

After Action Report Improvement Plan Exercises

Summary

On April 18, 2006, the City of Boulder and Boulder County performed a full-scale exercise called the “Big Thompson Flood on Boulder Creek.” An After Action Report (AAR) on the exercise provided the following insights relating to areas that needed improvement:

- There were shortcomings in the internal flow of information within the EOC, specifically with requesting resources between the various Emergency Support Functions (ESFs).
- Everyone in the EOC must gain a better understanding of the roles and responsibilities of each ESF, including their own.
- Each ESF binder needs to be updated by the individual ESF members before an actual incident to become an effective tool.
- There was internal confusion regarding the paging communication system.

In addition to the above, exercise coordinators felt it was very important for members of the Policy Group to have a full understanding of the flood monitoring technology and the potentially catastrophic flash flood hazard. It is critical that decision makers, who have the authority to order evacuations, coordinate and have a common situational awareness when a threat is imminent.

In order to thoroughly address the above areas, two separate training exercises were developed. The first, held on April 23, 2007, was a tabletop exercise with the Policy Group (PG) members (Sheriff, County Commissioners, City Manager, Assistant City Managers, Mayor, Police Chief, Fire Chief and Vice-Chancellor of the University of Colorado) participating, and members of the MACS Group and others observing. It began with a seminar on flash flood decision-making (sounding warning sirens, ordering evacuation, etc.). The training then moved to a simulation pertaining to a flood threat of Boulder Creek where the PG members were provided storm prediction information, rainfall data, stream gauge levels and field reports. The training ended with a “hot wash” conducted by the primary instructor, Mr. Kevin Stewart, Urban Drainage and Flood Control District, Mr. Eric Nilsson, Emergency Manager, Larimer County and Jerry Tate, Boulder OEM Director.

The second training exercise was held at the normally scheduled MACS meeting on May 7, 2007. The Colorado Department of Emergency Management trained the MACS group on the utilization of WEB EOC. It is believed this emergency management software tool

will greatly enhance the shortcomings pertaining to the flow of information between ESFs and simultaneously bring more “composure” to the EOC. Even though the exercise did not flow as smoothly as anticipated, the exercise still showed the value of an automated EOC and members of the MACS group had their first exposure to the software.

Overview of April 23 Exercise

The exercise began at 9 a.m. in the east training room of the Public Safety Building, 1805 33rd St., Boulder, Colorado. Exercise participants, primarily from the PG, were as follows:

- Mark Beckner, Chief of Police, City of Boulder
- Larry Donner, Fire Chief, City of Boulder
- Joe Pelle, Sheriff, Boulder County
- Ben Pearlman, County Commissioner, Boulder County
- Will Toor, County Commissioner, Boulder County
- Frank Bruno, Boulder City Manager
- Kevin Burke, Boulder Deputy City Manager
- Stephanie Grainger, Boulder Deputy City Manager
- Suzy Ageton, Deputy Mayor, City of Boulder
- Alisa Lewis, City Manager’s Office
- Paul Tabolt, Vice Chancellor, University of Colorado
- Joe Roy, Police Chief, University of Colorado

In addition to the above, a Monitoring Team (MT) was established to provide the PG information on the flash flood threat. This team consisted of the following persons:

- Jerry Tate, Office of Emergency Management
- Merrie Harper, Office of Emergency Management
- Linda Stafford, Office of Emergency Management
- Robert Harberg, City of Boulder Public Works
- Eric Lessard, City of Boulder Public Works
- Jeff Arthur, City of Boulder Public Works
- Cristina Martinez, City of Boulder Public Works
- Douglas Sullivan, City of Boulder Public Works
- Dave Webster, Boulder County Department of Transportation
- Ilse Gayl, President/CEO, OneRain Corporation
- Marci Linton, Boulder County Emergency Services
- Dave Booton, Boulder County Emergency Services

In addition to the participants, there were approximately 50 people observing the exercise. The majority of these were members of the MACS Group and city/county officials.

The exercise began with Kevin Stewart showing a film produced in 2006 by the Weather Channel illustrating the flash flood threat Boulder Creek poses to Boulder. Mr. Stewart also gave an orientation on the flood monitoring systems in place in Boulder County. This included information on the rainfall and stream level gauges that provide data for monitoring the potential for flooding.

After the one-hour orientation that included the film, the PG remained in the training room and the MT moved into the Emergency Operations Center (EOC). The exercise was designed to simulate the MT relaying flood threat information to the PG via telephone, which is believed to be a likely scenario, especially on a weekend or holiday. The MT obtained information from update messages, known as “injects” that had been prepared by lead instructor Kevin Stewart. The MT would then telephone the PG members who were assembled around a table and participating by using a speaker telephone. The scenario timeline was as follows:

It is Saturday, May 26th (Memorial Day Weekend) and the recent heat wave combined with the above average snow pack has Boulder Creek rising to near bank full conditions. Low-level moisture present in the area over the last couple days has caused isolated thunderstorms. Today, factors point to the chance for more widespread thunderstorm development.

1. **0530** NWS issues Hazardous Weather Outlook highlighting swollen streams and the chance for heavy rainfall during the afternoon and evening hours
1045 NWS issues Hazardous Weather Outlook updating the threat of heavy rain combining with snowmelt to create the potential for flash flooding.
1100 UDFCD/PMS issues Heavy Precipitation Outlook discussing high snowmelt runoff and the potential for afternoon/evening thunderstorms
- **TABLETOP PLAY BEGINS** -----
2. **1145** NWS issues Flash Flood Watch for entire Front Range effective from 1400 to 2400
UDFCD/PMS issues Message B (Flash Flood Watch)
1230 UDFCD/PMS issues QPF (Quantitative Precipitation Forecast)
3. **1700** UDFCD/PMS issues Message B Update, clear sky and warm in BoCo
4. **1945** NWS issues Short Term Forecast stating that a few thunderstorms have begun to develop between Conifer and Georgetown (0.5”/30-min rains possible)
1950 UDFCD/PMS issues StormTrack and Message B Update
5. **2040** NWS issues Short Term Forecast stating thunderstorms are drifting north and are intensifying (1.0”/45-min rains possible), heaviest rain anticipated between Hwy 287 and I-70 in JeffCo, expected to move into BoCo by 2100
6. **2055** UDFCD/PMS issues StormTrack and Message B Update

7. **2105** NWS issues **Flash Flood Warning for Central Boulder, Eastern Gilpin and Northern Jefferson Counties effective from now until 0100 Sunday. Rainfall rates of 1.5”/hour observed in Northern JeffCo and drifting slowly north.**
UDFCD/PMS issues Message C (Flash Flood Warning)
8. **2145** UDFCD/PMS Message C Update
2200 NWS issues Flash Flood Statement. Radar estimates of 2.5” in last 2 hours over Northern Jeffco and Southern Boulder County. Storms weakening but still have potential to drop another 1.0” to 1.5” before dissipating

NOTE: Numbers on the left represent the inject message folders used by the exercise controller. Some inject message folders contain supplemental field messages not listed above.

Achievement of Exercise Goals:

Primary Goals

The primary goals of the PG Tabletop Exercise were as follows:

- For Policy Group members, technical specialists and the OEM Staff to obtain a greater understanding of the resources and tools available to monitor the flood threat.
- Development of a common situational awareness among Policy Group Members relating to an understanding of the flood threat and when action is required to protect the public.
- Test the communications between the Policy Group Members, OEM staff and technical specialists to ensure that the threat is being accurately described and understood.

The exercise did provide PG members, technical specialists and the OEM staff with a better understanding of the resources and tools available to monitor the flood threat. For some persons this was a “refresher” session, for others it was new information. It is critically important to enhance public safety by fully maximizing the monitoring tools the city and county have in place. Over the past year there has been a great amount of personnel transition in both OEM and City Public Works, and there was concern that significant gaps existed in the present understanding of the flood warning systems in place. This exercise helped to reduce those gaps.

The exercise also served to develop a common situational awareness among PG Members relating to the flash flood threat. Almost all of the key city and county officials were

present as well as a strong representation from the University of Colorado. All participants demonstrated a keen interest in the information provided and enthusiastically participated in the simulation. The exercise also helped clarify the city's chain of command and roles in the decision making process. However, some PG members felt that the time showing the film could have been better spent since most were aware of the threat and had seen the film previously.

The exercise did test the communications between the PG and the MT. All information had to be relayed by telephone and the PG could only speak to one member of the MT at a time. The communications were good, however, it was generally understood in a real life scenario that the PG members would likely not be together exchanging information between each other and the MT. The City Manager's Office stated that the use of the telephone to relay injects was realistic and generated conversation among PG members that proved valuable for learning. However, even though communications seemed good during the exercise, some PG members felt that there was a greater need for confirmation of decisions from the EOC and that appropriate action was being taken to protect the public.

Secondary Goals

The secondary goals of the exercise were as follows:

- Test the warning sirens.
- Test the paging system.
- Utilize the mode system.

The secondary goals of the exercise were met and resulted in the discovery of gaps that need to be corrected. During the exercise the PG determined the flash flood threat for Eldorado Springs was great and decided the warning sirens should be sounded; however, they did not want the sirens sounded in Boulder at that point. The PG learned there is no mechanism to trigger only the Eldorado Springs siren because all sirens are sounded at once. At that point the decision was made to sound the sirens in all locations.

The test of the paging system also revealed gaps that need to be corrected. The paging system worked; however, the delay between the message being ordered and the recipient receiving it was so great that it will be a problem when timely notifications are critical. For example, during the exercise the MT would tell the Boulder Communications Center to send out a page that Mode 3 had been initiated. Some recipients had not yet received the earlier page advising that Mode 2 was in place, and it would take even more time for the Mode 3 message to be received. The delay was due to the paging system becoming overwhelmed by multiple pages, due to the increasing complexity of notification groups that has occurred over the last few years, both in the "flood major" and "EOC notification" groups. These groups have become more complex than is advisable for the paging system to work effectively. In addition, the MT was unaware that the EOC

notification group was included in the flood major group, which resulted in duplicate pages being sent out for each mode where only one was necessary.

The mode system was also exercised. During the exercise Mode 1 was activated during inject #2 (above). Mode 2 was activated when the MT received the #4 injects. Mode 3 was activated at inject #7 when a flash flood warning was issued for Boulder County. The timing of making the Mode level decisions seemed appropriate, however, the notifications proved to be a problem as a result of the paging system delays.

The “Hot Wash”

The tabletop exercise concluded at approximately 11:20 a.m. after the PG had sounded the warning sirens. At that point both groups were brought back into the main room where a “hot wash” was accomplished. Kevin Stewart and Eric Nilsson moderated this session. A discussion followed regarding the gaps mentioned above (paging, warning sirens) and significant comments were made which were as follows:

- “PG members were anticipating the outcome and some decisions were being made that I do not believe would happen in a real scenario.”
- “Information from the hydrologists was not very different than received by OEM and their information was not valuable until when in mode 3 evacuations were recommended.” (Note: a simulation of the rain/stream gauge monitoring was not a part of the exercise. It would have been helpful if this had of been built into the exercise and would have added to the scenario and given the hydrologists a more meaningful role.)
- One PG member stated that information should be put into a more commonly understood and simplified terminology to communicate the severity of the threat.
- Another PG member stated that it might be helpful to create preset hydrology benchmarks and locations for the PG so decisions could be made more quickly.

Subsequent to the training session additional input was received from PG members regarding the “hot wash”. Several members felt that the “hot wash” would have been more productive if it had been a two-way exchange of information rather than simply have a conveyance of observations by the outside consultants.

The training session ended at approximately 11:45 a.m. Generally, most PG members and others concluded the exercise had been meaningful and expanded their knowledge of the technology and resources available to monitor the threat. The exercise also emphasized the need to make timely decisions for sounding warning sirens and recommending or ordering evacuations.

Corrective Action Needed

The warning siren activation control system needs to be adjusted to allow for separate activation of the sirens in Boulder and Eldorado Springs. Boulder Creek could be a flood threat while South Boulder Creek may not be, or it could be the opposite. The Boulder County Sheriff's Communications Technical Services Section is presently working with the vendor, AV-TECH, and Boulder OEM to rectify this problem. This should be corrected by June 1, 2007.

The paging system needs to be modified to enable timely notifications. The Boulder County Sheriff's Office Communications Technical Services Section is evaluating this system to find ways to correct the problem. BCSO Technical Services has advised the OEM staff to carefully evaluate and identify the people who need to be notified in an EOC activation. These two sections will work together toward notification solutions.

The City Manager's Office subsequently stated that they would like to have a matrix to indicate stream levels at different locations that illustrate average stream levels versus flood stage. The City of Boulder Utilities has been asked to develop such a tool.

Some of the PG members felt that the role Kevin Stewart played during the exercise was not clear. At times he would be an observer and at other times a consultant. Furthermore, the PG members did not feel that they were getting enough information on the flood threat to help formulate a decision. This problem was recognized during the exercise and could have been lessened had a rainfall/stream gauge simulation been built into the monitoring systems. Future exercises of this nature should have a simulation prepared so the technical specialists (hydrologists) can read and evaluate rain and stream gauge data and then forward it to the decisions makers. This will make the exercise more realistic and give the hydrologists a more integral role.

The decision to have non-participants in the room (MACS members and other governmental officials) should be reviewed. Their conversations proved distracting to the PG members and in some instances they could be heard second-guessing the decisions being made.

Overview of May 7 Exercise

On May 7, 2007, the Colorado Department of Emergency Management (CDEM) provided assistance to the Boulder MACS Group on the utilization of WEB EOC. Mr. Kerry Kimble, CDEM, could only provide Boulder with 25 user access permits for the exercise because CDEM owns a license to the product and maintains the server. Access to the system was made through the Internet. At Boulder OEM's request, Mr.

Kimble set up a “Controller” position for the purpose of directing message traffic to the appropriate Emergency Support Function (ESF).

For this exercise Boulder County Emergency Services and the OEM had prepared approximately 60 message injects relating to a flash flood on Boulder Creek. The injects would be input into WEB EOC by the Controller, ESF 5, and then routed to the appropriate ESF to handle the task. The system was designed so that in the event of a large-scale disaster BCSO Communications and Boulder Police Communications would handle all emergency calls as they normally would, and other requests for assistance related to the disaster would be routed into the EOC through the controller.

The exercise began at approximately 8:30 a.m. with MACS Group members arriving with their laptop computers. City and County IT personnel provided assistance with connections and gaining access into WEB EOC. At 9:00 a.m., Mr. Kimble provided a brief overview of WEB EOC and then the simulation began. The controller began using the system as instructed by Mr. Kimble to input the prepared injects and then sent them to the appropriate ESFs. At this point a number of problems began to surface from many of the users and it was determined the system was not functioning as it should. The Controller was directing the task assignments to the appropriate ESF, however, it was discovered that the status board was not automatically populating as it should and many ESF’s were not receiving their messages. In some cases, all of the ESFs were receiving some of the messages. It was later determined that CDEM IT had not built the technical authorization and login specifications into the system to enable the Controller to perform the required functions.

Achievement of Exercise Goals

The primary goals of the MACS Group WEB EOC Exercise were as follows:

- To train the members of the MACS Group on the capabilities and use of WEB EOC.
- To practice the handling of assigned tasks from the Controller to the ESFs.
- To determine if the use of the Colorado Department of Emergency Management’s WEB EOC via the internet is a viable method.
- To gain input from the MACS Group on the use of WEB EOC and to evaluate the practicality of the Boulder Office of Emergency Management (OEM) acquiring their own software and licensing from the vendor.

While the exercise did provide exposure on the software to the MACS Group, the training session did not meet expectations for two reasons. First, the limitation of having only 25 users did not enable all persons at the session the opportunity to use the system. Additionally, due to the early delays in the training caused by the Controller position programming, valuable exercise time was lost identifying and correcting that glitch.

These same problems limited the practice time handling the assigned tasks between the Controller and the ESFs.

This exercise was a viable test of the use of the CDEM's WEB EOC system to manage the Boulder EOC, and proved that this is not a good approach for a number of reasons. First, Boulder OEM requested as many users as possible for the training exercise to enable all of the MACS members (approximately 45) to be active during the training. However, Boulder was limited by CDEM to 25 users. This exercise took place during a period when there was no other WEB EOC training or an emergency occurring in Colorado. If there had been a real region-wide emergency (i.e. blizzard), we would have been further limited, especially if other counties had asked to access the State's WEB EOC system to manage their EOCs. Second, Boulder was dependent on the CDEM's I.T. personnel to customize the system for our use in accordance with our emergency plan. This caused a problem when the Controller position was not programmed properly. Third, the use of the CDEM's system requires Internet connectivity for every user. Should the Internet go down during an emergency, the Boulder EOC would not be able to use the system. Finally, Boulder OEM relied on the CDEM to provide training on WEB EOC. CDEM has not received and does not intend to pursue formal training for WEB EOC at this time. The May 7, 2007 exercise illustrated the need for a proper training curriculum.

Despite the problems encountered during the training session, the majority of the MACS group agreed this system would be a valuable tool and is needed for Boulder. The problem was not the system itself, but the constraints related to using the State's system, and relying on the CDEM to provide training and customize EOC positions for our needs.

Even though it was not a pre-exercise goal, one other issue that surfaced during the training related to the use of the Controller assigning tasks directly to the ESFs. It was determined that a better method would be to have the controller assign the tasks to the Section Chiefs and then have the Section Chiefs send them to the appropriate ESFs. This would give the Section Chiefs more control of the tasks.

Corrective Action Needed

There is a great need to automate the Boulder EOC. The use of modern EOC management software will not only add "composure" to the EOC, it will provide a methodical manner of tracking tasks. Furthermore, it will simultaneously generate a complete record that will prove very valuable in after action reviews of an incident. It is recommended that the Boulder EOC be outfitted with WEB EOC and that the vendor, Emergency Services Integrators, provide the training.