without specifying any agency.

Programs that should be with a particular agency

with DOT:

Transportation safety programs

Training programs for other agencies on subjects of mutual interest

with USFA:

Data gathering from fire services; clearing house for information

Training courses for fire and affiliated personnel

Use of facilities for teaching courses, seminars, etc.

with Chemical Systems Laboratory (Aberdeen)

Chemical and biological detection and warning

Conference of Mayors

Coordination/cooperation within a city government

Programs that are needed (listed in order of frequency of mention)

1. Data system (see Workshop 4) and resource identification coordination (3)
2. Labeling/placarding requirements: a uniform marking of shipments; more definitive means of commodity identification (3) (One response suggested this should be responsibility of DOT.)
3. Coordination/cooperation between Federal, State, and local governments, and interagency communications (3)
4. Effective enforcement program (or stricter enforcement) for regulations (3)

Questionnaire Summary

Question 4 (contd): Please list any R & D, planning or other programs that should be conducted by your agency or other Federal agencies.

5. Additional training courses (2)
6. Equipment/Instrumentation (2)
   - Greater emphasis on development of devices, equipment, procedures, manuals, etc., for first-on-the-scene personnel.
   - Sophistication and miniaturization of hazardous materials detectors for employee safety and for investigatory personnel.
7. Incident management. Standardization of response protocols (1)

Question 5: Please note any additional facts, issues, questions or comments that you believe would be helpful to FEMA management in establishing hazardous materials programs

FEMA's Role

- o FEMA should remember that the rules of Federal involvement in hazardous materials emergencies are set down in the National Oil and Hazardous Substances Contingency Plan, which sets up a structure for the coordination of Federal resources and responsibilities not only during spills or potential spills, but also during presidentially declared disasters. FEMA would do well to coordinate its efforts under this plan lest it run afoul of other agencies. Conference was an excellent first step in such coordination.
- o Mechanism needed for interested groups to exchange views and accomplishments on a periodic basis. Provide FEMA with a strong leadership role in this area.
- o Insure information flow between various elements of FEMA working in similar areas.
- o Continue to coordinate with other agencies (e.g., EPA) who are heavily involved in this area.

Other Agencies/Contractors

- o Do not overlook National Fire Academy as a delivery mechanism
- o Because of background, Chemical Systems Lab (Aberdeen Proving Ground) can be a focal point in directing programs in chemical detection and warning.

Question 5: (contd) Please note any additional facts, issues, questions or comments that you believe would be helpful to FEMA management in establishing hazardous materials programs

Other Agencies/Contractors (contd)

- Training in hazard assessment through the Fire Academy.
- Utilize existing courses, equipment etc., with some modification, but do not reinvent the wheel. There must be an end to parochialism among emergency forces.
- FEMA might consider, with only several 100 k funding available, the contracting of a couple of programs designed to fabricate a detection system from commercially available hardware and components. Recognizing that devices are to be hand-held and portable, design criteria become critical, and will have to be realistically set in light of limited funding.

Issues

- Issue of WHO IS IN CHARGE very important — should be worked out before an incident (communication/coordination/authority).
- Guidance is needed for all levels of government.
- Planning should emphasize a comprehensive program rather than any one specific element.
- Management needs a more realistic feel for the problems of the first responder in order to develop meaningful plans of coordination.
- For the proper response, we must know the material to identify the hazard. Depth to which identification must go may simply be the functional, or active, group in the molecule.

Questionnaire Summary

Question 6: Was this conference useful and how might the next one be improved?

Very useful/excellent —7; useful — 7; noncommittal or no response — 3; not useful — 1.

Comments on meeting

- Very helpful to start a Federal dialog in a difficult area.
- Well run; objectives stated at beginning and meeting structured to meet them.
- First responders were able to impart first-hand knowledge and experience to those individuals largely responsible for implementation and R & D.
- Purpose of meeting was not clear and assignments to workshops not well defined. Therefore outcome was also very general.
- Helped to establish interfacing of several disciplines, and this is vital for technology and other information interchange. Excellent opportunity to meet a number of key persons in the emergency response R & D and other areas; to learn what is going on; to provide encouragement; and certainly it is always good to have the opportunity to suggest directions for R & D. That some one is seriously looking at the instrumentation problem re hazardous materials detection (identification) is very encouraging, because it is the most significant missing portion of the emergency response picture. It is the limiting factor.
- Workshop approach was especially good (2); good interchange of ideas.
- Funneled the various problems into a common bucket and got the various groups represented thinking about the "Big" picture, as opposed to their own corner of it.
- Beautiful place to hold it.
- Helped focus attention on proper planning, need for additional knowledge on incidents, need for better clothing for on-scene personnel, obvious need for a hand-held device for use by first personnel on scene, development of proper disposal techniques, resolution of chronic waste problems, and identification, locating and quantification of hazardous materials in waterways by in-situ sensors as well as portable systems brought to the scene upon notification of incident.

Questionnaire Summary

Question 6: (contd) Was this conference useful and how might the next one be improved?

Suggestions for Improvement

1. More advance notice (4)
   - With more explicit intentions so that participants could bring salient literature.
   - Helpful to have clearer identification of specific objectives and desired product.
2. Advance preparation (2)
   - Listing of attendees at beginning of meeting and introductory guidelines (felt I walked into middle of discussion).
   - Group chairmen meet together ahead of time to get clearer idea of where group sessions ought to be going.
3. More of same type of meeting of the minds (3)
   - Useful to determine progress and direction as a result of this conference.
   - Similar conference in a year or so to indicate extent to which the present one spurred developments.
4. Workshop (2)
   - Allow participants to rotate through workshops.
   - Give workshops two chances to get together (first day, and shorter time second day to pull it all together, then go to plenary session).
5. Should be a better and more detailed "cross-briefing" to the plenary session at the end.
6. More time than one-half day should be devoted to developing issues.
7. More time should be given to defining the problems than to proposing solutions.

LIST OF EMMITSBURG CONFERENCE ATTENDEES

Name	Organization
Benjamin, Irwin	National Bureau of Standards
Blair, Louis	Office of Science & Technology Policy
Clark, Joe	FEMA
Clarke, F.	National Bureau of Standards
Combs, Gerald L.	Department of Energy
Crisman, H.C., Jr.	Jackson County Planning Commission
Custer, Richard	DOC, National Bureau of Standards
Dick, Marshall	Environmental Protection Agency
Fink, Marvin	Drug Enforcement Administration
Hanbury, Bill	FEMA
Harton, Erskine	U.S. Department of Transportation
Holmes, Robert	Environmental Protection Agency
Kay, Fredie	U.S. Conference of Mayors, Emergency Preparedness Staff
Kerr, J.W.	DCPA
Kronenberg, Stanley	ERADCOM, U.S. Army
Lafornara, Joseph P.	Environmental Protection Agency
Lee, Myra	Multnomah County Office of Emergency Services
Loucks, Charles S.	Department of Transportation
Manno, D.	National Fire Academy
Mastracci, Michael L.	Environmental Protection Agency
McLain, Clifford	DCPA
Meyer, George C.	DCPA
Miller, Raymond	U.S. Coast Guard, National Response Center
Mitchell, G.D.	National Fire Academy
Moore, Michael B.	U.S. Department of Labor
Powell, R. Wayne	National Fire Academy

Name	Organization
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