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Title: Material Control and Accountability (MC&A) Recovery from the Cerro Grande Fire at Los Alamos National Laboratory

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Material Control and Accountability (MC&A) Recovery from the Cerro Grande Fire at Los Alamos National Laboratory

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Abstract

During the week of May 10-14, 2000, the Cerro Grande Fire scorched over 40,000 acres of prime forestland and destroyed over 400 homes in the Los Alamos community and several structures at the Los Alamos National Laboratory (LANL). Of the land affected by the fire, nearly one quarter of it was Laboratory property. All of LANL's 64 material balance areas (MBAs) were affected to some degree, but one Category I technical area and several Category III and IV areas sustained heavy damage. When the MC&A personnel were allowed to return to work on May 23, they addressed the following problems: How do we assure both ourselves and the Department of Energy (DOE) that no nuclear materials had been compromised? How do we assist the nuclear material (NM) custodians and their operating groups so that they can resume normal MC&A operations? Immediately after the return to work, the Laboratory issued emergency MC&A assurance actions for Category I through Category IV facilities. We conducted special inventories, area walk-throughs, and other forms of evaluation so that within a month after the fire, we were able to release the last MBA to resume work and assure that all nuclear material had been accounted for.

This paper discusses the measures LANL adopted to ensure that none of its nuclear material had been compromised.

Introduction

On May 7, 2000, with a wind-whipped prescribed burn out of control, LANL announced an emergency closure and did not resume normal operations until May 22. During those two weeks, particularly May 10-14, the prescribed burn came to be known as the Cerro Grande Fire -- New Mexico's worst forest fire. The Cerro Grande Fire struck both the Los Alamos community and the Los Alamos National Laboratory (LANL), scorching over 40,000 acres of prime forestland and destroying over 400 homes in Los Alamos. Of the land affected by the fire, nearly one quarter of it was Laboratory property. The fire resulted in the total evacuation of both Los Alamos and nearby White Rock, as well as western Espanola, displacing over 20,000 people and disrupting the lives of many more.

The fire caused over $300 million in damage to Laboratory property: 39 structures, mostly storage buildings and trailers that served as offices; miles of power and communication lines that covered the Laboratory; hundreds of desktop computers; and experiment results that were either lost or significantly set back.

All of LANL's 64 MBAs were affected to some degree by the fire and its aftermath. In particular, one Category I technical area and several Category III and IV areas sustained heavy damage. The fire burned seriously close to the Plutonium Facility at TA-55 and its support buildings, as well as heavily damaged the land near the Critical Assembly Facility at TA-18, where it burned up to one of the major buildings (CASA1). At several times during the fire, the security forces were forced to pull back due to safety concerns from many of the protected areas (PAs) and MBAs. Another area that was hit hard by the fire was the S-Site technical areas. In one Category III and IV area, the fire burned up to the storage buildings where the nuclear materials were kept. However, through the brave work of the firefighters and other emergency personnel, no NM storage facilities were destroyed. However, when Laboratory personnel were permitted to return to work on May 23, no one knew the status of the nuclear materials held at LANL and several questions needed to be addressed by the MC&A personnel before normal MC&A operations could be permitted to resume.

The first MC&A question that we had to ask: How do we assure both ourselves and the DOE that no nuclear materials had been compromised? LANL was able to answer this question by performing several steps. The Security Division (S-DO) managers met prior to the reopening of the Laboratory and, in an agreement with DOE/AL, they drafted The Cerro Grande Prescribed Fire: LANL Nuclear Safeguards Assurance Actions (May 19, 2000), which basically laid out the status of the different security attributes that existed during the fire and the resumption requirements. This document included the proposed MC&A requirements. As soon as employees were permitted back to the Laboratory, the following notice was issued by LANL Security Division:

> "Post-Emergency MC&A Assurance Actions-- Despite the enormous challenges posed by the Cerro Grande Fire -- which swept through Los Alamos County, including major portions of LANL -- the Pro Force, under EOC direction, was able to maintain control over the site throughout the emergency. Special attention was given to protecting Category I SNM. For the three Category I SNM facilities, all building boundary and interior alarm records that could not be assessed in real-time for a short period on May 11 were rigorously analyzed immediately thereafter and revealed no alarms, no alarm tampering, and no loss of alarm system power. LANL and DOE are now aggressively and systematically restoring normal operations in a safe and secure manner, consistent with post-emergency constraints. To this end, the following MC&A assurance actions were jointly developed/communicated by cognizant LANL and DOE/AL management.
>
> Cerro Grande Fire Recovery
> All Category III-IV Facilities:
> "Cognizant NM custodians will walk down their MBAs to check for gross anomalies, including evidence of tampering, and immediately report any concerns to S-4. Walk-downs must be completed and any concerns appropriately disposition before commencing normal NM operations.

Cerro Grande Fire Recovery
"ACTIONS: All Category I SNM Facilities (CMR, TA-18, and TA-55):
"Cognizant NM custodians will walk down their MBAs to check for gross anomalies, including evidence of tampering, and immediately report any concerns to S-4. Walk-downs must be completed and any concerns appropriately disposition before commencing normal NM operations. Also, barring emergency-related delays, all three Category I SNM facilities will plan to conduct their normal June semiannual physical inventory, which will provide further positive assurance on the integrity of their SNM holdings. In addition to these actions, and specific to the TA-55/PF-4 process floor, NMT and S-4 will jointly coordinate a tag inventory of SNM items (≥200-g SNM), which will be conducted by cognizant NM custodians and observed by DOE/AL, before commencing normal NM operations."

Implementation

Immediately after the return to work, the Laboratory issued the emergency MC&A assurance actions stated above for Category I through Category IV facilities. Employees were permitted to return to work on May 23, 2000, and the physical inventory officer (PIO) administratively locked all of the MBAs. This action stopped any movement of nuclear materials within and between MBAs on the Material Accountability Safeguard System (MASS) until their custodians could perform the required actions. In addition, the DOE Albuquerque Area Office (DOE/AL) contacted the Material Control and Accountability Group (S-4) to offer their assistance in the resumption of operations within LANL's nuclear material organizations.

The following outcomes resulted from the assurance actions:

- Both Category I facilities at TA-18 and at the CMR Building reported the status of their MBAs during fire to the PIO, indicating that none of the storage repositories were violated, no gross anomalies were detected or any evidence of tampering had occurred. Investigations showed that the material in these areas was never at risk. The NM custodians at the two facilities documented their completed results to the PIO. Both areas had reported to the PIO by May 23 and May 24, 2000.

- The Nuclear Material Technology (NMT) Division reported that the TA-55 storage vault had not been compromised, indicating that at no time was the vault accessed without the knowledge and observation of both NMT and LANL security. The results of the investigation was reported to the PIO on May 24. It was then determined by both S-4 and DOE/AL that, based on the results of the investigation and the high exposure to operators, a 100% inventory of the vault would not be needed.

- Because there had been material in process on Friday, May 4, 2000, the last work day before the fire, NMT Division, S-4, and DOE/AL decided on May 23 that a 100% tag physical inventory of SNM items greater than 200 grams within the processing MBAs should be performed, so this inventory was scheduled for May 25. The inventory would be conducted by each MBA NM custodian and alternate, with oversight from both S-4 and DOE/AL. Other

criteria specified that material of attractiveness levels B, C, and D would be inventoried and that no measurements would be performed. If any measurement concerns were detected, then that item would be placed on measurement hold.

- All NM custodians and their group management were informed by May 24 that their MBAs were locked down and would remained locked until they had formally documented the results of their inventories or inspections.

- Of the ~35 NM custodians and alternates, five had lost their homes or had experienced some personal loss from the fire. The majority of these individuals were Category IV MBA custodians and, because of their situations, it would have made it difficult for them to perform their duties as MBA custodians. S-4 immediately offered its assistance to these custodians and their operating groups so that they could assure their organizations of the quick resumption of normal MC&A operations within their MBAs.

Results of the Entire MBA Recovery Plan

With the assistance of all LANL organizations and DOE, all of the Category I MBAs were released to resume MC&A operations by May 30, 2000. The last Category IV MBA was unlocked by June 30, 2000, to resume their MC&A operations. Other outcomes of the recovery plan included the following:

- Within the Category I and II storage MBAs, the alarms and other security attributes were shown to assure that the locations were never accessed during the fire.

- The 100% special tag physical inventory of the processing MBAs at TA-55 was successfully completed with no analomies detected and all nuclear material was accounted for. A total of 295 items were inventoried and no measurements were required.

- In the Category III and IV MBAs outside of material access areas, the NM custodian and individuals participating visually checked their areas and validated that the material within the MBA was present and had not been handled during the fire.

- Within six weeks after the fire, all LANL MBAs were released for normal MC&A operations, and within two weeks, TA-55 MBAs were all released on MASS.

- The scheduled June 2000 semiannual inventory of TA-18, CMR, and TA-55 Vault Storage MBAs were performed during the week of June 26-30, 2000, with no analomies detected. These inventories helped to validate the holdings in these areas.

- By the end of June, every MBA at LANL had been inspected or inventoried to ensure that LANL had confidence in its nuclear material inventory.

Conclusion

Within six weeks after the devastating fire had stopped work, LANL was able to confidently demonstrate that its nuclear material holdings were accounted for. Through the use of special nuclear material inventories or inspections, the NM custodians, their organizations, and S-DO were able to demonstrate this and help the MBAs resume normal MC&A operations.

Although it took several more months to get the Laboratory up and running to where it is today, S-4 was able to respond quickly and work cooperatively with all parties in the area of MC&A. The results showed that no serious inventory observations were detected during the performance of any of the inventories, but most of all, it demonstrated that different organizations at LANL and at DOE could work together in a crisis to benefit all parties involved.