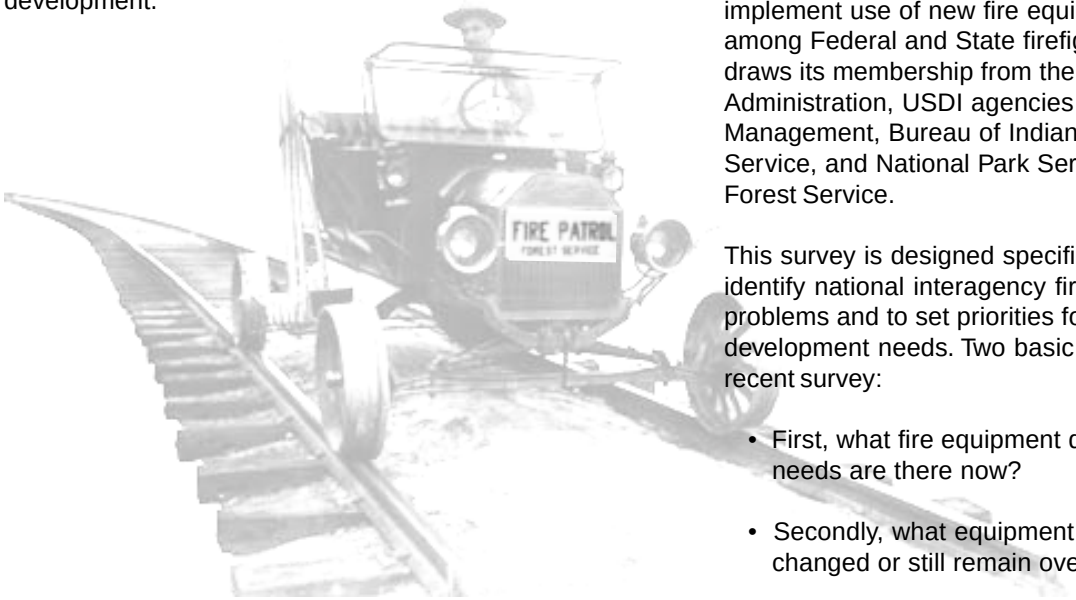
Introduction

The Missoula Technology and Development Center

The Missoula Technology and Development Center (MTDC) has played a central role in the development of equipment used in fire suppression throughout the United States and the world. As part of this broad effort, over the past 14 years the Fire and Aviation Program in the Center has sponsored three field-based surveys of firefighting equipment development priority needs. These surveys helped identify priority equipment needs of the interagency firefighting community in the United States. Findings from these surveys have provided input into decisions directing fire equipment and technology development.



The National Wildfire Coordinating Group and the Fire Equipment Working Team

Like previous wildfire equipment surveys done by the Center, the current survey is intended to help the work of the National Wildfire Coordinating Group (NWCG) and the Fire Equipment Working Team (FEWT). The mission of the NWCG is to coordinate programs and projects of mutual concern to the wildland fire protection community in the United States. In 1976, the Fire Equipment Working Team, a subcommittee of the National Wildfire Coordinating Group, was established. This team supports the mission of the NWCG by working to implement use of new fire equipment and chemicals among Federal and State firefighting agencies. FEWT draws its membership from the General Services Administration, USDI agencies (the Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service), and the USDA Forest Service.

This survey is designed specifically to assist FEWT to identify national interagency fire-equipment-related problems and to set priorities for equipment development needs. Two basic questions guided this recent survey:

- First, what fire equipment development priority needs are there now?
- Secondly, what equipment development needs have changed or still remain over the years?

Brief History of Wildfire Equipment Needs Surveys

1984: The First Interagency Fire Equipment Survey of Priority Needs

To help FEWT carry out its mission, in 1984 the first survey of fire equipment needs was conducted by MTDC. The purpose of the first survey was to identify common interagency fire-related equipment problems and identify priority development needs. This study analyzed 1,026 returned questionnaires from FEWT member agencies. Respondents represented a variety of fire-related work roles in these agencies. The survey identified and ranked the top-20 interagency fire equipment development priority needs in 1984 (Table 1). FEWT used findings from this survey to prioritize decisions about specific fire equipment development. Later in this report, the 1984 top-priority list will be compared with the 1998 top-priority list. This comparison will show what—if any—new fire equipment needs have emerged. It will also identify the needs that continue year after year.

1993: Pacific Southwest Region's (R-5) Fire Equipment Survey of Priority Needs

In 1993, a second fire equipment needs survey was conducted by MTDC. The questionnaire that was used in the 1984 survey had been updated. However, it preserved many of the original 20 equipment priority development items. Items that were deleted had become obsolete. For example, antikickback chains, an original high-priority item, have been developed on the commercial market. From extensive pretesting of the 1993 questionnaire, new fire equipment items and problems were identified from open-ended questions. The newly identified items were added to the 1993 questionnaire, and then it was used again for the 1998 survey.

The 1993 survey was deliberately designed to identify fire equipment priority needs for Region 5. Therefore, findings from this survey did not identify the needs for *interagency* members of FEWT. To accomplish this goal, a new survey was conducted by MTDC in 1998.

Table 1—Top-20 national interagency fire equipment priority needs in1984.

Priority	Fire Equipment Item
1	Improve goggles with scratch-resistant lenses that do not fog and are comfortable.
2	Improve fire clothes.
3	Improved communication with the dozer operator.
4	Better weather-forecasting resources between agencies.
5	Improve compatibility of communication between agencies.
6	Reducing the dead spots in radio communications.
7	A new fire shelter training film to replace *Your Way Out.*
8	Improved headlamps.
9	Radios with up to 48 channels that can span frequencies used by Federal, State, and local agencies to aid in cooperative response to an incident.
10	Protection of the dozer operator from smoke and dust.
11	Better fire weather information dissemination.
12	Information on the significance of CO health hazards and how to reduce exposure.
13	An improved Smokey Bear suit with better ventilation and audio.
14	Antikickback chain.
15	Provision for command channels common to all agencies.
16	Development of a means of quickly determining what resources are on a fire and where they are located.
17	Improved fire shelters.
18	Reflective material for fire safety clothing for night operations.
19	Correct deficiencies in fusees, drip torches, and flame throwers by developing lightweight firing devices lasting 30 or more minutes.
20	Better remote equipment (communications) with long-range capabilities.

The 1998 Interagency Fire Equipment Survey of Priority Needs

An agency has two basic questions to ask about fire equipment needs:

- First, in the 13 years since the 1984 fire equipment survey, what new fire equipment development priority needs have emerged from the national firefighting community?

- Secondly, what priority needs identified in the 1984 survey still continue to be top development priority?

These two questions guide the present survey. Hopefully, the answers will provide valuable input into NWCG and FEWT decisions about future equipment development for interagency firefighters.

A Comparative Study

The vast majority of surveys are cross-sectional in design. The results from such surveys are the opinion of a population at only a single time period; they are a snapshot. Longitudinal studies, those designed to compare the changing views of people over time, are rarely done. They are very expensive because of the complex methods used to track down the same respondents over a long period. People die, move, or just disappear.

Like the 1984 study, the current survey involved many logistical complexities. This was especially the case when more than 2,000 questionnaires were bundled and mailed to all member agencies of NWCG. The agencies distributed the questionnaires to those who worked in fire-related roles. Because of this method of distribution, we had no way to know who filled out and returned questionnaires. It is reasonable to assume, however, that in the 13 years since the first survey, it would be highly unlikely that few people who filled out the 1984 questionnaires had responded in 1998. In spite of this, we feel we can still ***compare the first survey to the 1998 survey.***

Comparison of both findings can be done if a distinction is made between two kinds of respondents. They can respond as private individuals, or they can answer questionnaires reflecting the views of their agency in their fire-related work roles. By viewing the respondents in the two surveys as ***employees of fire organizations,*** we can compare the findings. Those responding in the current survey reflect equipment development priority needs in their firefighting ***work roles in their agency*** in both the 1984 and 1998 surveys.

Survey Respondents: Work Roles in the Interagency Fire Community

In 1984, a total of 1,026 questionnaires were returned. Responses were from those who worked in fire-related roles in the member agencies of FEWT: Interior agencies (Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service); the USDA Forest Service; and State agencies. Their views on equipment-development priority needs were based on their work roles. Specifically, we received responses from field-level crew foremen, program managers, line officers, coordinators of fire support units such as cache managers, members of interagency Class I fire teams, and many others.

The Questionnaire and Number of Responses

The 1984 questionnaire contained 216 items. This number was reduced to 166 in 1998, because technology development had solved some problems. For example, lightweight radios and aerial-ignition systems are now being used. However, most of the top-20 items identified in the 1984 survey were included in the 1998 questionnaire.

In 1998 more than 2,000 survey questionnaires, with the addition of new equipment and technology items, were mailed to the same FEWT member agencies that received the 1984 survey questionnaire. We added the capacity to respond electronically, and 336 responses were received. Questionnaires returned by regular mail totaled 1,396, for a grand total of 1,622 responses. This is an increase of 596 responses from the first survey.

We received responses from employees in a wide variety work roles. They represented the views of forest Fire Management Officers, District Fire Management Officers, Assistant District Fire Management Officers, engine operators, hotshots, and dispatchers. The large *Other* category of respondents was made up of those who worked in reforestation, engineering, recreation, and other specialties (Table 2).

Two background variables were included in the survey:

- Sex of the respondent.
- Years of experience working in fire-related jobs.

Of the 1,662 responses, 118 (7 percent) were female. The vast majority of respondents were male, 1,565 (93 percent). Median years of fire-related work experience of the respondents was 19.

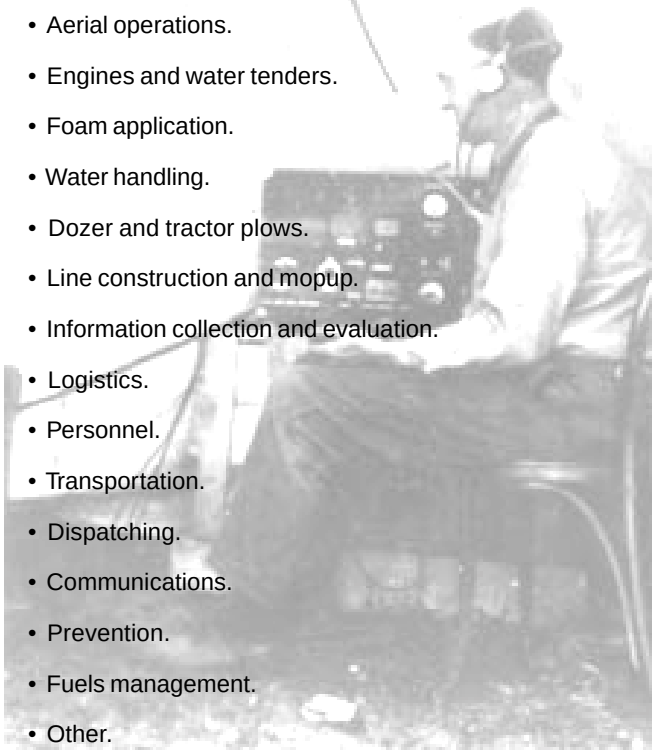
Table 2—Number of respondents by organizational role.

Organizational Role	Frequency	Percent of Total Study Population
Forest Supervisor	16	0.9
Forest FMO	123	7.1
District Range	71	4.1
DFMO	223	12.9
ADFMO	181	10.5
Engines	253	14.6
Prevention	20	1.2
Hotshots	118	6.8
Rotor wing	28	1.6
Fixed wing	6	0.3
Dispatch	25	1.4
Fuels	64	3.7
RO Fire	12	0.7
Other	482	27.8
TOTAL	**1,662**	**100.0**

Measurement and Analysis of the 1984 and 1998 Survey Data

For both surveys, the individual equipment items were grouped into:

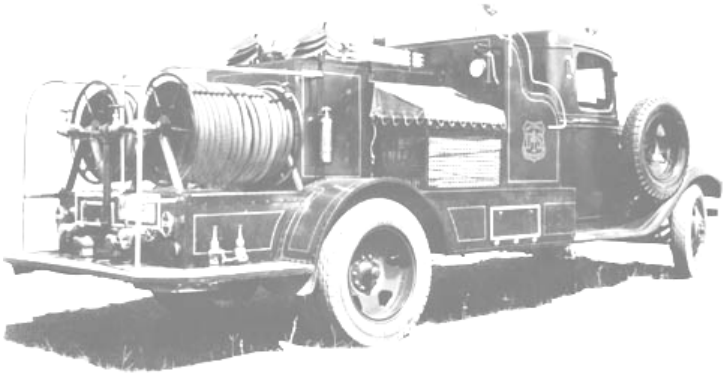
- Aerial operations.
- Engines and water tenders.
- Foam application.
- Water handling.
- Dozer and tractor plows.
- Line construction and mopup.
- Information collection and evaluation.
- Logistics.
- Personnel.
- Transportation.
- Dispatching.
- Communications.
- Prevention.
- Fuels management.
- Other.



All respondents were instructed to evaluate the statement of equipment items applicable to them. They were asked to indicate their degree of interest or priority need to develop each item. A measure of scaled response was used for every item in both the 1984 and 1998 surveys. Respondents were asked to indicate their need for each item by marking the following fixed-choice response categories:

0 – Satisfactory equipment exists
1 – Don't know
2 – Do not need
3 – Nice to have
4 – Need
5 – Must have.

In the 1984 survey, a raw score for each item was calculated. This score was based on the total responses for each item. From the calculated score in the questionnaire, all items were arrayed from high-to-low priority.



Computer analysis partitioning different agencies and different work roles in the agencies was not calculated in this 1998 survey. There is justification for this based on the findings from the 1984 survey. In the summary to that report, it was noted that there is a great deal of similarity between the top-20 lists for each agency or user group. In somewhat of a surprise, there was considerable similarity in the top 20 between the responses of crew foremen, program managers, and line officers. In designing the survey we expected to see a greater difference in the perception of problems and needs between field-level people and those in line or staff positions.

Because of these 1984 findings, to get an overall inter-agency priority equipment development needs list, we feel justified in collapsing and totaling all the scores on the questionnaire items irrespective of the respondents' work position or agency affiliation.

Calculation of scores to identify the final priority needs ranking for the current study differed slightly from the 1984 survey. For all 166 items in the new questionnaire, we just added the percentage of respondents who indicated *Need* and *Must have.* For example, if an item received a score of 70, this meant 70 percent of all the respondents to that particular equipment item responded either *Need* or *Must have*. Another item may have a score of 40, which indicated only 40 percent of all respondents checked *Need* or *Must have.* When looking at the priority ranking of each item, it is important to consider how many people actually responded to the particular item by expressing *Need* or *Must have.* For example, if only a few people from the total population expressed a strong need for a particular piece of equipment and the majority of the respondents failed to answer the question, then the item would appear high in the rankings. Because of this possible confusion, each item ranked in the 1998 survey includes the percentage of people in the total population of respondents who answered that question. For all of the 20 top-ranked items in 1998, more than 92 percent of the 1,622 respondents answered each question.

The total percentages of respondents who answered *Need* and *Must have* for each item was calculated, and like the 1984 survey, all items were ranked in priority from high to low, according to their total percentage scores.

Establishing a Priority Needs List for Equipment Development

One main goal of the survey is to identify high-priority interagency equipment development needs. There is no formula to identify what raw percentage score constitutes the magic cutoff point, determining whether the item can be labeled *High, Medium,* or *Low* development priority. We can only present the ranking of individual items in terms of where each was ranked compared to other items based on the percentage score each received. Presumably, the higher the item ranks on the list, the greater the expressed interagency collective need to develop it.

In the 1984 survey, we focused our report on the top-20 equipment items. We did this by simply counting down 20 from the list of 216, establishing the cutoff point. These items became the top-priority fire equipment development needs. In 1998, we followed the same procedure to identify the top 20 from the complete list of 166 items. By comparing this list to the priority list in 1984, we can identify equipment needs that didn't exist 13 years ago. This procedure also permitted us to identify equipment needs that have remained on the top-20 list over time.

1998 Survey Findings

Earlier, we pointed out that the survey was guided by two general questions. First, what fire equipment development priority needs exist today in the interagency firefighting community in the United States? Although we refer to the top-20 priority equipment items, the list actually has 23 items, because of a tie among four items at the 20 cutoff point (Table 3).

Different kinds of equipment items were grouped into 15 categories in the questionnaire. The breakdown of the number of top-20 equipment priorities grouped by these categories is shown in Table 4. The findings in Tables 3 and 4 clearly show equipment development for firefighting personnel received the greatest number of high-priority items. This category was followed closely in priority by equipment to improve communication and information sharing. In fact, if the categories of communication and information collection/evaluation are combined, this would be the top-priority development need. The fact that many categories of equipment did not receive a single top-20 item may reflect the arbitrary classification of items into these categories. The categories were primarily constructed to help format and analyze the questionnaire data.

Table 4—Fire equipment development priority needs by category.

Category of equipment	Number in top 20
Personnel	8
Communication	6
Information collection/evaluation	4
Logistics	2
Dozer/tractor plow	1
Engines/water tenders	1
Water-handling equipment	1
Aerial operations	0
Foam application	0
Line construction/mopup	0
Transportation	0
Dispatching	0
Prevention	0
Fuels management	0

Table 3—Top-20 fire equipment development needs in 1998 rated *Need* or *Must have*.

Rank	Percent Responding	Fire equipment item	Total	Percent
1 Tie	72	Reducing dead spots in radio communication.	1,660	96
	72	Improve communication with dozer operator.	1,605	93
2 Tie	70	Improve goggles with scratch-resistant lenses that do not fog and are comfortable.		
	70	Improve compatibility of communication equipment between agencies.	1,165	96
3	64	Improve fire weather information dissemination.	1,651	95
4	63	Increase protection of the dozer operator from smoke and dust.		
5 Tie	61	Improve low-heat-stress fire protective clothing.	1,671	97
	61	Improve microwave links to support isolated incidents and link them to dispatch.		
	61	Improve use of fire weather data.	1,641	95
	61	Improve forest fire shelters.	1,678	97
6	60	Establish adequate common command channels to all agencies.	1,662	96
7 Tie	59	Improve adequacy of handheld communication system.	1,670	96
	59	Develop maps marked off with latitude and longitude grids.	1,664	96
	59	Improve lightweight hose, with rugged characteristics of cotton-jacketed hose.	1,611	93
8	54	Improve GPS procedures for identification of individual location and situation mapping.		
9 Tie	53	Improve single-unit headlamps.	1,684	97
	53	Improve devices to protect face, ears, and neck from radiant heat and falling embers without heat stress.	1,679	98
10 Tie	52	Develop standardized engines among agencies.	1,626	94
	52	Develop an integrated fire camp electrical system, including a quiet, efficient central generator and safe wiring system to fill fire camp electrical needs.	1,651	95
11 Tie	51	Improve dissemination of information on the study of fine particulate hazard (less than 10 microns) to firefighters.	1,677	97
	51	Improve dissemination of information on the significance of CO health hazards and how to minimize exposure.		
	51	Design items so they can be easily recycled.	1,629	94
	51	Improve fire-resistant clothing and gear for cold-weather wildland firefighting.	1,676	97

Comparing Priority Fire Equipment Development Needs: 1984 to 1998

Table 5 shows the finding of the top-20 equipment priority ranking for 1998. Because of ties, the top 23 items are in order by top-10 priority. The table also compares the 1998 item rankings with the ranking the item received in the 1984 survey.

Many top-priority equipment development items identified in 1984 reappeared in 1998. In fact, in the top-23 items listed in 1998, 12 were included in the 1984 top-20 list. All the top-10 items identified in 1998 (except one) were also in the top 10 of the 1984 survey. The lone new item, developing microwave links, reflects the increased priority emphasis on equipment and technology to improve communication.

Over 13 years, there has been some minor shifting among the top-10 items. The shift is most noticeable in the increased priority for equipment to improve communication and information dissemination. The top-two communication items that moved up significantly in priority between 1984 and 1998—reducing dead spots in radio communication and establishing common command channels between agencies.

Improving goggles remained a top priority. In 1984, goggles ranked number one; in 1998, goggles were ranked number two. Improving fire shelters made a dramatic increase in priority. It was ranked 17 in 1984; in 1998, shelters jumped to number five.

Another significant priority increase occurred with developing equipment to protect dozer operators. This can be seen in the number-one-ranked item, improving communication with dozer operators, and the item ranked number four, increasing protection of dozer operators from smoke and dust.

Of the 23 equipment items ranked in 1998, 11 were new. These items did not appear at all in the 1984 survey. Of all the 11 new items, only one appeared in the top of the 1998 priority list —increasing microwave links to support isolated incidents. Except for this item, all the new items were ranked in the lower half of the 1998 priority listing.

Table 5—Comparison of rankings of the top-20 items between 1984 and 1998.

1998 Priority	Equipment Item	1984 Priority	Priority Change
1 Tie	Reducing dead spots in radio communication.	6	Up 5
	Improve communication with dozer operator.	3	Up 1
2 Tie	Improve goggles with scratch-resistant lenses that don't fog and are comfortable.	1	Down 1
	Improve compatibility of communication between agencies.	5	Up 3
3	Improve fire weather information dissemination.		
4	Increase protection of the dozer operator from smoke and dust.	10	Up 6
5 Tie	Improve low heat stress fire protective clothing.	2	Down 3
	Improve microwave links to support isolated incidents and link them to dispatch.	—	New
	Improve use of fire weather data.	4	Down 1
	Improve forest fire shelters.	17	Up 12
6	Establish adequate common command channels to all agencies.	15	Up 11
7 Tie	Improve adequacy of handheld communication system.	—	New
	Develop maps marked off with longitude and latitude grids.	—	New
	Improve lightweight hose, with rugged characteristics of cotton-jacketed hose.	—	New
8	Improve GPS procedures for identification of individual location and situation mapping.	—	New
9 Tie	Improve single-unit headlamps.	8	Down 1
	Improve devices to protect face, ears, and neck from radiant heat and falling embers without heat stress.	—	New
10 Tie	Develop standardized engines between agencies.	—	New
	Develop an integrated fire camp electrical system.	—	New
11 Tie	Improve dissemination of information on the study of fire particulate hazard (less than 10 microns).	12	Down 1
	Improve information on the significance of CO.	—	New
	Design items so they can be easily recycled.	—	New
	Improve fire-resistant clothing for cold-weather wildland firefighting.	—	New

Reappearing and New Priority Fire Equipment Development Needs

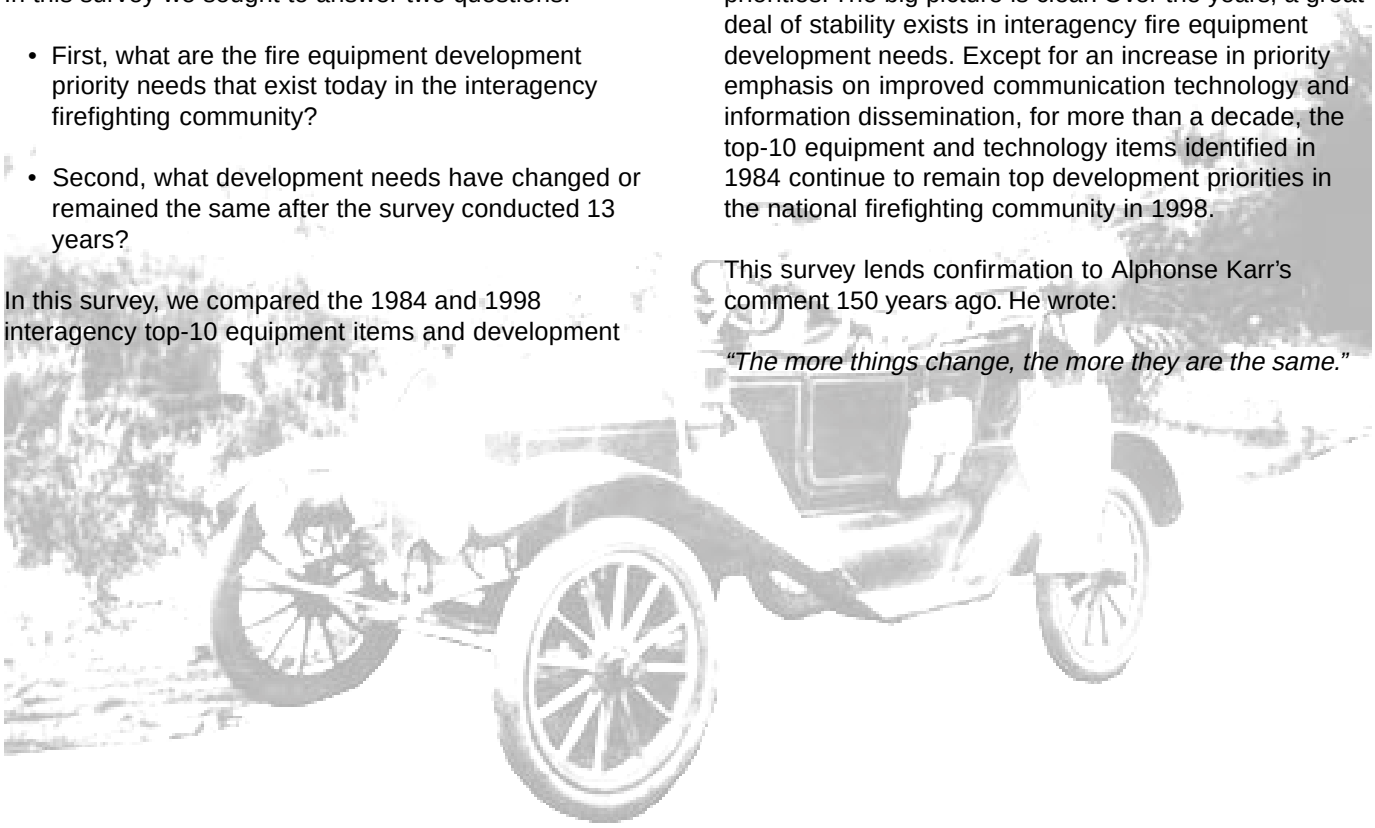
In this survey we sought to answer two questions:

- First, what are the fire equipment development priority needs that exist today in the interagency firefighting community?
- Second, what development needs have changed or remained the same after the survey conducted 13 years?

In this survey, we compared the 1984 and 1998 interagency top-10 equipment items and development priorities. The big picture is clear. Over the years, a great deal of stability exists in interagency fire equipment development needs. Except for an increase in priority emphasis on improved communication technology and information dissemination, for more than a decade, the top-10 equipment and technology items identified in 1984 continue to remain top development priorities in the national firefighting community in 1998.

This survey lends confirmation to Alphonse Karr's comment 150 years ago. He wrote:

"The more things change, the more they are the same."



Reflections on the 1998 Fire Equipment Survey

To evaluate the results of the 1998 fire equipment survey, a number of factors must be reviewed to set the proper context. These factors include:

- Major wildfire events from 1984 to 1998.
- Changes in workforce characteristics since 1984.
- Trends in the use of fire equipment from 1984 to 1998.

Once these factors are considered, it is easier for the fire manager to understand the logic that led to the priorities. Using the 1984 fire equipment survey as a baseline, similarities and contrasts between it and the 1998 survey reflect a high degree of consistency, especially in areas of equipment related to firefighter safety.

Major Wildfire Events: 1984 to 1998

Like most of society, the community of wildland firefighters tends to be driven by the most recent events and occurrences. The large wildfires and especially long and severe fire seasons since the 1984 survey probably bear a disproportionate weight on the priorities assigned by the respondents. The Southern Oregon/Northern California fires of late 1987 resulted in smoke inversions that lasted for weeks on end, conditions previously unseen. As a result, many on-the-ground firefighters experienced serious respiratory distress that lasted long after the fires were extinguished. This event, coupled with a similar but less-intense condition of smoke inversion in the Yellowstone area during 1988, raised the awareness and concern about respiratory protection shown in the latest survey. The Yellowstone area fires of 1988 also raised other concerns, including the need for communications systems for greater interagency cooperation, an increased fire weather-forecasting capability to help predict significant fire weather events that result in major fire spread, and improved performance of firefighter personal protective clothing and equipment. In the fall of 1991, the late season wind-driven fires of October caused major fires in interface areas in both Oakland, CA and Spokane, WA. These fires brought a new sense of awareness of the risks of wildland-interface fires, and of the interagency coordination requirements necessary to battle them. The large numbers of fires in Montana during 1994 and in Oregon during 1996, coupled with the 14 fatalities on the South Canyon Fire in Colorado in 1994, reinforced the concern about personal protective equipment, communication equipment, timely weather information, and the use of improved technology such as infrared devices, and cell phones.

Changing Work Force Characteristics

Since the previous survey was completed in 1984, major changes have occurred in the wildland firefighter work force. Today's organizations are significantly smaller than they were in 1984, with an aging work force that experienced many of the large fires discussed previously. In addition, today's firefighters have a much broader geographic background that those who completed the 1984 survey. The concept of total mobilization has been fully implemented, with firefighters routinely criss-crossing the country to assist in fire suppression in Alaska, Florida, and even occasionally into Canada.

These experiences have been coupled with an increased awareness of interagency operations, and the different techniques associated with those operations. Perhaps the best example can be found in the high priority given to dozer-plow operations in the 1998 survey. Although dozer-plow operations are a rather small part of the national fire suppression picture, they received significant emphasis from a high percentage of the respondents. Another factor that distinguishes today's firefighters from those in 1984 is increased computer literacy and access to communications, both in their every day lives and on the fireline. The Weather Channel, Internet access, E-mail, and 24-hour news on the television have all contributed to greater expectations of information and intelligence on the fireline. Those expectations are reflected in the survey responses. There is also an increased awareness of health-and-fitness issues among the 1998 survey respondents. Wellness programs, fitness centers, widely publicized health studies, nutritional values on food packages, and the *Health Hazards of Smoke* studies at MTDC have resulted in more health-conscious firefighters. Finally, the 1998 respondents show a keen awareness of the seriousness of fire safety issues, especially in the context of fatal fire events like the South Canyon Fire in 1994. For many wildland firefighters, the events of July 6, 1994, in Glenwood Springs, CO, are a defining moment equivalent to the death of President John Kennedy on November 22, 1963, in Dallas, TX. These firefighters are keenly aware of the significance of the deaths of 14 of their compatriots, regardless of agency affiliation or geographic region.

Fire Equipment Use Trends

The last major factor to consider when studying the responses in the 1998 survey is the change in fire equipment uses in the 15 years since the 1984 survey. The late 1980's and the 1990's saw a major change in the numbers and capabilities of personal portable radios on the fireline. As lower cost, multichannel radios with scanning ability became more readily obtainable, many fire crews expanded their radio coverage from two radios to four or six. The scanning feature allowed them to be more fully informed about tactical operations, aircraft communications, and weather updates. Besides the increase in personal portable radios on fire operations, there has been a tremendous influx of other specialized electronic devices during the past 15 years: GPS, electronic weather instruments, cell phones and laptop computers all became commonplace on wildland fires across the country. The dependence on this type of equipment mirrors its use in society in general. Expectations of needed improvements in wildland fire equipment was reflected by the introduction of customized fireline equipment used by the individual firefighter. This equipment has included custom-designed line packs and other web gear, as well as modified tools such as the super Pulaski and other fireline equipment. The last factor affecting fire equipment use trends is the increased emphasis on the survivability of the forest fire shelter because of events such as the Dude Fire (1990) and the South Canyon Fire (1994). The fatalities of the Dude and South Canyon Fires have prompted a renewed interest among the fire community in obtaining an improved fire shelter.

Understanding the Top 20 priorities

Interagency fire-equipment development needs have not changed much over the past 14 years.

In reviewing the top 20 items that emerged from the compilation of the 1998 Survey, several logical groupings become apparent:

- First, there is a major emphasis on areas dealing with firefighter safety. This is to be expected, since the memory of the fire community has been strongly influenced by the events of the South Canyon Fire in 1994, with the findings of the Interagency Management Review Team (IMRT) and the TriData firefighter safety study that the IMRT generated. This intense focus on fire safety, and the failures that resulted in 14 fatalities on South Canyon, have become the defining wildfire event of the decade of the 1990's in the United States.

- Next, the survey shows a strong focus on items that are personalized for individual firefighters: clothing, gloves, goggles, and so forth. All are items that a firefighter wears and uses continuously every day. They receive closer scrutiny for adequacy. These have been recurring high-priority items on this survey and earlier surveys. They will probably always be areas of interest and concern to survey respondents. It is hard to predict whether goggles and protective clothing will ever be "good enough," "satisfactory," or "perfect" from the point of view of more educated and more sophisticated firefighters.

- Finally, the emphasis on new or specialized equipment and its availability for use on wildfires is again apparent. Perhaps the best example is the technology that is available to improve communications capabilities in remote sites. The emergence of satellite phone systems allows instant voice and data communications in the most inaccessible areas of the world, including the well-documented calls from a dying mountaineer on Mount Everest. Rising expectations regarding improving communication and information dissemination is clearly a reflection of our computer- and technology-information age…and survey respondents. The respondents have an expectation of the availability of such technology on wildfires.

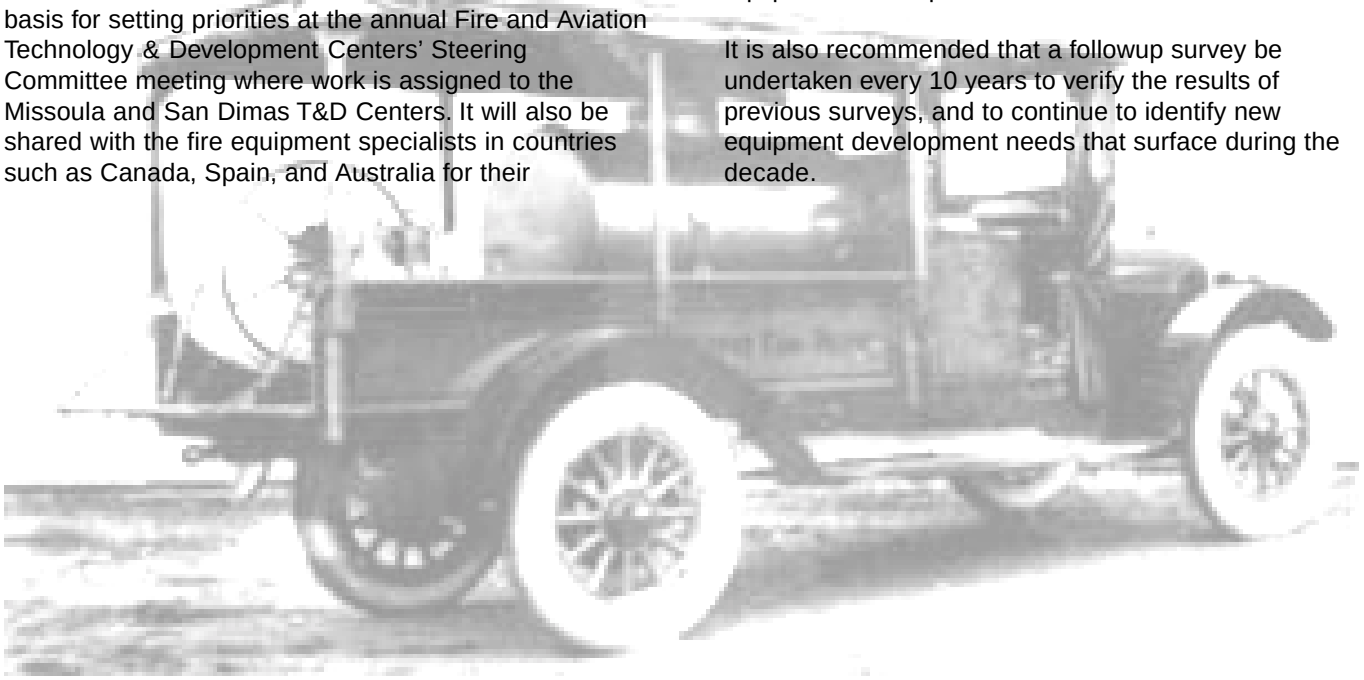
So Now What?

Now that the survey results have been compiled and analyzed, the question is, what do we do with the results?

This survey, like its predecessor in 1984, was commissioned by the National Wildfire Coordinating Group Fire Equipment Working Team to help set the priorities for fire equipment development for the next

decade. This report will be forwarded to the FEWT for consideration and further action. It will also serve as a basis for setting priorities at the annual Fire and Aviation Technology & Development Centers' Steering Committee meeting where work is assigned to the Missoula and San Dimas T&D Centers. It will also be shared with the fire equipment specialists in countries such as Canada, Spain, and Australia for their consideration in determining priorities for future fire equipment development.

It is also recommended that a followup survey be undertaken every 10 years to verify the results of previous surveys, and to continue to identify new equipment development needs that surface during the decade.



About the Authors

Jon Driessen received his Ph.D. in sociology from the University of Colorado in 1969. Since then he has been a professor of sociology at the University of Montana. Since 1977, he has worked as a faculty affiliate at the Missoula Technology and Development Center. His most recent project has been production of the Forest Service training program, *Making a Crew*. He has also been involved in production of another recently released video, *Driving Mountain Roads: Slowing Down*. He is working on the production of a training video for drivers who transport firefighters under wildfire conditions.

Dick Mangan has been Fire and Aviation Program Leader at MTDC since 1989. His major responsibilities include developing equipment for wildland firefighters, primarily personal protective equipment and equipment. Dick serves on the National Wildfire Coordinating Group Fire Equipment and Safety and Health Working Teams, and is chair of the National Fire Protection Association's technical committee for wildland fire personal protective equipment. He is red-card qualified as an Operations Section Chief I, Safety Officer, and Planning Section Chief II. Dick has a bachelor of science degree in forestry from Humboldt State University and more than 20 years experience on Ranger Districts and National Forests in Oregon and Washington. His last assignment before coming to MTDC was as Fire Staff Officer for the Ochoco National Forest in Prineville, OR.