APPENDIX A - SURVEY QUESTIONNAIRE AND RESPONSE FORM
OUTLINE

Questionnaire on Wildland Firefighter Safety

I. RATING OF SAFETY ISSUES
   A. Attitudes About Safety
   B. Resource Availability
   C. Priority Setting and Political Pressures
   D. Reporting and Investigating Safety Problems
   E. Personnel and Pay Policies
   F. Equipment and Protective Clothing
   G. Information Flow and Briefings
      1) Briefings and Plans
      2) Dispatching Resources
   H. Crew and Team Attributes
   I. Ethnic and Gender Issues
   J. Crisis Leadership
      1) Incident Management Team
      2) Crew Supervisors
   K. Experience/Competence
   L. Certifications
   M. Training
   N. Air Operations
   O. Physical Fitness

II. PERSONAL INFORMATION

III. MORE RATINGS OF SAFETY ISSUES
   A. Strategy and Tactics
   B. Fatigue
   C. Other Human Factors Issues

IV. WHICH ARE THE MOST IMPORTANT ISSUES?
V. POTENTIAL SOLUTIONS
   A. Equipment
   B. Firefighting Training (Individuals and Crews)
   C. Management Training
   D. Physical Fitness
   E. Information Flow and Briefings
   F. Fire Management Policy
   G. Personnel Practices and Pay
   H. Operating Procedures
   I. Fatigue Reduction Measures
   J. Psychological Preparation
   K. Interagency Exercises and Coordination

VI. CHOOSING THE BEST IDEAS

VII. WHAT IS WORKING WELL?
QUESTIONNAIRE ON WILDLAND FIREFIGHTER SAFETY AWARENESS

Dear Wildland Firefighter, Fire Manager, or Agency Administrator:

We greatly appreciate your cooperation in completing this questionnaire. Please provide all answers on the answer sheet. Send the answer sheet back to TriData in the enclosed envelope as soon as possible, within a week after you get this.

Please answer all questions from your own experience in your own geographic area.

We need your candor. Your identity will be strictly protected. The data will only be used in aggregated form.

Over the last nine months we spoke with firefighters, fire managers, and agency administrators throughout the country. Your colleagues raised the issues we present in this survey and proposed the solutions we discuss. Do not be surprised if you find yourself strongly agreeing or disagreeing with some of the statements on this questionnaire; we raise serious issues and there are strong opinions on many of them. We need to know which you agree and disagree with and what you feel is important for your safety. There is a long list of issues to consider because the problem is complex. We hope you will bear with us. Your effort will help determine priorities for improving safety in all the agencies involved in wildland fire suppression.

You can work on this questionnaire at one stretch, or break up the time, as you wish.

Before you start the survey, you might jot down here what you think are the three major problems in wildland fire safety. If these are not covered in the questions, you will have a chance to write them in later.

Answer all questions by filling in the appropriate circle on the answer sheet with a No. 2 pencil, as illustrated below. (The use of a pencil allows you to change an answer.) A few questions allow more than one circle to be filled. Most only allow for one.

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This identical questionnaire is being distributed to people of every level within the wildland fire community. There may be questions you may not be able to answer from your own experience and issues that you may not have come across. In those cases simply mark "Can't say" on the answer sheet. The "Can't say" choice will always be the last circle for each question.
This questionnaire uses incident Command System (ICS) terminology. Crew supervisor is used rather than crew boss, Incident Management Team rather than overhead, etc. Incident Management Team in the context of this questionnaire includes single resource positions on fires – not only members of a defined Type I or Type II team.

The survey begins on the next page.

IMPORTANT:

PLEASE INCLUDE ANY COMMENTS YOU HAVE ON THE ANSWER SHEET ONLY. DO NOT MAIL THE QUESTIONNAIRE BACK IN THE ENCLOSED ENVELOPE, ONLY THE ANSWER SHEET. THANK YOU.
ATTITUDES ABOUT SAFETY

1. How would you rate the overall federal interagency approach to wildland firefighting?
   a) Excellent
   b) Good
   c) Fair
   d) Poor
   e) Can't say

2. Which of the following is closest to your opinion on the need to change the federal interagency approach to wildland firefighting?
   a) Leave well enough alone
   b) Keep the current general approach, just tune it up to work better
   c) Make some significant changes in policy or approach
   d) Overhaul the entire system
   e) Can't say

3. Which is closest to the safety policy found at wildland fires today:
   a) Safety comes first on every fire
   b) Safety is equal with getting the job done
   c) Get the job done, even if you have to break some safety rules
   d) Can't say

4. Which two of the following positions would you say need the most strengthening to improve safety? (Select two.)
   a) Firefighters
   b) Crew Supervisors
   c) Division/Group Supervisors
   d) Strike Team/Task Force Leaders
   e) Operations Section Chiefs
   f) Safety Officers
   g) Incident Commanders
   h) Other Incident Management Team members
   i) Fire Management Officers
   j) Agency Administrators
   k) Other
   l) None in particular
   m) Can't say

5. How seriously do you feel your federal agency takes safety in relation to the other wildland agencies?
   a) More seriously than the others
   b) About the same
   c) Less seriously than the others
   d) Can't say
### How often do the situations listed below occur?

<table>
<thead>
<tr>
<th></th>
<th>a) Usually</th>
<th>b) Often</th>
<th>c) Occasionally</th>
<th>d) Rarely if ever</th>
<th>e) Can't say</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Your supervisors at fires ask you to do things in violation of reasonable safety practices.</td>
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<td>7. Your supervisors at fires listen carefully when you raise questions or make suggestions about safety.</td>
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<tr>
<td>8. Firefighters and fire managers are held accountable when they violate safety rules or are at fault in a safety incident.</td>
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<td>9. Agency administrators (forest supervisors, area managers, park superintendents, etc.) set the proper safety tone in briefings and in dealing with the Incident Management Team.</td>
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</table>

### To what extent do you agree or disagree with the comments listed below?

<table>
<thead>
<tr>
<th></th>
<th>a) Strongly agree</th>
<th>b) Agree</th>
<th>c) Disagree</th>
<th>d) Strongly disagree</th>
<th>e) Can't say</th>
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<tbody>
<tr>
<td>10. There have been positive changes made in safety since the South Canyon fire in 1994.</td>
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<td>11. You yourself pay adequate attention to safety.</td>
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<td>12. Your coworkers pay adequate attention to safety.</td>
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<tr>
<td>13. Your immediate supervisors pay adequate attention to safety.</td>
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<tr>
<td>14. Upper management pays adequate attention to safety.</td>
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<td>15. After 5-10 years of firefighting, an air of invulnerability, complacency, or denial of danger sets in, making it difficult for firefighters to stay on guard.</td>
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<td>16. It is difficult to get firefighters to drop their tools and run when they should.</td>
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<td>17. With fewer fire managers involved in fire today there is less understanding and support for fire needs, which ultimately impacts safety.</td>
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<td>18. We can safely live with budget cuts if people are well-trained, well-led and the hard choices are made to fight fewer fires when resources run out.</td>
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</table>
RESOURCES AVAILABILITY

<table>
<thead>
<tr>
<th>Problem</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too few qualified people on hand at the incident to fill all Incident Management Team positions (formerly known as Overhead positions) during the initial stages of extended attack.</td>
<td>Very often</td>
</tr>
<tr>
<td>Inexperienced but Red-Carded Incident Management Team members used in key positions.</td>
<td>Occasionally</td>
</tr>
<tr>
<td>Shortage of Type 1 crews, resulting in the use of less qualified crews for complex duties.</td>
<td>Rarely if ever</td>
</tr>
<tr>
<td>Shortage of field observers, requiring first and second level supervisors to split their attention to other duties.</td>
<td>Can't say</td>
</tr>
<tr>
<td>Shortage of safety officers at fires.</td>
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<tr>
<td>Use of local volunteer fire department personnel who do not have adequate training for wildland firefighting.</td>
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</tbody>
</table>

Below are more resource problems we heard about. How serious do you think they are?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal workers being hired later or laid off earlier, causing the remaining crews to work harder and take larger risks.</td>
<td>Very serious</td>
</tr>
<tr>
<td>New agency hires refusing fire duty.</td>
<td>Not sure</td>
</tr>
<tr>
<td>More use today of crews comprised of people who do not know each other, brought together from different agencies, districts, or units.</td>
<td>Not sure</td>
</tr>
</tbody>
</table>

PRIORITY SETTING AND POLITICAL PRESSURES

<table>
<thead>
<tr>
<th>Situation</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political pressures affecting the decision to fight a fire or the choice of firefighting tactics.</td>
<td>Very often</td>
</tr>
<tr>
<td>Fires being fought in a more dangerous way than the values to be protected merit.</td>
<td>Occasionally</td>
</tr>
<tr>
<td>Federal wildland firefighters making safety compromises to save homes.</td>
<td>Rarely if ever</td>
</tr>
<tr>
<td>Fuel buildup (and dying forests) increasing the intensity of fires and the dangers to firefighters.</td>
<td>Can't say</td>
</tr>
<tr>
<td>Prescribed burns not being given adequate safety attention.</td>
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<tr>
<td>Safety problems resulting from a disagreement on priorities, strategy, or tactics among multiple agencies operating at a fire.</td>
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</table>
REPORTING AND INVESTIGATING SAFETY PROBLEMS

We heard many comments about the completeness and promptness of reporting various types of safety incidents. Based on your experience, how often are each of the following reported?

a) Almost always  b) Usually  c) Sometimes  d) Rarely  e) Can't say

34. Near misses.
35. Shelter deployments.
36. Entrapments.
37. Injuries to fire personnel.

38. Observed safety problems that do not result in injury, entrapment or deployment.

There can be many reasons for not reporting the above situations. Overall, how important are the following reasons?

a) Very important  b) Somewhat important  c) Not important  d) Can't say

39. Fear of an immediate penalty.
40. Fear of affecting one's career.
41. Fear of triggering an investigation.
42. Concern about extra time spent on paperwork, investigations and reviews, etc.

43. Concern about the impact on one's agency.
44. Lack of a good system for reporting.
45. Belief that the reporting will not make a difference.

PERSONNEL AND PAY POLICIES

For the following statements about personnel and pay issues, please tell us whether you

a) Strongly agree  b) Agree  c) Disagree  d) Strongly disagree  e) Can't say

46. Paying time-and-a-half for non-supervisory ICS positions (non-exempt) but not for supervisory positions (exempt) is a disincentive for people to take on more responsible Incident Management Team positions.

47. There is too much “fast-tracking” of some employees without adequate training or graduated experience, which sets them up for failure and safety problems.

48. There are too many lateral transfers into fire management positions of people with little or no fire experience, and this affects safety.
EQUIPMENT AND PROTECTIVE CLOTHING

We heard several types of issues related to equipment and clothing. We need to find out which are the highest priority. How often do each of the following types of problems occur?

<table>
<thead>
<tr>
<th></th>
<th>a) Very often</th>
<th>b) Often</th>
<th>c) Occasionally</th>
<th>d) Rarely if ever</th>
<th>e) Can't say</th>
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<tbody>
<tr>
<td>49.</td>
<td>Too few radios available to crews.</td>
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<td>50.</td>
<td>Incompatibility of radio frequencies with state, local or military frequencies.</td>
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<td>51.</td>
<td>Not enough radio channels.</td>
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<td>52.</td>
<td>Type II crews not adequately equipped with or properly trained to use chain saws, radios, etc.</td>
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<td>53.</td>
<td>Where they are used, state firefighters not adequately equipped with protective clothing and equipment.</td>
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<td>54.</td>
<td>Where they are used, local volunteer firefighters not adequately equipped with protective clothing and equipment.</td>
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<td>55.</td>
<td>Incomplete or improperly maintained equipment kits coming from caches.</td>
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<td>56.</td>
<td>Shortage of replacement parts for equipment (e.g., batteries for radios).</td>
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<td>57.</td>
<td>Transport vehicles (e.g., buses) that are overcrowded and/or in unsafe condition.</td>
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<td>58.</td>
<td>Helicopters that are overloaded.</td>
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<td>59.</td>
<td>Unqualified operators coming along with contracted equipment.</td>
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<td>60.</td>
<td>Poor quality of contracted equipment.</td>
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</table>

We would also like to know whether you agree or disagree with the following comments about equipment and clothing.

<table>
<thead>
<tr>
<th></th>
<th>a) Strongly agree</th>
<th>b) Agree</th>
<th>c) Disagree</th>
<th>d) Strongly disagree</th>
<th>e) Can't say</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.</td>
<td>Many firefighters over-rely on their equipment for safety (e.g., counting on a pump to work; stretching the capability of a helicopter; relying on an engine for escape, etc.).</td>
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<td>62.</td>
<td>Carrying shelters leads many people to put themselves in risky situations.</td>
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<td>63.</td>
<td>Too much use is made of two-wheel drive engines.</td>
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<td>64.</td>
<td>The lack of insignia to identify command rank or experience hampers giving assignments in emergencies.</td>
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INFORMATION FLOW AND BRIEFINGS

Safety problems are sometimes caused by not getting key information to crews in a timely manner, or at all. For each type of information listed below, please tell us how often there is a problem in getting it to crews or firefighters on a timely basis.

<table>
<thead>
<tr>
<th></th>
<th>a) Almost every fire</th>
<th>b) Over half the time</th>
<th>c) Occasionally</th>
<th>d) Rarely if ever</th>
<th>e) Can't say</th>
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</thead>
<tbody>
<tr>
<td>65.</td>
<td>Weather forecasts.</td>
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<td>66.</td>
<td>Fuel conditions.</td>
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<td>67.</td>
<td>Predicted fire behavior.</td>
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<td>68.</td>
<td>Escape routes and safety zones.</td>
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<td>69.</td>
<td>Who is in charge.</td>
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<td>70.</td>
<td>When resources will be available.</td>
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<td>71.</td>
<td>Special hazards or situations.</td>
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<td>72.</td>
<td>Strategy for dealing with the fire.</td>
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<td>73.</td>
<td>Tactics for implementing the strategy.</td>
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</table>
Wildland Firefighter Safety Study
May 1996

Getting information to crews may be a problem for any of several reasons. How often is each of the following a significant reason?

a) Almost every fire b) Over half the fires c) Occasionally d) Rarely if ever e) Can't say

74. Dispatch not having the right information.
75. Dispatch not passing on or delaying information.
76. Dispatch unclear in communicating information or instructions.
77. Managers or administrators not sending relevant information.
78. Unclear directions from Incident Command.
79. English language difficulties.
80. People not knowing one another.

81. Communications equipment problems.
82. Inadequate crew briefings.
83. Inadequate exchange of information between crews from one operational period to the next.
84. Inadequate exchange of information between Incident Management Teams during transitions.
85. Reluctance of crews to ask again for information that was not clear or not sent.

Briefings and Plans

Some other problems raised about information flow are described in the two sections below. Please rate each problem as to whether it is

a) A frequent and important problem b) An infrequent problem, but important when it occurs c) Not a very important problem d) Not a common problem e) Can't say

86. Unclear statement of the incident objectives or strategy for a fire.
87. Planning occurring when crew supervisors are exhausted (e.g., after dinner, in middle of night) so it misses their best input.
88. Incident action plans having mixed messages about safety (e.g., leading off with a statement about not compromising safety, then planning construction of downhill line without sufficient mitigation).

89. Managers mis-timing their plans but sticking rigidly to them anyway (e.g., the work goes slower, the fire spreads further, and the plan is invalidated; or, work requiring daylight goes into night).
90. Planning meetings conducted like military briefings, with too little participation by those directly supervising crews on the fireline.
Wildland Firefighter Safety Study
May 1996

Dispatching Resources
91. Too slow turn-around time for obtaining needed equipment.
92. Priorities not adequately communicated to dispatch.

93. Dispatch changing requests for resources without getting approval from the Incident Commander or the requester.
94. Dispatch does not have adequate fire experience to support people in the field.

CREW AND TEAM ATTRIBUTES
95. In your usual role when involved in a fire do you construct, maintain or defend fire line?
   a) Yes
   b) No

We now turn to considering attributes of a crew or team as a whole. Please base your answers on your own personal experience. How often is there a problem with each of the attributes listed below, which together may be called "crew dynamics?"
   a) Usually   b) Often   c) Occasionally   d) Rarely if ever   e) Can't say

96. Crew/team cohesion (working together).
97. Crew/team leadership.
98. Stable crew/team membership.
99. Clear role assignments.

100. Ability of members to perform multiple roles.
101. Communication among crew/team members.
102. Trust among crew/team members and crew/team supervisors.

Here is a list of several potential problem areas that relate to crew/team safety.

103. Which two of these need the greatest improvement to enhance safety?
   a) Crew/team dynamics
   b) Getting information
   c) Adequate equipment
   d) Avoiding fatigue
   e) Quality of the Incident Management Team
   f) Crew/team supervisors
   g) Recognition of varied skill levels of available resources
   h) Can't say
ETHNIC AND GENDER ISSUES

Like the rest of society, firefighters are becoming more diverse in terms of ethnicity and gender, and this has led to some actual or perceived problems, according to our interviews. Three problem areas noted were: exclusion from communication patterns, willingness to speak up about safety issues, and requisite physical conditioning. Though controversial and sensitive, we need to know how widely these situations or their perceptions exist.

104. Compared to others, are firefighters of your same ethnic group and gender kept out of any communications loops or given any less situational information need for safety?
   a) Definitely
   b) Sometimes
   c) No
   d) Can't say

105. Compared to others, are firefighters of your same ethnic group and gender less likely to speak up about safety problems?
   a) Definitely
   b) Sometimes
   c) No
   d) Can't say

106. Compared to others, are firefighters of your same ethnic group and gender more likely to be below the physical condition required by the job?
   a) Definitely
   b) Sometimes
   c) No
   d) Can't say
CRISIS LEADERSHIP

Many types of fire leadership problems have been cited. For each problem listed in the two sections below, please indicate how often it occurs.

a) Almost every fire  b) Over half the fires  c) Occasionally  d) Rarely if ever  e) Can’t say

**Incident Management Team**

107. Leadership not performing well under stressful, dangerous situations.

108. Fire control effort not scaling up quickly enough as a fire grows.

109. Tactics and strategy not changed fast enough as fire complexity and size increase.

110. Field supervision (strike team/task force leaders and division/group supervisors) not staying close enough to what is happening on the ground.

111. Agency administrators “hiding” during a fire, leaving decisions to the incident management team.

112. Transition from an Incident Management Team back to local home unit control occurring too quickly.

113. Crew and division supervisors not questioning the reasonableness of their fire assignments.

114. Safety officers not focusing on tactical fire safety issues, but rather on less critical things (e.g., cleanliness).

115. Incident Management Team not debriefing crew supervisors.

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**Crew Supervisors**

116. Crew supervisors overloaded with information and tasks.

117. Crew supervisors not adequately controlling their crew members.

118. Crew supervisors not recognizing danger quickly enough.

119. Crew supervisors not reacting properly to dangers.

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For the following fire incident leadership issues please tell us whether you

a) Strongly agree  b) Agree  c) Disagree  d) Strongly disagree  e) Can’t say

120. There are too many safety rules and guidelines to remember and use in decision-making at fires.

121. Firefighters cannot keep a watch out for the fire and still use their tools safely.

122. Firefighters need to rely on their crew supervisor or squad boss, rather than themselves, to watch out for the safety of the crew.
EXPERIENCE/COMPETENCE

The drop in experience levels was frequently cited as an issue underlying many safety problems. Have the following issues been of:

<table>
<thead>
<tr>
<th></th>
<th>a) Major importance</th>
<th>b) Some importance</th>
<th>c) Little importance</th>
<th>d) Not a problem</th>
<th>e) Can't say</th>
</tr>
</thead>
<tbody>
<tr>
<td>123.</td>
<td>People working in Incident Management Team positions who have little experience.</td>
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<tr>
<td>124.</td>
<td>The lack of a requirement for fire experience for Agency Administrator positions.</td>
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<tr>
<td>125.</td>
<td>The lack of a requirement for fire experience for Fire Management Officer (FMO) positions.</td>
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<td>126.</td>
<td>People with rusty command skills used in command positions.</td>
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<tr>
<td>127.</td>
<td>Firefighters today having less firefighting experience than those in years past.</td>
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<tr>
<td>128.</td>
<td>Firefighters today having less woods knowledge than those in years past.</td>
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<tr>
<td>129.</td>
<td>Bus drivers having little or no experience in driving on mountain roads or other rough terrain.</td>
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<tr>
<td>130.</td>
<td>People involved in prescribed burning having little or no firefighting experience.</td>
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<tr>
<td>131.</td>
<td>Crews from geographic areas with significantly different fire characteristics being transported to fires in other geographic areas.</td>
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<tr>
<td>132.</td>
<td>Sector/Division supervisors who have little experience.</td>
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</tbody>
</table>

We have heard many comments about the use of crews beyond what is warranted by their experience or training. About how often have you have you seen each of the following types of crews used in situations that are relatively unsafe for their training or experience?

<table>
<thead>
<tr>
<th></th>
<th>a) Rarely if ever</th>
<th>b) Once or twice per season</th>
<th>c) 3-5 times a season</th>
<th>d) Over 5 times a season</th>
<th>e) Can't say</th>
</tr>
</thead>
<tbody>
<tr>
<td>133.</td>
<td>Contract crews.</td>
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<td>134.</td>
<td>Military crews.</td>
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<td>135.</td>
<td>EFF crews.</td>
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<td>136.</td>
<td>Inmate crews.</td>
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<tr>
<td>137.</td>
<td>Type II Agency crews.</td>
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<tr>
<td>138.</td>
<td>Type II Interagency crews.</td>
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<td>139.</td>
<td>Hotshot crews.</td>
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<tr>
<td>140.</td>
<td>Smokejumper crews.</td>
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<td>141.</td>
<td>Helitack crews.</td>
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<tr>
<td>142.</td>
<td>Local volunteer fire department crews.</td>
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<tr>
<td>143.</td>
<td>Local career fire department crews.</td>
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<tr>
<td>144.</td>
<td>State crews.</td>
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</tbody>
</table>
How many people in each of the operations section positions listed below would you say don't have enough experience for their job? Rate as
a) Almost none (less than 1%)   c) Quite a few (10-25%)   e) Over half
b) A few here and there (2-10%)  d) A significant number (25-50%)  f) Can't say

145. Type II crew supervisors.  149. Division/group supervisors.
146. EFF crew supervisors.  150. Operations section chiefs.
147. Inmate crew supervisors.  151. Incident commanders.
148. Strike team/task force leaders.

Many people have expressed concern with one or another aspect of certification. For each concern listed below, please rate whether it is a
a) Frequent and important problem  c) Not a very important problem
b) An infrequent problem, but important when it occurs  d) Can't say

CERTIFICATIONS

152. Unqualified people getting Red Card certifications because the requirements are too easy.
153. Unqualified people getting Red Card certifications because of abuse of the Task Book process.
154. People being given ICS ratings based on their federal, state, or local fire department rank, rather than their wildland firefighting experience or training.
155. Crews’ qualifications not being reviewed as they check in.
156. Individuals’ Red Cards not being checked prior to dispatch.
157. Crew supervisors not totally truthful about their crew’s condition or experience.

TRAINING

158. Almost everyone is in favor of more or better training in the classroom and hands-on training in the field, but of the following groups, which two most need to be better trained than they are now?
   a) Type I firefighters  e) Crew supervisors
   b) Type II agency firefighters  f) Incident Management Team
   c) EFF firefighters  g) Agency administrators
   d) Contract firefighters  h) Can’t say
We received a great many detailed comments about training. For each of the following, please tell us whether you

<table>
<thead>
<tr>
<th>a) Strongly agree</th>
<th>b) Agree</th>
<th>c) Disagree</th>
<th>d) Strongly disagree</th>
<th>e) Can't say</th>
</tr>
</thead>
</table>

159. The types of wildland fire training you need are readily available.

160. You are allowed by your agency to attend the training you need.

161. The training of firefighters does not emphasize the dangers and importance of safety practices well enough.

162. Crews are not adequately trained in real-time decision-making, especially in emergencies.

163. Training is now being used as a substitute for experience.

164. Training is not really a priority; management seldom checks to see if it is done. There are no consequences if crew supervisors do not train their crews.

165. "One size fits all" training is not appropriate across all geographic areas.

166. The sharp reduction in entry-level seasonal jobs on Type II crews makes it difficult to get enough early experience to be safe.

167. Seasonal workers are not getting adequate training.

168. Training on the use of shelters is not realistic enough.

169. More training is needed on safety in interface fires and establishing safety zones and escape routes in the urban/wildland interface.

170. More training is needed on the hazardous materials being used on the job (e.g., fusees, propane, and diesel fuel).

171. More knowledge is needed at the crew level of how weather affects fire behavior.

172. There is a shortage of good, qualified trainers with solid fire experience background.

173. There is a wide variety in the quality of training from instructor to instructor, unit to unit, and area to area.

174. Supervisors of Type II and EFF crews need better training on how to manage people.

175. Safety training once in the Spring is not enough.

176. Training courses are often incomplete or rushed.

177. Classroom training must be supplemented with hands-on field practice.
AIR OPERATIONS

<table>
<thead>
<tr>
<th>Please tell us whether the following situations occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Very often  b) Often  c) Occasionally  d) Rarely if ever  e) Can't say</td>
</tr>
<tr>
<td>178. Helicopter pilots performing unsafely.</td>
</tr>
<tr>
<td>179. Firefighters not taking proper safety precautions in or near their helicopter transport.</td>
</tr>
<tr>
<td>180. Helicopter or fixed wing pilots not having the training to act effectively as &quot;eyes in the sky&quot; (aerial observers).</td>
</tr>
<tr>
<td>181. Lack of adequate safety management at aviation facilities (e.g. helibases, heliports, helispots).</td>
</tr>
</tbody>
</table>

PHYSICAL FITNESS

<table>
<thead>
<tr>
<th>Physical fitness is another area with some controversy. For each of the following please tell us whether you think it is</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) High priority to fix  c) Low priority to fix  e) Can't say</td>
</tr>
<tr>
<td>b) Medium priority to fix  d) Not true</td>
</tr>
<tr>
<td>182. Many Type II firefighters are not physically fit.</td>
</tr>
<tr>
<td>183. The wide range of fitness levels across Type II crews makes it difficult to safely match assignments to crews.</td>
</tr>
<tr>
<td>184. The step test is not an adequate measure of physical fitness.</td>
</tr>
<tr>
<td>185. Physical fitness training is needed for Incident Management Team personnel.</td>
</tr>
<tr>
<td>186. Some crews or individuals are recorded as passing the step test when they did not pass it (a result of favoritism or local political pressure).</td>
</tr>
<tr>
<td>187. Many contract crews do not have adequate physical fitness.</td>
</tr>
<tr>
<td>188. Some states do not have or enforce adequate firefighter physical fitness standards.</td>
</tr>
</tbody>
</table>

Take a short break, and then give us some information about yourself.
PERSONAL INFORMATION

189. In what geographic area is your home unit? [See the map at the end for the definition of areas for the purpose of this survey.]
   a) NW  e) SZ  i) SW
   b) NR  f) WB  j) SA
   c) EA  g) EB  k) AK
   d) NZ  h) RM

190. Latest federal agency affiliation:
   a) FS  e) NPS
   b) BIA  f) Other (Write in on the answer sheet.)
   c) BLM
   d) FWS

191. Total years of experience:
   a) Less than 5  d) 16-20
   b) 5-9  e) over 20
   c) 10-15

192. How many times have you had an injury associated with a fire that required medical attention or loss of at least one day of work?
   a) Never  c) 2-5 times
   b) Once  d) 6 or more times

193. Most recent or usual level:
   a) Firefighter
   b) Crew supervisor or other single resource boss
   c) Incident Management Team
   d) Fire Management Officer or assistant FMO
   e) Agency administrator
   f) Other

194. If you answered "firefighter" to the above question, please tell us your usual role on a fire.
   a) Smokejumper
   b) Hotshot
   c) Helitack
   d) Engine
   e) Type II hand crew
   f) Emergency firefighter (EFF, A/D)

195. Gender:
   a) Male
   b) Female

196. Age:
   a) 20-29  d) 50-59
   b) 30-39  e) Over 60
   c) 40-49

197. Ethnic affiliation:
   a) African American
   b) Native American
   c) Asian
   d) Hispanic
   e) Other (including white, non-Hispanic)

198. Are you a seasonal employee? If so, which type?
   a) Seasonal permanent (WAE)
   b) Seasonal temporary (GS)
   c) Seasonal temporary (EFF)
   d) Not seasonal
   e) Can't say

199. Is your primary home agency job other than fire management or firefighting?
   a) Yes
   b) No

200. Have you been a(n):
   a) Smokejumper
   b) Helitack
   c) Hotshot
   d) Engine crew
   e) Type II firefighter
   f) EFF
   g) Seasonal firefighter
   h) State firefighter
   i) Local firefighter (Check all that apply on the answer sheet.)
## STRATEGY AND TACTICS

Although the focus here is on organizational culture, leadership, and human factors, many recurring problems with strategy or tactics were cited in our interviews. How often does each of the following situations occur each year in your experience?

<table>
<thead>
<tr>
<th>a) Very often</th>
<th>b) Often</th>
<th>c) Occasionally</th>
<th>d) Rarely if ever</th>
<th>e) Can't say</th>
</tr>
</thead>
</table>

201. Misuse of direct attack.
202. Ignoring the 10 standard fire orders.
203. Ignoring the 18 watchout situations.
204. Fire lines dug downhill without adequate mitigation efforts made.
205. Fire lines not properly anchored.
206. Too much fire line to defend with the available resources.
207. Flying crews to the tops of fires or above fires, high on slopes.
208. Hesitation to use air tankers on initial attack.
209. Too few lookouts posted.
210. Crews or dozers not giving adequate consideration or warning to other crews working below them (e.g., loosening rocks that fall).
211. Lack of coordination between state and federal efforts at fires.
212. Helicopter rescue attempts too slow or not attempted at all.

213. Paramedics/EMTs too slow to respond to field injuries.
214. Not enough attention given to identifying and/or building adequate safety zones.
215. Engine crews ignoring the need for escape routes and safety zones.
216. Lack of smooth, timely shift changes.
217. Fires fought without adequate resources, rather than choosing which fires to fight and which to just monitor.
218. Overuse of nighttime operational periods.
219. Divisions not adequately subdivided as they grow large.
220. Dangerous transitions from initial attack to extended attack.
221. Dangerous transition from extended attack to Type II or Type I teams.
222. Dangerous transitions from Type II to Type I Incident Management Teams.
FATIGUE

Many believe that fatigue can impact safety. We need to know which causes of fatigue are most important to address. Please rate the following as:

a) An important problem that occurs frequently
b) An uncommon situation, but important when it occurs
c) Not very frequent or important
d) Can't say

223. Crews being asked to work too many consecutive hours at a fire.
224. Crews being asked to work too many consecutive days at a fire.
225. Crews being asked to work too many consecutive fires.
226. Crews pushed too hard to avoid a transition to a higher level fire.
227. Crews agreeing to work too long to make more money.

228. Fatigue levels of newly arriving crews not being checked.
229. Crews who were dispatched in the middle of the night not given adequate rest after arrival and prior to assignment.
230. Incident Management Teams being fatigued.
231. Crews not acknowledging their own fatigue level and its impact on their safety.

OTHER HUMAN FACTORS ISSUES

For each of the following, please tell us whether you
a) Strongly agree   b) Somewhat agree   c) Disagree   d) Strongly disagree   e) Can't say

232. Many firefighters may be wrong for the job they do (e.g., too analytical, too slow in emergency decision making).
233. Many people in fire leadership positions may be wrong for the job (e.g., too analytical, too slow in emergency decision making).
234. Occasionally on Type I crews the "can do" attitude can conflict with safety in getting the job done.
235. Fire leadership has a reluctance to correct dangerous behavior observed at fires.

236. Screening is needed to select out the first-level supervisors who do not have the mental toughness, leadership skills, or personality to lead their crews or units.
237. Drugs and alcohol are a problem at incident bases and camps.
238. You often find yourself in fire situations where you don't have confidence in your ability to make decisions.
WHICH ARE THE MOST IMPORTANT ISSUES?

We have given you many detailed safety issues to rate, and now need your help in choosing overall priorities.

239. Of all of the questions you have been asked so far, which has had the greatest impact on safety in your geographic area? Choose up to five items, and write their question numbers on the answer sheet.

240. Which of the following general areas do you think merit the highest priority to improve safety? List up to three on the answer sheet, using the letters below.

a) Attitudes about safety  m) Training of firefighters
b) Personal accountability n) Training of Incident Management Team
c) Resource availability o) Certification process
d) Priority setting for firefighting p) Operating procedures
e) Reporting and investigating safety q) Physical fitness
     incidents
f) Personnel practices and pay r) Fatigue reduction measures
g) Equipment and protective clothing s) Screening for job suitability
h) Information flow and briefings t) Psychological preparation for firefighting
i) Fire management policy u) Crew cohesiveness
j) Crisis leadership v) Interagency coordination
k) Experience of firefighters w) Decision making skills
l) Experience of Incident Management Team x) Experience and abilities of crew
     supervisors

241. If you feel there are any important safety issues not mentioned above; please write them on the answer sheet. (You might refer to the ideas you initially jotted down.)

Take a short break before we address solutions to the safety problem.
POTENTIAL SOLUTIONS

Below are many detailed suggestions we received from firefighters and managers for improving safety. Please rate each as to the impact you think it would have:

<table>
<thead>
<tr>
<th>a) Much positive impact</th>
<th>c) Little or no impact</th>
<th>e) Already is done</th>
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</thead>
<tbody>
<tr>
<td>b) Some positive impact</td>
<td>d) Negative impact</td>
<td>f) Can't say</td>
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</table>

Later you will be asked to choose the five best ideas.

Personal Responsibility and Accountability

1. Give everyone, from firefighters to agency administrators, the right and obligation to point out safety problems.
2. Require crew supervisors to turn down an assignment if their crew is not qualified for it.
3. Hold everyone more accountable for their personal decisions affecting safety.
4. Do not re-dispatch a crew or crew member sent home for a safety violation without some interval or corrective action.
5. When appropriate, discipline someone working out of their home region after they go home.
6. Reduce Red Card qualification level as a penalty for poor safety performance.
7. Promptly investigate ALL reported safety violations.

EQUIPMENT

8. Modernize tools (e.g., use hydro axes, tractors with brush cutters, etc.).
9. Improve distribution of radios to crews (at least one per squad boss).
10. Use cellular phones or other technology to replace or supplement forest radio systems.
11. Add capability to send video of fire situations between crews and the Incident Management Team.
12. Increase use of single engine airtankers (they are cheaper and can be used at smaller fires).
Wildland Firefighter Safety Study
May 1996

Please continue, using the same scale:
a) Much positive impact   c) Little or no impact   e) Already is done
b) Some positive impact   d) Negative impact   f) Can't say

FIREFIGHTING TRAINING (INDIVIDUALS AND CREWS)

13. Get crews to practice responses to safety emergencies (e.g., practicing communications within the crew, communications to higher levels, dropping tools and running, identifying safe areas, etc.).

14. Improve training of firefighters and crews on situational awareness (ability to recognize dangers).

15. Require those who sign up for training to be available for assignments (so training is not wasted on people using it for building resumes or for career enhancement).

16. Put a special emphasis on making “safety first” automatic (defensive driving mentality).

17. Require an annual test of safety knowledge.

18. Add realism and relevance to training, such as by using critiques from real fires.

19. Use more graphic videos on the dangers of the job.

20. Simulate fire entrapment situations for all firefighters.

21. Emphasize that shelters are to be used only as a last resort.

22. Practice shelter deployment frequently, under stress and outdoors on real terrain, perhaps with artificial wind and even live fire.

23. Put more hands-on practice and field exercises into training courses.

24. Revise the 10 standard fire orders and 18 lookout situations into a logical risk assessment and management process that is easily remembered.

25. Emphasize continued refresher and on-the-job training to supplement initial formal training.

26. Do internal crew debriefings at the end of operational periods and after fires, for informed, on-the-job training (review performance, safety issues, etc.).

27. Broaden people's knowledge of the functions conducted by others.

28. Lengthen seasonals' work tours and bring them in before the start of the fire season for training.

29. Detail employees from geographic areas with low fire rates to ones with high fire rates to increase their experience.

30. Reduce the student-instructor ratio in EFF courses.

31. Provide courses in language skills for experienced Hispanic, Native American, Asian, or other firefighters who need it (to improve safety and to help them gain promotions where their experience can be best used).

32. Provide special training and motivation to the supervisors of inmate crews, since the crew's usefulness and safety is highly dependent on their supervision.
Please continue, using the same scale:

- a) Much positive impact
- b) Some positive impact
- c) Little or no impact
- d) Negative impact
- e) Already is done
- f) Can’t say

**MANAGEMENT TRAINING**

33. Give Type II and EFF crew supervisors more training in supervision and leadership.
34. Use realistic scenarios to practice making go/no go decisions on when to fight a fire.
35. Make more use of realistic scenarios for real-time decision-making for each ICS position.
36. Add more on strategy and tactics to management courses.
37. Add standardized tests to management courses, to make the criteria for management positions tougher and more consistent across agencies.
38. Do not pass people taking courses for certifications in supervisory or command positions if they do not have the skills or temperament for the next level of management.
39. Administer a psychological test to screen out managers, line/operations supervisors, and command personnel who are unfit for decision-making ability under stress.

**PHYSICAL FITNESS**

40. Increase physical fitness training and requirements for Type II crew firefighters.
41. Allow fire personnel to exercise an hour a day on the job (being done in some places but not others).
42. Extend wellness (including exercise) programs to seasonal employees.

**INFORMATION FLOW AND BRIEFINGS**

43. Give special attention to the hand-off of plans and briefings/debriefings, from one operational period to another.
44. Require acknowledgment of the receipt of information on weather changes (e.g., from dispatchers to operations section supervisors).
45. Keep dispatchers better informed during initial attack and extended attack.
46. Brief entire crews together, to promote cohesiveness.
47. Brief crews on the big picture enroute to or on arrival at an incident. Include weather and fire behavior, and the purpose of what they are doing. Refresh safety points for this incident.
48. Provide more information to crews on the specific site they are working (e.g., fire history of land, fuel loading, terrain, vegetation type, climatological data, human use patterns, specific hazards, drought intensity, topo maps, and expected weather).
49. Develop a system for reporting near misses.
FIRE MANAGEMENT POLICY

50. Use fire behavior and growth prediction models to help decide on the allocation of scarce resources among fires.

51. Better educate public and media on risks of the urban-wildland interface, and the limitations of wildland firefighting (i.e., lower expectations, raise budgets, or increase acceptance of losses).

52. Implement a large scale, long range program of hazard fuel reduction (through prescribed burning, thinning, etc.).

53. Educate or require the public to better mitigate the urban/wildlands interface problem.

54. Pull back crews and let fires get larger when their lack of experience threatens their safety.

55. Encourage insurance companies to rate structures on their safety features, and not just their location (to encourage owners to reduce the hazards).

56. Create a single, unified federal wildland firefighting service with high standards for training and safety.

57. Develop pre-fire plans for wildland firefighting around sub-divisions.

58. Stop federal firefighters from accepting firefighting tasks involving vehicles and structures, which are beyond their mandate and training, and support the firefighters against local flak; or train firefighters to safely handle these tasks, and allow them to do so.

59. Develop standards for constructing or selecting safety zones (by fuel type, weather, etc.).
Wildland Firefighter Safety Study
May 1996

Please continue, using the same scale:

a) Much positive impact   c) Little or no impact   e) Already is done
b) Some positive impact   d) Negative impact   f) Can't say

PERSONNEL PRACTICES AND PAY

60. If we cannot give satisfactory experience and training to all fire-related positions, at least ensure the competency and experience of FMOs and crew supervisors, two critical positions.

61. Increase fire experience for FMO qualification and standardize minimum FMO requirements across agencies.

62. The BIA should increase the standardization and qualifications for its fire management and fire control officers, who significantly affect safety policy (suggested by a BIA firefighter).

63. Develop pay and promotion incentives for fire duty.

64. Base one’s fire pay level on one’s level of responsibility at a fire, not one’s home assignment.

65. Consider use of portal-to-portal pay or 24-hour pay rather than overtime.

66. Reduce pay disincentives that stop experienced firefighters from taking more responsible firefighting positions.

67. Further encourage or require agency administrators to release their experienced fire personnel for fire duty even if they have a heavy workload in their home office, and without any career penalty.

68. Offer the more experienced firefighters and managers permanent fire positions.

69. Re-classify and rate firefighters as firefighters, not forestry technicians, to improve morale and self-view as professionals.

70. Improve validity and reliability of Red Card Qualifications. Require those who sign off on a taskbook to evaluate the quality and complexity of the experience gained in light of whether it was sufficient to merit as a qualification, especially for qualifying a division/group supervisor.

71. Use one multi-agency Red Card board to reduce the number of bogus sign-offs and inappropriate grandfathering of qualifications.

72. Increase number of full-time positions for Type I crews.

73. Give recognition to personnel who volunteer for fire duty.

74. Give better recognition and awards to seasonal firefighters.

75. Provide step increases for seasonal temporary employees (to improve their retention).

76. Use and evaluate firefighters on local assignments before sending them out of their area.

77. Provide a support system for the families of crews when they are away for 2-3 weeks, to reduce worry about their families.

78. Use experienced retired firefighters as advisors, especially as “shadows” to help train crew supervisors and Incident Management Team members.
Please continue, using the same scale:

<table>
<thead>
<tr>
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</tr>
</tbody>
</table>

**OPERATING PROCEDURES**

79. Develop a safety culture that encourages people to think rather than just obey rules.

80. Enforce stricter adherence to the existing safety rules.

81. Daily find innovative ways to motivate attention to safety on the job.

82. Raise a red flag during drought years (when high numbers of fatalities occur), and make appropriate changes to standard operating procedures and information flow.

83. Do size-ups over the radio, using a checklist.

84. "Triage" the structures involved in fires, to focus resources on avoiding the greater losses, and to prevent endangering crews.

85. Require division/group supervisors to periodically walk the line several times each operational period, and to fulfill their role in getting support for their crews, as well as commanding them.

86. Emphasize anchoring and flanking as a preferred strategy/tactic.

87. Require supervisors to check the weather frequently, so it is habit.

88. Use the appropriate number of firefighters needed to implement a chosen strategy, or change the strategy if the resources are not available.

89. Use qualified aircraft observers for fires over a specified size (e.g., 30 acres), to see the whole situation, pass observations to the IC, and to help identify safety zones.

90. Limit the number of rookies for any type of crew (e.g., to 3 or 4 per crew of 20).

91. Automatically dispatch safety officers as soon as an extended attack is declared, and not just for large fires when an Incident Management Team is ordered.

92. Distinguish the high capability Type II crews or crew supervisors from the others, so they can be used to reduce the burden on Type I’s, and so that complex tasks are not inadvertently given to the less competent crews. (Re-introduce grades II-A, B, or C or a Type III crew classification.)

93. Consider grading inmate crews; eliminate those which are incompetent.

94. Improve tracking of resources during a fire.

95. Ensure that fire behavior specialists are assigned to fires as specified in guidelines, and that their information gets to the crews.

96. Request agencies to hold back some experienced firefighters and supervisors to provide an experienced core for Type II crews likely to be called up at a later time (a change from using a first come, first served basis).

97. Limit military crews to mop-up assignments until they have on-the-job experience.
Please continue, using the same scale:

<table>
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<th>Impact Options</th>
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</tr>
<tr>
<td>f) Can't say</td>
</tr>
</tbody>
</table>

**FATIGUE REDUCTION MEASURES**

98. Limit use of night operational periods.
99. Limit tours of duty for Type II (or at least EFF) crews to two weeks.
100. Use the "fresh crew rule:" if not in camp by 11 PM, don't use them on the next daytime operational period.
101. Increase the use of spike camps, to reduce travel from a distant incident base.
102. Reduce noise in daytime around sleeping night crews. (Consider motels where available, or use of sleeping masks and ear plugs, or some other alternative.)
103. Emphasize the importance of hydration, especially for Type II crews. (It is already stressed for Type IIs).
104. Increase use of helicopters for transport.

**PSYCHOLOGICAL PREPARATION**

105. Teach people not to hesitate to back off.
106. Teach how to take the time to mentally "reload," and prepare for what's ahead.
107. Teach how to check whether we are causing a problem ourselves.
108. Teach critical thinking, the mental process to go through when faced with large amounts of information. How to recognize critical pieces, and how to recognize when critical pieces are missing, all under stress.
109. Teach people how to stay focused in spite of fatigue, carbon monoxide buildup, and inexperienced staff.
110. Prepare rookies for what a fire entails, and for being away from home.
111. Use examples from successful incidents as positive examples to reinforce safe behavior.
Wildland Firefighter Safety Study
May 1996

Please continue, using the same scale:

<table>
<thead>
<tr>
<th>a) Much positive impact</th>
<th>c) Little or no impact</th>
<th>e) Already is done</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Some positive impact</td>
<td>d) Negative impact</td>
<td>f) Can't say</td>
</tr>
</tbody>
</table>

INTERAGENCY EXERCISES AND COORDINATION

112. Open up prescribed burns to interagency participation, to provide experience in unfamiliar surroundings, practice teamwork and learn to interact better.

113. Provide state/federal interagency training at the command level, to smooth out joint command problems.

114. Develop clearer working relationships between federal agencies and local fire departments.

115. Help local fire departments to acquire adequate wildland firefighting equipment and training.

116. Assign extra Incident Management Team personnel to military crews, to compensate for their lack of experience.

CHOOSING THE BEST IDEAS

117. Which of the many suggestions above, if any, do you think are most important for improving safety? (List up to five on the answer sheet.)

118. Which of the many suggestions above, if any, do you think are counterproductive for safety? (List up to five on the answer sheet.)

119. Please write on the answer sheet any other idea you think would be important for improving safety.
**WHAT IS WORKING WELL?**

| 120. Integrating people from all over the nation into a successful firefighting force. |
| 121. Concern for safety being accepted now as part of the culture by firefighters. |
| 122. Concern of supervisors for the safety of their crews. |
| 123. Physical conditioning of wildland firefighters. |
| 124. Interagency cooperation in firefighting. |
| 125. Specialized training and use of Type I crews (hotshots, smoke jumpers, etc.). |
| 126. Forecasting of weather conditions. |
| 127. Knowledge of fuel conditions. |
| 128. Fire reconnaissance. |
| 129. Incident Command System. |
| 130. Speed of mobilization of people and equipment. |
| 131. Logistics system. |
| 132. Air Operations (helitack, transport, tankers). |

<p>| 133. Firefighters' generally positive attitude (committed, energetic, can-do, and love the job). |
| 134. Firefighters' adaptability and cross-training. |
| 135. Use of health and safety codes based on experience. |
| 136. Use of safety officer position. |
| 137. Willingness to back off when necessary. |
| 138. Personal protective equipment. |
| 139. Transportation equipment. |
| 140. Communications equipment. |
| 141. Use of the abbreviated &quot;LCES&quot; list (Lookouts, Communications, Escape routes, Safety zones). |
| 142. Lessons learned from the South Canyon fire have led to more people questioning strategy and tactics. |
| 143. Recognition of the need for improvement in fire safety. |
| 144. Existence of this study. |
| 145. Are there any other strengths of the system you would like to note? (Write them on the answer sheet.) |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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</thead>
</table>
| 146. If you have experience in more than one geographic area, have you found a greater awareness of safety in another region than your own and if so, which region? (Write it on the answer sheet.) | a) Yes  
b) No                                                    |
| 147. Any other special regional strengths you would like to note? (Please write them on the answer sheet.) |                                                                         |

THANK YOU SO MUCH FOR YOUR ASSISTANCE IN IMPROVING FIREFIGHTER SAFETY!

PLEASE REMEMBER TO SEND US ONLY THE ANSWER SHEET, NOT THE QUESTIONNAIRE BOOKLET, OR IT WILL NOT GET TO US.
### Wildland Firefighter Safety Study

**Marking Instructions**
- Use a No. 2 pencil only. (Scratches, heal marks, or felt tip pens completely erase cleanly on this form. Correct: black, incorrect: blue. Make no stray marks on this form. Any stray marks you wish to change)

**Briefings, Plans, and Reports**
- Personnel, Pay Policy, and Equipment

**Priority Setting and Political Pressure**

**Equipment (continued)**

**Information Flow and Briefings**

**Crisis Leadership**

**Gender Issues**

**Ethnic and Cultural Competence and Attributes**

**Training Certifications**

**Experience and Competence**

**Air Operations**

**Physical Fitness**
<table>
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Page 2
### Potential Solutions

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<th>Equipment</th>
<th>Accountability</th>
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<tbody>
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<td>Practice and Pay</td>
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<tr>
<td>Fatigue Reduction Measures</td>
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</tbody>
</table>

**What is working well?**

Please use page 4 of this answer sheet to give us any other ideas you believe are important for improving safety.

---

**Coordination**

Thank you again for taking the time to complete this survey.

---

**Coordination**

Please use page 4 for your answer to 145-147.
Space for ideas on questions 119, 145, and 147.