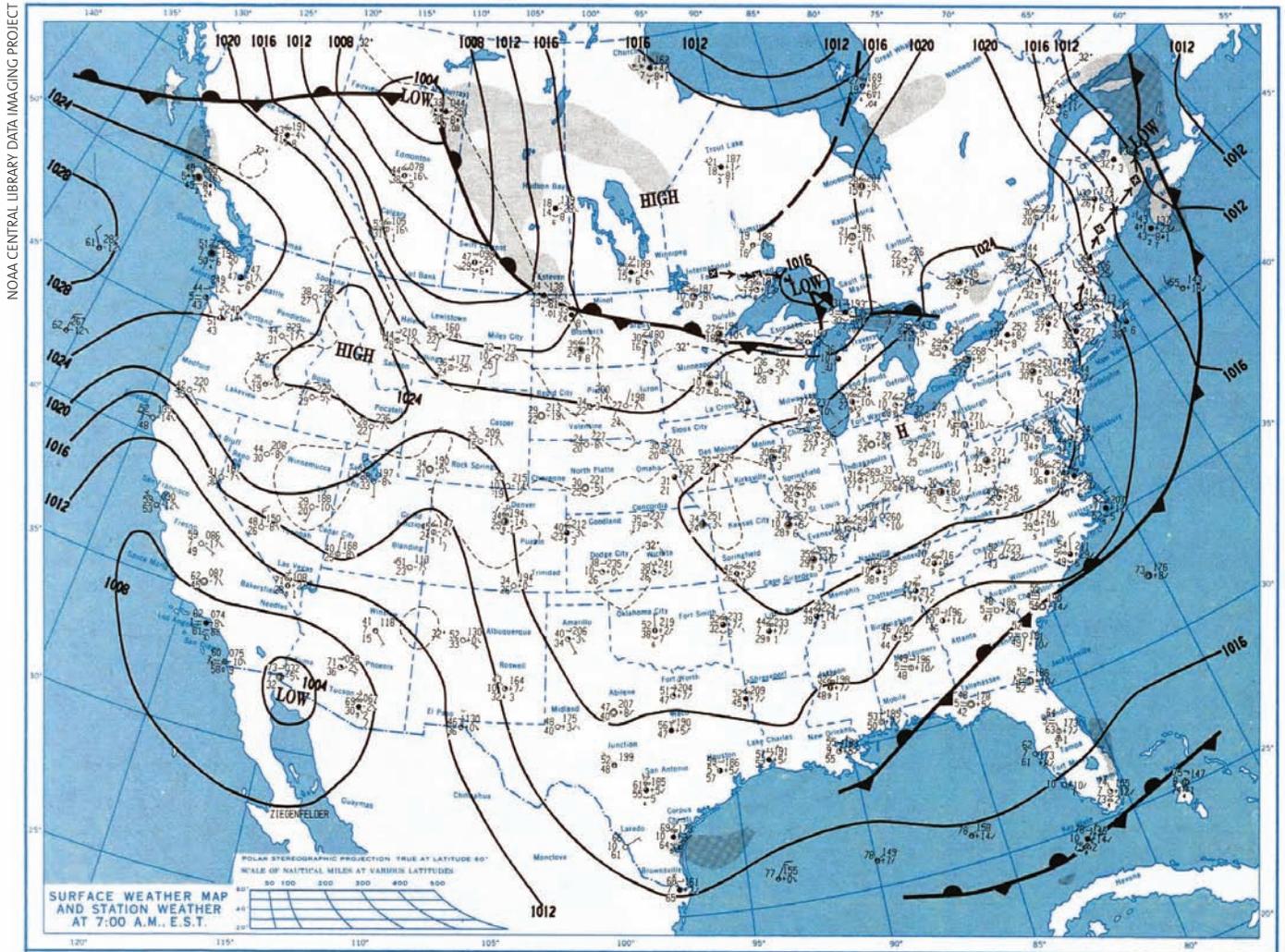


# October 20, 1991: Oakland Hills Firestorm



NOAA/NWS Daily Weather Map for 7:00 a.m. EST, October 20, 1991. High pressure over the Great Basin and low pressure off the Pacific Coast create a tight pressure gradient (as seen by the closely-spaced isobars) over northern California. This tight pressure gradient created the Diablo winds that contributed to the Oakland Hills Firestorm.

**P**rometheus, one of the Titans of Greek mythology, is said to have stolen fire from Zeus for the benefit of humanity, thus enabling progress and civilization. While fire has certainly allowed humanity to prosper and civilization to flourish over

the millennia, when this classical element clashes with humanity's illimitable progress, the results are often disastrous.

In the fall of 1991, such a tragedy unfolded across Oakland Hills, a largely affluent neighborhood in the eastern part of Oakland, California, just east of

the San Francisco Bay. Here, million-dollar homes nestle among pine and eucalyptus trees along what is known as the wildland-urban interface—the zone where wild, untouched land meets human development. This area is often a breeding ground for wildfire disasters,

as houses and other structures located next to brush, tall grasses, and trees fall victim to the conflagration that can result from an act as careless as tossing a cigarette out a car window or leaving a campfire smoldering.

The Oakland Hills Firestorm—which raged for some 72 hours—began as a relatively small brush fire that had been mostly contained on October 19, 1991. It reignited during the morning of October 20, resulting in a firestorm that, when finally extinguished, claimed 25 lives, destroyed more than 3,000 homes, and resulted in \$1.5 billion in damages.

While the fire itself was relatively short-lived, the conditions that led to it were years in the making. “The fire delivered another tragic blow to a region still recovering, physically and psychologically, from the earthquake that struck the Bay Area two years ago almost to the day,” *The New York Times* reported on October 22. “The instrument of the suffering this time was another natural insult, an unforgiving drought that for five years has withheld water from the eucalyptus-studded hills and canyons crowded with homes.”

As meteorologist and *Weatherwise* contributor Jan Null writes in the July/August 2015 issue (see “Weather and Wildland Fires: Firefighting in an Age of Droughts and Urban Sprawl”):

*The confluence of events that led to this disaster actually began the previous December, when one of the worst freezes in California history killed significant amounts of vegetation (especially non-indigenous eucalyptus trees) in the eastern foothills of Oakland, which were already stressed after several years of below-normal rainfall.*

The dried, twisted branches of eucalyptus and other vegetation served as fuel for the fire, whose flames quickly spread thanks to record high temperatures (Oakland reported a high of 92°F on October 20), low humidity, and

fierce easterly Diablo winds, which—much like their Southern California cousin, the Santa Ana winds—form as the result of a strong pressure gradient between high pressure over the Great Basin and low pressure off the Pacific coast. The Diablo winds direct warm, dry air offshore from higher elevations, causing the flames of a raging wildfire to become all the more powerful and difficult to control.

“The wind played a most crucial part in the scenario which manifested itself once the fire was established,” Chief Reginald J. Garcia of the Oakland Fire Department wrote in a summary of the event. “The wind blew into the Oakland hills from the east, over and down ridge tops forcing flames to swirl in many different directions, causing the fire to burn down hill as quick, and in some cases quicker, than uphill.”

This erratic behavior caught firefighters off-guard and made it difficult for crews to form defensible positions from which to fight the flames—and protect themselves. The windswept flames consumed everything in their path, causing homes, vehicles, and everything inside of them “to explode almost instantly.”

Wind gusts of 25 mph were commonplace in Oakland Hills on October 20, with some reports of wind gusts as high as 38–58 mph.

According to the National Fire Protection Association’s Fire Investigations report on the event, firestorms develop “when the heat, gases, and motion of a fire build up to the point where they begin to create their own weather and wind, independent of the external conditions.” This happens as the fire pulls air in at the base, creating a swirling vortex of flames as “the fire begins to feed itself, and towering convection columns result in long-distance spotting and tornado-like vortices.” As the firestorm continued across Oakland Hills, several fire fronts developed, allowing the fire to spread in several directions at once, in some cases independent of the prevailing winds.

Eventually, temperatures cooled and winds abated, slowing the fire’s progress, allowing firefighters to gain the upper hand in controlling the blaze. At the National Weather Service’s San Francisco Forecast Office, in Redwood City, Jan Null, who at the time served as lead forecaster, issued the following special fire forecast to the Alameda County Office of Emergency Services in San Leandro:

*THE DRY NORTHEAST WINDS ARE SUBSIDING BUT WILL CONTINUE TO BE IN THE 5 TO 10 MPH RANGE UNTIL MID-MORNING. AFTERNOON WINDS WILL BE WESTERLY FROM 10 TO 20 MPH. HUMIDITIES AT THIS TIME ARE BETWEEN 50 AND 60 PERCENT AND WILL RISE THROUGH THE MORNING. TEMPERATURES ARE CURRENTLY NEAR 60 DEGREES, AND WILL RISE INTO THE 70S EARLY AFTERNOON, THEN BEGIN COOLING.*

The aftermath of the Oakland Hills Firestorm brought a variety of changes aimed at mitigating losses from any future fires in the areas, including the founding of several nonprofit groups to address safety codes and other issues. Other improvements included an updated communications system for firefighters, new standards for fire hydrants, and a new fire station, along with the installation of two new weather stations in Oakland Hills—linked directly to various agencies, including the California Department of Forestry—to help firefighters and fire weather forecasters prepare for and prevent future disasters.” **W**

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*Contributing Editor SEAN POTTER is a Certified Consulting Meteorologist (CCM), Certified Broadcast Meteorologist (CBM), and science writer with an interest in weather history.*