Initial Impressions Report
Southern California Fires 2007:
What we learned, how we worked

Lessons recorded by an Information Collection Team
Report by the Wildland Fire Lessons Learned Center
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Contents

Introduction

Every firefighter says that every fire they respond to is different. That is one of the first things that became apparent when the Wildland Fire Lessons Learned Center's Information Collection Team began talking to emergency responders during southern California's 2007 fires: It was not like southern California's fire siege of 2003. Firefighters said they experienced dramatic differences even between the fires that were burning simultaneously in 2007.

In a thank you letter to all of the respondents to the 2007 event, Cal Fire Chief Director Ruben Grijalva wrote "Even though there were 23 fires burning at once, any firefighter can tell you that the conditions at each fire varied widely. Weather, terrain and visibility can vary erratically in southern California. The sheer magnitude of the October fires was incredible, and the fires moved in ways experienced firefighters had never seen. In some locations, flames were advancing at an acre per second amid 80 mph wind gusts."

"Firestorm 2003," as the media tagged it, was unprecedented at that time. More than 12,000 firefighters responded to thirteen wildfires, located within five southern California counties that eventually were contained at 745,190 acres. California's Office of Emergency Services (OES) reported that 3,641 homes and an additional 1,184 other buildings were destroyed. Suppression costs were estimated at $120 million. The most devastating result of the fires was the deaths of 22 residents and one firefighter.

Those interviewed for the "Lessons Learned Report" in 2003 said they believed that events on the magnitude of the 2003 fires would re-occur. Four years later, almost to the day, their expectations were met.

During southern California's 2007 fires, statistics varied somewhat. In addition to the 23 large fires that occurred, another 251 vegetation fires were extinguished by fire service personnel, before damage occurred, between October 20-25, Grijalva said. The 23 large wildfires that occurred in a seven-county area were eventually contained at 518,021 acres. The number of responding firefighters from local, state and federal agencies totaled more than 20,000. Fire suppression costs of the combined local, state and federal agencies reportedly totaled about $100 million. The state's OES reported 2,180 homes and 927 other buildings were destroyed. Authorities estimate that half a million residents were evacuated from the path of the fires and seven people died.

For a visual comparison of the burned areas in 2003 and 2007 in San Diego County alone, please go to http://weblog.signonsandiego.com/multimedia/utmedia/071030fireweek/

Beyond the statistics, several other differences were noted. In 2003, the Santa Ana winds rarely exceeded 40 mph. In 2007, the Santa Ana winds were regularly clocked at 70 and 80 mph. In 2003, state and federal agencies had not pre-staged resources for the possibility of wind-driven fires, but in 2007 many state and federal entities froze their off-duty personnel into preparedness and poised engines, aircraft and management teams in instant response readiness.

In fact, during the most recent fires, Cal Fire reported mobilizing more personnel and equipment in a two-day timeframe than they had in the whole six days in 2003. In 2003, many residents had not implemented defensible space requirements at their homes. But firefighters who defended whole communities during 2007 said many residents had met the 100' defensible space needs, making protection possible.

One of the most important differences noted in 2007 was found in the analytical response to the potential of the 2007 fires. In 2003, respondents said they had difficulty making the transition from an all-out tactical to a strategic response. In 2007, they transitioned to a strategic response almost at once. Many respondents said they immediately recognized the fires could quickly maximize their resources and that relief may be distant – so they began pacing themselves early in the event, mitigating fatigue with steps as simple as getting their feet up off of the floor for a minute. They said they knew they "were in it for the long haul."

Clearly, lessons learned from the 2003 southern California fires had a significant impact on county, state and federal agencies and among residents in southern California, because changes have been implemented. But interviewees for this report also noted several areas that should receive focused attention until, either through policy, training or equipment upgrades, these problems areas are resolved.

This report does not relate a complete history of the events or decisions made during southern California's 2007 fires. It is a reflection of a broad sampling of representatives from as many agencies and organizations as possible who were working at a variety of roles, in several functions, on different fires. The report collects the themes that rose as common concerns among all of these respondents. Generally, the organization for this report was patterned from the 2003 Lessons Learned Report with some variation because some issues became either more or less prominent during 2007.

Two other documents that may be of benefit to the reader are: "Southern California Firestorm 2003: Report for the Wildland Fire Lessons Learned Center" at http://www.wildfirelessons.net/documents/Southern_California_Firestorm_2003_ICT_Final_Report.pdf and "Faces: The Story of the Victims of Southern California's 2003 Fire Siege" at http://www.wildfirelessons.net/documents/Faces.doc.

Information Collection Team Efforts

Meet the Information Collection Team

From the left are, Dan Frazee, Phoenix, AZ Fire Department NIMS/ICS Training Prog. Mgr.; Dennis Baldridge, U.S. Forest Service South Zone Operations Training; Kevin Pfister, Bridger-Teton National Forest Fire Management Officer; and Dave Christenson, Wildland Fire Lessons Learned Center Assistant Manager. Not pictured is Jim Hollingsworth, Cal Fire South Zone Operations Intel. The writer-editor for the team's report was Jonetta Holt.

Information Collection Team Members

This Information Collection Team was composed of municipal, state and federal agency employees. They collected Wildland Urban Interface lessons learned and best practices by interviewing responders to the 2007 fires in southern California during a five-day period. The team traveled throughout the seven county region to conduct one-on-one interviews with local agency responders and leaders, incident management team members and individual resources called in from several states from various different agencies.

Focus Areas

Those who read the 2003 Lessons Learned Report may recall that the objective of the Information Collection Team was to capture the thoughts and feelings of respondents who wanted to learn from the event and integrate what they had learned into training and policy. Because we are now able to benchmark against the 2003 report, this review will also include the perspectives of interviewees who reflected on what was implemented in 2007 because of the 2003 and other recent fires, and what still needs improvement. It should be noted that the focus areas are examples of questions that were asked of interviewees, not actual questions asked of everyone who agreed to be interviewed.

Interviews conducted in 2007 were based on these focus areas:

1. Describe the best success in the urban interface you were involved with on your incident (i.e. tactics, techniques, procedures, media, politics, fire environment, and structure protection plan).

2. What was the most significant thing you learned regarding the urban interface on your incident? Please explain.

3. What was the biggest urban interface challenge you faced on the incident? Describe how you overcame this challenge.

4. Describe any lessons learned on the incident regarding structural protection, evacuation, command and control, or unified command if applicable.

5. How did the fire behavior affect your strategic and tactical decisions on the incident?

6. Please comment on the work/rest guidelines in regard to this incident (if Federal).

7. Describe any WUI lessons that you have learned since the 2003 Firestorm.

8. Were there any unresolved urban interface issues you faced? What is your recommendation for resolution?

Interviewees

There were 103 interviewees for this information collection effort. The people interviewed were in the following positions:

Agency Administrator
Area Command Team members
Aircraft Dispatcher
Air Operations Branch Director
Air Support Group Supervisor
Center Manager
Communications Unit Leader
Communications Officer
County Fire Chief
Division Chief
Dispatch Captain
Deputy Chief
Dispatcher
Division/Group Supervisor
Deputy Logistics Chief
Deputy Planning Section Chief
Deputy Incident Commander
Department of Defense Representative
Expanded Dispatcher
Engine Captain
ESF4
Emergency Medical Services Specialist
Fire Behavior Analyst
Firefighters
Finance Section Chief
Fire Behavior Analyst trainee
FEMA Mob Center Manager
GIS Specialist
Initial Attack Dispatcher

Liaison Officer
Local Engine Crew member
Logistics Section Chief
Logistics Section Chief trainee
MAC Group members
Operations Section Chief
Operations Branch Director
Ordering Manager
Planning Operations Section Leader
Planning Section Unit Leader
Planning Section Unit Leader trainee
Public Information Officer
Public Information Officer trainee
Resource Unit Leader/Demob Unit Leader
Radio Communications Technician
State Fire Chief
State IMT Incident Commander
Situation Unit Leader
Strike Team Leader
Safety Officer
Sheriff's Department Representative
Supply Unit Leader
Type 1 IMT Incident Commander trainee
Type 1 IMT Incident Commander
Type 3 Engine Captain
Task Force Leader

Southern CA Wildfires Map

SOUTHERN CALIFORNIA WILDFIRES as of 10/28/07 - 0600 Hours PDT with Start Dates - Chronologically

Southern California Fires 2007: What we learned, how we worked
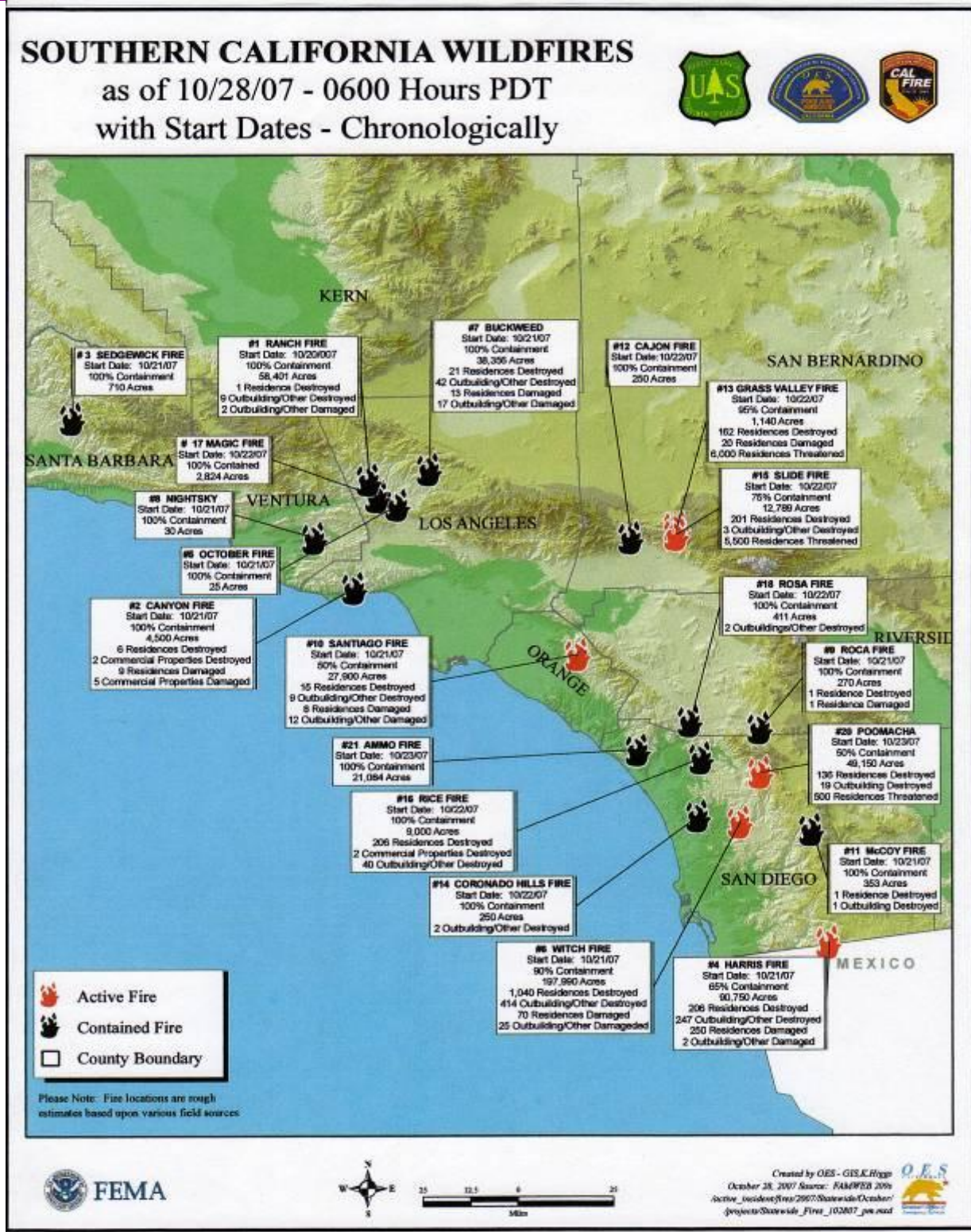
The Event

On Sunday, Oct. 21, a predicted wide-spread Santa Ana wind event occurred over southern California with predicted initial wind speeds of 50 mph. Ten fires quickly grew large, fanned by the strong winds. Commands for the fires were established locally. Large-scale evacuations began, while firefighters battled to protect homes in the Wildland Urban Interface (WUI). On Monday, Oct. 22, another seven fires that started grew large while local firefighters extinguished dozens of other fire starts. These seven would destroy several hundred more homes. Almost all of the large fires began in a 72-hour window, as opposed to 2003 when seven large fires began during a six-day period.

Command and Control

"We were thinking ahead based on our 2003 experiences."
~ Unified Command Incident Commander

Local fire authorities considered much of their success in response to the 23 large fires of 2007 as being directly due to their situation awareness and preparedness. Steps they reported as being the keys to their success included maintaining a keen awareness of the weather while preparing to implement a reactionary plan in case of a fire. Most respondents for this report cited elements in a three-level approach which they had established

Photo courtesy Jeff Whitney's IMT

prior to the fires beginning. All of the respondents who were integral in initial response said they were successful because they had one or all of the following three factors in place: 1) pre-planned evacuations and trigger points for implementation; 2) pre-staged engines, aircraft and fire management personnel; and/or 3) implementation of unified command with law enforcement in the initial attack phase.

Several local fire officials, such as Orange County Fire Authority, said they had worked to begin a collaborative response among all of the agencies who would be responding long before the fires began. In one county, fire authorities reported they had researched what resources were available throughout the state and were able to move some Type 1 helicopters from out of state into position in southern California. They also reported working collaboratively with the four southern National Forests to provide severity funding for extended staffing. Federal fire authorities checked in with Cal Fire in an effort to develop "mirrored" plans and lists were compiled of available resources in the case of large-scale fire.

Establishing Unified Command

On every fire where Unified Command was established at the local level and involved law enforcement during initial attack, evacuations were successfully conducted. At one large fire, an incoming Incident Management Team (IMT) Incident Commander noted that local resources were not in unified command and that "they should have been."

In one county, the local fire authority pre-staged the local IMT. They were able to do that based upon a predicted wind event and with funding from the State of California. Within six hours of ordering a national IMT, that team was beginning to set up an Incident Command Post (ICP) and initiate dialogue between county fire authorities and the national IMT.

Unified command had already begun in this county at the local level between the county fire authority and the Sheriff's Office. This cooperation began up to 24 hours before the fire started. In unified command, these two county authorities used a pre-approved evacuation plan for the communities (canyons) at risk. The Sheriff's Office identified that they would need at least five hours to effectively evacuate a canyon. The timing information was helpful to fire authorities in planning the fire response operations and coordinating the evacuation function. One county used an Assistant Sheriff for the Unified Commander role, and Lieutenants from the Sheriff's Office as leaders for Evacuation groups.

Unified command with law enforcement worked in reverse just as well. After the decision was made to repopulate the homes, the number of police officers needed decreased in one county from 140 to about 20. At that time, the Sheriff's Office Unified Commander dropped off of the organization and coordination with law enforcement reverted to the IMT's Liaison Officer ensuring a smooth transition.

Pre-Planning: An Element in Establishing Command

"You can't plan for this type of emergency at the last minute."
~ County Battalion Chief

In one county, a dislodged boulder knocked down a power pole and started a fire. An engine crew returning from another call discovered the fire and within minutes a team and 20 engines were called to the scene. A Sheriff's Deputy responding to the scene formed unified command with fire operations and because of previous work with the Sheriff's Office on an evacuation plan, the Sheriff's

Photo courtesy Eric Neitzel

Office personnel immediately assumed their role and began implementing the evacuation of residents in threatened areas. The earlier collaboration made it easier to work together, respondents said. Quick evacuation and road closures were instrumental in reducing public exposure and maximizing firefighter access to threatened homes. The pre-planned evacuation

that the two agencies had worked on together included escape routes that had been identified during a previous fire nearby. Many instances of working off of a pre-planned template occurred at a tactical response level on fires throughout southern California, but due to the constraints of this report, not all of them are included here. On one incident, it was reported that unified command was expanded to include all of the stakeholders for the jurisdiction, including utility and water authorities, as well as law enforcement and fire officials. All of the stakeholders were co-located at the Incident Command Post and engaged in information flow activities and decision-making. The expansion worked well, respondents said, because decisions were made with more information immediately available. Political representatives were not as well integrated into the planning process, respondents said. They noted that in the future they would seek out and partner with political representatives early on and integrate them into pre-planning sessions.

Pre-determining sites for use as Incident Command Posts (ICP) and key support facilities had been noted as lacking by respondents in the 2003 event. By 2007, the situation had changed dramatically. Many ICP locations were pre-determined and in every case it happened, it was considered a success. It was noted that military bases worked well for a large ICP, where it was also well supported. One challenge for the IMT was figuring out who was in charge on the base. The situation was resolved when the IMT requested a base representative who was instrumental in coordinating the ICP.

Recognizing Roles in Command

"I have stopped saying 'root causes.' There is seldom a single issue – rather multiple contributing factors, especially with human behavior complexity in a complex system." ~ EOC Chief

Emergency Operations Center

An Incident Management Team that reported good cooperation with law enforcement early in the incident also said that the county Emergency Operations Center (EOC) had not quite grasped the concept of unified command and this caused problems with the quality of the information given to the public. The EOC began issuing press releases with fire information and evacuation information; then, after it had been released, notified the team about what the release had said. Interviewees reported that the disconnected method of delivering information to the public took some time to fix.

In an effort to improve the situational awareness of Emergency Operations Center personnel in one county who were unfamiliar with the dynamic environment of fire and landscape scale of its impact, a group of fire chiefs gave a briefing to the people manning the center using a 3-D presentation featuring Google Earth. The presenter overlaid the parcels on top of the fire perimeter and did a fly over of the area in 3-D showing where the damaged homes were located. The briefing was well received and many comments overheard among EOC personnel indicated that the "big picture" briefing was extremely helpful for their level of understanding and how they would best be able to contribute in their roles. To watch a video of this briefing, please go to http://www.wildfirelessons.net/documents/ICT_Movie_GoogleEarth.mpg.

Multi-Agency Coordinating Group

Multi-Agency Coordinating (MAC) Group activities, during the southern California fires in 2007 took place at the Southern Operations Center. The location provided a sequestered environment allowing the group to focus on primary objectives, respondents noted. The group recognized early on that a Military Liaison to coordinate the use of military assets would be critical. Not having internet connectivity for the first 48 hours of the incident hampered their efforts. The MAC Group also ran the morning conference call collecting information from the individual Incident Management Teams assigned.

Respondents said that the conference calls were not well planned and reported that as a result, information that seemed like it conflicted often surfaced. One respondent said the situation was due to the dynamics of the fire environment. Messages may change from one call to the next, or the question asked may be different, interviewees reported. Then people began wondering why the information seemed to conflict.

One respondent offered a solution to this problem of apparent misinformation: Provide a bullet list to IMTs of required information items. The list of information items would be covered on every conference call and there would be reduced opportunities for the information gathering group to misinterpret the information or form a skewed mental picture of the situation update.

Area Command Team (ACT)

Photo courtesy Whitney IMT

Area command is rarely used in southern California because the state has several available Incident Management Teams. Historically, the Multi-Agency Coordinating Group assumes the role of an ACT when the situation calls for one. The use of an ACT during the 2003 fires was largely considered a success. Many respondents then indicated they would want ACTs to be pre-positioned along with IMTs. But that did not occur for the 2007 fires.

Although Area Command Teams were called in during the 2007 fires, respondents indicated the teams were underutilized, possibly reflecting that local agency administrators are unaware of the capabilities of an ACT and how they can augment the MAC Group. ACT members said during the 2007 fires, coordination of the various incidents overburdened the MAC Group and may have compromised their strategic focus. Management of large-scale multi-jurisdictional events is an area of expertise for ACTs. By vesting management of the 2007 fires in ACTs, the MAC Group may have sustained a clearer strategic focus, respondents said.

When several IMTs are pre-staged, ACT members suggested that pre-positioning an Area Command Team based is also beneficial. Once in place, the ACT can assess the EOC's capabilities and mission because emergency centers throughout the nation differ in these respects. Providing a liaison to the EOC is also considered a function of the Area Command Team, respondents said.

Interviewees recommended that instead of the MAC Group running the morning conference call as happened in this case, the agency administrators may have benefited from delegating that task to the area command. This was one example of how roles, responsibilities and authorities of ACTs and their relationships with the agency administrator and management of the IMTs should have been more clearly defined during the 2007 fires. Communication and Coordination responsibilities between area command and agency MAC Groups, Expanded Dispatch and the EOCs would have been clearer, respondents said, if the procedure had been for the Incident Management Team to report directly to area command instead of reporting to the MAC Group.

Photo courtesy Eric Neitzel

The command organization should be structured to maintain a reasonable span of control and unity of command, interviewees said. This structure improves information flow and provides for the effective use of available resources. These issues should be considered when agencies began ordering resources for pre-positioning. Advising National Interagency Fire Center personnel during the pre-positioning stage of an event is also recommended. Pre-positioning ACTs relative to the number of pre-positioned IMTs could have reduced the number of incidents requiring direct interaction with the MAC Group. The span of control for agency administrators could have then been reduced, aiding the group's strategic focus.

Assigning roles and responsibilities among area command, jurisdictional agencies and emergency services is best accomplished through the use of Delegations of Authority, respondents said. Letters of delegation to ACTs and IMTs by the agency administration with jurisdiction should be utilized in the future. On this incident, the IMTs were using their standard reporting process back to the MAC Group and continued that relationship even after area command was established. This created conflicting direction, negatively impacting the unity of command.

Safety Officers

Safety Officers provided one of the most noticeable cross-functional influences during the 2007 fires. Their proactive initiatives, as in 2003, were noted from area command to division and crew levels.

At the beginning of one IMT's command, the safety officer said that working with Operations to create strategies, set priorities and develop objectives and tactics was the most effective tools available at that point. Considering past failures where wind switches had occurred and planning contingencies for those kinds of events assisted operations' fireline leaders in preventing "back door blowouts."

Although the early order for the team was critical, one safety officer noted, the result was having a well planned Incident Action Plan and not enough resources to implement it. Then, the fire evolved so quickly that resource accountability became extremely challenging. "As soon as

you knew where things were and what they were doing, they had to move to somewhere else as the fire situation changed." In this situation, focusing on big picture safety objectives and relying on the Division Supervisors for resource accountability and safe operations became the most effective role for the safety officer.

One Safety Officer noted the effectiveness of the host unit's in-briefing as being the catalyst for incident personnel working safely. He said that even during the briefing, structures were burning: "You could hear it on the radio." The host unit's personnel anchored their talking points in previous events and presented the incoming team with real examples of what they did not want to have happen. They specifically "used stories from previous events that outlined negative outcomes they didn't want to see repeated." The incident objectives that resulted from the in-briefing, the respondent said, drove all of the discussions with cooperating agencies. Decision-making became easier because the objectives were clear and when tough calls had to be made, referring to the objectives stabilized the process.

Safety Officers said sometimes the most complex parts of the incident were not in the actual firefighting activities, but in the management of the people the fires were affecting. The complexity resulting from the evacuation of residents and the continuous feeding of information to the public, media and political representatives frequently overshadowed firefighting activities. Media, it was mentioned, often misguided the public telling them, for example, that an evacuation had been lifted when in fact it had not. Many of the safety "hiccups" that occurred during the management of the fires were generated by political representatives and media.

<u>Individual Initiative on the Line</u>

As in 2003, when conditions on the fires changed so dramatically, often within minutes, individual initiative exercised by Division Supervisors, Crew leaders, Strike Teams and nearly everyone on the line, became critical. Firefighters responded to multiple, emerging fires when command, control and communications were often compromised or simply unavailable.

In these cases, crew leaders reported using a group size-up briefing before engaging during many of their responses. With firefighters of varying experience levels on the same crews, this use of a "tactical pause" as it was called in 2003, was instrumental in ground-truthing the situation in which the crew was about to engage in. Interviewees said the pauses gave them time to consider the possible scenarios, establish trigger points and outline contingency plans. Firefighters of all experience levels could engage with high confidence levels and increased abilities in recognizing when conditions became unacceptable to continue working in.

On the other side of engagement, some respondents said independent action was ineffective. In some cases, law enforcement officers were using garden hoses on homes that were burning within sight of engine crews parked curbside who said they were waiting to be dispatched. In the minds of the law enforcement officers, intent was what was critical; acting with a good heart was key. Interviewees said, actions can be corrected, but failure to act cannot.

Differences Among Agencies' Working Shifts

Photo courtesy Eric Neitzel

Respondents said the disconnect between agencies in regard to the 24-hour schedule for state employees and 16-hour shifts for federal crews, remains an issue that continually challenges an effective response during large-scale, multi-jurisdictional events. Some interviewees said the issue is based in the agencies' philosophies more than in its' policies. But other respondents said that the working shift differences were embedded in policies and that these differences caused problems in staffing field operations safely and effectively.

One respondent said they were unsure what the 24-hour shifts were "buying us," in some cases during the 2007 fires, noting that in the hills it was too steep and rocky to complete any night work. The best progress was made at first light and toward the end of the day. Other difficulties created by different work shifts were due to the time of day when the shift changes occurred, at about 9:30 or 10:00 a.m. Because the outgoing shift needed to be back in camp, there were almost never face-to-face exchanges of information. The only exception to this seemed to be among Division Supervisors who were able to conduct face-to-face information exchanges before going off-shift.

Summary of Lessons Learned – Command and Control

- Pre-planning evacuations and trigger points for their implementation, pre-staging resources and equipment and utilizing unified command with law enforcement during initial attack were instrumental in the rapid response to the fires and the safe evacuation of thousands of people.
- Communication and coordination responsibilities among Incident Command Teams, Area Command Teams, Multi-Agency Coordinating Groups and Emergency Operations Centers should be made clear and widely shared.
- Assigning roles and responsibilities among area command, jurisdictional agencies and emergency services is best accomplished through the use of Delegations of Authority.
- Individual initiative guidelines for firefighters who may be 'curbside waiting to be dispatched' while homes within their sight are becoming compromised, should be addressed.
- The continuing support for differing work-shift schedules between federal, state and county agencies disrupts safe and effective staffing for field operations.

Southern California Fires 2007: What we learned, how we worked

Meeting the Demand for Information

Photo courtesy Eric Neitzel

Joint Information Centers

Anticipating that the need for information from the public, the media and political representatives would be extremely high, several local fire authorities ordered a large number of Public Information Officers (PIO) early on and established a multi-agency Joint Information Center (JIC). Where JICs were established, they were considered largely a success.

However, one respondent said that the JICs were not set up quickly enough and the ones that were did not seem to be staffed to the levels that were needed to be effective by National Incident Management System (NIMS) standards. The interviewee recommended that the JICs be pre-planned, set up quicker and that they meet Department of Homeland Security guidelines.

During incidents that performed most of their public and media information efforts from their command posts, the teams sometimes placed one of their PIOs in the JIC full time ensuring they had a solid tie-in with information coming directly from Unified Command.

One PIO function staffed with 14 members said they delivered information to California Governor Arnold Schwarzenager's Office, the Office of the U.S. President and 14 countries, in addition to local and regional public and media interests.

Key Messages and Delivery Methods

Respondents said educational efforts were key in all of their news releases. They reminded residents that roofs and rain gutters needed to be free from pine needles and other combustible materials and that defensible space was a "must have." Educational efforts also included attempts to prepare homeowners for the worst by letting them know that structures would be triaged and firefighters may not be able to save homes with low survivability features.

At the ICP of a late breaking fire in 2007, IMT members knew that resource requests for PIOs would be slow in getting filled because most of the available qualified personnel were already assigned and working on the fires. Instead of building a separate PIO function, this group worked closely with the Agency Administrator and home unit staff. The local unit phone number continued to act as the information line and the office was staffed with volunteers from the local Community Emergency Response Team (CERT). This was beneficial because people calling for information were talking to locals who were familiar with the area place names. PIOs provided the volunteers with all of the official information, talking points, hot topics and disaster relief contacts to ensure they were passing on timely and accurate information.

17

In addition, this PIO function plugged into the local weekly paper that had a blog that locals utilized to obtain much of their information. By keeping the newspaper fully informed on a real-time basis, the PIO function was able to connect to the public at large with a vast amount of the information they were looking for.

Photo courtesy Eric Neitzel

Meeting Political Representatives' Information Needs

Several interviewees voiced their concern about the level of distraction that resulted from on-site visits by political representatives during the 2007 fires. Respondents said that a distraction of this level meets the description of being "An incident within an incident." An on-site visitation by a high profile individual often has the effect of stalling or changing field operations objectives more than an injury or an unexpected fireline event would. One respondent suggested that a team with political expertise be utilized in meeting the needs of the political representatives who are seeking site tours while fire operations are ongoing. This way, the team engaged in containing the fire would not be distracted from that task during the visits.

Many respondents also said that the widely publicized dispute that occurred because of apparently conflicting information being reported by several different inter-agency offices was inappropriate and had no positive effect on containing any of the fires that threatened homes and infrastructure.

Interviewees said they were asked "Don't you people talk to each other?" while they were upwardly reporting pertinent information through the regular channels. When the numbers seemed to conflict, the requirement to sort it all out was returned to the Incident Management Teams where Operations Section and Planning Section leaders were distracted from field operations, ordering resources and from intelligence problems for two days. The need for numbers actually created dangerous situations for firefighters, one respondent said. Occasionally, when the requested numbers were provided, people went looking for other numbers, creating further levels of conflict. Requesting details, such as how many assigned personnel on each incident came from each organization, made for an inappropriate use of their time in the midst of the crises, respondents said.

Summary of Lessons Learned – Incident Information

- Joint Information Centers in 2003 and 2007 had substantially positive effects on the timeliness and quality of information for the public in the Wildland-Urban Interface (WUI) environment.
- The information needs of political representatives who request on-site visitation during large-scale, multiple fire events require more than the ordinary attention and may need to be met by resources other than the team managing the fire.

Southern California Fires 2007: What we learned, how we worked

- Collecting details about responding resources and feeding them back to the requesting party while trying to manage large-scale, multiple fire events can become an unwarranted distraction and may lead to dangerous situations for firefighters on the front lines.

Geospatial Intelligence

"We don't know where the fire front is. A lot of systems don't look down through the smoke very well. We need to work on this before, during and after these fires." ~ Operations Section Chief

3-D Maps Improved Situational Awareness

The use of geospatial technology on wildfires has experienced a huge advancement since southern California's 2003 fire storm. Not only are the tools better, but several respondents said the quality of personnel who received training in the National Wildfire Coordinating Group's (NWCG) course titled Geographic Information System Specialist for Incident Management, S-341, has dramatically improved capabilities in producing real situation maps that support operations objectives. With the ease and widespread use of the new visualization tools such as Google Earth and ArcGIS Explorer to present a picture in 3-D, operations personnel gain a better understanding of the fire situation than they do using 2-D maps with contour lines. The 3-D maps provide a more realistic picture of the actual terrain and enhance situational awareness for firefighters.

Mapping Tools Need Coordination

Although the availability of accurate fire maps was much faster than in 2003, there are still challenges to implementing true, real-time mapping capabilities, interviewees said. They noted the use of five independent real-time mapping platforms used on the fires with no coordination between them. The simultaneous efforts in gathering imagery from several different platforms and sending it digitally to the IMTs lacked good communication and coordination. During an incident, it was universally declared, is not a good time to introduce new programs. Use of the tools is usually embedded more in agency policy than in the capability of the Geographic Information Systems (GIS) specialists assigned to work with them. One agency supports the use of one platform's data, while another agency has another platform's imagery pre-selected for use. Many respondents said the technology introduced must be intuitive and easy to use or fireline personnel will not use it.

Technical problems often produced delays in map products, respondents said. The computer technical specialist assigned to the incident is usually absorbed in fixing problems that arise in other sections and does not have the time to repair technical failures on map plotters. Interviewees suggested a second computer technical specialist be called in to help with the workload or that


Photo Courtesy of Tom Patterson. This is an example of damage assessment results overlaid on a 3-D map representation.

purchasing a new plotter may be cost effective. Internet satellite connections provided by contractors that were "slower than dial-up," resulted in long delays.

Several Sources for Data Imagery

Military personnel flew missions for seven days providing more than 500 photos in support of 15 wildfires, identifying firelines and hotspots that could not be assessed from the ground. Advantages of images provided by Global Hawk included real-time and infrared sensors producing clear images, despite smoke and darkness of night. Predator aircraft also provided accurate and useful information and where it was available, it was considered a success. One respondent said he flew a GPS flight and compared that perimeter with the one produced by Predator and found that the two were identical. The only downside, the interviewee said, is that it took three hours to get the Predator deployed through the NWCG website.

For an overarching perspective on all of the elements impacting the geospatial information gathering process and a list of who participated in it during the 2007 fires, please activate the presentation offered here that was developed by Chief Kate Dargan, State Fire Marshal.
http://www.wildfirelessons.net/documents/Situational_Awareness_2007_SoCal_Fires.ppt

Situational Awareness -
2007 Southern California
Fires

Chief Kate Dargan
State Fire Marshal
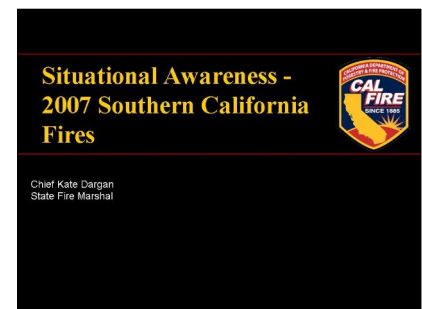
Summary of Lessons Learned – Geospatial Information Systems

- Visualization tools such as Google Earth and ArcGIS Explorer present a picture in 3-D that helps operations personnel gain a better understanding of the fire situation and terrain and enhances situational awareness for firefighters.
- While a broad spectrum of Geospatial imaging tools are available, the communication and coordination in using them is not as readily accessible. New technology must be intuitive and easy to use or fireline personnel won't use it. Introducing new GIS platforms during an incident does not ensure their applicability.
- Military personnel who gathered data imagery using Global Hawk – which is unhampered by smoke and dark of night – provided accurate information on firelines and hotspots that could not be gathered by traditional wildland fire management methods.

Southern California Fires 2007: What we learned, how we worked

Air Operations

Sharing Air Resources

Pre-positioning air tankers to bases in southern California, including Hemet/Ryan, Ramona and Porterville several days prior to the predicted wind event, is one of the actions that provided opportunities for firefighters to be more aggressive in the early days of the fires. Augmenting state and federal resources, air resources from the California National Guard and the U.S. Navy Reserves were engaged early on due to memorandums of understanding developed during pre-planning sessions between 2003 and 2007.

Interviewees said military air resources were a welcome addition, although some procedures differ between the management of the air resources that will need continuing attention. One of those problem areas is in personnel staffing requirements. The operation of military helicopters requires helicopter managers who are often called "spotters." These individuals are required to be onboard military helicopters when they perform water or retardant dropping missions. State and federal use helicopters do not require helicopter managers to be onboard during such missions. Future compliance with the military mandates will require that more personnel be trained as military helicopter managers as there is currently an identified shortage of these personnel.

Photo by Seaman Jon Husman
(Released)

Sharing air resources among multiple fires can be problematic, but many respondents said that their experiences during the 2007 fires were surprisingly smooth. One interviewee said the IMT shared air resources with three other fires, using a morning conference call to coordinate which fire needed what resources on a daily basis. "The conference call was a good vehicle to highlight shortages on other fires, and we sent any excess that we had had to other fires," they said. Air Operations Branch Directors faxed daily information to one site and received "mini IAPs" from each incident. This practice provided pilots with all of the information they needed for each fire as they moved around to several fires during the day.

Understaffed Aircraft Dispatch Desks

Aircraft Dispatch resources were severely limited and many aircraft dispatch desks remained understaffed throughout the duration of the incidents, respondents said. This resulted in air operations personnel assuming support roles they do not normally perform in. "We ended up assigning 'A' numbers in many cases after launching aircraft. Otherwise, we would be waiting to launch for up to an hour," one interviewee noted. The numbers were eventually sorted out but air

Southern California Fires 2007: What we learned, how we worked

operations personnel regretted the workaround because it undoubtedly caused problems for the aircraft dispatch personnel.

Air Space Coordination

Air space coordination could have been enhanced, respondents said, by placing an Air Space Field Coordinator per every two Incident Management Teams. One idea that has been proposed to better coordinate crowded air space conditions is to request the Federal Aviation Administration (FAA) provide an additional "Aircraft Tower" function that could expand and contract when multiple large-scale fires are burning. For a look at the proposed plan, please go to http://www.wildfirelessons.net/documents/Draft_Plan_to_Establish_Aviation_Coordination_Group_v4.doc

Summary of Lessons Learned – Air Operations

- Personnel staffing requirements between military and non-military air resources differ significantly. Addressing shortages in military personnel to properly staff aircraft will be necessary if military air resources continue to support wildland fire management efforts.
- Aircraft Dispatch resources were severely limited and many aircraft dispatch desks remained understaffed throughout the duration of the incidents. Understaffed aircraft dispatch desks can severely delay launching air support resources.
- Air space coordination could have been enhanced by strategic placement of Air Space Field Coordinators or by the use of a temporary FAA Aircraft Tower – a proposal currently under review.

Communications Systems

"Every agency has their communication format and can't get it right when they come together."
~ Unified Command Incident Commander

Interoperability

In 2003, it was reported that municipal and county fire departments in California had converted to 800 MHz radio communication systems. State and federal agencies were using VHF systems. The incompatibility of these two systems, then, was cited by virtually every respondent as being the largest problem encountered on the fires.

In 2007, although interoperability was challenged on many fronts, respondents said that counties that had patch capabilities in place provided coverage over the majority of their jurisdictional response areas. The patch capability for fire authorities in one county supported a

method of connecting VHF to their 800 MHz system through the dispatch center. The county has been assigned one VHF frequency, and the county's Sheriff's office also has one VHF frequency that it can use. But the patch is not automatic. Patching can be done at the local level for initial attack with a phone call, but cooperation from the federal and state levels is needed in order to accomplish this. Respondents said, when the U.S. Forest Service engines have 800 MHz radios, as well, they need the patch and the units must have the county's VHF frequency in their radios in order for the patch to work. Reprogramming 800 MHz radios from other departments is a possibility, but requires signed agreements by host and cooperating agencies. Signed agreements should be completed in pre-planning stages, not left until incidents are in operation, interviewees said. In one county, the patch was considered a success because it allowed the system to retain coverage over 95 percent of their land base.

One Communications Unit Leader said despite the success of patched systems, interoperability still needs serious focus by local fire authorities. One piece of radio frequency translation equipment, called an APC 1000 created by Raytheon, has already been delivered to several organizations in southern California. The equipment, however, is not powered up and checked out completely, so it was not available for use during the 2007 fires. In addition to turning on the equipment, a common communication plan is also required for the equipment's use. Turning it on without one may obliterate the current communications systems.

Photo courtesy Eric Neitzel

Lacking Enough Frequencies

Respondents on several incidents reported continued problems with obtaining enough frequencies to maintain effective communications. One incident reported having only one tactical frequency for the first two days. Interviewees said the use of 800 MHz radios by local government units created negative impacts because of limited operability between units. Some engine crew members reported having to switch around among locally approved frequencies in order for the strike team to accomplish normal communications. The crew was told that they were violating radio safety protocols by using unauthorized frequencies. Working with another strike team from out of the area, the crews found a tactical frequency that they could talk to each other on. On another incident, local fire authorities used two separate command channels (1 VHF, 1 UHF), which resulted in equipping everyone with two radios to remain in contact. An out-of-area handcrew said they were given an 800 MHz radio when they arrived on the incident and that it helped them talk to management while on the fireline. However, the radio could not scan between frequencies, making it difficult to maintain situational awareness. When command was dialed up the crew could not hear the tactical frequency and when the tactical frequency was on, they could not hear command. However, the crew said, they were able to maintain contact wherever they were on the fire.

Many respondents recommended pre-positioning communications equipment as teams are being pre-positioned. This would have the added benefit of dispersing a high ramp-up demand

and enable national radio cache personnel to support orders for systems. One interviewee also recommended that a statewide frequency manager be utilized for assistance during multiple, large-scale incidents. A frequency manager would be in position to pre-plan frequencies and designate them for tactical, command and extended attack needs. On one incident during the 2007 fires, personnel worked for three days on one tactical channel and a command channel that was also being used for non-incident initial attack and other traffic.

Photo courtesy Eric Neitzel

Pre-designated Incident Command Post locations, one respondent said, should also have phone pedestals installed so that communications can be up and running quickly. At one ICP, a portable satellite system donated by a local vendor that networked all the computers among local fire authorities and the Sheriff's trailers together, provided internet access and could be used for up to 16 phone lines. The use of this equipment was considered a success because "it was the quickest we had this type of connectivity working on an incident."

Transitioning Between Local and National Communications Systems

Transition of incident management communications from a local to a national IMT, seemed to cause some concern for local fire authorities in one case, respondents said. While local fire authorities in one case had supplied enough 800 MHz radios to carry the operation for the first 48 hours, when the air operations section of the incident grew there became a need to switch over to the National Interagency Fire Center radio system. The team wanted to change over to VHF and restore the local system for local initial attack responsibilities, which is standard procedure for national IMTs, interviewees said. This proved to be a difficult transition for some local personnel.

One respondent voiced concern about an issue they had not seen addressed in any plan they had reviewed. This interviewee asked a question nearly every firefighter responding to wildland-urban interface fires wants to know: "When a team takes over an incident, who is responsible for the emergency calls that are inside the fire area? For example, a resident who has not evacuated calls in with chest pains and the county does a response. Do we coordinate with the team before we send help, do we send help and possibly jeopardize firefighters as we enter the area, is there some of our own equipment close to the scene? I do not see this addressed in the plan or anywhere that tells firefighters, teams or the local unit how to coordinate this."

Summary of Lessons Learned – Communications Systems

- A patch conducted at the system level was found to be capable of connecting 800 MHz systems to VHF systems thus enabling fireline communications over a wide geographic

area. The patch, however, has limited capabilities and requires approval from all levels of government before it can be installed.

- Radio frequency translation equipment is available and has been purchased by several local government entities in southern California. But a common communication plan is also required before the equipment goes into use because turning it on without one may obliterate the current communications systems.

- Pre-positioning communications equipment as teams are being pre-positioned may disperse a high ramp-up demand on National Interagency Fire Center communications personnel and enable quicker installment of incident command communications.

- Pre-designated Incident Command Post locations with phone pedestals installed would support quicker incident communications capabilities.

- Obtaining the use of enough frequencies to maintain effective incident communications continues to be a challenge. One respondent recommended that a statewide frequency coordinator be utilized to resolve at least some of the issues involving frequency assignments.

Incident Resource Management

Dispatch

In 2003, inter-agency training and a cooperative work environment among differing agency personnel were hailed as hallmarks of success. Although these qualities were again highlighted in 2007, many respondents referred to particular areas where they believe large improvements could be made. One respondent suggested Dispatch should be included in the Unified Command concept, too. When Unified Command is adopted, the respondent said, the incident should also come under Unified Dispatch.

Physical Limitations of Emergency Communications Centers (ECC)

Dispatch centers located in some ECCs were reported as being too small and quickly overcrowded. Noise levels during the incidents became disruptive to personnel handling initial attack and aircraft radio traffic and phone calls. Other physical limitations of dispatch centers included having access to only three incoming phone lines and two outgoing lines. Limited communications systems like this quickly became overrun. Even in small dispatch centers, interviewees said access to the dispatch floor needs to be restricted during high intensity events. Business being conducted by those who did not need to be in the dispatch center in order to conduct that business interfered with dispatch activity in many cases.

<u>Qualified Personnel in Short Supply</u>

A shortage of qualified personnel regionally and nationally to fill dispatch needs for high intensity events like the southern California fires, made it difficult to fill the positions in 2007. In some dispatch centers, chronic understaffing prohibited personnel from fulfilling all the duties required of them. Initial Attack and Aircraft dispatch desks were notably understaffed, and since there simply were not any personnel to come in and relieve them, dispatchers at these desks continued to work long, unmitigated shifts. Several interviewees suggested creating a pre-plan for staffing needs for future events of this type. Many respondents said that the addition of one person assigned only to field questions, update incident personnel on the status of their orders and gather "Aviation Reports" for agency leaders would be an enormous asset to the productivity of the unit.

Photo courtesy Eric Neitzel

When personnel finally were relieved, they did not have any place to rest because they were evacuated from their homes or road closures prohibited them from getting home. Local hotels were full. To alleviate the situation, a mobile sleeping trailer was brought to one ECC where dispatchers could utilize it when off-shift. However, one agency's employees were not authorized to use the sleeping trailer because it did not meet their agency's sanitation regulations. Respondents said this was not known at the time the trailer was ordered.

Problems emerged at one center as expanded dispatch teams were brought in from out-of-area. One respondent explained that in California there are multiple databases and multiple agreements in place and available to the dispatch system. The system is inherently redundant and the duplication often creates confusion and a potential for record-keeping mishaps. For dispatch staff to succeed, they must be knowledgeable about all of the databases and the agreements. When expanded dispatchers come from out-of-area or out-of-region, they struggle with the steep learning curve this complex system of databases and agreements poses.

Complications in Resource Ordering

Southern California area fire agencies have access to a large number of fire resources and utilize extensive mutual assistance agreements. The number and size of these rapidly escalating wildfires threatening multiple communities simultaneously taxed the resource ordering/dispatch system, Emergency Operations Centers, Multi-Agency Coordinating Groups and commands.

This was due in part, respondents said, to the requirement of transitioning from traditional organizational management/dispatch roles to utilizing multi-agency coordination and command structures to support multiple large-scale events. If the roles, responsibilities and authorities of these emergency support systems are not clearly defined and communicated, missed opportunities, poor utilization of resources and duplication of effort occurs.

With California assets stretched, the state worked through mutual aid channels between states and through the federal process. Cal Fire Chief Ruben Grijalva noted that resources requested through the Emergency Management Assistance Compact (EMAC) system were received from other states more quickly than through the federal Resource Ordering and Status System (ROSS) request process.

At one interagency dispatch center in southern California, three separate systems were used for resource ordering among databases that did not link, a respondent explained. This situation required personnel to switch back and forth between systems when ordering resources. ROSS was used as a secondary system by some dispatchers due to it being too slow and cumbersome as a real-time resource ordering tool, respondents said. They recommended that an interface with ROSS, such as WildCAD (Wildland Computer-Aided Dispatch/ROSS may be helpful where the use of ROSS is not practical.

Photo courtesy Whitney IMT

Further complicating the resources ordering issue, was the quick ramp-up and ramp-down. Because of this, not all of the personnel and equipment on the fires were entered into ROSS with request numbers. When request numbers were missing, personnel were needed to double back and enter resources and assign them numbers in order to demobilize them from an incident or reassign them to another incident. State personnel have not been using the ROSS process as long as federal personnel have, and still have training needs in order to become proficient with the system. Respondents said, when ROSS kept resources tied to an incident where they were no longer needed, Cal Fire and OES personnel assisted expanded dispatch by tracking what was being ordered, assigning resource order numbers and getting firefighting personnel and equipment moving down the road to the next fire.

Dispatchers said ROSS "was slow at best and had to be bypassed on several occasions to meet the operational needs of the incident." The system seemed incapable of responding fast enough to avoid dramatic delays in aircraft missions. When it was not just slow, it was unavailable; the system went down for almost a whole day, respondents said, complicating reassignment of resources. One respondent said, "ROSS doesn't seem to be designed to handle the high capacity of orders for events like this."

Southern California Fires 2007: What we learned, how we worked

Another interviewee questioned whether the state's current computer system was capable of meeting ROSS's needs. They noted that while in 2003 the state worked both in California's Multi-Agency Incident Resource Processing System (MIRPS) and ROSS, in 2007 they worked entirely in ROSS. Still the system seemed extremely slow. They wondered if upgraded computers and a high speed internet connection would help alleviate some of the problems with ROSS the unit experienced in 2007. At one ICP, respondents noted that the satellite system did not have sufficient bandwidth to simultaneously support the use of ROSS and all of the other IMT's activities.

Photo courtesy Eric Neitzel

Single Point Ordering

The lack of single point ordering by the unified command agencies resulted in duplicate ordering and delayed many resource orders, respondents said. Single point ordering did not work in instances when units went to the local chief and said they needed the item immediately in order to go to work and then tried to get it paid for later. Asking for permission after the fact tied up the ordering personnel and slowed down the process.

When a national IMT assumed command at one incident, ordering was already in place through the local unit, but only one person was assigned to handle all of the ordering compared to the usual situation where four or five personnel are needed to complete the process. The national IMT personnel elected to keep the local individual in the ordering process having them act as a filter and interpreter for supply, ordering and logistics. The addition of the local expertise provided in-house knowledge of local vendors and suppliers and kept the system from bogging down.

Over Ordering Resources

Over ordering on early fires, respondents said, may have gotten more resources going to early fires than were needed or could be efficiently managed. This situation left the next fires to break out, short on available resources. Interviewees at one incident said they "got what we needed just barely in time, especially considering the incident was the 5th or 6th one out of the chutes."

Respondents said over-ordering problems may be solved by taking a closer look at the pre-planning documents for structure protection. Currently, pre-plans indicate how many structure engines are needed in neighborhoods. But, the interviewee said, "You cannot just add all of that up to get what you need to order because all of those neighborhoods won't be threatened at once." Initial orders for resources need to be reduced to reflect the true need. Looking at historical records that indicate what the numbers of resources actually needed were and comparing them to what current pre-plans call for, may offer a more realistic picture to local fire authorities. Ordering

double the amount of resources and expecting half of what was asked for, is an inefficient system for resource ordering.

Photo courtesy Eric Neitzel

FEMA Mobilization Center

In an effort to stage relief resources in close proximity to the 23 large fires in southern California, the Federal Emergency Management Agency (FEMA) planned to open a mobilization center with facilities at the Chino Airport. The Chino Airport center was slated to be used to stage approximately 300 wildland and structural engines to be mobilized through San Diego County. A national IMT was assigned to making the Chino Mobilization Center work.

Setting up the Mobilization Center

The facilities at Chino Airport were not prepared in time for the first resources that cycled through the center. About 4000 people were anticipated to be coming based on resource orders placed by FEMA. The resources were expected to begin arriving in two or three days. Instead, resources began showing up on the first day, before the IMT had arrived at the mob center location.

Respondents said the decision to establish a mob center was about two days late. The site chosen for the facility, expected to process 4,000 people, was capable of handling about 800 at the maximum. FEMA's logistical support processes lacked capability in several areas. For example, four days into the center's operation and after about 3,000 people had cycled through, trash dumpsters were still nonexistent at the center and IMT personnel reported "breaking the rules" to go buy garbage cans.

FEMA as a "blesser/denier" of resource orders impaired logistics from setting up a camp that met all requirements in a timely manner. A camp kit that was ordered by the IMT, was denied by FEMA personnel. The IMT was told they could only have a ½ kit. Critical needs were purchased using government credit cards because the FEMA approval/purchasing process was too slow to adequately support the center, respondents said. "We're borrowing tables from a nearby restaurant." And although the facility was set up to support about 4,000 people, it morphed into more than just FEMA orders.

Respondents noted that there was no FEMA liaison on-site at the mob center and wondered if that may have helped the situation that developed.

29

Resources Ordered by FEMA

The way FEMA resources were called to the southern California fires had negative impacts. One respondent explained how the ordering took place: The Governor's Office of Emergency Services (OES) ordered 125 strike teams of engines. The order was sent to OES in Sacramento and eventually to FEMA at the Joint Field Office where it arrived at the ESF4 desk as a Mission Assignment (MA). The MA was accepted and sent to South Zone Operations and then to NIFC where it was filled. Later the order was modified twice (engine types and numbers and adding a staging area). Because no MA number was assigned in ROSS, it was difficult to meet FEMA requests for morning and afternoon briefings describing the exact location of the FEMA engines. Lastly, this order should have been placed (for a fire incident) through normal fire ordering channels to South Zone Operations requiring no FEMA Mission Assignment.

Many of the FEMA resource orders contained verbiage such as, "RESOURCES ARE NEEDED ASAP, HOWEVER IF RESOURCE CAN'T BE HERE BY OCT 27TH @ 1800 HOURS DO NOT FILL REQUEST." One engine strike team drove 30 hours straight through to meet the resource order's timeframe, and there were many similar stories of breaking driving rules because of the wording on the resource orders, respondents reported.

At the dispatch center where the FEMA resource orders were processed, personnel reported using resource orders to get crews and using spreadsheets to get engines. This system was in place because they were trying to not overload ROSS. Interviewees said this system worked better than trying to use ROSS to get order numbers and send resources through to incidents.

Getting Resources Out of the Mob Center

Once they had arrived at the Chino Mobilization Center, getting resources assigned to incidents was extremely challenging. Interviewees said resources remained at the mob center waiting for orders. A coordinator at the state level became frustrated with the inability to get crews assigned and became involved in the process. Their involvement reportedly helped to get resource orders processed for crews and get them to assignments.

But personnel on some fires had not been notified of the incoming resources and did not have assignments for them when they arrived. One respondent said, "The mob center sent resources that had not been ordered. Those resources were then turned around and sent back – wasting everyone's time."

Recommendations

Interviewees had several recommendations for improving working relationships where multiple agencies are involved in response. First, respondents said, instead of using FEMA Mission Assignments, the use of Memorandums of Understanding would be more productive. When FEMA and Multi-Agency Coordinating Groups work together on an incident, co-locating FEMA's Joint Field Office at the State Emergency Operations Center may produce more of a team

effort. One respondent said, "Incident Command System mentors needed to be inserted into FEMA to help them move quicker using ICS."

Another respondent said they would like to see FEMA become more proactive in hazardous fuels management, citing that "Proactive mitigation is supplied by FEMA in flood, hurricane and earthquake situations – why not fire? Fire knows what needs to get done proactively, but doesn't have the money. FEMA has the money and doesn't have the know how to get proactive with fire." While fire personnel struggle to find funds to support collaboration, Community Wildfire Protection Plans remain too rare. FEMA's involvement with CWPPs could save billions on reactive emergency services and recovery, an interviewee said.

"Invest in hazardous fuels mitigation, not engines," one respondent said. "There are not enough engines and never will be. A small percentage of FEMA's budget invested in fuels management work would save a lot in response and recovery costs after the incidents occur."

Summary of Lessons Learned – Incident Resource Management

- Out-of-area dispatch teams struggled with the steep learning curve presented by California's complex system involving multiple databases and agreements. The system is inherently redundant and the duplication often creates confusion and a potential for record-keeping mishaps.
- The federal Resource Ordering and Status System (ROSS) was used as a secondary system by some dispatchers due to it being too slow and cumbersome as a real-time resource ordering tool. The slowness of the ROSS system seemed to indicate that it lacked the capacity to keep up with surges in demand and that it was incapable of supporting aircraft missions without dramatically delaying launches.
- The FEMA Mobilization Center experienced multiple logistical problems that could have been alleviated with more pre-planning.
- FEMA's ordering of wildland and structural engines circumvented the normal processes causing confusion among several Incident Management Teams who were not informed that the resources were due to arrive and did not have assignments for them when they did.
- Verbiage on the FEMA-generated resource orders appeared to require engine crews to break driving and work-rest rules in the effort to arrive on time.
- Recommendation: In place of FEMA Mission Assignments, the use of Memorandums of Understanding should be considered.

Fire Behavior in the Urban Interface

In 2003, respondents related that the fires that year were much more than typical wind-driven events. The extreme fire behavior noted then resulted from a convergence of extended drought, fuel conditions, hot and dry weather and typical Santa Ana winds of 30 to 40 mph.

Extensive human encroachment into fire prone landscapes and vegetation types had produced an extended wildland-urban interface increasing the values at risk and the risk to firefighters.

Fires crossed traditional interfaces into purely urban areas where structures became just another fuel type carrying fire deeper into cities. Ornamental vegetation proved to be a significant carrier of fire producing extreme heat, ember showers and burning fronds that landed on rooftops and smoldered until eventually they ignited structures. Burning homes produced firebrands that ignited other homes creating a chain effect that put firefighters at a severe disadvantage. In 2003, respondents regularly used the words "catastrophic" and "conflagration" to describe what they had seen and experienced.

Photo courtesy Eric Neitzel

In 2007, fuel conditions were much the same, respondents said, and fire behavior was again described as extreme. "We had firebrands up to ½ mile ahead of the flaming front. We couldn't see through the smoke." Respondents described this event as being both wind and fuels driven with sustained winds of 60 mph and wind gusts recorded at 80 mph. Fuels, such as decadent vegetation in some areas, ornamental shrubbery and structures all contributed to significant fuel loading in the paths of the fires.

Some respondents said they observed 110 foot flame lengths in 50 to 60-year-old vegetation, driven by winds up to 70 mph. Wherever dried vegetation existed, including roadsides, the fires were provided avenues to leap across what, under normal conditions, would have prevented them from advancing. Such was the case where the fire jumped across Interstate 15. The speed of the fires was overwhelming – one measured at 118,000 acres in WUI in the first 36 hours.

But conditions also varied widely among even the 23 fires burning simultaneously, interviewees said. "The Santa Ana winds didn't blow in all areas of Fallbrook," one respondent explained. "The ridges stopped the wind flow on the south edge of the fire." On the Witch Fire, structures became the fuel types, sending out embers. Tree limbs broke windows, embers came in, ornamentals, yard playgrounds, exposed decks and rooftops became the weak spots.

Tactics and Strategies

"We never fought fire in 70 mph winds before. It was scary." ~ Engine crewmember

Tactics and strategies developed along two lines: Initial Attack forces reported using "anchor and flank" methods and point protection wherever possible. The fires moved so quickly in the high winds that teams arriving to manage fires reported that many structures had already been lost and their best option was to begin perimeter control to protect structured areas that had not yet been hit. If firefighters were placed in positions where air support was impossible (due to the high winds) strategists frequently opted to return to the "anchor and flank" method.

Photo courtesy Eric Neitzel

Initial Attack

At one incident, the early arrival of a Fire Behavior Analyst was credited with helping firefighters decide first steps in strategy. "His early predictions on fire spread gave us the information we needed to plan – the areas to evacuate first and where to start structure protection." Under wind-driven conditions, suppression efforts on this incident consisted solely of structure protection. Air tanker drops were able to slow the fires' advancement in some cases, but nowhere could they stop it. When the winds became too high or turbulent, air operations were halted.

With spotting occurring ½ mile away and the fires spreading at rapid rates, firefighters said that it became important to follow the fires as opposed to getting in front of them during structure protection. Crew leaders said, "We've learned several times that it's not worth it," and they reported, "posting more lookouts than ever before." They also said they spent more time evaluating where to put personnel.

One Task Force Leader said that the urban interface was a new environment and a challenge for him. He said he was able to fall back on, "...my training, what felt right and taking advice." He reported that the task members reviewed their experience levels, agreed upon trigger points, got good participation and ownership in the plan, and went to work. This type of "tactical pause" experience was related many times. Several firefighters said they relied on their training to get them through the unfamiliarity of working in unimaginably extreme conditions.

Other firefighters also credited their training; "We saved six houses during initial attack because of proper training. It would've been easy to get hurt with the wind and the terrain." The firefighter said the crew followed the fire as it spread, suppressing any fire in the structures. Where the roads were curvy and the structures located mid-slope, they experienced frequent fire spotting. "We had to be more aware and our trigger points had to be farther ahead because of the fire behavior."

Photo courtesy Eric Neitzel

Firefighters said the fast pace accelerated "Getting your initial situational awareness and figuring out what you could accomplish." In the mix of agency and locally-based crews, there seemed to develop the rules of "get in and do what you can, stay if you can to protect structures or move on out if it's not safe or if there's nothing you can do." Several respondents said that constantly maintaining lookouts became especially important to help crews work comfortably when they couldn't see the fire well. Regular updates from the lookout included how close the fire was and the spread rate of the fire as it approached the crew. One crew of 12 firefighters deployed their fire shelters while working on the Santiago Fire. An LA Times photographer captured the sequence of events. For a slideshow that combines photos of the event as it unfolded and the radio calls transmitted during it, please go to the following link: http://www.wildfirelessons.net/documents/Santiago_Fire_Shelter_Deployment_Oct2007.mpg (Slideshow courtesy of the LA Times – for educational purposes only, not to be reproduced.)

One Initial Attack Captain reported that his crew was able to save every structure because of the existence of 100' fuels reduction that had been done around the homes and the improved building construction. All of the structures were stucco. Another factor that helped, he said, was the two-blade wide dozer line around the houses. Access to the houses was difficult because of two-lane, curvy roads and stalled public vehicles en-route. In other neighborhoods, "Vehicles adjacent to houses would sometimes catch fire and would affect houses, so both had to be put out."

Maps were the key pieces of intelligence that were needed early on, but many crews did not have them. Several respondents reported coming across new neighborhoods that were not on the outdated maps they had. "Thomas Brothers" maps were the most up-to-date and were used by some of the departments for dispatching to "Thomas Brothers" map coordinates. Crews said they needed more of these maps from the beginning.

And, as always, the wildland-urban interface contained surprises. Crews reported many different kinds of materials being kept on private lands, but in one place, the crew came upon what looked like a base of operations for small scale mining. Hundreds of gallons of gasoline and diesel were on the site, as well as explosives.

Incident Management Team Support

While several Incident Management Teams had been pre-positioned and coordinated widespread initial attack activities, the number of large fires breaking quickly outstripped the

number of pre-staged teams. More personnel were needed and called. Many fires had made some major runs when IMTs were called in to manage them. In those cases, the teams provided critical support mechanisms to contain the massive fires and stop them from threatening additional structured areas. Many of the responding teams reported adopting perimeter control strategies early. They said several fires had already burned through neighborhoods and were then making their way through vegetative fuel loads toward more homes when most of them arrived.

The team responding to the Rice Fire found that they needed to immediately address the threat the fire posed to new areas where thousands of structures and about 100,000 acres of burnable area would be consumed if they had been unable to get a handle on the perimeter. Where some fires had made large runs, they had also bumped into Fire Safe communities. Team members said the reduced fuel loads in these communities often stopped the fire. In cases where homes located one or two blocks away from the fire's edge burned, it was due to windblown embers getting into the homes through eaves and under porches and not due to direct flame contact.

Photo Courtesy of Eric Neitzel

Pine needles on the rooftops of houses were recognized as a significant problem to the survivability of the homes. Even after wood piles were moved away from the houses and the walls of the houses were jelled, if pine needles remained on the roofs the structure became susceptible. "I could do more good with a leaf blower than with a strike team of engines if I could just get the needles blown off the roofs and away from the homes," one interviewee said. Even metal roofs did not prevent structures from burning when needle accumulations were heavy.

Photo courtesy Eric Neitzel

An IMT responding to a fire in LA County said the majority of the fire's runs were made before the team arrived. Three structure groups were established and suppression efforts were focused on perimeter control. Major flare-ups in the canyons were also suppressed, protecting structures from additional threats. The majority of 38,000 acres were lined in a couple of days. Dozers were especially helpful in getting it lined quickly and eliminating additional threats to structured areas.

Operations personnel said that anchoring and flanking techniques also helped them prepare for anticipated wind reversals. In one case, perimeter control to the north kept firefighters in readiness for the wind switch to protect another community from being threatened.

But wind shift predictions just as frequently turned false, respondents said. Sometimes predictions of off-shore wind flows were not entirely accurate. The winds would blow off-shore,

then "we would get some eddies, and a stronger on-shore wind than the off-shore." When the off-shore winds stopped, on-shore winds would begin.

Fuel Treatments

> "The best success was what homeowners did to protect themselves from fire."
> ~ Strike Team Leader

As in 2003, respondents reported that fuel treatments that were a result of hazardous fuel reduction programs were extremely effective in assisting with community protection measures.

In Fallbrook, fuel modifications were critical to the number of homes that survived: 60 to 70 percent of the homes that survived had significant fuel reduction modifications, respondents said. A combination of enhanced building construction and "green belts" helped save houses. Houses that were susceptible and did not survive were mainly older homes located in the canyons.

Photo courtesy Eric Neitzel

A $100,000 fuels project done in the Grass Valley area, San Bernardino County, saved an estimated $1 billion dollars in losses beyond the 198 homes that burned in that area. Respondents said features that enabled them to successfully defend the homes included community protection zones, building codes and developed infrastructure for the inevitable fire the residents expected to happen sooner or later. This significant success was due at least in part to the combined efforts of the residents, assistance from the San Bernardino Fire department and the Mountain Area Safety Team (MAST) who all worked together on the fire evacuation plans and created fire safe home sites and neighborhoods. Interviewees attributed the success of the experience to the ability of people working in smaller groups and teams among all agencies participating.
For more information on MAST please go to www.calmast.org

A shaded fuel break created by the Fire Safe Councils was declared a success on the Slide Fire in San Bernardino County. Respondents said the fire "got out of the canopy and down on the ground," when it met the fuel break. Then the priority became removing dead trees from the evacuation routes.

Equally as dramatic as the success stories of hazardous fuels abatement programs, are the areas where no fuels management had been performed. Much of the Rice Fire in San Diego County burned in riparian areas where local fire leaders have no authority to perform fuels management. The heavy fuels in these areas contributed to the fire spread, respondents said. The Rice Fire covered 9,472 acres and destroyed all of the structures in its path, including 206 residences, two commercial buildings and 40 outbuildings. Areas that continue to concern interviewees are the large structure losses among mobile areas with poor access and "ranchettes" that usually feature high fuel loads.

36

- In 2007, fuel conditions were similar to those of 2003, but exacerbated by sustained winds of 60 mph and wind gusts recorded at 80 mph. Many of the fires were wind driven events compounded by significant fuel loads including decadent vegetation, ornamental shrubbery and structures.
- With spotting occurring ½ mile away and the fires spreading at rapid rates, firefighters said that it became important to follow the fires as opposed to getting in front of them during structure protection.
- The fast pace in initial attack stages, accelerated situational awareness and identifying possible objectives. Maintaining constant lookouts became especially important to help crews work comfortably when they could not see the fire well.
- Firefighters said everything seemed to become fuel to the fires, even vehicles parked next to homes would sometimes catch fire and then act as ignition points to the structures.
- Late breaking fires quickly outstripped span-of-control of pre-staged IMTs and more personnel were called to manage them. Instead of coordinating initial attack, those teams reported that perimeter control became extremely important to contain the fires before they arrived at structured areas further away from the point of ignition.
- As in 2003, fuel treatments that were the result of hazardous fuel abatement projects were very successful in saving homes and, in some Fire Safe Communities, stopping the fires. Respondents said 60 to 70 percent of the homes in one community were saved because of fuel treatments completed around the homes.
- Areas that remain high concerns to firefighters are those communities made up primarily of mobile homes and have poor access. "Ranchettes" also pose problems because they are characterized by high fuel loads.

Fatigue Management

"There is a 'normal' way to operate on incidents. But there is a point where you are operating in a disaster. At that point, you need to establish 'Disaster Command,' which would allow incident personnel to work outside of the box as relates to work/rest cycles and other elements that might adversely impact the incident."
~ Unified Command Incident Commander

Most of the angst over the hardships of adhering to mandated work/rest cycles reported among nearly all of the respondents in 2003, seemed to have abated by 2007. Instead of railing against rules and regulations, nearly everyone who said that work/rest cycle management continued to be a challenge in 2007 also said that they had pre-identified that it would be an issue

and began mitigating it as soon as possible. They realized that relief would be appearing after work/rest rules had been pushed and sought out creative ways to remain functional until new resources arrived.

One team working with initial attack resources installed "rehab centers" near where the crews were working. Because of very limited resources, personnel remained on the fireline for 48 to 72 hours without rest. To mitigate the needed rest "rehab centers" offered hot food, water and shade. Most importantly, the staff at the rehab centers were told to "look into the eyes of firefighters" to determine if fatigue was affecting their mental status. If so, that crew was given some sleep time to assure their safety. Crews said the rehab centers were helpful and effective.

Availability of resources of all types was a known problem coming in, interviewees said, so they knew they were not going to be able to provide adequate rest. One team addressed the issue in briefings, instructing everyone that they would need to disengage somewhat to recharge and get some rest, since not enough help would be arriving for awhile. Fresh personnel ended up arriving just as rest became a critical issue.

On one incident, respondents said that having a solid Incident Action Plan with clear objectives and safety messages for the team's first shift – the second day of the fire – "was a real success, especially with the very tired initial attack resources."

Some respondents said work/rest was well handled, although they did pull long shifts before relief was available. They reported using a sleep trailer for rest, and taking short breaks as needed. They received a day off as soon as other coverage was available.

Some crews worked a reported 60 hours during initial attack, before getting their first rest. Many respondents said they worked 48 hours in initial attack stages. From the IMT perspective, one respondent explained, "Once you figured out how long a crew had been going without rest, and tried to order them in to ICP, they'd often refuse since they were still losing structures, or they'd just quit answering the radio to avoid leaving the line." This same situation also occurred during the 2003 fires.

Other crews reported flexibility was the key to being able to break the work/rest rules. One respondent said they broke the rules during initial attack, but after the first couple of days they began mitigating to meet the guidelines.

Respondents said it was difficult to coordinate work/rest cycles among county, state and federal personnel because of their differing work shift policies. Initial attack resources that remained on the line did not make it to briefings. When these resources were badly in need of rest, they would sometimes return to their stations instead of coming to the ICP.

Summary of Lessons Learned – Fatigue Management

- Personnel responding to the 2007 fires reported that they knew work/rest rules would be broken before relief arrived so they began mitigating fatigue as soon as possible.
- Crews responded positively to "rehab centers" installed near where they were working. The centers offered hot food, water and shade. When staff identified overly fatigued crews, they were provided sleep time.
- Coordinating work/rest cycles among county, state and federal personnel remains difficult because of their differing work shift policies.

Evacuations, Residents and Re-Entry

"The dusk to dawn curfew was an important thing to have, but 24 hours would have been even better. People who refuse to leave become problems when they have to go to the store and drive over the firefighters' hoses." ~ Sheriff's Deputy

Photo Courtesy of Whitney

Evacuations

Pre-incident planning, early trigger points for implementation and establishing unified command with law enforcement officials, were cited as being the most critical elements for contributing to success in evacuations. Authorities estimate that half a million residents were safely evacuated from the paths of the fires.

Respondents identified the Reverse 911 system as working exceptionally well in notifying residents of their danger. On one fire, interviewees said the system, which is implemented by blocks within zip codes, may have worked too well because exit routes suddenly became more congested than authorities had anticipated.

Law enforcement officials reported in 2003 that they tried to use the door-to-door method of evacuating residents but found that it was too slow. In 2007, they immediately began using the Reverse 911 system and determined that the method was very effective. Interviewees said that one thing that carried forward from the 2003 fires was the continuing relationships – 2007 events reinforced that law enforcement needs to be part of unified command, not a partner that is just off to the side, but face-to-face, looking at the same information at the same time. Trailers at ICP for the two law enforcement agencies were beneficial because they presented a tangible location for people to get good information.

One respondent said they would like to see simple maps developed with established trigger points on them and be able to show people the location of the fire and talk about fire behavior and rate of spread in ways that everybody can comprehend.

Southern California Fires 2007: What we learned, how we worked

On one fire, since evacuations were conducted by zip code, efforts were also made to set evacuation centers up by zip code, ensuring that the residents retained a sense of community and mutual support while they waited to return home. Incident commanders or their deputies visited evacuation centers daily at regularly scheduled times. The daily updates from management personnel were well received, respondents said.

At a community center, a Disaster Relief Center was opened featuring about 50 different agencies and booths offering evacuees "one-stop shopping" to meet all of their possible needs. Some of the services offered assistance to evacuees who needed a new driver's license, social security card, IRS information, animal control, and U.S. Post Office services. Respondents said the Disaster Relief Center was hugely beneficial to evacuees and a great success.

<u>Evacuating Special Needs Medical Patients</u>

Hospitals were not as impacted during the 2007 fires as they had been in 2003, although the evacuation of Fallbrook Hospital was several days long and required all of the district's ambulances and additional staffing. Unresolved issues concerning special needs medical patients again rose to the surface. Respondents explained that it takes about 8 hours for hospital staff to be able to evacuate special needs medical patients once the hospital has been identified by authorities as needing to be evacuated. Then it takes another eight hours to re-locate medical patients to a place that is suitable for their needs.

Photo courtesy Eric Neitzel

Skilled Nursing Facilities require pre-planning and memorandums of understanding which must be in place prior to evacuations in order to successfully develop the information on who needs the care and agreements on where to go with the patients. Medical patients cannot go to shelters. Public health personnel cannot meet their needs and the facilities are not equipped with the support that special needs patients require.

Emergency medical specialists were identified in 2003 as personnel who needed to be included in pre-planning and coordination events that involved facility evacuations. One of the big questions that remains unanswered, respondents said, is "who pays?" Although hospitals are reimbursed for additional staff and equipment, physicians and nurses receive no reimbursement for their overtime or medications. If local authorities cannot address the question, interviewees said, perhaps it needs to be aimed at federal level coordination officials.

Re-Entry

"We were heroes no longer, if we kept people out of their homes too long." ~ Liaison Officer

Photo courtesy Eric Neitzel

Re-entry of residents in 2003, and again in 2007, remained an unassigned task; somebody had to plan and implement reintroduction, but it had not been a topic that was considered in pre-planning by all of the jurisdictions involved. As a consequence, IMTs were tasked with it in some areas, and EOCs developed and implemented the plans in others.

In areas where IMTs conducted re-entry, they reported that their most successful actions were preceded by attempts to facilitate information flow among all of the organizations, agencies and utilities that would be impacted. Planning sessions included county road departments, local fire authorities, law enforcement, and gas, water and electric utility representatives. They reported that the planning sessions worked well.

Several respondents noted that as soon as the fire danger passed, political pressure to repopulate the homes became very apparent. In two counties, respondents said the re-entry plans developed by the IMT had to be approved by the EOC before being implemented. In one case, the plan was stalled because it had not been predetermined who had jurisdictional authority to approve the plan. County personnel there said they needed 12 hours to give the approval. The delay "raised a whole new set of issues on getting people back in," one respondent said.

Local authorities in another county relied upon IMT members for direction and tips on how to successfully repopulate the communities that had been evacuated. Timing of repopulations, became critical respondents said. Handouts for homeowners provided awareness information about the possibility of contaminated water, contact numbers for utility company representatives and tips on how to deodorize their refrigerators if food had been left in them during long power outages.

Interviewees said they would advise that if repopulating an area, do it with no restrictions. In other words, repopulate ALL of the evacuees or NONE of them. Avoid restrictions if possible. Re-entry and return announcements need to clearly separate days and information on who is able to return, respondents said.

Once re-entry took place on one fire, the IMT made efforts to place personnel who had fought the fires in each neighborhood, were also assigned there when the public returned. This created a bond between the two parties and promoted some "healing" for both, respondents said. Community Emergency Response Team members were also placed in the area for support.

Damage Assessment

The value of Damage Assessment Teams was noted in 2003, as assisting with thorough documentation of the values lost to the fires and those that were saved. Although national IMTs do not use the teams, recommendations for county authorities included anticipating the need for such teams and ordering them as soon as possible to assemble, arrive on-site and begin assessing and documenting damage before the task became too large. A particular damage report format, held up as a national model, is available as a Microsoft Word document from the Lessons Learned Center.

For the 2007 fires, damage assessment was conducted by field teams but the collection methods varied between the counties. Some counties used handheld PDA's with built-in digital cameras using mobile mapping software. Inspectors in another county used a clip board and pencil. Respondents said standardization of damage assessment would be beneficial and could be patterned after wildfire mapping standards. For a slideshow on the tools used by one of the counties, please activate the live link to the right.

**Fire Assessment Deployment
SoCal Fires 2007**

Summary of Lessons Learned – Evacuations, Homeowners and Re-entry

- Pre-incident planning, early trigger points for implementation and establishing unified command with law enforcement officials, were the most critical elements for contributing to success in evacuations.
- The Reverse 911 system was noted as being very effective for notifying residents of evacuations. The system was much quicker than the standard door-to-door approach.
- When evacuations were conducted by zip code, efforts were also made to ensure that evacuation centers were also set up by zip code, ensuring that the residents retained a sense of community and mutual support while they waited to return home.
- A Disaster Relief Center was hugely beneficial to evacuees and considered a success.
- The evacuation, transportation and care of special needs medical patients requires early notification of hospital staff. Medical patients must be taken to skilled nursing facilities under memorandums of understanding. An unresolved issue with payment for such services remains at the core of caring for this special class of evacuees.
- Re-entry plans were most successful when they were preceded by the facilitation of information flow among all of the organizations, agencies and utilities that would be impacted.

Summary

Southern California Fires 2007: What we learned, how we worked

Comparing the responses to the "Firestorm" of 2003 and the fires of 2007, it is important to note how differently the two events were viewed. Most of the respondents who participated in the collection of Lessons Learned in 2003 described it in terms of a "conflagration" and a "catastrophe." These descriptions were completely absent among the reflections of the 2007 participants. It seems that the events of 2003 expanded our abilities to imagine, and prepare for, the worst. These lessons were hard won and well learned: Nearly every fire breaking early during October 2007 was responded to by personnel who had trained, pre-planned for and acted on established trigger points. In 2003 and again in 2007, the value of forming unified command with law enforcement officials was reinforced. The largest evacuations in California's history were the result.

Some of the issues that were important to firefighters in 2003, did not carry the same weight in 2007 such as ethical dilemmas posed when work/rest guidelines were violated. They moved to on to managing fatigue, the core issue, instead of wrapping themselves around the axle of a rules-bound position.

Others continued to be important in both positive and negative ways. Interoperability issues remain technically unresolved even though some steps have been taken to enable workarounds. Organizational leaders should feel compelled to find champions to spearhead interagency efforts to find and apply the appropriate solutions in this area. Another area where interagency officials must focus attention is the difference between work shifts among agencies. In every functional area, personnel said that the differences in work shifts have more negative impacts than positive ones.

Rivalries among personnel from different agencies continued to be a problem in 2007 despite the interagency atmosphere that many units have tried to cultivate. In one office, leaders posted explicit messages such as "Together We Succeed" to remind everyone in the vicinity that cooperation was the expected professional behavior.

There were new developments as well. Satisfying agency and political appetites for difficult to collect information became a distraction that led to dangerous situations. Leaders who were in the midst of managing an extremely challenging situation were distracted from highly pressing decisions to meet these information needs. They all noted that this was an inappropriate use of their time.

This report should be viewed as a snapshot – the initial impressions of the thoughts of firefighters involved in a large-scale multiple fire event. It is not an exhaustive study of everything that should or could be learned during similar situations. Indeed, more study is needed if we are to extract some of the deep lessons that will continue to push the parameters of our imagination and the scope of our capabilities.

Not everybody who reads this report is going to agree with what they have read. Firefighters who shared their thoughts for this report felt that it was important to get these issues up on the table for discussion in the hope that they will be dealt with. Being capable of

sustaining open discussion is one of the critical elements in building organizational trust. By building on this trust, the interagency fire community will continue to move forward.