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# Evaluation of the Fatality Assessment and Control Evaluation (FACE) Program: Phase II

## Final Report

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Submitted by:

Deborah A. Gibbs
Karen M. Spock

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# Executive Summary

## Introduction

This report describes an evaluation of information dissemination activities conducted by the National Institute for Occupational Safety and Health (NIOSH) through the Fatality Assessment and Control Evaluation (FACE) program. The FACE program seeks to prevent workplace fatalities by indentifying and investigating fatal occupational injuries and disseminating prevention strategies to those who can intervene in similar situations. Information from fatality investigations forms the basis of publications that identify occupational hazards and prevention measures. These publications are disseminated to persons who can influence work conditions and information availability in related occupations and work settings. NIOSH issued a task order to Research Triangle Institute (RTI) to (1) describe the dissemination of five recent FACE documents, (2) compile users' assessment of their usefulness and (3) identify examples of prevention efforts and other impacts attributable to the documents.

## Activities

Four NIOSH *Alerts* and one monograph served as the focus of the evaluation. For each publication, we conducted structured telephone interviews with intermediaries in occupational, governmental, educational or policy organizations. The interviews addressed users' assessment of the publications' accuracy, relevance and appropriateness; how the publications were used and disseminated by users; whether their content and format were appropriate to the users' needs; and identification of impacts resulting from the publication. Although the small number of interviews conducted does not allow us to represent the views of all persons receiving the publications, we attempted to include a variety of different users in the interviews. Interviews were limited to persons who had used, or planned to use the publication or information drawn from it.

We also conducted three focus groups with workers from each of the occupational groups targetted by the four *Alerts* to assess their reactions to the single page tear sheets intended for worksite distribution. The focus groups assessed the tear sheets in terms of their ability to attract and hold the attention of their intended audience, their technical accuracy, relevance and comprehensibility.

## Findings

With respect to publication content, interview respondents generally considered the publications technically accurate and focussed on significant occupational hazards. Workers participating in the focus groups saw job-related chronic diseases and nonfatal injuries as more significant risks, and were less convinced that the tear sheets' topics were of concern to them. Although the tear sheets are formatted to attract attention, their content and graphic organization may not hold workers' attention in the environments in which they are likely to be encountered.

Workers considered the tear sheets' recommendations to be generally accurate and appropriate, although some were concerned by the inclusion of recommendations seen as "common sense." Both participants' comments and moderators' observations suggest that the tear sheets' terminology and generally high literacy level may limit their usefulness to their target audiences.

With respect to the publications' dissemination and uses, the applications reported most frequently by interview respondents involved either distributing the publications' information directly or modifying it for incorporation into other informational materials. These secondary dissemination activities substantially extend the the publications' reach and potential impact. Information from the publications was used to improve worker training, identify existing hazards and improve safety standards. An analysis of feedback cards included in the publications indicated that materials were most often used in training, but also frequently used to change work environments and procedures. Interview respondents requested additional graphics and case studies, and tear sheets that could be distributed to low-literacy workers. Focus group participants' descriptions of the channels through which they were most likely to receive safety information corresponded with actual dissemination of the publications.

## Conclusions and Recommendations

Within the limitations of the evaluation's scope and methodologies, our findings strongly support the usefulness of FACE program publications as an authoritative source of occupational safety information. Information from the publications is adapted to meet the needs of diverse worksite and professional audiences and widely disseminated in a variety of formats.

Our findings suggest that the impact of FACE publications could be enhanced through the following measures:

- improving the tear sheets' effectiveness at capturing and holding workers' attention by increasing use of graphics and case histories, and simplifying text;
- increasing tear sheets' persuasiveness through judicious use of emotional and/or fear-based appeals and by addressing concerns related to feasibility of prevention measures;
- increasing intermediaries' access to materials through use of electronic dissemination channnels;
- using formative evaluation to identify themes and approaches that are most effective in conveying messages to worksite audiences.

Comments from workers and intermediaries document the following important strengths of the in-house program's dissemination efforts:

- The publications are widely recognized as providing technically accurate information with which health and safety professionals can identify occupational hazards and recommend prevention measures.

- The publications support a variety of applications by diverse users, including use as or incorporation into, reference materials, training curricula and safety publications.

- The publications, or information abstracted from them, are are widely distributed through existing information networks, extending their impact well beyond their dissemination by NIOSH.

- Impacts of FACE program publications reported within this evaluation include improvements in worker training programs, heightened awareness of hazards and prevention measures among both workers and employers, and strengthened safety standards and regulations.

# 1. Introduction

## 1.1 Program Background

The goal of the Fatality Assessment and Control Evaluation (FACE) program is to prevent workplace fatalities by identifying and investigating fatal occupational injuries and disseminating prevention strategies to those who can intervene in similar situations. Information from FACE investigations is used to develop a variety of materials, including National Institute for Occupational Safety and Health (NIOSH) Alerts, monographs, technical reports, and updates, that are distributed to employers, workers, unions, trade groups, and educators.

In order to continue its efforts to identify and promote effective strategies for communicating information on fatal occupational injuries, the Centers for Disease Control and Prevention (CDC) issued this task order to Research Triangle Institute (RTI) to assess the effectiveness of information dissemination activities conducted by NIOSH through their in-house FACE program. The evaluation focused on describing current and potential dissemination channels, compiling users' assessments of the potential usefulness of selected documents, and identifying examples of prevention efforts and other program impacts resulting from FACE publications.

## 1.2 Purpose of Task

In an earlier task (Contract No. 200-93-0697-03), RTI evaluated dissemination activities in three State-based FACE programs (Colorado, New Jersey, and Massachusetts) by assessing the response to fatality reports among employers and other key persons and by identifying strategies to reach occupational groups targeted by State program staff. This assessment concluded that the State-based programs provide high-quality safety information that meets the needs of diverse audiences. Specific recommendations to increase the program's responsiveness and reach included provision of rapid feedback on intervention recommendations, development of brief report formats with which to reach wider audiences, identification of industry-specific communication channels for targeted occupational groups, and broader use of computerized index files to facilitate access to existing materials.

The current task addressed the dissemination of materials developed by the in-house FACE program. The in-house program deploys NIOSH staff to investigate workplace fatalities in response to requests for assistance from State labor commissions, health departments, and workers. Information from related fatality investigations is synthesized to produce publications that identify occupational hazards and prevention strategies for various work conditions and worker populations. These publications are distributed nationally to key persons in occupational, educational, and policy organizations that are identified based on the publication's content area. These individuals are in positions that allow them to influence the working conditions of, and information received by, occupational groups relevant to the publication.

## 1.3 Research Questions

For each publication, the evaluation considered three broad questions:

- Do the materials developed by the in-house program meet the needs of their intended users?
- Are materials disseminated in a way that effectively reaches their intended users?
- What impacts are the materials likely to have on knowledge, attitudes, beliefs, workplace practices, costs, injuries, and mortality?

# 2. Activities

## 2.1 Overview

NIOSH staff selected five recent publications, targeting a range of occupational sectors, to serve as the focus for the evaluation:

- *Worker Deaths in Confined Spaces: A Summary of NIOSH Surveillance and Investigative Findings* (January 1994, total disseminated: 8,600);
- *NIOSH Alert: Preventing Scalping and Other Severe Injuries from Farm Machinery* (June 1994, total disseminated: 9,000);
- *NIOSH Alert: Preventing Injuries and Deaths of Fire Fighters* (September 1994, total disseminated: 61,000);
- *NIOSH Alert: Preventing Injuries and Deaths of Loggers* (December 1994, total disseminated: 9,500); and
- *NIOSH Alert: Preventing Electrocutions of Crane Operators and Crew Members Working Near Overhead Power Lines* (May 1995, total disseminated: 8,000).

Our data collection activities were designed to gather a range of perspectives on the effectiveness of FACE publications and dissemination strategies from representatives of their intended audiences. These audiences typically include a variety of individuals who are able to directly or indirectly affect occupational hazards. *Worksite audiences* are workers and their employers, whose behavior has the most immediate impact on the prevention of fatalities. *Intermediaries* are key persons in governmental, occupational, educational, and policy organizations who can influence worksite conditions and available information through efforts such as training programs, regulatory action, and public information.

## 2.2 Interviews

### 2.2.1 Interview Objectives

We conducted structured telephone interviews with intermediaries for each of the five selected publications. The interviews were intended to identify the utilization, dissemination, and impacts of the publications. For each publication, we interviewed individuals representing a variety of roles and organizational settings. However, the small number of interviews performed meant that we could not represent the diversity of users and applications associated with the publications.

### 2.2.2 Preparation for Interviews

Prior to beginning the interviews, we developed an interview guide for review by NIOSH staff. The interview guide was pretested by RTI staff and in an in-person interview prior to full implementation. It used a combination of specific and open-ended questions, allowing the interviewer to probe for detail where appropriate, and covered the following areas:

- respondent's assessment of publication's accuracy, relevance, and appropriateness;
- how the respondent uses, or could use, the publication;
- how the publications, or information drawn from them, are disseminated by those receiving them;
- the extent to which the publication's content and format were appropriate to the identified applications and dissemination;
- modifications which might enhance the publication's usefulness to the respondent; and
- examples of policy or program impacts identified with the publication.

Candidate names for interviews were drawn from NIOSH dissemination records for each publication and suggested by contacts knowledgeable in each field. These individuals received a lead letter from the NIOSH task monitor, describing the purpose of the evaluation and explaining that an RTI staff member would be calling to arrange an interview. Because we found in the Phase I evaluation that many persons contacted for interviews had difficulty retrieving the report in question or recalling specific reactions to it, the lead letter included a copy of the publication. A sample lead letter and interview guide are included in Appendix 1.

### 2.2.3 Interview Implementation

Following mailout of the lead letters from NIOSH, individuals were contacted by RTI staff members. During the initial telephone call, the interviewer confirmed that the lead letter and publication had been received and that the respondent would be likely to use the publication in his or her job. If not, a more appropriate respondent within the organization was identified, or the interview was terminated. Only persons who had actually used, or reported that they could use, the publication were interviewed. Exhibit 1 summarizes the types of respondents interviewed for each publication. A listing of respondents and their organizational affiliations is included in Appendix 3.

Interviews were conducted between May and August of 1996. We interviewed nine individuals for each publication, for a total of 45 interviews. Notes from each interview were

| Exhibit 1. Summary of Organizations Represented by Interview Respondents | | | | | | |
|---|---|---|---|---|---|---|
| Type of Organization | Publication | | | | | Total Interviews |
| | NIOSH *Alerts* | | | | Confined Spaces Monograph | |
| | Fire fighters | Crane Operator | Farm Machinery | Logging | | |
| Employers | 2 | | | | 1 | 3 |
| Unions | 1 | 2 | | | | 3 |
| Trade/professional groups | 1 | 3 | 1 | 2 | 1 | 8 |
| Vendors | | 3 | 2 | 1 | 1 | 7 |
| Government agencies | 1 | 1 | 4 | 5 | 3 | 14 |
| Academic | 4 | | 2 | 1 | 3 | 10 |
| Total Interviews | 9 | 9 | 9 | 9 | 9 | 45 |

entered into a database and sorted by topic and publication using AskSam, a text-oriented data manager, for review and synthesis.

### 2.2.4 Limitations of Interview Findings

The very limited number of interviews possible within the scope of this task constrain the conclusions that can be drawn based on their findings. We tried to maximize the value of the interviews by limiting them to those respondents who would make use of the publications and by encouraging the respondents to review the publication prior to our interview. However, responses cannot be assumed to be representative of a specific job role or of the recipients of that publication. Further, because relatively few recipients were able to identify specific policy or program impacts readily attributable to a given publication, it is unlikely that these interviews represent the impacts that have occurred within the larger population of publication recipients. Reported findings should instead be interpreted as indicators of the type and range of responses that might be identified by a more comprehensive evaluation.

## 2.3 Focus Groups

### 2.3.1 Focus Group Objectives

For each of the four *Alerts* (targeting crane operators, farmers, fire fighters, and loggers), we conducted focus groups with workers and worker-owners to assess their reactions to the single-page tear sheets included in the publication, which present prevention recommendations discussed in the *Alert*. The focus group protocol adapted cognitive interview

techniques both to capture first impressions of the tear sheet and to explore more thoughtful reactions in-depth. Specifically, the focus groups explored the target audience members' assessments of the tear sheets' effectiveness in attracting and holding their attention, technical accuracy, topical relevance, and comprehensibility.

### 2.3.2 Preparation for Focus Groups

A focus group topic guide was developed, reviewed by NIOSH staff, and modified based on experience in the initial group. The topic guide uses structured discussion and individual tasks to identify how participants interpret the tear sheet and evaluate its relevance to their work environment. Specifically, the guide elicits participants' assessment of:

- **Salience:** which features are noticed and remembered based on a controlled first look at the tear sheet and whether participants would be likely to read the entire handout based on their initial impression,
- **Relevance**: whether participants are convinced that the hazards and prevention measures addressed by the tear sheet are those that participants believe to be most significant in their work environment,
- **Clarity:** whether participants understand the text and illustrations in the manner intended by NIOSH,
- **Technical accuracy:** whether the description of the hazard and recommendations are seen as corresponding to actual working conditions,
- **Feasibility:** whether prevention recommendations were perceived as providing sufficient benefit to justify the cost and inconvenience required to implement them, and
- **Dissemination strategies** that would be most likely to bring the tear sheets to their attention.

Recruiting for focus groups was accomplished through contacts within each occupation, facilitated by NIOSH staff or developed by RTI project staff. Locations for groups were chosen to take advantage of recruiting contacts, achieve some geographic diversity, and make economical use of travel resources by scheduling multiple occupations within sites wherever possible. Because our initial groups with crane operators suggested that construction crew members working on the ground near crane operations were an essential audience for the crane operators' tear sheet, we substituted a group of carpenters for the third crane operators' group. Recruiting channels and locations for each occupation are summarized in Exhibit 2.

| Exhibit 2. Focus Group Recruiting Channels and Locations | | |
|---|---|---|
| Occupation | Recruiting Channels | Group Locations |
| Crane operators<br><br>Carpenters | National and local union staff<br><br>Union training center | Charleston, WV<br>Appleton, WI<br>Boston, MA |
| Farmers | Extension agents | Twin Falls, ID<br>Appleton, WI<br>Wakeman, OH |
| Fire fighters | Volunteer Fire Council<br>International Association of Fire fighters | Reedsville, WV<br>Cincinnati, OH<br>Green Bay, WI |
| Loggers | Registry of Certified Loggers<br>American Pulpwood Association | Kingwood, WV<br>Lincoln, ME<br>Escanaba, MI |

### 2.3.3 Focus Group Implementation

All groups were conducted between April and June of 1996 and were moderated by the RTI task leader. All participants were paid cash incentives. With participants' permission, each focus group was audiotaped and transcribed, with transcriptions supplemented by written notes taken by a second RTI staff member. Transcriptions were coded according to content, segment of tear sheet, and occupation using Nud*ist, a software package designed to facilitate qualitative data analysis.

The focus group topic guide provides a series of related activities that were followed within each group:

- **Discussion of hazards and information sources**: This open-ended discussion not only served as a means of drawing all participants into the conversation, but provided data on which hazards are of greatest concern to workers, where they perceive more information to be needed, and how they typically receive safety information.

- **First impressions exercise:** Before reviewing the tear sheet in-depth, participants were asked to glance at it briefly (approximately 20 seconds). They then discussed which parts of the tear sheet had caught their attention and how likely they would have been to continue reading the tear sheet if it had been encountered at the worksite.

- **Review and discuss tear sheets:** Each section of the tear sheet was discussed in detail, with probe questions used to elicit participants' assessment of its technical accuracy, feasibility, clarity, and relevance to their work experience.

Chapter 3 describes key findings from the focus groups. Note that quotes from focus groups have been edited for clarity and brevity, although we have retained participants' vocabulary and phrasing. A copy of the topic guide is included as Appendix 2. Appendix 4 summarizes participants' reactions to the individual recommendations within each of the four tear sheets.

### 2.3.4 Limitations of Focus Group Findings

As with any data collection method, results from the focus groups should be interpreted with appropriate cautions. In particular, recruitment strategies can bias findings if there is a bias of any sort in the group that is selected or if there is a systematic bias in the type of sampled person who agrees to participate. Our experience in this task and in Phase I suggest that persons who agree to participate in a focus group discussing safety materials appear to be predisposed toward safe work practices. Within this task, our use of professional networks and unions to help recruit participants makes it even more likely that those who were recruited were better trained and more oriented toward safe work practices than nonunion workers. Only one group, of loggers, was recruited by direct contact from a population-based list, and we found strong suggestions of differences in the attitudes of participants in this group. These are noted in the discussion of findings as appropriate. In addition, cautions on generalizing to larger populations are an inherent limitation of focus group methodology.

Moreover, unlike other methodologies in which data are collected from individuals, focus groups are also subject to bias if the conversation is dominated by persons with certain viewpoints or if a generalized inhibition against discussing certain topics exists within the group. The former situation is readily recognized and can be handled by a skilled moderator. The latter situation may not be detected by a moderator who is unfamiliar with the population and, if detected, may still be difficult to overcome. In this task, we were unable to assess the extent to which workers may have hesitated to describe specific situations of unsafe practice in the presence of co-workers, employers, employees, and/or competitors.

Finally, as with many data collection methodologies, there exists the possibility that participants will provide responses that they perceive to be socially desirable or pleasing to the moderator. One source of possible biases was a reluctance to admit difficulty in understanding the written material. We attempted to minimize this threat by reading text aloud prior to discussion of each segment. It is also possible that participants who were inclined toward socially desirable responses would be reluctant to challenge the technical accuracy or feasibility of the materials or would profess an unrealistic willingness to use the materials and follow their suggestions. More so than most methodologies, focus groups allow the moderator to rephrase questions and probe further when this appears to be occurring. In fact, it appeared that participants were careful to demonstrate their expertise by challenging points of fact or practicality wherever they were noted.

A more general limitation to the interpretation of these data is that they are largely limited to workers, with a small number of worker-owners. The focus group results thus represent only one of the tear sheets' intended audiences. Owners, managers, trainers, and trainees would no doubt have provided us with additional perspectives had it been possible to include them within the scope of this task.

# 3. Findings: Publication Content

## 3.1 Intermediaries' Reactions to *Alerts* and to *Monograph*

### 3.1.1 Accuracy

Most interview respondents indicated that both the *Alerts* and *Monograph* were very accurate in their technical discussions. Of the few respondents who questioned the accuracy of the *Alerts*, the predominant criticism was that important facts were not included when perhaps they should have been. For example, one reviewer of the fire fighter *Alert* noted that there was no mention of an Instant Command System (ICS), which is considered a necessity for firefighting in some geographical areas. Another reviewer questioned the publications' accuracy in regard to timeliness, noting that the information was "accurate but outdated."

### 3.1.2 Appropriateness

Respondents were typically satisfied with the appropriateness of the hazards addressed by the publications. No suggestions for improvement were made about the *Monograph* in this area; however, there was a concern about some of the topics addressed in the *Alerts*. Some respondents mentioned that these condensed publications ignored some particularly hazardous situations and instead addressed less pertinent issues.

Several examples of such unaddressed hazards were provided. For the crane operator *Alert*, one reviewer felt that the slack and sway of energized power lines was of particular importance. Some logging reviewers observed that there were additional hazards associated with driving the trucks and loading and unloading cargo. Also, several reviewers of the farm machinery *Alert* criticized the publication's focus on hair entanglement and scalping, which they did not recognize as a significant hazard in the industry.

### 3.1.3 Suggested Modifications

While reaction to the appropriateness of the recommendations was generally positive, respondents did have some suggestions for their improvement. The most frequent criticism across both publication types was that the recommendations were not practical or useful to implementation. For example, one recommendation from the *Monograph* advises the local extension agency to disseminate more information on a particular safety issue. However, it does not address the expense related to performing this service.

A second protest from those who widely distributed the publications is that the terminology in the recommendations is sometimes incorrect or too technical. The *Monograph* uses the term "grain silo," which one respondent explained made NIOSH "lose credibility since [this] was not a recognized term in the field." Further, the recommendation to "turn off the

tractor ignition" from in the Farm machinery *Alert* was considered both redundant and confusing, where "turn off the tractor" provided adequate clarity.

Third, respondents had differing opinions about the current scope of the publications. Some mentioned that they would prefer that the scope be expanded to include more information. An example provided by a crane operator *Alert* reviewer suggested that it explain how to react in certain emergency situations: "What do you do if you contact an overhead power line?" Different reviewers of these publications from the same industries mentioned that the recommendations were too vague and general. This disparity in recommendation for the scope is presumably due to a difference in the specific purposes of the training or distribution that these organizations provide.

## 3.2 Worksite Audiences' Reactions to Tear Sheets

### 3.2.1 Topical Emphasis

Prior to examining the tear sheets, we spent a few minutes of each focus group discussing what participants viewed as the major hazards associated with their occupation. Their comments revealed that the risks that are most salient to workers tend to emphasize the risk of disease and nonfatal injuries over the more serious, but possibly less prevalent, injuries targeted by the *Alerts*. Exhibit 3 summarizes the hazards identified by participants. Note that this tabulation does not represent any ranking of hazards. This disparity between the topics identified by NIOSH and those perceived as most important by workers suggests that the tear sheets may need to document the importance of the risk being presented by providing evidence of its impact on morbidity and mortality.

### 3.2.2 Capturing Workers' Attention

No matter how the tear sheets are disseminated, it is likely that they will have to compete with a variety of other stimuli for the attention of their target audience. We therefore used a "first impressions" exercise within the focus groups to simulate the quick glance that the tear sheet might be given when posted at a worksite. Our objective was to find out what components of the tear sheet were most effective in commanding attention and what kinds of decisions workers made based on this initial exposure. We found four parts of the tear sheet that consistently captured attention; however, further discussion revealed the following difficulties that limited the tear sheets' effectiveness in retaining attention:

- **Illustrations** were cited most often across all groups (even though the *Alert* for loggers contained no illustrations). The reaction was particularly strong for the tear sheet for fire fighters whose illustration was a color photograph rather than a line drawing. However, the highly detailed illustration frequently distracted viewers from the intended prevention message.

| Exhibit 3. Major Occupational Hazards Identified by Focus Group Participants, by Occupation | |
|---|---|
| **Occupation** | **Hazards Identified** |
| Crane Operators | • Leg and back problems related to limited movement<br>• Stress<br>• Injuries to other workers from dropped or slipping loads |
| Farmers | • Chronic disease related to pesticide and herbicide exposure<br>• Collisions involving farm vehicles, including four-wheelers<br>• Machinery entanglement<br>• Injuries from livestock handling<br>• Hearing loss |
| Fire fighters | • Stress<br>Firefighting Hazards<br>• Cancer, heart, and lung disease caused by hazardous material exposure<br>Emergency Medical Service Hazards<br>• Back problems from lifting victims<br>• Intentional injuries during domestic violence calls<br>• Communicable disease exposure |
| Loggers | • Back problems from falls<br>• Machinery injuries |

- The word **"warning"** in the shadowed box suggested new information about specific hazards and/or prevention measures. Some of the participants whose attention was captured by this term responded negatively upon reading further and finding the content familiar.

- **Headlines** caught the eye of text-oriented participants. However, the top-level headline was considered overly generic, while the text contained within the shadowed box was seen as excessively wordy.

- **NIOSH,** the agency acronym, attracts attention but generates confusion among those who are unfamiliar with the agency or confuse it with another State or Federal entity.

When asked whether they would be likely to continue reading the tear sheet after a similarly quick exposure, participants divided, in roughly equal numbers, between positive and

negative responses. Among those who said they would continue reading, some said they routinely read any safety-related material, either as a matter of personal interest or as part of a job role in disseminating safety information to others. Others said they would continue reading to see whether there was any new information in the tear sheet. Among those who said they would be unlikely to read the remainder of the tear sheet, the explanation offered most frequently was that their first glance did not suggest that it contained any new information. A third group said that their decision would depend on circumstances: if distributed during a required tailgate meeting or if waiting for service at a parts store, they might continue reading. During a work day, however, or if the tear sheet was posted on a crowded bulletin board, they would be unlikely to examine it further.

> We don't read that stuff. I don't know where you're going to post it. You might turn it out in a lunch box safety meeting, and face it, you've got five minutes, then they're going to want you to go back to work, right? You know where these end up? In the trash. They don't take them home, they don't read them.
>
> Crane operator, WV

> I photocopy and given it to them. Let them look at it and think about it, but I get the best results on understanding safety when I take wood cutters and say, what do you think? It's always a difference of opinion, but that's when they start looking at it.
>
> Logger, ME

Participants' comments suggest that receptivity to the tear sheet's message will be highest within a training session or other information-oriented context where the content can be reviewed and personalized. Workers already inundated with safety information may not be receptive to any publication, no matter how well designed. The fact that many of the intended audience felt that they could decide against reading the tear sheet based upon a 15-second review underscores the importance of using text and graphics that not only attract, but also engage readers' attention during their initial exposure. However, even the tear sheet components that attracted attention have limitations, as noted above. Concerns related to each of these tear sheet components are discussed in detail in subsequent sections.

### 3.2.3 Illustrations

The tear sheet illustration is the component most likely to capture attention initially, as well as to convey information about the topic and the intended audience. The color photograph in the fire fighter tear sheet and the lack of any illustration in the logger tear sheet seem to have contributed directly to the positive and negative overall assessments of those tear sheets. However, illustrations may also confuse audiences and distract them from the intended safety message. The detailed illustrations on the farm machinery and crane operator tear sheets generated extended discussion as participants debated their accuracy. Regional variations in the types of equipment used appeared to compound the confusion.

> They put rubber wheels on a crane, and they just have a little bit of spark where it hit the high tension wires, where it should melt through.
>
> Construction worker, MA

> I looked at that and I thought, what the hell? Who hung that thing on the back of there, because it doesn't look like a bale thrower, except we know it's a bale thrower. Somebody drew that, and it's incomplete.
>
> Farmer, WI

The illustration on the fire fighter tear sheet generated high praise overall for acknowledging the dangers faced by fire fighters, for depicting "real-life" rather than a "Hollywood" fire, and for its high quality. As participants examined it more closely, they were uncertain whether it was intended to illustrate safe or hazardous practices.

> Definitely it brought home the importance of their fire gear and breathing apparatus. Because if they didn't have it on, they'd be burnt right now.

> I see three stupid fire fighters. They've got a fire above their head. They've got structural collapse about ready to fall on them, post burnt half in two. They've got a line that doesn't look charged.
>
> Fire fighters, WV

Discussion also revealed that participants may use the illustrations to make a quick assessment of the tear sheets' intended audience if they do not use the equipment shown. Some Ohio farmers said they might not read the tear sheet based on its illustration of a hay baler. Carpenters interpreted the illustration on the crane operator tear sheet as applying to roadside work rather than to a construction site and to crane operators rather than to construction workers since no other crew members were pictured.

Participants' comments suggest that a simpler graphic may be more effective than the current detailed illustration if it avoids distracting details and potentially misleading interpretations. The illustration's effectiveness in attracting and holding attention could also be enhanced if it conveyed a simple situation with a moderate amount of drama, such as a preventable hazard about to happen.

### 3.2.4 Warning! and *Alert*

Because participants had consistent responses to both the publication name of *Alert* shown in the upper righthand corner of the tear sheet and the word "Warning!" prominently displayed in the shadowed box, we will discuss them together here. The dramatic tone of both terms, particularly the "Warning!", made them effective in capturing attention. However, participants' comments showed that these terms also raised expectations that are unlikely to be met by the tear sheet, and aroused a more general cynicism.

Across all occupations, participants told us that the term "warning" and to a lesser extent the term "alert" suggested a newly discovered hazard related to equipment or materials. Fire

fighters had a very specific association with the term "alert," interpreting it as a low-level warning of a general information nature. While these terms are effective at capturing attention, many participants responded with resentment upon reading further and discovering that the tear sheet was instead focused on well-established hazards and prevention measures.

> I expected a new regulation, something I hadn't seen before.
>
> Crane operator, WI

> It catches your eye, but like everyone's saying, it's just common knowledge. Tell us something new.
>
> Logger, MI

The terms frequently elicited a more general cynicism that suggests that workers are inundated with prevention messages and warning labels, both at work and in the media. In fact, several participants drew an explicit connection between safety messages on the job and media reports of newly-hypothesized dietary links to cancer. The cumulative effect becomes one of resistance and resentment.

> There's so many warnings, you start not to even pay attention to them anymore. I mean, you've got warnings stuck all over certain pieces of equipment.
>
> Farmer, WI

The high level of negative responses generated by these terms raises the possibility that their overall effect may be to decrease audience receptivity to their message. The tearsheets thus rely even more on their headlines and text to capture and hold attention.

### 3.2.5 Headlines

Each of the tear sheets uses two lines to convey its topic: the publication title, which is typically constructed as "Preventing Injuries and Deaths of (*type of worker*)," and a summary sentence displayed in the same shadowed box as the word "Warning!". Because they work together to present the tear sheet, and because participants' comments showed that they did not usually differentiate between the two, we will discuss them together here.

Since focus group participants saw the tear sheet alone, without the rest of the publication, the continuity conveyed by using the publication title was not apparent to them. Instead, they found the use of two separate lines of text to be redundant, since it seemed as if the topic was being presented in unnecessarily small increments.

Considered separately, they found the publication title to be uninformative. While they felt positively inclined toward the general notion of preventing injuries within their occupation, the title did not provide any specific information about the focus or intent of the tear sheet. Nor did the title convey any expectation of new information worthy of continued attention. While the size of the typeface used ensures that the title will be noticed, it does not serve to engage the audience.

It doesn't really lead you to expect that you're going to find anything on the rest of the page.

Fire fighter, WI

The summary sentence conveys more information about the tear sheet's content. However, its dry tone and general content, particularly in contrast to the word "Warning!" printed immediately above, were interpreted as announcing that the tear sheet would offer little new information. A few participants who were themselves involved in training other employees (as union officers or small-business owners) noted that the summary sentence, like the rest of the tear sheet, assumes a fairly high literacy level.

Within occupations, participants had specific concerns about titles that reflected more general responses to the choice of topic for the publication, as noted in Section 3.2.1. Farmers questioned the appropriateness of a focus on scalping injuries because they considered amputations and death to be the more common results of entanglements. Individual fire fighters were confused and distracted by that tear sheet's dual focus on department and individual behaviors. Both crane operators and carpenters felt that the publication title might exclude construction workers in the vicinity of crane operations, who faced significant risk from cranes contacting electrical lines.

Participants strongly preferred a single headline that would announce the tear sheet's content with some level of drama to engage interest. They offered two formulations that they felt would be more effective: a fear-based title presenting one or more specific hazards and conveying their significance in terms of individual or epidemiological risk or a prevention-oriented title focusing on the availability of effective and feasible prevention measures.

### 3.2.6 NIOSH

Because we began the focus groups without identifying the sponsor of the research, we were able to explore participants' interpretation and assessment of the agency name, which is displayed prominently in the upper righthand corner of the tear sheet. We found that the NIOSH acronym is unfamiliar and even misleading to many workers.

The most common interpretation of the acronym was to confuse it with the Occupational Safety and Health Administration (OSHA) or with a State-level regulatory agency such as MIOSHA, the Michigan Occupational Safety and Health Administration. While some participants, particularly employers, said they would be inclined to read a new publication from OSHA, the association of acronyms did not create a favorable mind-set among participants.

OSHA as a rule leaves a bitter taste in your mouth because of their reputation around here.

Farmer, WI

Tons of paperwork.
Somebody's in trouble.

Fire fighters, WV

Among those who differentiated between NIOSH and OSHA, NIOSH was typically associated with an orientation toward research rather than regulation and generally viewed in a positive light.

> NIOSH is the testing firm that advises OSHA, like a respirator that has to be approved for certain atmospheric conditions and concentrations. NIOSH is responsible for that.
>
> Crane operator, WV

> I know if this came from NIOSH and they're talking about injuries and deaths of fire fighters that it'll be thoroughly researched, and these will be things that you should be doing.
>
> Fire fighter, OH

In one group only (loggers in WV), the fact that a safety document was issued by a Federal agency generated strong skepticism as to the likely usefulness of the information and resentment that any bureaucrat would presume to instruct a worker educated by hard experience. As described in Chapter 2, this group was recruited through direct contact with certified loggers, rather than through the networking methods used to recruit the other focus group members. It may therefore be more representative of typical workers in the field, making this viewpoint worth consideration.

### 3.2.7 Prevention Recommendations

As noted earlier, Appendix 4 summarizes participants' reactions to each of the recommendations on the four tear sheets. In this section, we present the major concerns heard with regard to the recommendations.

**3.2.7.1 Appropriateness.** In additions to concerns discussed earlier related to selection of publication topic, participants voiced several concerns regarding NIOSH's choice of recommendations to be included in the tear sheet. Most centered around the preferred level of specificity for recommendations, and opinions varied widely. We found that many participants disliked what they perceived as overly specific and prescriptive recommendations that did not allow for situational variations and use of their judgment and experience. While agreeing with the recommendation in general, they were concerned that the exceptional circumstance, such as weather conditions that might require greater clearance between the crane and power line or adjustments to standard operations at a fire scene, was not acknowledged.

> My experience is that there are very few times when the policies work out exactly the way they're written down. There will be times you have to do something a little different.
>
> Fire fighter, WV

Similarly, participants reacted strongly to what they considered to be common sense global measures, such as getting proper training and following manufacturers' instructions. Participants already inclined toward safe practice felt that such recommendations were already so

widely disseminated that they had lost whatever impact they might once have had. Those less inclined to safe practice did not find such general recommendations convincing.

> Actually, I take it as an insult. What are we, stupid?
>
> Logger, WV

> If you're targeting something specific, this isn't what I would put in my paper because they're going to get this information everywhere they look.
>
> Logger, MI

While they disliked recommendations that were seen as either overly global or excessively specific, participants responded positively to those parts of recommendations that offered guiding principals, such as evaluating each situation before cutting lumber or assuming power lines are energized. Paradoxically, while many crane operators took exception to the American National Standards Institute (ANSI) and OSHA recommendations for power line clearance (seen as not feasible and overly prescriptive), many responded positively to their provision as a starting point for their own decision-making.

**3.2.7.2 Accuracy.** Few concerns were raised with respect to the technical accuracy of the recommendations. These appeared to respond to what were perceived as oversimplifications of complex issues, such as techniques for cutting springpoles and the importance of training for crane operators. In these cases, participants suggested that the recommendations acknowledge the complexity of the requirement and note the existence of important exceptions to the general rule.

> Operate cranes only if you've been trained. I think that's too liberal. The oiler can be trained, but you don't want him running the crane if the operator's gone. This says if you've got a learner's permit, you can run the crane!
>
> Carpenter, MA

**3.2.7.3 Clarity.** Most of the instances where the intent of the recommendations did not appear to be understood by participants involved terminology that was unfamiliar, even to these relatively well-trained workers. Participants raised a related concern regarding the overall literacy level of the tear sheets. Difficulties in reading the worksheets were noted by moderators in at least two of the focus groups. For the crane operator tear sheet, participants admitted or revealed a lack of understanding for the following terms: "kilovolt", "phase-to-phase", "insulator", "boom guards", "nonconductive links", and "proximity warning devices". Several participants in the farmers' groups were unfamiliar with the term "retrofit."

Conceptually, the following recommendations were found to cause confusion among several participants in at least two groups:

- Logging: Participants were puzzled by the recommendation that dead limbs be removed *before* logging operations began, since they considered removal to be part of logging operations.

- Farm machinery: Participants were unsure whether the recommendation to "identify" all power take off (PTO)-driven parts meant that they should be labeled or pointed out to nearby workers.

- Fire fighters: Since many of their duties are at nonfire emergency scenes, participants found the recommendation that they wear personal alert safety system (PASS) devices at all emergency scenes to be illogical.

**3.2.7.4 Feasibility.** Nearly all concerns regarding the feasibility of the recommendations involved cost considerations. Farmers and self-employed loggers were particularly sensitive to the cost implications of protective equipment for persons and machines. Workers employed by others were dubious that their employers would be willing to support such expenses or tolerate the additional labor costs that would be incurred by adherence to some of the recommendations.

Each of the tear sheets includes some recommendations, such as provision of protective equipment or assignment of a worker to signal cranes, that require support from management to implement. However, recommendations that target individuals are not differentiated from those addressed to employers, except in the fire fighter tear sheet. Participants' response to these recommendations was particularly negative, perhaps reflecting their perceived lack of efficacy in these areas.

> They don't see the value of a person like that (crane tagger) because 99 times out of 100 nothing's going to happen. If they can get by 99 times, they're ahead of the game. They haven't paid for a person they don't need. If they kill somebody, they pay a $200,000 fine. It's still economically more feasible for them to violate the law than to adhere to it.
>
> Crane operator, WV

**3.2.7.5 Persuasiveness.** The dry and matter-of-fact presentation of the recommendations does little to persuade worksite audiences that they are in fact vulnerable to the risks being described or that the benefit to be gained by following the recommended prevention measures justifies the time and effort required. Participants' comments suggested several possible themes that might increase their susceptibility to the tear sheets' message:

- **Numbers** demonstrating the impact of the risk being described in terms of morbidity and mortality, and adding credibility to the idea that the reader might also be at risk.

  > If you give the numbers of people who have had certain types of injuries, that would give you a sense of the importance of it.
  >
  > Farmer, WI

- **Emotional appeals**, portraying the impact that an injury could have upon the worker or upon family members, would enhance the perception of the seriousness of the risk being discussed.

I tell them: look, if you're hurt, you're no good to me, you're no good to yourself and especially, you're no good to your family. Either you're gone or disabled or they've got to wait on you the rest of your life and when you hit family, you start hitting home.

Logger, ME

- **Fear-based appeals**, used judiciously, may be another effective strategy for heightening audience perception of the potential seriousness of the risk.
I think we've all read different situations where a person was down, ten feet awy and they're unable to find him because his PASS device was not activated. That makes it compelling.

Firefighter, WI

- Stressing the **practicality** of safe work behavior may be an effective approach to confronting concerns regarding the cost involved in implementing prevention measures. Workers and employers who equate safe practice with lower production may be appropriate targets for a message that emphasizes reduction of lost work time due to injuries and increased effectiveness of workers operating safely.

When you first start talking safety to employees, the first thing they think of this well that's just something else, another regulation that's gonna slow me down. In the state of Maine more emphasis is being put on training that really shows that actually it enhances production and also allows that person to be less fatigued.

Logger, ME

# 4. Findings: Dissemination Strategies

## 4.1 Interview Findings

### 4.1.1 How Publications Were Used and Disseminated

Although the presentation styles of the *Monograph* and the *Alerts* are very different, their ultimate uses and distributions are rather similar. For the purposes of this analysis, then, both types of publications are discussed concurrently. Both *Alert* and *Monograph* respondents reported that they read the publication for similar reasons: because the subject matter pertains to them or to their line of work. Respondents also read the publications to educate themselves about current hazards in the industry, the frequency with which they occur, and how experts suggest avoiding them.

Respondents for the *Alerts* reported that they generally read the entire publication and tear sheet, without any particular interest in the various sections. *Monograph* respondents, on the other hand, seldom read the entire publication due to its size and to the breadth of issues it addresses. Instead, these respondents concentrate only on the sections that were most applicable to their industry (i.e., agriculture, waste management) or to their line of work (i.e., sections discussing epidemiological issues).

In an earlier document prepared as part of this evaluation[1], we hypothesized that different types of intermediaries might use the information from NIOSH publications in five ways:

- disseminating information;
- changing policies, regulations,or standards;
- providing vocational and professional training;
- influencing financial incentives for safe work behaviors; and
- improving equipment.

The actual and planned uses reported by respondents clustered almost entirely in the areas of information dissemination (of either the enture publication or information abstracted from it) and training. Of the 45 persons interviewed, 10 reported multiple uses. Of course, uses other than those identified in our relatively small set of interviews are also possible. However, we were able to document a variety of dissemination and training applications by various types of intermediaries, as shown in Exhibit 4.

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[1] Evaluation of the Fatality Assessment and Control Evaluation (FACE) Program: Phase II; Draft Protocol. November 6, 1995, Research Triangle Institute.

| Exhibit 4. Intermediary Audiences and Information Uses | | |
|---|---|---|
| **Information Users** | **Information Uses** | |
| | **Disseminate Information** | **Provide Vocational/ Professional Training** |
| **Employers** | Publish and post safety information | Provide pre- and in-service training |
| **Unions** | Distribute safety updates to members | Provide pre- and in-service training |
| **Trade/professional groups** | Include safety information in publications | Develop safety-oriented curricula |
| **Vendors** | Distribute safety information at retail sites and with new equipment | Develop instructional materials on the safe use of equipment |
| **Academic institutions** | Research injury prevalence; consult on safety standards | Develop safety-oriented curricula |
| **Government agencies** | Disseminate information through health and labor agencies | Support curriculum development |

The predominant uses of the publications can be roughly grouped into four broad categories: developing educational and training materials, using them as a reference or resource tool, distributing them indirectly by adapting their information in newsletters or mailings, and distributing them directly by handing out photocopied material. The *Monograph* has been used more often as an educational tool and as a reference, while the *Alerts* have overwhelmingly been used for mass distribution as handouts and mailings. Both publication types have at least one use in each of the above categories.

Of the 45 persons interviewed, nearly all reported disseminating either the publications or information abstracted from them. We asked these individuals to estimate the number of persons reached by their recent (within the past year) or planned secondary dissemination activities. As summarized in Exhibit 5, their estimates indicate that more than 23,000 persons were reached. Note that this figure does not represent secondary dissemination by the larger population of publication recipients, sincne interview respondents were selected only from those who reported using the publication. We cannot estimate the proportion of recipients who either do not use the publication or who use it for their own purposes without disseminating from it. However, the high level of secondary dissemination reported by this small sample of users suggests that many who receive the publications find the information useful to their constituents, and that the actual impact of the publications is likely to far exceed their direct dissemination by NIOSH.

Overall, the majority of respondents distributed the publications as handouts; use as a reference and resource tool was a close second. The most common multiple use was as handouts and educational materials. Of the reported dissemination shown in Exhibit 5, handouts

accounted for 10,000 of the estimated persons reached. Again, this figure does not represent distribution patterns among the entire population of recipients.

| Exhibit 5. Actual and Planned Dissemination of Information from NIOSH Publications by Interview Respondents | | |
|---|---|---|
| **Publication** | **Applications by Order of Use** | **Estimated Persons Reached** |
| Fire Fighting *Alert* | • Handout<br>• Newsletter/Mailing<br>• Training/Education<br>• Reference | 8,306 |
| Farm Machinery *Alert* | • Handout<br>• Reference<br>• Newsletter/Mailing<br>• Training/Education | 764 |
| Logging *Alert* | • Handout<br>• Training/Education<br>• Newsletter/Mailing<br>• Reference | 4,471 |
| Crane Operation *Alert* | • Handout<br>• Newsletter/Mailing<br>• Reference | 5,226 |
| Confined Space *Monograph* | • Training/Education<br>• Handout<br>• Reference | 4,695 |
| **TOTAL** | | **23,462** |

### 4.1.2 Impacts

While it is difficult to attribute policy or program impacts to any single publication, respondents reported that these documents made three consistent contributions across all industries. Most often cited was that the publications were used to develop more effective worker training programs. In addition, the *Alerts* and the *Monograph* were credited with the identifying existing hazards and reinforcing means of avoiding them. Finally, they frequently helped to identify the shortcomings of existing standards or of other educational materials.

### 4.1.3 Suggested Modifications

Along with their generally positive response to the publications, respondents offered some suggestions to enhance their usefulness for dissemination. Many respondents reported that they found the publications' graphics and charts to be extremely useful and suggested including even more graphics in the publications. The users also suggested that the publications be made available in an electronic format (i.e., on CD-ROM) so that information can be easily adapted for additional uses.

For the *Alerts*, respondents were appreciative of the case study descriptions and suggested that more case studies be included, since these were particularly useful for applications such as training. In the *Alert* tear sheets, it was suggested that the reading level be decreased so that they could be used with a wider (and more worker-oriented) audience. In addition, respondents suggested that the publications be made available in other languages (especially Spanish) in applicable industries, displaying English on one side of the tear sheet and Spanish on the opposite side.

Specific to the *Monograph*, respondents were very enthusiastic about the short overall summaries located at the very front of the publication and preferred that this feature not be changed. Additionally, a few respondents suggested that a one-page tear sheet be added to ease information dissemination.

## 4.2 Focus Group Findings

Although the route by which information is disseminated to workers depends largely on the industry's structure and organization, we heard a consistent general pattern in our discussions with construction workers, farmers, fire fighters and loggers. Employees told us that they received safety information primarily through their own employers and through external training programs (offered by unions, trade associations and community colleges, according to the occupation). Self-employed workers and small business owners reported relying on trade associations, trade journals and equipment manufacturers for information, which they in turn passed on to their employees. A review of dissemination records for the four *Alerts* shows that these intermediaries are strongly recommended.

## 4.3 Recipient Feedback

We tabulated responses received via cards included in each of the *Alerts* as shown in Exhibit 6. Since cards were received from an extremely small proportion of those receiving the *Alert*, and cannot be assumed to represent the larger population, these data should be interpreted with extreme caution. Given that the comments added to the cards are overwhelmingly positive, and that the large majority of respondents report reading the entire publication and putting the information to at least one use, it seems likely that these responses represent those who are most interested in and appreciative of the publication. In that light, however, a few patterns are worth noting.

| Exhibit 6. Recipient Feedback, by Publication | | | | |
|---|---|---|---|---|
| | Percent of Respondents, by Publication* | | | |
| | Cranes | Logging | Fire fighters | Farm Machinery |
| **Job Role** | | | | |
| Manager | 42.6 | 50.8 | 35.6 | 7.1 |
| Employee | 2.9 | 6.6 | 14.8 | 2.4 |
| Educator | 16.2 | 0.0 | 10.7 | 42.9 |
| Safety Professional | 51.5 | 24.6 | 25.5 | 14.3 |
| Occupational Health Professional | 17.6 | 4.9 | 2.7 | 28.6 |
| Health Care Worker | 1.5 | 11.5 | 2.7 | 9.5 |
| Researcher | 5.9 | 0.0 | 2.0 | 0.0 |
| **Work Setting** | | | | |
| Private Industry | 35.3 | 45.9 | 10.7 | 16.7 |
| Government Agency | 30.9 | 24.6 | 69.8 | 59.5 |
| Labor Organization | 13.2 | 0.0 | 5.4 | 0.0 |
| Academia | 5.9 | 0.0 | 4.7 | 14.3 |
| Own Business | 2.9 | 14.8 | 2.7 | 7.1 |
| Other | 22.1 | 16.4 | 15.4 | 11.9 |
| **How Publication Was Read** | | | | |
| Cover-to-Cover | 89.7 | 85.2 | 90.6 | 76.2 |
| Sections of Interest Only | 10.3 | 14.8 | 7.4 | 23.8 |
| Introduction Only | 0.0 | 0.0 | 1.3 | 0.0 |
| **How Information Was Used** | | | | |
| Change Environment or Procedure | 22.1 | 26.2 | 41.6 | 16.7 |
| Ongoing or New Research | 13.2 | 13.1 | 31.5 | 11.9 |
| Training or Course Curriculum | 55.9 | 14.8 | 46.3 | 40.5 |
| Not Used | 4.4 | 8.2 | 5.4 | 9.5 |
| | | | | |
| **Total Cards Received** | 68 | 61 | 149 | 42 |

**Percentages may not add to 100 due to missing or multiple responses.*

The job roles reported by respondents varied across publications, perhaps demonstrating how key figures in occupational health may vary according to the structure of a given occupation. Managers and safety professionals were the two roles cited most frequently by recipients of each of the publications except the farm machinery *Alert*. For the logging and fire fighters' *Alert*, managers comprised the largest group of respondents; for the crane *Alert*, safety professionals, and for the farm machinery *Alert*, educators. Respondents' work settings also varied by publication, with private industry most frequently cited by those receiving the crane and logging *Alerts*, and government agency most often mentioned by those receiving the fire fighters' and farm machinery *Alert*. The overwhelming majority (between 76 and 91 percent) of respondents report reading the *Alert* from cover-to-cover.

Consistent with interview findings, the applications most frequently cited include training and course curriculums (between 41 and 56 percent of those receiving the crane, logging and farm machinery *Alert*). However, use of information to change environments or procedure was reported by substantial proportions of those receiving the logging *Alert* (26 percent) and the fire fighters' *Alert* (42 percent), an application not reported by those interviewed.

# 5. Conclusions

## 5.1 Do the Publications Meet the Needs of their Users?

Within the limitations of the scope and methodologies used, each of the evaluation activities (focus groups, interviews, and recipient response cards) demonstrated that the FACE program's publications are serving their intended audiences. Users in a variety of industrial and health settings see the publications as a source of technically accurate information on important occupational hazards. The publications, or the information abstracted from them, are used as reference materials, provide a basis for training programs, are incorporated into users' own publications and are otherwise widely disseminated. Worksite audiences see the tear sheets as a source of technically accurate recommendations.

A general limitation to the publications' usefulness was identified by both intermediaries and worksite audiences. The publications' high literacy level, technical prose style, and reliance on text rather than graphics make them less effective in capturing and holding the attention of workers in the industries to which they are targeted. To the extent that this is a concern, the publications require more extensive adaptations before being disseminated, or they may be used less widely than they could be.

## 5.2 How are the Publications Disseminated and Used?

Interview respondents in a variety of settings reported that the publications were widely used as a resource in vocational training programs and disseminated to other intermediaries and to workers. Within the scope of this evaluation, we could not document evidence that the publications had been used to influence policy, regulations, financial incentives for safe practice, or equipment design, although these uses may also be occurring less frequently. The 45 persons interviewed indicated that they have disseminated or plan to disseminate, information from the publications to more than 23,000 individuals.

## 5.3 What Impacts can be Attributed to the Publications?

Although information alone is rarely sufficient to bring about changes in safety-related behaviors, it is recognized as an essential component of all models of behavior change. Our findings clearly document that information from the publications has raised awareness of hazards and prevention measures among workers and employers. It is also likely that the publications have influenced working conditions by contributing to safety-related standards and regulations. It is therefore reasonable to believe that the publications contribute to reductions in morbidity and mortality among workers, although it is not realistic to expect a documented impact on safety outcomes from such a diffuse intervention.

# 6. Recommendations

## 6.1 Publication Content

Both intermediaries and workers suggested various changes that would make the publications' material more persuasive to worksite audiences. The suggested modifications apply both to the full publication, whose content is abstracted and incorporated by intermediaries into various applications, and the tear sheet, which is disseminated directly to worksite audiences.

The Health Belief Model suggests that, prior to any behavior change, individuals must be convinced of:

- their *vulnerability* to the harm under discussion,
- the *seriousness* of the potential harm, and
- the *efficacy* of preventive measures whose benefits will outweigh their cost. [2]

Comments within the focus groups demonstrate that workers are convinced of the seriousness of the hazards they face: most can list a wide variety of potential hazards and can recount an injury experienced by a co-worker or family member. However, suggestions from both focus groups and interviews identified two changes that would make the publications more effective in persuading audiences of their vulnerability to the hazard being presented and would address concerns about the feasibility of prevention measures. Based on both explicit suggestions from interviews and focus groups, we suggest that the publications make greater use of case histories involving injuries. If the audience can identify with the case history's subject on grounds of either personal characteristics or similar (unsafe) behavior, they are more likely to acknowledge their own vulnerability to the hazard in question. The emotional appeal of a narrative describing an actual individual would also increase the material's effectiveness in capturing and retaining the workers' attention. A related modification would be use of simpler and more dramatic graphics. Illustrations that "tell a story" of an injury about to happen would support the text by helping to persuade the worker that a familiar workplace situation or behavior could indeed result in injury. Both interview respondents and focus group participants requested the inclusion of incidence statistics, where available. These would serve to underscore the frequency with which the consequence occurred.

Workers' skepticism that their employers would support the implementation of recommended preventive measures and their admission that production pressures are a primary factor in unsafe behavior suggest that the benefits and costs of safe practices should be addressed more explicitly in all publications. Several cited effective messages from other sources that used a theme of increasing productivity through safe practices. Text within the publication should

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[2] Green, L.W. and M.W. Kreuter (1991). *Health Promotion Planning: An Educational and Environmental Approach.* Mountain View, CA: Mayfield Publishing Co.

acknowledge and address employers' concerns about the costs and benefits of prevention measures. It was also suggested that anecdotes establishing the efficacy and cost-effectiveness of relatively new prevention technologies, such as the PASS device, be included in the publications.

Two general suggestions regarding tear sheet design are indicated. First, text should be simpler and more concise, in order to reduce the literacy and attention span required to absorb its message. Second, NIOSH should consider repositioning its agency logo to avoid the confusion and resistance it generated. Placing it less prominently, in conjunction with a brief statement of the agency's mission, would reduce its potential to distract from the tear sheet's message and increases its credibility.

## 6.2 Dissemination Strategies

The content modifications described above should increase the publications' dissemination by making them more responsive to the needs identified by various users. In addition, the following changes were identified that would increase the ease with which publications can be accessed and adapted. First, NIOSH should increase its use of current information technology. In this evaluation and in Phase I, interview respondents suggested that publications be made available on diskette so that text and graphics could be incorporated directly into other material. A dedicated World Wide Web (WWW) site could allow users to identify and access multiple publications that may meet their needs and possibly reach users who are not represented within the dissemination routes known to NIOSH.

Suggested content changes that would directly increase the publications' dissemination include the addition of Spanish-language tear sheets for selected occupations, such as agriculture, and the production of multiple tear sheets in each *Alert*, each addressing a single hazard, rather than the current comprehensive version.

## 6.3 Further Study

The objectives of further evaluation and research activities related to the FACE program include both program improvement and documentation of program effects. Efforts that might be considered include formative research on future publications, more concentrated efforts to collect user feedback, and an representative survey of user response based on a sample of recipients. The first two approaches would be relatively low in cost.

*Formative evaluation* is a small-scale test of audience response to draft materials prior to wide dissemination[3]. It can be used to identify parts of the material that create confusion or negative reactions in ways that may not be apparent to those who develop the material. Examples of such reactions identified within this task include the confusion generated by detailed illustrations in the farm machinery *Alert* and various technical terms that were not

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[3] Coyle, S.L., R.F. Boruch, and C.F. Turner (Eds.) (1989). *Evaluating AIDS Prevention Programs*. Washington, DC: National Academy Press.

familiar even to highly-trained crane operators. Interviews with intermediaries, many of whom have professional training similar to that of NIOSH staff, identified only a few questions of accuracy or clarity in the body of the *Alert*. Therefore, formative research efforts should concentrate on tear sheets, using focus groups similar to those conducted for this evaluation. It is important that focus group populations include all significant segments of the target occupation (i.e., unionized and non-unionized, workers and supervisors, employees, and owners) so that the perspectives of different regions, work roles or training levels are captured.

*User feedback* would involve expanding the efforts made to collect information from as many recipients of a publication as possible. Current response to the postcards inserted into the *Alerts* is fairly low (between 42 and 149 cards returned for the publications discussed in this report) and lack basic information such as dissemination. An alternative would be to use a longer set of questions, with more detailed questions about how the information was used and disseminated, combined with increased incentives for response. Because many individuals interviewed during the Phase I evaluation expressed a desire for statistical summaries of occupational injuries and fatalities, it is possible that the offer of such a publication would serve as an adequate incentive for completing a response form. However, it might be difficult to identify one or more incentives that would be attractive to the diverse users of NIOSH publications. In addition, even with expanded efforts, the resulting data on dissemination of information could not be interpreted as representing the larger population.

A *representative survey* would provide NIOSH with a basis for calculating population-based estimates of user responses, ways in which information was used, and the extent of information dissemination. Surveys could be distributed with the publication, using telephone follow-up to ensure an adequate response rate. However, since responses are likely to vary across different types of users, it would be necessary for NIOSH to be able to categorize users in advance on relevant characteristics, such as role and job setting, in order to stratify and weight the resulting data.

# Appendix 1

# Interview Protocol

## Cover Letter for Interview Respondents

Dear

One of the research projects being conducted by the National Institute for Occupational Safety and Health (NIOSH) is the Fatality Assessment and Control Evaluation (FACE) Program. The FACE program promotes occupational health and safety by identifying and investigating fatal occupational injuries, developing prevention strategies, and disseminating information about how such injuries can be prevented.

NIOSH is currently assessing the effectiveness of the FACE program's efforts to provide prevention information to persons and organizations who are in a position to use and disseminate this information. The evaluation of the FACE program's dissemination efforts is being conducted by the Research Triangle Institute (RTI), a not-for-profit research organization from North Carolina, under a contract with the Centers for Disease Control and Prevention.

You may have received a copy of the NIOSH publication [publication name], from the FACE program, and we are interested in your reactions to this publication. You will be contacted by Deborah Gibbs or a technical representative from RTI to discuss the NIOSH publication. We are interested in your input regarding: Was the information and recommendations presented in a clear manner? Were certain parts of the report more useful than others? Was the report useful in assisting in prevention efforts? Did you distribute the report to others? etc. We have enclosed a copy of the publication for your reference.

Of course, your participation is voluntary. However, we strongly encourage you to participate because of the importance of this in planning and improving future information dissemination activities by the NIOSH FACE program. Information you provide for the evaluation will be used only for the purpose of the program assessment. The evaluation report will not contain the names of any individual or agency.

If you have any questions about this evaluation, you may call Ms. Deborah Gibbs, Research Analyst at RTI, 800-334-8571, extension 6942, or Mr. Ted Pettit, NIOSH Technical Monitor for the evaluation, at (304) 285-5972. We thank you in advance for your assistance.

Sincerely yours,

Ted A. Pettit, M.S., R.E.H.S.
Chief
Trauma Investigations Section
Surveillance and Field
Investigations Branch
Division of Safety Research

## Interview Guide

**Name:**
**Telephone:**
Position:
Publication:
Note:

**Record of Contacts:**

**Final Status:** (Complete, Screened out, Unable to reach -- or describe)

## A. Introduction & Screener

Hello, my name is _____ and I'm calling from the Research Triangle Institute in North Carolina. Recently, you received a letter from Ted Pettit of the National Institute for Occupational Safety and Health concerning a study that we are conducting for them that involves evaluating materials promoting occupational safety that they distribute. Do you recall this letter, or have you had a chance to look over the enclosed Alert/Monograph from NIOSH?

*Screening Question:*

Before we get started, could you tell me if you have used or could use this NIOSH Alert/Monograph or similar NIOSH publications? If you don't really use these publications at all, feel free to tell me that too.

IF DON'T REALLY USE MATERIALS:

- Is there someone else at your organization who does use these NIOSH publications? *ARRANGE FOR INDIVIDUAL TO GET MATERIALS AND MAKE PHONE CALL WITH HIM/HER*

| |
|---|
| Name: _____ |
| Phone: _____ |

- Are there specific types of publications that you might be able use in the future?

- THANK RESPONDENT & STOP INTERVIEW

I would like to get information from you about the materials that NIOSH sends out, including how you use it, what you think of it, and any suggestions you have to improve it. This interview should last 20 minutes, and some respondents have found it helpful if they review the materials before we speak. Do you have some time to discuss this now, or would you prefer to make an appointment to discuss this later?

## B. Background of Organization/Individual's Activities

To get started, could you give me a sense of the background of what your organization does and how it is involved in promoting occupational health and safety?

- Are you involved in just one specific industry or multiple industries?
- Is this a public or private organization?
- Which of your activities relate to job safety?

[*Probe until you get a good understanding of what the organization/individual does*]

## C. Overall Impressions of Alerts/Monographs

1. Did you recall when you first received the original NIOSH publication entitled _____?

2 Did you read all of the publication, or only certain parts of it?

   - Which parts? Which parts do you read, or which parts do you read *first*?

3. Briefly, why did/do you read the NIOSH Alert(s)/Monographs?

4. In your view, is the NIOSH Alert/Monograph technically accurate?

5. Are the subject matter and the warning appropriate for what you see are hazards in the industry?

6. Are the recommendations appropriate?

## D. Specific Uses of NIOSH Alerts/Monographs

Could you give me an overview of how you use NIOSH publications like this? *Probe to get a complete list:* Do you use parts for your own publications or information? Do you pass them out to other people? Do you use them as reference materials? Do you use the one-page tear-sheets at the back of the Alerts/Monographs? What do you do with them? Do you use these NIOSH publications in any other ways? [*Make a numbered list of various uses of NIOSH publications*]

Uses of Alert/Monograph

| Who uses: | Use: |
| --- | --- |
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |

You mentioned that you use the NIOSH publication to _____.

[*use #1 from list & continue through list until reach last use*]

1. Describe use

2. Who uses the publication (does respondent use it directly? If respondent distributes it, to how many people? Do they distribute it further, and to how many people?, etc)

3. Which parts of the publication are used (Background, Current Standards, Case Reports, Conclusions or Recommendations, or References)?

4 Do you change/have you modified or adapted any of the parts of the publication to make better use of it? How have you/would you change it (wording, picture, headline)?

5 Are the level of detail and technical information it provides appropriate for doing _____?

6. Is the information presented in a useful format for this? What changes would make it more useful?

7. Is there anything that the NIOSH publication could do to improve? Is there anything that IS NOT included that you think SHOULD be included? Is there anything that IS included that SHOULD NOT be included?

8. Is there anything that you definitely would not change?

## E. Additional Uses

Are there additional uses you could make of this information if it were in a different format or at a different level of technical complexity?

## F. Impacts

Are you aware of any changes in policies or programs that these NIOSH publications have contributed to? *(Probe: What is your "best guess?")*

## G. Additional Comments

In addition to the things that you have already mentioned, are there any types of information that you would like to receive from NIOSH? *Prompt for suggestions within realistic budget limitations. (If mentions statistics/case studies:* Would it be better if these were more local, regional, or national in nature?)

Is there anything else that you'd like to mention, good or bad, about the NIOSH publications?

# Appendix 2

# Focus Group Protocol

## Focus Group Topic Guide

While group is assembling: distribute incentive checks and/or get receipts signed.

A. OPENING AND INTRODUCTION

1. Opening and purpose
   a. Thanks for coming; your presence is important
   b. We're from RTI in NC, a non-profit research group. We're doing research on the best ways to get safety information to workers and employers.
   c. Define focus group: like an opinion survey but questions are broader and we're especially interested in why you feel the way you do

2. Ground rules
   a. Goal is to gather a range of ideas and opinions; no right or wrong answers—feel free to disagree with each other; everyone's ideas are important; both positive and negative
   b. Group will last about 90 minutes
   c. Lots of material to cover; to make sure we get through all of it I may need to cut conversation short at times; please don't be offended.

3. Confidentiality
   a. I will be reporting on the themes that emerge from the discussion, but no names or specific details will be identified.
   b. Because we can't possibly remember all the comments made in this group, we tape session as a backup to our notes. Is that okay with everyone? So that we can understand tape, one person talking at a time.

START TAPING

4. Introductions
   a. Let's go around the room and introduce ourselves; please tell us your name and something about the type of work you do. It's not necessary to give the name of your company.

B. SAFETY AND INFORMATION

1. In your type of work, what kinds of hazards do workers need to be aware of?

   Which are the most important ones?
   Which are the hazards that workers aren't sufficiently aware of?
   Are there hazards that employers aren't aware of?

2. How do workers learn about safety?
Probe to get list of information channels

3. Why don't workers use what they know about safety?
Why don't employers enforce safe practice?

C. EXAMINE AND DISCUSS MATERIALS

1. First Impression

I'm going to pass out some safety information developed for (occupation). Please pass these around, but keep them face down for until I tell you to turn them over. I'm going to start by having you look at the flyer for just a few seconds—as if you were glancing at it on a bulletin board. Okay, turn it over and take a quick look. (Allow 5 seconds, then turn flyers face down)

a. What did you notice first?
b. What do you think it's intended for?
c. Who do you think this is for?
d. If you saw this on a bulletin board, would you keep reading?

2. Second look

Now I'm going to let take a slightly longer look. (Allow 15 seconds, then turn flyers over again)

a. What did you notice first this time
b. What do you think it's intended for?
c. Who do you think this is for?
d. If you saw this on a bulletin board, would you keep reading?

3. Read and Mark

Now I'm going to let you read it all the way through. As you read through, I want you to mark the page when you've got a reaction to something. Use an up-arrow to mark paragraphs that give a good explanation, or good advice, or present a good a idea. Use a down-arrow when you think something is confusing, inaccurate or not realistic.

When you've finished, use the highlighter to mark the three up-arrows and the three down-arrows that you feel most strongly about.

a. Let's start by talking about the headline and shadowed box. Any reaction to that?
b. Now let's go through the recommendations. What do you think of them in general? Are there specific reactions to the first recommendation? (go through them individually)
c. (If there is in illustration) Discuss clarity, usefulness, relevance
d. (If NIOSH header has not been discussed) ask whether it's recognizable, helpful.

Please jot some brief notes next to the arrows to let us know what you like and dislike about the points you've marked.

D. DISSEMINATION

1. Now—suppose that this flyer has been completely redesigned to put all of your suggestions to use.
   a. How can it be distributed so that people who need the information will see it?
   b. Probe for specific groups mentioned earlier -- how to get it to them?

E. CLOSING/THANK YOU

# Appendix 3

# List of Persons Interviewed

**Crane Operators' *Alert***

Mr. Peter Chaney
Director of Safety and Health Services
Associated General Contractors of America
Washington, DC

Mr. Brad Closson
North American Crane Bureau
San Diego, CA

Mr. C.E. Jackson
Construction Consultant
McComb, MS

Ms. E. J. Nodurft
Director of Safety
National Association of Homebuilders
Washington, DC

Mr. Joe Nolan
Division of Maritime Compliance Assistance
Department of Labor, OSHA
Washington, DC

Mr. Jim O'Leary
Administrator
Carpenter's Training Center
Millbury, MA

Mr. William Smith
Director, Safety and Health Department
International Operators Union
Washington, DC

Mr. Barry Spangler
Director, Product Safety and Reliabiliaty
Grove Worldwide
Shady Grove, PA

Mr. Paul Zorich
Chair
American Society of Mechanical Engineers B30 Committee

**Fire Fighters' *Alert***

Mr. Rich Duffy
Director, Health and Safety
International Association of Fire Fighters
Washington, DC

Mr. Bill Ferguson
Chief, Volunteer Fire Department
Parkersburg, WV

Mr. Ron Hopkins
Fire & Safety Engineering Technology Program
Richmond, KY

Ms. Mary McCormack
Executive Director
Fire Department Safety Officers Association
Ashland, MA

Mr. Barry Merner
Acting Director
Georgia Fire Academy
Forsyth, GA

Mr. Richard Perrault
Safety Officer
Minneapolis Fire Department
Cottage Grove, MN

Mr. Charles Shaw
Kentucky Fire/Rescue Training Program
Campbellsville, KY

Mr. Walter Smittle
State Fire Marshall
Charleston, WV

Mr. Chuck Soros
Safety Seminar Leader
Seattle, WA

**Logging *Alert***

Mr. Mike Aldrich
Wausau Insurance
San Francisco, CA

Mr. James Dougevito
Michigan Tech
Houghton, MI

Mr. Mel James
Department of Labor and Industries
Olympia, WA

Mr Don Kinnerson
Monongahela National Forest
Elkins, WV

Mr. Rick Meyer
American Pulpwood Association; Appalachian Technical Division
Roanoke, VA

Mr. Ed Murriner
Division of Forestry
Charleston, WV

Mr. Bob Myers
Commission on Safety and Health in the Maine Workplace
Augusta, ME

Mr. Dwayne Puro
Hiawatha National Forest
Escanaba, MI

Ms. Ruth Wells
CA Lumbermens' Accident Prevention Ass'n
Sacramento, CA

**Farm Machinery *Alert***

Mr. Dale Baker
J.I. Case, Inc
Hinsdale, IL

Mr. Tom Bean
Safety Leader
Ohio Cooperative Extension Service
Columbus, OH

Mr. Tom Karsky
Department of Biological and Agricultural Engineering
Moscow, ID

Mr. Murray Madsen
Product Safety
Deere & Co
Moline, IL

Ms. Donna Mast
Farm Bureau
Esparto, CA

Dr Jim Myers
Cooperative Extension Specialist
University of California at Berkeley.
Berkeley, CA

Dr. Mark Purschwitz
Univ. of Wisconsin Agricultural Engineering Dept
Madison, WI

Ms. Joyce Redington
Coordinator
Department of Environment, Health and Natural Resources
Raleigh, NC

Ms. Kate Summerill
Nurses Using Rural Sental Events
Fresno, CA

**Confined Spaces Monograph**

Dr. Robert Aherin
University of Illinois
Urbana, IL

Ms. Bonnie Boyd
Agricultural Occupational Health Nurse
Department of Environment, Health and Natural Resources Regional Office
Washington, NC

Mr Steve Calhoun
Program Director
Fire/Rescue Training Branch
Frankfort, KY

Mr. John Crowley
Equipment Manufacturers' Institute
Chicago, IL

Mr. Francis Fuja
Department of Natural Resources - SE Office
Milwaukee, WI

Ms. Judy Grzegorski
Safety Director
Milwaukee Sewage District
Milwaukee, WI

Ms. Carol Lehtola
University of Florida
Gainesville, FL

Dr. Charles Schwab
University of Iowa
Ames, Iowa

Mr. Bruce Warren
A.O. Smith Harvestore
DeKalb, IL

# Appendix 4

## Summary of Comments on Tear Sheet Recommendations

This appendix presents a detailed review of focus group participants' reactions to the recommendations contained in each of the four *Alerts*, including participants' recommended modifications. Italicized text are verbatim excerpts from the *Alert*. Numbering has been added to *Alerts* that previously used bulleted items.

## A. Preventing Injuries and Deaths of Loggers

*Take the following steps to protect yourself during logging operations:*

1. *Follow all of the safe work procedures outlined in the written safety program provided by your employer.*

While some logging participants reported that it was worthwhile to have guidelines to use to clarify a company's policies, the universal sentiment for this statement was negative. Groups of loggers noted that this was "overused," something that they "heard all of the time" and information that meant little to them to read again in this context.

No specific suggestions for improvement were made.

2. *Use appropriate personal protective equipment for the work being performed: safety helmets and boots, eye protection, face protection, protective clothing, hearing protection, dust masks, chaps, guards, etc.*

Participants in the logging focus groups reported that they wear appropriate personal protective equipment, and while they are reminded of it via other channels, it is nonetheless useful to include. Several 20+ year veteran loggers who attended one focus group disagreed with the prescription to always wear every piece of the protective equipment, citing restrictions to the senses and overall alertness.

Several examples were provided to explain this sentiment. Hearing protection restricts your ability to hear other workers trying to communicate with you, and chaps, while protecting your legs, may cause minor accidents by catching on limbs. In addition, the more protective equipment you wear, the more easily fatigued you become. These workers suggested that the situation should dictate what protective equipment is worn.

No specific suggestions for improvement were made.

3. *Evaluate each new situation for snow and ice accumulation, wind, lean of the tree, dead limbs, and location of other trees or hazards. Take proper precautions before starting a cut.*

Loggers generally felt that this recommendation was good to include, particularly because it trusted the logger's judgment to determine how best to make the cut. "Every tree you cut is different. Every situation is different." Several participants also thought this recommendation was common sense but not so much as to create a negative feeling toward its inclusion.

Participants also mentioned that recommendations 3, 4, 5, and 6 were very similar and suggested that 4-6 be collapsed as bullets under this recommendation since their topics were almost redundant.

4. *Make sure that the distance between workers is at least twice the height of the trees being felled.*

Described as "one of the hardest recommendations to follow," reaction to this statement was unanimously in favor of its importance. In addition to what is noted above, logging workers had two suggestions or cautions. The first was to add the following: "Ensure adequate communication—verbal, radio, or visual—among workers in the 'two-to-three tree length' area." All workers should be in contact with one another and know each others' location to prevent accidents.

Other loggers cautioned that the "twice the height of the tree" rule was worthwhile for workers on a relatively flat landscape; however, it could be an inadequate distance for those who work on hillsides or in mountainous areas. If a logger is working downhill on a steep incline, "twice the height of the tree" is not always enough distance to ensure safety.

5. *Remove dead, broken, and rotted limbs, loose bark, and trees that are a hazard before beginning logging operations.*

Recommendation 5 was met with objection and confusion from the focus group participants. The primary point of contention surrounded the wording "before beginning logging operations." The act of removing dead limbs is considered to be the first stage of a logging operation, not an activity to occur before a logging operation begins. They also raised some practical issues about the safest means of removing such items. It was determined that the use of a machine was the safest means of removing such material for a mechanized or partially mechanized establishment; however, for a traditional logging operation, a single worker with a power saw was the most likely (and most hazardous) means of clearing debris. In either instance, participants warned that it could be more dangerous to enter the forest before the thinning began than to clear debris during the logging operation.

Since they could not arrive at a single best approach to this situation, participants suggested that the recommendation be reworded as a caution: "Be aware of the hazards posed by dead, broken, and rotted limbs, loose bark, and trees that are a hazard." And to emphasize the need to perform such tasks as clearing dead limbs, the participants suggested adding: "Try to take care of these hazards before proceeding with your regular operation."

6. *Do not work under a tree that is lodged against another tree. Before work begins in the area, fell or remove the tree using mechanical means or other techniques that minimize worker exposures.*

Loggers acknowledged that trees that are lodged may pose a hazard. However, this information comes as no surprise to them. Many workers felt that this topic was covered in both recommendations 4 and 5, resulting in redundancy. As a bullet under recommendation 4, the suggested wording for this information was "Watch for leaning or rotten limbs, and hangers. Notify an operator to pull it down."

7. *When cutting a spring pole or other tree under stress, permit no one but the feller to be closer than two tree lengths when the stress is released. Cut spring poles under the bend so that they will not strike workers when the tension is released.*

This recommendation describing the management of spring poles easily received the most objection and discussion among logger participants. Universally, loggers acknowledged that spring poles were extremely dangerous and therefore warranted attention. Two points of contention were the incorrect description of how to cut a spring pole and the simplistic discussion of this apparently complicated and dangerous procedure.

Every logger agreed that there were specific methods of cutting a spring pole, but the one provided above ("Cut ... under the bend ...") was not correct. "It's absolutely impossible... You cannot undercut a stress. You'll pinch the chain." Workers also mentioned that spring poles should only be cut if they met certain conditions: if the tree is less than 2-3 inches in diameter and if it is at chest height or lower.

Loggers could not agree on one proper method of correctly cutting a spring pole, suggesting that several different procedures exist and are accepted in different geographic regions. Responses ranged from first cutting the side of it to gently shaving its bottom edge.

The participants vehemently disliked the one-sentence instruction because it was misleading in addressing the real danger associated with spring poles. "They make it sound so simple, [as if] there is no hazard in doing it. It is potentially dangerous to give printed instructions like this. This is actually a procedure that should take up one safety meeting." Loggers agreed that complicated procedures such as this should be demonstrated and practiced, and that no written instruction can substitute for hands-on instruction.

Given the disagreement with this recommendation, participants agreed to reword its second sentence as follows based on another organization's current training procedures: "Three rules for cutting a spring pole: (1) Do not mess with it. (2) If you have to mess with it, use a machine to knock it down. (3) If the other two options do not work, there is a proper procedure, but you need to be trained to use it."

8. *Select the appropriate chain saw and components for the type of work to be performed. Use and maintain chain saws according to the manufacturer's instructions.*

The logger participants reported that chain saw selection and maintenance were variously "good," to mention and a matter of "common sense." Most of the loggers agreed that there was some worth in discussing this topic, as they know workers who do not properly maintain their equipment. These workers could use a reminder, although it was doubtful that the information would affect their behavior.

No suggestions for improvement were made.

*9. Use seat belts on all appropriate mobile equipment.*

Loggers were divided on the issue of whether the use of seat belts on equipment was something that should be followed. Several loggers mentioned that they prefer not to wear seat belts, citing a desire to flee the machine if it should begin to tip over and the inconvenience of continuously snapping and unsnapping the belt as you get out to adjust your load. These workers suggested that you "Give the working man some credit to have some common sense," presumably to know what works best for him.

Other loggers mentioned that they would wear the seat belt for safety reasons and think it is a good reminder to include. However, they again doubted the effectiveness of such warnings: "If the guy in the cab doesn't read all the other warnings about seat belt safety, who's to say he'll read this [one-page tear sheet]?"

No suggestions for improvement were made.

## B. Preventing Injuries and Deaths of Fire Fighters

The fire fighter participants first noticed the structure of this *Alert*: department-level recommendations followed by individual-level recommendations. Throughout the discussion, fire fighters noted that this organization was awkward for capturing the individual's attention and repetitive because each issue was discussed twice. However, a few felt that this structure recognized the fact that safe practice is unlikely to be implemented in the absence of departmental support.

*Fire departments should take the following precautions to protect fire fighters from injury and death:*

1. *Establish and implement an incident management system with written standard operating procedures for all fire fighters. The system should include a well-coordinated approach to the emergency, accountability of all fire fighters, and provisions for their overall safety at the scene of the emergency.*

Standard operating procedures (SOPs) and a well-coordinated approach were considered important and equally applicable to both large metropolitan and smaller rural fire departments. Companies located in large metropolitan areas alone noted that this message was "repetitive" yet it may be an important reminder because some departments do not do it as well as others.

Fire fighters universally reported that written SOPs were a standard practice in the industry. However, they also cautioned that SOPs should be treated as guidelines and not as absolute rules. SOPs cannot and should not cover every possible scenario that you may encounter when fighting a fire; in addition, there are situations in which the SOP recommendation may not be the best course of action to follow given the conditions. "Each structure, each fire is unique to itself." Moreover, "[SOPs] give you both guidance and the ability to think on your own, too."

2. *Develop and implement a written respirator maintenance program for all respiratory protective equipment used by fire fighters. Establish service and maintenance procedures and rigidly enforce them to provide respirators that are dependable and are constantly evaluated, tested, and maintained.*

Fire fighter participants felt that this recommendation was very important, reasonable, and feasible. "You need air. There's nothing more important."

No suggestions for improvement were made.

3. *Establish and implement a system to account for the location and function of all companies, units, and fire fighters at the scene of an emergency.*

This recommendation was considered equally important by both large metropolitan and smaller rural fire departments. While fire fighters acknowledged that they have encountered

logistical problems in coordinating personnel and equipment at an emergency scene, this recommendation served a necessary purpose. This message was also considered to be timely: at least two departments were in the process of updating their current system of coordination or mutual aid.

4. *Employ a buddy system whenever fire fighters wear self-contained breathing apparatus (SCBAs).*

Using a buddy system was considered common among all fire fighter participants, but many fire fighters objected to the recommendation's wording. Most importantly, they pointed out that the buddy system is not only used when wearing SCBAs, as may be inferred. "This recommendation implies that it's OK not to use the buddy system if you're not wearing the mask... that there might be times when you would not use it and that's not true."

A second objection was in the terminology of "buddy system." Some readers were confused as to whether it was referring to a "two-in, two-out" approach or to "buddy breathing," while still others suggested that the term sounded too juvenile and colloquial.

To respond to these objections, it was suggested that the message read: "Employ two-person teams whenever you are involved in fire fighting activities. Never work alone."

5. *Provide personal alert safety system (PASS) devices and ensure that fire fighters activate them when they are involved in fire fighting, rescue, or other hazardous duties.*

Nearly every fire fighter agreed on the need to wear and activate PASS devices and that their use should be widely encouraged. They also acknowledged that some workers disagreed with their utility: "It frustrates and aggravates some fire fighters. They're such a nuisance. Many guys just turn them off." Voicing this minority opinion, one fire fighter repeatedly suggested that they be "taken off and thrown away."

No suggestions for improvement were made.

6. *Encourage municipalities to review and amend their elevator and life safety codes to require fire fighter control for all elevators with a total travel distance greater than 25 feet.*

Fire fighters from large metropolitan areas found this suggestion very appropriate and applicable and agreed that more should be done to encourage it. On the other hand, participants from small rural areas considered this recommendation foreign and irrelevant, as there were no buildings with elevators in their operating area.

No suggestions for improvement were made.

7. *Guard against heat stress and other medical emergencies of the fire scene; provide cool water supplies, rest areas and access to emergency medical personnel.*

All of the fire fighters agreed that this recommendation was very important to include and that it included very timely and relatively new information. Many participants recalled examples when heat stress and other related medical emergencies had occurred to colleagues in the recent past.

The only suggestion mentioned was for the fire department to take a more active role in preventing and recognizing potential emergencies by "pulling people off before they get to the point where they are fatigued and becoming clumsy."

*Fire fighters should take the following steps to protect themselves from injury and death:*

8. *Follow all established policies and procedures.*

Refer to recommendation 1 for comments.

9. *Wear and activate your PASS device at the scene of every emergency.*

In addition to the comments made in recommendation 5, one group of fire fighters took exception to using a PASS device at the scene of every emergency. They asserted that a PASS device is not needed at every emergency they respond to. "If you get out on a car accident where you're just directing traffic, [a PASS device] is kind of unnecessary."

Suggested rewordings included following what is written in the department-level recommendation (recommendation 5): activate it when you are "involved in fire fighting, rescue, or other hazardous duties" or just activate it "at the scene of every emergency requiring a SCBA."

10. *Wear the appropriate protective clothing and equipment (including your SCBA) at all incidents where hazardous atmospheres might be encountered.*

Fire fighters had divided reactions to this recommendation. The participants from large metropolitan areas described this message variously as "standard" and "boring" and said that "it's thrown at us all the time." Interestingly, one of these groups admitted that, even though they are aware that they should be following this rule, many fire fighters in their company do not because it is inconvenient or uncomfortable. Most of the objections were in relation to filter masks: "They're hot, they stick to your face, and they're pink."

On the other hand, the members of the rural volunteer fire squad were very receptive to this recommendation, perhaps suggesting that they did not receive many safety bulletins. These participants unanimously considered this statement both important to mention and "a good rule" to follow.

*11. Check your SCBA to assure that it is in working order and has been properly maintained.*

Fire fighter participants agreed that this recommendation was extremely appropriate and universally applicable. "If you want to live, you check it every morning."

One suggestion agreed upon by all fire fighters was to add the following: "Check your SCBA every morning." Making it a habit would ensure that it was checked every day upon your arrival at work.

*12. Drink fluids frequently and be aware of signs of heat stress.*

In addition to the comments in recommendation 7, one group noted the ambiguity surrounding the word "frequently" and the lack of knowledge about signs of heat stress. A suggestion was to provide a better description of drinking fluids frequently: "It may mean once every four hours for someone who's not doing anything, while [for someone exerting himself/herself], it may mean every 30 minutes." Also, many fire fighters acknowledged that they were unsure of the exact signs of heat stress, which could be remedied by including some examples of symptoms to be aware of.

## C. Preventing Electrocutions of Crane Operators and Crew Members Working Near Overhead Power Lines

With few exceptions, crane operators and taggers agreed that warnings such as this message applied equally well to those operating the cranes as to other crew members who are working on the ground. However, they felt that a different publication could be developed that would be more applicable to the crane taggers.

*Take the following steps to protect yourself from electrocution when operating or working around cranes that are near overhead power lines:*

1. *Operate cranes only if you have been trained in safe operating procedures and the Occupational Safety and Health Administration (OSHA) safety requirements.*

Nearly all of the crane operators agreed with this statement and mentioned that its advice is already followed automatically. "The best defense against an accident is training." The sole objection was that this recommendation mentioned OSHA, an agency that apparently is not popular in the construction industry.

No suggestions for improvement were made.

2. *Participate in all crane safety programs offered by your employer or labor organization.*

The majority of the participants reluctantly agreed with this recommendation, although it was not often followed. A few crane operators mentioned that it "won't change any worker's behavior just by reading this."

No suggestions for improvement were made.

3. *Know the location and voltage of all overhead power lines at the jobsite before operating or working with any crane.*

All of the crane operators and taggers agreed that they rarely know the voltage of overhead power lines and did not feel it is their responsibility to know voltages. This recommendation is routinely ignored because of confusion over who is responsible for knowing voltages and the general inconvenience of finding that information out. The groups disagreed as to who should know the voltage: the crane taggers suggested that crane operators should know, while the crane operators suggested that the site supervisor or manager should be aware of it.

No suggestions for improvement were made.

4. *Assume that all power lines are energized and maintain the minimum clearance required by OSHA at all times:*

    - *At least 10 feet for lines rated 50 kilovolts or below;*

- *At least 10 feet plus 0.4 inch for each kilovolt above 50 kilovolts (or maintain twice the length of the line insulator, but never less than 10 feet).*

Crane workers liked the first sentence of this recommendation, but they reported that the bulleted suggestions were both confusing and impractical to implement. Confusion mainly surrounded terminology: "What's a kilovolt or 'twice the length of the line insulator'?" Participants also mentioned that the bulleted recommendations, while probably developed with sound scientific judgment, were impractical. The second bullet received the most attention: "Four-tenths of an inch makes it ridiculous." "I can't imagine a situation where you'd be messing around with tenths of an inch."

No specific suggestions for improvement were made.

5. *For more protection, maintain the greater clearances recommended by the American National Standards Institute (ANSI):*

| *Power line voltage phase to phase (kV)* | *Minimum safe clearance (feet)* |
|---|---|
| *50 or below* | *10* |
| *Above 50 to 200* | *15* |
| *Above 200 to 350* | *20* |
| *Above 350 to 500* | *25* |
| *Above 500 to 750* | *35* |
| *Above 750 to 1,000* | *45* |

Crane workers were baffled as to why the *Alert* would provide two different sets of recommendations on the same issue. Some were confused by this terminology ("What are phase to phase kilovolts?") but generally agreed that the ANSI recommendations were significantly easier to understand and implement than those provided by OSHA in recommendation 4. "I can't put OSHA's recommendations to use; I can with ANSI's." To make it easier for the common construction worker to understand, it was suggested that the chart heading simply read "Recommended Clearances."

One major objection to ANSI's recommended clearances was that they do not take weather conditions into account. "Electricity can jump further than these recommended distances on a rainy, cold night." It was suggested that a statement such as "Allow additional clearance during poor weather" be added.

6. *Where it is difficult for the crane operator to see the power lines or pay attention to maintaining required clearance during crane movement or operation, designate a person whose sole responsibility is to observe the clearance and to give immediate warning when the crane approaches the limits of safe clearance.*

Crane taggers and operators differed in their opinions of this recommendation. Taggers liked it but thought it should also address the importance of operator/tagger communication;

especially the use of agreed-upon signals. While acknowledging that it is a practical solution, crane operators questioned the feasibility of having an extra person at a job site. They doubted that it would happen: "The contractor won't pay for a man to stand there and do nothing."

The only suggestion was to add some information about the importance of adequate operator/tagger communication.

7. *Be aware of the limitations of boom guards, insulated lines, ground rods, nonconductive links, and proximity warning devices. Do not use these devices as a substitute for de-energizing and grounding lines or maintaining safe clearance.*

Crane operators and taggers also had differing opinions on this recommendation. Operators liked the warning not to use these devices as a substitute. They also acknowledged confusion over the terminology used in the recommendation and reported only recognizing or understanding "about half" of the devices described. Taggers, on the other hand, did not find this statement relevant or useful at all and were equally befuddled by the terms.

No suggestions for improvement were made.

## D. Preventing Scalping and Other Severe Injuries from Farm Machinery

*Many farm workers are injured or killed each year when their hair, clothing, or body parts become entangled around rotating drivelines or shafts driven by power take-offs (PTOs). Entanglement in farm machinery can result in scalpings, amputations, and death. Take the following steps to protect yourself and others when working near PTO-driven farm machinery:*

1. *Identify all PTO-driven equipment components (such as drivelines, drive chains, or gears) on all farm machinery.*

All farm workers reported that this recommendation was confusing and that they had difficulty interpreting it. Some participants understood it to mean "label every component on farm machinery with a decal," while others thought it meant "identify the significant components."

To clarify this recommendation, be more specific about what is to be done with which parts by including an addition: "The user should familiarize himself/herself and other users with the moving parts on the machinery." As one farmer explained, "Just tell them to watch out for any moving parts—that's what can get you."

2. *Examine all PTO-driven farm machinery for U-shaped tunnel guards and replace them with retrofit guards recommended by the manufacturer or dealer.*

Farm workers doubted the usefulness of this recommendation, noting that it used unfamiliar terminology. Farmers from a wide variety of geographic areas agreed that they were unfamiliar with U-shaped tunnel guards and retrofit guards. Yet even if the terminology was clarified, it was unlikely that they would have complied with the recommendation due to cost and a general dislike of machine guards.

No suggestion for improvement was made.

3. *Always disengage the PTO and turn off the tractor ignition before leaving the tractor seat and approaching the driveline.*

With the exception of one objection, farmers were generally positive about this recommendation to turn off machinery and thought it was important to include. All of the farmers agreed that the PTO should be disengaged before approaching the driveline, but participants were divided as to whether the tractor should be turned off as well.

While recognizing the worth of the recommendation, several farmers protested turning off the tractor, citing mechanical logistics. "You don't just shut down a hot tractor -- I've fired employees for doing that." They mentioned that they had never known anyone to follow this recommendation, and they doubted that it would ever become common practice.

No suggestions for improvement were made.

4. *Do not perform maintenance or adjustments until both the driveline and the machinery have completely stopped moving.*

While farm workers reported that this recommendation was applicable and an important reminder, it was also redundant. Participants noted that, in essence, it said the same thing as recommendation 3. It was suggested that recommendations 3 and 4 be collapsed and moved closer to the top of the page to indicate their combined importance.

5. *Warn anyone who might come near an operating PTO about the entanglement hazard.*

As a whole, farm workers reported that this recommendation was relatively straightforward and easy to understand. Interestingly, male and female farmers had slightly different interpretations about warning others of PTO entanglement. Females tended to associate "anyone" with children and others who might be visiting the farm, thereby finding this suggestion highly applicable and useful. Male farmers, on the other hand, reported that it was not as useful or applicable, having generally interpreted "anyone" to mean other (presumably already experienced) farm workers.

No suggestions for improvement were made.

6. *Instruct all farm family children and untrained adolescents never to approach, operate, or perform maintenance on PTO-driven farm machinery.*

While farm workers agreed that this message was very important to include, they disliked its wording. Farm mothers found the word "instruct" misleading, as it implied children would be taught to operate equipment. They preferred instead to use the term "warn."

The phrase "untrained adolescent" also drew attention. Workers generally felt that anyone "untrained" (regardless of whether they were an adolescent or a non-family member) was at equal risk of injury. A suggested amendment was to include all children who might be unfamiliar with the operation of farm machinery. In addition, a recommendation guarding against allowing children to play on farm machinery was suggested for inclusion.

7. *Follow the manufacturer's instructions whenever maintenance or adjustments are performed on any farm machinery.*

Farm workers were relatively positive about this recommendation and thought it was a good reminder to include.

No suggestions for improvement were made.

8. *Do not wear loose-fitting clothing or jewelry near operating farm machinery.*

Reaction to this suggestion was very positive, as workers declared it very applicable and reasonable. In addition to warning against loose-fitting clothing and jewelry, workers also

wanted to include examples of related clothing hazards: frayed clothing (especially sleeves and gloves), flannel shirts, and ties on sweatshirt hoods. It was also suggested that more specific examples of jewelry be identified as hazards, including wedding bands, looped earrings, and necklaces.

9. *Tie back or otherwise secure loose hair, but be aware that even short or tied-back hair may become entangled in moving equipment.*

All farm workers, but particularly women, reported that this suggestion was both useful and relevant. Some female workers thought the language could be enhanced to provide additional, more accurate detail. "It reads 'tie back or otherwise secure,' which suggests that tying hair back [as in a pony tail] is enough when it's not. Hair really should be put up in a hat."

10. *Maintain machine guarding according to the manufacturer's most current specifications and OSHA regulations [29 CFR 1928.57] (see NIOSH Alert: Request for Assistance in Preventing Scalping and Other Severe Injuries from Farm Machinery).*

Farm workers universally felt that this recommendation was useless due to disinterest and lack of knowledge of where to locate referenced information. One suggestion, therefore, is to include information on where to get more information or to provide a toll-free number to call for more information. Yet, even with these changes, farmer participants cautioned that it would still be highly unlikely that they would search for it.

11. *Check periodically with manufacturers, dealers, and county extension agents for updated information about retrofit guards for PTOs.*

All of the farmer participants mentioned that this recommendation was worthless, citing constraints on time and lack of interest. "I've got better things to do with my time. This doesn't happen; it won't happen."

No suggestions for improvement were made.