FACT SHEET: CERRO GRANDE FIRE

BACKGROUND INFORMATION

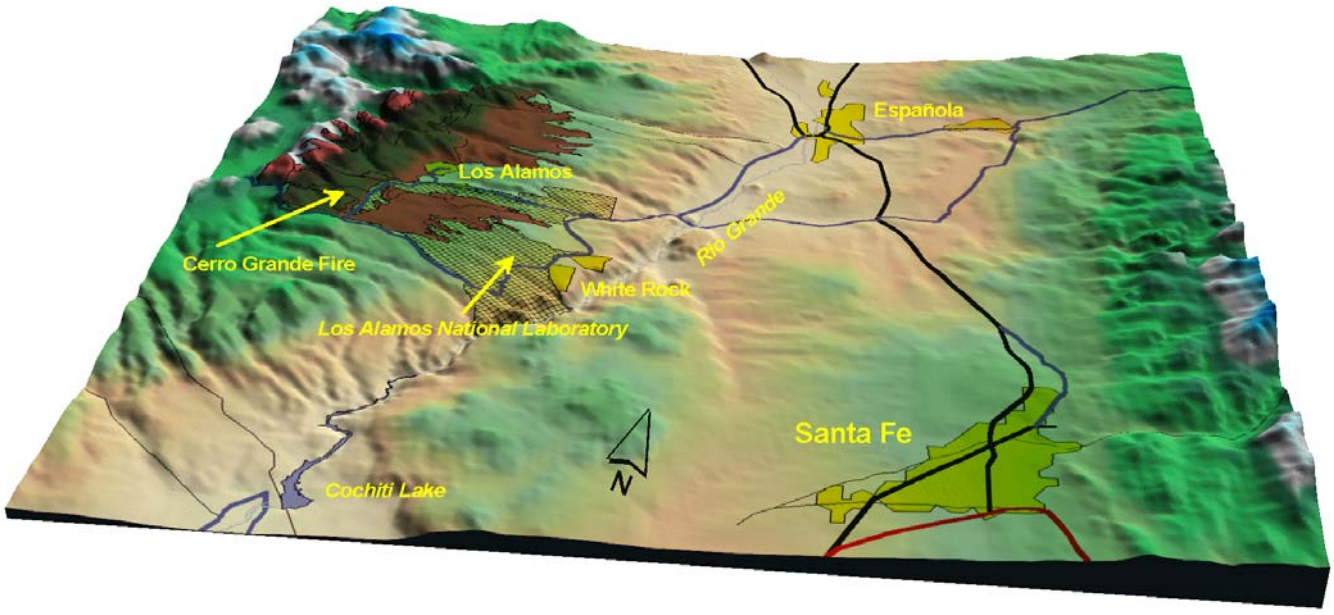
The Cerro Grande Fire burned about 45,000 acres in northern New Mexico in May 2000. The fire burned for 16 days over the Pajarito Plateau, including approximately 7500 acres of the Los Alamos National Laboratory (LANL) site. At the request of the New Mexico Environment Department (NMED), the Department of Energy provided funds for an independent study of public health risks from the fire. *Risk Assessment Corporation* (*RAC*) performed the study under contract to NMED. *RAC* estimated the potential risk to the public from chemicals and radioactive materials released from the Cerro Grande Fire burning over LANL property and from the fire itself. A team of national and international scientists led by Colorado State University provided technical peer review of the work. The NMED provided opportunities for public input throughout the 18-month study period. In addition, *RAC* held three public meetings during the project to answer questions and to talk about the study findings.

SUMMARY OF RISKS

What did we find about potential health risks to the public?

The primary health risks during the fire were associated with breathing materials released into the air. We estimated the risk of cancer from breathing any LANL-derived chemical or radioactive material that may have been carried in the smoke plume to be less than 1 chance in 10 million. Potential exposures in the surrounding communities to LANL-derived chemicals that are not carcinogenic were about 10 times lower than acceptable intakes established by the U.S. Environmental Protection Agency (EPA). The risk of cancer from breathing chemicals and radioactive materials in and on the natural vegetation that burned in the Cerro Grande Fire was greater than that from LANL-derived materials, but still less than 1 chance in 1 million. The vegetation that burned contained naturally occurring chemicals and radioactive materials and radioactive fallout produced during atmospheric tests of nuclear weapons. These materials and the risks they posed are present during any forest fire. The evidence suggests that some adverse health effects did result from breathing high concentrations of particulate matter in the smoke. Such exposures are associated with any forest fire. Deposition of LANL-derived chemicals and radioactive materials from the smoke plume to the soil was minimal.

STUDY AREA



The study area (shown above) encompassed approximately 815,000 acres (3300 km^2). We also investigated potential exposures at locations outside the study area (such as Taos). Exposures at these locations were less than the maximum exposures calculated within the study area.

RELEASES TO AIR

Releases to Air During the Fire

Why is the fire important to the release of chemicals and radioactive materials?

The fire released chemicals and radionuclides from the burning and heating of materials located in vegetation and soils across the LANL facility and the surrounding area.

What were the sources of chemicals and radioactive materials released into air during the fire?

Our primary focus was chemicals and radioactive materials from past and ongoing operations at LANL. These materials were detected in soils on LANL property. A secondary analysis examined naturally occurring radionuclides and metals and radionuclides from global atmospheric weapons tests present on all vegetation that burned during the Cerro Grande Fire.

How long did these exposures from breathing air last?

The fire started on May 4, 2000. The fire actively burned on LANL property from May 10 to May 18, and continued to smolder for a considerable time. The majority of LANL-derived materials were released into the air between May 11 and May 13, 2000.

Study Methods & Limitations

How did we estimate the release and spread of chemical and radioactive materials during the fire?

First, we studied the behavior and progression of the Cerro Grande Fire. Then we used computer models to estimate the movement of combustion products common to all wildfires in the study area. Particulates in air less than 10 micrometers in diameter (PM10) are generated by all wildfires and were measured in air during the fire. We compared the computer model-estimated concentrations of PM10 with the measured concentrations to confirm the computer model estimates and to better understand the uncertainty associated with the results. We used these modeled PM10 concentrations as the basis for estimating the release and spread of radioactive materials and chemicals from areas within LANL.

How certain are the risk estimates?

While the modeling we developed using the PM10 data is quite reliable, the estimates of the quantities of materials available for release to the air, the rate at which these materials were released to the air, and the risk associated with short-term exposure to some chemicals are less certain. Therefore, we made conservative or cautious assumptions to ensure the risks were not underestimated.

How were environmental measurements used in the study?

A large amount of air monitoring data was collected by different agencies during the Cerro Grande Fire. Unfortunately, these data were not sufficient to calculate risk in this study because they were collected for different purposes and did not cover the entire area burned. Also, there were no measurements for some chemicals and radioactive materials, and measurements were not made at all potentially important locations within the study area. As a result, we used computer models to estimate the release and dispersal in the atmosphere of the chemicals and radioactive materials. The environmental monitoring data were useful to identify data trends and to reveal that materials other than LANL-derived contaminants were probably responsible for a large fraction of the airborne contamination, as well as the potential risks to exposed people.

More Information

Where can I get more information about this project?

Contact the NMED DOE Oversight Bureau

2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, NM 87505

Telephone: (505) 827-1536

www.nmenv.state.nm.us/DOE_Oversight/RAC.htm

Information about the Cerro Grande Fire can also be found at several other websites:

- www.nmenv.state.nm.us/IFRAT
- www.lanl.gov/worldview/news/fire/
- www.nps.gov/band/fire.htm

New Mexico Environment Department

Risk Assessment Corporation

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SUMMARY OF RISKS

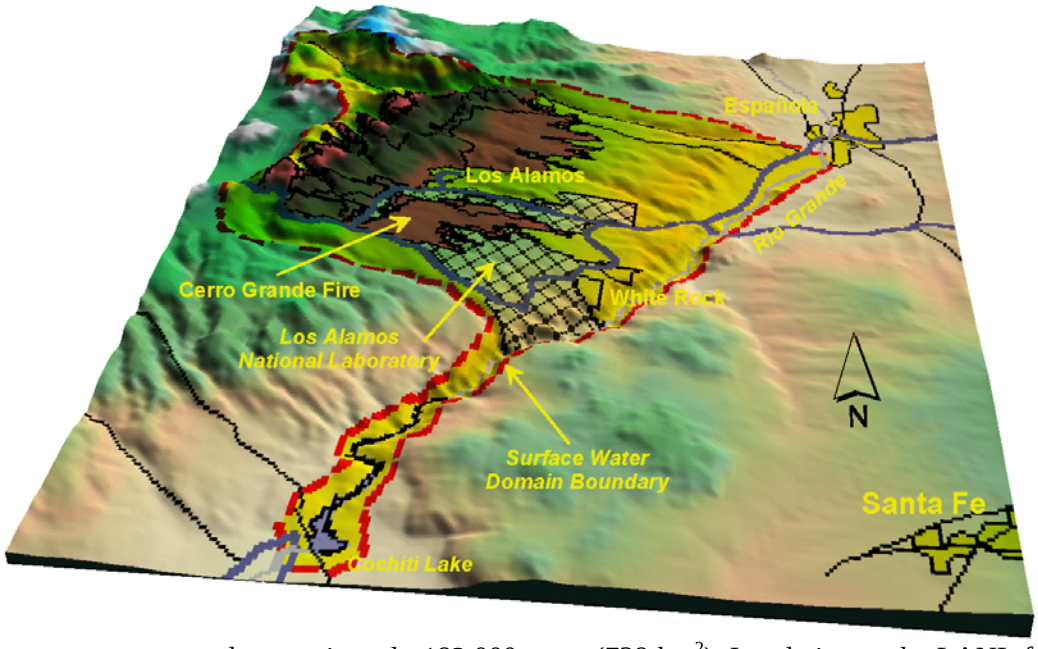
What did we find about risks to the public?

We estimated the potential annual cancer risk to be less than 3 in 1 million from exposure to any LANL-derived chemical or radioactive material that may have been carried in the surface water and sediments to the Rio Grande and Cochiti Lake. If exposure to the same concentrations of LANL-derived chemicals or radioactive materials was assumed to continue for 7 years (the time it may take to return to pre-fire vegetation conditions in the area), then the potential cancer risk was greater at about 20 in 1 million. Potential exposures to LANL-derived chemicals that are not carcinogenic were within acceptable intakes established by the U.S. Environmental Protection Agency (EPA). We evaluated the potential health risks for hypothetical people drinking water from the Rio Grande or Cochiti Lake, contacting sediments near the edge of the water, eating fish from the Rio Grande or Cochiti Lake, eating produce irrigated with water from the lake, eating beef raised in the area, or participating in recreational activities like swimming. The type of exposure contributing most to the potential risk was eating fish.

Were there other important results from this study?

The study provides a basis for identifying specific areas at LANL, certain chemicals and radioactive materials, and the most important types of exposure that could contribute to potential risk. More focused attention can be given to refining or increasing available information about those areas, materials, and types of exposure in the future.

STUDY AREA



The study area encompassed approximately 182,000 acres (738 km^2). In relation to the LANL facility, the study area extended to the west to include the upper Pajarito Plateau watersheds for the canyons, to the north to include the extent of the burned area in Santa Clara Canyon, to the east to include the Rio Grande, and to the south along the Rio Grande and downstream of Cochiti Dam.

RELEASES TO SURFACE WATER

Potential Releases to Surface Water

What are the sources of chemicals and radioactive materials that could have been released to surface water following the fire?

Chemicals and radioactive materials in the surface water study area came from past and ongoing operations at LANL, were deposited as fallout from global atmospheric weapons tests, or were present naturally in the environment. We evaluated more than 250 chemicals and 75 radioactive materials during the study.

Why is the fire important to the release of chemicals and radioactive materials to surface water?

The fire destroyed vegetation and changed the surface soil, which has increased the amount of storm water that could flow through the canyons. This increased storm water flow has the potential to carry with it greater amounts of soil, sediment, and ash from the entire impacted watershed, including some areas at LANL that contain elevated levels of chemicals and radioactive materials. New vegetation cover is stabilizing the soils, but this takes time, especially on the steeper hillsides.

Study Methods & Limitations

For whom were risks calculated in the study area?

We developed four scenarios to evaluate potential risks to people in the study area from exposure to chemicals and radioactive materials in surface water or sediments. These scenarios were (1) a local hunter, (2) an adult and child residing near the Rio Grande below Cochiti Lake, (3) a resident on the Rio Grande at the confluence of Water Canyon, and (4) a local fire/cleanup worker on the LANL site during and after the fire. The hypothetical individuals in Scenarios 2 and 3 were exposed by drinking water from the Rio Grande or Cochiti Lake, contacting sediments near the edge of the water, eating fish from the Rio Grande or Cochiti Lake, eating produce irrigated with water from the lake, eating beef raised in the area, and participating in recreational activities like swimming. The hypothetical individuals in Scenario 1 were exposed through drinking water from the river, contacting sediments, and eating fish from the river. The hypothetical individuals in Scenario 4 were exposed by contacting sediments near the edge of streams. We evaluated potential risks using predicted concentrations of chemical and radioactive materials at points of exposure selected for each scenario, considering their likely activities and methods of exposure.

How were environmental measurements used in the study? Why can't these measurements be used directly to determine the risks?

Extensive surface water and sediment monitoring data were collected by different agencies during and after the Cerro Grande Fire. Unfortunately, not all of these measurements can be used directly to evaluate potential future risks. In addition, monitoring for some chemicals and radioactive materials was not done, and concentrations for others were frequently at levels below the detection limits of the laboratory instruments. As a result, we used environmental transport computer models to predict concentrations in water and sediment at different locations.

How certain are these risk estimates?

There is some uncertainty in the estimated concentrations and associated risks because of questions about the accuracy and completeness of data and limitations associated with predicting the behavior of materials in the environment. In particular, much of the available data was collected for other purposes and so was not ideally suited for this study. Because of this, we made a number of assumptions that significantly reduced the possibility of underestimating potential risks. When we compared some of the environmental measurements with our predicted concentrations, we found the computer model predicted concentrations higher than current environmental measurements, which indicates that our cautious assumptions likely resulted in overestimated concentrations and health risks from the fire.

More Information

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