Worker Health During Emergency Response: Opinions of Health and Safety Experts and California Workers

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GLOSSARY OF ABBREVIATIONS USED

Cal/OSHA	California Division of Occupational Safety and Health
DHS	California Department of Health Services
EMT	Emergency Medical Technician
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
HAZMAT	Hazardous materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
OHB	Occupational Health Branch
OSHA	Occupational Safety and Health Administration
POST	Peace Officer Standards Training
PPE	Personal protective equipment
WTC	World Trade Center

EXECUTIVE SUMMARY

Worker health and safety is a critical consideration during emergency response to hazardous incidents and one that is often inadequately addressed. As a function of its mandate, the Occupational Health Branch (OHB) of the California Department of Health Services (DHS) assists state and local agencies, workers, and others in assessing the occupational health and safety risks of hazardous incidents and recommends ways to respond safely. A hazardous incident is an unintentional or intentional release of chemical or biologic material. Worker groups most likely to be involved during incident response and recovery are first responders and health care workers. Construction workers may also play a critical role during recovery efforts.

Recognizing the need to address the breaches in worker health and safety highlighted by responses to recent hazardous incidents, OHB conducted a survey to address gaps in worker health and safety during response to incidents and to elicit suggestions for improvement.

In the first phase of this two-phase key informant telephone survey, experts who were involved in the response to the World Trade Center (WTC) incident of September 11, 2001, were interviewed to obtain their perspectives regarding worker health and safety issues. In the second phase, labor and management representatives from three California occupational groups, first responders, health care workers, and construction workers, were interviewed. These worker groups were chosen because of their involvement in recent hazardous incidents.

Four health and safety professionals who had participated in the response to the WTC incident were interviewed; they identified construction workers, police, and firefighters as the workers at greatest risk for injury or illness during emergency incident response. The greatest health and safety gaps were: absent or inadequate eye and hearing protective equipment; lack of respiratory protection training; lack of concern for personal safety;

inadequate on-site training; poor training for dealing with a high stress situation; and poor control over access to the site.

Among California workers, a total of 15 interviews were completed: four firefighters, four health care workers, four construction industry representatives, and three police representatives. Common concerns expressed by those interviewed included: a need for information about hazards faced in day-to-day work and how to resolve conflicting information on hazards; the need to maintain adequate training levels for rare large-scale incidents; and uncertainty about the long-term health effects of work exposures. Interviewees also reported a number of work-related concerns and information needs in daily emergency, as well as nonemergency, duties that differed by occupational group.

Survey respondents had several suggestions for improving training for emergency response and developing a consistent and coordinated response plan for hazardous materials incidents, including: establishing a distinct chain of command to enforce a unified worker health and safety message; creating designated teams dedicated to emergency response; involving stakeholders in government, the private sector, nonprofit advocacy groups, and labor organizations in worker health and safety during emergency response; ensuring worker health and safety staff access to the incident site at the onset of worker exposure; utilizing a peer-enforced training structure to encourage use of protective equipment in the high stress situation of responding to emergency incidents; and making training materials and methods more relevant to specific worker groups and anticipated working conditions.

This report documents the perspectives of those interviewed regarding worker health and safety needs during emergency response. Respondents provided recommendations for improving the health and safety of workers during emergency response. Employers and state and local agencies can use these results to provide more targeted training for the occupational groups interviewed. There was a high level of agreement between worker and management recommendations, providing an opportunity for these two groups to work together to better protect workers.

BACKGROUND

The Occupational Health Branch (OHB) of the California Department of Health Services (DHS) is mandated to maintain a program on occupational health and occupational disease prevention, including the identification and evaluation of workplace hazards, investigations into the causes of morbidity and mortality from work-related diseases, and development of recommendations for improved control of work-related diseases. This includes making recommendations to avoid, minimize, or prevent adverse health effects. As a function of its mandate, OHB assists state and local agencies, workers, and others in assessing the occupational health and safety risks of hazardous incidents and recommending ways to respond safely. A hazardous incident is an unintentional or intentional release of chemical or biologic material.

Worker health and safety is a critical consideration during emergency response to an incident and one that is frequently under-recognized, as observed during the 2001 anthrax exposures to postal workers. Although any worker can be impacted during the response to incidents, the occupational groups most likely to be involved and at high risk of illness and injury due to exposure during emergency response and recovery are first responders, including hazardous materials workers, and health care workers. Following incidents affecting occupied buildings, such the attacks on the New York City World Trade Center (WTC) on September 11, 2001, construction workers may also play a critical role in recovery and cleanup efforts and suffer resulting injuries or illness.

Historically, during rescue, recovery, and remediation efforts following chemical, biological, or other incidents, important occupational health and safety issues have not been adequately addressed. During the 1995 Sarin attack in Tokyo, 135 firefighters were injured while attending to victims (ten percent of the firefighters who responded to the incident).[1] More recently, after the attacks on the WTC, prolonged rescue and recovery activities occurred under extremely stressful conditions never anticipated by workers, employers, and governmental and nongovernmental organizations.[2]

Firefighters reported five times as many respiratory medical leaves-of-absence in the 11 months following the attacks compared to the previous 11 months.[3] Many of these illnesses and injuries could have been avoided through pre-event planning, hazard identification, the use of appropriate personal protective equipment (PPE), better pre-event training, and risk communication.[3-5]

Recognizing the need to address the breaches in worker health and safety highlighted by the response following hazardous incidents, OHB held a forum in 2002 to discuss the occupational health response to the WTC incident. Forum participants raised a number of concerns that, if addressed, would enable better protection of the health and safety of workers in the future. A consistent message of forum participants was the need to improve training and to include worker perspectives when planning for response. The current survey was conducted to pursue these issues raised during the OHB forum. The main objective of this survey was to identify the perspectives of experts and workers regarding: 1) gaps in worker health and safety during response to both intentional and unintentional emergency incidents; and 2) suggestions for improvement.

METHODS

In order to adequately understand the health risks of workers called upon to respond to emergency incidents, including terrorist events, and to recommend preventive measures, OHB determined that it was necessary to: 1) understand the health and safety problems encountered during the response following the WTC incident; and 2) understand the workers' perspectives on these problems. To fully appreciate the problems encountered during response to the WTC incident, OHB interviewed health and safety professionals involved during and after the acute response. OHB then interviewed representatives from three groups: first responders, health care workers, and construction workers. These groups were chosen because of the likelihood that they would be involved in the response to hazardous materials incidents or were so involved in the past. The goal of the interviews was to understand perspectives and perceived needs of these worker groups regarding emergency preparedness.

WTC HEALTH AND SAFETY PROFESSIONAL INTERVIEWS

In order to gain an understanding of some of the worker health and safety issues encountered during the response to the terrorist attacks in 2001, four health and safety professionals who were involved in the response to the WTC attacks or in epidemiologic surveillance of workers involved in the response and recovery were interviewed (Table 1).

Table 1. Health and Safety Professionals Interviewed

Profession	Affiliation
Industrial Hygienist	Mt. Sinai Medical Center, New York City
Occupational Medicine Physician	Mt. Sinai Medical Center, New York City
Industrial Hygienist	NIOSH*
Occupational Medicine Physician	NIOSH*

* National Institute for Occupational Safety and Health

These professionals were interviewed by telephone for approximately 10-15 minutes on the following topics (Appendix 1):

- Gaps in worker health and safety;
- Worker groups with the greatest health and safety needs;
- Health and safety information requested most frequently by workers;
- Methods to optimize worker health and safety during emergency response;
- Key issues to consider in developing worker health and safety protocols;
- Need to improve interagency coordination;
- Key questions to ask workers to assess their knowledge;
- Agencies with the greatest impact on worker health and safety during response; and
- The optimal role of a state regulatory or public health occupational health program during emergency response.

Interviews of health and safety professionals involved in worker health and safety during WTC response or follow up were conducted in April and May 2003. The responses to these questions aided in the development of worker interview questionnaires described in the following section.

CALIFORNIA INTERVIEWS

Based on the results of the WTC health and safety professional interviews, and on the likelihood of involvement in an incident, three California worker groups were identified for interviews: first responders, health care workers, and construction workers (Table 2).

Within each occupational group, both labor and management representatives were included in the list of potential respondents. First responders typically consist of three unique professions, emergency medical technicians (EMTs), firefighters, and police. However, the situation is different in California, where firefighters and EMTs are often employed by the same employer and represented by the same union. Thus, for this

survey, the same labor and management representatives were used for these two groups.

Table 2. Definitions of California Occupational Groups Interviewed

Occupational Group	Definition
First Responder	Firefighter, police, and emergency medical technicians
Health Care	Workers in a hospital or urgent care setting
Construction	Laborers, carpenters, operating engineers, ironworkers, and trades covered by the State Building Construction Trades Council

First responder management staff was recruited through the Bay Area Terrorism Working Group. Health care worker management staff was identified through the California Emergency Medical Service Hospital Disaster Interest Group. Southern California fire and police management and police associations were identified on the internet. Construction management staff and union representatives were identified through the attendee list for the 2002 WTC forum organized by OHB.

An open-ended questionnaire (Appendices 2-4) was designed based on WTC health and safety professional interviews and a review of the literature.[3, 6-8] The survey defined a hazardous materials incident as any situation where substances that can have an adverse effect on human health are released into the environment. Respondents were instructed to apply this definition to intentional or unintentional release of hazardous chemicals. The topics covered were:

- Types of health and safety concerns workers have in their daily duties;
- Health and safety information workers want during emergency response;
- Current hazardous materials (HAZMAT) training and source of training;
- Issues that were not addressed or needed to be addressed more fully during emergency response training;

- Perceived role of a state occupational health program during emergency response; and
- Perceived roles of other organizations in worker health and safety.

A single interviewer conducted the survey by telephone from May 2003 to June 2003. Each interview lasted approximately 25-30 minutes.

RESULTS

WTC HEALTH AND SAFETY PROFESSIONAL INTERVIEWS

The four health and safety professionals interviewed identified gaps in worker health and safety during the response to WTC, needs of workers who responded to the incident, ways to optimize worker health and safety, and their perceptions of the role of state occupational health programs during response to incidents. They also made specific recommendations for addressing these issues (Appendix 5).

Worker Health and Safety Gaps

During the WTC response, three major gaps in worker health and safety were identified by the survey respondents: 1) workers not wearing eye or hearing protection; 2) workers wearing inappropriate PPE; and 3) little control over access to the scene. Respondents felt that these issues arose because most of the workers had no knowledge of how to handle work in an event of this scale with multiple simultaneous hazards, and were not trained on using respiratory protection equipment. This was especially true of volunteers, primarily construction workers. It was suggested that because the site was uncontrolled, no one was responsible for overseeing the health and safety of the numerous volunteers or supplying them with respirators or training. When on-site training was provided, respondents felt it was inadequate. This was a major concern because many workers had never used respirators before and were not comfortable or familiar with wearing them, and the training provided was not geared to this type of audience. Even for those who were trained, it was very difficult to obtain and correctly use PPE due to: 1) inadequate supply of replacement cartridges; 2) varied and inappropriate equipment; and 3) difficulty in communicating while wearing respirators.

Perceived Health and Safety Needs

Respondents were asked to address the health and safety needs of workers who participated in the WTC response. Overall, respondents chose to focus on PPE use, particularly respirators. Based on the clean-up efforts following the WTC incident, respondents noted the following needs:

- Police had some training on the use of PPE, but were identified as poorly compliant by all respondents.
- Firefighters were exceptionally well trained on protective equipment, but often did not use it, particularly when engaged in the rescue of downed colleagues.
- Construction worker volunteers, especially heavy equipment operators and truck drivers, had the greatest need for training on all health and safety issues. Even construction workers assigned to the particular worksite and who had some previous respirator and other health and safety training did not put their knowledge into practice.
- Overall, due to the stress of the situation, no one group was compliant about wearing PPE or paying attention to their own safety.

The information that workers requested from health and safety professionals at the WTC most frequently concerned:

- Substances to which they were exposed;
- Short- and long-term health risks of exposure to these substances;
- Symptoms of chronic illness due to exposure;
- Situational changes to the site that might impact health and/or safety; and
- How to file for workers' compensation or other benefits and/or victim relief funds.

Respondents identified the following as the most important information for health and safety professionals to collect from workers during emergency response and recovery:

- The worker's reason for not using PPE, including whether the equipment was functioning properly;
- Type of training they had received in the past; and
- Symptoms experienced during initial exposure.

Optimizing Worker Health and Safety

WTC respondents identified a clear need to establish a distinct chain of command and a unified worker health and safety message. They felt that such a message would have greatly improved worker health and safety at the site. It was recommended that communication channels be established prior to an event to optimize the process of disseminating information. One problem during the WTC response was the number of occupational health agencies and people offering contradictory advice, which muddled already poor communications between worker health and safety advisors, the front line workers, and the incident commander. Key agencies needed to improve worker health and safety coordination and training identified by the respondents were:

- Federal Emergency Management Agency (FEMA);
- Occupational Safety and Health Administration (OSHA);
- U.S. Environmental Protection Agency (EPA);
- Federal Bureau of Investigation (FBI);
- Local and state occupational health programs;
- Management representatives; and
- Unions or worker representatives.

Respondents felt that, prior to an event, health and safety agency staff should receive the following training:

- Optimal method for shipping equipment and samples;
- FEMA assistance and reimbursement process, policies, and procedures;
- Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard; and
- Logistics and planning methods.

Respondents also suggested that managers and planners should have a better sense of available staff specialties and should consider creating designated teams for emergency response. Based on the WTC cleanup, respondents recommended the following steps to improve worker health and safety:

- Worker health and safety advisors should have access to the incident site at the onset of worker exposure. Access to the site and the workers is needed to identify acute signs and symptoms of illness, to characterize whether equipment is functioning properly, for clinical evaluation, and to make any necessary industrial hygiene procedure changes. This is especially true for any situation where workers may be at risk for sensitization due to exposure.
- Worker training should be improved through development of a peer-to-peer enforced training structure to encourage use of protective equipment in a high stress/high emotion situation. This would help to reduce opposition when workers with inadequate or inappropriate protective equipment are requested to leave a disaster scene. All respondents indicated that personal health and safety was not a high priority for any worker following the WTC incident due to the emotional nature of the situation.
- Worker health and safety agencies need at least one knowledgeable staff member to assist workers and their families in making workers' compensation or other victims' assistance claims.

Role of a State Occupational Health Program

To more effectively address the needs of workers, WTC health and safety experts were asked their opinions on the optimum functions of a state occupational health program during an incident. The questionnaire did not distinguish between regulatory programs such as Cal/OSHA and nonregulatory programs, such as the DHS Occupational Health Branch. Respondents believed that a state occupational health program should fulfill the following functions:

- Coordinate and oversee all worker health and safety activities related to the incident;
- Mediate between workers and management, and between workers, management, and regulatory agencies;
- Perform risk communication, including providing exposure information, to the medical community. This is especially needed because many doctors are not familiar with assessing occupational and environmental illness;
- Distribute medical evaluation, management, and treatment guidelines to the medical community. Screening questionnaires and information on often overlooked conditions, such as post-traumatic stress disorder, should be included;
- Organize talks with impacted workers to disseminate information and to ensure that the health and safety message is consistent;
- Interact with union stewards and membership;
- Provide advice to the incident commander on controlling access to the site and assuring that only those with training may enter the site; and
- Provide information to workers and employers on training, fit testing, and medically clearing workers who need to use respirators before they are allowed to have site access.

CALIFORNIA INTERVIEWS

A total of 15 interviews were completed: four firefighters, four health care workers, four construction industry representatives, and three police representatives.

Common Themes

The three different worker groups that were interviewed raised the following common issues and concerns:

- Difficulty finding information about hazards faced in day-to-day work;
- Difficulty collecting information about the worker health and safety implications of exposures during emergency response and how to interpret conflicting information;

- The need to rapidly identify substances to allow workers to protect themselves during emergency response;
- The need to maintain a high level of training and preparedness for rare events (large-scale incidents);
- Greater comfort when responding to familiar threats, rather than the unfamiliar;
    - For example, health care workers felt more prepared to handle biologic agents than chemical agents, and firefighters felt more prepared to handle chemical, rather than biologic agents. All respondents felt that training for the unfamiliar and rare event needs to be frequently repeated.
- Anxiety about the long-term health effects of work processes, including exposures; and
- Difficulty keeping up with the rapid introduction of new hazards to the work environment.

Respondents offered the following ideas for improving training for emergency response preparedness:

- Shorter, more frequent training is better;
- Scenario-based training is more likely to be remembered;
- Portable materials for use in the field or on the hospital floor are useful;
- Written materials should be as physically durable as possible (i.e., spill-resistant, tear-resistant, heat-resistant);
- There is no “one-size-fits-all” strategy for worker training; and
- Current training materials need to be tailored to the audience and their needs, including making training materials and methods more relevant to anticipated working conditions.

All interviewees highlighted the need for stakeholders in government, the private sector, nonprofit groups, and unions to be involved in discussions on worker health and safety during emergency response. This is needed to avoid mixed messages and to ensure that all parties have a forum in which to voice their concerns.

Respondents identified worker health and safety issues that were not related to emergency response but that were of concern:

- Long-term health effects of methamphetamine lab exposures and other chemical exposures encountered by patrol officers;
- Long-term health effects of diesel exhaust exposure among firefighters;
- Clarification of the California Division of Occupational Safety and Health (Cal/OSHA) standards for PPE use by first responders in non-emergency response situations;
- Clarification of Cal/OSHA standards covering criteria for effective isolation rooms to improve infection control and control of airborne exposures for health care workers;
- Musculoskeletal injuries other than back injuries and those due to workplace violence in health care workers, and various health and safety issues for home health care workers; and
- Respiratory illnesses and chemical exposure in construction workers.

Suggestions for improving training for response to nonemergency situations included:

- Developing more effective training materials for handling unknown substances and protection against blood-borne pathogens for firefighters and police;
- Making basic hazard awareness training mandatory;
- Improving training on routine decontamination methods for health care workers; and
- Improvements in fall-prevention training for construction workers.

Differences

Interviewees reported a number of work-related concerns and information needs in both emergency response and day-to-day duties that differed by occupational group. Those in firefighting wanted information on:

- Chronic and reproductive health effects of exposure;
- Medical monitoring and management of results; and

- Self-decontamination after exposure to chemical, biologic, or radiologic agents.

Police representatives wanted information on:

- Health effects of exposure to methamphetamine labs and their by-products;
- How to protect against take-home contamination; and
- Enforcement of PPE requirements and protective distance determination during response to hazardous materials incidents.

The most common concerns health care respondents reported in their daily duties were:

- Choosing the correct PPE;
- Chemical contamination;
- Workers' compensation; and
- Crisis response and working in high stress environments.

When handling casualties after HAZMAT incidents, health care workers respondents indicated that they want to know how to:

- Assess adequacy of on-scene decontamination;
- Implement basic principles of emergency response;
- Follow up patients according to a protocol; and
- Assess potential for exposure transfer.

If construction workers were called upon to clean up after a hazardous materials emergency, they would want the following information:

- Nonchemical health hazards (e.g., heat, stress);
- Toxicity of compounds; and
- Methods of equipment decontamination.

HAZMAT Training

The quality and quantity of HAZMAT training received varied between occupational group and within each profession. All fire department employees received HAZWOPER training

plus training on chemical, biological, radiological, and nuclear (CBRN) agents of terrorism. In police departments, the type of training received varied from HAZWOPER plus CBRN agents for HAZMAT teams to little or no training for patrol officers. Training for first responders was provided by the Department of Defense, International Association of Fire Fighters, County HAZMAT teams, California Specialized Training Institute, and the State Fire Marshal's Joint Action Committee.

Health care workers reported that the type of hazardous materials training in hospitals varied, with little consistency across organizations and hospitals. All health care respondents reported that hospital management provided the training and, in one case, the hospital had also trained with the local fire department. Some, but not all, workers received training on the following topics:

- Basic methods of decontamination;
- Assessment of pesticide exposure; and
- Choice and use of PPE.

Construction respondents reported that workers in their organization had received HAZWOPER training to the technician level, which allows trainees to perform work in a contaminated area. For construction workers, unions provided all HAZMAT training in a joint effort with the state fire marshal.

Training Gaps

Despite receiving health and safety training, respondents believed that there were areas where improvements could be made. Worker groups differed in their opinions about which areas were covered well in their current training and which areas needed improvement:

- Police worker representatives and management staff identified patrol officers as the members of police organizations who had received the least training on hazardous materials identification and response, even though it was believed that in many cases they are the first to arrive on and assess the scene of an incident.[9]

- Issues identified by health care respondents as needing improved coverage during training were basic first responder skills (e.g., hazard identification and hazardous materials awareness) and the roles and responsibilities of multidisciplinary response teams (e.g., emergency room doctors, floor nurses, housekeeping, security) and interactions between team members.
- Construction respondents believed that handling debris, equipment decontamination, and logistics of responding to an incident needed more extensive coverage during training.

Respondents had various suggestions to improve training:

- Firefighters and EMTs recommended CD-ROMs, short internet-based training, and laminated safety cards, since these cards could also be referred to during an actual incident, as the best training methods.
- Police respondents suggested that training materials be offered through Peace Officer Standards Training (POST) Commission, which sets minimum selection and training standards for law enforcement.
- All first responders (police and firefighters) believed that the best times to deliver information relevant to a specific emergency is roll call prior to entering a site or in the recuperation area, if one has been established, after leaving the site and decontamination. First responders suggested that the information that delivered at roll call should be related directly to the immediate hazards that might be encountered during that shift (e.g., heat stress, signs and symptoms of acute exposure, any new exposures identified, PPE recommendations). These respondents believed that information about long-term health issues should be delivered after workers had come off the site and decontaminated, preferably in the recuperation area.
- Health care workers preferred posters and pocket cards with care algorithms for physicians and nurses. Face-to-face training was recommended if the training was mandatory for hospitals, and a combination of video, CD-ROM, and written material if it was not mandatory. Train-the-trainer sessions on regional levels and

awarding continuing education credit to attendees were other suggestions for delivering training to health care workers.

- Union publications were believed to be the best method for delivering of worker health and safety information to construction workers.

Role of Occupational Health Programs

Respondents' views of the optimal role for occupational health programs varied by occupational group. As with the WTC health and safety professionals, the questionnaire did not distinguish between regulatory programs such as Cal/OSHA and nonregulatory programs, such as the DHS OHB. First responders believed that occupational health programs should develop medical management guidelines for use during emergency response. Health care workers believed that occupational health programs had roles assisting them with preparing for an event as well as during response and envisioned these programs fulfilling the following roles:

- Evaluating hospital emergency response plans and worker preparation/training;
- Developing guidelines for hospitals to evaluate their preparation/training;
- Assuring consistent training across facilities;
- Communicating information on emergency preparedness activities being conducted by state and local programs; and
- Acting as a liaison between labor and management.

Construction worker respondents also saw a role for occupational health programs both before an event and during emergency response and recommended that:

- Prior to an event, occupational health programs should coordinate health and safety meetings with representatives from management, safety directors, labor, and relevant state agencies to address construction health and safety issues; and
- During a response, occupational health programs should provide training and technical assistance on health and safety issues for construction workers.

Role of Other Agencies

First responders recommended that the following additional organizations should have a role in worker health and safety during emergency response: Emergency Medical Services; Police Officers' Research Association of California, and POST. Health care respondents wanted insurance benefits specialists to have a role in worker health and safety during emergency response. Construction workers believed that the Governor's Office of Emergency Services and the Associated General Contractors, a trade association, should have roles during emergency response.

LIMITATIONS

Limitations to the methods used must be considered when reviewing this report. Due to the small number of respondents interviewed (n=14), the findings may not represent the views and opinions of the entire first responder, health care, or construction worker communities in California. Also, the biases associated with convenience sampling (selection bias, volunteer bias, etc.) apply to any interpretation of the results.

A specific issue of concern is the difficulty encountered trying to contact a representative from a police association who is comfortable addressing these issues. The majority of California police departments do not have dedicated health and safety staff, do not develop policies or recommendations around worker health and safety, and distribute little to no information on health and safety issues.[10] Thus, nine interview attempts were made with police associations throughout the state before a single respondent could be found. This potentially limits the ability to make generalizations from the police labor representatives' perceptions of worker health and safety needs during emergency response.

The timing of the interviews, as they coincided with the epidemic of Severe Acute Respiratory Syndrome and the introduction of monkeypox to the United Sates, may have caused respondents, especially health care workers, to emphasize their concern with new infectious diseases.

SUMMARY AND CONCLUSIONS

In order to assess the health risks of workers called upon to respond to emergency incidents, and to understand the health and safety concerns and needs of these workers, OHB interviewed four selected health and safety professionals involved in the response following the WTC incident and 15 representatives from three worker groups: first responders, health care workers, and construction workers.

During the WTC response, the major gaps in worker health and safety identified by the survey respondents were:

- Absent or inadequate eye and hearing protective equipment;
- Lack of respiratory protection training;
- Inadequate on-site training;
- Inadequate concern for personal safety in a high stress situation;
- Inadequate training for dealing with a high stress situation, and
- Poor control over access to the incident.

In California, labor and management representatives reported a number of work-related concerns and information needs in daily emergency, as well as nonemergency, duties that differed by occupational group. Common concerns expressed by this group included:

- Where to find information about hazards faced in day-to-day work and how to interpret conflicting information;
- The need to maintain adequate training levels for rare, large-scale incidents; and
- Uncertainty about the long-term health effects of work exposures.

Survey respondents had several ideas for improving training for emergency response and developing a consistent and coordinated response plan for hazardous materials incidents. Suggestions made by health and safety experts and workers interviewed as part of this survey were to:

- Establish a distinct chain of command to enforce a unified worker health and safety message;

- Create designated teams dedicated to emergency response;
- Involve stakeholders in government, the private sector, nonprofit advocacy groups, and labor organizations in worker health and safety during emergency response;
- Give worker health and safety staff access to the incident site at the onset of worker exposure;
- Use a peer-enforced training structure to encourage use of protective equipment in the high stress situation of responding to emergency incidents;
- Make training materials and methods more relevant to specific worker groups and anticipated working conditions; and
- Utilize regulatory and public health occupational health agencies in a variety of roles, including:
    - Response coordination and oversight;
    - Mediation between labor and management;
    - Distribution of health and safety information to workers;
    - Distribution of risk, exposure, and medical management information to medical care providers; and
    - Keeping the incident commander appraised of worker health and safety issues.

This report summarized the perspectives of four health and safety experts involved in the response to the WTC incident and 15 California workers selected from three occupational groups regarding worker health and safety needs during response to hazardous incidents. Respondents provided recommendations for improving the health and safety of workers during emergency response. Employers and state and local agencies can use these results to provide more targeted training for the occupational groups interviewed. There was a high level of agreement between worker and management recommendations, providing an opportunity for these two groups to work together to better protect workers.

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8. MMWR. Use of Respiratory Protection Among Responders at the World Trade Center Site - New York City, September 2001. CDC. September 11, 2002. 51(Special Issue):6-8.

9. One respondent felt that in many cases patrol officers often found themselves in situations where they played the "…blue canary, all the HAZMAT team needs to figure out what's what is to watch us drop…"

10. McLeod R, General Manager, California Coalition of Law Enforcement Associations. Personal Communication, June 11, 2003.

APPENDIX 1

WTC INTERVIEW QUESTIONNAIRE

1. What issues do you feel should be addressed in a protocol for managing the worker health and safety aspects of emergency response?

2. During the WTC response, how would you have improved interagency cooperation?

3. Which agencies do you feel are key players in worker health and safety issues during response to an emergency?

4. In general, what do you think were gaps in worker health and safety at the WTC?

5. What questions do you think are essential to ask workers in order to evaluate worker health and safety?

6. Which worker group(s) do you think had the greatest worker health and safety training needs?

7. What would you do to improve emergency response worker health and safety training?

8. How would you optimize worker acceptance of health and safety protocols to increase compliance (i.e., what makes workers follow the rules that are set up to protect their health and safety)?

9. What role do you think a state occupational health program should have in emergency response?

Thank you very much for your time!

APPENDIX 2

FIRST RESPONDER INTERVIEW QUESTIONNAIRE

Hello my name is _____ from the California Department of Health Services Occupational Health Branch. Our program tries to prevent work-related injury and illness by:

- Identifying and evaluating workplace hazards
- Tracking patterns of work related injury and illness
- Providing information and technical assistance to prevent workplace illness and injury
- Our Branch employs doctors, nurses, toxicologists, safety engineers, industrial hygienists, epidemiologists, and health educators.

I am calling today because we are developing procedures for our Branch to enhance worker health and safety during emergency response and site clean-up.

Do you have time to answer a few questions? **YES** **NO**

IF YES GO TO QUESTION 1

IF NO: Can you schedule another time to answer these questions?

YES TIME____:_____ DATE: ____/____/____ **NO**

IF NO: Is there anyone else in your organization who might be willing to answer these questions?

YES NAME:_____ PHONE _____

NO

IF NO: Thank you for your time, have a nice day.

1. What types of health and safety concerns or questions do employees in your organization typically have?

2. What type of health and safety information do you think employees in your organization would like to have when responding to accidental or intentional hazardous materials releases?

3. What type of emergency response and/or hazardous materials training have employees in your organization received?

4. Who provided the training?

5. In your opinion have there been any worker health and safety issues that were not addressed or needed to be addressed more fully during your organization's emergency response training?

6. [REITERATE WHAT BRANCH DOES] In your opinion, what role, if any, would your organization like to see our Branch take during the acute and recovery phases of emergency response?

7. Are there other organizations that you think would have a role in worker health and safety during emergency response?

8. Our Branch has experience delivering health information in a variety of ways such as fact sheets, tailgate training, etc. What would be the best method for our Branch to deliver health information during an emergency response operation?

9. Are there any other health and safety issues that affect employees in your organization that you would like to see our Branch address?

Thank you very much for your time.

APPENDIX 3

HEALTH CARE WORKER INTERVIEW QUESTIONNAIRE

Hello my name is _____ from the California Department of Health Services Occupational Health Branch. Our program tries to prevent work-related injury and illness by:

- Identifying and evaluating workplace hazards
- Tracking patterns of work related injury and illness
- Providing information and technical assistance to prevent workplace illness and injury
- Our branch employs doctors, nurses, toxicologists, safety engineers, industrial hygienists, epidemiologists, and health educators.

I am calling today because we are developing procedures for our branch to enhance worker health and safety during emergency response and site clean-up.

Do you have time to answer nine questions? **YES** **NO**

IF YES GO TO QUESTION 1

IF NO: Can you schedule another time to answer these questions?

YES TIME____:_____ DATE: ____/____/____ **NO**

IF NO: Is there anyone else in your organization who might be willing to answer these questions?

YES NAME:_____ PHONE _____

NO

IF NO: Thank you for your time, have a nice day.

1. What types of health and safety concerns or questions do employees in your organization typically have?

2. What type of health and safety information do you think employees in your organization would like to receive when responding to accidental or intentional hazardous materials releases?

3. What type of emergency response and/or hazardous materials training have employees in your organization received?

4. Who provided the training?

5. In your opinion have there been any worker health and safety issues that were not addressed or needed to be addressed more fully during your organization's emergency response training?

6. [REITERATE WHAT BRANCH DOES] In your opinion, what role, if any, would your organization like to see our branch take during emergency response to accidental or intentional hazardous materials incidents?

7. Are there other organizations that you think would have a role in worker health and safety during emergency response?

8. Our branch has experience delivering health information in a variety of ways such as fact sheets, in-service training, etc. What would be the best method for our branch to deliver health information during an emergency response operation?

9. Are there any other health and safety issues that affect employees in your organization that you would like to see our branch address?

Thank you very much for your time.

APPENDIX 4

CONSTRUCTION WORKER INTERVIEW QUESTIONNAIRE

Hello my name is _____ from the California Department of Health Services Occupational Health Branch. Our program tries to prevent work-related injury and illness by:

- Identifying and evaluating workplace hazards
- Tracking patterns of work related injury and illness
- Providing information and technical assistance to prevent workplace illness and injury
- Our branch employs doctors, nurses, toxicologists, safety engineers, industrial hygienists, epidemiologists, and health educators.

I am calling today because we are developing procedures for our branch to enhance worker health and safety during emergency response and site clean-up.

Do you have time to answer a few questions? **YES** **NO**

IF YES GO TO QUESTION 1

IF NO: Can you schedule another time to answer these questions?

YES TIME____:_____ DATE: ____/____/____ **NO**

IF NO: Is there anyone else in your organization who might be willing to answer these questions?

YES NAME:_____ PHONE _____ **NO**

IF NO: Thank you for your time, have a nice day.

1. What type of health and safety information do you think employees in your organization would like to receive when given a contract to clean up a site after an accidental or intentional hazardous materials incident?

2. What type of hazardous materials training have employees in your organization received?

3. Who provided the training?

4. In your opinion have there been any worker health and safety issues that were not addressed or needed to be addressed more fully during your organization's training for cleaning up after an accidental or intentional hazardous materials incident?

5. [REITERATE WHAT BRANCH DOES] In your opinion, what role, if any, would your organization like to see our branch take when employees in your organization are cleaning up after an intentional or accidental hazardous materials incident?

6. Are there other organizations that you think would have a role in worker health and safety during the clean-up operation?

7. Our branch has experience delivering health information in a variety of ways such as fact sheets, tailgate training, etc. What would be the best method for our branch to deliver health information during cleanup after an intentional or accidental hazardous materials incident?

8. Are there any other health and safety issues that affect employees in your organization that you would like to see our branch address?

Thank you very much for your time.

Appendix 5

WTC Expert Interviews: Summary of Recommendations

Category	Specific recommendation
Protocol development	• Communication with public, other agencies • Sample shipping methods • FEMA procedures • HAZWOPER Standard • Logistics and planning
Improving interagency coordination	• Communication established before event • Unified worker health and safety message
Agencies with greatest impact	• Local occupational health program, OSHA • EPA • Management representatives • Unions/worker representatives • FBI
Health and safety gaps	• Eye and hearing PPE • Incompatible PPE • Little control over access to scene • Lack of respirator training • Inadequate on-site training • Lack of concern for personal safety • High stress/high emotion situation
Key worker questions	• Reason for not using PPE • Past training • Initial symptoms
Workers at highest risk	• Construction volunteers • Police • Fire
Information requested	• Hazard identification • Long- and short-term risk of illness • How to make a workers' compensation claim
Optimizing worker health and safety	• Develop improved training • Better staff training • Early site access for health and safety professionals
Role of state occupational health programs	• Coordination and oversight • Mediation • Distribute health and safety information to workers • Distribute risk, exposure, and medical management information to medical community • Advise the incident commander