

Future of All-Risk Incident Meteorology

Margaret Querciagrossa-Sand*, Joe Stutler, Sam Goldwater, Gary Bennett

Northtree Fire International, PO Box 1588, Monterey, CA 93942

A primary need of incident management, resource management and emergency response is RELIABLE real-time weather and weather forecasts. Incident meteorology has been a part of incident management teams nearly 70 years. During that time, Incident Meteorologists (IMETs) have delivered predictive services that have allowed incident managers to fight fires aggressively while maintaining a high level of safety for all firefighters. Nearly every catastrophic event resulting in firefighter fatalities had a weather component as a contributing factor. After the South Canyon Fire in 1994, OSHA citations resulted in federal Wildland Agencies requiring an IMET to be assigned for each Incident Management Team where a Fire Behavior Analyst (FBAN) was present.

As experienced in Montana this summer, a massive lightning outbreak ignited more wildfires than there were incident management teams and other resources to manage. Incident Commanders found themselves responsible for multiple fires within a fire complex. While that situation taxed resources and abilities, the growing number of fires and limited resources later required Area Command Teams



to command multiple complexes. As the situation further deteriorated, Multi-Agency Coordination Groups at the National and Geographic Areas were formed to prioritize incidents for resources allocation. At this critical level (and this occurs more frequently every year), numerous teams found themselves with fire behavior analysts and NO Incident Meteorologist. In August 2003, many IMT's were without on-site IMET weather support.

Following the horrific events that took place on September 11, 2001, and other significant natural disasters, Federal, State and Local Incident Command Teams are working on more "all-risk" or non-wildland fire incidents. The Department of Homeland Security has emerged and emergency response management is evolving into new directions with "interagency" coordination centers evolving in several states and Geographic Areas where all resources, including weather and predictive services, are shared under one umbrella.

As the Department of Homeland Security evolves, interagency infrastructures spread, and as times change, the importance of all-risk, year round, effective, and adaptable meteorological support to incidents and to these interagency centers shall too increase. Emergency responders everywhere continually express their need for dependable, timely and accurate weather forecasts.



Fire Spread models, wind and smoke dispersion models, and other predictive incident management models are used religiously by Fire Behavior Analysts, Emergency Response Teams, and other emergency responders. These models help managers make the best strategic and tactical decisions. And what is at the base of every such model? Whether dealing with prescribed fire, hazardous material releases, wildland fire, or all-risk incidents, the driving force of model outputs are weather predictions.

So just where are these strategic and tactical decisions made? Let's begin with the big picture and then focus to the finer scale.

First, let's look at Interagency Coordination Centers and the role of weather. In the National and Geographic Coordination Centers,

resources, mobilization, prioritizing, and decisions are shared among all agencies. As in the California

Firestorms of 1993, long range weather support communicated in person at various weather briefings allowed decision makers to retain and reposition out of state resources that helped to minimize losses with the second outbreak of wildfires associated with the Santa Ana winds.



Relationships have developed between weather personnel and emergency response personnel that establish a level of confidence. Operations and planning personnel have the daily ability to communicate in person with the meteorologist any movement of resources, projects, etc., that are often otherwise unknown. In 1991, one member of the California Department of Forestry was moving resources from the San Diego area to San Francisco for a routine assignment. This information was shared before the outbreak of a Sundowner Wind event in Santa Barbara. Through in person discussions, CDF decided to send these resources to San Francisco via Santa Barbara

“just in case”. There was no additional cost to this routing, however the savings may never be fully realized, as hundreds of homes were destroyed while these winds carried fire to the coast. Because these resources were in the proximity of the wildland fire which occurred in Santa Barbara, the resources were immediately utilized, thus minimizing the loss of property and homes.

The next level of meteorological support occurs at the incident. To understand this relationship and information need exchange, let’s review the responsibilities and mission of incident management teams. There are 16 Type 1 National Incident Management Teams, 50 Type 2 Geographical Incident Management Teams, and four Area Command Teams in the United States. The role of these teams is to respond to both wildland fire and all types of “all-risk” non-wildland fires incidents in the United States and occasionally internationally. The “all-risk” assignments come from either FEMA or now the Homeland Security Agency. Examples include hurricanes, floods, the World Trade Center, Columbia Space Shuttle and a variety of other natural disasters. Over the last five years the normal role of incident management teams has expanded from approximately two assignments per year to now over five per year. Mega fires and all-risk response is common place and incident management teams consistently are involved in complex incident management essentially year around.

In both scenarios, the role played by IMET’s and FBA’s with the command and general staff of the incident management team is critical for developing incident objectives, strategy and tactics for the incident.

When incident management teams are assigned, many policies and guidelines must be followed. None are more important than the **10 Standard Fire Fighting Orders**. Relationship with these orders and the IMET/IMT is illustrated by the following:

- **Standard Fire Fighting Order #1:** Keep informed on fire weather conditions and forecasts.
- **Standard Fire Fighting Order #3:** Base all actions on current and expected behavior of the fire.

These critical orders (developed over time after serious accidents and fatalities have occurred) are equally important to all-risk assignments. The relationship, expertise and communication between the IMET and incident management teams are a critical component. How can an Incident Commander follow the orders when forecasts are inaccurate or not timely or for the specific incident site?

Needs of IMT's/Coordination Centers

NEEDS TO GET THE JOB DONE RIGHT	Incident Management Team	Interagency Coordination Centers
Planning	✓	✓
Weather Support	✓	✓
Fire Behavior Support	✓	
Mapping	✓	✓
Air Attack	✓	
Communications	✓	✓
Clerical	✓	✓
Logistics	✓	

As one can see from the above chart, there is a broad common denominator of needs amongst various emergency response personnel. **To effectively achieve these responsibilities, strategic and tactical planning requires every team member to understand not only the objectives but also comprehend the probability of success and the consequences of failure.** The increasing variety, duration, and complexity of incidents is forcing communications and methodology to evolve in ways that are commensurate to each incident, such as available incident resources, costs containment issues and other factors inherent to Incident Command Team, the expectations of the public, Agency Administrators and the firefighter.

However, current practices that were effective 30 years ago may actually be inhibiting effectiveness of these resources and unnecessarily raising costs today. Fire camps have grown to become small cities with all the logistical requirements associated with building a small city. The logistical support costs are skyrocketing, and yet the trend continues. Presently, individual resources provide their specialized service independent from each other. Technologies and personnel are not used together. Production and communication of products are separate, individualized, and lack integration with other available resources to present short, concise and effective messages that potentially could compliment and enhance each other in one product. Each individual resource comprises a level of redundancy at some level (products, hardware, physical space, technologies, and personnel).

As incident types and complexity has changed, we must explore ways to make incident command resources and teams more efficient and meet cost containment objectives. Yet several questions arise:

- Where will incident management teams get needed information to do the job right?
- Where will the Homeland Security Agency get their information?
- How can this information be communicated best to those who need it?
- What kind of message is most effective?
- Are there ways to provide these needs and resources in more efficient and cost-effective ways?"

NTFI has closely examined these questions as related to the evolution of complex incident management. We have identified areas of redundancy, opportunities for more efficiency and to reduce unnecessary costs to both the incident and tax payer.

Logistical/Resource Needs

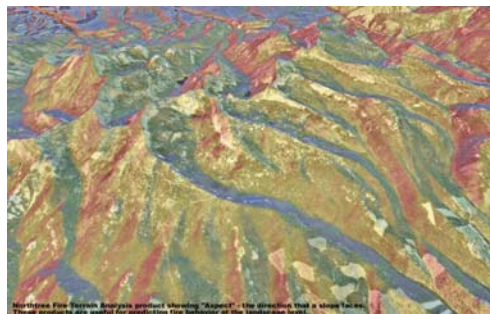
Separate Resource Needs	IMET	FBAN	GIS	CLERICAL
Space	✓	✓	✓	✓
Food	✓	✓	✓	✓
Phone Lines	✓	✓	✓	✓
Satellite connections	✓	✓	✓	✓
Paper and supplies	✓	✓	✓	✓
Computers, printers, technology	✓	✓	✓	✓
Software	✓	✓	✓	✓
Personnel	✓	✓	✓	✓
Trailer or Yurt	✓	✓	✓	✓
Briefing Equipment	✓	✓	✓	
Radios	✓	✓	✓	✓
Weather Stations	✓	✓	✓	

The diagram above details four different necessary resources and their individual requirements at incident. One can clearly see potential benefits and savings not only to the incident, but also the taxpayer, by simply combining many aspects of these three services at an incident.

What are some potential advantages and savings in combining some of these resources?

- Save money, space, resources, personnel and necessary logistical support
- Enhanced technological applications to create more meaningful products
- Shorten and clarify the communication products
- One-stop shopping to assign resources to the most critical portions of the incident commensurate with incident objectives.
- Provide state of the art technology to incidents that enhances confidences, improves short and long term planning, which potentially can save more lives, property and minimizes damage to natural resources
- Improved communications through integrated technology.

At NTFI, and our partners, we have found by using our GIS technology, our military predictive services technologies, our IMET and clerical units, we can provide incident management teams a combination of all these resources, in one package, using approximately one half the now required resources. Instead of 4 individual satellite dishes for each resource, we can use one for all. Our IMET unit is designed with four networked workstations to host FBAN, and others. The meld of these technologies provide tools in which to communicate critical weather elements at very small resolutions in formats commensurate with specific incident needs, such as air support, toxic releases and fire operations support.



Imagine Incident Action Plans (IAP's) containing a readable topographic map (3-D) with incident boundaries, relevant weather stations and predictions for critical weather elements at specific times. Overlay this with fire spread model output and see predicted fire boundaries with weather and terrain! While these products exist in research, military and our in-house operations, they have yet to be used operationally at incidents in the United States. These are classic examples where pictures speak thousands of words...and where technology is not being used to its fullest potential at incidents.

NTFI has the capability to further add clerical support in taking these products and packaging them in a pocket-sized IAP and mass producing these on-site.

This integrated technology package has not been coordinated well and consequently not readily available from the public sector. Both President Clinton and Bush have called for the partnering of private and public sectors. In some areas, the Administration and OMB have called for 30% privatization. The perception that some of these services, which are not fully integrated, are "free" is a misconception and result in much higher cost to the incident and consequently to the taxpayer.



NTFI has hired only highly qualified, known and experienced personnel in these fields. We have the technology, partnerships and resources to further this opportunity, and to make a positive difference to incident management and at a lower cost to the tax payer.



We are currently at a crossroad in Emergency Management. September 11th opened our eyes to the needs for complex incident management and certainly the wildland fire activity the last five years has documented, demonstrated and emphasized the need sufficiently. How we configure ourselves and take advantage of technology in this new emergency world will have ramifications for years to come. The use of non-government resources has been mandated by Presidents Bush and Clinton Administrations. In conclusion, when we researched these integrated technology applications,

we found that they are actually more efficient and cost effective than current applications. Then we wonder why we haven't done it sooner, as the Military has and is. The most compelling question is this, "Is the past more compelling than success?" In any case the impact of weather will never go away. How we integrate weather information for the betterment of emergency responders will be the legacy we leave for the future.