Wildland Firefighter Safety Awareness Study

Phase I -Identifying the Organizational Culture, Leadership, Human Factors, and Other Issues Impacting Firefighter Safety

October 1996

TriData

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Dedicated to the over 1000 federal and state wildland firefighters who contributed their time and heartfelt thoughts to this project.

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PROLOGUE

Comments From the Field

"We understand the science of fighting fires, but we do not understand the science of people fighting fires" – Montana hotshot.

"The least qualified people [seem to] go to the worst fires."

"We're hiking kids to exhaustion a hundred times more often than we're exposing them to flame" – California firefighter.

"Some of my most harrowing experiences on fires have been the bus drivers."

"The dying western forests pose a great risk to firefighters..."

"Controlled burns are not given adequate [safety] attention. It's like we think those fires don't burn as hot as others."

"Fatigue is a particular problem on campaign-type fires . . . It creates the walking dead."

"I need to focus on my saw, and let the squad boss tell me if the fire is coming."

"It's a short distance from okay to 'oh sh--.'"

"One in five division superintendents is really scary."

"Training is being used as a substitute for experience. You used to work your way into each position. Now you take a course."

"The present approach to overall federal interagency wildland firefighting is good to excellent" (paraphrased opinion of 76 percent of wildland firefighters surveyed). Keep the current general approach, just fix it up to work better (opinion of 63 percent).

EXECUTIVE SUMMARY

There are many characterizations of wildland firefighters and their work culture. These characterizations vary across all levels of organizations, jurisdictions and types of jobs. As closely held as these perceptions are, as confident as each of us is with our own perceptions--it begs the question of what a systematic look at firefighters and their culture, from within and without, would reveal.

This report summarizes the results of Phase I of a four-phase study to examine the Federal wildland firefighting community and to improve firefighter safety. The first phase identified and assessed the organizational culture, leadership, accountability and human factors that affect firefighter safety in the five federal agencies most directly involved in wildland firefighting: the Department of Agriculture Forest Service, and the Department of the Interior Bureau of Land Management, National Park Service, Bureau of Indian Affairs, and Fish and Wildlife Service. Based on the findings here, the remaining phases will address the desired organizational culture of the future that will enhance safety (Phase II), identify the steps needed to move from the current culture to the desired culture of the future (Phase III), and evaluate, assist in, and monitor the change (Phase IV).

The focus in Phase I was on systematically interviewing and surveying over 1000 federal (and some state) wildland firefighters to get their perceptions of the underlying issues of firefighter safety, and the organizational culture in which they operate in each of the five agencies and in every geographical area. All ranks from basic firefighter to agency administrator were included. A number of senior experts on wildland firefighting within and outside of the federal agencies were interviewed, and the literature reviewed. The study considered all factors that wildland firefighters said were important in their experience.

A myriad of organizational culture, leadership, accountability, human factors, and external influences that affect wildland firefighter safety were identified – about 250 separate issues falling into about 25 general categories. While individual firefighters and experts have their own view of the top two or three issues, there was a surprising degree of consensus across agencies, ranks, areas, and even gender and ethnic groups on what were the most important aspects affecting firefighter safety.

The highest priority needs identified by the 1000 firefighters interviewed or surveyed were:

- improving the experience level, training, and physical fitness of the individual firefighters;

- improving the attitude toward safety of the minority of firefighters who do not seem to have the necessary passion for safety;

- making sure that crew and division supervisors have the temperament, training and experience to supervise during emergencies and

- holding all ranks accountable for unsafe performance or decisions.

The lack of adequate accountability in the current culture was especially stressed. While all levels of management came in for various criticisms, and many outside influences (from local political pressures to budget shortfalls to forest health considerations) were identified as important influences on safety, the firefighters focused most on the need to make improvements at the firefighting level rather than blame others, even though the survey was anonymous.

Some highlights of the findings are described below, but it really is necessary to read the details to get below the generalities that many could identify even without this study. The range of issues that need to be addressed, and the lack of having just two or three underlying issues, make it difficult to summarize the richness and specificity of the improvements seen as necessary by the participants in the study.

Methodology

Five different approaches were used to collect information for this study:
- face to face, one-on-one interviews with 164 federal wildland firefighters and fire officials, spread across the five agencies and 10 geographic areas spanning the nation.
- a series of 12 focus groups involving another 130 firefighters, at least one group per geographic area.

- a national random survey of 730 wildland federal firefighters, using a 25-page, 400 question survey instrument (with 98 percent or better response to the questions on problem areas).
- interviews with various experts within and outside the federal agencies.
- a literature search in firefighting and other relevant safety fields.

The over 1000 wildland firefighters and fire managers heard from in the study ranged from basic firefighters to crew supervisors, incident management team members, fire management officers and agency administrators. Special efforts were made to analyze the inputs from female, Hispanic and Native American firefighters, and from agency administrators. A range of seasonal and full-time personnel, people with a wide range of experience (from less than 5 years to more than 20 years in the job), and Type I and Type II crews were included. Among Type I crews, the responses of smokejumpers, helitack, and hotshot crew members were separately analyzed.

The scope of this study did not include field observations of firefighting, but the study team included several people who had been wildland firefighters and some that had done field research of wildland firefighting.

There was surprising consistency on the key safety issues across areas, agencies, and ranks; the exceptions are noted in the discussion of each issue in the text. Overall, with respect to safety, there seems to be one large culture on most issues. Though there are different weightings given to the importance of different issues by different subcultures and individuals, there are few issues where one subgroup thinks it is a problem and another not. The differences are modest ones.

Organizational Culture

Most federal firefighters feel that the federal approach to wildland firefighting is good, and they are proud to participate in it. Few call for a revolution; however, most express great concern about the need to make significant improvements to get the current system working as intended, and to use the standards that have been developed.

Strengths − The firefighters interviewed and surveyed (and outside observers) strongly believe that there are many strengths of the current wildland firefighting system and culture, including the following:

- There generally is excellent interagency cooperation, with successful integration of people from all over the nation into a successful firefighting force. (One indication of this was the remarkably consistent views across agencies; there are differences to be sure in the nature of firefighting from Alaska to California to the East, but many of the safety concerns were quite similar; e.g., the lack of briefings on local fuels and terrain among those transported across areas to fight the fire; the lack of adequate leadership skills among some division supervisors, etc.)

- There is a strong concern of firefighters, crew supervisors and upper management about safety, and it has grown even stronger in recent years, especially since the South Canyon tragedy which killed 14 firefighters. The vast majority of those interviewed thought that their colleagues and immediate supervisors cared a great deal about safety.

- Firefighters have a positive "can do" attitude and adaptability.

- There are good standards and specialized training.

- The development and use of Type I crews has increased productivity and safety.
- The Incident Command System and use of Incident Management Teams works well in general.

- The firefighting culture makes good use of technology, ranging from Air Operations to advanced meteorology and fire behavior models. Equipment is generally perceived to be good, and so is the logistics system (all with some exceptions discussed later.)

- The use of the "militia" system, in which people with non-firefighting jobs for most of the year volunteer for duty at all levels of firefighting, is an effective concept.

Overall, the wildland firefighters felt that their safety record has been quite good, given the numbers of firefighters involved, and in light of the inherent risk of wildland

firefighting. There is pride in the safety record, but a desire to improve it further. And there are fears about safety worsening.

Table 1 shows the list of strengths, and the percentage of survey respondents who agreed or disagreed with them.

Problem Areas – There are widespread concerns that the organizational culture has undergone significant changes that contribute to a decrease in safety. The experience level of the firefighting work force and leadership is perceived to have dropped. That has many impacts, none were more important than in crisis decision making, which depends on experienced personnel making good decisions under stress. The experienced personnel leaving firefighting are not all retiring. Some are being driven out of firefighting by loss of incentives and lack of encouragement, and they are not being replaced fast enough by adequately qualified personnel.

There also are grave concerns that the high public visibility of wildland firefighting puts political pressures on field leadership that in turn influence strategy and tactics, and increase danger to firefighters. There is a perception that the situation is worsening as federal firefighting budgets and resources are declining without a concurrent lessening of public expectations. The trend continues toward more severe

Table 1. Strengths of the National System					
		Percent Survey Respondents Who			
Question Number	**Strength**	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
S120	Integrating people from all over the nation into a successful firefighting force.	29	54	8	1
S121	Concern for safety being accepted now as part of the culture by firefighters.	29	62	6	*
S122	Concern of supervisors for the safety of their crews.	34	60	4	*
S123	Physical conditioning of wildland firefighters.	18	48	23	6
S124	Interagency cooperation in firefighting.	24	61	9	1
S125	Specialized training and use of Type I crews (hotshots, smokejumpers, etc.).	30	56	6	*
S126	Forecasting of weather conditions.	22	64	8	1
S127	Knowledge of fuel conditions.	19	59	17	1
S128	Fire reconnaissance.	16	66	10	*
S129	Incident Command System.	30	56	8	1
S130	Speed of mobilization of people and equipment.	16	58	18	2
S131	Logistics system.	11	66	12	1
S132	Air Operations (helitack, transport, tankers).	21	66	4	1
S133	Firefighters' generally positive attitude (committed, energetic, can-do, and love the job).	36	54	7	*
S134	Firefighters' adaptability and cross-training.	21	61	12	1
S135	Use of health and safety codes based on experience.	11	52	18	1
S136	Use of safety officer position.	16	54	17	2
S137	Willingness to back off when necessary.	20	49	23	2
S138	Personal protective equipment.	28	64	5	1
S139	Transportation equipment.	10	70	12	1
S140	Communications equipment.	15	57	20	3
S141	Use of the abbreviated "LCES" list (Lookouts, Communications, Escape routes, Safety zones).	38	46	7	1

Question Number	Strength	Strongly Agree	Agree	Disagree	Strongly Disagree
S142	Lessons learned from the South Canyon fire have led to more people questioning strategy and tactics.	32	48	12	1
S143	Recognition of the need for improvement in fire safety.	33	59	4	*

* Less than 0.5 percent.

wildland fires, and more people being at risk in the urban/wildland interface. The increasing number of fires in the urban/wildland interface, coupled with the changes of tactics needed to protect structures; more pressure to perform and not retreat; and the lack of training on the risks around structures (e.g., hidden propane tanks, electrical wires) combine into a major concern. There is a demand for more knowledge about fighting fires around structures, and a need to further educate the public on mitigation measures they can take.

Among other key aspects of the organizational culture as it affects safety are the following:

- There is a tendency to try to do as much as before with less resources, which sometimes pushes the envelope of safety. The safety issue is further exacerbated by declining forest health, accumulation of fuels from years of fire exclusion and lack of an adequately sized prescribed burn program. Fewer firefighters are available to handle more frequent and more severe fires while feeling less than fully supported, and while experience levels drop. This was considered another dangerous confluence, especially by the most experienced people interviewed.

- Too many firefighters still feel uncomfortable in raising safety issues. They perceive that the organizational culture does not allow them to point out safety problems in the field without fear of retribution, despite assurances to the contrary. There has not been acceptance and practice of a philosophy like that used in flight operations (the crew resource management system), in which it is not only acceptable to point out safety problems, but one is expected to do so. On the other hand, there is concern about letting the pendulum swing too far the other way, and having crews frequently balk at assignments, with the

potential for disruption of operations and increasing danger to those crews that remain.

- There is a broad perception that to bridge the experience gap, some managers have been fast-tracked into positions of responsibility that are above their ability to handle safely. Some of those fast-tracked were among those raising the alarm. This perception was shared by 82 percent of the overall firefighter population, and by 84 percent of women and minorities.

- There are feelings that seasonal employees are not adequately appreciated, trained or given incentives to return in the current organizational culture, which reduces the experience base.

- There is a perception that firefighters today have less woodland experience and therefore are more prone to accidents. More scientists ('ologists) fill positions, and a smaller portion of the workforce is interested in firefighting. It is no longer considered necessary for all or most to participate in firefighting. Those who do participate feel they do not get enough encouragement, and may be given subtle or not so subtle signs that they are abandoning their real jobs when they go to fight fires.

- There is not a high enough degree of confidence that key information gets through to crews during a fire, especially regarding weather, fuel conditions, and when requested resources will arrive. The culture is such that crews do not have a checklist of information they should expect, and they do not always ask for what they do not receive. A highly ranked communication problem was the lack of adequate exchange of information between crew shifts, and a lack of adequate briefings en route to fires and at fires, with too little input allowed or solicited from crew supervisors.

- There is concern that the organizational culture allows red-card certification for some who do not merit it. The culture does not take the certifications seriously enough, and the experience standards for IMT positions are thought by many to be too low.

- About a third of women and minorities reported feeling they get less information than others at fires – but overall, the women and minorities surveyed expressed the same safety concerns as all others. The response profiles of male, female, Hispanic, Native American, and other firefighters regarding safety issues were remarkably similar, to the point that it could be considered a tribute to the change in organizational culture in the direction of fairness.

- Equipment drew relatively little criticism except in two areas: radios and shelters. There is not yet universal provision of radios for each Type II crew or squad, and these are problems of signal clarity, interference and inadequate channels at times. Obviously all people must be able to be reached expeditiously for safe operations. The second major equipment concern was shelters, especially the lack of realistic training with them, their being viewed as a backup that allows one to take risks, and the confusion about what constitutes an adequately sized safety zone in which to deploy a shelter.

Leadership

Good leadership – getting people to do the right thing – is crucial in emergencies of all types. There is a generally high regard for incident commanders, and a feeling that most people in supervisory positions are suitable. But there also is a strong feeling that a small but non-trivial fraction of supervisors are either too inexperienced, or of the wrong temperament, or simply not good leaders. Only about 10-20 percent of division supervisors and crew supervisors were thought to be unsatisfactory, but that small fraction represented a significant amount of exposure to potentially unsafe decisions.

Agency administrators without fire backgrounds or at least fire training also were a matter of concern, especially for setting the proper safety tone in briefings, setting the achievable goals for a particular fire, getting too involved without adequate understanding of what is possible with limited firefighting resources, or "hiding" during a fire and not being available when needed.

Lack of accountability was repeatedly raised as a major issue in the interviews and focus groups. It also was rated among the top issues on the survey. Supervisors and higher levels who endanger safety are not held to task when they

make major errors. The community wants to weed out or discipline those who endanger its safety.

There is an emphasis on accountability and responsibility for safety at all levels within the community. Perhaps those interviewed and surveyed are saying that safety is a global responsibility. That is, individuals have a safety responsibility at the level of tool use, personal awareness of danger, maintaining physical health and watching out for fellow firefighters. Crew supervisors have the added responsibility for safety of the crew and the requirement that they watch for future threats to the safety of the crew. The Incident Management Team also carries the responsibility for the safety of all those on the fire, all those that may be called to the fire and all those supporting the fire suppression effort. They have a requirement to look even farther into the future. Nevertheless, the gist of many of the comments expressed by the participants was that, "You cannot assign away safety." Safety is not a responsibility that can be transferred to a squad boss, a crew boss, a line safety officer or the IMT safety officer.

Among other leadership concerns were the following:

- Misuse of Type II crews, caused in part by shortages of Type I crews and in part by the difficulty in identifying the diverse skill and fitness levels of Type II crews. The greatest concern was for misuse of local volunteer and career fire department crews, who are being relied on more despite shortfalls in their wildland fire training and equipment. This concern is sharply greater in some areas than others – one of the exceptions to the comment that many areas had similar responses.

- Mixed messages from leadership about safety.

- Lack of adequate promotion paths for highly experienced seasonal personnel.

- Need to pay special attention to the selection and training of the crew supervisors of inmate crews, whose competency and safety depend on the on-the-job training they get from the supervisors.

Human Factors

Many psychological factors play a key role in firefighter safety. First is how people cope with being in the presence of danger over the course of many fires. There were split opinions about whether complacency or denial of dangers set in over time, and whether the "can do" attitude led to unnecessary risks. The consensus was that there probably was at least a non-trivial fraction of firefighters who needed to have their attitudes changed.

A more widespread concern was the difficulty in dealing with a large number of fire orders and watchouts, and the need to reduce their number and improve their clarity. The LCES (Lookouts, Communications, Escape routes, Safety zones) short checklist drew much praise.

There was a large consensus that although much of current training was very good, there was not enough realistic training at every level. There is a demand for more scenarios, more field training, more training of decision making under stressful conditions, more use of video, and more use of simulations. The decline in experience has put a large premium on increasing the realism of training.

Crew dynamics and especially crew cohesiveness were not rated as highly important by most of the firefighters interviewed and surveyed, relative to many other issues. This was somewhat puzzling in light of the importance given to this subject in firefighter fatality investigation literature, and in safety literature in general. However, many aspects of crew dynamics came up under other guises, such as concern about the increasing number of crews comprised of people who do not know each other, and the importance of having a crew supervisor who was a good people manager and communicator. Many of those interviewed who had read Ted Putnam's work on crew decision making under stress referred to it, and expressed a belief that it was on target. Firefighters may be unaware of the importance of this issue, perhaps because it is a problem mainly in extremis, in the last minutes before an acute situation hits home. Therefore it is rarely experienced as a problem, and "They do not know that they do not know, " said one senior fire manager. Some feel that more attention should be given to keeping crews out of harms way, rather than deciding what to do when they are already in acute danger.

Other human factors issues thought important were:

- Rampant fatigue, with pay incentives that exacerbate the problem. Working too many consecutive hours, hiding fatigue to get better or more assignments, not having crew fatigue levels checked after arrival at a fire, and lack of adequate rest opportunities were all frequently cited aspects of the problem.

- Personnel practices that do not provide incentives to retain experienced personnel

- There is a firefighting community acceptance of the need for good physical fitness, yet there is acceptance of many who are not fit, primarily for some Type II crews. Also, there is questionable validity and honesty of the step test procedure.

Conclusion

There is a strong consensus among firefighters and fire managers on the broad categories of safety problems they face, and on many of the details. This raises the confidence that can be placed in the identification of the problem here. It also will make it easier to address the solutions, since for the most part they do not have to be tailored to each area, agency, or other subdivisions of the community.

Most of the problems identified seemed tractable to solve, and many ideas for solutions were raised by those interviewed, and in over 100 survey questions on solutions. The solutions will be presented in Phases II and III of this study.

One of the greatest challenges is to set the priorities for changes or improvements across the many problem areas. The comparative ratings and rankings of the general and specific issues raised during Phase I should contribute to these priorities.

ACKNOWLEDGMENTS

The authors hope this report does justice to the passion for safety and outstanding cooperation exhibited by so many leaders and firefighters in the five Federal agencies that sponsored this effort, which are as follows:

- USDA Forest Service
- USDI Bureau of Land Management
- USDI National Park Service
- USDI Bureau of Indian Affairs
- USDI Fish and Wildlife Service

This study was given guidance by the Fire Directors of the five federal agencies that sponsored this project; the Project Steering Committee; and the Federal Fire and Aviation Safety Team (FFAST). The members of these committees and the fire directors also graciously shared their personal views about safety. They are as follows:

Agency Fire Directors	*Project Steering Committee*	*Federal Fire And Aviation Safety Team (FFAST)*
Mary Jo Lavin, FS	Mark Boche, FS	Dave Aldrich, FS
Rick Gale, NPS	Steve Frye, NPS	Paul Broyles, NPS
Al Dunton, BLM	Jerry Williams, FS	Roy Johnson, BLM
Robert Erb, FWS	E.K. James, BLM	Bob Martin, FS
Steve Haglund, BIA		Mike Martin, DOI
		Carlos Mendiola, FWS
		Stan Palmer, BLM
		Mike Wallace, BIA

William Bradshaw of the U.S. Forest Service coordinated this project, as the Contract Officer's Representative. Kathleen Shriver of the Bureau of Land Management served as the Contract Officer. The authors greatly appreciate their outstanding helpfulness and guidance throughout this study.

Many other experts and firefighters in the federal agencies also granted interviews, and are appreciated even though not mentioned by name.

Project Team

TriData Corporation of Arlington, Virginia was the prime contractor for this project. It was assisted by Klein and Associates and several independent consultants. The key team members are listed below. Those with asterisks also served as principal field interviewers.

TriData Corporation   *Klein Associates Inc.*

Philip Schaenman, Project Manager   Gary Klein
* Roy Hodges, Assistant Project Manager   *Marvin Thordsen
Charlene Cullen
Erik Gaull
Jennifer Fratzke
William Overbey

Principal Consultants

Dr. Jason Greenlee, Deputy Project Manager; author of the Literature Review
*Michael DeGrosky, wildland firefighting expert
Paul Gunther, statistician
*Dr. Bud Levin, psychologist
*Nancy Moore-Hope, human resources specialist
Robert Mutch, wildland firefighting expert
*Dr. Kenneth Perkins, sociologist
Dr. Charles Perrow, sociologist
* Michael Thoele, interviewer

CHAPTER 1. INTRODUCTION

Wildland firefighting continues to take a high toll on the firefighters involved. In 1994, one of the most tragic years of wildland firefighting in the United States, 38 wildland firefighters died in job-related activities.[1] Of these, 36 were directly related to fires, with 22 occurring at the fire and 14 en route. The largest life loss incident was the South Canyon fire (also known as the Storm King Mountain fire) in Colorado, where 14 federal firefighters died. Figure 1-1 shows the wildland firefighter deaths at fires, 1986-1994. The South Canyon fire brought increased public attention to issues of wildland firefighter safety but firefighter safety has been a topic of study and debate since the turn of the century. The historic fires of 1910, only five years after the formation of the fledgling US Forest Service, burned five million acres and killed seventy-eight firefighters.[2] Fire again struck firefighters hard in the 1930s, late 1940s, and late 1980s. After each season, lessons were learned and in some cases relearned about how to better protect those on the fireline.

Investigations were made of the South Canyon fire by the agencies involved and the Occupational Safety and Health Agency (OSHA). Individuals, like Putnam(1995) and Weick(1995) also studied the tragedy and offered insights. Interagency meetings have been held to help to identify root causes and ideas for improving safety.

There emerged a consensus in the wildland fire community that despite a great deal of attention to safety, there were still unsolved problems and underlying factors that led to a continuing reoccurrence of the same kinds of tragic fires today as had occurred in the past. In addition to the headline-grabbing multi-fatality fires, there are many incidents killing firefighters in one and twos that are less heralded. There also is a fairly regular, periodic peaking of fire fatalities.

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[1] Firefighter Fatalities in the United States in 1994, U.S. Fire Administration, September 1995.
[2] *Fire Line: Summer Battles of the West,* p. 22, Michael Thoele, Golden, Colorado, 1995.

this is for figure 1-1

Following the soul-searching, multiple agency investigations, and special conferences on safety stimulated by the South Canyon Fire, a new idea arose, that the usual things sought in investigations that yielded the immediate cause of fatalities in a particular fire were not sufficient. There were likely to be organizational cultural problems, leadership issues, human factors problems, and possibly other issues that were underlying the firefighter safety problems. Putnam articulated this need in what should be considered a landmark paper (Putnam, 1995).

The five Federal agencies that predominate in wildland firefighting decided to pool support for an examination of the wildland firefighter safety problem in greater depth. All of these agencies regularly work together in the interagency attack on wildland fires, including the provision of personnel, support services, and fire management. There were deep concerns of these agencies from their firefighters to their crew supervisors, to forest managers, area managers, refuge managers, and park superintendents, to their fire directors, and up through the Secretaries of the Departments.

In 1994-1995 an interagency committee met to formulate what became the concept for this study. An outside contractor was to be selected to study the safety awareness, organizational culture, leadership, accountability, human factors and other issues that affected the safety of wildland firefighters. The contractor would be required to use not only experts in wildland firefighting, but also experts in psychology, sociology, interviewing, human resources, and data analysis. This would ensure a multi-disciplinary, independent viewpoint, and go beyond the typical findings of fire investigations.

In August 1995, TriData Corporation of Arlington, Virginia and a team of affiliated consultants was selected to undertake the project. This report presents the results of Phase I of this project.

Study Goals and Phases

The intent of this study was very clear: to contribute to a reduction in fatalities and injuries associated with wildland firefighting. To help achieve this, the study planned by the multi-agency committee had four phases, each with its own clear goals:

Phase I − Identification of Existing Culture − The goals of Phase I were to define the organizational culture, human factors, leadership, accountability, and other issues underlying safety problems, by collecting the insights from a broad and deep sample of the fire community across all five federal agencies. This information was to be blended with information from the literature and from experts within and outside the agencies to form a diagnosis of the problem, and an articulation of the issues, especially as perceived by the firefighters. This report describes the results of that effort in detail.

Phase II − Formulate the Desired Organizational Culture/Safety Environment. The goal of Phase II will be to identify the desired environment needed to improve wildland firefighter safety in the federal agencies − how safety should be incorporated with other activities, what changes are needed in organizational culture, and how to instill a "passion for safety" throughout the five agencies. This phase is to draw on the definition of the problem in Phase I.

Phase III − Develop an Implementation Plan − The goal of this phase is to define how to move from the current safety environment identified in Phase I, to the desired environment articulated in Phase II. It will draw on recommendations from firefighters, fire managers, and agency administrators.

Phase IV − Assisting, Monitoring and Evaluating Implementation − The goal of this phase is to see whether the changes proposed in Phases II and III get implemented, and to identify road blocks and help find alternative paths around them.

Scope of Phase I

After an initial meeting with the project's inter-agency steering committee held in Denver in September 1995, the methodology for Phase I was defined to consist of five major tasks:

- Literature review

- Interviews with experts and leadership

- One-on-one interviews and focus groups with federal and state wildland firefighters

- A national survey of a sample of federal wildland firefighters

- Listing and synthesis of the issues.

This report describes each of these steps, and provides the listing and synthesis of the issues.

Methodology – The next chapter discusses the methodology used in detail. In brief, the methodology of Phase I included one-on-one, face-to-face interviews with 164 firefighters, focus groups with 130 firefighters, and a survey of 730 other firefighters. "Firefighters" here include everyone from basic firefighters through agency administrators. This is thought to be the broadest effort of its kind in wildland firefighting history. The vast majority of those interviewed were federal firefighters.[3] The 130 firefighters who participated in focus groups to discuss safety issues included a number of state as well as federal firefighters. Many of the federal firefighter interviews and focus groups included a discussion of safety concerns of state and local wildland firefighters, though both of these groups (state and local) deserve additional research attention in future studies. About 30 state firefighters participated in the focus groups or interviews.

Based in large part on the issues and insights gained through the one-on-one interviews and focus groups, and discussions with experts, a questionnaire was crafted, reviewed, tested, revised and then sent out to 1,400 federal firefighters, from whom over 700 were returned on time, complete, and with high face validity.

Throughout the course of Phase I, interviews were conducted by phone and in person with experts in wildland firefighting and safety. These included each of the fire directors of the five participating agencies, most members of the Federal Fire and Aviation Safety Team, and some members of the project review team. The expertise of the project consultants was tapped, in some cases by formal interviews, in addition to their other contributions.

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[3] Only a few state firefighters could be interviewed because of OMB restrictions on the number of people other than federal employees who can be surveyed without a review by OMB, which can be a lengthy process.

Ground Firefighting Focus – This study focused mainly on firefighter safety on the ground; some aspects of air operations were considered as they impacted those on the ground (e.g. retardant drops, loading/unloading of aircraft, and tactical use of aircraft), but the scope did not include the maintenance of aircraft or safe flying, which are special topics that have been the subject of other studies.

Vertical Management Span – While the study focused on gaining the inputs of the people most directly involved in firefighting, from the firefighter to the supervisor to Incident Management Team, it also included a large sample of fire management officers and some agency administrators.

Inclusiveness of Safety Issues – The study focused on issues of organizational culture, leadership, accountability, and human factors but also considered any significant safety issues that were raised about safety by those interviewed and surveyed. It included, for example, issues concerning equipment maintenance, which is affected by organizational culture, leadership and human factors, though maintenance is not what is generally thought of under those terms. The operational rule of thumb here was, if it impacted safety, report it.

Strengths as Well as Weaknesses – The bulk of the study effort was spent identifying problems, but the study also gave attention to identifying what was considered by firefighters to be working well in the current organizational culture and worthy of preserving.

Potential Solutions – In the course of conducting the interviews and surveys, ideas and opinions were solicited on how to improve safety. Though Phase I conceptually was to focus only on identifying the problems, in practice it was thought to be more cost-effective to collect ideas on all three areas – problems, strengths, and solutions – rather than to re-do surveys and interviews in future phases. Collecting ideas for all three areas from each individual interviewed or surveyed also lent coherence to their thinking. Some interviewers identified new problems in the course of proposing solutions. Most of the findings on the proposed solutions will be presented in the Phase II and III reports.

Cross-tabulations were made for every question on the survey against each of 12 items of personal information provided by the respondents. Because age correlated so

highly with experience, we don't comment on both in the text, only experience in position. Also, the analysis stressed current or most recent position in firefighting, rather than past positions, though the data are available to search on people's histories if there were interest in that.

Organization of the Report

The next chapter (2) discusses the methodology used to gather and analyze data. Then the findings of the study are presented in six chapters under the headings of overall strengths (3); organizational culture (4); leadership (5); human factors (6); external influences on safety (7); and overall comparisons of issues (8). These are not mutually exclusive categories. Many of the issues raised by firefighters could fit under more than one heading.

The analysis is organized by issue, rather than by data collection approach. Information was used from the one-on-one interviews, focus groups, written survey, and in some cases the literature in discussing each issue.

Appendix A is the survey questionnaire and answer form as it was distributed to the field. Appendix B includes direct quotations from firefighters responding to the survey. Appendix C discusses statistical confidence limits for the survey analysis. Detached Appendix D is an extensive review of the literature of wildland firefighting and other fields relevant to this study. Detached Appendix E is a bibliography of relevant literature. Because of their size, Appendices D and E are not included with this document. Another detached appendix, F, contains the frequency tables for each question on the questionnaire; however, the body of this report contains many of the significant statistics. Cross-tabulations of each question by each of the 12 demographic and personal data items collected in the survey (over 2000 tables) were also generated and utilized in the writing of this document and are not included.

CHAPTER 2. METHODOLOGY

This section describes the methodology used to collect the information in Phase I. It also discusses the profiles of the people interviewed and the respondents to the survey.

Literature Review

The project started with a short, intense review and summary of the literature on wildland firefighting safety conducted by Dr. Jason Greenlee.[4] The highlights of the literature review are summarized in Appendix D, along with a bibliography in Appendix E. The literature review focused on wildland firefighter safety, but also considered key works from other literature fields.

Several members of the project team themselves have written on wildland firefighter safety or related topics, and these insights are part of the information presented here. For example, Dr. Charles Perrow, professor of sociology at Yale, wrote a book, *Normal Accidents*, which discusses some of the aspects of organizational culture that affect safety in nuclear power plants, the merchant marine, commercial aircraft, and other high risk activities. These insights fed into the interview and questionnaire design. Gary Klein, Ph.D. in psychology, helped develop the concept of naturalistic decision making, and applied these ideas to wildland firefighting and to on-the-job training of the fire service. Michael Thoele authored *Fire Line: Summer Battles of the West,* which describes the realities of wildland firefighting. TriData Corporation developed the latest reports on *Firefighter Fatalities in the United States*, published by the U.S. Fire Administration.

References are made throughout the text to practices and problems from various fields. These references came from the literature review, from discussions with fire experts in the five agencies who had researched or had personal knowledge of safety practices in other fields, and from the knowledge of the project team itself. Specific references are given only where further clarification might be required.

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[4] Greenlee, a wildland firefighting instructor and Ph.D. in Fire Ecology, is publisher of *Wildfire* Magazine, and used the library of the International Association of Wildland Fire in this review.

Face-to-Face Interviews

A major part of the Phase I effort went into conducting one-on-one interviews and focus groups, mostly with federal firefighters but including some state personnel as well.

A two-person interviewer team was sent to each of the ten geographic coordinating centers that span the nation. In two geographic areas (Alaska and the Great Basin), the interview sites were split between two locations to facilitate travel by those interviewed. Table 2-1 shows the number of people interviewed, and the number participating in the focus groups, which are discussed later in this chapter. A total of 164 "firefighters" were interviewed, and another 130 heard from in focus groups, for a total close to 300.[5]

At each site, the geographic coordinating center director or designee identified the people to be interviewed from the personnel in the several federal wildland firefighting agencies and state firefighting agencies in that geographic area, roughly in proportion to the size of the work force from each agency operating in that area. General guidance was provided to them on the approximate numbers desired by agency and position. The interviewees were to be representative of the work force but were not selected at random. (There were too few interview slots in each geographic area to risk random selection.) People were brought from within the geographic area to the center for the one to one-and-one-half hour interviews. The two-person interview team spent two or three days doing interviews and conducting focus groups in each geographic area.

The people interviewed were for the most part experienced firefighters. The profile of interviewees by level is shown in Table 2-2. Because the project schedule required the interviews to be conducted during the winter, few seasonal workers were included, but many of those interviewed had worked their way up from seasonal jobs. Many had worked for more than one agency and in multiple firefighting and fire management positions. Most knew ahead of time that they would be interviewed, and came prepared. Some brought notes.

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[5] The term "firefighters" is used loosely here to mean those associated with wildland firefighting, from basic firefighter through agency administrator, except where specific reference is made to job positions.

**Table 2-1. One-on-One Interview
and Focus Group Participants
by Geographic Area**

Geographic Area	Interview Participants	Focus Group Participants
Northwest	23	6
Northern Rockies	18	13
Eastern Area	14	15
North Zone (CA)	23	16
South Zone (CA)	11	12
West Basin	6	9
East Basin	6	10
Rocky Mountains	17	13
Southwest	14	5
Southern Area	18	13
Alaska	14	18
Totals:	164	130

**Table 2-2. One-on-One Interview and Focus Group
Participants by "Level"**

Level	Interview Participants	Focus Group Participants	Total Participants by Level
Agency Administrators	3	22	5
Fire Management Officers/Assistant FMOs	29	27	56
Incident Management Team Members (Overhead)	30	32	62
Crew Supervisor to Superintendent	44	33	77
Firefighter to Squadboss	55	34	89

Other	3	2	5
Totals:	164	130	294

There was an attempt to interview a few state fire management officers and a few agency administrators as part of the overall interview sample. Also, each geographic area was asked to include women and minorities in the people invited. (Women, for example, comprised 13 percent of the interviews and focus groups, about the same proportion as in the national survey.)

When people who were supposed to be interviewed could not make it to the interview site because of weather, illness, or other reasons, last minute substitutes were sought from the local area or the coordinating center office.

The interviews were conducted one-on-one, in private, to encourage candor. The people interviewed were promised anonymity unless they gave their express permission to be quoted by name (which many did).

The interview schedule was interrupted by two federal furloughs, resulting in much rescheduling and a lengthening of Phase I. Nevertheless, the project team felt that these were an outstanding set of interviews that yielded a huge amount of information – an abundance of riches. The firefighters interviewed gave heartfelt comments. About 95 percent of the interviews were rated as good or excellent in quality and candor by the interviewers.

Interview Protocols – Each interviewee was asked to fill out a personal data sheet ahead of time, to allow more of the interview time to be used to discuss safety during the precious one- to one-and-a-half hours of the interview. The interviews were conducted with a flexible structure. An interview protocol was developed as a rough guide to make sure that general areas of interest were covered. However, there were no set questions about specific topics, and the interviewers did not use a questionnaire or checklist form. The idea was to probe deeply for underlying factors, and for safety problems that tend not to get reported, to listen and not to cubbyhole.

The areas of interest on the survey protocol were as follows:

- Any personal anecdote of a near miss or injury experienced in wildland firefighting, including, as best was known, what caused it and how such injuries could be avoided.

- Major firefighting safety concerns.

- Any other firefighting safety concerns.

- Highest priority concerns among those mentioned above.

- Suggestions for improving safety.

- Strengths of the current system.

The interviewees were encouraged to be specific in identifying problems and solutions. They were probed as to how the suggestions or problems they raised affected safety. For example, if they said the exempt positions not receiving overtime was a problem[6], they were asked to explain how that affected safety (e.g., it affects the willingness of exempt employees to take incident management positions, which affects experience, which in turn affects judgment under stress at fires, which in turn affects tactics, information flow, etc.).

The purpose of these interviews was to gain insights on the organizational culture, leadership, human factors, and accountability issues affecting safety, rather than to gather statistics on a fixed set of questions. The interviewers were all experienced and allowed much leeway to make the interviewees comfortable enough to be candid.

Interviewers – Seven interviewers were used to conduct the one-on-one interviews. They included a former hotshot firefighter (Roy Hodges); a psychologist who had undertaken research on wildland firefighting (Marvin Thordsen); a psychologist with a career spent at the National Bureau of Standards Center for Fire Research researching people's behavior in fires (Dr. Bud Levin); a professor of sociology/rural volunteer firefighter, and co-author of a book on the future of volunteer firefighters (Dr. Kenneth Perkins); a former newspaper reporter and college instructor in interview techniques, who also had written a book on wildland firefighting in the West (Mike Thoele); a highly experienced wildland firefighter who worked for a dozen years directing various levels of state fire programs (Mike DeGrosky); and a retired Human Resources specialist for the Forest Service (Nancy Moore-Hope).

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[6] Under the Fair Labor Standards Act overtime is earned at the rate of no more than time and one-half of a GS-10 Step 1. In other words, a GS-12 would earn only the GS-10-Step 1 pay rate while on overtime.

One of the interviewers was sent to five geographic areas, and the others to at least two, so that there could be comparisons between areas, holding the interviewers and interview approach constant. This also allowed the interviewers to comment on differences between areas. The results were surprisingly consistent across interviewers and areas.

Documentation – The interviewers wrote up notes on the key issues raised by each interviewee (and the results of their focus groups). The interviewers also summarized the leading issues raised in the set of interviews they conducted in each area (and the results of their focus groups). The interview write-ups were read and analyzed only by the project manager and assistant project manager to maintain confidentiality. Results were tallied.[7]

Focus Groups

About 44 percent of the firefighters met with at the coordinating centers were seen through "focus groups" ranging in size from 5-13 people, selected much as were the people for the one-on-one interviews. At least one focus group was held in each area. Table 2-1 shows the distribution of participants.

Two interviewers were assigned to discuss priorities in firefighting safety with each focus group for about three hours. The purpose was to see to whether different insights would result from people stimulating each other's thinking on safety, and whether a group would be able to reach consensus on what safety issues were most important. The same general protocol guide was used as in the interviews. One interviewer led each group. Notes were written up on the issues raised in each focus group.

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[7] The interview summaries are ***not*** available because of confidentiality issues (many comments could lead to an individual). Many ideas and quotes from the interviews are used throughout this report.

At the outset of the project it was not clear whether people would be more candid in private interviews or in focus groups. As it turned out, both proved to be excellent approaches. The information derived was quite similar from both approaches, with the focus groups providing more critiques of proposed solutions from other members of the group.

Results of the Interviews and Focus Groups – A great surprise was the wide range of issues raised in the interviews and focus groups. There was strong consensus on many issues. There were also a large number of issues raised by only one or two people, though may of these issues also seemed important. There were very few instances of interviewees or focus groups taking opposite positions on a given issue. Different people assigned different priorities to the same issues, but it was rare that some would list as strengths what others listed as weaknesses, especially below the "general headings" level. For example, some would say that communications capability was a strength and others that it was a problem area, but many would agree that there were too few radios for crews at times, and too few channels in some situations; the question is whether a low number of occurrences of a situation that is critical when it occurs should be described as a problem (because of criticality) or a strength (because of its rarity).

It became clear that nearly everyone encountered in this project moves quickly from generalities on the importance of safety into greater and greater detail about the issues they consider most important. Of course, the greater the level of detail, the broader the number of issues raised.

National Random Survey of Firefighters

Following the interviews and focus groups, a survey questionnaire was developed with three primary objectives; first, to validate the insights collected during the interview process with a broader, random sample; second, to provide a larger audience the opportunity to submit comments and suggestions on issues impacting safety; and third, to generate a ranking of the issues.

Questionnaire Development – Based on the issues and solutions raised in the one-on-one interviews and the focus groups, a survey questionnaire was constructed and

sent to a random sample of 1,400 people involved in federal wildland firefighting, from basic firefighters to agency administrators. About 90 percent of the questionnaire was based on the issues and solutions raised in the interviews. Some additional areas were added by the project team and reviewers.   The survey questionnaire addressed general safety problem areas, specific problem areas, strength of the current system, and potential improvements to the system to improve safety.

The largest problem resulting from the one-on-one interviews and focus groups was the deluge of issues presented. There were so many issues of importance, and so many nuances on the various problems, that it proved virtually impossible to develop a short survey that didn't leave out large numbers of issues.

It also must be realized that there are some kinds of safety problems that are not likely to be raised by firefighters in interviews. Some issues need to be identified from field observations. Some need to be identified by applying paradigms of psychology or sociology or other disciplines to an examination of wildland firefighting in a way that might not be thought of by firefighters, or is not natural for firefighters to bring up; crew dynamics and critical decision-making under stress, for example. Charles Perrow, in the book *Normal Accidents*, discusses situations from nuclear power plants to shipboard crew operations to chemical industry plants where the complexity of a whole system – technology plus operators plus environment – cause virtually inevitable ("normal") accidents, despite the fact that each individual is conscientiously doing his or her job in making decisions under stress with the best information available and the training they were given. The individual is often not aware of the underlying factors contributing to the crisis. Even experts (e.g., in nuclear power plant safety) often disagree on the causes of technology-related disasters.

The absence of an issue being raised frequently or at all in the interviews does not necessarily mean it is unimportant or doesn't exist – it just may not be the kind of issue that those within the culture might raise.

For some such issues, such as crew cohesiveness, and decision-making under stress, questions were inserted in the questionnaire on issues that had been raised by experts, but not directly or clearly raised during the interviews. It was necessary to insert only a few of these as those interviewed covered the range of issues quite well.

The questionnaire was tested on several firefighters, and went through several reviews by the study steering committee, the FFAST committee, and the five agency fire directors. A major concern raised by virtually every reviewer was that it was too long, but most reviewers suggested additional questions and few deletions. A major objective of this study was to acquire a detailed understanding of the issues and not just identify general areas of dissatisfaction. Based especially on the review comments of experienced firefighters, a calculated risk was taken in using the long, detailed questionnaire.

The resulting survey instrument probably was one of the longest ever used in the fire world. It was 25 pages long, with 387 questions to be answered (see Appendix A). While there were many who were concerned about whether wildland firefighters would respond to this much paperwork, the study team received 730 responses, almost all complete and filled out carefully, out of approximately 1,400 forms that were randomly distributed.

The answer sheets, separate from the survey questionnaire, consisted of fill-in-the-bubble, multiple choice answers that were scannable electronically. The answer sheets were sent directly to TriData in franked envelopes to facilitate their return and to preserve confidentiality. The answer sheets had no serial number to further assure those surveyed that they could not be identified.

The survey forms had to be completed during June-August 1996, one of the most intense fire seasons experienced in the United States in a decade. The better than 50 percent return is considered excellent, and the sample received was large enough for most of the purposes of this study.

Many of the responding firefighters not only filled out the forms, but also provided a great deal of handwritten amplification and detailed suggestions. Some included several pages of handwritten or typed comments with their answer sheets (see Appendix B for a sample of their quotes).

Survey Distribution Methodology – The survey questionnaire was intended for distribution to a random sample of the "federal wildland firefighting community." It was important that the survey be well distributed across geographic areas, agencies, and firefighter job levels. A secondary objective was a representative distribution by ethnic groups, gender, years of experience, and type of firefighting experience.

Working with the government COR and the FFAST, the team defined a survey distribution table as guidance to the dissemination of an average of 140 forms in each of 10 geographic areas. The proportions of people to be sent the questionnaire in each agency and geographic area was roughly proportional to each agency's personnel involved in fire, the size of the firefighting contingent within each area, and the people in different job levels. However, minimum numbers were set in each category to improve the odds of getting enough respondents to analyze opinions by certain subgroups (e.g., Agency Administrators, or Fish and Wildlife Service personnel).

No nationwide personnel list existed from which a random sample could be drawn based on the entire set of survey objectives. There were, however, Red Card qualification lists within each of the five federal agencies. The lists include the names, unit affiliation, unit address, and level of qualifications. They do not contain information regarding gender, age, ethnic affiliation or years of experience. Unfortunately the agencies do not share a common format for their Red Card databases. A member of the project team (Greenlee) collected copies of all of the lists that could be located, and they were combined into a single database.

The database included the following information:
- Name
- Agency
- Street Address
- City and State
- Area Red Card Qualification
- Phone number (when available)

Utilizing the Red Card information contained in the database, each individual was placed into one of two categories: firefighter or Incident Management Team member (overhead). The final version of the database contains about 16,500 federal red carded firefighters. The database was then sent to the ten geographic centers for their use in selecting survey recipients.

The COR distributed guidelines to each geographic coordinating center for the survey distribution. The instructions included the proportions and number of survey forms to be distributed in each geographic area by category of respondents (agency and

rank). Staff at NIFC coordinated the distribution of the survey questionnaires to the representatives in each area, who then coordinated the distribution to firefighters within their own area.

Each coordination center tackled the distribution challenge differently. Some centers chose to select the sample of firefighters from their own qualification lists, and then double check that those selected were in the 16,500 member database. A second set of centers chose to select directly from the 16,500 member database, and then confirm that those selected were also on their local qualification lists. Others found the 16,500 member list to be inadequate for their geographic area and based their selection solely on their own qualifications lists.

The coordinators and staff in each geographic area went to great lengths to assure that the surveys reached their intended recipients and that those individuals returned their surveys promptly. The entire research team is indebted to the coordination center staff for their effort in distributing the survey and for their help in impressing upon the recipients the importance of returning the surveys.

No one but the coordinators in each area knew who received the surveys by name; therefore, the second appeal for recipients of the questionnaire to respond was made to the entire federal firefighting community.

The answer sheets returned indicate that the survey was successfully distributed across the population as hoped for in the distribution design.

Profile of Respondents – There were a total of 12 pieces of personal information requested on the survey questionnaire to allow the views of different subgroups and subcultures to be compared. The distribution of respondents by geographic area and federal agency are shown in Table 2-3, along with the targeted percentages. Table 2-4 shows the percentages of respondents by their most recent or usual position, and the targeted percentage. The profile of respondents by years of experience and gender is shown in Table 2-5. These and other attributes were used to develop cross-tabulations of each question by each personal characteristic, so that feelings felt strongly by some particular sub-group on a particular subject could be identified. To focus on the high points and keep the report length manageable, we did analysis by exception: for each

survey question, only subgroups that stood out from the norm are discussed, though the cross-tabs on every question by every subgroup were reviewed.

       Geographic Area – For sampling purposes, we used 10 areas. In one area, the Great Basin, the area subdivided the sample into the East Basin and West Basin. As shown in Table 2-3, there was a reasonably good sample size from every geographic area; the numbers of respondents ranged from 58 to 85 per area. There were 10 respondents who either listed two geographic areas or no geographic area. This is considered a reasonably representative national sample by area [8] (Q189).

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[8] All "Q" numbers refer to the question numbers on the national survey. (See Appendix A for the questionnaire).

Table 2-3
National Firefighter Safety Survey Respondents, by Geographic Area and Agency

Geographic Area	FS	BIA	BLM	F&WS	NPS	No Answer	Total/Area	Target Distribution Percent	Actual Distribution Percent
Northwest	38	6	18	4	7	2	75	9.4%	10.3%
Northern Rockies	30	6	8	11	3		58	9.7	8.1
Eastern Area	61	3	1	10	10		85	7.4	11.9
North Zone (CA)	45	1	8	1	5	2	62	9.4	8.6
South Zone (CA)	37		12	1	9		59	9.3	8.2
West Basin	5	1	8				14	*Combined*	*Combined*
East Basin	26	1	13	3	5		48	12.3	8.6
Rocky Mountains	40	5	23	6	9	1	84	9.7	11.7
Southwest	37	11	16	6	6	1	77	10.4	10.7
Southern Area	46		2	16	11	1	76	8.9	10.6
Alaska	10	1	47	5	5		68	7.0	9.5
None/multiple						10	10		1.4
Totals:	375	35	156	63	70	17	716		
Target Distribution Percent	*52*	*7*	*22*	*9*	*10*				
Actual Distribution Percent	*52.3*	*4.8*	*21.7*	*8.7*	*9.7*	*2.3*			

**Table 2-4. National Firefighter Safety Survey Respondents -
Percent Target and Actual Survey Response by Level**

Level	Number of Respondents	Target Percentage	Percent of Respondents	Adjusted Percent
Firefighter	147			
Crew Supervisor/ Resource Boss	196	*Combined* 70%	*Combined* 48.3%	*Combined* 51.3%
Incident Management Team	92	10	12.9	13.7
Fire Management Officer/ AFMO	168	15	23.6	25.1
Agency Administrator	32	5	4.5	4.8
Other	34		4.8	5.1
Multiple Positions	42		5.9	----------
TOTALS:	711			

Number of "no" response" cases: 5
Adjusted percent shows the breakdown of the 669 respondents who did not report more than one position.

Agency – As shown in Table 2-3, the distribution by agency was reasonably close to what had been desired, except perhaps for the BIA, where returns were a slightly lower percentage than had been allocated (5 percent received vs. 7 percent planned). The sample sizes were allocated initially in rough proportion to the agency's staffing of firefighters, with some oversampling of the smaller agencies.

The overall responses should be reasonably representative of all agencies and geographic areas. Where there were significant differences in the answers to questions between areas or agencies (or any other subgroup) they are noted in the analysis (Q190).

Experience Level – About a third of the respondents consisted of people with more than 20 years experience, as shown in Table 2-5. At the other extreme, 8 percent of the respondents had been firefighters for less than 5 years (Q191).

Frequency of Injury and Near Misses – Almost one-third of the sample (31 percent) had been injured during their career, as shown in Table 2-6. Slightly over 10 percent had been injured two or more times; less than 1 percent reported being injured 6 or more times. At the other extreme, over two-thirds (69 percent) said they were never injured. In the one-on-one interviews with firefighters, about 10 percent reported injuries. To qualify as an injury for this report, it had to have been associated with a fire and require medical attention or loss of at least one day of work. Two-thirds of the interview and focus group participants (64 percent) said they had near misses where they could have been injured seriously from falling snags or other major threats (Q192).

Most Recent or Usual Fire Position – The distribution of respondents by their most recent or usual fire position is shown in Table 2-4. About half (48 percent) were firefighters or crew supervisors, 24 percent Fire Management Officers, 13 percent Incident Management Team (IMT) members, and 5 percent Agency Administrators. The firefighter sample size was somewhat smaller than targeted but still ample. Proportionately, more managers returned their forms than firefighters. This over-sampled the smaller categories, which was useful (Q193).

Type of Firefighter –Among those who described their recent or usual level at a fire as being a firefighter (as opposed to a crew supervisor or above), there were 26 smokejumpers, 25 hotshots, and 29 helitack. Current members of these elite units together comprised over 11 percent of the sample. In addition, there were 89 respondents from engines, 81 from Type II handcrews, and only 5 who listed their current position as emergency firefighter (EFF). Since the total was greater than the number of firefighters reported in Q193, it was apparent that many respondents above basic firefighter rank wanted to indicate their specialty (Q194).

Gender – There were slightly over 100 female firefighters who returned forms, of whom 97 made it into the baseline survey of 716 responses before the cut-off date. They comprised 14 percent of the sample analyzed, and are a large enough number to provide reasonably good confidence levels on their responses (Q195).

Age – The largest number of respondents came from the 40-49 year old age group, in which much of the middle and upper management fell. There were very few age 60 or over (only 5). There was a good size sample of 117 in the youngest ages of 20-29. Table 2-6 shows the distribution of the sample by age and number of injuries (Q196).

Ethnic Affiliation – The minority respondents on the survey were distributed as follows:

Native American	52
Hispanic	34
Asian	3
African American	4
Total	93

These numbers resulted from random sampling; there was no attempt to control for them. The number of Native American respondents was considerably greater than the number of people responding from the BIA; some people are not aware of the many Native American firefighters and crews who are affiliated with other agencies. The remainder of the sample identified themselves as "others," most of whom are non-Hispanic White (Q197).

Table 2-5
National Firefighter Safety Survey Respondents -
Years of Experience by Gender

Total Years of Experience	Male	Female	Total /Experience	Distribution
Less than 5	42	17	59	8.4%
5-10	109	17	126	17.8%
10-15	98	38	136	19.3
16-20	125	15	140	19.8
Over 20	235	10	245	34.7
TOTAL	609	97	706	
Distribution	86.3%	13.7%		

Number of Missing Observations: 10

Table 2-6. National Firefighter Safety Survey Respondents -
by Age and Number of Injuries
(With Row Percentages)

Age	Never	Once	2-5 Times	6 or More Times	Row Total
20-29	83 70.9%	22 18.8%	10 8.5%	2 1.7%	117 16.5%
30-39	134 70.5	39 20.5	17 8.9		190 26.9
40-49	210 65.4	72 22.4	37 11.5	2 .6%	321 45.4
50-59	55 74.3	14 18.9	4 5.4	1 1.4%	74 10.5
60 or Over	5 100				5 .7
TOTAL	487 68.9%	147 20.8%	68 9.6%	5 .7%	707 100%

Because there were so few Asians and African Americans in the sample, they are not
discussed separately in the analysis. In some cases the minorities are analyzed together.
Where response from the Hispanics and Native Americans differed significantly, they are
addressed separately.

Seasonal Employees – Over half the sample (55 percent) were seasonal employees.
Almost all of the seasonal employees were seasonal temporary (GS); 1.7 percent of the
sample were seasonal permanents (WAE), and 0.6 percent were seasonal temporary
(EFF). The rest (45 percent) were permanent employees (Q198).

Primary Home Agency Job – Sixty-one percent of the survey respondents had a primary
job other than fire (Q199).

Past Firefighting Jobs – In Q200, respondents were asked whether they had served in
various types of positions in the past. They were allowed to check all that applied. This
included whether they had served as state and local firefighters. The results are shown in
Table 2-7. The total is greater than the number of respondents (716). because many had
experience in more than one of the positions listed in the question.

Table 2-7 – Past Positions of Survey Respondents

Position	Number	Percent
Smokejumper	49	7%
Helitack	261	37
Hotshot	240	34
Engine Crew	506	71
Type II Firefighter	520	73
EFF	100	14
Seasonal Firefighter	391	55
State Firefighter	66	9
Local Firefighter	137	19

Many of those surveyed had worn several hats, and could speak from a variety of
experience in different positions (Q200).

The Relief Valve Response: "Can't Say" – For quality control, it seemed important to be able to distinguish when respondents simply didn't answer a question and when they felt they did not have enough information to give an informed judgment.

A choice of "can't say" was given to the respondents on every question where it made sense. The existence of the "can't say" alternative lent more power to the interpretation of questions on which everyone had an opinion, and the "can't says" fell to almost zero. On questions dealing with strategy or political decisions the average line firefighters, who comprised the largest respondent group, probably didn't have the information to answer, and so they responded with high numbers of "can't say." So did agency administrators on questions of firefighting tactics. The survey respondents seemed to make good use of the can't say option.

Where the number of people who gave a response of "can't say" was relatively similar across the questions in a particular topic block (a group of questions with the same topic and the same rating scale), the scores presented are the raw percentages, unadjusted for the "can't says." Where there was a sharp difference in the percentage of "can't says" from question to question within a block (e.g., by more than 10-15 percent), then an adjustment was made where it was thought to be important to use the responses of only those who responded. Otherwise the question-to-question comparisons becomes distorted when, say, one-third of the population didn't answer one question and only 10 percent did not answer on the next. Also, we occasionally note in the discussion questions where the "can't says" were high on a whole group of questions, because it reduced the magnitude of the positive or negative response when just the raw score was used. For example, if 30 percent disagreed and 50 percent said "can't say" on an issue, the 30 percent figure quoted alone might seem low, whereas in fact 60 percent <u>of those who felt they could answer</u> had disagreed. The data presented is the raw, unadjusted percentage unless otherwise flagged.

Data Analysis and Validity Consideration

Below are a number of validity considerations, and comments on the data
analysis. A discussion of statistical validity (confidence limits) may be
found in Appendix C.

Size of Sample – A total of 730 survey responses were received of which 716 were in
time to be scanned. A few additional forms still trickled in after the final cut-off time in
mid-August 1996. We looked at their comments but not the data. An informal and
somewhat arbitrary goal of the project was to solicit input from a sample of one thousand
firefighters across the nation, with reasonable proportions by agency, job level and
geographic area. This was accomplished between the one-on-one interviews and focus
groups (about 300) and the statistical survey (about 700).

It had been hoped to obtain approximately 100 responses from each of 10 geographical
areas, but it averaged 70 per area. This was a 52 percent (730/1400) return on a 25-page
long, 400-question survey.[9] The response rate probably could have been increased with a
much shorter survey form, but there was a consensus from the agency reviewers of the
survey instrument that it could not be substantially reduced without eliminating the
suggestions part of the survey, or the portion on strengths, or only including more general
issues and not the details. Many of the nuances and distinctions that were felt to be
needed for policy-making in the future were in the details.

As a side note, the differing statistical confidence limits between one thousand responses
(the target) and 730 (what was achieved) are $\pm$ 2.8 percent vs. $\pm$ 3.4 percent for a typical
question where 30 percent of the respondents agreed with the statement. The difference
in confidence limits for the responses for a subgroup of 100 vs. a subgroup of 70 is $\pm$ 9.8
percent vs. $\pm$ 11.7 percent respectively. The survey forms received were quite well
distributed across geographic areas and agencies, as discussed above.

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[9] The project team is not sure of the number of forms that actually reached the intended audience. Only
1,400 were sent to the regional centers, but there was no positive count on the number they sent out, or the
number with incorrect names or addresses, or how many forms reached firefighters. Every region did an
excellent job overall, based on the number, quality and distribution of the respondents.

Subgroup Comparisons − There is a vast amount of interesting comparisons that can be made by various subgroups. A separate report could be written on the responses of agency administrators, or Native Americans, or females, for example. We have opted here to report on subgroups only where their opinions were significantly different from the main group, or where differences were expected but did not occur.

There are many analytical approaches that could be used on the subgroup data, such as factor analysis and cluster analysis. The presentation here is relatively straightforward because there are a large number of points to cover, and many stand-out issues without having to go to statistical subtleties. There also was a desire to keep the size of this report manageable.

Solicitation of Input from Population Subgroups − During the one-on-one interviews, the Coordinating Centers made a special effort to include female firefighters and fire managers. They comprised about 20 percent of those interviewed and participating in the focus groups. On the survey, females comprised 14 percent of the sample (almost 100).

There was also a desire to get some direct input from state firefighters, and not just comments about state firefighters from federal firefighters. The state firefighters had their own perceptions of the hazards of fighting wildland fires, and perceptions of working with the federal agencies. Because of the previously mentioned OMB restrictions, most of the state firefighters opinions were obtained from their participation in focus groups rather than formally being surveyed. Inputs were obtained from over 30 state firefighters, but were not separately analyzed.

Special efforts were made to analyze opinions from Native American and Hispanic American firefighters, the two largest ethnic minorities among wildland firefighters. There were 52 Native Americans and 32 Hispanics who responded on the survey.[10]

Another special effort was to obtain opinions of agency administrators. They were sent the same questionnaire as the others, though many questions were geared toward firefighters. Many agency administrators had a fire background. We received responses from 32 agency administrators on the survey and 5 in the course of the one-on-one

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[10] Note that many Native Americans work for agencies other than BIA; 52 percent of the survey respondents worked for agencies other than BIA.

interviews. Where it seemed appropriate and statistically meaningful, their comments are
addressed in the analysis separately.

Interpreting the Survey Statistics – In interpreting the statistical results of the random
survey of wildland firefighters, several things need to be kept in mind.

First, this was an unusual situation in which a detailed survey was developed after a
large-scale series of one-on-one interviews and focus groups were held on the issues of
interest. The interviews and focus groups served quite well to identify major issues. The
consistency of the messages heard across geographic areas, agencies, and levels of the
organization lend considerable credibility to the findings, at least as representing
perceptions of the wildland firefighting community if not also reality. A widespread
perception usually, but not always, will be based on an underlying reality. But there was
a time when a statistically significant sample of scientists thought that the world was flat;
that is why outside opinions and various systematic controls are applied to the data
collection.

The prime purposes of the survey were to: a) get confirmation on the important issues,
with more reliable statistics, b) determine whether there were significant variations across
geographic areas, job positions, ethnic groups, gender, experience, and other personal
factors for which the samples in the one-on-one interviews were slightly too small to
generalize from.

The survey instrument also gave a large number of people the opportunity to write in
additional issues they felt were not covered by the survey, which opened the possibility of
hearing something new for the first time. They also were able to describe some of the
nuances and variations on the issues that were not possible to capture without lengthening
the survey even more. (The first cut at the survey form was 35 pages long.)

The body of the report is organized by major topic areas (organizational culture,
leadership, human factors) and important subheadings under those. The survey questions
did not appear sequentially under these headings (i.e., all organizational culture questions
first, then all leadership questions, etc.), and thus the order of discussing questions is not
numerically sequential.

Overall, the responses collected from firefighters through the interviews, focus groups, and written surveys can only be described as extremely candid, heartfelt and of great interest and use. We were astounded at the openness, candor, thoughtfulness and quality of the information received. There was no small amount of cynicism among some of the people interviewed and surveyed because they were not sure the results would be used, or ever see the light of day. But most were convinced by word of mouth and the cover letters from the fire directors and the survey form itself that it was worth a shot, and many gave it the best they had.

Bias – An effort was made to try to word most of the questions neutrally. But in a number of questions, they were frankly presented as opinions heard from other firefighters for which we wanted the respondent's opinion as to whether it was an issue in their experience, whether it was of major or minor importance, or whether it was of high or low frequency. We also switched some questions to negative wording so that the more common answer would be a disagreement, to encourage alertness of the respondent.

One would expect that the population of firefighters surveyed would tend to agree with most of the issues raised, because we were basically soliciting opinions from a sample of 730 that we had previously derived from a sample of 300. There shouldn't be too much variation in the findings between those two groups, based purely on statistical expectations.

While the absolute percentages of firefighters that responded in agreement or disagreement on questions is of interest, more weight should be given to the relative intensity of agreement across questions. When the mode shifts from "agree" to "strongly agree" or when heavy agreement switches to about a 50/50 opinion, those are considered the more strongly felt or frequently recurring issues.

Survey Form Completeness – Rather incredibly, considering the length of the survey, every question on safety problems (Q1-Q238) was responded to by 98 percent or more of the respondents, and most by 99 percent. There were only a handful of forms where respondents gave up finishing the form (some had to respond to fires), far, far fewer than had been anticipated. A few survey forms were returned entirely blank, with a note that the person had not yet gone on any fires though they had received Red Card certification.

With as long a survey as it was, we were prepared and even expecting to receive significant numbers of answer sheets with no responses given on the last part of the survey or a fall-off in response. It is a tribute to the sincerity and level of caring of the wildland firefighting community that very few questionnaires were returned incomplete. On Question 238, the last detailed question on problems, only 2.2 percent of the respondents left it blank! On S143, the last question on solutions, only 6 percent left it blank.

No Weighting of Responses – We chose not to make any weighting adjustments of the responses received to tune them to the originally planned survey stratification because there was no way of knowing whether we had moved closer to a representative sample or further away, since the original stratification was based in part on informed judgment. Furthermore, there was concern that any weighting of the results without a sound basis would make it more difficult to interpret the facts of the survey.

Also, because the strata (subgroup responses) could be looked at individually, any major deviations of subgroups from the total survey group could be addressed, and were. For example, if females or Native Americans or another subgroup were under-represented, we had enough of a sample of each of those groups to see whether their responses were significantly different from others. If a given subgroup's responses are not different from those of the overall group, then even if there were disproportional numbers of that subgroup in the respondent population, the overall result would be no different than if there were proportional numbers of the group.

The raw information on the survey responses is available by subgroup (geographic area, position, etc.) for others in the future to weight the results if they choose.

Choice of Scales – An attempt was made to make the scale used on each question appropriate to the question, and likely to yield as much useful information as possible. Some of the scales were changed after the initial round of testing.

For some questions, it was thought appropriate to ask whether the problem occurred usually, occasionally, or rarely. For others, specific breakpoint numbers were used, such as once or twice a season, three to five times a season, over five times a season, because

one person's "occasionally" might be another person's "frequently" for a situation that is alarming whenever it occurs.

It also was decided to change the scales after every several questions on the survey to keep the respondents alert and not let them just check long sequences of "agree" or "frequently." That seemed to work quite well.

Questions were grouped not only by subject but also by the nature of the scale considered most useful.

Statistical Significance −As noted earlier, Appendix C presents a discussion on statistical confidence limits. We have not encrusted the body of this report with statistical measures of variance, confidence limits, or significance tests. The results are intended to be looked at broadly as to areas that the firefighting community feels are highly important vs. those that are given lower ratings. Precise rankings are not as important as identifying the groups of issues felt to be more important than others.

Also, ranking on the basis of respondent's "votes" on the survey can be misleading; some problems that do not occur frequently or are not frequently cited have high criticality. A popularity vote or frequency of occurrence does not necessarily mean low importance. Although rank orderings are given, the report also tries to give a sense of the clustering of issues given similar weight by the respondents.

Differences between subgroups (areas, ranks, agencies) are noted in the text where they seemed significantly different from the total population (in both the lay sense and the statistical sense) and where the difference was thought to be meaningful. For example, the difference between 80 percent of Group A and 90 percent of Group B saying a problem was important might not be an important difference for policymaking. Individual areas might wish to look at the analysis for themselves across questions. We have tried to note differences wherever they seemed important.[11]

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[11] The cross-tab of any personal characteristic of respondents vs. the full set of questions takes a ream of paper to print out. It therefore was not practical to provide appendices with a full set of cross-tabs for each personal attribute, question by each question, though a set of cross-tabs exists both in hard copy and on disk.

Consistency – One of the great surprises of the one-on-one interviews and focus groups, which took place all across the country, was the consistency of the issues raised by personnel from various agencies and across all geographic areas. The focus groups yielded similar issues to the interviews, but fewer of them. While there were of course some regional comments and agency-particular comments, the vast majority of issues arose time and again from firefighters in different geographic areas and different agencies. This increased our confidence in the credibility of the information and the prioritization of the issues. The survey results confirmed that the issues identified in the interviews and focus groups were highly representative of those held by the broader federal fire community.

While the particulars of an issue might vary from area to area, the underlying issue often did not. For example, a frequently heard comment in the interviews was that firefighters transported from their home area into another often were not briefed on the local terrain and fuels. The problem might be lack of knowledge of scrub oak in one area and tundra in another, but the underlying issue was the same – people transported without adequate information on the fuels to be faced.

There are few major issues here where significant parts of the wildland fire service disagreed. Of course there were minority opinions on everything, but the major thrusts of the findings seemed to hold across agencies, geographic areas, and ethnic groups.

Inclusiveness – The vast majority of issues here were based on a consensus of many interviewees or survey respondents. However, there were a few exceptions. The fact that an issue was raised by only a few of those interviewed or surveyed does not mean that the issue does not merit discussion. If an issue had potentially significant impact that might be of concern to a large percentage of the firefighting community, it was included even if raised by one or two people. For example, the only cache manager interviewed focused on the problem of cache personnel not testing and fixing equipment before repacking it for transport to the fireline.

Generally, however, issues were not included on the survey if not raised by several people and the issue was also felt to be important by the many reviewers of the draft survey instrument. Also, most of the "unique" observations were subcomponents of larger issues identified by other respondents. For example, an individual raised the issue

of bulldozer operators cutting fireline without having radios. Such an observation fits under the larger issue of radio availability on the fireline.

Respondent Focus and Judgment – A problem with long surveys, especially surveys as long as that attempted here, is that some people may answer strings of questions the same way because of fatigue, boredom, having a generally negative view of the world, or a generally positive view of the world.

Scanning the answers on a large sample of response forms, it was evident that the vast majority of respondents reviewed each question and did not just give the same answer to each. On an individual response form, one would typically see a run of agreements, then a disagreement, then a strong agreement, etc. There did appear to be some firefighters who simply checked off all of the agrees or strongly agrees on some of the lists, especially in the suggestions section, but even then there would be a column of agreements with one or two items flagged differently. Some of these respondents may have been fatigued by the vast number of questions and taken the easy way out by checking the same answers on every question. After deliberation, we decided not to delete those forms which had long runs with no apparent discrimination. They could have had the long runs on the negative side of the question as well as the positive side, and while their discrimination may not have been the same as others, they were "voting" for issues by which column they chose to put their "runs." Also, there were very few cases where there did not seem to be discrimination even among long runs.

When given blank space to write in anything they considered important that was not covered by the survey, about 300 of the 730 sample respondents wrote in comments after responding to almost 400 questions – another indication of the degree to which the respondents focused and cared about their responses.

Strength of Opinion – One must also deal with the fact that some people tend to be more opinionated than others, and tend to "strongly agree" when they are positive about an issue and "strongly disagree" when they feel negative. Others are more conservative and tend to use the more moderate choices of "agree" and "disagree." We did much of the analysis by grouping together both categories of agreement (agree and strongly agree), and compared them to both categories of disagreement (disagree and strongly disagree.

We also paid special attention to significant shifts in the overall group score "strongly agree" or "strongly disagree" responses.

Uniqueness of Viewpoint

Before this study, there were many in-depth investigations of the facts of wildland fires that killed firefighters. There is much literature based on the investigations and other observations about wildland firefighting safety. There have been conferences held within individual federal agencies and an inter-agency committee that focuses on fire and aviation safety (the FFAST team).

There also are hundreds of experienced wildland firefighters in all five agencies who have a vast amount of first-hand experience of what happens at fires, and what leads to unsafe conditions. The project staff also had people on it with first-hand experience of fighting wildland fires.

We could not get an overview of the firefighter safety problem by attending several fires during the time period of the study; they would mainly describe the results of a small number of firefighting situations. The main contribution here was the systematically solicitation of in-depth insights from a large cross-section of firefighters with different levels of experience form across all five agencies. We are tapping into a collective experience and organizational memory in a systematic way. While individuals whom we spoke with may have given interesting opinions, their voices would be no more reasonable to consider individually than that of experienced agency managers who are responsible for safety. It is the combination of in-depth interviewing and a follow-up broad survey from people who understood what was being sought and felt comfortable with the confidentiality to bear their soul that yielded new information.

A Framework for Discussing Organizational Culture, Leadership, Accountability, and Human Factors

The charter of this study was to focus especially on organizational culture, leadership, human factors, and accountability issues. A fourth category was the external/environmental effects on the culture. These concepts guided design of the study and interpretation of results. These are broad concepts and there are a variety of senses in which they can be taken. We therefore asked our project team sociologists to write short introductions on the subjects of organizational culture and leadership in the context of that culture. We asked our team psychologists to write a similar introduction to what is included in human factors (including psychological factors) here. The resultant two brief "papers" were treated as "working papers" during Phase I. Below are some of the topics covered under each heading.

Organizational Culture:

Organization

Technology (equipment)

Communications (information flow)

Symbols (e.g., insignia)

Beliefs

Values

Attitudes

Ritual and rites of passage (e.g., training, which also has technology and human factors aspects)

Clannishness

Leadership

Priority setting

Experience level of leadership

Training of leaders

Strategy and Tactics

Role models

Accountability

Use of resources

Human and Psychological Factors

Crew decision making, especially under stress

Individual decision making, especially under stress

Crew dynamics

Information overload

Rewards and Reinforcement (e.g., pay, promotions, recognition, status)

Denial of risks

Rationalization

Social/Political/Ecological Environment

Political pressures

Forest conditions

Resource availability

Note that some areas such as "attitudes" or "accountability" could be considered part of organizational culture, part of leadership responsibility, and closely related to human factors. Some of the categorization is therefore arguable.

This report tries to describe the safety issues in as clear and straightforward manner as possible, and they are not embellished with academic jargon or forced into a social science model.

CHAPTER 3. STRENGTHS OF THE SYSTEM

Though the bulk of this study focused on identifying problem areas, it is important to keep in mind that the vast majority of federal firefighters feel they are working in a national, interagency wildland firefighting system which is working well overall, and in which they take great pride in being a member.

This chapter summarizes the views of the federal firefighters as to the strengths of the overall system in which they operate. The many problems and suggestions for improvements identified in this study have been made by people who think their system needs many improvements but is generally sound. Those we interacted with were not a group of dissatisfied people wanting a revolution, but a group of people frustrated that their system isn't working better.

Attitudes Toward the Overall System

Before getting into detailed issues, as a backdrop to the discussion of particulars, wildland firefighters were asked on the survey what they thought about the overall system of wildland firefighting, not just about safety. The presumption was that a morose, unhappy work force who think they are in a bad system would be a major problem in trying to create a better atmosphere for safety, and would color their comments on the survey. The results were quite the contrary. <u>The vast majority of firefighters surveyed felt that the overall federal interagency approach to fighting wildland fires in the United States was good (60 percent) or excellent (15</u>

percent).[12] So did those interviewed. Only 2 percent rated the approach as poor, and 21 percent fair (Q1). Agency Administrators tended to rank the overall system as better compared with the overall population's ranking. Twenty eight percent chose excellent, 63 percent chose good for a total of 91 percent.

Conversely, when asked about the extent to which the current system needed to be changed, the majority felt that the system needed to be improved but not discarded.

> *I don't think we need to reinvent any wheels here. Let's*
> *use the tools we have. It's when we don't pay attention to*
> *what's going on around us, we don't think clearly and*
> *act decisively or don't recognize the situation we're in --*
> *that's when we get hurt."*

-Fire behavior specialist

Sixty-three percent of survey respondents support the current approach, but believe it needs to be improved; 28 percent felt significant changes were needed. Only 3 percent thought the entire system needed overhauling.   Also significant was that only 4 percent felt one should leave well enough alone – that the system did not need fixing. Agency administrators even more than other groups felt that the system only needed a tune-up (Q2).

There were few Pollyannas. The vast majority of firefighters heard from in interviews, focus groups, and on the survey felt that important changes were needed to the system to improve firefighting. There were an enormous number of safety issues raised in the interviews and focus groups. We included 240 questions reflecting the

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[12] All percentages quoted without further qualification in this report are from the survey of 716 scanned responses. When percentages are used from other sources (e.g. one-on-one interviews) they are cited. All references such as Q120 or S120 refer to the question number on the survey. "S" was used to denote the survey section on question relating to suggestions or strengths. We renumbered in mid-stream to hold down the high numbering of the questions.

issues they raised, after consolidating them from over 300. Although serious concerns were voiced, the majority felt that the foundations of the system were solid.

Specific Strengths

Table 3-1 shows the long list of strengths and positive features of the national system of wildland firefighting that was derived from the one-on-one interviews and focus groups. Following each "strength" are the percent of the 716 respondents to the survey who either "strongly agreed" or "agreed." The percent who said "can't say" generally ranged from 1-10 percent on all but one question and is not shown. (Question S135, on health and safety codes, had a much higher "can't say" response, an exception.) All percentages here and elsewhere are based on the percent who responded to the question.

	Table 3-1. Strengths of the National System				
		Percent Survey Respondents Who			
Question Number	**Strength**	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
S120	Integrating people from all over the nation into a successful firefighting force.	29	54	8	1
S121	Concern for safety being accepted now as part of the culture by firefighters.	29	62	6	*
S122	Concern of supervisors for the safety of their crews.	34	60	4	*
S123	Physical conditioning of wildland firefighters.	18	48	23	6
S124	Interagency cooperation in firefighting.	24	61	9	1
S125	Specialized training and use of Type I crews (hotshots, smokejumpers, etc.).	30	56	6	*
S126	Forecasting of weather conditions.	22	64	8	1
S127	Knowledge of fuel conditions.	19	59	17	1
S128	Fire reconnaissance.	16	66	10	*
S129	Incident Command System.	30	56	8	1
S130	Speed of mobilization of people and equipment.	16	58	18	2
S131	Logistics system.	11	66	12	1
S132	Air Operations (helitack, transport, tankers).	21	66	4	1
S133	Firefighters' generally positive attitude (committed, energetic, can-do, and love the job).	36	54	7	*
S134	Firefighters' adaptability and cross-training.	21	61	12	1
S135	Use of health and safety codes based on experience.	11	52	18	1
S136	Use of safety officer position.	16	54	17	2
S137	Willingness to back off when necessary.	20	49	23	2
S138	Personal protective equipment.	28	64	5	1
S139	Transportation equipment.	10	70	12	1
S140	Communications equipment.	15	57	20	3
S141	Use of the abbreviated "LCES" list (Lookouts, Communications, Escape routes, Safety zones).	38	46	7	1

Question Number	Strength	Strongly Agree	Agree	Disagree	Strongly Disagree
S142	Lessons learned from the South Canyon fire have led to more people questioning strategy and tactics.	32	48	12	1
S143	Recognition of the need for improvement in fire safety.	33	59	4	*

* Less than 0.5 percent.

The percent who did not answer at all (left the question blank) ran about 3 percent on the strengths questions.

The vast majority of the survey respondents agreed with almost every strength identified in the interviews and focus groups. Over 90 percent of the respondents felt that the strengths included the following:

- A concern for safety is now accepted by firefighters as part of the culture.
- Crew supervisors are concerned for the safety of their crews.
- Firefighters have a positive, can-do attitude (committed, energetic, love the job).
- Personal protective equipment is good.
- There is a recognition of the need for further improvement in fire safety.

Over 80 percent of the respondents felt that the strengths included:

- Successful integration of firefighters from all over the nation into a successful firefighting force.
- Good specialized training and use of Type I crews.
- Forecasting of weather conditions.
- Incident Command System.
- Air Operations (helitack, transport, tankers).
- Firefighters adaptability and cross-training.
- Transportation equipment.
- Use of the abbreviated LCES list (lookouts, communications, escape routes, safety zones).

Several other points to observe:

Whereas only 6 percent of respondents did not think that safety has now been accepted as part of the culture of wildland firefighting; 91 percent did, with 34 percent strongly agreeing. That last 6 percent (or the people that deal with) may be a critical group to reach.

About 80 percent of those surveyed felt that the lessons of the South Canyon fire had indeed led more people to question strategy and tactics and think more about safety. There was a widespread feeling that there is recognition throughout the five agencies for the need to improve safety – considered a major positive.

Most felt that knowledge of fuel conditions and the impact of fuel conditions on fire behavior was a strength, but 17 percent disagreed. The interviews showed that crews too often were not knowledgeable or aware of fuel conditions affecting the fire they fought. South Canyon and some other major fires had this feature.

We checked cynicism levels by asking about attitudes toward this study (S-144). Many interviewed one-on-one felt that the existence of this study was a good sign, and an opportunity to have the firefighter's view of safety heard at high levels, though many were skeptical about whether there would be follow-up, despite the planned Phases 2-4. On the survey, about 75 percent agreed that this study would contribute to safety, with 16 percent saying "can't say" and 9 percent disagreeing (S-144).

Significant numbers of firefighters disagreed with some areas being labeled as strengths. The most disagreement came on physical conditioning (29 percent disagreeing), willingness to back off when necessary (26 percent) and communications equipment (23 percent). Aspects of these areas all were raised as significant problems in other parts of the survey, as will be discussed.

With respect to the face validity of the statistics from the survey, note that levels of disagreement on some of the strengths questions were four times as high as on others, indicating selective thinking. Likewise, levels of strong agreement ranged from 11 percent to as high as 38 percent. However, to reiterate, there were no areas that were identified as strengths in the interviews that were not confirmed as strengths by at least two-thirds of the respondents.

Other Strengths

The general survey respondents were asked to add comments on any other strengths of the system that they wanted to note. After answering 388 questions, which took 2-3 hours, 96 respondents of the 730 took the time to write in comments on strengths. In most cases, the comments were not really new thoughts but amplifications or emphases on the strengths already on the list.

The additional strengths not covered on the list in the survey were as follows:

- The caliber of the individual personnel (this was both an area of criticism and praise on the interviews)

- The system's ability to check itself

- The safety record

- Access to resources

- Task book system (though its application drew many negative comments as well).

The quotes below, all from S145 on the survey, give a flavor of the strengths and positive comments that were written in.

> *"The systems' ability to constantly check itself for good and not so good practices! It's great being part of it!"*

> *"The fact someone finally cares enough to look into a broken system."*

> *"The training when you can get it is usually excellent."*

> *"In the few years I have worked in the government I have noticed a dramatic increase in emphasis on training and safety...."*

> *"The greatest dangers in this business are environmental. This is the factor we have almost no control over. Considering the nature of the business, I believe we have an outstanding safety record."*

> *"There seems to be an increasing awareness towards taking problems seriously and dealing with them properly."*

> *"Firefighters - the grunts have an excellent attitude and work very well together."*

> *"Good and constantly improving inter-agency cooperation."*

> *"I like the fact that someone wants to know the problems."*

"Camaraderie developed through years of firefighting experience exists. It should be encouraged and recognized as a communication and operational tool."

"Agencies willing to self-evaluate and accept change."

"...most crews are very aware of safety first. It is a new ball game in the 80s and 90s with fire."

"The care that some crews show for one another – also respect, appreciation, sense of personal accountability and responsibility."

CHAPTER 4. ORGANIZATIONAL CULTURE

Among the fundamental aspects of an organization's 'culture' are the attitudes, beliefs, values, rituals and ceremonies shared by the members of the culture. These components of culture arise from an organization's structure (hierarchy of positions and labor force characteristics, for example), its type of technology employed to get work done (tools, radios, vehicles, aircraft, backpacks), and its communications and information systems (direction of official memoranda, rules for dispatching, codes and signals, jargon). Training, which can in part be considered a ritual (rituals are intended to produce changes in the person – hopefully greater effectiveness and safety), is a vital part of wildland firefighting organizational culture and will be discussed later under the topic of human factors. An organizational culture functions to provide meaning and an outlook on one's job and affects the kinds of relationships workers have with their equals and with their superiors.

One striking feature of federal wildland firefighting is that it seems to be best described as a composite of several organizational cultures. It was suggested by the interviews that the vast group of seasonal firefighters may be different organizational creatures from the people who work in the year round fire-related jobs. Different crew types seemed to have some differences in outlook. Although all five sister agencies fight wildfire, each agency has its own distinct identity and missions which affect the agencies' own employees and impacts how they relate to members of the other agencies. The interaction with local and state resources suggests some major differences in organizational culture (local volunteer fire departments, for example).

A second feature of the culture of wildland firefighting is that not everybody brings to the job and into the organizational culture the same "home culture." In other words, a firefighter brings with her all of the experiences she has had, her perception of how the world works and how it should work when she joins the culture. Many employees are from unique subgroups in society. These subgroups often can be understood as having their own "sub-culture." Language, ethnicity, and racial groups in the U.S. tend to perceive themselves as having their own cultural heritage (e.g., Mexican-Americans, or the many tribes of Native Americans). These groups supply a considerable

number of wildland firefighters. Even females, given their numerical minority status in wildland firefighting, may be thought of as having sub-cultural characteristics.

One of the major findings here is that there is great consistency in the perception of firefighter safety across all of the subcultures. There are differences among individuals, but the consistency in responding to interviewers and the questionnaire was remarkably similar across sub-cultures, to the point that, for safety issues, it is generally useful to visualize one culture, with a few exceptions on some issues. That makes remediation of the many problems much more tractable.

The Federal wildland firefighter culture interacts with many other cultures − the various state firefighting cultures, local career firefighters, local volunteer firefighters, inmates, national guard, etc. We will consider aspects of these various subcultures where they interact with the main culture.

The following sections discuss various aspects of wildland firefighter culture that affect safety.   Some aspects of organizational culture are discussed in the leadership or human factors chapters when that seemed more appropriate.

Attitudes

One of the most fundamental influences on safety is whether the workers and the management take it seriously. Do they give it high priority and not just lip service? What do the workers think of their supervisor's real attitude toward safety?

Overall Perception of Safety Attitude − The agencies' official position on firefighter safety is that it comes first. About 43 percent of the firefighters surveyed felt that was indeed the case at fires; a large minority (40 percent) felt that safety in reality was viewed equal to getting the job done; and 15 percent said that the policy found in practice was to get the job done even if you have to break the rules (Q3). That is, over half the respondents did not think the policy in the field was to put safety first.

In the in-depth interviews a common feeling was that firefighting is an inherently dangerous job, and that literally putting safety first meant not fighting fires. Others felt

that while fighting fires had inherent risk, the risk could be mitigated if safety practices were followed. Many interviewees felt strongly that firefighters should not be risked for fires of low importance. Over 25 of those interviewed one-on-one spontaneously noted that they were often given a mixed message about the importance of their safety compared to property and resources. Although none of the interviewees believed that their safety was intentionally rated as less important than the property or resources they were asked to defend, they did feel that in the heat of battle the importance of holding a ridge line or defending a subdivision sometimes overrode safety concerns. An FMO articulated the issues raised by several of the interviewees when he said, "A lot of times incident objectives are contrary to what is safe. It is not OK to have a line about safety first on every fire and then present operations plans that clearly violate many reasonable rules of safety."

My Agency's Safety vs. Others – Only 5 percent of respondents felt that their home agency took safety less seriously than others. Almost half (47 percent) felt that their agency took safety more seriously than the others; for the Forest Service respondents it was 57 percent, the highest among the agencies. The interviews revealed little difference in safety concerns or strengths across agencies. Most follow interagency practices (Q5).

About 60 percent of the respondents from the Eastern Area thought that their home agency took safety more seriously than others, the highest score across geographic areas.

Ability to Make Safety Suggestions – One of the most crucial aspects of organizational culture as it relates to safety is whether the workers feel comfortable in pointing out hazards and making suggestions about safety to their supervisors.

Too many firefighters still do not feel comfortable in raising safety issues. Some are concerned that there may be punishment for doing so, especially if a worker refuses an assignment or a crew supervisor won't let his/her crew be used to do something he or she considers too dangerous. Some are concerned about pressures that dissuades complaining and encourages risk taking.

When asked whether supervisors at fires listen carefully when you raise questions or make suggestions about safety, only 40 percent said that their supervisors usually listened carefully; another 40 percent said often (but not usually or always). Another 18 percent said their supervisors only occasionally or rarely listened to them. Two-thirds (65 percent) of the female firefighters who gave opinions on this question said that their supervisors often or usually listen when they raised safety issues, a significantly lower percentage than for males (79 percent). There was little difference by position (rank).

While a few may be chronic whiners or disruptive employees, the percentage of firefighters who believe their supervisors will listen and act on their safety concerns seems too low.   The supervisors of the 18 percent who say it is rare or only occasionally that their supervisors listen are particularly critical to reach (Q7). That is roughly a fifth of all supervisors.

Aircraft operations use the so-called "crew resource management system," in commercial, military, and wildland aircraft. This system works on the principle of not only allowing but requiring personnel associated with aircraft to point out any safety problem they observe. Crews practice how to make comments and how to listen. Within the federal fire agencies, aircraft operations extended the practice from the air crew to the ground crew and then to the passengers and cabin crew. It has reportedly worked extremely well. Several interviewees commented that the ground troops need to adopt a similar philosophy, which changes the culture from "frowning on whiners" to "rewarding observant lifesavers."

Among those who suggested aircraft operations as a model for safety briefings and awareness was a National Park Service Engine Captain interviewed who observed that there is a different level of awareness when dealing with aircraft. Everyone recognizes the small margin of safety with a helicopter. We need to develop that same recognition of the small margin when dealing with fire.

Is Change Possible? – Some cynics feel that the system won't change no matter what happens. That is not the case with the wildland firefighters: 70 percent felt that there <u>have</u> been positive changes made since the South Canyon fire of 1994; 22 percent disagreed, and the rest were not sure. The changes made since South Canyon were listed as a strength (see Chapter 3, S142). Several participants in the interviews knew

firefighters involved in the South Canyon fire or were themselves. A Forest Service fire management specialist with over 10 years experience said, "People who've walked South Canyon since the fire are always saying "I did something like that on another fire, and I don't think I ever realized it." On the other hand, there was a concern expressed among those that have seen positive change that as time passes the memory of South Canyon will fade and the changes it created will as well (Q10).

Self -Assessment of Safety Attitude – Many people interviewed admitted to lapses in their own attention to safety. But they seemed highly motivated to find ways to improve their own safety, and to improve safety of the whole system. A possibility existed that there was self-selection of people who cared more than average about safety among those who agreed to be interviewed or to participate in the focus groups. But the national survey found an astonishing 99.4 percent saying they pay adequate attention to safety. Perhaps a slight show of the need for improvement in individual's attitudes could be divined from the fact that 48 percent only "agreed" rather than "strongly agreed" that they pay adequate attention to safety. Only four people out of 716 responding said they did not pay adequate attention to safety (Q11).

While this statistic is heartening because it reflects an awareness of safety as an issue, it also raises a significant concern. If virtually all firefighters believe they are in fact paying adequate attention to safety how is that consistent with the lapses in safety that were reported in the interviews and elsewhere in the survey? The survey respondents are rating their own level of attention to safety compared to the level of attention they perceive as necessary. Few people intentionally set out to be unsafe on the fireline; however, there may not be a clear understanding of the level of attention required to perform safely in the hostile environment in which firefighters work.

Although both men and women agreed with the statement that they paid adequate attention to safety, two-thirds of the women "strongly agreed" vs. less than half the men. The women perceived themselves as paying more attention.

Firefighters who had been injured one or more times in the line of duty were only slightly more likely to strongly agree that they paid adequate attention to safety than did those who had never been injured (56 percent vs. 49 percent). Those injured also did not have a much different attitude about co-workers paying attention to safety, and actually

rated their supervisors paying attention to safety more than did those people who were not injured. They also felt no more strongly about upper management paying attention to safety than did those not injured. Thus, somewhat surprisingly, having experienced an injury does not seem to have much perceived long-term effect on safety attitudes.

Attitude Toward Co-workers Safety – More surprising than the positive self-attitudes toward safety was the finding that almost everyone felt that their co-workers, too, paid adequate attention to safety. Only 5 percent disagreed. However, only 24 percent strongly agreed that co-workers paid adequate attention to safety vs. 51 percent strongly agreeing that they themselves paid adequate attention. While there was a little bit more of a jaundiced view taken of co-workers, there still was an overwhelming feeling that the fellow members of their community practiced safety almost as much as they did themselves (Q12).

Attitude Toward Supervisors Safety – Most people gave even higher marks to their supervisors practicing safety than their co-workers, though the proportion who disagreed rose slightly to 9 percent (from 5 percent on the co-workers safety). Turning this around, however, if even 9 percent of supervisors (almost one in ten) do not pay adequate attention to safety, that could be dangerous to many. From the results of the above three questions, making further safety improvements in the wildland firefighting community has a good base to work from, given that most federal firefighters believe that their colleagues and supervisors as well as themselves care about safety (Q13).

Attitude of Upper Management – The survey statistics and interview results change slightly with respect to views about "upper management" caring for safety. Most people have no first hand knowledge of "upper management" and form opinions on hearsay, media coverage, written communications, and occasional remarks and speeches. The vast majority, over two-thirds, felt that upper management did pay adequate attention to safety. But about 25 percent of those surveyed disagreed with the statement that their upper management paid adequate attention to safety, vs. 9 percent feeling that way about their supervisors (Q14).

FMOs were harder on upper management then were others on this question, with 39 percent disagreeing that upper management pays adequate attention to safety vs. 25 percent disagreement for the overall population. About 19 percent of agency

administrators disagreed with the statement that upper management paid adequate attention to safety.

Safety Attitudes of Elite Crews –Firefighters in Type I crews, firefighters in Type II crews, and fire managers all expressed admiration for the competence, motivation, and training of Type I crews. There was, however, a concern on the part of many that the "can do" attitude of Type I crews sometimes went too far and got them into trouble.

> *There is a protocol for not jumping but I can count on one hand*
> *the number of fires I have not jumped, and there were a bunch I*
> *probably shouldn't have.*

> -Smokejumper with over 20 years experience

Occasionally the "can do" attitudes conflict with safety in getting the job done. A very high 80 percent of those surveyed agreed that there was at least occasionally a problem with the "can do" attitude leading to safety problems. The comparable percentages for the opinions of the smokejumpers (77 percent), hotshots (65 percent) and helitack (82 percent) were all high; even the elite crews themselves acknowledge the potential danger (Q234).

There is a narrow edge to walk between motivating people to get the job done and creating an overpowering "can do" attitude that does not allow a crew to back down from a dangerous position or encourages them to stick their neck out unnecessarily. Some, however, pointed out that "can do" does not have to mean "can do regardless of safety," but rather "can do with attention to safety." A smokejumper respondent to the survey said "the 'can do' attitude has nothing to do with disregarding safety."

> *I have turned down more jumps as a spotter than I did as a jumper. As a jumper*
> *I always wanted to get down and get on the fire. Being married with young kids*
> *changes your perspective.*

> -Smokejumper with over 20 years experience.

Related was the concern that some Type II crews might try to emulate Type I crews without having comparable training, or that Type II crews without adequate training might be used inappropriately to substitute one-for-one with Type I crews. (This is discussed further under the issue of misuse of crews of various types, later in Chapter 4.)

Composition of the Workforce

Fewer Electing Fire Duty – A profound change in the organizational culture of the five federal agencies is a diminishing number of people who accept fire duty as part of their responsibility. Many new hires have specialized science degrees. Often they are city folk drawn from all over the nation in a competitive hiring process, which includes consideration of college grades, rather than local woods folk drawn from the vicinity of the forest, park, district, area, or refuge, as was said by the more senior interviewees to have once been the case. Just short of half of the respondents (46 percent) felt that the reduced number volunteering for fire duty as militia was a serious problem; only 11 percent said it wasn't true in their experience (Q26).

The feelings about the seriousness of the problem of people electing fire duty increased sharply with the experience level of the respondents (see Figure 4-1). Among those with over 20 years of experience, 65 percent, about two-thirds, thought it was serious, with 36 percent rating it very serious. In contrast, 33 percent of those with 10 to 15 years experience rated the trend to refuse fire duty as serious, and only 10 percent of those with less than 5 years experience rated it serious. The groups with fewer years of experience had large percentages who reported "can't say," so their percentages would be

figure 4-1

greater, but not nearly as great as those with over 20 years experience, even if they were scaled up.

The majority of agency administrators (56 percent) thought that this was not a problem.

Fewer Crew Members from the Same Unit – Not many years ago, many, if not most crews were drawn entirely from single units within the Forest Service, BLM, and other agencies. Members of the crew tended to know each other, and could quickly become a cohesive unit with good internal communications, good understanding of the strengths and weaknesses of its members, and a common experience background.

People interviewed in several areas reported that more use is being made today of crews comprised of people who do not know each other, or are not from the same subculture. Reduction in the workforce and in people willing to take on fire duties have made it necessary more often to assemble crews from several units, whereas before they could be gathered from within one unit. The risks of doing this are less crew cohesiveness, greater potential for misuse of people's skills, poorer communications on safety issues, and less mutual caring (for strangers than for acquaintances).

> *Every agency will, at times, mix AD* [emergency hire] *people with hotshots and regular crews. This can cause a big problem in communication and in the experienced firefighters having to worry about other weaker crew members. This can distract them from safety.*

About a third of respondents thought this "crew of strangers" problem was serious, while half of the respondents thought it was true but not serious. More of the respondents from the Northwest area (47 percent) felt this a problem than in other areas (30 percent). Those with 16 or more years of experience felt this was a more serious problem than those with fewer years experience, presumably in contrasting the situation to previous years (Q27).

Another major change in the composition of the workforce is the experience level. This was so strongly flagged and had so many dimensions that it is addressed separately below.

Experience of Workforce

"The ICS system is good, but MANY individual positions are filled by inexperienced people..."

−Wildland firefighter

A major change in the culture of federal firefighting has been a drop in the proportion of the workforce that engages in firefighting, and a drop in experience levels, which was said to be accelerating as larger numbers of experienced firefighters and fire managers retire before equally experienced cadres replace them.

Part of the drop in experience comes from losing people who are not given the right incentives to continue as firefighters, though they continue as federal employees. Questions 123-132 on the survey explored various aspects of the experience issue. Table 4-1 shows the ranking of these aspects of the problems. The ranking is by the percent who rated the problem of major importance. Heavy majorities rated each of the experience issues as at least somewhat important. Less than 20 percent of the survey population thought any of these issues was of little or no importance. We therefore used the more extreme rating criteria "is of major importance" to rank the issues.

Overall there were very strong feelings expressed that the drop in experience was of major importance. It clearly struck a chord with the vast majority of respondents. The table shows that there was much more concern about the drop in experience levels of management than of firefighters. Most of the discussion of this issue is in the next chapter (5) on leadership issues. Here is discussed only the experience issues relative to firefighters.

Drops in experience affect not only the efficiency of firefighting, but the safety of the firefighters. Experience translates to better judgment in deciding how to fight fires, better judgment in when to pull out from a position, and the ability to manage crews. Experience also is critical in decision making under stress, as will be discussed in Chapter 6. The concern about experience levels was found across the nation in virtually every geographic area, agency, position, and experience level.

Table 4-1. Experience Issues

Survey Question		Percent Rating of Major Importance
Q125	Lack of requirement for fire experience for Fire Management Officer position.	54
Q132	Sector/Division supervisors who have little experience.	49
Q123	People working on Incident Management Teams who have little experience.	41
Q124	Lack of requirement for fire experience for Agency Administrator position.	36
Q127	Firefighters today having less firefighting experience than those in years past.	35
Q128	Firefighters today having less woods knowledge than those in years past.	34
Q129	Bus drivers having little or no experience in driving on mountain roads.	33
Q126	People with rusty command skills used in command positions.	28
Q130	People involved in prescribed burning having little or no firefighting experience.	26
Q131	Crews from areas with significantly different fire characteristics being transported to fires in other geographic areas.	24

Before proceeding, one word of caution on interpreting comments about experience: there is little factual data we know of on how experience levels have truly declined, though the perception that they have is widespread. At the Tower Fire in Oregon in the summer of 1996, a crew supervisor told a member of our team (Roy Hodges) that crews today were not as experienced as those from three or four years ago. It happened that our team member had been in the same general area four years ago, and heard the same comment at a fire then, that the teams weren't as good then as they were three or four years earlier. That perception may be a generational type thing, or it could be a continued trend toward less experience.

Less Woods Experience – A subtle change in the organizational culture over the past few decades has been a shift from firefighters who were outdoors or woods people

and often drawn from local areas to work in the nearby forest or area, to those who have less woods experience today. Many interviewees noted a change in the characteristics of their fellow employees, from generalists to more specialized employees. Many of these new employees lack the experience of living in rural areas and a general understanding of operating in the wilderness. While it is hard to quantify this change in character within the agencies, about a third (34 percent) of those on the national survey thought a decrease in "woods knowledge" among firefighters was a problem of major importance (and a large majority thought it of importance) (Q128).

Survey respondents with more years of experience were more likely to rate the problem of firefighters having less woods knowledge as important than were respondents with lesser experience. Over 40 percent of those with more than 20 years experience thought it was a problem of major importance vs. 10 percent feeling that way with less than 5 years experience (see Figure 4-2).

Less Firefighting Experience – Another alleged change was that the firefighters today have less firefighting experience than they used to. One reason cited for this was the reduced opportunity for practicing at prescribed fires. There also is an overall drop in experience levels mentioned earlier, with young people occupying positions from firefighter to IMT to manager. The rate of retirement of the old war-horses was said to be greater than those coming up behind them.[13] About 35 percent of the survey sample thought that firefighters today having less firefighting experience was a major problem. (Q127).

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[13] Whether there has been a real decline in experience or if it is just one of those things that each generation thinks about the previous might be a candidate for follow-up study. It would require checking personnel records from twenty years ago to look at the actual experience profiles then vs. today.

this is for figure 4-2

Prescribed Burning Experience – Prescribed fire is considered by many to be one of the best training tools available for introducing firefighters to fire behavior and firefighting techniques. The training value of prescribed fire is discussed with the other training issues in Chapter 6. During the interview and focus group process several experienced fire managers raised the issue of complacency and lack of experience at prescribed fires. Examples of prescribed fires being supervised by inexperienced commanders and controlled by inexperienced firefighters were also raised. While the prescribed burns are a good training ground, they too must be taken seriously as a safety concern. When the question was put to the survey respondents inexperienced managers of prescribed burns was rated as rarely, if ever, a problem by 37 percent. However, another quarter of the respondents believed that it was of major importance, suggesting that safety needs to be given more attention at many prescribed burns (Q130).

Other Firefighter Experience Problems – Crews transported from one area to another have less experience with the local terrain, fuel, and weather (this is discussed further under briefings and information flow.) The lack of experience of bus drivers is discussed under transportation issues, below.

Certifications

Each culture has rituals and tests that one is required to get through before becoming a full member or a leader of that culture. In wildland firefighting, training, experience, and performance evaluation are prerequisites for certification as a firefighter and to advance to supervisory or IMT positions. The Red Card system has made a significant improvement in the standardization of certifications. However, many feel there is inconsistency in applying the standards, and in some cases, disregard of the standards for awarding Red Card qualifications, to the point that instead of being a powerful symbol of pride and status, many feel the Red Card to be questionable as proof of competence.

Abuse of the Red Card System – Only 10 percent of those surveyed thought that the issue of unqualified people getting Red Cards because of abuse of the task book process was not very important. Seventeen percent thought it was important and frequent, and almost half of the population (47 percent) thought it was an infrequent but important problem (Q153).

One type of abuse of the task book process is reported to be cronyism. Some people go with their task books to friends in their agency, and ask them to sign off a credential based on what may be less than adequate experience. Part of the problem is lack of agreement or lack of clear understanding on what constitutes adequate experience. The cultural problem here is that there may not be a strong ethic throughout the organizations to take the task book process very seriously, and to use judgment in deciding whether a set of tasks proffered for sign-off meets the intent as well as the letter of the requirements for certification. If one's experience is in supervising two crews working a small grass fire, should that qualify you as having supervised crews at a wildfire, when on the next fire you may be a division supervisor required to manage six crews at a forest fire – or vice versa, for that matter, since high, dry grass represents a different dangerous situation than can a slow moving forest fire.

Another aspect of abuse of certification is people being given ICS ratings based on their federal, state, or local fire department rank, rather than on their wildland firefighting experience or training. It was said this happened through favoritism, for political reasons, or for misplaced respect for chief-level officers in local departments who had significant command authority and knowledge of firefighting, though no experience or training in wildland firefighting. Over 40 percent of those giving an opinion (i.e., deleting the "can't says") said this was a frequent and important problem, a high rating for this scale (Q154).

Too Easy – Some people thought that unqualified people get the red card certification because the requirements are too easy. Only 17 percent did not think this was an important problem (Q152).

Not Checked – Certifications are useful as credentials only if they get checked. It was said that crew qualifications were often not reviewed as crews checked in at a fire, hence they might be given inappropriate assignments. Over 30 percent of the survey group commented that this was a frequent and important problem, and another 40 percent thought it was infrequent but important. Less than 20 percent thought it was not very important (Q155).

On the individual level, firefighters sometimes do not have their red cards checked prior to being dispatched. Again, there can be inappropriate duties assigned. This was given a somewhat lower importance rating than the above three red-card problems, but still was considered frequent and important by about one-quarter of those responding, and an important though infrequent problem by over 40 percent (Q156).

Inaccurate Presentation of Qualifications – Sometimes, to get better assignments, crew supervisors are not totally candid about their crew's experience credentials, or about their condition (especially their fatigue level). Only 7 percent thought this was not a very important problem. Over a quarter of the group thought this was a frequent and important problem, and over 60 percent thought it was infrequent but important when it occurred (Q157).

Thus, while the Red Card system was viewed as a strength of the system, the closing of its loopholes is a major step needed to improve safety, since so much depends on the proven competency of the leadership and the firefighters.

Symbols and Insignia

Wildland firefighters in some ways are a very egalitarian group, and in other ways are very conscious of showing distinctions as to which "tribe" they belong (smokejumpers, hotshots, helitack, etc.). There is great unit pride in the elite groups, just as in military ranger and commando units. But unlike the Army, the mass of wildland firefighters other than hotshots and to some extent smokejumpers do not wear any special insignia or jackets or have any other visible way to designate their rank or skill level while on the fireline. Many of the crews only wear matching shirts or sweatshirts with their affiliation while in camp. The base camp vendors also create unique T-shirts for each project fire that firefighters buy and then wear with pride at subsequent fires.

No one interviewed suggested the need for insignia of rank as a matter of pride or prestige. However, some felt that the lack of insignia to identify command rank, experience levels, and special capabilities hampered giving assignments in emergencies. Several interviewees raised the importance of knowing that instructions or orders are coming from someone qualified to give them. They felt, because of their experiences

with the California Department of Forestry, that insignia allowed the recipient to take into account the experience of the "officer."

The concept was that incident commanders and division supervisors often do not know the people under them as well as they once did, because of drawing more people from various places in the nation. Commands might be more safely delegated – and more responsibility might be delegated – if the incident commander or operations chief or division supervisor could tell that someone was experienced, or was a member of an elite unit. However, the majority of those surveyed (52 percent) did <u>not</u> agree with this concept; only 7 percent strongly agreed that the lack of insignia hampered assignments, and had a link to safety (Q64).

Interestingly, one-third of the female firefighters responding (33 percent) felt that lack of insignia hampered giving out assignments, vs. 27 percent of the males. The spread was several percentage points greater if the "can't say" responses are deleted from both groups. That is not highly significant statistically, but if this perception difference between genders is real, it may be that male supervisors do not adequately recognize the experience or rank of female firefighters, or that female firefighters are more sensitive to this issue. It might be worth a follow-up look to make sure that it is not discrimination against women by men who are assuming that the women are of lower rank or experience.

Information Flow

One of the main weapons in the arsenal of the wildland firefighter is information. Information about weather conditions, fuel moistures, available resources, the expertise of the crews on hand and hundreds more pieces of information combine with the knowledge of the firefighter to help best fight the fire. How the individual, from the firefighter through the incident commander, comes by that information is an important component of wildland firefighter culture.

Information "flow" is often visualized as a flow of data messages from a sender to a receiver. Application of this model often emphasizes flow in one direction, with the assumption that if the message is sent, communication is successful. In the case of wildland fire the typical perception would be that information flows from the dispatch to the fire IC, from the IC to the division supervisor and so on. Some information, of course, travels in the opposite direction up from the field. The problem with this model is it sets up "they didn't tell us" versus "they didn't ask" situations. Reviews of firefighter injuries and fatalities often cite lack of information as a key contributor to the incident. The follow-on discussion to these reviews often focuses on who did not pass on the information or why the intended receiver did not request it. The structure of information exchange was raised in several interviews as was the types of information needed in the field. The structure may need to be more appropriately seen as "dialogue" than as sending information in one direction.

Many fatalities, injuries, and near misses are attributed to firefighters not realizing they were in acute danger, e.g., from shifts in weather, about which they were not forewarned. Table 4-2, Frequency of Information Flow Problems, shows the types of information that crews identified as not reaching them, and the frequency with which they were perceived to be a problem by those surveyed. As would be expected, most people said that every type of information listed in Table 4-2 was a problem at least occasionally. To force distinction on priorities, the question was structured to ask whether the problem occurred over half the time, or on almost every fire.

None of the information problems were rated by many to occur on almost every fire. Overall information flow was rated as being good. About a quarter to a third of the respondents said that each element of information was rarely, if ever a problem. The majority of respondents said that the flow was a problem no more than occasionally for any of the types of information in the questions. However, though a minority, there were significant numbers of firefighters (140-280 out of 716) who said there was a problem on each type of information.

Table 4-2. Frequency of Information Flow Problems

(Q65-Q73)

Type of Information	Percent Respondents Saying the Problem Occurs		Total
	(A) Almost Every Fire	**(B) Over Half the Time**	**(A) + (B)**
Q70 When resources will be available	11%	29%	40%
Q72 Strategy for dealing with the fire	8	23	31
Q66 Fuel conditions	7	21	28
Q73 Tactics for Implementation Strategy	6	21	27
Q68 Escape routes and safety zones	8	18	26
Q67 Predicted fire behavior	7	19	26
Q69 Who is in charge	8	16	24
Q71 Special hazards or situations	5	18	23
Q65 Weather forecasts	8	12	20

When Resources Will Appear – The most complaints were registered about information on when resources would be available. Typically, a crew boss or division supervisor would ask for additional support, or an air operation, and not be told when to expect it. Forty percent of the total respondents (and 46 percent of Incident Management Team Members and FMOs) felt that it was a problem on over half of the fires they went to, with 11 percent feeling it was the case on almost every fire. That may not be so surprising – dispatchers often can't say exactly when resources will be available. But from the one-on-one in-depth interviews, it was clear that <u>there are too many situations where firefighters were not told whether the resources were coming at all</u>, or what resources were coming. There are even examples when the dispatcher decided unilaterally not to dispatch the requested resources and did not tell the people on the ground (Q70).

Strategy – The second most common problem in information flow was the failure to communicate the strategy for fighting the fire to the ground troops. Many of the survey respondents were firefighters, and they might not have been told about the overall strategy for fighting a fire, though that is supposed to be part of the briefing they received. However, analyzing the data by rank, one finds that about the same percentages of crew supervisors and incident management team members felt the same way as did the firefighters. Many say they are kept in the dark about the big picture and just told the details of the situation they are going into. This is a source of significant dissatisfaction (Q72).

Weather – It was felt by those interviewed that supervisors did not check the weather frequently enough, and that there were not adequate operational procedures in the system to insure that weather information was transmitted, received, and understood, and that proper actions ensued. There is no fail-safe acknowledgment system. The current system works well most of the time, but when it doesn't it can contribute to a "South Canyon" tragedy. <u>There were more strongly felt concerns about not receiving and interpreting information about changes in weather than most other types of information.</u> Even though more "votes" were given in the survey to not getting information about when resources were coming – a more common information problem than is weather information – and even though there was agreement that a strength of the system was the availability of generally excellent meteorologists and excellent weather information, there are occasional omissions of weather information that were considered extremely hazardous. Weather information affects expectations about the direction and speed with which the fire will move, and is crucial for anticipating problems.

About 21 percent of respondents felt that problems with transmission of weather forecasts were a frequent problem; 49 percent felt it was only an occasional problem. Over one-third of the Native American respondents said there was a problem in getting weather information to crews, vs. 18 percent for other respondents.

Perhaps an interpretation of this finding should be as follows: since weather information is critical and should always be communicated well, and since the majority have at least occasional experience where it is not communicated, that represents a huge number of situations in which there was potential jeopardy. This is an example where the criticality of the information needs to be considered: transmission of weather

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information, especially changes in weather that will influence fire direction, intensity, or velocity, needs to have a "zero-defects" goal.

There also were concerns that training did not adequately focus on interpreting weather information. And there were those who raised the question as to whether the raw weather information should be sent down the line without interpretation, or whether it should always be sent with an interpretation as to what to do in the short or long term.

Fuel Conditions – Firefighters also were said by those interviewed to often be sent to areas without adequate information on fuel conditions. A crew moved from Georgia to a dry area in the Southwest needs to be briefed about the different types of fuels, how dry they were, and how fast they would burn before being placed on the line. About 28 percent felt there was a frequent problem in transmitting this information (Q66).

Predicted Fire Behavior – Predictions as to the behavior of fire are made on large project fires. In 1996 there were instances of fire behavior predictions being issued for entire Geographic Areas. The technology to predict fire behavior accurately has improved over the decades. Senior managers said that this information should be used to plan whether to fight fire at all. However, the transmission of predicted fire behavior to line firefighters was rated a problem by about as many (27 percent) as fuel conditions (Q67).

Escape Routes and Safety Zones – Many fire investigations have shown that there was too little attention to planning escape routes and identifying safety zones to which to retreat and if necessary, deploy shelters. While only one-quarter of the survey group felt this was a frequent information problem, that again represents a very large number. Safety zones were raised as an issue several times during interviews and focus groups. One crew boss stressed the importance of safety zones by prioritizing the components of his job as follows: "99 percent of my job as head of a hand crew is knowing where the safety zone is and how to get my crew there...every minute we are on the line." A hotshot superintendent related an experience where he was forced to lead his own and another crew into safety zones after an indirect attack had failed. He is sure that "we would have had it without the safety zone."

Type II handcrews were especially concerned about not getting information on escape routes and safety zones; 40 percent of those on Type II crews said that they lacked the information on safety zones or escape routes on over half of the fires they attended. About 31 percent of women said there was a problem in getting information about escape routes and safety zones, vs. about 25 percent for men. (From a statistical standpoint this is borderline significant and it is unclear why there would be a gender difference.) It is important to have an organizational culture in which escape route planning is rarely omitted (Q68).

> *We need more emphasis on the idea that a fire shelter is the last resort. A safety zone is not some place that's designated as 'survivable with shelters.' If you think you might need to use a shelter, you're in the wrong place.*

> Division supervisor, over 15 years of experience

Person in Charge – Everyone at a fire needs to know who is in charge as their immediate supervisor, and who is in charge for the area in which they are working. This was rated as rarely a problem by more respondents than any other type of information here. But even for so obvious a thing as who is in charge, two-thirds of the group said it was a problem at least occasionally (Q69).

Special hazards or situations, and tactics for implementing strategy, received middling scores. They were rated as areas needing communication but without the intensity of feeling behind some of the other categories.

In summary, a significant number of those surveyed felt that every issue on the list was not frequently communicated at some time or other. Every one of the above items should be communicated to crews on a regular basis on every fire.

Reasons for Poor Information Flow

The kinds of information that is not reaching crews in the field was discussed above. This section explores the reasons behind the breakdown in communication.

In the one-on-one interviews, a long list of problems in transmitting information to and from crews was raised. Table 4-3 shows the list of reasons given for lack of communication down to the crews, and the frequency with which these were cited by the respondents on the general survey.

In formulating this set of questions, it was expected that most people would say that they encountered most of these issues occasionally, which was the case. As above, the more interesting question is which ones would be cited as frequently occurring.

Shift Changes – The standout problem flagged here was the inadequate exchange of information between crews from one operational period to the next. Over one-third (37 percent) said there was a poor exchange of information more than half the time. During the interviews it was common to hear cases of crews making no contact at all with the crew they were relieving. Sometimes these shift changes occur after dark, with the arriving crew entering an area they had not seen in daylight. Hazards visible to the departing crew were not identified for the arriving crew (Q83).

Those with more than 10 years experience rated the problem of inadequate exchange of information between shifts as occurring more frequently than did those with less experience; the concern peaked with those over 20 years experience, at 46 percent of the respondents reporting that the problem occurred in over half of the fires.

Seasonal employees rated the problem of shift-to-shift exchanges of information as more serious than did permanent employees (37 percent vs. 25 percent said it occurred on over half the fires, a very high proportion).

Reluctance to Request Repeats – The reluctance of crews to ask for information to be repeated was the number two problem here and not significantly different from first place (35 percent vs. 37 percent). Radio noise and interference, confusing messages and many other reasons often stop crews from clearly hearing information they need. But there seems to be a cultural reluctance to ask for information to be retransmitted (Q85).

The Southwest Area scored considerably higher than any other in saying that there was reluctance to ask for repeats of information; almost half (47 percent) of respondents said it was a problem on over half the fires or every fire. (Could this be because of cultural norms, where some ethnic groups expressed greater than average reluctance to point out safety problems?)

Table 4-3 Reasons for Information Flow Problems

Question		Almost Every Fire	Over Half the Time	Total
Q83	Inadequate exchange of information. between shifts	8%	29%	37%
Q85	Reluctance of crews to ask for information. to be repeated	10	25	35
Q81	Communications equipment problems	6	21	27
Q77	Managers or administrators not sending relevant information	3	18	21
Q80	People not knowing each other	4	13	17
Q82	Inadequate crew briefings	29	14	17
Q84	Inadequate exchange of information between IMTs during transition	3	12	15

Q74	Dispatch not having the right information	3	12	14
Q75	Dispatch not passing on or delaying information	2	11	13
Q76	Dispatch unclear in communications	2	11	13
Q78	Unclear directions from incident command	1	10	11
Q79	English language difficulties	1	3	4

Male firefighters – perhaps in a display of classic male, "I-don't-ask-for-directions" behavior – said there was significantly more reluctance to ask for a repeat of information than did females (36 vs. 27 percent respectively). If the question had been posed to ask about males vs. females, there might have been an even sharper difference, judging from research on how men and women communicate differently.[14]

Managers Not Sending the Information – In fourth place on the list in Table 4-3 of reasons for information flow problems was managers or administrators not sending relevant information downstream. This was cited as a problem considerably more frequently than were problems with dispatchers not passing on information or being unclear in their communications. Quite a few people raised problems about dispatchers, but they do not seem to be as important as the dispatchers not being given the necessary information in the first place (Q77).

Familiarity – People not knowing each other was cited as an information flow problem by only 17 percent as a problem occurring over half the time, and 36 percent said it was rarely if ever a problem – the largest use of the "rarely" category of multiple choice answers here. The mixing within crews of people who don't know each other was thought to be a significant problem especially because of their being less likely to communicate well, but it did not show up as large a problem as one might have expected.

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[14] See the research and popular books by Deborah Tanner, e.g., *That's Not What I Meant,* on this subject.

Inadequate Crew Briefings – Crews were said to often arrive at an incident without having been given adequate information on the weather, fire behavior, or what they were expected to do. This information, and a refresher on the safety points likely to be most relevant to the incident, could be provided en route to or upon arrival at an incident; apparently that is not often done. This and other examples indicate that in many cases the dispatch protocol is either not followed or insufficient. Dispatch and issues surrounding it are discussed in the next section.

Inadequate crew briefings were cited as a frequent problem by only 17 percent of those surveyed. About one-quarter (23 percent) of the females surveyed who gave an opinion on this question felt that inadequate briefings was a frequent problem, vs. about 16 percent for men. (Are women more aware of the information gap, or are they given less information in briefings?) (Q82).

Crews want information on the specific site they are working: the fuel history of land, fuel loading, terrain, vegetation type, climatalogical data, human use patterns, specific hazards, drought intensity, topographic maps, and the expected weather.

Communications Equipment Problems – Radio noise, too few channels, too few radios, and inadequate replacement batteries all were cited as reasons for blocking two-way information flow. But the biggest comment here, based on the interviews, was problems with the quality of the sound – audibility. About 27 percent of survey respondents said that communications equipment problems were frequently a problem (Q81). (See more on radios in the equipment section later in the chapter.)

IMT Information Exchange – Next on the list in frequency of problems was inadequate exchange of information between incident management teams during transitions. About one-third of the survey respondents said "can't say." Of those who felt they could answer, over 20 percent said it happened over half the time (Q84). Even less a problem was unclear direction received from incident command (Q78).

English Difficulties – During the focus groups and one-on-one interviews, quite a few interviewees commented about how some Hispanic and Native American crews had language difficulties which impact safety. On the survey, however, only 4 percent said

that English difficulties were a frequent problem. It can be a problem in certain groups or areas, but did not appear to be a large problem (Q79).

Dispatching

The most important gatekeeper regulating information flow during the initial stages of a fire is the dispatcher. The dispatcher not having the right information, not passing along or delaying information, or being unclear in communications, was frequently cited in interviews, which led to two groups of questions on dispatchers and dispatching being put on the survey questionnaire.

The first set of dispatch problems dealt with the dispatcher (Q74-76). About 13-14 percent said that over half the time needed information did not get to the crews because the dispatchers did not have the right information to pass on, or delayed passing it on, or were unclear. But relative to other reasons for poor information flow, this was a relatively low priority, though it can be important when it occurs.

There were four other issues also brought up about dispatch problems, which are partly information flow problems and partly resource management problems. (They are addressed here to keep all dispatch-related issues together.)

The first, which was felt by the survey respondents to be the most important, is slow turnaround for obtaining needed equipment, which of course may not be the dispatchers fault. A third of those surveyed said delays in getting needed equipment were a frequent and important problem – a relatively large response. Only 18 percent said it wasn't a very important or very common problem. This delay in getting resources problem gets compounded when the requesters are not told that there is going to be a delay or that the equipment is not going to arrive at all, which often is in the dispatcher's power to pass on. This type of problem was raised repeatedly during the interviews and focus groups. The comments focused on the dispatch system which is in place during initial attack and extended attack rather than the extended dispatch system which is set up during project fires. There appears to be a frequent problem with resource requests not being filled or information about the inability to fill them not being passed back to the incident commander in the field (Q91).

Several interviewees also described experiences where several initial attack efforts were underway and the resource requests outnumbered the available resources on the unit leaving the dispatcher to prioritize the requests. Ideally the dispatcher has fire experience or has ready access to the local fire management officer (FMO) or assistant fire management officer (AFMO) to assist in the "triage" which is often necessary when several incidents are working and resources are limited. The concern that dispatchers did not have adequate fire experience to support people in the field was perceived to be a frequent and important problem by a quarter of those surveyed, and another quarter thought it was infrequent but important (Q94).

Over two-thirds of those with more than 16 years experience thought that priorities were not adequately communicated to dispatch, significantly more than those with less than five years experience. Overall, 16 percent of the total group thought the problem of priorities not being communicated to dispatch was a frequent and important problem, and another 46 percent an important but not frequent problem (Q92).

The final dispatch-related problem addressed was felt not to be a frequent problem, but infuriated the line people when it happened. Dispatchers sometimes change requests for resources without getting approval from the incident commander, or the person who made the original request. Often this happens in the heat of battle, when dispatchers don't have enough resources to send everywhere. But it is crucial to inform people when changes to their requests are made. Only 11 percent of the people cited this as a frequent and important problem, but when it happens it can be very dangerous – expecting to be relieved, expecting help in building a fireline, etc. (Q93).

Equipment and Protective Clothing

This section discusses equipment other than shelters, which were such an important area and involved so many psychological considerations that they are discussed under a separate heading under human factors in Chapter 6.

Equipment from Caches –Much of the equipment used to supply federal firefighters is distributed from caches at the time of fires, and returned to a cache after the fire. Only 12 percent of respondents said that the condition of equipment received from caches was often a problem, one of the lowest flagged issues on the survey (Q55).

About 20 percent of female firefighters (vs. 12 percent of the total group on the survey) thought that there were incomplete or improperly maintained equipment kits coming from the caches, almost double the frequency of concern expressed by male firefighters. (Are female firefighters more observant or more sensitive to this?)

A cache operator noted two other types of safety problems concerning caches that did not seem useful to include on the survey because few firefighters would know about them: sometimes there were problems with the people at caches not adequately checking the equipment returned from the field to make sure it was in good condition before turning it around and sending it out on other fires. An even larger problem that tends to be less noticed, he felt, was the lack of care given in the field to packing up equipment at the conclusion of fires, and returning them to the caches. The containers of equipment are often overloaded; open food is sometimes left in them, creating a pest problem; and the equipment may be stored in ways that cause it to fall out and injure people opening the supplies at the cache. At the cache end, safety requires all equipment to be tested, carefully packed, and the containers not overloaded and not stacked in a way to injure people when they are opened at the scene of fires.

Adequate Equipment for Type II Crews − There was a general consensus that Type I crews were very well equipped and maintained. However, many concerns were raised about Type II crews not being adequately equipped with chainsaws, radios, and other supplies. (There also was concern about how well some Type II crews were trained to use the equipment.) Some people from Type II crews consider themselves treated as second-class citizens. One manifestation of that was not having the best equipment or enough equipment. While most of the people surveyed said that Type II crews only occasionally were not adequately equipped, about a third said it happened often or very often. Interestingly, among those who identified themselves on the survey as Type II handcrew firefighters, there was the same frequency of complaint as for the whole population − about one-third of the respondents. That is, the perception of the problem was shared about equally between Type I and Type II crews and managers (Q52).

Only 15 percent of the agency administrators (22 percent if the "can't says" are eliminated) felt that Type II crews often didn't get adequate equipment, vs. 33 percent for the overall group. This may be an example of a problem not obvious to top management.

Availability of Radios to Crews – A fundamental characteristic of a culture is how people communicate within it. Another attribute of culture is the level of technology used. Both aspects come together in radio communications. There were many strong comments made in the one-on-one interviews and focus groups about problems in radio communications. Most strongly heard was the need for every crew to have at least one radio. There are apparently many times when some crews do not have one. Sometimes this happens because they are divided, leaving part of the crew without a radio. The majority of crews always have radios, but any crew or part of a crew without radio communications is a major safety hazard. Their warning time could be significantly reduced, and their ability to pass warnings up the chain of command is also reduced.

On the survey, about 45 percent of the respondents thought that too few radios was often or very often a problem. It was hard to get a sense of whether one crew without a radio on a project fire out of many crews would be considered a problem because it was one too many. The in-depth interviews tended to indicate that that was the case. Some of those interviewed felt that some Type II crews were less likely to be equipped with radios than others, especially Native American EFF crews, Hispanic EFF crews and inmate crews. In agreement with this perception, about 59 percent of Hispanic respondents and 56 percent of Native American respondents said that there were often too few radios available, vs. 45 percent for all respondents (Q49).

The geographic area with the most concern about shortage of radios was the Southwest, with almost two-thirds (64 percent) of respondents saying it was often or very often a problem; 35 percent said it occurred very often, by far the highest intensity score on this question of any area. The Northern Rockies Area was second, with 60 percent saying it occurred often or very often.

Agency administrators thought there were significantly fewer instances where too few radios were available than did the other ranks (31 percent agency administrators vs. 45 percent overall group), another case where a problem may not be apparent at the top, and where fire crew input is important.

About 55 percent of the females on the survey felt the lack of availability of radios was often a problem, vs. 45 percent of the males. But there were no gender-specific comments about radio availability on either the interviews or the survey, so it is

not clear why there should be that difference (on many questions here, female respondents showed greater sensitivity to communication issues than males, which could mean that women are more sensitive to the need to communicate, and/or female firefighters are being discriminated against in certain communications).

Several other problems were brought up with respect to radios: incompatibility of radio frequencies with state, local, and military frequencies; inadequate numbers of radio channels at fires; and shortages of batteries for radios.

Compatibility of Channels – Federal firefighters deal with many non-federal agencies at fires, and they may not always have compatible frequencies. Eighteen percent of those surveyed said this incompatibility happened very often. The vast majority of those surveyed said it happened at least occasionally. Incompatibility of radio communications has been a problem common to all kinds of disasters, and needs further attention. It was cited as occurring often by somewhat more respondents in the Southwest area (54 percent) than elsewhere (43 percent), but was flagged about equally in most other areas. Over half of incident management team members and FMOs said it occurred often (Q50).

Forty-five percent of seasonal temporary respondents said that incompatibility of radio frequencies was often a problem vs. 30 percent for the permanent employees. The seasonals likewise thought that there were not enough radio channels more often than did the permanent (28 percent vs. 17 percent) (Q51).[15]

The clarity of radio communications is affected by problems with radio repeaters in the unit radio system, said some interviewees. Terrain often adds to the problems of good radio communications (e.g., blockages by mountains and ridges), and the repeaters are not always set in the right places.

Lack of an Adequate Number of Radio Channels – This problem was noted as occurring often by 27 percent of the respondents, though 29 percent said it rarely, if ever

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[15] It might be interesting for a future study to look at whether there were systematic degrees of greater complaining from one group vs. the others; that is does one group report problems more than another because the members of that group were more or less likely to rate a given situation as a problem than others. In this report all respondents are taken at face value.

was a problem. The problem of overloaded channels seems to occur on a minority of fires, but when it does arise, it can significantly hinder operations.   Some interviewees noted a particular problem when military units came on the scene. The military tended to use more channels and interfere more with others' communications (Q51).

Shortage of Replacement Parts – Having a radio doesn't ensure good communications unless the radio is working. Shortages of batteries for radios were noted by several interviewees. Not having working radios can seriously affect safety. However, the vast majority of respondents on the survey did not believe that batteries or other components were in short supply. It was cited by 18 percent or respondents as a problem that occurs often. This may be a situation where in general, supply is good and batteries usually work, but when they don't it is memorable and dangerous.   Note that the question on the survey included replacement parts for all kinds of equipment, not just radios, though batteries were the only component shortage problem singled out by the interviewees (Q56).

About 29 percent of Native Americans thought that shortage of replacement parts was often or very often a problem, vs. 17 percent for the overall group.

Problems With Communications Equipment – As briefly mentioned earlier, 27 percent of respondents reported problems with communications equipment as a reason for information flow problems. About 39 percent of Native American respondents and 41 percent of Hispanic respondents said that communications equipment was a problem in over half the fires, quite high compared to the 25 percent of others who felt that way.

Equipment of Non-Federal Crews

Federal firefighters at times interact with, make use of, and depend on state and local firefighters, inmate crews, military crews and contract crews. They are interdependent for safety in many situations.

The largest areas of concern about these groups, as raised in interviews and focus groups, were the adequacy of their equipment and protective gear, the adequacy of their

training, and their misuse in roles they cannot handle. Interference with communications by the military was also a concern, as noted earlier.

The subsections below discuss equipment of the non-federal firefighter crews; their misuse is discussed as a leadership issue in the next chapter.

State Firefighters – Although many states run wildland firefighting operations using practices similar if not identical to federal firefighters, there were many concerns expressed by federal firefighters about the adequacy of equipment and protective clothing for state firefighters. About one-quarter of those surveyed felt that there often or very often were equipment problems among state crews. However, a third of the group said it was rare, if ever, and another 26 percent said that it only happened occasionally. Overall it was not a very highly flagged issue nationally.

Survey respondents in different geographic areas had sharply different opinions on the adequacy of the equipment of state agencies in their area. The Southwest had an especially high level of concern about state crews (52 percent said it was often a problem), followed by West Basin (42), Northwest (39), Southeast (38), and East Basin (37). At the other end of opinions, the lowest proportion of respondents indicating concern about states were in the Eastern (13 percent), Alaska (11), North Zone, California (10) South Zone, California (7). (See Figure 4-3.) Note that the survey question concerned state firefighters in general, not just about state firefighters in the state in which the respondent most often works, though that was implied by the directions at the beginning of the survey (respondents had been asked to respond to problems from their experience). There may be significant differences between two states in one area, however the survey did not allow discerning differences by state (Q53).

Local Volunteer Firefighters – In contrast to the state firefighters, well over half (57 percent) of those surveyed said that local volunteer personnel in their experience did not have adequate equipment or protective clothing often (29 percent) or very often (28 percent). There are wide extremes in the equipment of volunteer firefighters, especially in rural areas. Some have two sets of gear, one for structural firefighting, and one for wildland firefighting. Volunteer departments often have brush trucks and various other suitable vehicles. But there also are a large fraction (it is unknown whether it is the majority or a large minority) that are financially poor and barely have enough equipment

and protective gear for their more usual jobs. In some areas of the country, such as Washington State, the volunteer fire protection districts are gearing up rapidly to take on more of the wildland firefighting role, but this was still a major issue of wide concern.

The Southwest area respondents to the survey reported local volunteer personnel as not being adequately equipped more than any other area (78 percent of respondents there said it occurred often). Other geographic areas where 60 percent or more of the survey respondents felt volunteers often lacked adequate wildland equipment or training were: Rocky Mountain, Great Basin, and Eastern Area. The areas with the lowest level of concern over volunteers equipment was the Northwest (as it was for misuse of volunteers) and South Zone (CA), but even in those areas about a third of respondents said lack of equipment for volunteers was often a problem.

this is for figure 4-3

About three-quarters of the Hispanic respondents felt that local volunteer fire departments were not adequately equipped or trained, significantly higher than the overall group score of 58 percent (Q54).

Private Contractors – As federal and state resources are reduced, and less full-time personnel and even seasonal personnel are on the payroll, contractors are being used to fill gaps. They also are used to provide specialized equipment, such as bulldozers. Some firefighters interviewed said that occasionally there are unqualified operators coming along with some of the contracted equipment and some of the contracted equipment is of poor quality. Both can be dangerous.

A quarter of the respondents on the national survey had no comment about unqualified operators, and the rest did not flag the question especially strongly. The majority felt it was only occasionally a problem. Likewise, contracted equipment was flagged as of poor quality only occasionally by the majority of those queried (Q59-60). The strongest response came from BIA respondents, of whom over one-third thought this was often a problem.[16]

Transportation to Fires

A fundamental aspect of the organizational culture of wildland firefighters is that they should be prepared to serve all over the nation. It is quite routine for firefighters to serve in several states in one season, and to be flown or otherwise moved from one geographic area to another by a variety of conveyances that include fixed-wing aircraft and vehicles of various types. Closer to the fire, transport includes helicopters, buses, trucks, parachutes, or rappelling from helicopters, and ultimately, trudging in by foot.

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[16] BIA had the smallest number of respondents among agencies here, so there can be greater differences between it and other agencies just from statistical variance of a small sample.

In 1994, when there were 14 firefighters killed at the South Canyon fire, another 7 died en route to fires or in landing zone accidents, not counting air crew, who died flying transport planes or in tanker operations.

Ground Transport – One experienced firefighter said in an interview, "Some of my most harrowing experiences on fires have been the bus drivers." There were numerous complaints raised about unskilled drivers driving school buses filled with firefighters along logging roads or fire roads. Sometimes this occurred at night. There was concern raised about the condition of vehicles, the condition of roads, driving conditions, and the experience of the drivers in dealing with them. On the survey, a third of the respondents felt that the lack of experience of bus drivers was a major problem, and almost three-quarters of the respondents said that it was of at least some importance (Q129). The condition of the transport vehicles themselves was cited as a problem that occurs often by only 14 percent. Thus the driver experience was the main problem rather than the vehicles themselves (Q57).

Air Transport – As noted in the discussion of scope, this study did not consider in-flight safety nor the maintenance of aircraft. Those topics have been well addressed elsewhere. Some questions were included on the interaction of air operations with the ground, to test the strength of feeling about safety of air operations relative to everything else, and because a few specific problems were raised in the interviews. Later in this report, air operations also arise in connection with aerial views for situational awareness.

The issues raised with respect to the safety of air operations received very low complaint levels. Air operations passed this test with flying colors. In the one-on-one interviews a few people commented on overloaded helicopters as a serious concern, but among respondents on the national survey. Two-thirds said it occurred rarely if ever, and only 14 percent said it occurred even occasionally; only 1.5 percent said it occurred often or very often. This is one of the lowest complaint levels on any question, and is a tribute to those running helicopter operations that in general, there were so few complaints (Q58).

Almost half the population surveyed (47 percent) thought it was rare that firefighters did not take proper safety precautions in or near helicopter transport; only 6 percent though it occurred often (Q179).

With respect to helicopter pilots performing unsafely in transporting crews, only 5 percent said this occurred often, whereas 51 percent said it was rare if ever, and 32 percent said it occurred only occasionally. The majority of helitack crew members responding on the survey thought that it was rare for helicopter pilots to perform unsafely, and most of the rest (39 percent) said that they performed unsafely only occasionally (Q178).

Lack of adequate safety management at aviation facilities, such as heli-bases, heli-ports, and heli-spots, was raised by very few. It was infrequently cited as a problem on the survey, with 51 percent of the respondents saying it occurred rarely, if ever (63 percent if the 19 percent who said they couldn't' say were left out.) Only 5 percent flagged it as a frequent problem (Q181).

Reporting and Investigating Safety Problems

An important aspect of a safety-oriented organization's culture is how it monitors and corrects its safety behavior. Does the organizational culture encourage reporting of problems, or put up barriers? Are people rewarded or ostracized by bringing up a problem? Many said that a strength of the federal wildland firefighting system was its attention to problems and willingness to self-correct, as discussed in Chapter 3. However, the reporting and investigation of safety problems and firefighter injuries was flagged as having problems, too.

Frequency of Reporting – The project team heard many comments about the incompleteness and lack of promptness of reporting safety incidents. Approximately two-thirds of those interviewed one-on-one said they had experienced a near-miss or an injury. Most of the near-misses had not been reported. The survey confirmed this finding: two-thirds of the respondents said that near-misses were only sometimes or rarely reported in their personal experience (Q34). At the other extreme, shelter deployments were said to be almost always reported by 65 percent of the population and usually reported by another 13 percent (Q35). Entrapments were said to be reported at about the same rate as shelter deployments (Q36).

Injuries to firefighters were said to be reported usually or almost always by three-quarters of the respondents, but another 20 percent said they were only sometimes reported (Q37). The 20 percent of firefighters who felt injuries were only sometimes reported may not be the ones who don't report. Anecdotally, those interviewed one-on-one as well as the focus groups cited numerous examples of injuries that were not reported, though they were usually not the most serious, obvious injuries. Some further attention is needed to identify whether the wildland firefighter injury statistics are reasonably reflective of the total number of non-trivial injuries.

In sharp contrast to injuries, observed safety problems that do not result in injuries, entrapments or deployments are reported as infrequently as near-misses. Almost three-quarters of the respondents thought they were not usually reported (Q38).

Reasons for Not Reporting – There are many reasons for not reporting safety problems.   The most important reason for not reporting was concern about the extra time spent on the paperwork involved; 72 percent rated that reason as somewhat or very important (Q42). Other important reasons, tied at 64 percent, were fear of triggering an investigation and fear of affecting one's career (Q41 and Q40). Somewhat further back but cited by well over half the respondents was fear of an immediate penalty (Q39). Far behind was concern about the impact on one's agency; the majority of the respondents thought that was not an important factor. Not surprisingly, the permanent employees were more concerned about impacts on their agency of reporting safety problems than were seasonals (49 percent of the permanents said it was somewhat or very important, vs. 35 percent of the seasonals).

Native Americans were somewhat more concerned about the fear of triggering an investigation than the overall group (77 percent thought it important vs. 62 percent for the other people). Native Americans also were more concerned about speaking up for fear of the impact on their agency (56 percent of Native Americans thought it important, vs. 36 percent for the other people).

While there was little difference in the frequency of reporting injuries between male and female firefighters, 30 percent of female firefighters said that fear of receiving an immediate penalty was a very important factor, vs. 17 percent of the male firefighters. Combining somewhat important and very important, 63 percent of females vs. 55 percent of males thought it important. Likewise, 73 percent of females vs. 62 percent of males felt that reporting injuries would have a somewhat or very important impact on their careers. Women also registered more concern about the fear of triggering an investigation – over a third of females felt that was very important, vs. less than a quarter of the men (Q43).

Another significant reason for not reporting, cited by just short of half of the group, was lack of good reporting systems for reporting a problem. That was considered more important by a number of those interviewed one-on-one, who explained the difficulty of trying to report a near-miss or a safety violation (Q44).

There also was a sense of futility in reporting errors in safety judgments because of the lack of accountability for those who violate safety rules, as reflected in the discussion of accountability in the next chapter. When asked as part of this question sequence on reasons for lack of reporting whether there was a belief that the reporting wouldn't make a difference, almost two-thirds of the respondents said that that was a somewhat or very important factor (Q45). Perceptions that there is no point in reporting are a major contributor to the lack of reporting. There also were comments from the one-on-one interviews that those who reported were considered tattling, and that they were just as likely to get in trouble as to get praised for formally reporting a safety violation. The above list suggests the need to simplify reporting of hazardous events, the need to encourage reporting, and the need to praise, not penalize those who do report (Q34-45).

Rescues

A major ethic among emergency responders is that they take care of each other, especially when one is injured. The wildland firefighter culture is no different. One might therefore expect high sensitivity to any problems in rescuing injured firefighters.

A few firefighters interviewed felt that rescues of injured firefighters were too slow. One comment related to helicopter rescue attempts, and another the speed with which paramedics or EMTs arrived at a fire. Both were put on the survey to test the breadth of the concern.

There was an extraordinarily low percentage of survey respondents who thought either of these two areas was a problem – only 3-5 percent respectively, thought that the rescue problems occurred often. The majority of respondents thought that they occurred rarely, if ever. These seem to be among the few problems on the survey that were virtually totally dismissed, with no write-in remarks about them as well as low ratings as a problem (Q213).

Ethnic and Gender Issues

Like the rest of society, firefighters are becoming more diverse in terms of ethnicity and gender. This has led to some actual or perceived problems according to those interviewed, and the issues were included on the national survey. It is obviously a sensitive subject. The only questions on the survey that specifically dealt with ethnicity or gender asked respondents to give opinions on how their own ethnic group and gender were treated. The results are described below.

Throughout the report, where it appeared relevant, the responses to various questions are discussed by ethnic group and gender, as they are by geographic area, rank, and firefighting position.

Communicating – In the one-on-one interviews, quite a few firefighters expressed the feeling that Native American and Hispanic crews and crew bosses faced

communications problems that others did not. Some said that they were given less information, possibly out of difficulty in communicating with them. Some said that they had poorer than average communication skills; some crews and crew supervisors did not have English as a first language, and their crews were said to face greater hazards because of not having clear two-way communication up and down the line.

On the survey, respondents were asked whether firefighters of their own ethnic group and gender were kept out of communications loops or given less situational information needed for safety, compared to others. For the overall group, about 81 percent said no, 9 percent said sometimes, and only 2 percent "definitely."

The group of survey respondents was 13 percent minority, 14 percent female, and 26 percent who were female or minority (Q104).[17] One might have expected the minorities to respond quite differently. They did, but not nearly as sharply as some have expected, as shown in Figure 4-4. About 28 percent said it was definitely or sometimes a problem.

By subgroup, 4 percent of the Native American respondents and 9 percent of the Hispanic respondents said that they were definitely kept out of communication loops or given less situational information about safety than others. Another 24 percent of Native Americans and 19 percent of Hispanic respondents said that it happened sometimes. The majority of both groups said that it did not happen in their experience. The problem does not appear to be widespread, but it occurs often enough to be of concern.

Female firefighters felt more strongly than minorities that they sometimes were kept out of communications loops. Seven percent of the female respondents felt they were definitely kept out of communication loops or given less situational information needed for safety than others, and 25 percent said that it happened sometimes, in contrast to male respondents, among whom 1 percent said definitely and 7 percent said sometimes. Since female firefighters answered very similarly to males on most other issues in the survey, this was a relatively sharp difference (Q105).

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[17] There were 5 minority females in the survey.

> *It's hard to know if something happens because you're a woman,*
> *or for another reason.*

<div align="center">Female Hotshot, over 10 years of experience</div>

Some respondents were offended that these questions appeared at all, feeling that safety should be blind to gender and ethnic group. But the charter of this study was to look at all organizational culture issues, and beliefs play an important role in defining a culture. Even more important was the need to find out whether there are problems affecting any particular subgroup disproportionately. We reiterate that overall there was outstanding consistency in the perception of safety issues across genders and all ethnic groups.

figure 4-4

Reticence In Speaking Up About Safety – A second area of potential differences was that minorities and women might be less likely to be the first to speak up about observed safety problems. One female firefighter who was interviewed said she would be damned if she would jeopardize a decade of hard work in gaining acceptance among male firefighters by being the first to show fear in a dangerous situation, or to point out the danger of an assignment, suggesting fear. Several other experienced female firefighters interviewed said they would definitely not be the first to speak up about a safety issue after having won respect for their skills, physical ability and bravery.

One Native American crew leader reported that his crew was sent home after refusing what he considered an unnecessarily dangerous assignment, and that sets up conditions for the next time around.

Native Americans interviewed from some tribes said that their culture tended to be relatively reticent, and inhibited them from speaking about problems when among outsiders, though there is large variation in the culture from tribe to tribe, and it is improper to generalize. On Q105, Native Americans were strikingly higher in agreeing that firefighters of their ethnic group were less likely to speak up about safety problems; 12 percent said definitely and 40 percent said sometimes, compared to 4 percent and 16 percent of the "other," primarily white group. Hispanic firefighters registered almost as high: 6 percent said definitely and 47 percent said sometimes. That is, a majority of both Native Americans and Hispanics said that firefighters of their ethnic group were less likely to speak up about safety problems than others.

When asked whether firefighters of your ethnic group and gender were less likely to speak up about safety problems, 13 percent of females said definitely and another 42 percent said sometimes, for a total of 54 percent of female firefighters saying that it was at least occasionally a problem, vs. only 19 percent of males feeling that way (see Figure 4-5). When the females were asked about reasons why safety incidents were not reported (Q39-45), only slightly more women than men said that the problem was fear of penalty in affecting one's career. Based on in-depth interviews with female firefighters, it seemed less the penalties – which applied to both genders – than concern about being considered too "wimpy" to be a firefighter.

Physical Conditioning – Several interviewees volunteered that physical conditioning of Native Americans was not always up to Red Card standards, based on their observation at fires. One person who administered step tests to Native American crews admitted that he did not stop some who could not pass the step test from being certified in the face of tacit pressures from villages and families who depended on the earnings of their wildland firefighters.

On the survey, about 10 percent of Native American respondents said that others of their ethnic group were definitely more likely to be below physical condition than others, and 31 percent said that sometimes was the case, vs. 2 percent and 21 percent for the "other" respondents. Figure 4-6 shows the results for all minorities compared to "other;" 34 percent of minorities said definitely or sometimes, vs. 23 percent for others.

The relevance of the step test was challenged by many of those interviewed. Several Native Americans and other firefighters felt that many who could not pass the step test did very well climbing mountains and walking safely on slopes. There have been no Native American fatalities due to exertion at wildland fires, at least for the last several years (while, as a comparison, about half of local, mostly white volunteer firefighters who die at fires die from heart attacks or strokes)[18].

The adequacy of physical conditioning of female firefighters was also raised as an issue – especially whether their upper body strength was a problem, and whether it was appropriate that women should have a lower standard to meet in the step test. On the survey, 45 percent of female firefighters felt that members of their gender and ethnic group were sometimes or definitely more likely to be below the physical condition required by the job, in contrast to 20 percent of males holding that opinion (see Figure 4-4.) On the in-depth interviews, some women expressed concern about others not in condition giving those in condition a bad name (Q106).

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[18] U.S. Fire Administration, annual reports on firefighter fatalities.

figure 4-5

figure 4-6

Overall Females vs. Male Opinions – Overall, men and women agreed on almost all questions dealing with observations about what constitutes safety, the positions needing the most attention, etc. Female firefighters felt they have more problems with getting heard, and did have more concern about communications in general, but only somewhat more than did the males on the survey. The female responses seemed to be from the same population as the male responses – both at the firefighter and fire manager levels. This is a tacit tribute to the significant gains made by women in the federal fire service. But it is important to address the communications and fitness issues raised above.

Although there was no control in the sample with respect to gender, it turned out that precisely the same proportions of respondents of both genders, two-thirds said that their usual role when involved in a fire was construction, maintaining or defending fireline. In other words, the sample of women in the survey was not biased toward management or toward firefighters. If their experiences were generally similar to those of the men, one might expect the answers to be similar, and they were with a few notable exceptions.

CHAPTER 5. LEADERSHIP AND ACCOUNTABILITY

Leadership here is defined to include all ranks above squad boss – crew supervisors, division supervisors, operations chiefs, other incident management team members, incident commanders, fire management officers, etc., up to agency administrators and fire directors.

The overall level of resources allocated to fire programs is affected by leadership of fire programs but is largely determined by others, and is considered part of the external environment of the wildland firefighting culture discussed in Chapter 7. Resource management within fire programs is considered here.

An organization's culture is determined in many ways by its leadership, and the leadership is shaped by the culture. Leadership must set the tone for safety by example and by emphasizing safety policies. Leadership must have the training and experience to lead and to make wise decisions at fires. Leadership must be able to handle stress.

Leadership is not a single quality of a specific job. One fire leader's definition of leadership is getting people to do the right thing. Leadership can be thought of as being of three broad types. The first type is "organizational" leadership, the need for leadership on the direction of the components of an organization. This type of leadership is reflected in the assumption that people of a given position will provide goals and objectives to the organizational components under them because of their defined role within the organization. A second type of leadership is "hierarchical;" individuals in a given position are expected to provide leadership to those people in positions "below" them within the hierarchical structure of the organization. For example, a crew leader commanding his or her crew on the fireline or the operations chief lining out the responsibilities of each division supervisor. The third type of leadership is that displayed on an "individual" level. This kind of leadership describes people making the right choices, regardless of their level within the organization. This level of leadership applies not only to management activities but also to firefighters of any level. It is this level of

leadership which defines each individual's leadership role in safety, leadership by example, one might say.

The leadership issues discussed here cover a wide range of topics, including fire management policy, situational awareness, misuse of crews, strategy and tactics, leadership experience, leadership training, briefing and plans, accountability and crisis leadership. Many of the issues discussed in this chapter could be placed in the chapters on organizational culture or human factors as well. Decision making under stress is discussed in the human factors chapter. Most of the discussion on response to political pressure is discussed in the external factors chapter.

Fire Management Policy

Allocation of Resources to Fires – The resources allocated to a particular fire affect what can be done safely, and how well safety is managed and monitored. Even more fundamental to safety is the decision as to how individual incidents (fires) are managed.

Several senior wildland fire managers we interviewed felt that there was a need to improve the decision making on the allocation of scarce resources among fires in a busy season. Some favored making more use of fire behavior and growth prediction models, not only in developing pre-fire plans for various forests, areas, etc., but dynamically, in real-time, if situations warrant a revised look relative to what had been set on paper initially. In other words, they thought one should be flexible, and not necessarily bound by the pre-fire plan. This flexibility was thought to be particularly important for safety when most resources were committed and decisions had to be made on priorities among fires. Based on weather, terrain, property at risk, the number of fires burning at the same time, the resources remaining, and other factors, it was thought desirable to consider new or different decisions using better information about the actual fires as to which ones to fight or continue fighting, vs. which ones to retreat from or not fight at all. Others felt this could and should be thought out in advance, in plans.

There also were questions raised as to whether the approach to handling multiple simultaneous project fires should be the same in drought years vs. other years. In drought

years fires are likely to spread faster, and there are likely to be more of them. Different types of information may need to be given to crews and IMTs during drought years, and different thresholds may have to be used on how and when to attack fires. Most importantly, there were concerns as to whether firefighters and fire managers properly recalibrated their thinking and their approach during drought years, though others felt that they should be on guard and have the same types of information all the time.

Disagreement on Priorities – There can be disagreement on priorities, strategy, and tactics among multiple federal and state agencies operating at a fire. For example, there might be disagreement on the priorities for saving an ecologically valuable property vs. timber vs. structures. Only a small fraction of those surveyed felt that this was a major problem, but here again, when it happens it can be important. (Twenty percent said it rarely happened, 40 percent said it only happened occasionally, and 18 percent said they couldn't say) (Q233).

Urban Wildland Interface – One of the most strongly registered concerns in the interviews and on the survey was the need for improving federal policy in fighting wildland fires around subdivisions and individual houses in the urban/wildland interface. Current federal fire policy dictates that federal firefighters do not engage in structural fire suppression in the urban/wildland interface, and that that job is the responsibility of local or state resources. However, federal wildland firefighters do often find themselves providing "exterior structural protection" as opposed to structural suppression.

> *Everybody knows that the highest priority dispatch they'll give*
> *you is to go to Southern California and protect houses.*
>
> -Assistant Fire Management Officer

Wildland firefighters do not have the equipment, training, or mandate to enter structures and attempt to extinguish fires. They do have, however, skills that allow them to effectively defend structures by digging line, clearing brush, and in some cases utilizing back fires.

...on several recent fires we did better than many of the municipalities. These are lateral fires. Municipalities are used to fires being "up." They get the $2\frac{1}{2}$ inch hose out, which is good for one small area, etc., but not good for fire moving laterally. So many of these fires are closer to wildland than they are structure.

-U.S. Forest Service, Engine Captain, Northern

California

Interviewees and survey respondents identified the need for training in tactics for the urban/wildland interface and clarification of the role of the federal forces during interface incidents. The direct impact of many interface situations is that they add another layer of leadership which, if not coordinated in advance, can increase complexity and confusion.

The biggest single trend is the extension of the interface. We have no structural responsibilities, funding, equipment, or mandate, but are called on to do it anyway. This increases the complexity of our job.

-Fire behavior analyst and instructor with 17 years of experience

Interface fires are a topic of discussion at all levels in the wildland fire community and are perceived as a significant risk to firefighter safety.

More on the problem of dealing with the urban/wildland interface is addressed in Chapter 7, on political and other external influences on wildland firefighting. Fire leadership must deal with the public, and cope with the pressures brought on by the media and political pressures from three levels of government, as will be discussed.

Situational Awareness

Field supervision, including strike team leaders, task force leaders, and division and group supervisors, were sometimes criticized in the interviews for not staying close to what is happening on the ground during a fire. They may isolate themselves either physically or mentally. They may give orders but then do not continually monitor whether the orders are being carried out, and whether circumstances are changing. In part, this can be made up by staying in touch by radio, but there was criticism of leaders not getting out to view the situation from aircraft, or to visit the fire on the ground, or to have adequate lookouts reporting to them. There was some

criticism that the some incident commanders and operations chiefs <u>only</u> view the fire from the air. There seems to be a desire of the ground personnel that supervisors get a well-rounded perspective...and not just from one vantage point.

In the survey, over one-quarter of those who offered comment felt that field supervision losing touch was a rare occurrence, if ever, and another 21 percent thought that it field supervisors losing touch was a problem on almost any fire (Q110).

A particular accusation leveled at agency administrators staying in touch was that they sometimes "hide" during a fire, leaving decisions to the incident management team. This criticism was heard from agency administrators and IMT members about their colleagues. On the survey, over one-third of the population opted not to answer this question, quite properly. Most people have no idea of what the agency administrator is doing during a fire. Among those who did comment, it was flagged as a frequent problem by a third of the group. Among people who were themselves incident management team members or fire management officers, about one-third thought it a frequent problem. The agency administrators thought it much less a problem; over half said it was rare, but the rest agreed it happened at least occasionally, and about 15 percent (adjusted) thought it was frequent (Q111).

Walking the Line – Some of those interviewed felt that division/group supervisors did not walk the fireline frequently enough during each operational period, and therefore did not fulfill their role in getting support for their crews as well as commanding them. (There was no question on the survey about this.)

Using Aerial Overviews – While a need was expressed for second-level supervisors to keep in touch with what is happening on the ground, there also was an

expression of a need to maintain an overview, including literally a visual overview of the fire situation. Not having a clear image of the fire relative to the crews can be dangerous.

Extensive use already is being made of helicopters and sometimes fixed-wing planes to fly IMT personnel over fires to see where the fire is, how it is advancing, and where ground troops are in relation to it. Infrared is used to track the progress of major fires. But a number of those interviewed, including some senior experts, felt that even more frequent direct visual observation would be useful, and suggested everything from increased use of drones with cameras to relay real-time pictures, to increased use of satellites, to increasing the training and use of pilots or aircraft observers to pass on information, and to having more helicopter flights over the fire by the supervisors. All of these comments were to improve the ability to view the whole situation, pass observations to the incident commander, and help check on crew deployment and spot safety problems. The view from above also was thought helpful to identify safety zones and escape paths.

An increase in air operations can be expensive, but there were many comments to the effect that the firefighting culture should be making more use of technology to improve the real-time visual information available to its leaders, one way or another.

Some survey respondents (16 percent) felt that helicopter or fixed wing pilots often did not have adequate training to act effectively and safety as aerial observers (Q180). There was also a strong desire expressed in several interviews to have the IMT members make more use of aircraft to get overviews of the fire. One experienced firefighter felt that safety would be much improved if aerial observers (or drones) were used more often, and the "scene" conveyed down to crew supervisors either verbally or by transmitted pictures. Others wanted the division supervisor or operations chiefs to get an aerial view themselves more often. Some suggested that aerial observers be used on any fire over 30 acres, despite the cost, to enhance safety as well as operations

There was disagreement as to whether a pictorial or visual overview of the fire was needed by the crew supervisor level for safety. This has become a feasible concept as a result of new technology developed for military intelligence field operations, which has

developed communications packages that are transportable and affordable. These can be used to receive and relay images to and from the ground through an airborne link to the incident commander and/or local FMO. The question is, how much decision making should be delegated to the crew supervisors, which affects the amount and type of information that must be sent to them, vs. having interpretation of the data made at higher fire management levels, with action instructions passed on to the crew. The crucial point here may be where the information processing and decision making should take place to prevent a crew from being put in jeopardy, rather than focusing on assisting them if they get into trouble. Increased use of pictorial information alone, without the assurance that the information is processed properly and in a timely manner, may not be the answer. (This could lead to information overload with superfluous information.)

Overall, there was a strong feeling expressed in the interviews that the old cliché was true, that a picture was worth a thousand words, and that incident commanders and operational chiefs might back off from some situations if they saw how severe they were. Crew supervisors might help persuade higher-ups of the dangers if they could relay pictures of what they see. Likewise, pictures can be used to convince crew supervisors or firefighters as to the hazards of a particular situation. It also was felt that perhaps the media and public pressures might lessen if it was clear what the threat was to the firefighters, rather than insisting on trying to save some homes or other property. However, often the imagery is used the other way: a line of fire advancing on homes stimulates local politicians, citizens, and sometimes state or national officials to demand deployments or aircraft operations even when they are fruitless, to show the public that "something is being done." This is a source of great frustration and concern by all levels of firefighters that were interviewed. (Again, see Chapter 7 for further discussion.)

Use of Lookouts – A need to make greater use of lookouts to improve situational awareness and free division and crew supervisors to other duties was repeatedly suggested. (Data on this is discussed as part of the Strategy and Tactics section below.)

Debriefing Crew Supervisors – There was a surprisingly strong response to the question on IMT members not debriefing crew supervisors. Fully one-third of the respondents said it was a problem over half the time; deleting the "can't says," the percentage raises to 42 percent. The concern here is that the IMTs are not getting the

ground truth from the crew supervisors. They do not take the opportunity of passing on critical information to the crews based on what other crews are reporting. Both shortchange themselves on the information on what is happening. This was by far the strongest response for the block of questions dealing with Crisis Leadership on the survey (Q115).

Appropriate Use of Various Crews

One of the leader's jobs is to make sure that there are adequate resources to get the job done, or else tailor the job to the resources at hand. It can be dangerous to give tasks to a crew that are beyond the capabilities of the crew. The capabilities are a function of the crew's equipment, firefighting training, physical condition, experience and supervision. Given the reduction in available resources as a busy fire season proceeds, or very early or late in a season, before seasonals are hired or after they are dismissed, there is often a tendency to make do with what one has.

Table 5-1 shows how survey respondents rated 11 different types of crews with respect to how often leadership misused them.[19]

Local Volunteers – By far the greatest concern for crew misuse was the potential for misusing local volunteer firefighters. Over half of the population surveyed said that they had seen volunteer crews misused at least several times per season. Table 5-1 shows the frequency rating for volunteer crew misuse was 16 points higher than the next closest misuse rating. The gap is of very high statistical significance.

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[19] The survey respondents were asked how often they saw each type of crew being misused. A low score can mean they did not have many assignments with a particular type of crew, or were not in a position to view other crews. There were very high "can't say" scores on this series of questions, suggesting that the respondents were indeed answering the questions literally, and only if they had personal experience. For example, 46 percent of the respondents said they couldn't say anything about contract crews, 38 percent couldn't say anything about military crews, and 36 percent couldn't say anything about local career fire department crews. For the rest, the "can't says" varied from 10-30 percent. The scores in Table 5-1 are all adjusted percentages after taking out the "can't says."

There was concern expressed in the interviews about the volunteers' training for wildland firefighting, their lack of experience at large wildland fires, and their equipment, including protective clothing for wildland firefighting as opposed to structural firefighting. (The volunteer's lack of proper equipment was as discussed in Chapter 4, and was the greatest equipment concern in wildland firefighting.)

Table 5-1. Unsafe Use of Crews

Question	Type of Crew	Frequency of Occurrence You Have Personally Seen per Season		
		3 or more	1-2	Rarely if ever
142	Local volunteer firefighters	55%	35%	10%
143	Local career firefighters	39	39	22
135	EFF	27	40	33
144	State	25	41	34
132	Inmate	23	36	41
137	Type II agency	21	38	41
133	Contract	21	40	40
138	Type II interagency	20	39	41
134	Military	17	38	44
141	Helitack	14	28	58
139	Hotshot	11	18	71
140	Smokejumper	9	20	70

Note: The "can't says" were large in these questions. The percentages in the table are the percent of respondents who gave an answer to the particular question indicated.

The capability of volunteers is an extremely important problem to address because of decreases in state and federal firefighting forces, and the concomitant greater reliance

being placed on local fire protection districts and fire departments for initial attack and escaped fires. The project team heard many horror stories about local volunteer departments endangering themselves or being ineffective.

There is also great concern about the reliance of volunteers on their vehicles. They often tacitly assume that they can get out by the same route as they came in. They do not pay enough attention to other escape routes, or to safety areas they may have to reach on foot. Of course, this does not apply to all volunteer crews. In fact, there are local volunteer firefighters who have literally written textbooks on wildland firefighting and are as expert members of incident management teams as anyone.

There was much greater concern about the frequency of misusing volunteer crews in some areas more than others, as shown in Figure 5-1. Over 50 percent of the respondents said that they witnessed misuse of volunteers several times a season in the Southwest, Rocky Mountain, and South Zones (CA). Fewer said it was a problem in the Northwest than any other geographic area.

Local Career Firefighters – Of lower concern than the local volunteers but of higher concern than any other type of crew by a large, statistically significant margin, was the misuse of local career firefighter crews. It is not uncommon for a big city to send task forces with full turnout gear on apparatus meant for heavy load-bearing city streets to extinguish wildfires. Some cities and counties have excellent experience in wildland firefighting (e.g., Los Angeles County and Kern County, California). Many city fire departments have special off-road vehicles and brush firefighting vehicles. But there also are many career departments that do not have proper clothing, equipment, or training. Their sophistication as urban firefighters can get themselves into trouble in a wildfire situation. The concern about misuse of career firefighting crews was greater than for any type of state or federal crew. Fully 39 percent of those who commented said they saw several misuses of career firefighter crews each season, and another 30 percent said they saw it once or twice per season.

Figure 5-2 shows that misuse of local career fire departments was identified more often by Southwest area respondents than any other. Note also that the level of concern

about misuse of career firefighters was lower in every geographic area than was the case for volunteers (as shown in Figure 5-1).

EFF Crews – After local fire department crews, the next highest concern was for the misuse of EFF (Emergency Fire Fighter) crews, which often are Native American or Hispanic crews with special contracting arrangements. Many concerns were raised about those crews in the interviews, ranging from their getting less than average training to being underequipped relative to other Type II crews, to questions about their conditioning (see equipment, training and physical conditioning discussions elsewhere). About 27 percent of respondents saw EFF units misused several times a season.

figure 5-1

FIGURE 5-2

State Crews – State crews were ranked as being misused just slightly less frequently than EFF crews, and slightly more than inmate crews, at 25 percent.

Inmate Crews – Many people feel strongly that inmate crews can perform well if properly led. Much of their performance depends on the quality of the crew supervisor, and his or her ability to do on-the-job training.[20] But some have voiced concern about overuse of inmate crews. Some states (e.g., Washington and California) are highly dependent on inmate crews for supporting the state; often times requesting state assistance will yield inmate crews. About 23 percent of respondents said that inmate crews were misused several times a season (Q132).

Type II Crews – Type II crews have a wide range of capabilities. Unfortunately, it is not always clear what their capability is. They were said to vary so much in capability that some feel there should be a return to a system of grading them A, B, C, or by some other designation that indicates their skill and experience level. Type II crews sometimes are given assignments by fire managers that are equivalent to what would be given to a Type I crew, and sometimes they are just used for mopping up.

It may not be obvious to an incident commander or division supervisor as to whether a given Type II crew (or for that matter inmate or EFF crew) is at the leading edge of capability of their category, or average, or poorly equipped and trained. Relying on a crew that is not up to the job with respect to training, physical conditioning, or desire can leave a hole in a fireline, or cause the crew to endanger itself by trying to bite off more than it can chew.

The experience level of Type II crews can change significantly as a fire season progresses, and as multiple fires require reaching further into the staffing pool. For example, in Native American villages in the Southwest, according to an interviewee from that area, the practice is for the most experienced firefighters in a village to turn out for the initial call up of crews, leaving less experienced people for the later crews if they are needed. Both the crews called up first and those called later are considered "Type II," but may have significant differences in experience levels and probably in competency levels,

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[20] *Wildfire* magazine issue on inmate crews, 1996, International Association of Wildfire.

though they are all treated equally on the fireline. There does not seem to be a practice to hold back an experienced cadre to form the core of teams to be called up later, even in a busy season when it is highly likely that the second call-up will be needed. The most experienced firefighters, often the breadwinners in their family, are all sent first.

Well over half of the people queried said they saw Type II, inmate, and contract crews being misused each season. Less than half the respondents thought the misuse of these crews was a rare occurrence. About one-fifth of the survey respondents (20-23 percent) felt that Type II crews, inmate crews, and contract crews were misused several times a year. Every misuse of a crew is another hazard. There was no difference in perception about agency vs. interagency Type II crews (Q132-133, Q137-138).

Type I Crews – There also can be misuse of experienced Type I crews. There have been anecdotes about smokejumper crews used for extended attack, and hotshot crews used for initial attack in ways that did not jibe with the experience or expectations of the crews, leading to disharmony, inefficiency, and potential safety problems. There also are questions about whether the role of helitacks is now clear.

As might be expected, however, these crews were thought to be the least misused. About 70 percent of hotshots themselves thought they were rarely misused and the rest of their group said there were problems with their misuse only once or twice per season. Likewise, about 70 percent of smokejumpers thought they were rarely misused, with a smattering of responses on misuse. Only half of the helitack respondents said they were rarely misused, with 13 percent (3 respondents) saying "can't say." (Why any felt they could not say is a little puzzling, but the absolute number was small; it might reflect the continuing evolution of their role.)

Military Crews – Inappropriate use of military crews was said to be of concern on the interviews because of their lack of firefighting training. They usually were in superb physical condition, well-led, and available in large numbers. They often get very brief firefighting training but considerable on-the-job training, and get better as their use progresses. But military crews then return whence they came, and it is rare that the same people are called out again the following year; training has to start all over. Some people

in the field felt that military crews should be used primarily for support activities – mop-up, checking hot spots, putting out spot fires, etc..

Given the concern voiced in interviews, the relatively low frequency with which survey respondents felt that military crews were misused was somewhat surprising. This result was based on slightly over 60 percent of the responding population, with the rest saying they couldn't say, so it may be that the interviewees, who were permanent employees, had a better viewpoint. It also may be that most of the time the military crews are used properly, but there are enough times when they are misused at fires to warrant concern (Q134).

Interpreting Crew Misuse – In interpreting results about crew misuse, one must consider that it is possible for one prominent misuse of a crew to make a lasting impression on a large segment of the community. Also, as noted in the appendix on Confidence Limits, the distance between the responses on two questions has to be more than six percentage points for the rank order to be considered significantly different.

In general, people who had served in a particular function felt that it was misused about like the rest of the population. There was no case where the subgroup thought it was seriously misused and the general population thought otherwise, or vice versa, at least for federal crews (non-federal employees were not surveyed).

Note also that the ranking of the misuse of crews on Questions 133-144 were not at all like the order in which the questions were listed on the questionnaire, suggesting that the respondents were thoughtful. The overall rank order from the large population on the survey is quite similar to what we might have constructed based on the one-on-one interviews. Perhaps the largest surprise was that state crews were rated as being misused as often as EFF or inmate crews, since there were far more comments about EFF and inmate crews than about state crews in the interviews.

Strategy and Tactics Issues Affecting Safety

One of the major responsibilities of fire leadership is to choose the appropriate strategy and tactics for a fire. Some of the strategy is worked out ahead of time in pre-fire planning as to what types of fires will be fought and the general approaches to be used for different types of fires. But when a fire actually strikes, the strategy planned to fight it may be altered by the agency administrator or the incident commander.

There were many concerns raised about the direction received from agency administrators. Some of the concerns dealt with the fire experience of the agency administrator. But even a knowledgeable agency administrator has difficult decisions to make regarding ecologically valuable land, the degree of risk to firefighters, and the amount of resources to expend.

The firefighters interviewed said that in some cases they were directed to fight fires with strategies that cause firefighters to be risked to save land with endangered species or otherwise environmentally valuable resources. They do not always feel comfortable or were not always given the opportunity by the agency administrator to present arguments why they should not do what they are doing. They also were not comfortable in making appeals above an agency administrator's head.

One of the highest priority issues was said to be <u>fires being fought in a more dangerous way than the values to be protected merited</u>. About 43 percent of those surveyed said this happened often or very often (Q29).

A long list of specific issues on strategy and tactics emerged from the interviews and focus groups. Anecdotes were related to the project team's interviewers on confirmed instances where each of the strategy and tactics issues listed in Table 5-2 raised a significant safety problem, at least in the eyes of the person interviewed. The table shows the percentage of respondents on the survey who thought a given strategy or tactics problem occurred often. Again, one must not necessarily equate the frequency of a problem with the seriousness of the problem; some relatively rare problems can have higher degrees of criticality than common problems. The issues raised were at different levels of detail, which complicates further prioritization. Nevertheless, it is useful to see what the rank ordering was. The following discussion is in order of priority of the issues on Table 5-2.

Table 5-2. Strategy and Tactics Issues

Issue	Percent Saying It Occurs Very Often Or Often (Adjusted Percentage)
216 Lack of smooth, timely shift changes.	45%
206 Too much fireline to defend with the available resources.	39
209 Too few lookouts posted.	36
217 Fires fought without adequate resources, rather than choosing which to fight and which to monitor.	36
214 Not enough attention given to identifying and/or building adequate safety zones.	30
211 Lack of coordination between federal and state efforts at fires.	30
207 Flying crews to the tops of fires or above fires, high on slopes.	29
215 Engine crews ignoring the need for escape routes and safety zones.	28
203 Ignoring the 18 watchout situations.	28
220 Dangerous transitions from initial attack to extended attack.	25
208 Hesitation to use air tankers on initial attack.	25

219	Divisions not adequately subdivided as they grow.	24
202	Ignoring the 10 standard fire orders.	23
221	Dangerous transition from extended attack to Type II or Type I team.	20
201	Misuse of direct attack.	17
204	Fire lines dug downhill without adequate mitigation efforts.	15
210	Crews or dozers not giving warning to those below them.	14
218	Overuse of nighttime operational periods.	14
205	Fire lines not properly anchored.	13
222	Dangerous transitions from Type II to Type I IMTs.	13
212	Helicopter rescue attempts too slow.	5
213	Paramedics too slow to respond.	3

Note: Percentages adjusted after deleting responses of "can't say."

Changing Crew Shifts – <u>The strategy and tactics issue rated as occurring very often or often by the most respondents (45 percent, adjusted) was the lack of smooth, timely crew shift between operational periods.</u> This is consistent with the ratings described in Chapter 4 that the worst information flow problem was the lack of communication between changing shifts. That is where information is exchanged about what has been occurring at the crew level of the battlefront, and the conditions faced. When a fire goes on long enough to require a crew change, it is by definition a significant fire that has been going on for some time. There was far more concern about that crew-to-crew information exchange than about interactions within a crew (Q216).

The North and South Zone (California) respondents rated crew shifts as a problem more frequently than did any other geographic area; in the North Zone, 62 percent of the respondents said it was often or very often a problem, vs. 41 percent nationally, unadjusted. A larger population of seasonal temporary employees thought that the lack of smooth and timely shift changes was a frequent problem than did permanent employees (42 percent vs. 26 percent unadjusted).

Overstretching Resources – Two problems relating to insufficient resources closely followed the crew shift change issue. The first was assigning too much fireline to defend with the available resources; 39 percent of respondents rated it as occurring often or very often, which made it the second most cited of the 22 specific strategy and tactics issues. It goes back to comments about choosing the right strategy and tactics in light of the resources available, and the need to give up area or use other means (e.g., air operations) to assist. Many commented on stretching resources too thin in the face of political pressures in other questions on the survey and in the interviews (Q206).

Fires being fought without adequate resources, rather than choosing which to fight and which to monitor was the next most frequent issue (at 36 percent). It is just a slightly broader issue than having too much fireline to defend. (As a point of quality control, note that these questions were Q217 and Q206; they were widely separated on the questionnaire, but scored about the same.)

While in the big picture one can consider lack of adequate funding of fire programs as an external influence, here the firefighters were talking about the influence

of leadership on getting resources to the scene or making a decision about how to cope with available resources. The total pool of resources is of course, dictated by outside influences, and there are political pressures on how to use them, but there also is a leadership issue in making the best use of the resources to fight a fire, or having the courage to refuse an assignment when that is appropriate. Of some interest was an issue raised during the one-on-one interviews where it was pointed out that greater access to communications (i.e., radios for more of the crew members) seemed to lead some leaders to stretch their crews out along greater and greater lengths of fireline. It appears that enhanced communications may mislead individuals into believing that they can cover more line than is realistic.

Lookouts – Too few lookouts being posted was in fourth place, with 36 percent saying it occurred often, not statistically different from the previous issue. Crews are supposed to stay alert, but they may lose touch with the big picture. So may division supervisors if they don't have information from the ground. Making more use of lookouts was one of the stronger recommendations made by those interviewed on how to improve safety (Q209).

The next group of nine issues were all in the 23 to 30 percent rating as to occurring often or very often. This group of issues was significantly lower than the preceding four issues, but still important, especially in light of the intensity of comments raised about these issues by individuals during the one-on-one interviews and focus groups.

Safety Zones – <u>The need for better instruction on sizing safety zones, and checking that safety zones were identified,</u> was a significant issue raised by the interviewees. On the survey, about 30 percent of respondents said that there was not enough attention given to identifying or building adequate safety zones. About 30 percent of the group said that happened often or very often, which is a huge number of situations out in the field. (Having 30 percent of the group say it happens often doesn't mean it happens 30 percent of the time, but rather that it happens often enough so that 30 percent rated it as a serious issue.)

Interviewees said that safety zones were sometimes not bothered with at all, and other times were not appropriately sized. The project team was told during interviews that many firefighters are not given specifics on how large a safety zone has to be in different types of fuel, terrain, and weather conditions. Do you need a 10-yard square? a football field? three football fields? Some people said they do not know even roughly what was considered large enough, and were often told it was a "judgment issue" without being told how to make the judgment (Q214).

Engine crews in particular were said to often ignore the need for escape routes and safety zones, getting overly confident in the ability of their vehicle to drive them quickly to safety, as noted earlier. The Fish and Wildlife Service respondents flagged the problem of engine crews ignoring escape routes somewhat more frequently than did other agencies (32 percent vs. 23 percent) (Q215).

Federal-State Coordination – Another issue in this group on strategy and tactics was lack of coordination between federal and state efforts at fires. In general, inter-agency cooperation within the federal agencies was said to be excellent. But there were a surprising number of people (26 percent) who raised concerns about relations with state agencies. There also was a surprise (at least to the research team) that there was so much concern for the safety of state crews and their training and equipment, as was related in the earlier discussion on individual types of crews.

While individual states were not named as problems, slightly more of the survey respondents (about one-third) in the Southwest, West Basin, and South Zone, California, areas rated their federal-state interaction as a greater problem than did those in other areas (about one-quarter), which was not of much statistical significance considering the small number of respondents voicing problems. The States of California and Alaska were often singled out as having examples of excellent federal-state relations by those interviewed, though the South Zone, California respondents reported above average concern on the survey on this issue (Q211).

Flying Crews to Slopes – About equally rated with the above three issues was the flying of crews to the tops of fires or high on slopes, leaving them to work their way down slope, sometimes in contradiction to good safety practice. The practice is done

both to find a place where the crews can be safety dropped off by the aircraft, and also to reduce fatigue, giving them a downhill walk to the fire. But en route on foot, there may be jeopardy. More importantly, there is a temptation to dig the line downhill (Q207).

Ignoring Watchouts and Fire Orders – Over one-quarter of the respondents thought that ignoring the 18 watchout situations occurred often or very often. One reason given during interviews was the difficulty in keeping track of all of the situations, a thinking overload problem. Another reason was simply the desire to get the job done efficiently, using judgment to cut corners. The crew supervisor or operations supervisor or higher level may be aware of a watchout situation, but gives an instruction to perform an action in violation of it anyhow. The issue is whether people have the judgment and experience to know if this is okay, and whether they take mitigation actions and have escape plans ready should things go awry. It is usually a combination of errors that causes a problem.

NPS personnel were almost twice as likely to rate the ignoring of the 18 watchout situations as a problem compared to respondents from other agencies (40 percent of NPS respondents vs. 26 percent from the other agencies) (Q203).

Almost every watchout situation was said by many of those interviewed to be frequently violated. Some of the watchout situations were addressed specifically in questions. Watchout Situation 9, building a fireline downhill without adequate mitigation efforts, was put on the survey but only 15 percent of the respondents said it was a common problem (Q204). Not anchoring firelines (Watchout 8) was addressed in question Q205, but only 13 percent rated that as a common problem.

Less frequently cited than ignoring watchouts was ignoring the 10 standard fire orders (23 percent said the orders were often violated vs. 28 percent for the watchouts). In general, people felt the orders were observed better than the watchouts, but were still a problem. As noted in the human factors chapter, perhaps the biggest reason for ignoring watchouts and fire orders was the difficulty in trying to remember all of them in a real-time emergency, under pressure. Critical decision making under stress showed up as an issue in the survey in many places, and in the interviews and focus groups, though rarely called anything like that by name (Q202).

Some interviewees and experts felt that rather than just obeying the rules set forth in the orders and watchouts, an organizational culture should be developed where people are encouraged to think rather than follow rules. They should be trained on the general practices to follow, but allowed to make exceptions when warranted, and given lots of practice in decision making to improve the ability to make those decisions. Others felt that having a culture in which it was not only acceptable to point out the violation of a watchout or fire order, but that one was expected to do so and applauded for doing so would help. Others thought that crews should consult more together to have the benefit of a group's thinking and memory.

Transitions (Scaling Up or Scaling Down Efforts) – Many of the experienced fire managers who were interviewed pointed to the danger of transitions from initial attack to extended attack. The fire is starting to get out of hand, the nature of fighting it is changing, the resources are scaling up, and the initial attack force may not have adequate experience or may not have the skills most needed. Many experienced fire managers consider the transitions from one stage to another as more dangerous than the largest project fires. The latter already have large, well organized teams, safety officers, and many safety practices in place.

> *One big difference between fighting the 'big' fires versus these*
> *initial response fires by yourself is that the small ones are 'pre-*
> *organization.' The organization has not yet been put into place*
> *and there is a great potential to work longer, cut corners, etc. that*
> *you shouldn't.*

-National Park Service, Division Head with 10 years of experience.

As the fire expands from initial attack to extended attack, there can be great jeopardy to those on the scene, though the fire may still be relatively small. A fire moving beyond initial attack is nearly always a fire which is growing in complexity. The increase in complexity during a transition is usually not linear. Changing fire behavior, more resources committed and the need for longer range planning all contribute to the growth in complexity.

The focus during initial attack and often during extended attack is on fighting the fire. It is imperative that the "lets hit it hard and fast" objectives of the first efforts of

initial attack give way to management of the incident. This rapid onset of increased complexity can be missed if the local incident commander is focused on "fighting the fire."

Training practice in the form of simulations and field exercises might address this problem in the future, suggested some of those interviewed. Under the training section in Chapter 6, it will be seen that lack of training on making the transitions is considered a sore need. A quarter of respondents to the survey thought the transition from initial to extended attack was a frequent problem, most others that it was a problem occasionally (Q220).

The transition from extended attack to use of a Type II or Type I team was rated a lower problem than going from initial attack to extended attack, but still was considered a frequent problem by 20 percent of those surveyed (Q221).

The transition from Type II to Type I IMTs was rated as a significantly less frequent problem with respect to safety; 13 percent of respondents said it occurred often or very often (Q222).

Another transition of concern is the period after the fire seems to be under control, and control switches back from an incident management team to the local home unit. Some interviewed said that this transition can occur prematurely, and the resulting confusion is another period of high danger. But the survey group felt this was a much smaller problem than those mentioned above. Only 8 percent said it occurred over half the time, 34 percent occasionally, and 35 percent that it was rare. All those percentages would be increased if we deleted the 22 percent "can't says" (Q112).[21]

Closely related to the scaling of efforts is the need to change tactics and strategy as fire complexity and size increased. Locking into an approach is a psychological problem as much as a managerial problem. (This was addressed in another part of the

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[21] Inadvertently, a second question on the survey (Q108) was worded quite closely to Q220. It was under the heading "Crisis Leadership," and asked how often scaling up of fire control efforts were a problem. It was rated as a problem occurring on over half of all fires by 22 percent of respondents, about the same proportion who said that going from initial to extended attack was a problem. This is another validity check.

survey.) About 22 percent of respondents thought that lack of flexibility was a problem more than half the time, and another 52 percent occasionally. A relatively small minority thought it happened rarely (16 percent) (Q109).

Air Operations in Initial Attack – The safety of air operations in transporting personnel, and the use of aircraft for observation were addressed in Chapter 4. An additional impact of air operations on safety is their role in attacking or retarding the fire.

A number of fire managers thought that there should be greater use made of air tankers for initial attack. It was felt that they weren't used enough in that role because of the expense. There is a gamble as to whether a small fire will stay small until smokejumpers or ground crew gets to it, and whether they can control it when they do. Fire managers earn their money by making those decisions. But there were widespread comments in the interviews and expert suggestions that it pays to make greater use of air operations to extinguish small fires, and hence avoid the expense and greater hazard of a small fire that blew up. The cost of air operations grows exponentially when a large fire vs. a small fire needs to be attacked. One can buy many small attacks for the price of one large attack. The Los Angeles County Fire Department includes a helicopter as one of the apparatus that automatically responds to a brush fire alarm. Depending on the fire danger, the northern California coordination center also includes air apparatus as part of the initial response to reports of a brush fire. The unit fire management staff must decide between the upfront cost of going quickly to air resources compared to the potential greater cost of allowing the fire to grow in size. It is not always an easy decision to make.

Some interviewees had experience with the newer, single-engine, less expensive air tankers for initial attack. They spoke positively of their experience and suggested that these smaller tankers have a potentially important role to play on initial attack and extended attack fires.

There was almost no one who raised overuse of air operations as a issue.

Some raised concern about lack of adequate air/ground communications, especially with respect to warning people on the ground that a water or retardant drop was going to take place. Two people interviewed said they had been hit by drops that they did

not know were coming, despite the standard operating procedures that are intended to insure air/ground coordination to prevent this.

Among the survey respondents, 25 percent said that hesitation to use air tankers on initial attack was a frequent problem. Hesitation to use air power was a greater issue for Native American respondents, of whom 40 percent said it was often a problem (vs. 21 percent for the "other" group) (Q208).

Subdividing Divisions – Although one of the more lowly rated items, about one-quarter of those commenting felt that divisions often were not subdivided quickly enough as fires grew. That spread division supervisors too thin (Q219).

Misuse of Direct Attack – It was felt by some of these interviewed that direct attack was used improperly, especially when there was a shortage of resources. Some felt that direct attack was sometimes encouraged by agency administrators who wanted an aggressive attack and were not totally aware of the implications of the different approaches (direct vs. indirect) with respect to various fire situations. Several firefighters and fire managers suggested that the training for agency administrators include information on the appropriate use of different types of attack, and familiarization with strategy and tactics of firefighting, if not already being done adequately (Q201).

Some interviewees felt that the preferred strategy/tactics should be "anchoring and flanking" the fire, and that there was not adequate use being made of natural terrain features. An attempt to be overly aggressive to reduce the acreage of the fire needlessly endangered the firefighters, and often didn't work, requiring fallback anyhow, went this line of thought. What particularly embittered some of those responding was that the choice of tactics and strategies was sometimes politically influenced, or was made by people high in the organization chain without adequate firefighting experience. However, on the survey, only 17 percent of respondents said direct attack was often misused, a relatively low level compared to other strategy and tactics concerns.

Watching Out for People Below – Another type of tactical hazard that was brought up several times during one-on-one interviews was the danger posed to crews working downhill from other crews or bulldozers. Those on the higher level sometimes

are not aware that the debris they kick up may roll and literally fall on the heads of the people below them. Watchout Situation 13 is being alert for rolling material that can ignite fuel below, but it doesn't address solid rolling material that can strike people below. The alarm raised in the interviews was primarily for falling rocks and other solid debris. The threat from falling debris was second only to snags in the opinion of the interviewees, who described many more injury and near-miss situations where they were harmed by something falling on them than by being burned or coming close to being enveloped by fire. However, this was one of the lower ranked tactical issues in this group, said to be a frequent concern by 14 percent. A much larger percent felt that it was occasionally a problem (Q210).

About one-quarter of Native American respondents (24 percent) said that crews or dozers not giving adequate consideration to those working below them was a problem often or very often, double the proportion (12 percent) of the rest of the population.

Night Operations – Some of those interviewed felt that there was overuse of nighttime operations. There was particular concern over crews not familiar with the terrain starting firefighting operations at night, a situation flagged in Watchout Situation 2 ("in country not seen in daylight"). On the other hand, some people felt that there should be an <u>increase</u> in nighttime operations, when conditions were cooler, the fire often moving slower, and the hazard from the fire was less, even though the hazard from the terrain might be increased. Some other nations (e.g., Canada and Australia) have more emphasis on night operations. On the survey, only 16 percent flagged night operations as a frequent problem (Q218).

Leadership Experience and Competence

There is a widespread belief that the majority of people in leadership positions are competent and have adequate experience, but that there is a non-trivial minority that do not have adequate experience. The latter raise the risk level on fires in which they play a role. They have less of a basis on which to make judgments, and are more vulnerable to making poor decisions under stress.

Only 10 percent of respondents thought leadership did not perform well under stressful, dangerous situations at more than half the fires. Most respondents (55 percent) said that leadership did not perform well only occasionally. Another 25 percent said that poor performance was rare, if ever. Among respondents in leadership positions, the feelings were similar, with slightly more critical ratings by IMT and FMO respondents, and slightly less critical comments by agency administrators (Q107).

However, as noted earlier, there were many comments from the interviews with fire managers, firefighters, and experts that there were significant shortfalls in the training, experience, and competence of a significant minority of those in leadership positions. It was felt that this shortfall was tending to get worse, and that it was worse for some leadership positions than others. Experience and the need for improving leadership are discussed here; training is discussed in the next chapter, on human factors.

There are many aspects to the leadership experience problem. The first major issue is a faster rate of retirement or force reduction than new experience is building up, further exacerbated by lack of incentives to keep experienced fire managers (and firefighters) interested in returning to participate in fires each year.

The second major experience issue is the dropping of fire experience as a requirement for certain leadership positions, including agency administrator positions and Fire Management Officer positions. This is discussed in detail below.

The third major experience issue is that training is not realistic enough and extensive enough to compensate for the lack of fire experience. This is discussed further under training in Chapter 6.

The fourth major experience issue is fast-tracking, and the fifth, lateral transfers. A sixth is allowing people with rusty skills into leadership positions.

Fast Tracking – An intensely felt problem brought up spontaneously during many one-on-one interviews was that there was too much fast-tracking of employees without adequate training or graduated experience, which sets them up for failure and also could lead to safety problems. There is a general belief in the workforce, whether

true or not, that some women and minorities have been advanced too rapidly, with minimal red card certification levels. Though they have the minimum credentials on paper, there was a great fear that they were lacking the experience or the right kind of realistic training that substitutes for experience to be effective and safe. Eighty-two percent of those surveyed felt fast-tracking was a problem, with 49 percent strongly agreeing. Only 17 percent disagreed (Q47).

In the one-on-one interviews and focus groups, women and minorities expressed this opinion about fast-tracking almost as frequently as did white males. One experienced female crew supervisor said she was very concerned about young women being placed into positions they were not prepared for, and that they would make other women look bad through their incompetence. On the survey, 84 percent of the women agreed or strongly agreed that there is too much fast-tracking, vs. 82 percent of the men. And 84 percent of minorities agreed or strongly agreed. That is, there was no significant difference between genders or ethnic groups on the subject (Q47).

Crew supervisors registered the strongest concern about fast-tracking, while agency administrators the least; but even among agency administrators, about 60 percent agreed or strongly agreed with the problems of fast-tracking.

The people interviewed went out of their way to say they had no problem with women or minorities being supervisors or serving anywhere in the hierarchy, so long as they were not going to hurt the people below them because of inadequate training or experience.

The concern on the part of some of the women and minorities interviewed was that they were being set up for failure, not intentionally, but inevitably nevertheless. One female said she was put in over her head virtually against her will when she appeared at a fire before more experienced management team personnel arrived. She was put in a key incident management team position for which she had a red card rating but for which she felt totally unprepared. These comments also were a reflection on the use of the red card system as screening for incident management team positions.

Lateral Transfers – Similar to the concern about fast-tracking was a concern about lateral transfers into key fire incident management team positions by people in management who had little or no fire experience. Again, there was a concern that their decisions would affect safety. Sometimes people having advanced leadership positions in fire departments were given leadership roles even though they had no wildland fire training. Rather than embarrassing someone who has served as an Assistant Chief in a career department, they were grandfathered in. Other management personnel were said to be laterally transferred into incident management team positions because they had advanced degrees, often in technical subjects, and were considered smart enough and adaptable enough to handle the assignment, even though not experienced. These concerns on lateral transfers did not register quite as strongly as the concerns about fast-tracking, but 69 percent of the survey population agreed that lateral transfers were a problem, with 39 percent strongly agreeing (Q48).

Agency administrators had a sharply different opinion about lateral transfers. Over 50 percent of those who responded disagreed that there were too many lateral transfers, whereas almost 70 percent of the other groups agreed that there were too many lateral transfers.

Rusty Command Skills – A survey respondent wrote in that "a division supervisors can keep his [red card] qualification for three years without going to a fire. There is a loss of skill and [the] feel for fire behavior [when one is] away from a fire situation for that long a period, especially if the person is a resource specialist and does not participate in initial attack activities."

On the survey, 28 percent thought that there were major safety problems from allowing people with rusty command skills to hold control positions at fires.

Interestingly, on this question, there was no significant difference of opinion about the importance of rusty command skills across people with different amounts of experience; all levels of experience agreed that it was a problem, though somewhat fewer of those with 20 years experience tended to rate rusty command skills as a problem than did those who were younger.

National Park Service personnel felt the problem of people with rusty command skills being used in command positions was somewhat more of a problem than did the other agencies (36 percent rated it of major importance, vs. 28 percent in the others).

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Table 4-1 showed the rank ordering of experience issues addressed in questions 123-132 from the survey. Most of the highest rated issues deal with management experience. Every one of these issues had been raised in the interviews and focus groups, and was rated of some importance or major importance by the vast majority of respondents. As noted in Chapter 4, the issues are rank ordered on the basis of the percentage of respondents ratings of the issue as being of major importance, but it should be kept in mind that only small fractions of respondents thought any of these issues were of little or no importance.

FMO Fire Experience – Leading the list of concerns about experience was the lack of a requirement for fire experience in fire management officer positions. The position descriptions are written so that people with scientific credentials can transfer into them even if they have no fire experience. Because the FMOs often play a role on incident management teams, often set fire policy for an agency, and do much pre-fire preparation, many of those interviewed thought the lack of a requirement for fire experience was a major problem. On the survey, 54 percent of the respondents thought that this problem was of major importance (Q125).

Counter to what some might have expected, more females (61 percent) rated the lack of FMO experience of major importance than did males (54 percent). On Q126, concerning people with rusty command skills used in command positions, 41 percent of the females said it was of major importance vs. 26 percent of the males. (The differences between female and male responses is even higher if the "can't says" were dropped, because 8 percent more women said "can't say" on that question than did males.) There were no questions about experience where females thought the lack of experience was not of much importance and the males thought they were of much importance; if anything, the women saw it as even more important than the men.

Division Supervisors −Almost as many people (49 percent) felt that the lack of fire experience of sector/division supervisors was of major importance, as they did for the experience of agency administrators and FMOs. These people supervise groups of crews, and are the link between crew supervisors and the rest of command. They have great influence on the safety of the crews. Forty-nine percent thinking that the lack of experience of division supervisors is a major problem, puts a huge emphasis on this issue (Q132).

Incident Management Teams − In third place among experience issues was the lack of experience of people serving on incident management teams. Generally, incident commanders got high marks; the attention here was to people filling key positions in the incident command system who had little experience in, say, logistics. They have less direct influence on the crews than do the division supervisors, but still have major influence. About 41 percent of respondents rated the lack of experience of IMT personnel a major problem.

Agency Administrators − A large number of people interviewed, and several senior firefighting experts, raised the point that agency administrators did not have to have any fire background for their position anymore, and that a growing number of agency administrators indeed did not have that experience in contrast to the past, when almost everyone in the agency participated in firefighting at some point in their career. Many people at different levels are concerned about the lack of experience that impacts safety when the agency administrators get involved in setting the strategy and tactics for a fire.

Another concern expressed in the interviews about the lack of fire experience of agency administrators (and other senior management) is that they lack the interest and understanding of the issues to go to bat for the fire community to get adequate resources, and that the lack of adequate resources increases the danger because expectations haven't been reduced to the same extent as have resources. Whether this is myth or not, it is believed by many, and is part of the culture's mindset. In the survey, two-thirds of the respondents felt that there is less fire manager understanding today about firefighting needs than there used to be, and that it ultimately impacts safety. Less than one-quarter of respondents disagreed (Q17).

There was strikingly stronger agreement on this issue among those with many years experience: 46 percent for those with over 20 years experience, 39 percent for 16-20 years, 27 percent for 10-15 years, 21 percent for 5-9 years, and 10 percent for less than 5 years of experience. The proportion of "can't says" were vastly more for those with less than 5 years than for the over 20 years, but even dropping out the "can't says," there still was much greater strength of feeling on this issue from the respondents with many years of experience.

FMOs were significantly stronger than other positions in agreeing that there is less understanding and support for fire needs today because fewer fire managers are involved in fire (Q17).

As was shown in Table 4-1, concern about the lack of experience of agency administrators was in fourth place, after FMOs, Operations Supervisors, and IMT members. Still, 36 percent of respondents rated the lack of required fire experience for agency administrators as a major problem (Q124).

Fewer agency administrators themselves rated this as a major issue compared to other ranks. Still a majority of agency administrators (53 percent) felt that the lack of a requirement for fire experience for agency administrator positions was either of some importance or major importance, and 25 percent said it was of major importance.

Operations Section Leadership − Questions 145-151 on the survey asked the respondents about how many people in each of seven operations section positions didn't have enough experience for their job. The positions included Type II, EFF and inmate crew supervisors; strike team/task force leaders; division/group supervisors; operations section chiefs, and incident commanders. The scale choices were: almost none (less than 1 percent), a few here and there (2-10 percent); quite a few (10-25 percent); a significant number (25-50); or over half. The results are shown in Table 5-3.

Table 5-3 Shortfalls in Experience by Position

Leadership and Accountability

Question	Position	Percent of Respondents Saying:			Total
		Quite a few (10-25%)	A significant number (25-50%)	Over Half (>50%)	
146	EFF crew supervisors	32	13	4	49
147	Inmate crew supervisors	24	12	6	42
148	Strike team/Task force leaders	29	7	1	37
149	Division/group supervisors	26	9	2	37
145	Type II crew supervisors	25	9	2	36
150	Operators section chiefs	16	4	2	22
151	Incident commanders	14	2	1	17

* All percentages are recomputed from the raw tallies using only those who gave an opinion on the question (i.e., did not check "can't say").

EFF crew supervisors were the position in the operations leadership chain flagged most often by those who responded. Almost half of the survey respondents (49 percent) felt that quite a few EFF crew supervisors don't have enough experience for their job. The second greatest shortage of experience was thought to exist among inmate crew supervisors.

Over one-third (37 percent) of the respondents thought that quite a few strike team/task force leaders, division/group supervisors, and Type II crew supervisors did not have adequate experience.

Operations section chiefs and incident commanders had the best experience ratings, with few respondents believing they had significant shortfalls in experience.

The survey dealt in perceptions about experience, which may or may not reflect actual experience accurately. However, the perception that a leader lacks experience can affect safety as much as the reality of the lack of experience. If many in an organization think a colleague or subordinate is inexperienced, there may be more wariness in

delegating responsibility. At the Mann Gulch fire, a lack of familiarity with the crew leadership and lack of clarity of who in fact was the leader led the crew to question the knowledge of the crew boss Dodge when he lit the escape fire and ordered the crew to jump into it (Weick 1995). Thus the perceptions about experience are important, regardless of whether the lack of experience is true.

Positions Needing Strengthening – Because the issue of choosing priorities on positions that needed improvement seemed critical, and because there were concerns about the reliability of the opinions, survey respondents were explicitly asked to make rankings of positions most in need of strengthening early in the survey, and then again implicitly in detailed questions. There was generally good agreement.

The results of the survey respondents ranking of the positions needing the most strengthening to improve safety is shown in Table 5-4. Crew supervisor, division/group supervisor, and agency administrator were the three positions felt most in need of strengthening, all things considered (importance, training, experience, etc.). Firefighters finished a close (and not significantly different) fourth. The top three on the survey were not quite the same top three identified on the interviews. Interviewees felt most strongly about the division supervisor and agency administrator positions. Crew supervisors were generally thought to be important to safety but generally up to the job. A minority needed more training, especially in communications with higher levels, and in real-time decision- making under stress.

Note that Fire Management Officers were not flagged as one of the positions most in need of improvement, even though the respondents felt very strongly that the lack of a requirement for FMOs to have fire experience was a safety issue of major importance, in another question.

Only the top four in the table indicate special concern – crew supervisor, division/group supervisor, agency administrator, and firefighter.

**TABLE 5-4. POSITIONS MOST IN NEED OF
STRENGTHENING TO IMPROVE SAFETY (Q4)**

	Percent of Respondents
Crew Supervisors	34
Division/Group Supervisors	31
Agency Administrators	28
Firefighters	27
Operations Section Chief	16
Incident Commanders	12
Fire Management Officers	11
Strike Team/Task Force Leaders	9
Other Incident Management	6
Safety Officers	5
Other (write ins)	3
None in Particular	4
Can't Say	4

*Note: These sum to over 100 percent because respondents were allowed two choices.

Briefings and Plans

Safety and good firefighting requires incident commanders and subordinates to develop good plans and communicate them clearly to the operations staff and ultimately the crews and firefighters below them.

Many problems involving briefings and plans by leaders were raised during the one-on-one interviews and focus groups. Question 9 and 86-90 addressed them on the survey.

Setting the Proper Tone for Safety – Agency administrators came under criticism in the interviews and survey for failing to set the proper safety tone in briefings and in dealings with Incident Management Teams. The criticism was of three sorts:

- Meddling in fire management without having adequate fire safety knowledge (which is correctable by training if not experience, unless it is a personality problem).
- Timidity in setting the tone ("the agency administrator hid during the fire"). This may be from lack of knowledge or interest.
- Inappropriate strategic goal setting (e.g., having an expectation of containment without understanding that the resources available will not be enough; or setting politically motivated goals that may increase risk for firefighters).

On the survey, 30 percent of respondents said that agency administrators only occasionally or rarely set the proper safety tone; only 23 percent felt they usually set the tone properly. (A large number, 18 percent, mostly basic firefighters, answered "can't say"; many first level firefighters never see the administrator, and could not answer.)

Some agency administrators who were interviewed were among the harshest critics of their peers. They lamented the fact that agency administrators no longer have to have fire experience. About one-third of the agency administrators surveyed said that they thought that their fellow agency administrators only set the proper tone occasionally or rarely, if ever; their opinions were quite similar to that of the rest of the group on this question (Q9).

Lack of Crew/Supervisor Input – About one-third of the survey respondents said that a frequent and important problem was that planning meetings at fires were conducted too much like military briefings, with too little participation by crew supervisors. Crew supervisors among the interviewees said they often were not allowed to speak, or to raise questions about strategy during these meetings. That meant they had less of a chance to clarify the instructions, and less chance to raise problems for consideration based on their knowledge of the terrain. Both can lead to safety problems. In addition to the 31 percent who said this was a frequent and important problem, another 27 percent said it was infrequent but important. Only 19 percent said it was not a common problem (Q90).

About a third of those surveyed also said that planning frequently occurs when crew supervisors are exhausted, and this was an important problem. Planning meetings may be held after dinner, or in the middle of the night, and miss the best input of crew

supervisors, who are exhausted from the daytime operational period. Only 13 percent said this was not a common problem and only 8 percent said it was not a very important problem. Leadership needs to pay more attention to supervisors when these planning meetings are held (Q87).

Rigid Adherence to Plans – Managers sometimes mis-time their plans but stick rigidly to them anyway. Sometimes the work on the fireline goes slower than anticipated, the fire spreads further, resources ordered do not arrive, and the plan is invalidated. Or work that was to be completed during daytime goes into the night, but the work requires daylight to be done safely. This type of problem was thought to be frequent and important by a quarter of the respondents. Only 14 percent thought it wasn't a common problem (Q89).

Mixed Messages – Two other planning problems were cited less frequently. The first was having mixed messages about safety in incident action plans; for example, the plan might lead off with a statement about not compromising safety, and then plan a construction of a downhill line without sufficient mitigation of the dangers. About half the survey group thought this was an infrequent problem though important when it occurred. It was cited as a frequent and important problem by 18 percent, and not a problem by 19 percent (Q88).

Unclear statements of incident objectives or strategy occur infrequently, based on the survey. A quarter thought it wasn't common, a half thought it was infrequent but important when it did, and only 9 percent thought it was a frequent and important problem (Q86).

Making Size-ups – Inadequate size-ups – initial analyses of fire situations – due to inadequate experience was another problem raised by interviewees. Some felt that size-ups should be made with the benefit of checklists. The analogy was to a pilot and co-pilot doing a cockpit check before takeoff. This could be done by two people communicating by radio, one at the fire and another at the IMT base or elsewhere.

Briefing Crews Transported from Other Areas – Overall, about one-quarter of the survey population felt there was a serious problem that arose from transporting crews

to other areas with different fire characteristics than their home area. Many interviewed said they were not familiar with the fuel, terrain, and climate of the new area, and that the lack of knowledge wasn't being compensated for by good briefings en route or after arrival at the scene. The respondents from the Northwest Area rated this as a greater problem than did any other geographic area. Thirty-three percent thought it was of major importance, vs. 24 percent in the overall group. Eighty-one percent thought it was either of some or major importance, vs. 69 percent for the total group. More female firefighters (32 percent) thought the transfer of crews to other areas caused a problem than did males (23 percent) (Q131).

Accountability

One of the highest concerns raised in the interviews and focus groups was the perceived lack of accountability for safety violations. Fire managers and firefighters who violated safety rules were often not even verbally reprimanded let alone given punishment. The strongest feelings expressed were about the lack of accountability of crew supervisors and division supervisors, but it extended to all positions.

> *You never hear about anything happening to unsafe crew leaders*
> *or overhead people. The problems just fade into the background.*
> *We all do unsafe things and we get away with it.*

> -Hotshot Foreman, 15 years of experience

On the survey, only 13 percent felt that firefighters and fire managers were usually held accountable when they violated safety rules or were at fault in a safety incident. The majority felt that people were held accountable rarely if ever (34 percent) or only occasionally (28 percent). The norm seems to be that people get away even with safety violations that have been noticed by others. If leaders do not take these people to task, it probably makes it easier to repeat violations in the future.

Interviewees said that safety violators often return to their home area before any action can be taken. Most supervisors do not try to "pursue" violators, preferring to let the issue drop. Supervisors expressed concerns about getting sued or doing damage to ones' relationship among peers if one too rigorously tries to "prosecute" offenders. There is not

a strong tradition in the organizational culture that "violators will be strictly prosecuted."
Part of this attitude stems from the leader who will get the job done at any cost, risk his or
her own neck, and consider that people who emphasize safety too much should not be in
the job.

> In reference to a Type 1 Operations Chief who violates safety
> standards: *He goes somewhere else, he becomes somebody else's
> problem. The system needs some method to deal with problems like
> that.*

-Member of a Type 1 Team with 20 plus years of experience

Among survey respondents with over 20 years of experience, 40 percent thought
that firefighters and managers were rarely, if ever, held accountable, vs. 10 percent of
respondents with less than 5 years experience. (One-third of the lowest experience group
said they could not say, but even if the "can't say" responses were dropped, the
percentage would be 15 percent, still an enormous disparity in the response by experience
level.) The more experienced firefighters and fire managers wanted the most to see
people held accountable, including themselves.

Somewhat counter-intuitively, seasonal temporary employees felt even more
strongly about accountability than non-seasonal workers (66 percent vs. 45 percent), and
more non-seasonal workers dropped out of the question (said "can't say") than did
seasonal (19 percent vs. 10 percent).

A related question on the survey was whether fire leadership has a reluctance to
correct dangerous behavior observed at a fire. Forty-four percent agreed that there was
such a reluctance. That is way too high.

> *If you look at the record, you won't see people being reprimanded
> for unsafe behavior. It doesn't happen.*

-Fire Management Officer, over 25 years of experience

That suggests a need to change not only the culture of the firefighters, but the culture of the leadership in
permitting that kind of thinking (Q235).

Chapter 5
<div style="text-align:center">Leadership and Accountability</div>

If something doesn't happen to them, it becomes a way of doing business.

<div style="text-align:center">Type II crew boss, over 15 years experience</div>

Many on the survey and in one-on-one interviews and focus group discussions included the important role of personal leadership in their observations about the lack of accountability. This ranged from discussions about the need for each crew member to contribute to crew safety, to a recognition that no matter what an individual firefighter might be told, or expect, the greatest percentage of responsibility for one's safety lies firmly on ones own shoulders.

> *Its important to keep in mind that you are going to be working for someone else who may be several ridges away. Don't take his word as gospel-- you are on the line, it is your eyes that see the danger and what is going on, right now.*

<div style="text-align:center">-Hotshot Superintendent, over 22 years of experience</div>

Many of the more experienced interviewees raised the concern that rookie firefighters don't fully understand the important role they play in their own safety.

> *Safety is your personal responsibility. How well prepared [are you] is the question you have to ask yourself when you face fire. Some people believe that a lot of people are going to be watching out for them. We have gotten away from the issue of personal safety.*

<div style="text-align:center">-Hotshot Superintendent, over 20 years of experience</div>

Some of those closest to the firefighters believe that the desire to really learn the art of firefighting, and with it a recognition of ones own role in safety, is lacking amongst many of the rookie firefighters that do not consider their seasonal job as a career choice.

> *Most basic trained firefighters on regular crews, when they go on a fire assignment, are just walking behind somebody, waiting for someone to tell them what to do.*

<div style="text-align:center">Squad boss, over 10 years experience</div>

This focus on personal accountability, its importance, and its apparent absence in many cases, conflicts with the survey response that 99.4 percent of respondents believe they pay adequate attention to safety. This may well reflect a need to fully educate the fire community about what level of safety awareness is sufficient. There appear to be conflicting opinions on the level of personal awareness in the field.

Challenging One's Assignments

In the chapter on organizational culture, results were given for what people thought about their ability to point out safety problems to their supervisors. At the leadership level, the question is how often crew and division supervisors do not question the reasonableness of their fire safety assignments (Q113). The question may have been misleading because it didn't say "question the reasonableness of their fire assignments when they should be questioned." Some people may have answered how often they question their assignments as opposed to whether they are not questioning assignments when they should question them. The response profile to this question was like the immediately preceding questions, with most people thinking it was an occasional problem, a minority thinking it happened frequently, and a minority thinking it rarely happened. BIA respondents ranked the issue of crew and division supervisors not questioning the reasonableness of their assignments as a problem much more frequently than did others (40 percent vs. 23 percent) (Q113).

Safety Officers

The use of safety officers was widely praised. The main negative comment about them was that they sometimes were not used at fires because of being in short supply, or were not there early because of logistical movement problems.

But another type of complaint about safety officers was that some focused on minor issues rather than on firefighter safety from the fire. Some were said to focus primarily on hygiene issues such as washing one's hands. The point raised in the one-on-one interviews was that the safety officers should primarily focus on watching out for safety from the fire in situations where the individuals might have lost vigilance or might not be aware of a danger. Playing the role of a "parent" was seen as less important.

Twenty-eight percent of respondents felt that safety officers were not adequately focusing on fire safety issues over half the time. Just short of 60 percent of the respondents felt that there was a problem at least occasionally if not often.

> *Firefighters and crew supervisors don't even listen to some safety officers anymore because for years they have made big deals out of petty safety infractions. They don't face people on the line who they see violating safety rules, but then write them up later in camp*

-Smokejumper, former Type II Safety Officer

Almost half of the smokejumpers and hotshots surveyed said that safety officers did not focus on tactical fire safety issues enough, much higher concern than was registered by other types of crews. BLM respondents thought the lack of focus of safety officers on tactical safety issues was greater problem than did other agencies − 39 percent vs. 28 percent (Q114).

Summary

The analysis in Chapter 5 has focused on several dimensions of leadership in the wildland fire protection community. The topics analyzed in this chapter apply to all levels, all kinds of leadership. These are not issues that can be assigned over to someone else with the point of a finger. Issues of "situational awareness," of "appropriate crew use," of "leadership experience and competence" apply to all members of the community, to all components of the culture. The data analyses can be interpreted to apply to all of the types of leadership discussed at the beginning of the chapter.

With that leadership responsibility comes accountability. This also is not something that can be delegated with a point of a finger. To paraphrase an old saying, "ask not who is accountable, for the responsibility lies with all of us."

CHAPTER 6. HUMAN AND PSYCHOLOGICAL FACTORS

This chapter primarily addresses aspects of safety that deal with the human mind and cognition– its capability to deal with pressure, information overload, relationships with others, rewards, denial – the range of psychological factors that affect safety. It also addresses training. The focus in this chapter is more at the firefighter or crew supervisor level than the senior levels of leadership, except for discussing leadership training, which is covered here.

In engineering, human factors tends to mean something entirely different – how well tools are designed to fit human hands or bodies, how well dials and meters and knobs are arranged to be convenient and safe, etc. This study did not consider design of firefighting tools at all, and human factors in that sense is not discussed here. This chapter is more the psychologist's view, whereas the organizational culture chapter is more the sociologist's view, though there is no purity in organization of the issues, which often involve a complex melange of human considerations.

Self Image, Self-Esteem, Self-Assurance

Attitudes about safety were discussed in Chapter 4, Organizational Culture. Two more subtle aspects of attitude are discussed below: complacency or denial about the danger, and self-confidence in dealing with the job.

> *We need to address the three biggest issues that threaten safety:*
> *Complacency, Arrogance, and Ignorance.*
>
> -Division Supervisor with 22 years of experience

Development of Complacency or Denial – A concern of many veteran firefighters is that while new firefighters can suffer from not recognizing a threat due to inexperience, the veterans can be equally at risk if they develop complacency from

having survived many apparently dangerous situations that turned out satisfactorily. Once getting over the terror of wildland firefighting, and after escaping many hazardous situations, they may develop an attitude that they will somehow get through the next one, that they had "seen it all."

We got away with it [a particular tactic] *so we will try it again.*

-Focus group participant

 Or so said quite a few interviewed. There was a particularly strong feeling that this attitude developed more quickly among hotshots and smokejumpers, who were considered elite units, and under strong peer pressure.

People who've walked South Canyon since the fire are always saying, I did something exactly like that on another fire, and I don't think I even realized it.

-A Fire Management Specialist with 11 years of experience

A fire director of one of the agencies noted that there was a significant challenge in teaching new firefighters about the dangers of wildland firefighting without scaring them into not fighting the fire aggressively. On the other hand, not stressing the risks increases the likelihood of complacency in the face of danger.

I don't believe the new kids realize how dangerous this job is. When I got burned I got a whole new perspective on fire and what we are trying to do. I am not scared of fire but I sure as hell respect it. I don't think many of the newer firefighters respect fire like they should.

Engine Captain, over 15 years of experience

On the survey, there was strong disagreement on this issue. About 38 percent agreed that complacency set in, but a much larger 54 percent disagreed, with 20 percent strongly disagreeing. The upshot may be that there are some individuals who become complacent, and they need to be watched out for and perhaps counseled or otherwise reached (Q 15). It is also possible that those who are complacent do not see their own complacency.

Opinions here varied significantly with job experience. Incident commanders split 50-50 on the question; firefighters split 25-75, with only 25 percent agreeing. Those who recently have been hotshots or smokejumpers overwhelmingly disagreed that time on the job breeds complacency or denial.

A significantly larger fraction of the seasonal employees (41 percent) agreed that complacency or denial developed after 5-10 years than did non-seasonal employees (27 percent).

Self Confidence – The final question on the questionnaire asked people to candidly assess whether they often found themselves in fire situations where they didn't have confidence in their ability to make decisions. The vast majority disagreed with this statement, though 16 percent agreed with it. Very few strongly agreed with it. That was good news – there is high self confidence in general, which indicates a general feeling of satisfaction with levels of preparedness and competence. Coupled with some of the selection factors discussed above, it seems that most people in firefighting feel they themselves are well suited for the job, but that many other people in it are not well suited (Q238). An obvious question this raises is whether this degree of confidence is realistic or if it is simply over confidence.

One-quarter of Native American respondents on the survey agreed that they often found themselves in situations where they did not have confidence in their ability to make decisions, vs. 16 percent of the other (mostly white) group. More Hispanic firefighters denied having any self-doubts than the other group on this question. Twice as many BIA personnel said they sometimes lacked confidence as did the overall population (32 percent vs. 16 percent).

About one-third of the women on the survey said that they often found themselves in fire situations where they didn't have confidence in their ability to make decisions, vs. only 14 percent of the men. There is clearly a self-confidence gap. A puzzling 12 percent of women on that question said they couldn't say, which could make the percentages lacking confidence even higher if the women who couldn't say distributed like the women who could answer the question.

Professional Image – A common lament is that firefighting and fire expertise is not recognized as a profession within the five agencies. Firefighters are usually classified as forestry technicians or some other category rather than firefighters per se. The linkage to safety is through self-image as professionals, said many interviewed. If they are to think as professionals about safety, they should be respected. While it was very clear that the image issue was real and made a real difference to the individuals involved, it was less clear that that served as disincentive not to practice safety. However, the lack of a strong image of professionalism can affect retention.

> *"Until the* [Agency] *recognizes that we are professionals and we are treated as such you will continue to lose some of the best and the brightest.*
>
> - Hotshot foreman, over 15 years experience

Almost two-thirds (62 percent) of those surveyed said there would be some or much positive impact on safety by reclassifying and rating firefighters as firefighters (S69).

Ability to Take Extraordinary Action in an Emergency – Detailed investigations of the South Canyon Fire and some other fires found evidence that some firefighters find it difficult to drop their tools and run after having been taught to carry their tools and not leave valuable equipment behind. In policing, there is a comparable well-known anecdote of a police officer who stopped to collect brass cartridges during a shoot-out, and was shot dead while doing so; he had been trained to collect cartridges so they could be reloaded to save money, and the habit was so ingrained that he stopped to do so even during a shoot-out.

A possibly even stronger psychological factor is the desire to retain one's self-image as a professional firefighter and as someone remaining in control in the face of an emergency. The identification of wildland firefighters with their tools of the trade (saw, Pulaski tool, shovel, etc.) and other gear may make it difficult to throw them away and tacitly admit defeat by the fire. Some firefighters interviewed felt that also could be a way to prevent panic; retaining one's tool allows one to believe that one can still take some firefighting action. However, it can be denial that the situation is so dire that one

has to throw away one's tools and run. An additional factor that emerged occasionally in the one-on-one interviews was that there may also be pressure to <u>not</u> drop your tools. If a crew member is told they will be docked for lost or damaged equipment, the implication is that you do not leave them behind. Obviously, if it is clear you will not survive carrying them, you can justify dropping them. However, many situations are not clear cut and leaving the tools behind to burn, when it may not be necessary, could bring about retribution from other firefighters.

Putnam and others stress the significance of dropping a tool as an indication that things have really gone wrong and the subconscious desire to hold onto the tools to avoid confronting the seriousness of the situation. It is also important to note that in many situations a pulaski or shovel is an important tool for preparing a deployment area and might be best kept if at all possible; the same cannot usually be said for saws.

On the survey, 42 percent of the respondents agreed that it is difficult to get firefighters to drop their tools. Thirty-three percent disagreed (i.e., said it was not difficult to get firefighters to drop their tools and run). And a relatively large 25 percent said they couldn't say, even though by far the largest number of respondents were firefighters themselves. At the minimum, this result shows that there is a difference in perception among firefighters and a lack of information about this potentially critical issue. The sad fact is that many firefighters who die in wildland fires have been relatively short distances from the crest of a ridge or another safety position, and heading in the right direction, but just not getting there quite fast enough before being overcome by the fire. This anecdotal evidence, and the fact that it makes enormous common sense to lighten the load so as to escape faster in some critical situations, suggests the need to educate and train the workforce to drop their tools and run (Q16).

Some firefighters interviewed felt that the question was moot because one should never put oneself in the position of having to run away from a fire. Several interviewees were asked if they had practiced the dropping of tools and fleeing to a safety zone no one recalled having practiced dropping tools; in fact one firefighter steadfastly maintained that a firefighter "should never ever ever be in the situation where it is necessary to drop their tools." While it is clear that a firefighter should do everything to avoid being caught in such a situation it is also true that firefighters have been in the position where dropping their tools was the right thing to do.

While it is good to be prudent and not to endanger oneself, and while most safety planning needs to be oriented to preventing the need for last ditch actions, it is unrealistic to believe that it is not going to happen sooner or later to many people. The same sentiment was felt by some firefighters with respect to deployment of a shelter – if you had to use it, you were doing something wrong, and you should train to avoid those situations rather than train to deploy shelters.

Not being able to escape with tools also implied to some a failure to communicate the imminent danger. Given early warning, one should not have to run, but could hike out in advance of the danger. Again, while this is good to strive for, one needs to think about last-ditch defenses when one hasn't been wise enough or when unusual circumstances crop up to require fleeing.

Substance Abuse –Most of those interviewed and those on the survey felt that there was little or no drug or alcohol abuse problems at incident bases and camps. However, many thought there were some problems. Almost one-quarter of the people who gave an opinion on this survey thought there was a problem. Officials at base camps need to be alert to the problem – it does exist (Q237).

Over half of those answering the question from BIA said that there was a problem at base camps, vs. less than one-third for the overall population.

Psychological Preparation – Adding to stress and the problem of getting mentally overloaded is the lack of training in how to mentally prepare oneself for what is ahead, and how to mentally "reload" during stress (S106). Ways to mentally refresh generally have not been considered part of training, even for supervisors and senior managers.[22]

There also were comments in the interviews that everyone from firefighters and up needed to be taught how to deal with large amounts of information in the field – and how to recognize when critical pieces of information are missing, especially under stress.

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[22] Putnam has keyed on this problem and recommended use of meditation in the field. Presentation at Northwest Wildfire Conference, 1996.

Some of the stress at fires occurs from people being away from home. Many seasonal firefighters are relatively young, in their early twenties, and may not have been away from home or their village or their people for extended periods of time. Having to do hard work and not having much time for relaxation adds to the stress. It can lead to people's minds wandering, not staying focused on the tasks at hand, and thinking of returning home. There seems to be a particular effect of this about the third week away, said some experienced supervisors.

There were specific suggestions from the interviewees on preparing the troops for being away from home, and on incorporating stress and information overload in training exercises, and how to cope with them.

Personnel Practices: Rewards, Penalties, Feedback

It was surprising to the interviewers that so many personnel and pay issues were raised during the interviews. This would not be surprising if the question was "What would you like to see improved about current firefighting jobs?" or "What affects morale?" but it was a surprise in there was felt to be a strong connection between personnel and pay practices, and safety. The main links were through the retention of experienced personnel, the availability of the "militia" personnel to leave their regular non-fire job to train for fighting fires, and selection of the right people for the job. Experience was one of the critical issues that cropped up throughout the survey, interviews, and focus groups.

Personnel Selection – Many firefighters may be wrong for the job they do. For example, they may be too analytical, or too slow in emergency decision making, or too much "city people" without a feel for the woods and without adequate training. Considering that everyone surveyed was connected with firefighting, and about half were seasonal employees, it was surprising to find that almost three-quarters of the group (73 percent) agreed that many firefighters were wrong for the job. The people from the culture itself are saying that many are not suitable (Q232).

Agency administrators split 50/50 as to whether they agreed or disagreed that many firefighters were wrong for the job they do, whereas almost three-quarters of the overall population thought it was a problem.

Likewise, many people in fire leadership positions were thought to have the wrong characteristics for the job, for some of the same reasons as firefighters. Somewhat over three-quarters of the respondents felt that many in fire leadership were unsuited. They were not just picking at top fire leadership, but at the whole range of supervisory positions (Q233).

Many people interviewed thought that there needed to be more thorough screening of first-level crew supervisors. People should not be allowed into leadership positions just because they took the right courses and had the right experience tickets punched. Many felt there should be a subjective evaluation of the individual's competence to lead, and an assessment of likely performance in an emergency. While this could lead to various types of unfairness, panels are used to review fire officers for these qualities in local governments all the time.

A question on the survey asked specifically whether screening is needed to select first-level supervisors who do not have the mental toughness, leadership skills, or personality to lead their crews or units. The concept here was both to screen out those not considered suitable in the first place, and to review performance of crew supervisors on the job. A striking 87 percent of those surveyed agreed with this notion, with 45 percent strongly agreeing – a very strong opinion on this survey relative to other questions. This result also reinforces respondent's perceptions that crew supervisor is the position that most needs strengthening, another finding from the survey. (Q236).

Pay Incentives – At present, there are no pay incentives for permanent employees to take on fire duty, and there are some disincentives. Often one's work stacks up while on a fire assignment, causing more workload and pressure on one's return from the fire. There is little differentiation in pay for experienced, non-supervisory firefighters. Reliance has been put on people who enjoy being firefighters, and are willing to work for relatively low pay. Those serving as managers sacrifice overtime pay.

Paying time-and-a-half for overtime to non-supervisory fire positions but having a limited pay benefit[23] for supervisory positions creates a disincentive for people to take on responsibility and to attempt to move up the ladder of incident management team positions. The thinking went as follows: why should I bother to get credentials and take on more responsibility only to get less pay for being away from home? Since many people enjoy working as firefighters, if they also wind up making more money doing that than if they were in a supervisory position, why would they take on more responsibility? The link to safety, of course, is that many talented leaders experienced in firefighting are dodging taking on more responsibility and are being beat out by those with less experience on which to base judgment. An amazing 45 percent of those surveyed strongly agreed that this is a disincentive. Only 13 percent disagreed that it was a factor − a very low level of disagreement relative to other questions (Q46). This inequity in payscales has been demoralizing. While not directly a safety factor, it has helped drive out experienced personnel at the firefighter and manager level, and experience was cited as a major safety issue (S66).

Seasonals − There is little opportunity for seasonals to become permanent employees, and no particular incentive for seasonals to keep coming back. Those in low-income brackets or who do not have other decent jobs, or simply love firefighting, return. But the system does not encourage the build-up of a cadre of experienced seasonal workers, nor encourage the best seasonal workers to become permanent.

Release of Permanent Workers for Fire Duty − Some experienced fire managers say they are dissuaded from taking on fire duty by their bosses, because it takes them away from their main function. It not only is not encouraged, but can be career damaging to abide by department policy and volunteer to fight fire. That again drains experienced people and talented people away from fire duty (S67).

Lack of Recognition − There are not many recognition incentives for firefighters. Many feel underappreciated, another factor driving out experience, said the interviewees.

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[23] Time and a half of a GS10, Step 1.

There were a large number of specific suggestions made for improving personnel practices and pay. They are shown in the wording of questions S60-S78. The suggestions will be addressed in Phases II-III of this project.

Training

Almost everyone interviewed was in favor of more or better training in the classroom, and more hands-on training in the field. The need for improved training was frequently and spontaneously raised as an issue in virtually every interview and focus group.

Respondents indicated major change was needed in the quality of training, the frequency of training, and the access to training. Every one of the training issues noted in the one-on-one interviews and focus groups was agreed to by over half of the survey respondents with two exceptions.[24]

Positions in Most Need of Improved Training –On the survey, Q158 asked which positions needed to be better trained than they are now. Respondents were allowed to choose two. The results are shown in Table 6-1, Which Positions are Most in Need of Better Training. Note that the question here was similar but subtly different from a question early in the survey that asked which positions needed the most improvement. Improvements can come from building up experience, selecting the right people and other approaches besides training, though training is one of the main approaches.

The position that was selected as needing better training by more respondents than any other was crew supervisors. Over and over, in many questions, and many interviews, crew supervisors were identified as the final line of command, the final determinant of crew safety after all was said and done. Crew supervisors probably have more responsibility for safety than anyone else in the chain of command. They need to have

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[24] The exceptions were 1) that current training didn't emphasize hazards and safety enough, and that 2) training isn't really a priority, with management seldom checking to see it is done; there are no consequences if crew supervisors do not train their crews There was strong disagreement with both of those notions.

technical information, leadership know-how, and an environment that allows them to ask for information and allows them to comment on safety of the assignments given to their crews.

The second most frequently cited group needing better training was Type II firefighters. There were concerns that seasonal employees are being given less training than they used to get because of a shorter season, which in practice cuts off the training rather than cuts assignments to fires. There is a wide range of training levels among Type II crews, and attention needs to be given to those with the minimal training who are likely to be used in roles similar to those given to Type I crews. The mismatch of skills vs. assignment represents a great concern, as was discussed in the misuse of crews in the Leadership Chapter (4).

Close behind and not statistically significantly different in the rating of need for training was the agency administrators. A third of those polled felt they were one of the highest priorities for further training. Among the agency administrators themselves, a third thought they needed better training the most of any position.

EFF firefighters, and contract firefighters were given lower training priority relative to the above positions. The Incident Management Team and Type I firefighters were given the lowest need for improved training, not to say that their training was perfect.

Table 6-1 Which Positions are Most in Need of Better Training	
Position	**Percent Selecting**
Crew Supervisors	40
Type II Firefighter	36
Agency Administrators	33
EFF firefighters	26
Contract firefighters	23
IMT staff	16
Type I firefighters	8

Note: Nine percent did not exercise their vote, and reported "can't say." The total is greater than 100 percent because respondents could choose two positions.

Specific Training Issues – There were 19 training issues brought up in interviews and focus groups that were tested on the survey. They are discussed below in priority order. See Table 6-2 for a ranking of most of these issues[25] (Q159-177).

Hands-on Practice –By far the strongest consensus about training, or for that matter any other question on the survey was the need for the training to be supplemented with hands-on practice. This included senior level courses in incident command as well as manual firefighting tasks. Fully 97 percent agreed with this need, with 59 percent strongly agreeing (Q177).

Urban/Wildland Interface – There was very strong agreement on the need for more training on safety in interface fires. This included how to establish escape safety zones and escape routes in the urban/wildland interface, and the special hazards associated with structures, and the areas around structures. Because federal wildland firefighters are not supposed to be fighting structure fires in most cases, by policy, structural firefighting/suppression is not part of the training. Nevertheless, there are many special hazards to consider around structures.

> *How many wildland firefighters recognize the danger of external propane tanks hidden in the grass, or electrical lines run on poles hidden amongst the trees?*
>
> *-California Division of Forestry Engine Captain with 23 years of experience*

Also needed to be taught are how houses affect the creation of firelines, and how to determine priorities when fighting a fire near structures (when are they to be protected, and when are they not to be protected). There is fear that the public will expect the wildland firefighter to perform well around structures, especially homes, and that the firefighter is doing it but is not trained to do it (Q169).

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[25] A few issues addressed in the questions are not in the table but discussed in the text, for reasons that will be discussed below.

The next eight items all received agreement ratings of from two-thirds to three-quarters of those surveyed, but not quite as high as those discussed above.

Table 6-2. Training Issues

| | Issue | Amount of Respondents Who: | | |
		Strongly Agreed	Agreed	Total Agreeing[1]
177	Need to supplement classroom training with hands-on experience.	59%	39%	97%
169	More training needed on safety in interface zones.	29	56	86
173	Wide variety in quality of training across instructors, areas, units.	34	51	84
175	Safety training once in spring is not enough.	26	54	80
165	"One size fits all" training is not appropriate across areas.	26	54	79
162	Crews not adequately trained in real-time decision making, especially in emergencies.	18	60	77
171	More knowledge needed by crews on how weather affects fire behavior.	19	56	75
174	Supervisors of Type II and EFF crews need better training on managing people.	21	53	74
163	Training now being used as a substitute for experience.	27	45	72
166	Sharp reduction in entry-level jobs makes it difficult to get experience on Type II crews.	21	49	70
172	Shortage of good, qualified trainers with fire experience.	18	42	60
126	Training courses are often rushed or incomplete.	17	42	60
167	Seasonal workers not getting adequate training	18	40	58
168	Training on shelters is not realistic enough.	12	41	53
164	Training is not a priority; management seldom checks; no consequences for not training crews.	6	24	30[2]

| 161 | Training of firefighters does not adequately emphasize dangers and safety practices. | 4 | 21 | 25[3] |

Quality of Instructors −The third strongest response, with an agreement rating of 84 percent, was to improve the quality and consistency of instruction from instructor to instructor, unit to unit, and area to area. There needs to be more consistent use of lesson plans, more screening of instructors, and more checking that the instructors are delivering high quality instruction. The quality of the training becomes more important as experience levels drop. Of the 84 percent agreeing, 34 percent rated it as strongly agree (Q173).

Frequency of Training −The frequency of training was thought to be a problem. Safety training once in the Spring was said to be not enough, especially for seasonal firefighters. Also, the training sometimes is curtailed and sometimes cut out altogether. Some refreshers are needed in season either as part of briefings or mini-refresher courses. (Rating of 80 percent agreement − Q175).

Consistency Across Geographic Areas −While it is desirable for safety to have a common core of training applied consistently across geographic areas, "one size fits all training" was not considered appropriate (79 percent agreed with this). There are special problems associated with terrain and fuel that need to be addressed differently in different geographic areas. One example was instruction on the size of safety areas that had to be dug on tundra in Alaska. Or how fast dry grass burns in the Southwest. On the other hand, firefighters who are likely to be moved from one area to another, which is just about everybody, need some information on fuels in other areas, and need to get information while en route or upon arrival. They cannot depend on information peculiar to the fuels and terrain in their home area.

> *How can you be a division supervisor on a California chapparal*
> *fire when all you've seen is Alaska tundra?*
>
> -Fire Management Officer, over 30 years experience.

There also are significant differences in terrain that affect fire behavior, communications, and other aspects of firefighting. It is not inconsistent to want a common core, of training with a common high standard for instructors, but with some information tailored to the geographic area (Q165).

Real-time Emergency Decision Making −As noted in several places, real time decision-making at the crew level is considered by some experts who have studied crew behavior

(e.g., Putnam) as a critical factor in determining whether a crew successfully avoids danger or escapes danger. The need for training in real-time decision-making, especially in emergencies, was agreed to by three-quarters of the respondents (77 percent) (Q162).

Weather Training − There were many types of information that were identified as being needed to reach the crew level, but none more important than weather information, and how weather is likely to affect fire behavior. There are two schools of thought on this (as was discussed under information flow in Chapter 4). One is that crews should not be expected to interpret weather, but rather should be told "the weather is changing and you need to move to your safety zone immediately." The second school is of the opinion that the crew needs to be continually updated with weather information, and have the knowledge to interpret it with respect to fuels and fire situation to determine what they should do. Question 171 was inadvertently worded ambiguously to possibly mean either of the two thoughts. It was in an overall section about training, and should have been taken as a training question in that context. But the specific wording of that question was "more knowledge is needed at the crew level..." rather than "more training is needed." In any event, the subject of the crew needing information on weather registered as a high area of agreement (75 percent agreed) (Q171).

Management of People −Three-quarters of the respondents agreed that supervisors of Type II and EFF crews need better training on how to manage people. In the in-depth interviews there was, generally, agreement that they were taught the technical aspects of the job. But supervisors of Type II and EFF crews are working with crews that tend to have more turnover and less individual training than Type I crews. The effectiveness of the Type II crews was thought to be highly dependent on the quality of the crew supervisor, and the ability of the crew supervisor to lead and train on the job the crew. (The same was said for inmate crews.) (Q174).

Training as Substitute for Experience −A frequently heard complaint across geographic areas was that training is now being used as a substitute for experience. That was said so often it almost became a truism. On the survey, 72 percent of the respondents agreed, with 27 percent strongly agreeing. The unwritten part of those remarks, drawn out in the in-depth interviews, was that the training was not realistic enough to be a substitute, at least in most present forms of training being used. There was a call for

more field work, for more computer-based modern simulations, and for crew supervisors, IMT members and senior managers to get more training using realistic scenarios. There were many specific suggestions given on how to improve the realism of the training (Q163).

Structural fire departments, the aviation industry, the military, and law enforcement are all possible sources of techniques and technology for effective simulation. All four professions share the wildland fire professions need to simulate hazardous and potential fatal situations to train people how to respond appropriately and under high stress. Some work has been done on wildfire simulations but there was a strong call for more, and more effective, simulation as part of training.

Reduction in Entry Level Jobs – The sharp reduction in entry-level seasonal jobs on Type II crews (such as brush disposal crews) was a factor cited in why it is difficult to get early experience in the career of a firefighter to be safe. (Agreement rating 70 percent – Q166).

Training of Seasonal Workers – Many felt seasonal workers were not getting adequate training, especially as the length of the season has been curtailed. This was a repeated theme whenever seasonal workers were discussed in the interviews, focus groups, and survey comments. On the survey, 58 percent of all respondents felt that seasonal workers were not getting adequate training. Agency administrators disagreed that seasonal workers are not getting adequate training (56 percent) whereas the majority of the other ranks felt that it was a significant problem (Q167).

Slightly over half of the seasonal temporaries agreed that they did not get enough training, whereas over 70 percent of the permanent employees said the seasonals didn't get enough training. The permanents had fewer "can't says" than did the seasonals on this question, but even allowing for that, the permanent employees felt stronger about this issue than did the seasonals.

Shortage of Qualified Trainers – It was felt by 60 percent of those surveyed and many of those interviewed that there was a shortage of good, qualified trainers with solid fire experience background. As noted earlier, the problem of the variation in the quality

of instruction between instructors, units, and areas had received an even stronger score (84 percent agreement). In other words, there was concern about the shortage of good instructors but even more concern about the variation in the quality of the training (Q172).

Completeness of Training – About 60 percent of respondents thought training was rushed or incomplete. Permanent employees felt even more strongly than did the seasonals that training courses were often incomplete and rushed (73 percent vs. 54 percent, respectively agreed) (Q176).

Training Availability – Several firefighters and fire managers interviewed felt that either the types of wildland fire training they needed were not readily available or they were not allowed to attend the training by their home organizations. On the survey, 32 percent felt that the problem was not being allowed to attend training, and 40 percent that the right training was not available. (These two issues are not included in Table 6-1 because they were worded differently from the others and the comparison would be confusing.)[26]

Among agency administrators, 75 percent felt that the types of fire training they needed were readily available, a much higher satisfaction level than for other ranks. However, the other ranks thought that agency administrators needed more training in fire issues. There is a difference between their self-assessment of the adequacy of training and that of others.[27]

Almost half of the permanent employees (46 percent) <u>disagreed</u> that the types of wildland training they needed were readily available, and that their agency allowed them

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[26] These two questions – on availability of training and on being allowed to attend training – were intentionally worded positively, whereas all of the others in this section were stated in the negative. That is, agreeing with Q159 and Q160 meant you thought there was not a problem, whereas agreeing with the remainder of the questions meant you thought there was a problem. There would be more concern if these two questions had been placed in the middle of a set of questions that were all negatively worded; however, they were the first two questions, and therefore were less likely to be misconstrued in that position. But the agreement scores would be confusing to put on the table, wherein all the other items agreement means agreement with there being a problem. Considering the negative side of questions 159-160, they would rank in the lowest set of problems.

[27] Within the past year there was a surge of interest by agency administrators in taking fire-related courses at the training facility in Marana, Arizona, so the situation may be changing.

to attend the training they need (almost identical scores on both questions). In surprising contrast, a smaller fraction of seasonal temporary employees disagreed that the training they needed was readily available, and disagreed that they were allowed to attend the training they needed (37 percent and 25 percent, respectively). The in-depth interviews had pointed more to the difficulties of seasonals getting adequate training than permanents. And on question 167, 58 percent of the survey population agreed that seasonal workers were not getting adequate training.

Shelters – Training on shelters deserves special attention. In the course of the interviews, there were many strong comments about the need to improve training on the use of shelters, though only half of the respondents on the survey agreed that it was a problem. The main issue raised by experienced firefighters is that instruction on the deployment of shelters is usually done under benign conditions, such as the front lawn of the training facility, or indoors. Several thought it would be much more useful to conduct the training on rougher ground, say a slope, and use a wind machine or natural winds to simulate the more severe conditions under which the shelters have to be deployed. Opening a shelter and then getting into it and holding it down securely in a strong wind is a quite different skill than doing it in total calm.

> *We need actual deployment practice, getting into the shelters on*
> *the side of a hill after scraping out a deployment spot, not in the*
> *shade on the lawn in front of the district office.*

> -Hotshot foreman, over 15 years of experience

Many comments also were received about the difficulty of using shelters, the desire for improving their technology, and the need not to rely on them as the prime approach to safety, but rather only as a last resort. (Elsewhere we discuss their psychological impact.) (Q168).

Other Training Issues – The twenty questions on the survey that dealt with training were far fewer than the number of detailed observations and suggestions provided during the interviews and focus groups on training needs. Some of the additional training needs were reflected in the suggestions section of the survey. For example, there were strong suggestions on the desirability of getting crews to practice

responses to emergencies (e.g., practicing communications within the crew, communications with higher levels, dropping tools and running, and identify safe areas, etc.). Real time practice of using simulations as close to reality as possible was one of the areas thought most missing from current training, and most desired. Filling that gap was seen as likely to have strong positive impact by 41 percent of those surveyed (S13).

Other training issues flagged in the interviews and agreed to on the survey were:

- Training on developing situational awareness (the ability to recognize dangers). This was thought to be particularly important for crew supervisors, but everyone could benefit.
- Lack of an annual test of safety knowledge.
- Wasting spaces in training on those who are just getting tickets punched for resumes, rather than those who sign up to be available.
- Lack of adequate realism and relevance to the training, such as using critiques of real fires.
- Need for more use of graphic videos in training, to show reality and overcome boredom of training.
- Simulating entrapment and practicing what to do, including use of shelters.
- Lack of adequate refresher training and/or on the job training, to supplement initial formal training.

There were suggestions raised in the interviews and focus groups on how to improve all of those areas.

Management Training –Many of the laments about management training were similar to those for improving firefighter training. In addition to those reflected in Table 6-1 and elsewhere in the report, there was concern about:

- The lack of adequate training of supervisors of Type II, EFF, and inmate crews
- Lack of realistic scenarios for practicing go/no go decisions on when to fight a fire

- Lack of realistic scenarios for real-time decision making for each IMT position
- Lack of adequate exposure to strategy and tactics in courses aimed at upper management, including agency administrators.

Female and Minority Perceptions About Training – In general, firefighters of both genders and the major ethnic groups on the survey felt similarly about training, with a few exceptions.

There was a slight difference between males and females in their perception of the availability of training. A slim majority of female respondents (52 percent) disagreed that the types of fire training they needed was readily available, whereas a slim majority of men said that training was readily available. The difference between males and females was not highly significant statistically, but one of the few cases where a few percentage points changed the group majority opinion from agreeing to disagreeing. There was no disagreement between males and females as far as whether their agency allowed them to attend the training, just on the availability of the right kinds of training.

More women (33 percent) than men (24 percent) felt that training doesn't emphasize the dangers and importance of safety practices enough (Q161).

Significantly more female respondents (71 percent) than males (54 percent) felt that more training was needed on hazardous materials (Q170). Significantly more women than men strongly agreed that more knowledge was needed at the crew level on how weather affects fire behavior; 84 percent of the women agreed with that need vs. 74 percent of the men; 33 percent vs. 17 percent strongly agreed, respectively (Q171).

A strong majority of Native Americans (75 percent) felt that more training was needed on hazardous materials, vs. 57 percent of the overall group. More BIA respondents to the survey agreed with the need for more training on hazardous materials than did other agencies (77 percent vs. 57 percent).

Crew Supervisors and Firefighters Ability to Cope

A large concern arising from the investigation of firefighter fatalities and the human factors literature is the danger of overloading crew supervisors with information and tasks. When that happens, the crew supervisor may "burrow in," focusing on a simple manual task or only a small portion of his or her leadership duties. They can lose situational awareness, and stop being a leader. Also, it is difficult for humans to remember a long list of different considerations, and that gets even worse during emergencies. There are too many lookout situations and warning situations and orders to keep track of. The crew supervisor was selected on Question 4 of the survey as the position needing the most improvement, in light of concerns such as the above.

Questions 116-119 on the survey explored perceptions about crew supervisors capabilities from the human/psychological factors perspective. The issues considered were:

- overload
- control of the crew
- recognizing danger
- reacting to danger

The survey respondents felt there were fewer problems with crew supervisors ability to handle their load of information and tasks than was the case for the members of the Incident Management Team. About 19 percent of respondents felt that crew supervisors get overloaded on over half the fires, while 54 percent felt that happened only occasionally, and 18 percent rarely.   One-quarter of crew supervisors said they were overloaded frequently. Unfortunately, while the everyday firefighting job of the supervisor may be easier to handle than the IMT from an information overload viewpoint, it is in the extreme emergency situation that it matters, and that is a relatively rare event not amenable to a single survey question. In other words, the fact that information

overload didn't register as a big issue for supervisors on the survey doesn't necessarily mean it isn't as important as the people who were interviewed and the literature says it is, especially at the point in time when a crew is in danger of being overtaken by a fire (Q116).

Crew supervisors not adequately controlling their crew members was rated to be a frequent problem by only 11 percent of respondents (Q117). Crew supervisors not recognizing danger frequently enough was rated frequently a problem by 14 percent (Q118). And crew supervisors not reacting properly to dangers was a factor rated frequent by 11 percent (Q119). Those are relatively low indications of problems, but on each of these questions, the majority said the problem occurred occasionally. There seemed to be a consensus from the interviews and focus groups that crew supervisors generally were doing a good job. They generally were well selected and reasonably well trained. However, despite the low ratings of individual problems above, their was a strong consensus that supervisors could use better training and practice in dealing with information overloads and in dealing with emergencies.

Those who were crew supervisors themselves rated the above issues quite similarly to other ranks.

Number of Safety Rules and Guidelines − One of the most common feelings in the interviews and focus groups was that there are too many safety rules and guidelines to remember and use in decision making at fires. Over one-third of the survey respondents (37 percent) agreed, with 11 percent strongly agreeing. However, a surprising 51 percent disagreed. Many praised the safety rules. The main disagreement between the two parts of the population is whether one can remember and use the rules and guidelines in decision making at fires. One of the highest scoring strengths of the current system discussed in Chapter 3 was the use of the LCES system, which vastly reduces the number of rules to remember (Q120).

If you can't "spell" L.C.E.S. you shouldn't be where you are!

-Hotshot foreman, 25 years of experience

Almost two-thirds (62 percent) of the smokejumpers on the survey agreed that there were too many safety rules, almost double the concern level of the Type II crews. One might have thought the results would have been exactly the reverse. It is hard to believe that Type II crews have an easier time of remembering safety rules than the most elite firefighting crews. The strength of comments by the smokejumpers may reflect more intensity of feeling about the problem, or that they were not necessarily answering the question with respect to their own group, but rather for the group at large. (Is it possible that smokejumpers are busier and have more on their mind?) It also may be that smokejumpers feel they do not need all of those rules because of their experience and judgment, and that the LCES suffices (as some smokejumpers said to our interview team).

Those respondents with more years of fire experience complained more about the numbers of safety rules and guidelines than did the firefighters with the least experience. For example, about 45 percent of those with 16-20 years experience agreed that there were too many rules, vs. 25 percent of those with less than 5 years experience.

About 29 percent of females on the survey agreed that there were too many safety rules and guidelines, whereas 38 percent of the males agreed – a significant difference.

Heads Up or Heads Down −Another aspect of information overload is whether firefighters can keep a watch out for the fire and still use their tools safely. Some firefighters commented that when they are using a saw, they need to stay focused on the saw operation to make sure they don't injure themselves or someone else. However, the vast majority of respondents disagreed with this point, with one-third strongly disagreeing. They would argue that firefighters have to occasionally look up and perform a "situation check," and not get totally absorbed in the task at hand. They need to retain a modicum of situational awareness. They need to see where the rest of their crew is, and to make sure that they still are in touch.

One of the changes in the wildland firefighting culture that many felt is needed is to go in the opposite direction: getting more input from alert firefighters passed on to crew bosses, and then crew bosses transmitting their perception up the line, rather than people just focusing narrowly on their own task. Interviewees described experiences on

some crews where information and objections were welcomed by the crew boss and others where there was nearly zero information flow from the firefighter level upward.

A majority of firefighters interviewed cited snags as a major danger. The importance of communications and a "heads up looking around" attitude is clear when snags are a risk (Q121).

Reliance on the Supervisor − Related to the above issue, there was strong disagreement as to whether firefighters should rely on their crew supervisor and squad boss to watch out for the safety of the crew, or whether the firefighters had to watch out for themselves. This question had one of the strongest disagreement ratings of any question on the survey; 76 percent disagreed that firefighters should rely on their crew supervisor, with 46 percent strongly disagreeing (Q122). On the other hand, almost a quarter of the respondents felt that firefighters should rely on their crew supervisors. Combining Q121 and 122, there seems to be a sizable minority in the workforce who feel that they should just do their job head down, and rely on the squad boss or crew supervisor to keep them safe. Operational policy on this needs to be clarified and communicated to all crews; there should be a consistent way of thinking about that aspect of safety at fires. The strength of the disagreement may be indicative of the need for both watching out for oneself and having the crew or squad boss watch out, too. In addition, the disagreement may have roots in the level of experience of the respondents where the less experienced individuals not only want, but also need to rely more on their supervisors as a means of gaining access to greater levels of experience.

BIA respondents agreed with the need for firefighters to rely on their supervisor or squad boss twice as much as did respondents from other agencies.

Fatigue

Most people understand that fatigue can have a major impact on safety. It is necessary to know which causes of fatigue are most important to address. That it is important does not have to be dwelled upon.

Fatigue in wildland firefighting arises in many ways. Crews may be asked to work too many consecutive hours, days, or fires. They may be pushed too hard to avoid a transition to a higher level fire, either to hold down expense, or to avoid a more complex situation, or because of lack of available crews.

Adding to the fatigue problem is the noise level around sleeping crews. This was said to be a problem especially in daytime, around crews who had worked at night. They have a hard time getting adequate rest. Camps are not quiet places. Some suggested that the problem was so bad that night crews needed to be rested in separate camps or even transported to motels.

Adequate hydration is also important for reducing fatigue, as well as for health. In combination with fatigue, a dehydration problem can be of great concern. Adequate hydration is stressed for Type I crews, but some of those interviewed felt that it needed more emphasis among Type II crews.

Finally, many thought that fatigue would be reduced by increasing use of helicopters for transport, rather than hiking in. But that may result in their being put down on mountain tops and ridge lines, thus increasing the risks of the downhill hike and possibility of downhill line construction. An increased use of helicopters for transport also carries with it the added cost and added exposure of firefighting crews to the risks associated with helicopter operation. (Note that on the survey, helitack crews reported lower fatigue on consecutive fires than the other Type I crews.)

Questions 223-231 on the survey addressed various aspects of fatigue. The results are summarized in Table 6-3.

Lack of Crew Acknowledgment of Fatigue –Fatigue can cause major safety problems, especially when a crew does not acknowledge its fatigue level, and is not aware of how their potential for getting injured goes up significantly with fatigue. This was the highest rated fatigue issue. It was judged a frequent and important problem by 57 percent of the survey respondents, and less common but important when it occurs by another 38 percent.

Table 6-3. Fatigue

	Aspect of Fatigue	Frequent and Important (Adjusted Percent)	Uncommon but Important (Adjusted Percent)
231	Crews not acknowledging their fatigue.	57%	38%
229	Crews dispatched at night not given enough rest.	57	34
227	Crews agreeing to work too long for money.	53	29
228	Fatigue levels of newly arriving crews not being checked.	44	47
223	Crews asked to work too many consecutive hours.	44	45
230	IMTs being fatigued.	30	55
224	Crews asked to work too many days at a fire.	29	51
225	Crews asked to work too many consecutive fires.	29	45
226	Crews pushed too hard to avoid transition to a higher level fire.	16	53

Note: Percentages adjusted after deleting responses of "can't say."

Lack of Rest After Dispatch at Night – Rated almost a tie for the highest concern was crews being dispatched in the middle of the night and not given adequate rest after their arrival, but before receiving an assignment. They don't get much of a night's sleep, but are immediately put on the fireline, and start in a highly fatigued situation. This, too, was rated important and frequent by 57 percent and important although not frequent by another 34 percent (Q229).

Stories abound of crews arriving exhausted at base camp after driving all night either from their home base or another fire and being put immediately out on the line.

While it appears that plans and operations rarely ask incoming crews about their fatigue level it is also true that many crews do not speak up about their need to rest upon arrival at the fire. This often relates to eagerness to get "on the fire," the objective of earning money, pride in the crew's stamina and the belief that the crew won't get any sleep in camp during the day anyway.

Desire for Extra Money – Also among the top three fatigue issues was some crews agreeing to work too long to make more money. They may mask their fatigue condition to stay out longer.

> *I almost hate to blame safety problems on fatigue, because that is*
> *our bread and butter.*

-Smokejumper, over 20 years experience

Data from a study in the BIA showed that the majority of injuries occurred among crews during the third week they had left their home base.[28]   While the problem was rated high in every geographic area, it was rated highest in the Northwest and the Northern Rockies areas.   Seasonal firefighters thought that crews working too long to make money was a worse problem than did the permanent employees (Q227).

> *Overtime is what we're after, and I think a lot of people on the fireline push*
> *themselves past their workable point of fatigue. Hotshots do this for weeks at a*
> *time, then the season goes on and it accumulates.*

-Smokejumper, over 20 years experience

Fatigue Levels Not Checked – Sometimes crews have worked at other fires before arriving at their next, but their fatigue level is not checked. They are treated as a "new" crew even though they may have been working long shifts for two weeks. This was rated frequent and important problem by 44 percent, and frequent but not important by another 47 percent (Q228).

FMOs thought that the fatigue levels of newly arriving crews was an even more important problem than did other ranks. Forty-nine percent of FMOs said it was an important problem, vs. 39 percent overall, unadjusted. This was a question in which the

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[28] Personal communication, Steve Haglund, Fire Director, BIA.

higher the rank of respondents, the greater importance was put on the problem, except for agency administrators, of whom 25 percent said it was an important problem.

Too Many Hours, Days, Fires – Too many consecutive hours was considered a more frequent and important fatigue problem than too many days at a single fire, or too many consecutive fires, but all were judged to be important.

> *Anyone can think in the right frame of mind after 8 hours of sleep...What about after two to three weeks on a real fire. You are tired, hungry, fatigued, worried about your wife and children.*

-Engine Foreman, over 15 years experience

Seasonal employees thought that working too many consecutive hours at a fire was a more frequent and important problem than did the permanent employees (45 percent vs. 31 percent) (Q223). Likewise, the seasonals thought that working too many consecutive days and too many consecutive fires was a greater problem than did the permanent employees (Q224-225).

Among various types of firefighters, those in helitack felt that working too many consecutive fires was less of a problem than did other types of firefighters. (The majority of helitack said it was not a frequent or important problem, whereas the majority of other positions said it was a problem. Helitack crews get transported in and out by helicopter, which may make a large difference in fatigue.[29]

Female firefighters (51 percent) felt that being asked to work too many consecutive hours, days, or fires was an even more important problem than did male firefighters (42 percent). In fact, females rated every fatigue question as a more important and more frequent problem than did males.

IMT Fatigue – It is not just crews that are endangered by fatigue; incident management teams are, too. Their fatigue problem was rated lower than the issues above, but still significant (Q231). There was a sharp difference between genders on this issue: 38 percent of the women thought was an important and frequent problem vs. 19 percent of the men.

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[29] It might be worthwhile exploring actual injuries as to whether too many consecutive hours, days, or fires was the larger problem. This has been considered in evaluating shift lengths for urban firefighters, EMTs and dispatchers.

Transitions – The fatigue problem getting the lowest ranking was crews being pushed too hard to avoid a transition to a high level fire. That reason, brought up by one person during an interview, is not rare, but also seems not to be common.

Over-Reliance on Tools and Shelters

It was suggested by several interviewees that firefighters tend to rely too much on their tools for safety. They became psychologically dependent on them, putting too much trust in the technology. Examples of this include counting on a pump to work, stretching the capability of a helicopter, relying on an engine to work for escape (as opposed to having an escape route on foot after disembarking)[30] and – receiving by far the most emphasis – reliance on shelters.

There were sharp disagreements on the national survey on this issue. Half (50 percent) of respondents agreed with the premise that firefighters over-rely on their equipment, with an additional 9 percent strongly agreeing, for a total of 59 percent. But 36 percent disagreed (Q61).

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[30] The death of two volunteer firefighters at a 1995 wildland fire in which they could not restart their old two-wheel engine was a vivid example in many people's minds of the dangers of relying on a vehicle to drive out of a wildland fire situation. The vehicle may not work when you need it. You need to plan escape routes both by foot and alternative ways to drive out if there are any, which often is not the case.

When asked specifically about whether carrying a shelter leads people to put themselves in risky situations, 26 percent agreed; however, 50 percent disagreed and another 21 percent strongly disagreed, for a total of 71 percent disagreeing. So while there was a majority feeling that firefighters over-relied on equipment, a much smaller number felt that shelters were giving false security. Nevertheless, there were some very strong opinions in the one-on-one interviews that there were too many firefighters who felt that shelters were the equivalent of parachutes to safety, and endangered themselves with the confidence that they could just get into their shelter and escape from a fire. A number of senior fire managers strongly felt that firefighters must be taught not to rely on shelters first; they needed to avoid getting endangered in the first place; second, they needed to plan escape paths; and third, they needed to understand that deploying a shelter safely required having a large enough safety zone in which to deploy it. These managers generally also felt that deployment of a shelter was a sign of failing to heed safe practices, though a valuable last ditch defense. In general, pilots have been successfully taught to fly safely and not rely on their parachute to bail them out from carelessness, but rather consider it as something to be used as a last ditch defense, which might well get them injured when used. Many felt it was important that firefighters thought the same way about their shelters.

Less than one-quarter of those identifying themselves as firefighters but almost two-thirds of the smokejumpers agreed with the premise that shelters lead people to put themselves in risky situations.

Vehicles – Another question on the survey asked whether too much use is made of two-wheel drive vehicles. About one-third of people responding to the survey felt they couldn't say. The majority of those who answered did not agree that two-wheel vehicles were used too much (Q63).

Crew Dynamics

Frequently cited in the literature and in investigations of wildland firefighter fatalities is the impact of crew dynamics on safety. A group of seven aspects of crew

dynamics was addressed on the survey (Q96-102). These factors came more from the literature and experts than from the one-on-one interviews.

The subject of crew dynamics seemed to be more difficult for individual firefighters to address, more so than many of the other issues here. It was rarely brought up spontaneously on the interviews, though many comments on interviews touched on the fringes of crew dynamics (e.g., the need for competent crew supervisors, and the increasing use of crews comprised of strangers).

The elements of crew dynamics considered on the survey were as follows:

- Crew/team cohesion (working together)
- Crew/team leadership
- Stable crew/team membership
- Clear role assignments
- Ability of members to perform multiple roles
- Communication among crew/team members
- Trust among crew/team members and crew/team supervisors

Most of these issues were cited by the majority of respondents as being a problem only occasionally. The one most frequently cited as a problem was stable crew/team membership. Almost one-third (30 percent) of respondents said that this was often or usually a problem. The other issues tended to be cited as being a problem often or usually by 19-23 percent of the group surveyed, with no clear distinctions among the various sub-issues.

Very few people dodged this series of questions, despite the fact that one-third of the survey respondents answered no to Q95, "In your usual role when involved in a fire

do you construct, maintain or defend fireline?," almost all answered the questions about crew dynamics, but did not emphasize them. [31]

Most respondents said the crew dynamics sub-issues listed above occurred occasionally. Slightly less than a third of the respondents thought each of these problems was rare. So there is a feeling that the crew dynamics problems do occur, but they are just not very frequent.

There seemed to be little ability, at least on a written questionnaire, to distinguish among the different subtleties that contribute to crew dynamics. Although crew members felt that crew stability was the biggest problem, that didn't seem to manifest itself in correspondingly high scores for communications problems among crew members, trust, lack of clarity in role assignments or overall crew cohesion, which all ought to be affected by crew stability – or else crew stability is not a problem.

Crew/team cohesion, the ability to work together, was cited as often or usually a problem by only 19 percent of those surveyed. Based on the number of expert comments about crew attributes, one might have expected it to be much higher. The investigation of the South Canyon fire and the Mann Gulch fire each cited crew cohesion and crew dynamics problems. On the survey, 29 percent said it was rarely, if ever, a problem. However, the fact that it was not usually a problem did not mean it was not very important when it occurred.

The Southwest Area had more respondents who felt that there was a problem with crew cohesion than any other area, at 28 percent of the respondents vs. 19 percent for the group overall. The Southwest also registered 36 percent reporting frequent problems with stability of crew composition, and 32 percent feeling that trust among crew team members and supervisors was a problem. It was either the highest or second-highest geographic area on each of the crew dynamics questions.

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[31] A puzzling 95 percent of those who said they were not seasonal employees, presumably permanent employees, said that they "construct, maintain or defend fireline in their usual role. That seemed too high, since it would include management and non-fire positions, unless those employees took the question in a broader sense than it was meant, with IMT members saying yes they defended fireline. This was one of the few and possibly the only question for which we felt there was questionable face validity.

The answers of the group who worked on the fireline and the group who didn't were much closer across questions Q96-102 than one might have expected. In fact, those who did not work on the fireline thought there were more frequent problems with crew leadership and stable crew membership than did those who worked on crews! More of those who worked on the fireline rated the problem of clear role assignments a common problem than those who didn't (24 percent vs. 18 percent).

On almost all of the questions dealing with crew dynamics (Q96-102), more of the Type II handcrews thought that the problems existed frequently than did the other types of crews.

Approximately half the smokejumpers and hotshots responding said that crew cohesion was rarely a problem. Less than one-third of the Type II handcrews felt it was rare, with 20 percent of them saying it was often or usually a problem. Among engine crews, 22 percent thought crew cohesion was often a problem, and 42 percent thought it was rarely a problem.

Many more Native Americans felt that crew cohesion was a frequent problem than did others (38 percent vs. 17 percent). Native Americans also felt there was a higher frequency of crew/team leadership problems (29 percent vs. 18 percent); clear role assignments (42 percent vs. 21 percent); communication among crew members (35 percent vs. 18 percent), and trust among crew members (35 percent vs. 19 percent). Overall, there was a clearer concern among Native Americans on crew dynamics problems than Hispanics or the general population.

However, when given a chance to rate crew dynamics vs. other issues (Q103), the Native Americans rated fatigue as the leading issue, and crew dynamics fifth.

Female respondents felt there were problems of crew dynamics slightly less often than did the men. The difference was not statistically significant on most of the questions. On Q100, ability of members to perform multiple roles, the men said that was more frequently a problem than did the women (25 percent vs. 13 percent). Even with an adjustment for the slightly greater percentage of women than men more women who reported "can't say," the male response was higher.

The BIA respondents listed every question under crew and team attributes (crew dynamics) as occurring more frequently than did their colleagues in other agencies, for all questions Q96-102. Half of the respondents from BIA felt that crew cohesion was often or very often a problem, relative to 19 percent of the overall group.[32] Almost half of the BIA respondents (48 percent) listed crew stability as a problem that occurred often or very often, vs. 30 percent for the overall population.[33] But when asked to choose the two priorities needing greatest improvement on Q103, which included crew dynamics and six other issues, crew dynamics was one of the lower ranked issues by the BIA personnel, as was the case for the other agencies.

Leading Crew Attributes That Affect Safety– It was desired to see how crew dynamics rated relative to other factors in the perception of the survey respondents. To that end, Question 103 listed seven potential problems affecting crew/team safety that had been raised by the one-on-one interviews and expert interviews. The rank ordering of these issues is shown in Table 6-4.

Table 6-4. What Factors Relating to Crew Safety Need the Most Improvement
(A "Pick Two" Question)

Question	Percent of Respondents
Recognition of varied skill levels of available resources	34.4%
Crew/team supervisors	33.1
Getting information	32.0
Avoiding fatigue	30.9
Quality of the IMT	23.3

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[32] As noted earlier, BIA had a smaller number of respondents than other agencies, so there can be greater differences just from statistical variance considerations.

[33] op cit.

Crew/team dynamics	21.9
Adequate equipment	9.9

The results here were quite striking and unexpected. Crew/team dynamics received the second fewest votes as one of the areas needing the greatest improvement to enhance safety. Perhaps respondents ranking "crew dynamics" as a low priority area for improvement 'don't know they don't know,' not realizing the significance because of individual perspective, pride in crew performance, or the culture of the type of crew (hotshots, smokejumpers, engines, etc.).   When crew dynamics had been broken into its component parts in the preceding questions, they hadn't registered very highly as problems, either.

This is an area where the experts and the field people seem to have sharp disagreement, at least on the surface. The issues of crew dynamics were brought up by relatively few of the interviewees or focus groups, and the components were not selected as very important individually, nor when ranked against other problems. <u>This does not necessarily mean that crew dynamics truly is not important</u>. It can be one of the most important issues in certain extreme situations that lead to fatalities such as at South Canyon, where there is little question that it was important. The fact that it is not perceived to be important relative to many other safety issues may mean that either there is a major misperception of its importance that needs to be corrected, or that it is important only in the extreme, when a crew is in grave danger. This needs follow-up research.

The factor in dead last place, behind crew dynamics, was adequacy of equipment. That is a very positive result. The vast majority of people surveyed felt that overall their equipment was adequate and not one of the areas most needing improvement to enhance safety, except for certain select problems such as shortage of radios. (Many feel that wildland firefighting needs to consider new technology going into the future, but that it wasn't a large problem at present.)

What was flagged as the number one improvement needed was a subtlety that was not expected to rank high: recognition of the varied skill levels of available resources.

By implication, it was important to understand when people or crews could not do tasks, and not assign tasks to them. This came up in a number of ways elsewhere on the survey and the interviews: concern about the misuse of Type II and inmate crews, concern about levels of training, concern about substitutes thrown into otherwise strong teams, and fast-tracking.

Just slightly behind recognition of varied skill levels, also cited by about one-third of the respondents, was crew/team supervisors needing improvement. This was consistent with the response to Q4 on the survey, where respondents chose crew supervisors as one of the positions most needing strengthening.

Getting information, and avoiding fatigue were also cited by over 30 percent of the respondents as important. The quality of the incident management team received significantly fewer votes, slightly less than a quarter of the group. Again, realize that these totals add up to more than 100 because each respondent was allowed two votes.

Physical Fitness

A major aspect of the wildland firefighter culture is keeping fit. The wildland firefighters have an enviable record of fitness, and a very physically demanding set of tasks. Very few wildland firefighters, especially wildland firefighters die in the line of duty from heart attack or strokes, based on U.S. Fire Administration national statistics on firefighter fatalities.[34] It therefore might surprise some that physical fitness proved to be another area of controversy as to whether fitness problems were frequent, and whether they merit high priority to fix.

Type II Crews – There was a strong consensus among those responding to the national survey that many Type II firefighters are not physically fit. (Virtually no one during the interviews raised questions about Type I firefighter fitness other than to praise it.) Almost 50 percent of the respondents said that physical fitness of Type II firefighters was a high priority to fix. Another 30 percent thought it was at least of medium priority.

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[34] Op cit.

Only 10 percent thought it was not a problem and 7 percent that it was a problem but low priority. This is a very strong response relative to other questions on the survey (Q182).

A number of interviewees said that the problem was complicated by there being was a wide range of fitness levels across Type II crews, which makes it difficult to safely match assignments to crews. This is a clear safety issue and a significant challenge for those who have to allot crews to tasks on the line without knowing their strength. About three-quarters of the respondents agreed that that was true, and of medium to high priority to fix. Only 7 percent thought it was not a problem. The Alaska, Southwest, West Basin, and North Zone (California) geographic areas all had higher than average levels of concern on the fitness of Type II crews (Q183).

Step Test Validity and Veracity – One of the highest levels of emotion with respect to physical fitness is associated with the step test. There are many who feel it does not test aerobic capacity in a job-relevant manner; many of these people would prefer a test that uses hiking or running with or without a backpack or carrying a weight.

> *The step test is a complete joke, it doesn't tell you anything about a person's stamina. The physical test has got to be relevant to the work he or she is going to be doing.*

> -Strike team leader, over 15 years experience

Others feel the step test was too demanding, saying they or others could adequately perform firefighting duties on the side of a mountain, but couldn't pass the step test. Virtually all of the active firefighters who were interviewed felt it was extremely important that they and others they count on be physically fit so they would pull their own weight and be efficient on the fireline. Almost everyone interviewed wanted to have a test that would validly screen for conditioning.

On the survey, 60 percent said that fixing problems with the step test was a high priority, and another 20 percent said it was at least medium priority. Only 8 percent of those surveyed said that there was not a problem with the step test. About 70 percent of females thought that the step test was not an adequate measure of fitness and a high priority to fix, vs. 57 percent of males. The strength of the feeling among firefighters that the step test is inadequate was virtually at the level of a cultural belief (Q184).

There also are some who believe that the step test is not legitimately administered to some groups, to avoid being a barrier to employment. Others feel that some people have been grandfathered in. Fifty-

three percent of the respondents (71 percent when those who said "can't say" are deleted) said that it was medium or high priority to fix the problem of recording people as passing the step test when they did not pass it. Only 13 percent thought the problem did not exist, and 9 percent that it was low priority to fix. The vast majority thought this was a significant problem (Q186).

Although some of those interviewed one-on-one said that they thought there were more problems with the validity of step tests administered in some areas of the BIA than other agencies, the BIA respondents felt that instances of individuals being recorded as passing a step test when they didn't was less of a problem than did other agency personnel (43 percent of BIA responders rated it low priority or not true, vs. 22 percent in the overall group.) On the other hand, 40 percent of the BIA personnel sample flagged it as a high priority, about the same as did the overall group (42 percent). There seemed to be a sharper division of feeling within BIA on this issue than within other agencies.

At the other extreme, 52 percent of NPS personnel rated this step test veracity a high priority problem to correct, the highest of any agency. (Note that the question did not direct people to consider only their own agency.)

Significantly fewer agency administrators thought that the step test was a problem than did other ranks (35 percent agency administrators thought it was of low priority to fix or not a problem, vs. 22 percent feeling that way among other ranks).

Contract Crews – The physical fitness issue with the highest concern score was the fitness of contract crews. Eighty-nine percent of those who gave a response (i.e., deleting the "can't says") felt it was at least medium if not high priority. The high priority ratings alone comprised 62 percent of the sample. There is concern that contract crews will be used more as the federal firefighting workforce decreases, but they may not have the same physical fitness as the federal crews. Some dispute this, saying that it is a misperception and that most contract crews are comprised of adequately screened personnel.

State Crews – Somewhat surprising, virtually the identical concern was felt toward the physical fitness of state crews as contract crews. It was felt that some states do not have or enforce adequate firefighter physical fitness standards. This tended to be a comment more in the Northwest, Southwest, and the NZ and SZ California areas than elsewhere. The high score in an area is supposed to reflect the experience of the federal firefighters surveyed from that area, who may or may not be referring to their own area when they flag a problem (Q188).

IMT Fitness – Physical fitness training was also considered a need for incident management team personnel. Some felt IMT personnel need to be in reasonable shape to walk the line, work at base camps, and handle the stress of the job. Slightly over half of the respondents thought that physical fitness of IMT personnel was a medium to high priority problem. While rated lower priority to fix than any of the other fitness questions here, it still was considered a concern by a large fraction of the group. A smokejumper said that "team members must be physically fit to do the job, to understand the grunts better, and to be good role models" (Q185).

CHAPTER 7. EXTERNAL INFLUENCES ON SAFETY

> *The system works fine, up to the overload point, when we scrape the*
> *bottom of the barrel looking for resources. Then priorities have to be set*
> *and the whole process slows down.* – Firefighter Interviewee

Changes in the nation's social, political, economic, and natural environment affect wildland firefighting from without, as much as firefighting's organizational culture, leadership, and human factors affect it from within.

Resource Shortages

Changes in national priorities can lead to reduced budgets for wildland firefighting, which in turn can create pressures for change in the traditional organizational culture of wildland firefighting. Changes in accounting practices within agencies, e.g., how overhead is allocated, can (and have) affected fire budgets, too.

The reduced availability of resources for wildland firefighting was a major area of concern that emerged from the one-on-one interviews and focus groups. Many firefighters challenge the notion that we can do more with less. They argued that if federal resources are reduced, then federal firefighting and public expectations also should be reduced, or other resources used to augment firefighting, until such time as improved technology, public and private fire prevention, fuel management or some other approach balances goals with resources.

There is great concern among the wildland firefighting community that reduced resources for firefighting and fuel management will lead to putting more pressures on firefighters to work harder and take greater risks, leading to reduced safety. That affects morale. Morale also is affected by a perception that senior management is not aware of pressures on the firefighters, though our interviews with fire directors and senior managers showed that that definitely is not the case in any of the five agencies.

Tolerating Budget Cuts – Many people interviewed felt that budget cuts were a root cause of changes that lead to safety problems. Others, especially some of the more senior people interviewed in the one-on-one interviews or as individual experts, felt that we could safely live with budget cuts if people are well-trained, well-led and appropriate hard choices are made to fight fewer fires when resources run out. The public has to buy into this philosophy, i.e., tolerate having some large fires monitored but not fought.

In the survey, 51 percent of the respondents agreed that we could live safely with budget cuts under the above constraints, while 46 percent disagreed, of whom 26 percent strongly disagreed – one of the stronger disagreement levels on any question on the survey (Q18).

Some people were very upset by the presence of this question on the survey, and felt it was a plot by management to bias opinions. One said:

> *Q18 is a completely BS statement – budget cuts are resulting in firefighters who are poorly trained and poorly led. We cannot afford to scale down manpower and cut budgets at a time when wildfires are becoming more hazardous, firefighting is becoming more complex, and more fuel management needs to be done.*

A larger proportion of experienced personnel than inexperienced personnel thought we could live with budget cuts if people are well trained, led, and choices are made on which fires to fight (22 percent of those with more than 20 years experience strongly agreed with the statement vs. only 9 percent in the under 5 years experience group.) Seasonal employees agreed in much greater numbers than non-seasonals as to

being able to live with budget cuts if people are well-trained or well-led (57 percent for the seasonals vs. 37 percent for non-seasonals).

Several interviewees and focus groups raised an interesting external influence issue which is not readily apparent to the majority of the members of the firefighting community but could clearly have an impact on resources for fire programs. Apparently there are instances where funds intended for disbursement on fire programs are redirected towards overhead costs of the unit on which the fire budget is allocated. Due to the decrease in funding of many other areas, the increase in overhead charge placed against funds slated for fires effectively transfers funding to other areas on the unit. For example, an interviewee described an overhead charge placed against fire for use of the computer system.

Questions 18-24 on the survey dealt with some specific resource availability issues raised by the interviewees and focus groups, as discussed below.

Reduced IMT Resources: There are sometimes too few qualified people on hand to fill positions other than firefighter during the initial stages of extended attack. This was said to be a problem often or very often by over half (53 percent) of those surveyed. The result can be a dangerous period when resources are arriving to deal with the extended attack without adequate incident command in place. About 20 percent said this was a problem very often (Q19).

Significantly more FMOs than other positions thought that there was a problem in having too few qualified people on hand to fill all IMT positions. About 71 percent of FMOs felt this problem occurred often or very often, vs. 53 percent for the overall group. An interesting side observation here was that the higher up the firefighting organization chain, the greater the perception was that IMT positions were not often filled with qualified people (Firefighter, Supervisor, IMT, FMOs) – but agency administrators felt the problem occurred slightly less often than did the overall population.

The more years of experience of the survey respondents, the more likely they thought this was a frequent problem (27 percent of those with over 20 years of experience rated it very often, vs. 3 percent of those with less than 5 years of experience) (Q19).

The seasonal respondents thought the problem of too few qualified people available to fill IMT positions occurred more frequently than did non-seasonals (54 percent vs. 34 percent).

More generally, there is a shortage of experienced red-carded IMT members, which sometimes leads to inexperienced but red-carded people being used in key IMT positions. About 41 percent of those surveyed said this occurred often (Q20).

Smokejumpers were especially concerned about inexperienced but red-carded incident management team members used in key positions; almost three-quarters of the smokejumpers on the survey (73 percent) felt that this was often or very often a problem. They were more sensitive to it than any other type of firefighter.

Shortages in Type I Crews − Just because a crew is labeled Type I does not mean that it has good experience or a good leader. But overall the Type I crews tend to have the better qualifications and experience. Shortages in Type I crews can result in the use of less qualified crews for complex duties, which can be dangerous. It also can be expensive: It can take several type II crews to accomplish the work that might be assigned to a single Type I crew. About 30 percent of respondents said that the use of less qualified crews for complex duties occurred often, and 45 percent said it occurred occasionally (Q21). Thirty-five percent of FMOs and 31 percent of ICs thought that a shortage of Type I crews occurred often or very often − about the same as the general population on the survey. However, only 18 percent of agency administrators felt it was a problem and almost one-fifth of the agency administrators responding said they couldn't say.

Field Observers − Field observers were said often to be in short supply by 32 percent of respondents (Q22). When observers are not available, first and second level supervisors may have to divert their attention away from other management duties, and do more first-hand observation themselves (which, in fairness, some feel may not be bad).

Safety Officers − There was said to often be a shortage of safety officers at fires by 24 percent of respondents (Q23). In general, the firefighters interviewed thought the

shortage of safety officers was important for safety. However, there also were complaints about safety officers (see Chapter 5). A striking finding here is that there is less emphasis on the need for safety officers than the need for there to be a more distributed accountability for safety at every level.

Reliance on Local Volunteers – Another result of not having enough crews to go around is the increased reliance on volunteer firefighters for initial attack, and sometimes for periods beyond that continuing for hours or days. However, as discussed earlier, many volunteers often do not have adequate training or equipment for wildland fires. A local volunteer department's first responsibility is to protect the people and property of their community. As more people move into the urban-wildland interface, the volunteer role is growing; but their first priority is to be prepared for structural firefighting. The concern is that inadequately trained or inadequately equipped volunteers endanger themselves, and can create a weak link that can have a cascading effect on the safety of others. Over 54 percent of those surveyed said this occurred often. More BIA personnel (78 percent) said that use had to be made of volunteers who lacked adequate wildland firefighting training than did the overall sample (54 percent.). Of these, 24 percent said it occurred very often. Only 9 percent said it happened rarely (Q24).

Shortened Season for Seasonal Workers – Many interviewees said reduced resources also has caused seasonal workers to be hired later in the season and laid off earlier in the year than they used to be, which they believe causes the remaining workers to work harder and take more risks. About 47 percent said this shortage of seasonal worker days was a serious or very serious problem; 22 percent said it was true but not serious. Another 20 percent said they were not sure; if these responses were deleted, well over half the rest thought it was a serious problem. The Southern Zone (CA) registered the highest score on this concern, with 66 percent of the respondents feeling it was a serious or very serious problem (Q25).

Political Pressures

Another of the most strongly emphasized issues that came out of the one-on-one interviews and focus groups was dealing with political pressures that affect the decision to fight a fire, or the choice of firefighting strategy or tactics. Sometimes fires are fought when they could have just been monitored. Parameters such as low expectation of fire spread or positive ecological impact are often overridden by the political need to "fight" the fire. Usually the pressures came from local media, homeowners, businesses or politicians, who see the fire, are concerned about its spread, and think that the federal government is "doing nothing about it." One interviewee, not totally tongue in cheek, suggested a list of watchout situations for overhead teams that included "Watchout when the governor is on the phone or on his way to fire camp." Every fire fought presents some risk to firefighters. Fires that are fought more aggressively than the true situation dictates add needless risk.

This problem worsens during high fire seasons, when resources are limited and fighting an extra fire may mean sending less than the best units or a less than adequate complement of resources to the scene. Often cobbled-together crews or IMTs have to be sent after most other resources are committed.

Political pressures often affect not just whether to fight a fire, but how to fight the fire. Demand for containment or extinguishment may cause a more aggressive approach to be taken than would otherwise be the case. Political pressures to defend homes in the urban/wildland interface in places where they are extremely difficult to defend may lead firefighters to have to build fires lines that do not take best advantage of natural features (for example, building a fireline in front of a subdivision instead of anchored at a creek behind it).

Political pressures also often force federal incident commanders or lower level supervisors into a structural protection role. In some reported cases this "protection role" became a structural suppression role as fire reached residences. Several federal firefighters interviewed said that it was extremely difficult for firefighters to stand by and watch a home burn when people are asking them to help save it, regardless of policy.

*...interface fires are certainly the worst we have. You have
homeowners yelling at you to do something. You feel sorry, that
could be my house. Politically we have to throw everything we
have at a fire -- especially if its threatening somebody's house.*

Regional Fire Management Officer, over 25 years of experience

They are often in the eye of TV cameras, with individual members of the public and local
officials beseeching them for help. Some said that if they truly are to abide by the letter
of federal policy and not fight structure fires, then they need to be guaranteed political
support in standing up to the media and to the negative comments they will receive. This
is a clash of values within the organizational culture. The firefighter wants to be
defended from what appears to the public to be bureaucratic delay or laziness or
cowardice, or the firefighter wants to be trained to handle structural fire safety, and
allowed judgment or given authority on when it is okay to do so. At present, they are put
in danger and/or made to feel badly about taking the risk.

In the survey, 59 percent of firefighters said that politics often affect the decision
to fight a fire.   Of these 23 percent said it happened very often. Only 9 percent said that
it rarely if ever, happened, in their experience (Q28).

The smokejumpers, hotshots, and helitack respondents all rated the political
influence on firefighting as occurring even more often than did the rest of the group,
indicating their particular sensitivity.

Agency administrators disagreed with the main group, with less than one-third (31
percent) believing that politics often or very often affects the decision to fight fire (vs. 59
percent for the total respondent group). They also sharply disagreed with the FMOs
surveyed, in the same proportion. Since one might expect agency administrators to be
particularly sensitive to political pressure issues, their opinions are important. Either the
general group is cynical about political pressures, and overestimates them, or the agency
administrators are somehow not seeing the pressures put on incident commanders and
those on the fireline. (This might be worth clarifying.) Another possible interpretation is
that the question is the frequency – what constitutes "often" – one-third of agency
administrators thought the problem of political pressure occurred often or very often,
which represents a large number of cases. They may have a more accurate view, while

firefighters, who occasionally hear of political influence, may exaggerate the frequency. Regardless, it is clearly flagged by all groups as a major issue that affects firefighter safety.

Public Perceptions and Political Pressure − Political pressures play a role, and they ultimately come from the public, or perceptions of the public's perceptions. It therefore was felt by many interviewed that a major problem that ultimately affected safety was the lack of public and media understanding of the risks of the urban-wildland interface, and the limitations of wildland firefighting. If public expectations were lowered, or at least made more realistic, that could either raise budgets and provide more resources to get the job done, or increase acceptance of losses, and reduce pressures to use firefighters unwisely. A third option is to shift more of the fire protection responsibility to the public, as discussed next.

Public Awareness and Code Requirements

The growth of homes in wooded areas − and the expansion of the urban/wildland interface – creates a danger to firefighters by shifting their attention from fighting a fire solely in the context of a natural environment, to having to defend manmade structures and not necessarily fight the fire as best and safe as it could be otherwise.

The risk of starting a fire and the danger to homes once a fire starts can both be mitigated by proper construction of the home, and by appropriate brush clearing and landscaping with the right kinds of plants. The lack of strong enough public education and/or code requirements on homes that would mitigate the risks increases danger to the firefighters. There was a strong feeling by those interviewed that the public was not aware of what they needed to know.

The lack of intuitive understanding on the part of the public, the media, and local officials on the nature of wildland firefighting may put pressures on the firefighters that are undue. There is a feeling that better public education is needed on the capability and cost of wildland firefighting, the ecological issues, and the detailed mitigation efforts that the public can undertake. It also was thought necessary to explain to the public that it has some major choices or combination of choices to make: a) do more prevention and

mitigation themselves, including thinking about potential fire risk when choosing the sites for homes; b) accept higher risk levels; c) pay more taxes for fire protection to protect homes; d) consider the risks they ask firefighters to take; and e) consider tradeoffs between saving homes, habitat, and timber.

The problem is exacerbated because of the lack of adequate training to handle the interface situations, lack of adequate briefings and communications about the urban/wildland interface danger to crews and incident command personnel handling the fire, and changing expectations in the media and public about what can be done with such fires. There needs to be a better match between expectations and capabilities.

Fuel Build-up

Aggressive fire suppression has interrupted the natural occurrence of fire in many ecosystems, replacing the more frequent light fires with infrequent catastrophic events. Build up of unburned fuels combined with unhealthy forests in some areas has made firefighting more dangerous in many places. Reduced prescribed fire for fuel control, because of air quality concerns and fear that a prescribed fire might escape, is also a contributor to the chance of large fires.

The resulting fires may spread faster, burn hotter and higher, and otherwise change the nature of fires from what was experienced in similar areas in previous years. Even experienced firefighters may be surprised by the intensity and speed of spread of the fire. An enormous 83 percent of the firefighters surveyed felt that fuel build-up (and dying forests) often increased the intensity of fires and the danger to the firefighters. Over 50 percent said it was very often a problem – one of the highest responses of "very often" to any question on the survey. Only 2 percent of the firefighters said this occurred rarely, if ever. It was one of the major issues flagged in this study (Q31).

CHAPTER 8. SUMMING UP − THE HIGHEST PRIORITY AREAS TO ADDRESS

The Culture

This first phase of the study sought to describe the culture of the wildland firefighting community as it relates to safety by identifying those issues and qualities that members of the culture identify as important to their safety. This is only a small part of the study's findings on the culture. A more detailed description of the culture can be found in the literature survey, Appendix D.

The culture of wildland firefighting is broad and deep. Each member of the culture carries his or her own mental photo album of what that culture is. It includes the attitudes and beliefs of a rookie firefighter on a Bureau of Land Management engine in the Mojave desert and the insights of a 25-year jump veteran detailed to the Washington Forest Service office. It is shaped by the interaction of a Fish and Wildlife biologist pulling her first fire assignment, a Bureau of Indian Affairs squad boss who is leading a crew down the line on the twenty-first day of an assignment, and a National Park Service ranger who is part of a prescribed fire detail early in the season.

The over 1000 firefighters who participated in this study have combined their insights, suggestions, complaints, fears and hopes to provide an outline of their culture. Wildland firefighting is a culture of hardship, adventure, close friendships, and commitment. Many firefighters believe that a hard day's work for a fair day's pay describes the average day in wildland firefighting. Admittedly there are debates, disagreements, and major issues within the community. The culture described by the firefighters respects experience over rank, values an aggressive attitude in the face of hardship, enjoys stories of conquest and danger, and is proud of how different the life of a wildland firefighter is from nearly everyone else's.

Wildland firefighters clearly value accountability at all levels within the culture. It is not an understatement to say that wildland firefighters, like sailors on the high seas, expect and demand that accountability accompany responsibility. Again and again the

importance of personal accountability and accountability of those in charge was raised in one-on-one interviews, in heated focus group debates, and in passionate comments written in the margins of the survey forms.

There is no question that wildland firefighters consider themselves, and each other, professionals. When they pull on their boots and put on a Nomex yellow shirt they are donning a professional uniform. Not everyone in a Nomex shirt wants to fight fire as a career, in fact careerists are a minority for a variety of reasons, but nearly everyone seems to take pride in what they are doing. Of course, pride can sometimes manifest itself as arrogance, and there are examples of that within this culture as well. The participants of this study related experiences of individuals and even entire crews displaying arrogance combined with ignorance which can, and has, led to injury and death. Still, the theme of professionalism and the need to be recognized as professionals was raised again and again. It is impressive how often the issue of "technician" versus "firefighter" was raised in discussions of safety. While some might argue that a title has little bearing on safety, the participants in this study were quick to point out a connection between their title, their pay, their attitude, and their safety.

In the wildland culture, learning takes place in training courses, on the fireline, around a cup of coffee in fire camp, or in the "back of the rig" during an all night drive to the next assignment. Members of this culture value the experiences of those that have come before. The up side of this characteristic is that the institutional memory is passed on from one "generation" of firefighters to the next. The downside is that there is not necessarily a filter in place to assure that what is adopted by follow on "generations" is the best, the safest or the most effective.

Related to the culture's respect for experience is a great deal of anxiety about the apparent exodus of those with experience. Experience is always leaving the culture as elders retire or move off the fire track within their agencies, but there is a true concern on the part of nearly everyone encountered that experience is leaving the fire community much faster than those moving up in the ranks are able to acquire it. Downsizing was a common issue raised when discussing safety, first, because of the reduction of the absolute number of people available for fire duty and, second, because of the removal of the experience base through early retirements and the elimination of positions.

Related to the respect for experience within the culture is the strong negative feelings about "fast-tracking." In a culture that values "time in rank" and "paying your dues" the concept of "fast-tracking" managers through experience is bound to be unpopular. Some in the community of wildland firefighting are opposed to fast-tracking because they believe the program robs them of job opportunities and others are bitter because they do not believe that women should be on the fireline. The complaints of that portion of the population are not the ones addressed here. The larger community has a tough time with fast tracking because it violates the belief that THE way to learn how to fight wildfire is to fight wildfire. A culture that struggles with the concept that fire behavior can be learned in the classroom has a much more difficult time with the concept that anyone, regardless of race or gender, can be pushed up the learning curve of experience. Women and minorities voiced the same complaints and concerns about fast-tracking and the need to "experience experience" as the larger community.

Physical fitness sets the wildland fire culture apart from many external cultures as well as between subcultures within the fire world. There was great disdain for the step test. Again, members of the community are proud that they wrestle with nature for hours and days on mountain sides where there are no trails. The concept that their capability could be judged by steeping up and down on a box for five minutes is scoffed at. No one defended the step test. There were those who felt it let physically unfit people onto fires and others who felt it unfairly excluded people. Virtually no one believes in it.

Although the firefighters who participated in this study did not readily identify issues of crew dynamics, they did demonstrate the importance of the crew to their own safety in nearly all of their stories. The stories of injury or danger nearly always included comments like, "we were all on autopilot-not one of us caught it," or "really it was the crew bosses responsibility but I should have spoken up." Many of those who were most eloquent about their time on fires talked about how the crew becomes almost like a family with all of the affection and support of a family and, yes, the fights and disagreements as well. Former wildland firefighters who have moved into other careers often identify themselves as former firefighters and usually relish retelling stories of the fireline and their fellow crew members years after their last fire.

The wildland culture is dynamic and powerful. It is a culture which recognizes the importance of safety while not always recognizing how best to accomplish it. It is a culture of dedicated individuals working together often against overwhelming odds. It is a culture with long traditions but one which with effort recognizes the need for change and supports that change.

Issues Facing the Culture

There were a great many issues discussed in the previous chapters. That profusion of issues reflected the breadth and volume of issues that firefighters brought out in the interviews, and that is reflected in the literature on wildland firefighting safety. In going forward to improve safety, some prioritization is needed among the myriad of issues. The purpose of the survey used in this study was to get input on prioritization from a broad sample of the Federal firefighting community. The length of the questionnaire used in this study was necessitated by the numerous issues for which some weighting was desired.

Weightings of priorities can be developed by comparing ratings of the answers to the various individual questions; for example, some questions had the agreement of 80 percent of firefighters, others the agreement of 50 percent. But, in addition, it seemed important to get the firefighters to give their own weighting across questions, to get a consistent viewpoint. Also, the various questions used different scales; the issues are not directly commensurate.

General Areas of Highest Priority

The firefighters and fire managers that were interviewed and those met with in focus groups were asked to identify the issues they considered most important. These issues were included in the formulation of the questionnaire. After having responded to 238 detailed questions based on the interviews and the literature, the respondents on the survey were asked to choose up to 3 from a list of 24 major categories of issues addressed on the survey that they felt were highest priority to improve safety (Q240). The results are shown in Table 8-1, General Areas of Highest Priority.

Summing Up − The Highest Priority Areas to

The 24 issues listed – mostly subheadings from the questionnaire, – fell into 3 subgroups: the 6 issues that clearly had the most votes as being of highest priority; another 11 issues that formed a mid-range of priority; and 7 issues that had a significantly lower number of votes. None of the issue areas received more than about one-quarter of the votes. That is, there was no stand-out issue, no single issue that the majority of respondents thought was among the top three. This was consistent with the large number of issue areas, and the intense but diverse views on which were of most important.

In considering the scores on the high priority areas, one might keep in mind that if all areas were considered of equal importance, the score for each area would be 12.5 percent. Those issue areas getting a score of 13 percent or higher indicate a leaning of the group toward considering them important; correspondingly, scores of 12 percent or less are the bottom half of issues (Q239).[35]

The Top Issues − A group of six issue areas were rated of paramount importance for safety. Each of these six issues were selected as being one of the highest priority issues by 22-27 percent of the respondents. First was attitudes about safety. Those who formulated the concept for this study were right on target: the federal wildland firefighting community strongly believes that there is a need to change attitudes about safety. The "passion for safety" is widespread but not universal.

Closely related was the need to improve accountability for unsafe actions (Q1). "Accountability" was in second place but not of statistically significant difference from the first place entry.

Experience of firefighters was tied for third place. Experience is vital to decision making under stress, and knowing how to do the job safely. The physical fitness of firefighters, the experience and ability of crew supervisors, and the training of firefighters rounded out the top six (Q1).

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[35] Each respondent got to pick three areas. The average percentage points if all issues were considered of equal importance was (3x100%)/ 24 issues = 12.5%

Table 8-1

Areas Judged To Merit the Highest Priority to Improve Safety

	Question	Percent Choosing as Highest Priority
a)	Attitudes about safety.	27%
k)	Experience of firefighters.	27
b)	Personal accountability.	26
q)	Physical fitness.	24
x)	Experience and abilities of crew supervisors.	23
m)	Training of firefighters.	22
f)	Personnel practices and pay.	15
r)	Fatigue reduction measures.	14
w)	Decision making skills.	14
c)	Resource availability.	13
d)	Priority setting for firefighting.	12
s)	Screening for job suitability.	12
h)	Information flow and briefings.	10
i)	Fire management policy.	10
j)	Crisis leadership.	10
o)	Certification process.	10
l)	Experience of Incident Management Team.	9
v)	Interagency coordination.	5
p)	Operating procedures.	4
t)	Psychological preparation for firefighting.	4
u)	Crew cohesiveness.	4

g)	Equipment and protective clothing.	3
n)	Training of Incident Management Team.	3
e)	Reporting and investigating safety incidents.	2

Physical fitness is crucial to sustain the effort needed for wildland firefighting without injury and without succumbing to the physical stress. Experienced crew supervisors have unique leadership responsibilities when it comes to assuring the safety of their crews. They must help keep the crew out of trouble and lead it to safety when that becomes necessary. Training of firefighters is needed for them to perform their tasks safely and to know what information they need to know, and when to ask for information or point out safety problems.

Viewed another way, what the group of over 700 firefighter/respondents was saying was as follows: improve the individual firefighter's experience, training, and physical fitness; work on attitudes about safety, make sure that crew supervisors have the ability and experience to supervise, and hold people accountable for unsafe performance.

The Next Tier of Issues − In the middle ground, with 10-15 percent of the group choosing them as among the highest priority areas were 11 issues. The top half of the tier included personnel practices and pay, fatigue reduction, improved decision-making skills, improved availability of resources, priority setting for firefighting, and screening personnel for job suitability. (The latter might be considered a type of personnel practice.)

The second half of this tier of issues included improved information flow and briefings; fire management policy; crisis leadership; certification process; and the experience level of the incident management team.

Lowest Tier − Among the issues considered the least in need of improvement relative to the others were interagency coordination, operating procedures, psychological preparation for firefighting, crew cohesiveness, equipment and protective clothing, training of IMT personnel, and the reporting and investigation of safety incidents. Many issues of this group were considered reasonably well in hand: interagency coordination,

standard operating procedures, equipment, training of IMTs, and probably crew cohesiveness − though there were mixed messages from the firefighters about the importance of the latter. Psychological preparation and investigation of incidents were considered important and needing improvement when considered by themselves, but less so than the other areas rated highly. Nothing in this list was written off − all were in need of attention. Even the lowest area on the list was considered of importance to improve

Comments on the Top Choices − It seemed quite remarkable to the project team that accountability would tie for first place among the issues considered of highest priority to correct for firefighter safety. But that finding goes along with the opinions given at the very beginning of the survey that the overall wildland firefighting system is not badly broken nor in need of major changes. Rather, there is a need to make the current system work, and hold people accountable for meeting the standards that have been set.

It also seems to merit special note that most of the top six choices dealt with the experience and training of firefighters and crew supervisors, not middle or upper management. Those surveyed did not just throw blame up the organization chart; they felt the most improvement was needed on the attack line. Three times as many people thought that experience of firefighters was a problem as did experience of the incident management team, despite many complaints about fast-tracking, turnover of experienced personnel in middle management, etc. It is the sharp end of the attack where most of the concern lies. This is especially impressive to consider in light of the confidentiality of the interviews and especially the survey questionnaire. An anonymous form provides the potential for making derogatory remarks without penalty. There was less than two percent of the forms where cheap shots were taken; the norm was reasoned, heartfelt, constructive criticism.

It was somewhat surprising that physical fitness made the top six categories. Wildland firefighters are generally perceived as being in quite good shape. But there were very strong feelings about the wide range of conditioning of the Type II crews and the validity of the step test.

Although the project team heard a myriad of comments about improving pay incentives, professionalizing the fire service, changing titles of individuals, etc., personnel practices and pay were ranked significantly below the top six issues.

The bottom of the list also produced some sharp surprises. Inter-agency coordination and operating procedures were not surprises to be low, because by and large they were perceived by survey respondents to be good, although there were many suggestions for improving strategy and tactics. Likewise equipment and protective clothing were generally seen to be quite good, despite a few key equipment concerns such as the adequacy of providing radios.

But it was surprising that only 4 percent of respondents selected crew cohesiveness among the areas needing improvement the most. "Crew dynamics" also did not rate as a large concern. But many elements that relate to crew cohesion or result from crew cohesion did register as important: the need for crew decision making under stress, the increased use of "crews comprised of strangers," the importance of training crew supervisors in people management, etc. It may simply be that "crew cohesiveness" is not a clear or resonant phrase, or does not seem natural. Or cohesiveness may indeed be an important issue just because it is not perceived to be an important issue, but has been a contributor to multiple firefighter fatality incidents. It may not be apparent as an every day concern. Larger daily concerns may include the safety of transport to the fire, or whether the wind will shift and you will not get adequate warning before the fire overtakes you. There may be less day-to-day concern about how well your crew will stick together in an emergency. Or, crew cohesion may be so intuitively and obviously important that it is taken care of either in the formation of Type I crews, or the composition of Type II crews as they gain experience together (the crews are chosen from lists of diverse people initially, but may weed out problematic members as the season develops). The authors' intuition is that crew cohesiveness (and other aspects of crew dynamics) were important but were not well understood concepts. Further study is needed, however, as to why there were mixed messages about its importance.

Highest Priority Specific Issues/Questions

In addition to choosing the top three general issues from a list of 24 general categories as discussed above, the survey respondents were asked to identify up to five specific questions that they considered had the greatest impact on safety in their geographic area, out of the 238 questions about problems on the survey.

It is difficult to make this selection. One has just gone through 238 questions, the most recent of which were freshest in one's mind. A long list of questions is difficult to scan. To help prepare them for this question, the respondents had been asked at the beginning of the survey to note on a separate piece of paper any issue they considered particularly important, so they could find those issues on questions, or write them in, if they were not covered. That should have helped in identifying the key questions.

It would be easy to miss some important questions, and some of the choices are difficult. Some respondents gave up. But the dozen questions/issues that came out on top seemed important based on the ratings of the individual questions and in light of the general issues that were selected as most important in Q240. Table 8-2 shows the top dozen specific questions/issues. Figure 8-1 shows the rating of each question. If all questions were of equal priority, then there would have been 16 "votes" for each.[36] The maximum number of votes any question could get was 716. In actuality, the numbers ranged from zero to a maximum of 75 votes on any one question.

The selected top dozen issues were:
- political pressures
- fast tracking
- fuel build-up
- step test validity
- strengthening of selected fire positions
- lack of qualified people to fill IMT positions during the transition to extended attack
- firefighters having too little experience

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[36] There were 716 respondents x 5 votes each = 3580 total votes. Since there were 226 questions to choose from (excluding the personal data questions), the average votes per question would be 3580 ÷ 226 = 15.8.

- tougher screening of crew supervisors
- firefighters ignoring the 18 watchouts and 10 standing fire orders
- shortening of the season for seasonal workers, and
- physical fitness of Type II firefighters.

All of these were issues that stood out on the one-on-one interviews and focus groups.
(Note that some of these issues were not offered or not apparent in the list of general
issues in Table 8-1; e.g., fuel management was subsumed under fire management policy,
which might not be obvious. The top five priorities of female firefighters were almost
identical to those of the males. In sixth place was decision making skills, which was
somewhat higher ranked among women than men.)

Table 8-2. Top 12 Issues (Questions) Rated as Having the Greatest Impact

	Issues	Number of Survey Respondents Rating This a Top Five Issue (out of 716 respondents)
Q28	Political pressures affecting the decision to fire a fire, or the tactics	75
Q47	Fast-tracking of employees without adequate experience	73
Q31	Fuel build up increasing the intensity of fires	71
Q184	Step test not an adequate measure of performance	50
Q4	Some positions need strengthening to improve safety	48
Q19	Too few qualified people to fill IMT positions during initial attack	47

Q127	Firefighters having less experience than in the past	43
Q236	Screening needed to select out crew supervisors who do not have toughness, skills, and personality to be a leader	41
Q203	Ignoring the 18 watchouts	39
Q25	Seasonal workers being hired later and leaving earlier, creating burden for others	39
Q182	Many Type II firefighters are not physically fit	38
Q202	Ignoring the 10 Standard Fire Orders	37

figure 8-1

figure 8-1

figure 8-1 cont'd

figure 8-1 cont'd

figure 8-1 cont'd

Another way that the results should be viewed here is by clusters of questions. Where a whole issue area spanning several questions was deemed important, the votes might be split among four or five questions that were all considered about equal in priority, and the issue then would not appear among the top dozen questions. This can be countered by observing the groupings of the higher scoring questions, in Figure 8-1.

Interestingly, the issue areas show up despite where sub-headings were placed on the survey form. For example, some resource availability questions were placed on the questionnaire at the end of the section preceding the section entitled "resource availability," and were rated similar to those that were under the sub-heading of "resource availability." (They had been placed under the different sub-heading because of the need to use a different scale.)[37]

The key areas that stand out when clusters of questions are considered are: resource availability (Q17-21, Q24-25); priority setting, and political pressures (Q28-31); personnel and pay policies (Q46-48); experience/competence (Q123-132); certifications (Q152-154), training (Q158-163); physical fitness (Q182-184); ignoring fire orders and watchout situations (Q202-203); fatigue (Q223-231); and selected human factors issues (Q232-236).

Validity of Selections – There was some concern as to whether respondents would focus most on the questions they had just finished responding to, or whether they would turn to the beginning of the survey, and focus on the first 10 or 20 questions. The series of graphs showing the distribution of responses for each question (Figure 8-1) reveals that the respondents selected questions throughout the entire set – quite a tribute to their willingness to focus after so long a survey.

Almost every question received some votes as one of the five most important areas. This jibes with individual interviews, where different people felt very strongly

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[37] Figure 8-2 shows boundaries between categories that are closer to where the category actually changed than where the category subheadings were placed on the survey. For example, Questions 17-18 were about resource availability but were "cheated in" under the heading of attitudes about safety so that they could use the "strength of agreement" scale rather than the "frequency of occurrence" scale, which would have been less appropriate.

about two or three issues that were often quite different from the next person, though overall sets of interviews revealed very similar results from one to another.

Similar groups of issues and individual issues show up as of high priority almost no matter how we asked the questions. There also was generally good consistency in the areas that were rated low compared to others.

Other Issues and Comments Written In

After the survey respondents had gone through 240 questions relating to their rating of various problem areas and many detailed problems, and after selecting the most important issues, they were given the opportunity to add any additional issues that they thought had not been covered by the preceding questions (Q241). Over 40 percent of the respondents availed themselves of this opportunity.

There were no major new areas added, which added to the confidence level that the one-on-one interviews and focus groups had rather comprehensively covered the broad range of issues that needed to be addressed. And there were relatively few new detailed areas. But there were many nuances and variations on the previously cited areas, and several truly new points.

When the respondents wrote in comments, it was rarely just a few phrases, but much more often paragraphs or pages of comments handwritten or typed. The intensity of the comments, and the willingness of firefighters to write in comments after responding to a questionnaire of grueling length, suggests that the passion for safety has existed for a long time among many firefighters.

Below are excerpts from the responses that deal with issues not covered previously, or variations on them. Appendix B includes quotes that elaborate on the issue areas in the body of this report, to give the reader a better feel for the intensity of concern and viewpoint of the firefighters in their own words.[38]

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[38] The consultants, TriData, developed a data base with all of the written-in responses by firefighters, with the answers to the personal data questions attached, so that an analysis of comments can be made by

Some people's responses covered several topic areas, and were subdivided among different headings. In a few cases, the combined answers were left together in one place, to give the reader a flavor of how quite a few respondents gave complex, multi-part responses.

Often the respondents were elaborating on the issues, giving examples, synthesizing issues, and adding what they considered to be appropriate underscoring of certain remarks beyond what they could do on the multiple choice survey questions. There were several comments about the survey itself − a few thought it too long, a few thought the answers were biased toward a particular point of view (despite the fact that each question allowed the respondent to indicate disagreement as well as agreement, or weight the issue as minor/major or no issue at all). The number of comments about the survey were far fewer than its authors expected.

There were a few issues raised that one wished might have been added to the survey, but for the most part the written-in responses are elaboration's and support for areas that were addressed in the report.

The quotes below (and in Appendix B) are direct quotes, not paraphrasing. There was editing out of parts of quotes that added length but not clarity. A number of quotes were dropped because they were redundant with others or with the material in the body, though a few of these redundancies were left in to give the flavor of the many remarks received. Also edited out were profanity, people's names, specification of areas or information that might have revealed the identity of the respondent, and unintelligible or unfathomable responses. Where it was clear that the meaning would not be distorted, spelling and grammatical errors were corrected. Where portions of a quote are deleted, it is indicated by ellipses (...).

Selected Quotes:

Better facilities in fire camps

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experience level or job position or other category.

I think the strength of the Type I crews need to be reinforced; i.e., support them when they wash (out) people that do not measure up physically.

Hotshot supervisors need to be used more in the overhead team environment as they have the bulk of the current fire knowledge

Need to recognize [the] skilled fire personnel we want to keep that will replace us [old-timers].

Supt. of Park Service sites shouldn't have final say over [the] FMO as to sending firefighters [to fires] or not allowing them to go.

ICS teams get bigger almost every year, but MOST new positions are quasi-support or actual baggage, contributing little to the suppression mission.

Physical abilities are limited because [a] wellness program is not offered.

...the difficulties of releasing bad federal employees.

Code of conduct addressing human factors

Upper management has resisted going to another crew type classification, but we are putting poorly trained/little experienced firefighters on fires with the most dangerous conditions on record, while our most experienced fire vets sit at home waiting for a call. The system must be changed to get our best firefighters assigned to fires, rather than letting the least cost dictate where the Type II crews come from.

We need to put resources into encouraging folks to come back year after year − it will be cheaper in long run to pay a seasonal more each year than to try to train rookies every year! − Thanks.

One item not really addressed in this study is the ability ... to give ... firefighters, supervisors, etc. a solid background in fire behavior, fuels, tactics, etc. through [experience at] prescribed fires. ...Folks who have spent a lot of time in firing, holding, and monitoring perform much better in a suppression assignment. Much of the OTJ for operations positions can be obtained on prescribed fires .... We are missing an opportunity here.

I disagree with the assumption made in #Q142 that questioning tactics and strategy is good...it can be deadly!

Fire assignments are a 21-day commitment, no less despite your supervisor's opinion [in your home agency].

Conclusion

Phase I of this study focused on identifying the organizational culture, leadership, accountability, and human factors issues that impact safety. There are many to consider.

Virtually every problem raised by firefighters had one or more solutions offered by firefighters to solve it. There is no need for a massive change in the approach to wildland firefighting. Rather, attention must be given to making the current approaches work better. The one big caveat to this is the availability of resources relative to expectations and the condition of the wildlands. If resources do not keep up with needs, then some major readjustments may be needed.

Phase II of this project will reflect on the wealth of information provided by the over 1000 firefighters who contributed their thoughts to this study. The priorities identified in Phase I will be used in Phase II of this project to shape the set of goals for changing the organizational culture and improving leadership and human factors so as to enhance wildland firefighting safety. Phase III will draw on the ideas raised in Phase I on how to reach those goals via specific implementation steps.

APPENDIX A - SURVEY QUESTIONNAIRE AND RESPONSE FORM

APPENDIX B - FIREFIGHTER AND FIRE MANAGER QUOTES FROM THE SURVEY QUESTIONNAIRE

APPENDIX C − STATISTICAL CONFIDENCE LIMITS

APPENDIX D – LITERATURE REVIEW AND INITIAL EXPERT INTERVIEWS

(Including Reference List)

APPENDIX E − BIBLIOGRAPHY

APPENDIX F − STATISTICAL RESULTS OF THE SURVEY

[38] The total column may differ from the sum of the other two because of roundoffs. Questions 159 & 160 were worded negatively ("there is no issue") rather than positively as the others here ("there is an issue") and are not included in the comparison here, to avoid misinterpretation; they are discussed in the text.

[38] 58% disagreed with this statement.

[38] 73% disagreed with this statement.