



OPERATING EXPERIENCE SUMMARY



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Operating Experience from Cerro Grande and Las Conchas Fires Improves Los Alamos National Laboratory Emergency Preparedness and Response to Wildfire Events

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The following article provides a summary of the lessons learned and key actions from Los Alamos National Laboratory (LANL) as a result of the 2011 Las Conchas Fire in New Mexico. The Las Conchas Fire consumed more than 156,593 acres in just over a month, including a 1-acre spot fire on LANL property. LANL's lessons learned from the Cerro Grande Fire in 2000 were proven to be beneficial during the 2011 Las Conchas Fire.

After reading the article, we encourage you to visit the Operating Experience Summary Blog at <http://oesummary.wordpress.com> and rate the article in terms of value to you and provide a comment on the article and/or identify topics that would be of interest to you for future articles.

We also encourage readers to submit articles of their own for sharing in the Operating Experience Summary. Please let us know if you have something to share. Thank you!

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Lessons Learned

The 2011 Las Conchas Fire reaffirmed the principle that, in order to be effective, emergency management should be regarded as an ongoing activity, not one that occurs only in reaction to an initiating event. Los Alamos National Laboratory (LANL) has now experienced two significant wildfire events in the past 11 years. Key lessons learned added to the LANL wildfire knowledge base as a result of the Laboratory closure due to the nearby Las Conchas Fire include the following.

- There is immense value to capturing operating experience. Improvements related to the lessons learned from the Cerro Grande Fire in 2000 were proven to be beneficial during the 2011 Las Conchas Fire.
- For large wildfire-related emergency closures, effective teams are required to support emergency operations (EO), multi-media communications, computing and communications infrastructure, environmental monitoring and data analysis, and facility and site recovery.
- Employees and the public rely on multiple sources, including social media, to keep themselves informed, but no single method will reach all employees or all audiences.

Synopsis

The Las Conchas wildland fire began on June 26, 2011, at approximately 1300, in the Jemez Mountains about 13 miles from LANL property. The fire consumed more than 156,593 acres before it was declared contained on August 1, 2011. It was the largest fire in New Mexico history, nearly three times the size of the Cerro Grande Fire of May 2000. Post-Las Conchas Fire reviews revealed that preparations and actions taken as a result of the Cerro Grande Fire proved beneficial to firefighting efforts in protecting the Laboratory during the Las Conchas Fire. With the exception of a 1-acre spot fire in Technical Area 49 (TA-49), when the Las Conchas Fire crossed over into LANL property on June 27, no fire activity occurred on LANL property, and no structures or facilities were damaged on LANL property due to the Las Conchas Fire. However, outside Laboratory property, the combination of high temperatures, low humidity, high winds, and other factors created explosive conditions that thwarted firefighting efforts.

On June 26, 2011, at the time of ignition, the fire was about 13 miles away from LANL property. Figure 1-1 shows the fire burning on the horizon just above the site. Despite efforts by county and Federal fire response personnel, the fire progressed to a point where LANL EO personnel declared the fire as a non-emergency significant event (at 1541). At 1700, with the fire still progressing, the Laboratory elected to activate the Emergency Operations Center (EOC) (Figure 1-2) and to categorize the wildland fire as a Department of Energy (DOE) Occurrence Reporting Processing System (ORPS) reportable occurrence.

On the evening of June 26, Laboratory and Los Alamos Site Office (LASO) management had elected to close the Laboratory for normal operations until the hazards of the fire were mitigated. Into the next morning of June 27, the fire progressed rapidly from about 4,000 acres to nearly 45,000 acres. In the early afternoon of June 27, the fire briefly crossed over the established fire lines onto LANL property along the main southern boundary at TA-49. Steadily increasing winds also caused the fire to cross established fire lines to the north, and

thus posed a threat to the Los Alamos town site similar to that experienced during the Cerro Grande Fire. Los Alamos County officials ordered a mandatory evacuation of the Los Alamos town site at 1334, which stayed in effect until July 3. The Laboratory declared an end to its state of emergency on July 1, which allowed resources previously assigned to LANL to be relocated to assist ongoing firefighting efforts nearby.

On July 1, 2011, the Laboratory prepared the Las Conchas Wildfire Recovery Plan, and recovery efforts commenced after the plan was approved by the Laboratory director. The Laboratory was re-opened to employees on July 6, 2011, and continued operating under its post-fire-danger recovery plan. Recovery operations were declared complete on July 15, 2011. In reviewing firefighting efforts after the fire was contained, Laboratory officials said that the 1-acre spot fire at TA-49 burned over an area that had been previously mitigated for fire protection purposes (i.e., clearing and thinning of brush as depicted in Figure 1-3), which helped keep the fire low to the ground and aided firefighters in containing the fire.



Figure 1-1. Las Conchas Fire burning on the horizon above LANL



Figure 1-2. Emergency Operations Center at LANL



Figure 1-3. Example of new fire breaks in LANL canyons

Overall, the LANL improvements implemented as a result of lessons learned from the Cerro Grande Fire in 2000 helped to reduce the impact from the Las Conchas Fire. These improvements included: (1) clearing and thinning activities and fire road maintenance, which reduced the fuel load on LANL property and enabled back-up burning to be effectively used to protect LANL; (2) using a single EOC for LANL and Los Alamos County, which improved information flow and reduced the time required to make decisions between the two entities; and (3) pre-planning performed by the Interagency Wildfire Management Team (LANL, Federal, state, and local agency representatives), which proved useful in responding to fire behavior as the Las Conchas Fire progressed. Laboratory management took key actions following entry into the

recovery mode to ensure the safety of facilities and infrastructure for resuming normal operations and re-occupancy of facilities by LANL employees. Laboratory and LASO management continue to identify and evaluate areas for improvement for emergency events, such as emergency contact information and lists; access to media distribution lists; reliability, availability, and performance improvements for essential data/communication systems to the EOC; modes for communicating with employees, including students; situation-specific access control at the site boundary to LANL and the EOC; integration of Emergency Public Information (EPI) activities with EOC activities and infrastructure; and a pre-established list of the most vulnerable environmental resources. A timeline of the events is depicted in the textbox on the following page.

Cause

An interagency investigative team led by New Mexico State Forestry personnel determined that the Las Conchas Fire was caused by a fallen aspen tree that caught fire after contacting nearby power lines. The tree was located external to LANL property, about 13 miles away. The investigators believed the fire started after the aspen tree was blown down onto nearby power lines during a period of sustained and strong winds. The contact resulted in the line arcing, causing the tree to catch on fire. Heat and flames caused the line to snap, allowing the burning tree to fall onto the ground where the fire spread to nearby vegetation. The fire started external to LANL property and did not result from LANL operations. Therefore, investigators concluded that the ORPS causal factor that best described this scenario is (A7B1C03) External Phenomena, External Fire, or Explosion. With the exception of the 1-acre fire in TA-49, no fire activity occurred and no structures or facilities were damaged on LANL property due to the fire.



TIMELINE OF EVENTS

JUNE 26, 2011: The Las Conchas wildland fire began in the Jemez Mountains at approximately 1300. LANL EO personnel declared the fire as a non-emergency significant event at 1541. Wildland fire is categorized as a DOE ORPS reportable occurrence (Significance Category 4). The Laboratory elected to activate the EOC at 1700. Later that evening, Laboratory and LASO management elected to close the Laboratory for normal operations on June 27, 2011.

JUNE 27, 2011: Laboratory was closed for normal operations. In the early afternoon, the fire crossed over the established fire lines onto LANL property along the main southern boundary of the Laboratory at TA-49. The Laboratory declared an Operational Emergency, Health and Safety Event. LANL EO, LANL, and DOE-NNSA LASO management made all appropriate notifications to Federal and State officials. Assurances were made by the Laboratory Director through daily news reports televised by major television stations that all radioactive and hazardous materials were appropriately accounted for and protected. At 1334, Los Alamos County officials ordered a mandatory evacuation of the Los Alamos town site. The White Rock town site remained under a voluntary evacuation. Significant new developments continued to be provided in real time via LANL and LASO emergency response channels. (At this point, the fire had consumed approximately 50,000 total acres, nearly all of which was on National Forest and Park Service land.)

JULY 1, 2011: At 1544, LANL terminated the EO phase and entered the recovery mode.

JULY 3, 2011: At 0800, the Los Alamos County lifted the evacuation order for the Los Alamos town site and the precautionary evacuation for the White Rock town site, and re-population activities began. The Laboratory had fully accounted for and protected all radioactive and hazardous materials.

JULY 4, 2011: Phase I of recovery mode concluded. Phase I activities included walkdowns of all LANL facilities by facility operations directors (FOD) and the resumption of information technologies systems.

JULY 6, 2011: LANL resumed normal operations. (LANL was closed for normal operations due to the Operational Emergency and Phase I and II of Recovery Mode from June 27 through July 5, 2011, for a total of 9 days [6 business days].) Particulate matter air sampling for Los Alamos was conducted from June 30 through July 7, 2011.

JULY 15, 2011: The LANL fire recovery manager formally declared that LANL had completed all facilities and operations recovery activities and that programmatic research and development activities had returned to normal.

Analysis

Multiple teams performed lessons learned analyses following the Las Conchas Fire. These teams included the LANL senior leadership team; Los Alamos County officials; LANL Emergency Operations Division; LASO; LANL Las Conchas Recovery Team; LANL Communications and Government Affairs Office; LANL Information Technology Division; LANL Environment, Safety, Health and Quality Division; LANL Student Programs Office; and an interagency fire investigation team. The analysis results included the following.

- Improvements implemented as a result of lessons learned from the Cerro Grande Fire of 2000 were proven to help reduce the impact of the Las Conchas Fire. Using a single EOC for the Laboratory and Los Alamos County improved information flow and reduced the time required to make decisions, even though it complicated some Los Alamos County operations, including county IT systems not designed for remote access. The pre-planning performed by the Interagency Wildfire Management Team (Laboratory, Federal, state, and local agency representatives) proved useful in responding to fire behavior as the Las Conchas incident progressed.



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- Teamwork was essential to successful management of the emergency, the closure, and the recovery. For example, teams dedicated to EO, communications, computing and communications infrastructure, environmental monitoring and data analysis, and facility and site recovery were all found to be essential. That is, LANL found that organizing the work to include these types of teams, ones not commonly thought of in these situations, to be a very effective work management approach. The approach ensured the maintenance and monitoring of communications equipment that the site depends on for functions such as paying employees, ensuring safeguards and security systems are functioning, collecting environmental data, and addressing loss of power to cooling systems.
- The potential release of above-ground waste during a fire remains a significant public concern. In addition to the pre-placed existing network of fixed air monitoring stations on the Laboratory and in the surrounding communities, the Laboratory deployed a small number of portable high-volume air sampling stations to obtain data more rapidly. Results from air samples taken at Laboratory boundaries showed no radioactive materials from Laboratory operations or legacy waste in smoke from the Las Conchas Fire. Independent validation of the results began as soon as samples were acquired; results will be posted on the internet when available.
- Advance agreement with the Regional Development Corporation in Santa Fe as an alternate Joint Information Center (JIC) location enabled the JIC to be operational within 2 hours in anticipation of the evacuation that did occur the next afternoon.
- Embedding archaeologists with fuel clearing and thinning teams helped ensure that no impact to archaeological sites or cultural resources occurred on LANL property.
- During the Lab closure, most LANL employees relied upon televised press conferences as their primary source of information. Social media such as Twitter and Flickr® were used by about 30 percent of employees. The Lab's Twitter following increased by about 50 percent during the week of the fire, and the Lab's Flickr® site experienced 31,000 views on the set of photographs related to the fire. Laboratory-issued Blackberry smartphones proved very useful for keeping key individuals up to date and synchronized. Some employees, especially those in evacuation shelters, did not have access to the internet. Not all employees had their token cards with them during the evacuation and closure, which prevented them from accessing their LANL e-mail accounts and internal web pages. Multiple communication avenues were required due to this situation, including television, printed news bulletins, and public ways of communication. A LANL Closure Q&A Blog was established mid-week of the fire to answer employee questions on a variety of issues; after the fire, that evolved into a Closure and Recovery Blog used by the Recovery Team to keep employees informed and to engage employees in sharing personal lessons learned.
- LANL collaborated with Transparent Sky, LLC, to provide interactive imagery of the extent of the Las Conchas Fire on a public website. The effort helped ease public concerns by demonstrating that the fire was not near LANL nuclear or waste management facilities. Los Alamos residents could also use the site to verify the fire's location relative to their homes. The equipment used for this collection was based on the Angel Fire system developed by LANL, in conjunction with the Air Force Research Laboratory, for the Department of Defense to aid soldiers on the battlefield.
- After the Laboratory re-opened, air quality monitoring results were updated every 30 minutes and made available to employees through the Laboratory's home page. Along

with the particulate levels, managers and employees were kept informed of associated health risks and recommended precautionary measures.

- A formally chartered recovery team, formally approved recovery plan, and approved checklists for facility pre-entry requirements, facility re-entry pre-job briefs, and facility walkdowns aided the transition from EO to operational recovery.

Actions

Some of the key actions that were taken by LANL after the Laboratory entered recovery mode included the following.

- Briefed managers, employees, and subcontractors on what to expect and how LANL would return to normal operations. This was accomplished by briefing managers and then cascading the information from management through the rest of the Laboratory.
- Continued to monitor air quality across the site and made results available to the public and to employees.
- Completed high-priority flood and erosion control work in anticipation of flash flooding that might be caused by damage to canyons and drainages from the Las Conchas Fire. For example, 600 feet of water diversion barriers were installed and more than 1,200 cubic yards of sediment were removed to minimize the transport of any contaminants off Laboratory property during a flash flood. These efforts complement the flood control structures such as weirs (which help prevent sediment from moving down-canyon), earth berms, rock dams, and wetlands established following the Cerro Grande Fire (Figures 1-4 and 1-5).



Figure 1-4. Heavy equipment scoops sediment from Los Alamos canyon



Figure 1-5. Heavy equipment working near a weir



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- Verified that key storm water gauges were operational and suffered no damage in the fire. These gauges support Santa Fe's public water utility and connect wirelessly to the utility's control room, allowing operators to stop diverting Rio Grande water if they choose. The gauges also take water samples at pre-set intervals during a flood. Crews installed sampling gauges on the Laboratory's western boundary to compare run-on water with run-off water and collected samples from fish at a nearby reservoir. Sampling is being coordinated with the New Mexico Environment Department (NMED) and other agencies, and all results will be made public.
- Evaluated 90-day storage areas to identify any areas of concern.
- Worked with NMED and the U.S. Environmental Protection Agency to adjust timelines affected by the closure and recovery for Resource Conservation and Recovery Act permit modifications, Transuranic waste facility permits, hazardous waste inspections, and National Pollutant Discharge Elimination System sampling.
- Provided Air and Toxic Waste Inventory submissions online during the closure.
- Conducted Material Control and Accountability (MC&A) inventories and verified that Special Nuclear Material was accounted for and protected.
- Extended training expiration dates by 90 days. Extended authority expiration dates to the end of the current month.

Some areas are still being evaluated by LANL and LASO for improvement potential. These include:

- On-call lists, emergency contact information, organizational phone trees;

- EOC room and network configurations, especially for Los Alamos County and LASO functions;
- Pre-established emergency communications website(s);
- Pre-established list of the most vulnerable environmental resources;
- Better access to media distribution lists;
- Pre-established recovery team membership and recovery planning resources;
- Reliability and performance improvements for essential data/communications systems;
- Interface with the NM State EOC;
- Accuracy of Geographical Information System (GIS) data available to the EOC;
- Communication with employees who do not have access to the Laboratory intranet;
- Liaison with officials and agencies that are not formally a part of EOC activities;
- Integration of EPI activities with EOC activities and infrastructure;
- Situation-specific access control to the LANL site and the EOC;
- Student mentor responsibilities for communications with students during emergencies; and
- Keeping EOC personnel training up-to-date across reorganizations and other position or role changes.

KEYWORDS: Cerro Grande, emergency management, EOC, Emergency Operations Center, Las Conchas, recovery plan, wildfire



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