WILDFIRE
NATURAL EVENTS ACTION PLAN
FOR SAN DIEGO COUNTY

Minimizing Public Exposure to Smoke
During Wildfire Events

NASA, 2003

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SAN DIEGO COUNTY
AIR POLLUTION CONTROL DISTRICT
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Wildfire Natural Events Action Plan for San Diego County

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1.0 INTRODUCTION

Wildfires (unwanted wildland fires) are a natural source of air pollution in San Diego County. Although relatively infrequent, wildfires are unpredictable and may result in periods of intense smoke, which contains high levels of airborne particulate matter (PM) that can be inhaled into and accumulate in the respiratory system, causing health effects. The ability to control and reduce wildfire smoke emissions is very limited and therefore the best measure to reduce smoke impacts on public health is minimizing public exposure. To address this situation, the U.S. Environmental Protection Agency (EPA) issued a Natural Events Policy in May 1996 (Attachment 1) for protecting public health in areas where uncontrollable natural events such as wildfires cause a violation of federal clean air standards for inhalable particles 10 microns or less in diameter (PM10).

Pursuant to the Natural Events Policy, exceedances of federal PM10 air quality standards caused by wildfire are excluded from consideration by EPA when making decisions related to the air quality attainment status of a region, provided the region prepares a Natural Events Action Plan (NEAP) to minimize public exposure to high concentrations of PM that could result from future wildfire events. In October 2003, EPA issued additional guidance (Attachment 2) extending the Natural Events Policy to new federal air quality standards for respirable fine particles 2.5 microns or less in diameter (PM2.5) that can penetrate deeper into the lungs.[1] PM2.5 is a constituent of PM10.

The purpose of this NEAP is to minimize public exposure to high concentrations of inhalable PM (PM10 and PM2.5)[2] that could result from future wildfire events in San Diego County and to fulfill requirements of EPA's Natural Events Policy. NEAP development was prompted by local exceedances of the federal 24-hour average PM10 air quality standard caused by large-scale wildfires that occurred in October and November 2003. Smoke and ash from these wildfires brought unhealthful levels of particle pollution into heavily populated areas of San Diego County, presenting an immediate health threat to the public. This triggered a series of public notifications and health advisories issued by the County of San Diego and the San Diego County Air Pollution Control District (APCD) to communicate potential health risks and identify steps the public should take to reduce their exposure to unhealthful levels of air pollution.

As authorized by EPA's Natural Events Policy, on April 21, 2004, the California Air Resources Board (ARB) submitted a written request to EPA (Attachment 3) on behalf of San Diego County to designate certain exceedances of the federal PM10 24-hour standard as natural events caused by wildfires. On July 21, 2004, EPA approved this request (Attachment 4) and requested development of a NEAP by the end of May 2005. This NEAP for San Diego County fulfills this requirement and documents ongoing efforts of local, state, and federal agencies to prepare for future wildfire events and safeguard public health from high concentrations of inhalable PM during such events.

[1] Federal PM2.5 standards were established in 1997, subsequent to issuance of EPA's Natural Events Policy in 1996.

[2] Federal PM standards are undergoing scientific review at the time of NEAP publication. EPA staff has issued a draft recommendation to establish separate federal standards for inhalable coarse particles between 2.5 and 10 micrometers (PM10-2.5). This NEAP is intended to apply to any future federal PM10-2.5 standards, as well as existing PM10 and PM2.5 standards.

1.1 BACKGROUND

1.1.1 National Ambient Air Quality Standards

The federal Clean Air Act requires EPA to establish National Ambient Air Quality Standards (NAAQS) to protect human health and welfare. Areas that violate a NAAQS are designated as "nonattainment areas" and must develop and implement air quality plans and emission control measures providing for attainment within specified timeframes. NAAQS have been established for six air pollutants: carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, lead, and particulate matter. Particulate matter is the most prevalent air pollutant in wildfire smoke and is the focus of this NEAP, consistent with EPA policy.

Particulate Matter Standards
EPA promulgated NAAQS focusing on the inhalable fraction of PM (PM10) in 1987. Two PM10 standards were established, an annual average of 50 micrograms of particles per cubic meter of air ($\mu g/m^3$), which protects against long-term health effects, and a 24-hour average of 150 $\mu g/m^3$, which protects against short-term health effects. In 1997, EPA promulgated an additional set of PM NAAQS focusing on the respirable fraction of PM (PM2.5), which can penetrate deeper into the lungs. The annual PM2.5 standard is 15 $\mu g/m^3$ and the 24-hour standard is 65 $\mu g/m^3$.

The 24-hour PM10 standard is violated when the number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is greater than 1.0. Because the federal reference method PM10 monitors are run only every sixth day, a single monitored exceedance represents six exceedance days and therefore is considered a violation of the standard.

The 24-hour PM2.5 standard is violated when the 3-year average of the 98th percentile of 24-hour concentrations exceeds 65 ug/m^3. EPA established this form for the 24-hour standard to reduce the regulatory impact of a single high-exposure event, thus providing a more stable basis upon which to design effective emission control programs. For PM2.5 sites that sample daily, the 98^{th} percentile value is the eighth highest of 365 daily values. For PM2.5 sites sampling every third day, the 98^{th} percentile value is the third highest.

1.1.2 Particulate Matter Monitoring Network

APCD operates a network of monitors that record actual concentrations of ambient PM10 and PM2.5 at numerous sites throughout San Diego County (Figure 1) in compliance with federal requirements. The data generated at these monitors are used to define the nature and severity of particle pollution in San Diego County and to demonstrate attainment or nonattainment of PM standards.

FIGURE 1
PARTICULATE MATTER MONITORS IN SAN DIEGO COUNTY

1.1.3 Health Effects of Wildfire Smoke

Wildfire smoke is composed of PM, gases, and water vapor. One of the biggest health concerns of smoke comes from PM. Most of the PM produced in wildland fire is respirable; that is, it is small enough to pass through the upper respiratory system and enter deep into the lungs. Respirable particles can build up in the respiratory system, causing a number of health problems, including illnesses such as bronchitis.[3] Particles can also aggravate existing heart and lung diseases, such as congestive heart failure,[4] chronic obstructive pulmonary disease (emphysema[5] and chronic bronchitis), and asthma.[6]

It is important to note that not everyone who is exposed to smoke will suffer health problems. Smoke-related health problems will depend on the fuel type, level of exposure, individual age and susceptibility, and other factors. Healthy individuals will normally recover quickly from smoke exposure and not suffer long-term consequences. However, certain sensitive populations may experience more severe symptoms from smoke exposure. The following discussion of

[3] Inflammation of the lung airways, resulting in a persistent cough.
[4] Inability of the heart to maintain adequate blood circulation.
[5] A lung disease in which tissue deterioration results in increased air retention and reduced exchange of gases.
[6] Inflammatory lung disease.

smoke effects on sensitive populations is from "Wildfire Smoke: A Guide for Public Health Officials" (California Office of Environmental Health Hazard Assessment, et al., 2002).

People with Asthma and Other Respiratory Diseases

Levels of pollutants that may not affect healthy people may cause breathing difficulties for people with asthma or other chronic lung diseases. Asthma is a condition characterized by chronic inflammation of the airways, with intermittent bronchoconstriction[7] and airflow obstruction, causing shortness of breath, wheezing, chest tightness, coughing, and sometimes accompanied by excess phlegm production. During an asthma attack, the muscles tighten around the airways and the lining of the airways becomes inflamed and swollen, constricting the free flow of air. Irritation creating minor problems for an adult may result in significant obstruction in the narrower airways of a young child. However, the highest mortality rates from asthma occur among older adults. Individuals with chronic obstructive pulmonary disease (COPD), which is generally considered to encompass emphysema and chronic bronchitis, may also experience a worsening of their conditions because of exposure to wildfire smoke. Often COPD patients have an asthmatic component to their condition, which may result in asthma-like symptoms. However, because their pulmonary reserve[8] typically has been seriously compromised, additional bronchoconstriction may result in symptoms requiring medical attention. Studies have indicated that individuals with COPD run an increased risk of requiring emergency medical care after exposure to PM or forest fire smoke. Exposure to smoke may also depress the ability to fight lung infection. People with COPD may develop lower respiratory infections after exposure to wildfire smoke, which may require urgent medical care as well. In addition, because COPD is usually the result of many years of smoking, individuals with this condition may also have heart disease and are potentially at risk from both conditions.

People with Cardiovascular Disease

Diseases of the circulatory system include, among others: high blood pressure, cardiovascular diseases (such as hardening of the arteries, coronary artery disease, and congestive heart failure), and cerebrovascular conditions such as atherosclerosis.[9] These chronic conditions can render individuals susceptible to angina pectoris attack,[10] heart attack, sudden death by cardiac arrhythmia,[11] acute congestive heart failure, or stroke. Cardiovascular diseases represent the leading cause of death in the United States, responsible for about 40 percent of all deaths each year. The vast majority of these deaths are in people over 65. Studies have linked particle pollution to increased risk of heart attack, cardiac arrhythmia, and other adverse conditions in those with cardiovascular disease. People with chronic lung or heart disease may experience one or more of the following symptoms: shortness of breath; chest tightness; chest, neck, shoulder, or arm pain; palpitations; unusual fatigue; and lightheadedness. Chemical messengers released because of particle-related lung inflammation may increase the risk of blood clots, angina episodes, heart attacks, and strokes.

[7] Airway contraction.
[8] Total lung capacity.
[9] A build-up of plaque in the arteries leading to the brain.
[10] Chest pain caused by insufficient supply of blood to the heart.
[11] Irregular heartbeat.

Elders
In several studies, researchers have estimated that tens of thousands of elderly people die prematurely each year from exposure to particle pollution. This is probably because the elderly are more likely to have pre-existing lung and heart diseases and therefore are more susceptible to particle-associated effects. The elderly also seem to be more affected because important respiratory defense mechanisms may decline with age. Particle pollution can compromise the immune system, increasing susceptibility to bacterial or viral respiratory infections.

Children
All children, even healthy children, are considered a sensitive population because their lungs are still developing. Several factors lead to increased exposure in children, including more time spent outdoors, more vigorous activity, and more air inhaled (therefore more particles) per pound of body weight.

Studies have shown that particle pollution is associated with increased respiratory symptoms and decreased lung function in children, such as coughing and difficulty breathing. These can result in school absences and limitations on normal childhood activities.

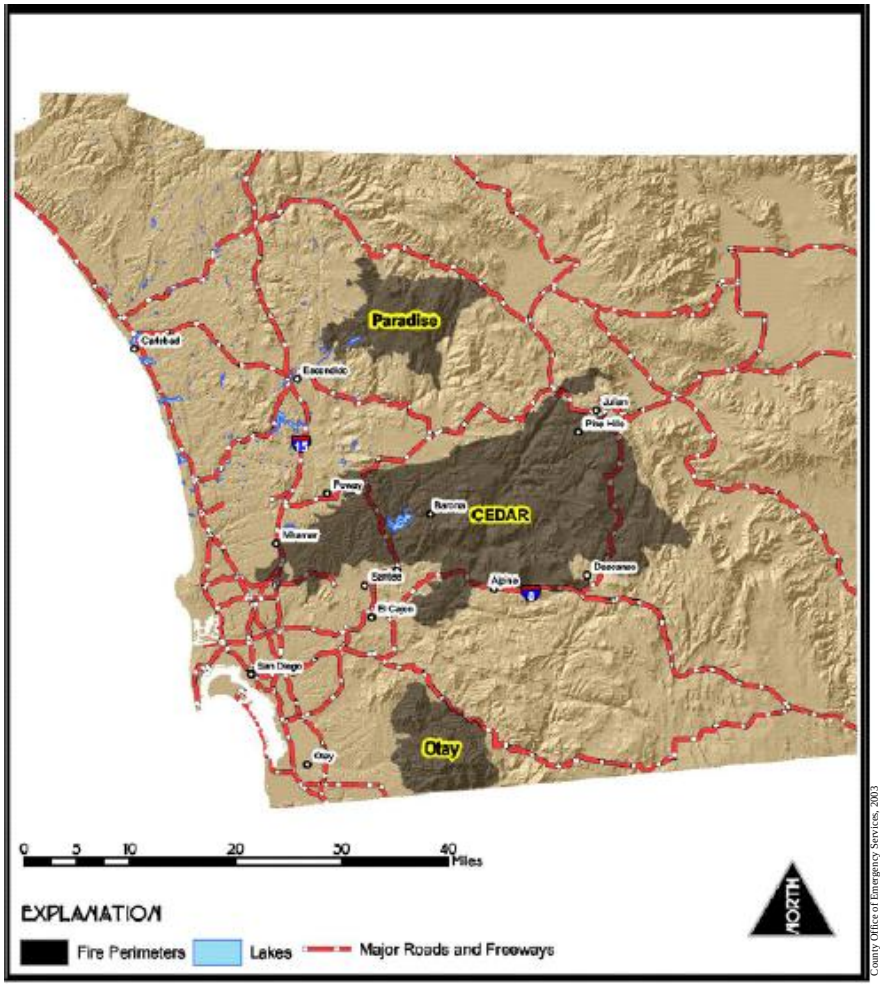
Smokers
Smokers, especially long-term smokers, have already compromised their lung function. Because their lungs have adapted to ongoing irritation, smokers are less likely to report symptoms from exposure to irritant chemicals. However, their lungs may still be injured by wildfire smoke. Therefore, some smokers may unwittingly put themselves at greater risk of potentially harmful wildfire smoke exposure, believing that they are not being affected.

Medical Surveillance Efforts
The San Diego County Health and Human Services Agency conducted medical surveillance efforts during and after the 2003 fires to determine the health effects of the fires. Results of the study were reported in "Medical Surveillance for the San Diego County Wild Fires, 2003" (Attachment 5) and indicate a substantial increase in emergency room visits for asthma and other respiratory complaints, particularly during the days of greatest fire burn and unhealthful air quality.

1.1.4 San Diego County's 2003 Wildfires and Resuspended Ash

Until 2003, San Diego County had never violated the federal air quality standards for PM10. However, in October 2003 San Diego County experienced a series of large-scale wildfires (the Cedar, Paradise, and Otay fires) both in the unincorporated area and within urban San Diego that destroyed nearly 400,000 acres. These wildfires caused PM concentrations to reach health-threatening levels over much of the County for a number of days. A map showing the location and extent of the wildfires is presented below in Figure 2.

FIGURE 2
MAP OF BURN AREA
WILDFIRES OF OCTOBER 2003



The fires were fanned by hot, dry offshore winds (Santa Ana winds) blowing from the east, gusting up to 50 miles per hour. The Santa Ana winds blew the smoke plume (and the flame front) towards the densely populated coastal plane in the metropolitan western portion of the County on October 26, 27, and 28. When the Santa Ana winds subsided on October 29 and the normal sea breeze took over, the smoke plume that had accumulated over the ocean was blown back onto land across the populated coastal plane. Thereafter, the sea breeze blew the fire and smoke plume toward the sparsely populated mountain and desert regions of the eastern County.

Fire-related PM2.5 Levels

The PM2.5 air quality levels in San Diego County during the fires reached four to five times the federal 24-hour average standard of 65 $\mu g/m^3$. APCD's federal reference method PM2.5 monitors recorded high 24-hour average concentrations on October 26 (105 $\mu g/m^3$ at Downtown San Diego) and October 27 (239 $\mu g/m^3$ at Chula Vista, 170 $\mu g/m^3$ at Kearny Mesa and

Downtown San Diego, and 69 μg/m^3 at Escondido). On the following day, October 28, the continuous PM2.5 monitor in Escondido indicated 24-hour average levels reached 350 μg/m^3, while short-term (one-hour) concentrations in Escondido reached 738 μg/m^3 or "Hazardous" levels. However, because the federal 24-hour PM2.5 standard is based on the 3-year average of the 98th percentile values, the exceedances recorded during the fires did not cause a violation of the standard.

Fire-related PM10 Levels

Federal reference method PM10 monitors operate every sixth day pursuant to federal requirements. The PM10 monitors operated on October 24 and were not scheduled to operate again until October 30. However, because of the wildfires, APCD made special arrangements on October 28 to operate two of the PM10 monitors (Escondido and Downtown San Diego) on October 29, one day ahead of schedule. Because the wind changed back to a sea breeze that day, blowing the smoke plume that had accumulated over the ocean back inland, the Escondido site recorded a violation of the 24-hour PM10 standard with a measurement of 179 μg/m^3.

Resuspended Ash Impacts

The October 2003 wildfires burned nearly 400,000 acres in San Diego County, leaving those areas denuded of foliage and covered with a layer of ash. On November 23, strong Santa Ana winds returned, again gusting up to 50 miles per hour. The high winds kicked up thick clouds of ash from the fire-exposed ash-covered ground and blew them across the metropolitan coastal plane of San Diego County. In contrast to the mostly very small (PM2.5) combustion aerosols that dominated the area during the fire, the particle size of the ash was considerably larger (predominantly PM10), causing elevated PM10 concentrations at all monitoring sites. The 24-hour average PM10 concentrations measured on November 23 were: Kearny Mesa: 280 μg/m^3; El Cajon: 230 μg/m^3; Downtown: 140 μg/m^3; Escondido: 124 μg/m^3; Otay Mesa: 82 μg/m^3 and Chula Vista: 75 μg/m^3. The pollution levels at Kearny Mesa and El Cajon exceeded the federal 24-hour PM10 standard. On December 17, another Santa Ana winds episode again resuspended the ash and caused elevated PM10 concentrations at all monitoring sites. However, the highest concentration on December 17—99 μg/m^3 at Downtown San Diego—did not exceed the federal 24-hour PM10 standard.

1.1.5 APCD Response Efforts

During the 2003 wildfires APCD worked closely with the County Office of Emergency Services and contributed to efforts of the San Diego County Emergency Operations Center (EOC), which was activated to coordinate response efforts, provide emergency information to the public, and ensure public health and safety. APCD provided timely and accurate information on meteorology and real-time and forecasted air quality conditions. The public was kept informed of fire-related issues—including smoke and ash exposure and air quality concerns—via the dissemination of news releases and/or media advisories issued by the County and APCD and regular press briefings held at the EOC. APCD responded to numerous public inquiries concerning health hazards from wildfire smoke and ash.

Further, special air monitoring was conducted to enhance information regarding wildfire smoke impacts and address concerns regarding toxic air contaminant emissions,[12] both regionwide and localized to certain areas. Air toxics were a concern because of the magnitude of the fires and past studies that confirmed the potential for toxics to be emitted during wildland fires.

APCD collected several air samples from the urban air toxics sampling network sites during the fires and analyzed them for compounds known to be carcinogenic. Several additional "grab samples" (single instantaneous samples) were analyzed for air toxics at non-network sites in San Diego County, and EPA took several "near fire" samples in the mountain community of Julian toward the end of the fire.

The monitoring data indicate that several air toxic gases and metals were somewhat elevated during the wildfires. However, similar levels have also been observed in the state in the last 10 years even in the absence of wildfires. Further, most of the compounds were at levels either less than the recent high values for San Diego County for the past three years, or were below the analytical limit of detection.

APCD also coordinated with other response agencies evaluating for asbestos in areas with burned structures. This minimized the potential for release of asbestos dust during the demolition of the burned structures.

1.2 NATURAL EVENTS POLICY

The Natural Events Policy (Attachment 1) and the Policy on PM2.5 Natural Events (Attachment 2) provide that EPA will exercise its discretion under Clean Air Act section 107(d)(3) not to redesignate areas as nonattainment of PM standards if the area would attain but for exceedances caused by uncontrollable natural events and the area develops and implements a NEAP to respond to the health impacts of future natural events. Three categories of natural events are considered in the policies: (1) wildland fires, (2) high wind events, and (3) volcanic and seismic activity. As required by the Natural Events Policy, the NEAP should include commitments to:

1. Establish public notification and education programs.
2. Minimize public exposure to high concentrations of inhalable PM that could result from future natural events.
3. Abate or minimize appropriate contributing controllable sources of inhalable PM.
4. Identify, study and implement practical mitigating measures as necessary.
5. Reevaluate the NEAP for an area every 5 years at a minimum and make appropriate changes to the plan.

This NEAP herein fulfills these requirements. Commitments described are ongoing and were in place during the October 2003 wildfires to minimize public exposure to high concentrations of inhalable PM.

[12] Volatile organic compounds, carbonyls, polycyclic aromatic hydrocarbons, and metals.

2.0 WILDFIRE NATURAL EVENTS ACTION PLAN FOR SAN DIEGO COUNTY

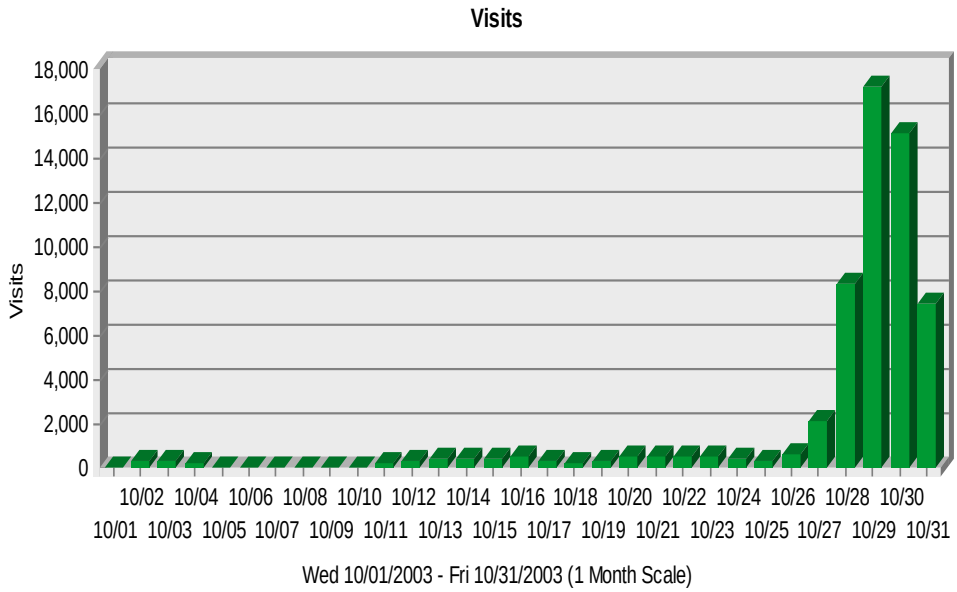
2.1 ELEMENT 1: PUBLIC EDUCATION AND NOTIFICATION

EPA policy indicates that a NEAP should include a commitment to establish public education and notification programs. Such programs may be designed to educate the public about the short-term and long-term harmful effects that high concentrations of PM could have on their health, and inform the public that: (a) certain types of natural events periodically affect the air quality of the area; (b) a natural event is imminent; and (c) specific actions are being taken to minimize the health impacts of events.

2.1.1 APCD Website

The APCD uses its publicly accessible website on the Internet as a primary outreach tool for informing the public of the health effects of fire smoke and actions to reduce or avoid exposure. "Current Air Quality" provides links to information on real-time and forecasted air quality conditions in San Diego County; "Wildfire Smoke & Your Health" explains the health effects of fire smoke, and actions to minimize exposure. During the October 2003 wildfires, the number of website visits per day increased substantially, as shown in Figure 3.

FIGURE 3
VISITS TO APCD WEBSITE
DURING WILDFIRES OF OCTOBER 2003



2.1.1 APCD Public Information Office

The APCD's public information office distributes a brochure describing the health effects of fire smoke and actions to reduce or avoid exposure. A copy is provided in Attachment 6.

2.2 ELEMENT 2: MINIMIZING PUBLIC EXPOSURE

EPA policy indicates that a NEAP should include a commitment to minimize public exposure to high concentrations of PM due to future natural events. Programs to minimize public exposure should: (a) identify the people most at risk; (b) notify the at-risk population that a natural event is imminent or currently taking place; (c) suggest actions to be taken by the public to minimize their exposure to high concentrations of PM; and (d) suggest precautions to take if exposure cannot be avoided.

2.2.1 Air Quality Index

The APCD publishes a daily "Air Quality Index" (AQI) report to help the public understand what local air quality conditions mean to health. Different pollutants affect health at different concentrations. By relating similar degrees of health effects to a uniform scale, an index enables one to easily determine when air pollution levels are high so activities can be modified.

Ambient air quality is measured by a network of monitors described in Section 1.1.2. The measurements are converted to an AQI value using a formula developed by EPA that relates similar degrees of health effects to the AQI scale. The scale ranges from 0 to 500, with 0 representing pristine air. An AQI of 100 usually corresponds to the federal standard for that pollutant.[13] Accordingly, values below 100 are generally thought of as satisfactory, whereas values over 100 correspond to unhealthful air quality, at first for sensitive groups of people, then for everyone as AQI values get higher.

The AQI scale has been divided into distinct health-risk categories, each corresponding to a different level of health concern. Additionally, a specific color has been assigned to each category to make it easier for people to understand quickly the significance of air pollution levels in their communities. The AQI is a national index, so the values and colors used to show local air quality and the associated level of health concern are consistent throughout the country. Table 1 identifies each AQI threshold level and its corresponding qualitative descriptor, health, and cautionary statements.

The AQI report for San Diego County can be accessed by phoning (858) 650-4777 or by visiting the APCD website at www.sdapcd.org/air/forecasts/otoday.html. Additionally, a summary of the daily AQI report is regularly published in local newspapers and reported during the weather forecast segment of local television newscasts. Moreover, when air pollution levels are expected to exceed an AQI value of 150, the APCD issues an Air Quality Health Advisory alerting at-risk groups to take the necessary precautions.

[13] For PM2.5, EPA set the AQI at 150 (rather than 100) for the 24-hour standard, and at 50 for the annual standard.

TABLE 1
AIR QUALITY INDEX (AQI) LEGEND

Level of Health Concern	AQI Value	Cautionary Statements
Good	0-50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51-100	Air quality is acceptable. However, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution. These individuals may experience some respiratory symptoms. Unusually sensitive people should consider reducing prolonged or heavy exertion outdoors.
Unhealthful for Sensitive Groups	101-150	Members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range. Sensitive groups for particle pollution include people with heart or lung disease, older adults (who may have undiagnosed heart or lung disease), and children. Active children and adults and people with lung disease such as asthma should reduce prolonged or heavy exertion outdoors.
Unhealthful	151-200	Everyone may begin to experience health effects when the AQI is in this range. Members of sensitive groups may experience more serious health effects. Active children and adults, and people with lung disease, such as asthma, should avoid prolonged or heavy exertion outdoors. Everyone else should reduce prolonged or heavy exertion outdoors.
Very Unhealthful	201-300	Health alert, meaning everyone may experience more serious health effects. Active children and adults, and people with lung disease, such as asthma, should avoid all outdoor exertion. Everyone else should avoid prolonged or heavy exertion outdoors.
Hazardous	300-500	Health warnings of emergency conditions. The entire population is more likely to be affected. People with heart or lung disease, older adults, and children should remain indoors and keep activity levels low. Everyone should avoid all physical activity outdoors.

2.2.2 News Releases

When fire smoke or resuspended ash is predicted to impact populated areas in San Diego County, the APCD issues news releases to communicate health risks and precautions to the public. Copies of the news releases issued during the 2003 wildfires and resuspended ash events are provided in Attachment 7.

2.2.3 Health Advisories

APCD has established procedures for notifying school districts, news media, and local government officials when air pollution concentrations reach and are forecast to remain above Health Advisory levels. Health Advisories inform the public of the period during which air pollution levels are predicted to be unhealthful (i.e., an AQI greater than 150), and appropriate precautionary actions to minimize exposure.

2.3 ELEMENT 3: ABATE OR MINIMIZE CONTRIBUTING SOURCES

EPA policy indicates that a NEAP should include a commitment to abate or minimize appropriate contributing controllable sources of PM. Programs to minimize wildfire PM emissions may include prohibition of other burning activities during wildfire events and steps to minimize fuel loadings in areas vulnerable to fire.

2.3.1 Control of Open Burning

APCD Rule 101 (Burning Control), initially adopted in 1973, requires open burning[14] in San Diego County be conducted in a manner that minimizes emissions and smoke, pursuant to the California Code of Regulations, Title 17, Sections 80100-80330. Burners are required to obtain authorization from the APCD or ARB to burn on a particular day. Open burning is prohibited when the APCD or ARB has declared a "no-burn" day based on meteorological conditions, ambient air pollution levels, and/or fire danger conditions that day. Consistent with EPA's Natural Events Policy, days during wildfire events are declared no-burn days.

2.3.2 Minimize Fuel Loadings

Weather, topography, and aging vegetation (fire fuel) combine into a significant risk of fast-burning wildland fire in San Diego County. Fuel management efforts are occurring at the local, state, and federal levels to mitigate the wildfire danger, as described below.

San Diego County
The County of San Diego assembled the San Diego County Wildland Fire Task Force during 2002-2003 to develop a comprehensive plan addressing a number of wildland fire risk and mitigation issues. The Task Force comprised a broad base of expertise including specialists in fire, land management, wildlife, and the environment, with members from 24 regional agencies and local environmental groups.

[14] Prescribed (controlled) or agricultural burning operations conducted outdoors in the open air.

On August 13, 2003, the San Diego County Board of Supervisors accepted the Task Force report, "Mitigation Strategies for Reducing Wildland Fire Risks" (Attachment 8). The report addresses four major areas of concern and provides wildfire mitigation recommendations in each area:

- Vegetation Management recommendations address annual evaluations of fire risks, defensible space, weed abatement/fuel modification ordinances, grant funding, wildland fire rapid response teams, and low cost insurance for prescribed (controlled) burning.
- Codes and Ordinances recommendations address property setbacks, venting and glazing requirements for new construction, weed abatement issues, fire hazards, and review of regulatory compliance on County-owned, operated, or controlled properties.
- Bark Beetle Management recommendations consider grant funding for removal of dead and dying trees and establishing priorities for tree removal efforts.
- Public Education recommendations propose education efforts regarding forest health, risks and responsibilities of those living in the wildland/urban interface, and defensible space.

In 2004 the County applied for and was awarded approximately $40 million in federal grant funds for fuels reduction activities. To ensure comprehensive regional coverage for fuels treatment, the County has provided an additional $5 million in local funding to implement a Fire Safety and Fuels Reduction Program. Additionally, in June 2004 the County amended its Fire and Building Codes to maximize fire safety and address issues faced in safeguarding structures in the wildland/urban interface.

California Fire Plan

The California Fire Plan[15] is the state's roadmap for reducing the risk of wildfire by taking action before wildfires occur. Jointly written by the State Board of Forestry and the California Department of Forestry and Fire Protection (CDF), the California Fire Plan has five strategic objectives:

- To create "wildfire protection zones" to buffer communities and other high-value assets and reduce citizen and firefighter risks from future large wildfires;
- To assess all wildlands in California and identify high-risk, high-value areas and develop information on and determine who is responsible, who is responding, and who is paying for wildland fire emergencies;
- To identify and analyze key policy issues and develop recommendations for appropriate changes in public policy to maximize the efficiency of local, state, and federal firefighting resources;
- To have a strong fiscal policy focus and monitor the wildland fire protection system in fiscal terms. This will include all public and private expenditures for

[15] The California Fire Plan is available on-line at www.fire.ca.gov/fireemergencyresponse/fireplan/fireplan.pdf.

pre-fire management and fire suppression as well as economic losses due to wildfires; and

- To translate the analyses into public policies.

Pre-fire management is an integral part of the California Fire Plan and focuses on taking action before fires occur. Projects are designed and implemented to reduce the frequency, severity, and size of wildfires and associated losses and costs:

- Fuel breaks to stop wildfires;
- Wildfire Protection Zones to buffer communities;
- Forest stewardship for healthy forests;
- Prescribed fire to reduce fire fuels;
- Defensible space for homes and firefighters; and
- Fire safe landscaping.

Federal Wild Lands
According to the Natural Events Policy, EPA intends to treat federal Fire Management Plans as "acceptable plans for mitigating the public health impacts of smoke from wildland fires on federal lands." The U.S. Forest Service has developed and annually updates a Fire Management Plan for Southern California's Cleveland National Forest, which extends into northern and eastern San Diego County. It provides a framework for the management of wildland fire, prescribed (controlled) fire, and hazard fuel reduction as tools to safely accomplish resource protection and management objectives for the Cleveland National Forest. Additionally, the Fire Management Plan includes a section addressing "Air Quality and Smoke Management" that indicates a primary goal of air resource management on the forest is to minimize air pollution caused by forest management activities.

Additionally, all five federal wildland fire management agencies[16] are jointly developing a common interagency system ("Fire Program Analysis System") for wildfire preparedness analysis, planning, and budgeting. The objective is to model an efficient, cost-effective federal organization to implement fire management program objectives articulated in the Fire Management Plan. When completed, the Fire Program Analysis System will address the full scope of federal fire management activities, including fuels management and prevention/education.

2.3.3 Additional Considerations

Ash Deposits and High Winds
EPA policy indicates that programs to minimize PM emissions may also include: (a) cleaning ash and dust deposits from volcanic and seismic activities where the deposits would be resuspended into the air by human activities; and (b) application of control measures to any

[16] The U.S. Forest Service, U.S. Bureau of Land Management, U.S. National Park Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Indian Affairs.

sources of soil that have been disturbed by human activities. As described in Section 1.1.4, in late November 2003 strong Santa Ana winds resuspended ash deposited by the October wildfires and blew it across the metropolitan coastal plane, causing exceedances of the federal 24-hour PM10 standard at the El Cajon and San Diego-Overland monitoring sites on November 23.

EPA policy statements addressing ash cleaning and dust suppression do not apply because the ash resuspension was caused by strong winds, not human activities. Nevertheless, it is worth noting that following the October 2003 wildfires the APCD issued news releases (Attachment 7) to communicate health risks of resuspended ash and advise that precautions be taken when cleaning up ash. Suggestions included dampening ash to reduce dust until placed in sealed or closed containers, avoiding use of leaf blowers, and wearing a tight-fitting particulate mask designed to protect the respiratory system from fine particles.

2.4 ELEMENT 4: MITIGATION MEASURES

EPA policy indicates that a NEAP should include a commitment to identify, study, and implement practical mitigation measures as necessary. Practical mitigation measures are addressed by the numerous plans, programs, and projects described above in Section 2.3 (Abate or Minimize Contributing Sources).

2.5 ELEMENT 5: PERIODIC REEVALUATION

EPA policy indicates that a NEAP should include a commitment to periodically reevaluate: (a) the conditions causing violations of a federal PM air quality standard; (b) the status of NEAP implementation; and (c) the adequacy of the actions being implemented. The NEAP should be reevaluated at least every five years and appropriate changes should be made.

The NEAP will be reevaluated at least once every five years. This reevaluation will address any future natural events leading to federal PM violations, and each NEAP element will be evaluated for effective implementation and changes will be considered if necessary. Input will be requested from interested parties.

ATTACHMENT 1

NATURAL EVENTS POLICY

MEMORANDUM

SUBJECT: Areas Affected by PM-10 Natural Events

FROM: Mary D. Nichols
Assistant Administrator
for Air and Radiation (6101)

TO: Director, Air, Pesticides and Toxics Management Division, Regions I and IV
Director, Air and Waste Management Division, Region II
Director, Air, Radiation and Toxics Division, Region III
Director, Air and Radiation Division, Region V
Director, Air, Pesticides and Toxics Division, Region VI
Director, Air and Toxics Division

Purpose

This memorandum sets forth the Environmental Protection Agency's (EPA's) policy for protecting public health in areas where the PM-10 (particulate matter having a nominal aerodynamic diameter less than or equal to 10 microns) national ambient air quality standards (NAAQS) are violated due to natural events. This policy will be followed in implementing the PM-10 NAAQS until it is superseded. [1] The

[1]This document contains EPA policy and, therefore, does not establish or affect legal rights or obligations. It does not establish a binding norm and it is not finally determinative of the issues addressed. In applying this policy in any particular case, the EPA will consider its applicability to the specific facts of that case, the underlying validity of the interpretations set forth in this memorandum, and any other relevant considerations, including

need for revisions to this policy will be considered by EPA, State agencies and the Federal Advisory Committee Act's Particulate Matter/Ozone/Regional Haze Subcommittee if the NAAQS for particulate matter are revised.

Three categories of natural events have been identified as affecting the PM-10 NAAQS: (1) volcanic and seismic activity, (2) wildland fires, and (3) high wind events. These PM-10

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any that may be required under applicable law and regulations.

natural events are defined further below. If other significant categories of natural events are identified, they may be added tothis policy in the future. [2]

Background

Prior to the 1990 Clean Air Act Amendments (Act), the Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events (exceptional events guideline) and Appendix K to 40 CFR, part 50, were issued by EPA to address, in part, the situation where natural sources strongly influence an area's PM-10 air quality. To avoid imposing potentially unreasonable State implementation plan (SIP) requirements on such areas, EPA provided for the exclusion of certain natural source data from nonattainment determinations. Thus, Appendix K provides, in part, that measured exceedances of the PM-10 NAAQS in an area may be discounted from decisions regarding nonattainment status if the data are shown to be influenced by uncontrollable events caused by natural sources of particulate matter. The 1986 exceptional events guideline contains EPA's guidance regarding the process States should follow when dealing with PM-10 air quality data that may be eligible for the adjustments authorized under section 2.4 of Appendix K.

Subsequently, the Act added section 188(f) which provides EPA with discretionary statutory authority to waive either a specific attainment date or certain planning requirements for serious PM-10 nonattainment areas that are impacted significantly
by nonanthropogenic sources. The EPA states in current PM-10 guidance documents that it interprets the section 188(f) waiver provision to mean that the data exclusion policy contained in Appendix K and the procedures described in the exceptional events guideline no longer apply.

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[2]Other types of temporary or exceptional events that can impact ambient PM-10 concentrations are structural fires, chemical spills, industrial accidents, and clean-up activities following a major disaster. The EPA's Guideline on the Identification and Use of Air Quality Data Affected by Exceptional Events, July 1986, is still applicable for treating air quality data resulting from these types of exceptional, anthropogenic events.

Under this natural events policy, those statements no longer reflect EPA's interpretation of the relationship between the section 188(f) waiver provision, Appendix K, and the exceptional events guideline and should be treated as revised to the extent described herein.

In establishing this natural events policy, EPA now believes that, under certain circumstances, it is appropriate to again exclude PM-10 air quality data that are attributable to uncontrollable natural events from the decisions regarding an area's nonattainment status. The discussion in the Appendix at the end of this memorandum briefly describes the legal rationale underlying this revised interpretation.

Description of Policy

The policy described in this document addresses PM-10 NAAQS violations caused by natural events in areas designated unclassifiable or attainment. It also addresses certain reclassification and redesignation questions for PM-10 nonattainment areas. This policy applies at the time the State determines that a PM-10 NAAQS has been violated due to natural events and addresses the question of what should be done to protect public health. The policy provides that EPA will: (1) exercise its discretion under section 107(d)(3) not to redesignate areas as nonattainment if the State develops and implements a plan to respond to the health impacts of natural events; and, (2) redesignate nonattainment areas as attainment by applying Appendix K, on a case-by-case basis, to discount data in circumstances where an area would attain but for exceedances that result from uncontrollable natural events.

The guiding principles followed in developing this policy are:

1. Protection of public health is the highest priority of Federal, State, and local air pollution control agencies.

2. The public must be informed whenever the air quality in an area is unhealthy. [3]

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[3]The air quality is considered unhealthy whenever the 24-hour PM-10 NAAQS is exceeded. The short-term PM-10 NAAQS is exceeded when the 24-hour average PM-10 concentration is

3. All valid ambient air quality data should be submitted to the EPA Aerometric Information Retrieval System (AIRS) and made available for public access.

4. State and local agencies must take appropriate reasonable measures to safeguard public health regardless of the source of PM-10 emissions.

5. Emission controls should be applied to sources that contribute to exceedances of the PM-10 NAAQS when those controls will result in fewer violations of the standards.

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greater than 150 micrograms per cubic meter (µg/m ^{3}). The 24-hour NAAQS is violated when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is greater than 1.0, as determined by procedures described in Appendix K.

Definition of PM-10 Natural Events

Volcanic and seismic activities: Ambient PM-10 concentrations caused by volcanic eruptions or seismic activity will be treated as due to natural events. Volcanic eruptions contribute to ambient PM-10 concentrations in two ways: (1) with emissions of primary PM-10 (e.g., ash), and (2) with emissions of precursor pollutants (e.g., sulfur dioxide) that react to form secondary particulate matter. Seismic activity (e.g., earthquakes) can also contribute to ambient PM-10 concentrations by shaking the ground, causing structures to collapse and otherwise raising dust (primary PM-10 emissions).

Also, emissions caused by anthropogenic activities that re-entrain volcanic ash during the first year (12 months) following an event will be treated as due to the natural event. One year is considered adequate time for cleaning ash deposits from areas where anthropogenic activities (e.g., vehicle traffic) would cause reentrainment. After 1 year, only emissions resulting from reentrainment of ash by high winds will be treated as due to a natural event.

Wildland fires: Ambient PM-10 concentrations caused by smoke from wildland fires will be treated as due to natural events if the fires are unwanted fires, not designated or managed as prescribed fires, and requiring appropriate suppression action by the wildlands manager. [4]

For the purposes of this policy, wildland fire natural events are limited to unwanted fires that do not meet a prescription (wildfires) and, therefore, require appropriate suppression actions. Wildland prescribed fires, burning of

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[4]The EPA recognizes and endorses the Federal Wildland Fire Policies adopted by the Departments of Interior and Agriculture in December 1995. These policies refer to all fires on sparsely populated lands managed by Federal agencies (e.g., national parks, national forests, grasslands, etc.) as wildland fires. The wildland fires term includes unwanted fires that do not meet a prescription (wildfires), management-ignited prescribed fires, and naturally-ignited fires that meet a prescription (prescribed natural fire). Only wildland fires that meet a prescription may be used to accomplish land and resource management objectives.

forest harvest residues, agricultural burning, and fires for land clearing are not covered by this natural events policy. The EPA will develop broader guidance in the near future to address issues raised by smoke emissions from wildland prescribed fires and other policy issues surrounding prevention of significant deterioration, conformity, visibility protection programs and regional haze.

High Winds : Ambient PM-10 concentrations due to dust raised by unusually high winds will be treated as due to uncontrollable natural events under the following conditions: (1) the dust originated from nonanthropogenic sources, or (2) the dust originated from anthropogenic sources controlled with best available control measures (BACM). [5]

The BACM must be implemented at contributing anthropogenic sources of dust in order for PM-10 NAAQS exceedances to be treated as due to uncontrollable natural events under this policy. Therefore, BACM must be implemented for anthropogenic dust sources contributing to NAAQS exceedances in attainment and unclassifiable areas and in moderate PM-10 nonattainment areas. In unclassifiable and attainment areas, BACM must be implemented for those contributing sources for which it has been defined within 3 years after the first NAAQS violation attributed to high wind events or from the date of this policy. In these same areas, implementation should be as expeditious as practicable for sources for which BACM are undefined.

The conditions that create high wind events vary from area to area with soil type, precipitation and the speed of wind gusts. Therefore, the State must determine the unusually high wind conditions that will overcome BACM in each region or subregion of the State.

Response to NAAQS Violations

If natural events cause ambient concentrations of PM-10 to violate a NAAQS, a plan should be developed to address future

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[5]BACM for PM-10 are techniques that achieve the maximum degree of emissions reduction from a source as determined on a case-by-case basis considering technological and economic feasibility (59 FR 42010, August 16, 1994).

events.[6] A natural events action plan (NEAP) should include commitments to:

1. Establish public notification and education programs. Such programs may be designed to educate the public about the short-term and long-term harmful effects that high concentrations of PM-10 could have on their health and inform them that: (a) certain types of natural events affect the air quality of the area periodically, (b) a natural event is imminent, and (c) specific actions are being taken to minimize the health impacts of events.

2. Minimize public exposure to high concentrations of PM-10 due to future natural events. Programs to minimize public exposure should: (a) identify the people most at risk, (b) notify the at-risk population that a natural event is imminent or currently taking place, (c) suggest actions to be taken by the public to minimize their exposure to high concentrations of PM-10, and (d) suggest precautions to take if exposure cannot be avoided.

3. Abate or minimize appropriate contributing controllable sources of PM-10. Programs to minimize PM-10 emissions may include:

(a) volcanic and seismic activities - cleaning ash and dust deposits from areas where it would be re-entrained into the air by anthropogenic activities;

(b) wildland fires - prohibition of other burning activities during wildland fire events and steps to minimize fuel loadings in areas vulnerable to fire. Appropriate suppression actions, as determined by the wildlands manager, should be taken for fires that do not meet a prescription. The Federal Wildland Fire Policies require that fire management plans (FMP) be developed

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[6]The annual PM-10 NAAQS is violated if the expected average annual arithmetic mean concentration for the past 3 calendar years is greater than 50 $\mu g/m^3$. Several elevated 24-hour PM-10 concentrations caused by natural events can potentially cause the annual NAAQS (which is an annual arithmetic mean of 24-hour concentrations) to be exceeded. If natural events cause the annual NAAQS to be violated, one NEAP for the area will cover both the 24-hour and annual NAAQS.

for all Federal lands with burnable vegetation. [7] It is anticipated that a goal of FMP will be to prevent NAAQS exceedances caused by wildland fires. Therefore, EPA envisions treating future FMP as acceptable plans for mitigating the public health impacts of smoke from wildland fires on Federal lands. Similar FMP should be developed to serve the same purpose for State and private wildlands.

(c) High winds - application of BACM to any sources of soil that have been disturbed by anthropogenic activities. The BACM application criteria require analysis of the technological and economic feasibility of individual control measures on a case-by-case basis. The NEAP should include analyses of BACM for contributing sources. The BACM for windblown dust include, but are not limited to, application of chemical dust suppressants to unpaved roads, parking lots and open areas; dust suppression at construction sites; use of conservation farming practices on agricultural lands; tree

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[7]FMP are not in place for all Federal lands at this time. These plans will be developed by Federal land managers in conjunction with all stakeholders including Federal, State and local air management agencies. The FMP will integrate fire, as a natural ecological process, into land and resource management plans and will form the basis for management actions taken on wildland fires. The FMP must include prescriptions for any use of fire to meet land and resource management objectives.

The EPA anticipates that FMP will achieve an acceptable balance between forest health and public health concerns. Public health concerns caused by the potential effects of smoke on air quality from wildland fires will be addressed in FMP through smoke management plans and other measures. Smoke management plans attempt to minimize smoke impacts by monitoring fire behavior, meteorology and air quality during the fire and by publicly announcing forecasts of likely smoke conditions in communities impacted by ongoing fires. Since FMP will treat fire as a natural ecological process, the impact of wildland fires on air quality and regional haze is expected to increase in the future. Therefore, EPA will encourage Federal land management agencies to support air quality monitoring near fires, to assess air and haze impacts, and to develop a fire information data base and regional-scale smoke management plans.

rows and other physical wind breaks; restricting or prohibiting recreational off-road vehicle activities; and use of surface coverings. If BACM are not defined for the anthropogenic sources in question, step 4 below is required.

4. Identify, study and implement practical mitigating measures as necessary. The NEAP may include commitments to conduct pilot tests of new emission reduction techniques. For example, it may be desirable to test the feasibility and effectiveness of new strategies for minimizing sources of windblown dust through pilot programs. The plan must include a timely schedule for conducting such studies and implementing measures that are technologically and economically feasible.

5. Periodically reevaluate: (a) the conditions causing violations of a PM-10 NAAQS in the area, (b) the status of implementation of the NEAP, and (c) the adequacy of the actions being implemented. The State should reevaluate the NEAP for an area every 5 years at a minimum and make appropriate changes to the plan.

Form and Timing of the Response

The NEAP should be developed by the State air pollution control agency in conjunction with the stakeholders affected by the plan. Development of a NEAP for wildland fires should include input from Federal, State and private land managers in areas vulnerable to fire. Also, agencies responsible for suppressing fires and the citizens in the affected area should be involved in developing the plan. Development of a NEAP for high- wind events should include input from Federal, State and private managers of open desert lands, rangelands, agricultural lands; the construction industry; and organizations promoting the use of recreational off-road vehicles. Development of a NEAP for volcanic and seismic activities should include input from geophysicists and public works officials who will be responsible for ash removal and disposal. The plan should include documented agreements among the stakeholders as to planned actions, the implementation schedule, and the parties responsible for carrying out those actions.

At a minimum, States should develop NEAP for any areas where natural events cause or have caused a PM-10 NAAQS to be violated within 18 months of the violation or the date this policy is issued. The NEAP should be made available for public

review and comment and may, but are not required to, be adopted as revisions to the SIP if current SIP rules are not revised. Final plans should be submitted to EPA for review and comment.

Documentation of Natural Events

In circumstances where a State has reason to believe that natural events have caused measured exceedances of the NAAQS, the State is responsible for establishing a clear causal relationship between the measured exceedance and the natural event. Supporting documentation concerning the natural event could include filter analysis, meteorological data (e.g., wind speed and wind direction to support a source receptor relationship), modeling and receptor analysis, videos and/or photographs of the event and the resulting emissions, maps of the area showing sources of emissions and the area affected by the event, and news accounts of the event.

In the case of high-wind events where the sources of dust are anthropogenic, the State must document that BACM were required for those sources, and the sources were in compliance at the time of the high-wind event. If BACM are not required for some dust sources, the NEAP developed must include agreements with appropriate stakeholders to minimize future emissions from such sources using BACM.

The type and amount of documentation provided for each event should be sufficient to demonstrate that the natural event occurred, and that it impacted a particular monitoring site in such a way as to cause the PM-10 concentrations measured. This documentation should also provide evidence that, absent the emissions from the natural event, concentrations of PM-10 at the monitoring site under consideration would not cause a NAAQS exceedance.

The State should also make the documentation of natural events and their impact on measured air quality available to the public for review. This may be accomplished through a number of means, such as the publishing of newspaper announcements, periodic reports on air quality in the area, and through public hearings. This would serve to allow the public an opportunity to comment on whether the causal relationship between the natural event and the air quality measurement is convincing. Also, open hearings, where State and local regulatory boards review the documentation, are

useful forums in which to notify the public of potentially-important policy decisions.

When air quality data affected by a natural event are submitted to EPA for inclusion into the AIRS data base, the State should request that a flag be placed on the data to indicate that a natural event was involved. Documentation to support the flagged data should be maintained by the State. A copy of the documentation should be sent to the relevant EPA Regional Office monitoring representative no later than 180 days from the time the exceedance occurred or from the date of this policy for past events. The Regional Office will acknowledge receipt of the documentation and confirm that the natural event data were flagged within 60 days.

Current PM-10 Nonattainment Areas

States may request that a moderate nonattainment area not be reclassified as serious if it can be demonstrated that the area would attain the standards by the statutory attainment date but for emissions caused by natural events. Similarly, States may request redesignation of nonattainment areas to attainment if it can be demonstrated that the area would be meeting the NAAQS but for the emissions caused by natural events. This policy applies to emissions caused by natural events that have occurred since January 1, 1994. [8]

Approval of the above requests will be made by EPA on a case-by-case basis as determined by the sufficiency of the information submitted by the State to substantiate its claim. At a minimum, the State must have adopted a SIP for the area which demonstrates that, but for the emissions from natural events, the area would be able to attain the NAAQS. All of the requirements under section 107(d)(3)(E) of the Act must also be satisfied before an area can be redesignated to attainment. Those requirements include the submittal of a maintenance plan under section 175A, among other things. The

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[8]The 1990 Amendments to the Clean Air Act required that control measures for anthropogenic sources in PM-10 nonattainment areas be implemented by the end of 1993. Therefore, this policy is made retroactive to January 1, 1994 so that NAAQS exceedances that may prevent areas from having sufficient clean air quality data to meet the standards will be covered by this policy.

maintenance plan for areas affected by natural events must include a NEAP.

Failure to Submit a Natural Events Action Plan

If a State fails to submit an adequate NEAP within 18 months in response to violations of a PM-10 NAAQS, EPA will notify the governor of the State that the area should be redesignated as nonattainment. The EPA's action, in such instances, would be authorized under the Act based on the conclusion that the health of citizens affected by such events is not being protected by the State.

Once the area violating the NAAQS is designated nonattainment, the State will be required to adopt a federally- enforceable SIP revision and address the sources of PM-10 emissions. Most likely, the SIP revision will include many of the same mitigative measures that could have been included in a NEAP.

APPENDIX

INTERPRETATION OF THE CLEAN AIR ACT (ACT) AS AMENDED IN 1990

Section 107(d)(4)(B) of the Act, as amended in 1990, provided EPA with the authority to designate initial areas as nonattainment for PM-10. Where such determinations involved an assessment of a potential PM-10 nonattainment area's air quality data, Congress expressly required such assessments to be made in accordance with Appendix K (section 107(d)(4)(B)(ii)). Since, upon enactment, Congress did not alter or revise Appendix K in any way, all the provisions of Appendix K, including section 2.4, remained applicable under the Act. Among other things, section 2.4 authorizes EPA to discount air quality data that are attributable to "an uncontrollable event caused by natural sources" of PM-10. Consequently, if an area's nonattainment problem was attributable to uncontrollable natural sources, application of section 2.4 of Appendix K would allow the data from the uncontrollable natural event to be excluded from regulatory determinations regarding an area's nonattainment status.

The Act also added section 188(f) which specifically addresses the adverse influence of nonanthropogenic PM-10 sources. This section provides EPA with discretionary authority to waive a specific attainment date for all areas or certain planning requirements for serious PM-10 nonattainment areas that are significantly impacted by nonanthropogenic sources.

The EPA previously interpreted the inclusion of such an express waiver provision in the 1990 Amendments as implying that Congress may have intended to limit the application of section 2.4 of Appendix K. The argument in support of this interpretation was that in contrast to section 2.4 of Appendix K, which contemplates the discounting of data due to emissions from certain events, the section 188(f) waiver provisions envisioned that adjustments prompted by adverse air quality impacts that are attributable to data from natural uncontrollable sources of PM-10 should be made only after all the data have been considered and the area has been designated nonattainment.

The EPA, however, believes that this is not the only reasonable interpretation of the Act's provisions that is possible. The EPA believes that the congressional directive in section 107(d)(4)(B)(ii) to base designation decisions on

Appendix K, and the differences in how section 188(f) and Appendix K address issues related to emissions from natural sources, indicate that it is not necessary to conclude that section 188(f) limits the application of section 2.4 of Appendix K. Rather, it is possible to view both section 188(f) and section 2.4 of Appendix K as being operative and dealing with related but distinct aspects of the issues connected with emissions from natural PM-10 sources.

The starting point for this analysis is section 107(d)(4)(B)(ii), which, by operation of law, designated nonattainment any area with data showing a violation of the PM-10 NAAQS before January 1, 1989 "(as determined under part 50, appendix K of title 40 of the Code of Federal Regulations)." In that section, Congress required the use of Appendix K in designating areas nonattainment without indicating that any portion of Appendix K was to be considered invalid. Thus, that provision indicates that Congress intended designation decisions to be based on that appendix, including the procedures in section 2.4 regarding exceptional events.

Notably, section 2.4 defines an exceptional event as "an uncontrollable event caused by natural sources of particulate matter or an event that is not expected to recur at a given location." Thus, exceptional events include both uncontrollable natural sources and nonrecurring events related to any kind of source of particulate matter. Section 2.4 further provides that data from such events may be discounted (i.e., EPA may compensate for such data or exclude such data entirely from decisions regarding an area). Consequently, Appendix K contemplates that data from "exceptional events" may be discounted, including, but not limited to, data due to emissions from uncontrollable natural events.

On the other hand, section 188(f), which was enacted by Congress in the same amendments as section 107(d)(4)(B)(ii), discusses PM-10 natural sources in terms of whether they are "anthropogenic" or "nonanthropogenic." It does not discuss such sources or emissions in the terms of Appendix K (i.e., it does not discuss matters in terms of exceptional or nonexceptional events, nor does it distinguish between uncontrollable and controllable natural sources). In general, section 188(f) provides that EPA may waive certain requirements where EPA determines that anthropogenic sources do not contribute significantly to a violation of the PM-10 standard, and that EPA may waive a specific attainment date if

it determines that the contribution of nonanthropogenic emissions to a violation is demonstrated to be "significant."

As Congress, without express exception, directed the use of Appendix K in determining whether areas were attaining the PM-10 standard, EPA believes it is reasonable to interpret section 188(f) as not limiting the use of that appendix, provided that such an interpretation does not render section 188(f) invalid. The EPA believes that the approach taken in this natural events policy does not do that, and that it represents a reasonable harmonization of these provisions of the Act and the language of Appendix K regarding exceptional events.

Under EPA's revised interpretation, section 188(f) continues to have force and effect. As section 188(f) addresses the issues in terms of "anthropogenic" and "nonanthropogenic" sources, not in terms of exceptional events (which are defined in Appendix K as both uncontrollable natural events and nonrecurring events from both natural and other sources), it is possible to view the waivers of section 188(f) as being potentially applicable only to areas that are designated nonattainment because the data do not qualify for adjustment under Appendix K. For such areas, it may be reasonable and appropriate to grant waivers from some requirements that simply do not make sense in light of the nature of the sources generating the PM-10 problem in the area. Thus, EPA's new interpretation does not render section 188(f) meaningless. Consequently, EPA believes that the exercise of its discretionary authority under Appendix K to discount or de-weight air quality data that are affected by uncontrollable natural sources of PM-10 is reasonable and appropriate.

ATTACHMENT 2

POLICY ON PM2.5 NATURAL EVENTS

October 20, 2003

NOTE TO: Director, Air Program Division
Regions I-X

FROM: Lydia Wegman, Director
Air Quality Strategies and Standards Division (AQSSD)

SUBJECT: Policy on PM-2.5 Natural Events Issues

This note is to provide guidance concerning the handling of Fine Particle (PM-2.5) data where States have requested that the data be treated as being affected by uncontrollable or natural events. EPA has general authority to make decisions concerning PM-2.5 data determined to be affected by natural events under 40 CFR Part 50, Appendix N. Appendix N generally sets forth what is needed to determine whether the PM-2.5 standards are met, based on three consecutive, complete calendar years of air quality data. Section 1.0(b) of Appendix N allows EPA to apply special consideration to data affected by uncontrollable or natural events. While all valid ambient air quality data should be submitted to EPA via the Air Quality System (AQS) database, appendix N provides that in some cases it may be appropriate for the Regional Administrator to exclude data that has been appropriately flagged in the AQS database from calculations in determining whether an area has attained the standard or not. These decisions are to be made on a case by case basis using all available information related to the event under consideration, and should be made available to the public for review. In order to make sure that decisions concerning the exclusion of data for regulatory purposes for PM-2.5 are handled in a consistent manner, both Regional Offices and States should follow the current PM-10 guidance in order to resolve issues related to uncontrollable and natural events.

The following documents should be applied in assessing events affecting PM-2.5 data:

- Areas Affected by PM-10 Natural Events, Memorandum from Mary D. Nichols, Assistant Administrator for Air and Radiation, to EPA Regional Office Air Program Directors, May 30, 1996.
(http://www.epa.gov/ttn/oarpg/t1/memoranda/nepol.pdf)

- Interim Air Quality Policy on Wildland and Prescribed Fires, Memorandum from Richard D. Wilson, Acting Assistant Administrator for Air and Radiation, to EPA Regional Administrators, May 15, 1998.
(http://www.epa.gov/ttn/oarpg/t1/memoranda/wilson.pdf)

- Guidance on the Identification and Use of Air Quality Data Affected by Exceptional Events, EPA 450/4-86-007, July, 1986.
(http://www.epa.gov/ttn/amtic/files/ambient/criteria/reldocs/4-86-007.pdf)

While OAQPS in the coming months will be reviewing the need to draft further guidance concerning how to handle data affected by natural and uncontrollable events related to the

Particulate Matter standards, it is recommended that the aforementioned guidance continue to be followed, and the Regional Offices continue to work with States to resolve these issues. In order to make sure that prompt attention is given to data flagged as natural events it is recommended that Regional Offices review the data related to PM-2.5 on a quarterly basis in order to keep track of data issues that could affect an area's attainment of the annual standard. These issues should also be discussed with the affected States to make sure that the appropriate documentation is provided and that Natural Event Action Plans (NEAP) are being developed where necessary. Please feel free to contact OAQPS for assistance in these matters if necessary.

I trust that this note will be helpful in making decisions concerning PM-2.5 data affected by uncontrollable and natural events. If there are further questions concerning this issue please feel free to contact Larry Wallace (919) 541-0906 for policy questions and Mark Schmidt (919) 541-2416 for technical questions related to PM-2.5 data.

ATTACHMENT 3

REQUEST TO FLAG PM10 EXCEEDANCES AS NATURAL EVENTS DUE TO WILDFIRES

Air Resources Board

Terry Tamminen
Agency Secretary

Alan C. Lloyd, Ph.D.
Chairman
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Arnold Schwarzenegger
Governor

April 21, 2004

Mr. John Kennedy, Chief
Technical Support Office (AIR-7)
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Kennedy:

Attached you will find documentation supporting the San Diego, Mojave Desert, South Coast, and Imperial County Air District requests to flag the PM10 exceedances at the monitoring sites and dates listed in Attachment 1 as natural events due to wildfires.

The 1996 United States Environmental Protection Agency (U. S. EPA) policy for areas affected by PM10 natural events allows such data to be flagged and thus excluded from consideration by U. S. EPA when making decisions related to the attainment status of an area. This policy requires that States submit documentation to support flagging to the appropriate U. S. EPA Regional Office.

We are formally requesting that you flag these exceedances as PM10 natural events and send confirmation to us by letter after the data have been flagged. If you have any questions regarding the enclosed documentation, please contact Karen Magliano at (916) 322-7137 or via email at kmaglian@arb.ca.gov.

Sincerely,

/s/

Robert D. Fletcher, Chief
Planning and Technical Support Division

Attachments

cc: see next page

cc: Mr. Reyes Romero
Deputy Air Pollution Control Officer
Imperial County Air Pollution Control District
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El Centro, California 92243-2850

Ms. Elaine Chang, DrPH
Deputy Executive Officer
Planning, Rule Development and Area Sources
South Coast Air Quality Management District
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Mr. Alan DeSalvio
Mojave Desert Air Quality Management District
14306 Park Avenue
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Ms. Judy Lake
San Diego Air Pollution Control District
9150 Chesapeake Drive
San Diego, California 92123-1096

Karen Magliano, Manager
Particulate Matter Analysis Section

bcc: Via email:

Lynn Terry, EO
Bob Effa, PTSD
Cynthia Marvin, PTSD
Sylvia Oey, PTSD
Rich Hackney, PTSD
Gabe Ruiz, PTSD
Joe Calavita, PTSD
Lucille Van Ommering, PTSD

Via hard copy:

PTSD Chron File
AQDB Chron File
AQTPB Chron File
Assignment Number 4430

//div/Natural Events/wildfire_oct_2003_submittals.doc

Attachment 1

Exceptional Event Analysis of PM10 Federal Exceedances Between October 24, 2003 and November 23, 2004 in San Diego, Mojave Desert, South Coast, and Imperial County Air Districts

During late October 2003, a large number of severe wildfires swept through Southern California. These wildfires led to a number of exceedances of the federal PM10 standard throughout the region. A summary of the monitoring sites and dates affected, and the resulting PM10 concentrations are provided in Table 1. Documentation of the location and extent of the wildfires in provided in the following attachments:

- Attachment A: Documentation prepared by ARB - "Air Quality and the Wildland Fires of Southern California October, 2003"

- Attachment B: Documentation provided by Imperial County Air Pollution Control District on March 23, 2004

- Attachment C: News Accounts of Resuspended Ash Impacts in San Diego Area

During this period, there were nine distinct fires, from Ventura County in the north to the U.S. Mexican border in the south, burning nearly three-quarters of a million acres of land. The first fires began on October 21, 2003, and the fires were not fully contained until early November. The PM10 exceedances listed in Table 1 for October 24, 2003 through October 30, 2003 were all due to the direct impact of smoke from the wildfires (Attachments A and B). In late November 2003, strong Santa Ana winds with gusts of over 40 miles per hour hit the San Diego area, re-entraining ash from fire damaged areas (Attachment C). The PM10 exceedances on November 23 were due to significant impacts from this resuspended ash, and as such, we believe should also be identified as natural events due to residual wildfire impacts.

Table 1: Monitoring Site Locations and Dates of PM10 Exceedances

Air District	Location	PM10 Concentration (ug/m^3)	Date of Exceedance
Imperial	Calexico-Ethel	214	October 24, 2003
Imperial	Calexico-Grant	174	October 24, 2003
Imperial	Calexico-Ethel	238	October 30, 2003
Imperial	El Centro-9th	180	October 30, 2003
Imperial	Brawley-Main	509	October 30, 2003
Imperial	Westmoreland	540	October 30, 2003
Imperial	Niland-English	402	October 30, 2003
San Diego	Escondido	179	October 29, 2003
San Diego	El Cajon	230	November 23, 2003
San Diego	San Diego-Overland	280	November 23, 2003
Mojave Desert	Victorville	181	October 30, 2003
South Coast	Riverside-Rubidoux	164	October 27, 2003

Attachment A

Documentation prepared by ARB - "Air Quality and the Wildland Fires of Southern California October, 2003"

Air Quality and the Wildland Fires of Southern California October, 2003

A preliminary review of particulate matter, air toxics, and carbon monoxide

California Air Resources Board
Emergency Response Team
December, 2003

A powerful group of wildland fires struck the southern California area as the 2003 fire season began to wind down. Strong, dry winds from the desert fanned flames from as many as nine distinct fires from Ventura County in the north, to the U.S. Mexican border in the south. The fires burned nearly three-quarters of a million acres of land and destroyed approximately 5000 residences and outbuildings. Almost half of the acreage that burned was in San Diego County alone. The smoke from the fires formed an enormous blanket that covered much of the Southland for days.

Figure 1- Midnight at noon in San Diego County

The fires began on October 21 in the northern counties and were generally contained by early November. The large smoke plumes made it relatively easy to assess the size

and location of the fires, and provided information about the direction the pollutants would initially drift. Individual visual observations were aided by daily statements, forecasts, and alerts produced by local air quality districts and weather services. The plume gradually reached the ground and brought smoke at high concentrations into heavily populated areas. Throughout the region activities were halted and businesses closed as people responded to avoid or reduce their exposure to the smoke.

Figure 2- Smoke plumes over southern California skies

A network of air monitors, operated by the local air pollution districts tracked particulate matter movement and were key in developing reports of the day's pollutant levels. The Ventura County Air Pollution Control District (APCD), the South Coast Air Quality Management District (AQMD), the San Diego County APCD (SDCAPCD), and the Mojave Desert AQMD posted particulate matter (PM) air quality information on their web pages for the current day and forecast for the following day. The California Air Pollution Control Officers Association (CAPCOA) consolidated the districts' web offerings onto a one-stop web page, '*Smoke Impact*.' The CAPCOA web page included publications about fires posted by the California Air Resources Board (ARB) and the U.S. Environmental Protection Agency (USEPA) that dealt with personal exposure, risk reduction, and effective personal protective equipment.

Air toxics were a concern as well because of the magnitude of the fires and that past studies confirmed the potential for toxics to be emitted during wildland fires. Air agencies were able to collect several samples from their urban air toxics sampling networks during the fire that were analyzed for compounds known to be carcinogenic. Several additional samples were analyzed for air toxics at non-network sites in San Diego County, and the USEPA-Region 9 took several 'near fire' samples in the mountain community of Julian toward the end of the fire. The ARB provided laboratory

analyses for PM and air toxics (volatile organic compounds (VOC), carbonyls, polycyclic aromatic hydrocarbons (PAH), and metals).

The health effects from air pollutants can be divided into three categories: acute and chronic noncancer, and cancer. Acute noncancer health effects can occur after short duration exposure to relatively high concentrations. Chronic noncancer health effects can occur after exposure to pollutants for longer periods of time. The severity of exposure for some components in smoke are contained in Acute and Chronic Reference Exposure Level Health Standards from the Office of Environmental Health Hazard Assessment. These health standards are “safe levels” for short term (acute) or long term (chronic) exposure. However, many of the chemicals emitted by forest fires may not have health values because they are uncommon except when generated by combustion. Regardless, the respiratory irritation from exposure to chemicals in smoke can be particularly serious for those with pre-existing lung disease (e.g. asthma).

Fires and other types of combustion can generate cancer-causing chemicals as well. The total amount of these chemicals that a person is exposed to over time determines the amount of excess risk of cancer. Somewhat higher exposures during relatively short duration events, such as a forest fire, are not likely to be significant in comparison to lower concentrations from exposure over ones lifetime.

This preliminary review addresses an initial concern about PM, toxics, and carbon monoxide, and compares the sample results to various benchmarks to put the data in context that can be easily understood. The indicators used here are the state and federal ambient air quality standards, the Air Quality Index (AQI), and ambient air toxic levels from the past three years.

The ambient air quality data from the period of the fires were assembled from an assortment of single purpose air monitoring networks operated by local and state agencies. These are the particulate matter networks (PM2.5 and PM10 micron), the ambient air toxics network, the real time ‘criteria pollutant’ network, the real time

monitors that support the daily Air Quality Index (AQI), and the Photochemical Assessment Monitoring Stations (PAMS). State and local agencies operate the networks, and local air districts implement the AQI program. The USEPA developed the AQI program and was instrumental in funding a variety of monitoring networks.

1. *Particulate Matter (PM)*

Individuals with heart and lung disease and disorders are at the greatest risk to high PM levels. A range of health effects can occur in a relatively short time, and hospitalization rates for people with pre-existing conditions increase with ambient PM. The rate PM is generated varies depending on a fire's size, the fuel involved, and the fire's behavior. Tons of PM can be generated each minute from large fires. In addition, ground and airborne sampling indicates that approximately 90 percent of the particulate mass is <2 um in diameter. In this size range, particles can penetrate deeply into the lung.

1.1 PM Air Quality Standards

Particulate matter from fires is made up primarily of soot, char, and entrained dust. Gases and metals are also produced and at times reach levels of concern. The ARB and the USEPA have adopted health based air quality standards for ambient PM mass, shown in Table 1, which identifies the level above which particulate matter can impair respiratory functions. The standards for particles are divided into two size ranges, those less than or equal to 10 microns, and less than or equal to 2.5 microns in diameter.

Table 1
PM Ambient Air Quality Standards (24 hour)

	National	**State**
PM10	150 ug/m3	50 ug/m3
PM2.5	65ug/m3	--

The state PM standards were reviewed in 2003. Federal standards are undergoing scientific review at this time.

1.2 Air Quality Index (AQI)

The Air Quality Index is a uniform monitoring and data reporting program of air quality levels in urban areas. It is based on the same health evidence as are the ambient standards and is gathered and disseminated to keep the public apprised of the current ambient levels of criteria pollutants in their community. It includes several elements, but principally transforms air quality data into discrete levels with narrative for each level. It addresses individual segments of the population that may be at risk, and steps they can take to reduce their exposure.

Air districts in major urban areas develop and distribute AQI information on a daily basis to the public, local schools, and public health officials. They use a variety of print and television outlets, and a range of Internet, pager and cell resources to notify the public. The advisories identify air quality as 'Good', 'Unhealthy for Sensitive People', 'Unhealthy', 'Very Unhealthy', or 'Hazardous'. The descriptor for 'Hazardous', for example, advises that people with heart or lung disease, older adults, or children should remain indoors and keep activity levels low, and that all others should avoid all physical activity outdoors.

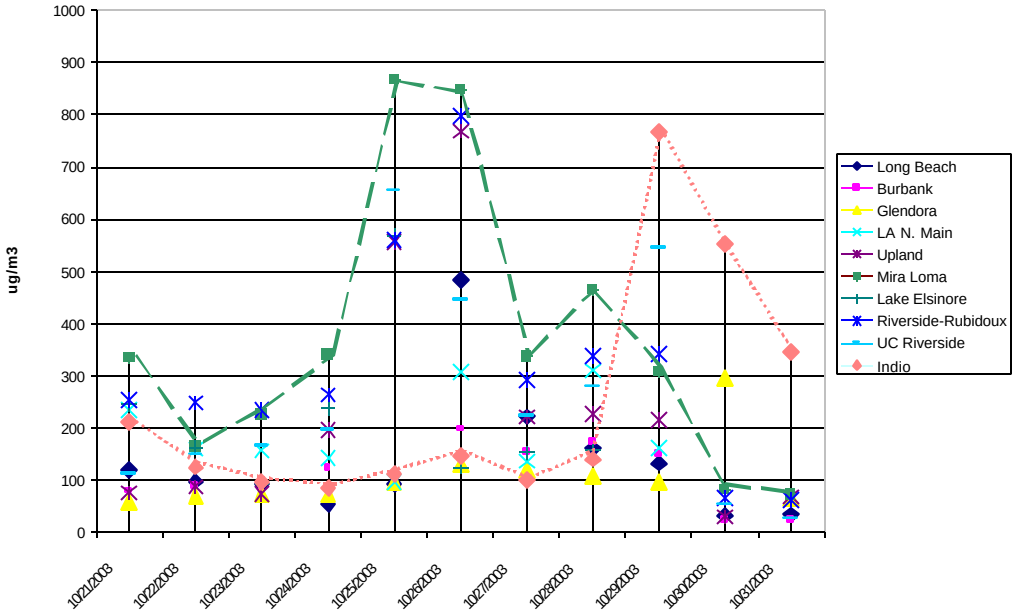
Real time PM monitors are the foundation of the AQI for fires, and are the most relevant single measurement of the air quality impairment from fires. Because of this, the alerts and warnings can be used as a general indicator of potential harm not just from PM, and should provide a measure of protection for other fire-related pollutants as well.

1.3 Summary of Particulate Matter Data

The PM data are compiled as two averaging times, one-hour, and 24-hour. This is because the time of exposure and the concentration of the pollutant affect people's responses. Of the times reported, only the 24-hour data can be compared directly to the ambient air quality standards. The one-hour data are very valuable, and are being reviewed for short-term effects, but for now they are used primarily to provide insight into the occurrence and behavior of the smoke.

Once a smoke plume reached the ground, PM levels began to soar. The peak one-hour PM 2.5 levels exceeded 500 ug/m3, and one-hour PM10 levels reached 900ug/m3 at various locations. Mid-way through the fires, the dry easterly Santa Ana winds gave way to clean moisture-laden westerly winds from the Pacific Ocean. This is evident in Figure 3 as the peak one-hour PM10 levels dropped at Mira Loma with the wind shift. However, while the ocean breezes brought relief to the coastal and inland areas, it carried the smoke-laden air to desert communities inland. The result was an abrupt increase in PM concentrations in the Coachella Valley (Indio) on October 29, and Victorville in the high desert. The plume carried as far as Las Vegas, NV where the airport reported greatly reduced visibility for several days. The South Coast area continued to record transient high one hour PM levels, although air quality was much improved throughout most of the day after October 29.

Figure 3
South Coast Air Basin
Wildland Fires
1 hr PM10 Maximum Concentrations



The federal and state PM 24-hour standards were exceeded throughout much of southern California during this time. Table 2 shows the high one-hour, and the 24-hour high values.

Table 2

Basin Maximum Particulate Matter (PM2.5) Concentrations*

Southern California Wildland Fires,

October, 2003

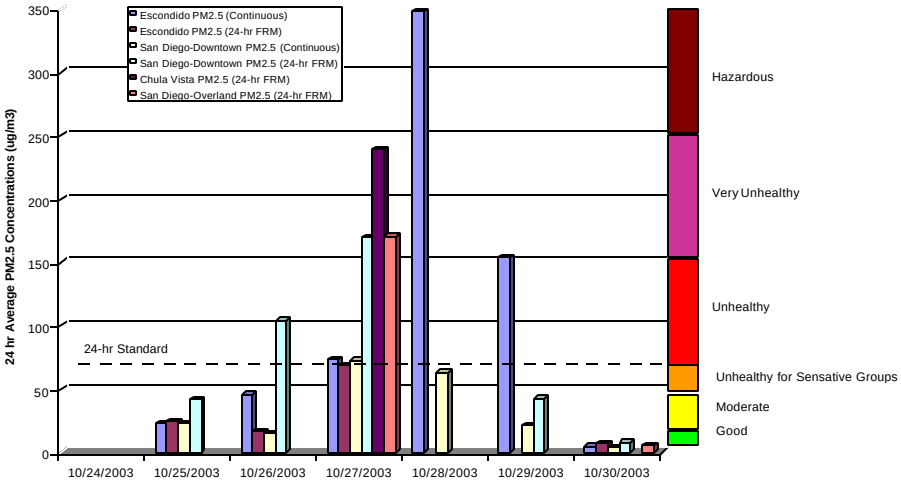
		Ventura		San Diego		South Coast		Mojave		Imperial	
		1hr	24hr	1hr	24hr	1hr	24hr	1hr	24hr	1hr	24hr
24	Fri	27	**22**								
25	Sat	33	**8**		**42**		74			549	**61**
26	Sun	220	**46**	146	**104**	347	150			124	**34**
27	Mon	199	**125**	--	**239**	118	71			111	**42**
28	Tue	303	**164**	738	**350**	569	119			96	**35**
29	Wed	154	**85**	375	**154**	218	117	~700**		175	**35**
30	Thurs	21	**14**	30	**8**	524	40			271	**59**
31	Fri	11	**7**			498	71			183	**31**
Nov 1	Sat	25	**9**			484	28			24	**11**

* Preliminary data, pending final qc review
** PM10 level was 906 ug/m3. Approximate PM2.5=700 ug/m3

The PM2.5 air quality levels in San Diego County during the fires were four to five times the federal standard. On October 27, the 24-hour PM2.5 levels in Chula Vista reached 239 ug/m3. On the following day, levels in Escondido reached 350 ug/m3. Short-term (one-hour) concentrations in San Diego exceeded 700 ug/m3 during the smokiest days.

The PM2.5 concentrations are shown with the AQI descriptors for San Diego and Ventura in Figures 4 and 5. San Diego's air quality was declared to be 'Unhealthy' on three days, and reached 'Very Unhealthy' levels twice. The Escondido levels reached the highest or 'Hazardous' levels on October 28. An AQI value of 100 generally corresponds to the 24 hour national air quality standard for PM2.5 (65 ug/m3).

Figure 4
San Diego County Wildland Fires
PM2.5 Levels- October, 2003



Particulate levels in Ventura County exceeded the air quality standard on several days. The AQI alerts for the district warned people the air was 'Very Unhealthy' on one occasion. The onshore winds that helped clear out the South Coast, beginning on October 30, cleared the smoke from Simi, Thousand Oaks (T.O.), Piru and El Rio as well.

Figure 5
Ventura County Wildland Fires
PM2.5 Levels- October, 2003

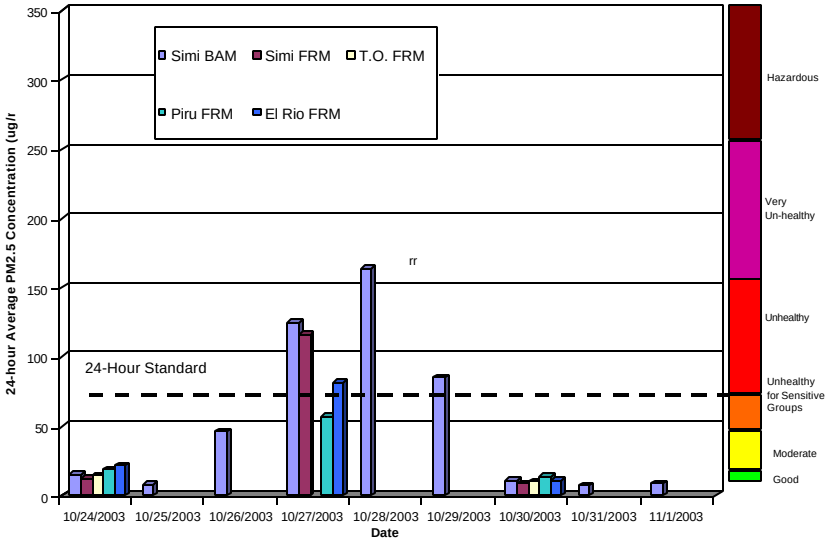


Table 3 contains a comparison of the PM2.5 concentration (24-hr average values) during the fires with those recorded in previous years. Not surprisingly, the measured PM2.5 levels during the fires had not been observed in any of the four air basins in recent years. The maximum 24-hr average values and those obtained during the fires are reported in Table 3.

Table 3

High Particulate Matter (PM2.5) Concentrations

Historical v. Fire

(24 hour Average Concentration)

Air Basin	**1999-2001** Highest 24 hour average value (ug/m3)	**2003 Wildland Fire** Highest 24 hour average value (ug/m3)
South Central Coast (Ventura Co)	64	164
South Coast	121	150
San Diego	66	350
Mojave Desert	48	na

- The federal 24-hour ambient air quality standard for PM2.5 is 65 ug/m3.

Strong Santa Ana winds returned to the San Diego area several weeks after the fires were contained and brought with them ash that had been intrained from the burned areas (Figure 6). In contrast to the very small (PM2.5) combustion aerosols that dominated the area during the fire, the particle size of the ash was considerably larger, i.e. predominantly PM10.

Figure 6- Offshore winds carry ash plume from inland burn areas. November 23, 2003

The 24-hr PM10 concentrations measured on November 23rd were: Kearny Mesa: 280; El Cajon: 230; Downtown (12th Street): 140; Escondido: 124; and Chula Vista: 75 ug/m3. The pollution levels at Kearny Mesa and El Cajon exceeded the federal and state PM10 standards, and were well above the maximum 24-hour level recorded in the District for the 1999-2001 timeframe.

2. *Air Toxics*

Wildland fire smoke can also contain a range of potentially toxic constituents. These can be generated either directly during biomass combustion, or indirectly through chemical interactions with other combustion by-products in the smoke plume. When structures are involved, incineration of household and commercial chemicals, building materials, and a variety of other non-biomass fuels are a potential concern. During a firestorm, it is also possible for trace metals to be entrained in the smoke that had been deposited over time onto vegetation, and possibly from soils that are rich in metals.

The toxic compounds reported here are grouped into volatile organic compounds and aldehydes (VOC), semi-volatile polycyclic aromatic hydrocarbons (PAH), and trace metals. Air toxics are distinguished from 'criteria pollutants' because of their acute toxic

or carcinogenic nature, and are generally not referenced to a bright line that denotes a safe level.

Unlike real time instruments, the air toxic sampler network uses manual samplers preset on timers to collect 24-hour average samples. The process requires samples collected in the field to be sent to the laboratory for analyses. Samples are scheduled on an regular, yet intermittent basis, in part due to nature of the equipment used and to the principle need for the data, i.e. long-term population exposure. Real time air toxic analyzers are not cost effective for network or rapid relocation at this time. Hand held instruments can be is especially useful as screening devices recognizing their limitations. Fortunately, during the fires, field personnel were able to obtain several extra samples.

Several sources of air toxic data were compiled for this comparison. They include samples from local air districts in Ventura, San Diego, Imperial counties, and the South Coast Air Basin. The California ARB and the San Diego County APCD conducted most of the sample analyses. The data collected in San Diego County, lead by efforts of the San Diego County APCD, provided an air toxic data record for VOC, PAH and metals analyses. Data for VOC and metals came from the California air toxic and PM2.5 networks, from several grab samples (instantaneous) samples from the San Diego County APCD, and from the District's year-around PAMS sites. The PM10 network provided filters for PAH analyses.

The USEPA took samples from three locations in the eastern portion of the San Diego Air Basin for VOC, semi-volatile compounds and metals. The Ventura County APCD and South Coast AQMD collected an additional sample at one of its air toxic network sites. With data coming from different sources, the overall data set contains, at times, dissimilar attributes.

The primary means of assessing the fire-related data was to compare it to the previous three-year average and peak values. We also compared the results of several

pollutants to their respective ambient air quality standards. There are no risk calculations presented given the short timeframe involved, however, information on airborne risk from the long-term exposure to specific chemicals detected in the fires can be found on the ARB Air Quality Data, web page.

Toxic compounds that become a health threat are generally those people are exposed to at high concentrations for a relatively short time. For example, workplace standards exist generally for eight hour (time weighted averages) and 15 minute (short term exposure limits) intervals. They are one of several benchmarks against which short term exposure can be evaluated. The other exposure scenario comes from long term (over a lifetime) exposure to lower concentrations.

Several of the more potent compounds drew the greatest interest at the outset of the fire including benzene, toluene, acrolein, formaldehyde, PAH (benzo (a) pyrene), arsenic, lead, nickel, and mercury. There was concern both for the emergency response workers, residents living near fires, and the general population.

2.1 Volatile Organic Compounds and Aldehydes (VOC)

Benzene and several VOCs were of particular interest during the fires because of their prominent contribution to toxicity in urban air. Benzene is emitted principally with toluene and the xylenes (commonly referred to as BTX) in the exhaust gases of gasoline powered engines. It is emitted to some degree during forest fires. Although benzene is not present in household products, except possibly in small amounts in some automotive and cleaning products, it is a widely used industrial chemical. The combustion of structures and their contents during the fire raised additional concern for benzene and other toxic compounds in the smoke.

Acrolein is another irritating chemical generated by forest fires and of interest for its cancer properties as well. It was added to the air toxic network target list in 2003 and as yet has no historical point of reference for comparison during the fires. Like so many other toxic compounds, it is produced during incomplete combustion in forest fires.

Aldehydes are compounds that can irritate mucous membranes of the human body. Formaldehyde is one of the most abundantly produced compounds of this class. It is also a relatively potent carcinogenic compound and is routinely found at low levels in urban air. Formaldehyde is both directly emitted into the atmosphere and formed through photochemical reactions. During fires, it is formed during wood combustion as large carbon chain molecules break down into smaller units.

2.2 Polycyclic aromatic hydrocarbons (PAH)

Polycyclic aromatic hydrocarbons (PAH) are a group of high molecular weight organic compounds that are synthesized during incomplete combustion from carbon fragments. PAH originates in low oxygen environments yet can transform to other forms depending on the fire's behavior and its combustion characteristics.

Benzo [a] pyrene (BaP) is perhaps the most thoroughly researched of the family of PAH compounds. It is a known carcinogen and has other toxic properties when inhaled. A number of the other PAH species measured do not have specific cancer potency factors, however they have been given a relative ranking compared to benzo [a] pyrene potency. The suggested potencies of other measured PAH constituents are between 10% and 40% of BaP at the same concentration.

BaP was measured at four sites in San Diego and at Simi Valley in the north. Measurements were made by the local air districts and analyzed by the ARB. The USEPA-Region 9 took samples in the Julian area.

2.3 Toxic metals

Forest fires are known to emit a variety of metals that are of concern for their cancer and/or noncancer health effects. Previous studies have indicated that metals released by forest fires are not a major risk to human health. Arsenic and mercury were of particular concern because of the potential for arsenic to be released from wood that had been treated with preservatives. Mercury is generally below detection in air

samples in California, yet it had been shown, in some parts of the country, to be reintrained during fires after being deposited onto vegetation, or from soils with high mercury levels. Lead, arsenic and nickel are detected periodically in ambient air in California.

The data for metals were obtained from filter samples collected from several sources: the air toxics network, the PM2.5 network, and additional samples sited specifically to monitor the effects of the fire. The San Diego County APCD, the California ARB, and the USEPA-Region 9 contributed staff and resources to the effort. The air toxic network samples reported here were collected by the San Diego County APCD and analyzed by the ARB. The air agencies were also able to obtain metals information from daily PM2.5 samples, which added greatly to the data base on fire impacted days. The USEPA Region 9 collected samples for metal analyses on November 1, 2003, in the mountain communities near Julian.

2.4 Air Toxic Data Summary

Several air toxic gases and metals were elevated during the fire, although the bulk of the compounds were either less than the recent basin high values for the past three years, or were below the analytical limit of detection. The levels of the various gases, metals, and PAH compounds seen during the fire have been observed within the past 10 years in the state in the absence of wildland fires.

2.4.1 Volatile Organic Compounds

Benzene, toluene, and formaldehyde were detected during the height of the fire. Formaldehyde samples collected in the mountains near Julian were the highest of the hydrocarbons compared to historical values. Benzene concentrations are presented in Figure 7 for several populated areas in southern California. The results from the 12 sites in the San Diego area were generally low, i.e. equal to or below 1 ppb, or about half the basin high level of the past three years (2.2 ppb.) The samples taken during the most intensive period of the fire (October 29) were not appreciably higher than samples taken before the smoke inundated the region. Samples taken in the South Coast were

slightly higher than those in San Diego, but only on the order of half to three fourths the three-year basin high value. The instantaneous (grab) samples taken by the SDCAPCD tended to be higher although still relatively low. Toluene and the xylene concentrations in San Diego County were about one half of the three-year peak levels in the basin.

The ratio of benzene to toluene in the air samples during the fires was consistently about 30-40% in the urban areas. This ratio is very similar to what is reported on a routine basis in the air toxic network. It also closely matches the benzene to toluene ratio that is found in gasoline powered motor vehicles exhaust gases. This suggests that during the fires, motor vehicle exhaust was the dominant source of benzene, toluene, and xylene emissions. Several samples from the mountain communities of Alpine and Julian taken toward the end of the fire reported a significantly higher benzene to toluene ratio, however. In those instances, the benzene levels themselves were comparable to those seen in urban areas. This suggests that toluene concentrations were likely lower than usual and that there were no new sources of benzene in these rural communities toward the end of the fire.

Acrolein analyses were conducted on regularly scheduled toxic network sampling days. One researcher reported that acrolein concentrations near fires could be as high as .1 to 10 ppm, and that acrolein is suspected to effect respiratory functions at levels as low as 100 ppb. Acrolein sample results on the several days that were sampled during the southern California fires were below 1 ppb in the San Diego and Ventura counties and in the South Coast.

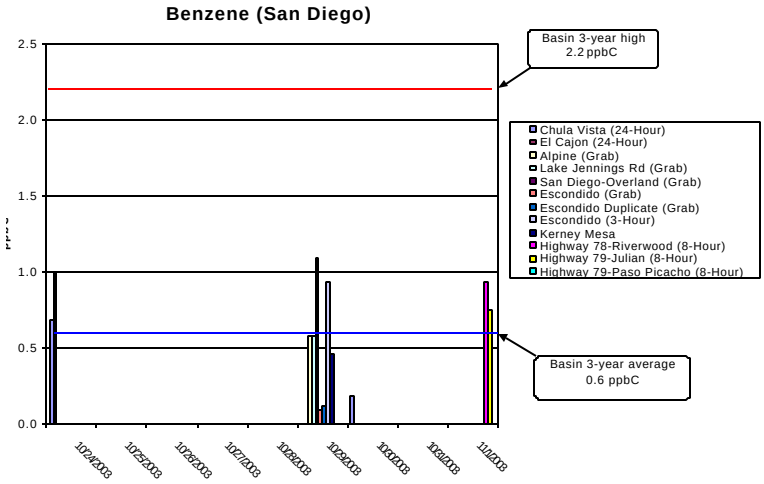
Carbonyls

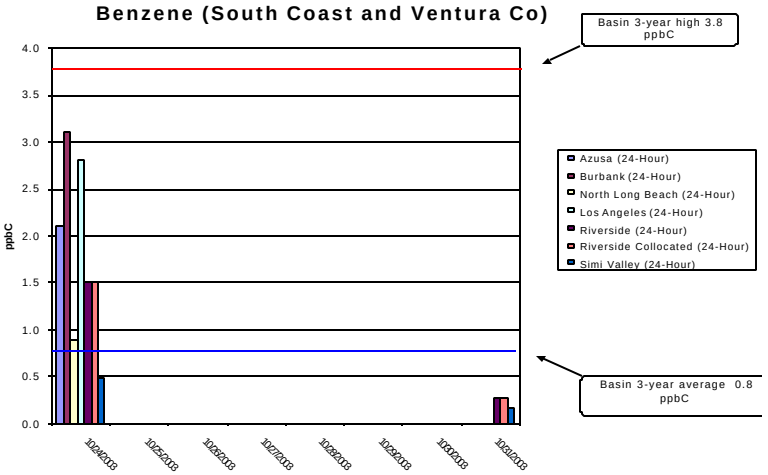
Four aldehyde samples were obtained in San Diego County during the fire. The results from them were at or above the basin average. One exceeded the peak concentration for the past three years. Formaldehyde concentrations in the Julian area exceeded the prior three-year high level by a factor of two. A value of 22 ppb was recorded in a 19-hour sample collected by the USEPA near the Cedar fire at the ‘Hiway 79-Julian’ site.

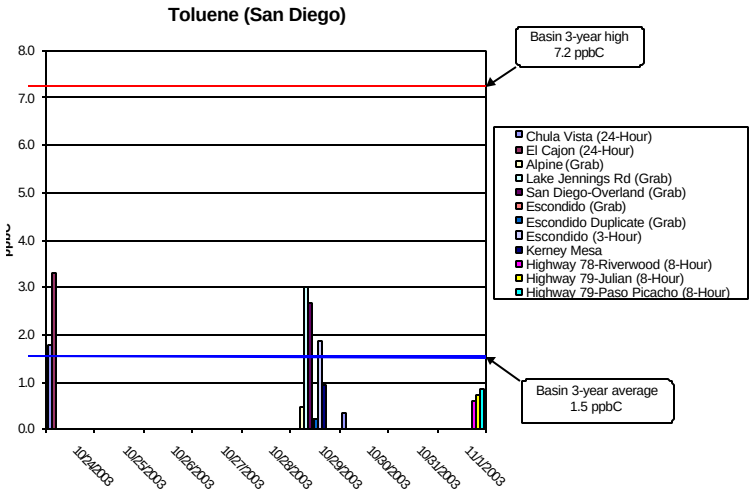
The fire was largely under control by that time, however, it did confirm the presence of formaldehyde in the area during biomass combustion.

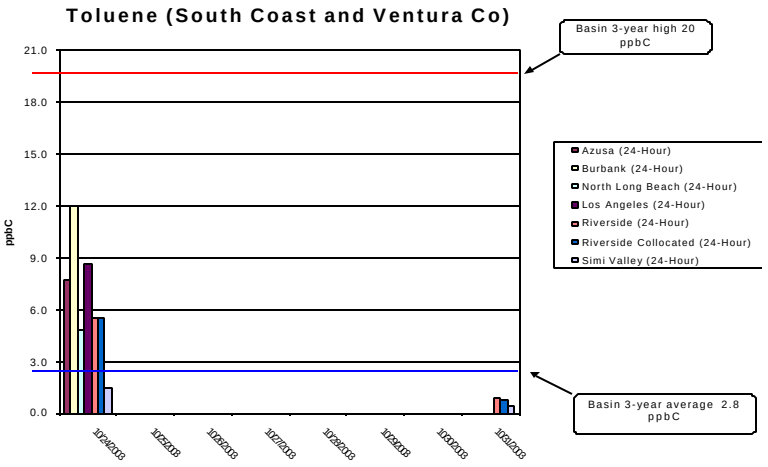
As we saw before, Riverside was heavily affected by smoke for several days on end. It is not surprising, therefore, that formaldehyde was higher at that location than at other sites in the South Coast. Despite that, the level on the highest sample day was one-half of the highest value reported over the past three years.

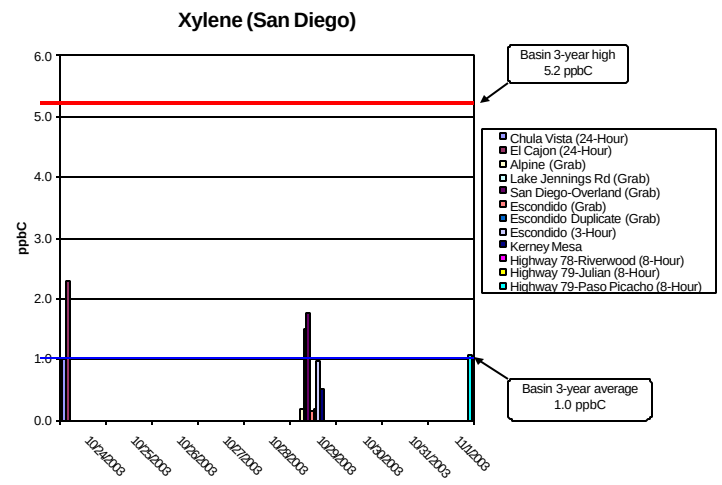
Figure 7
Toxic Gases











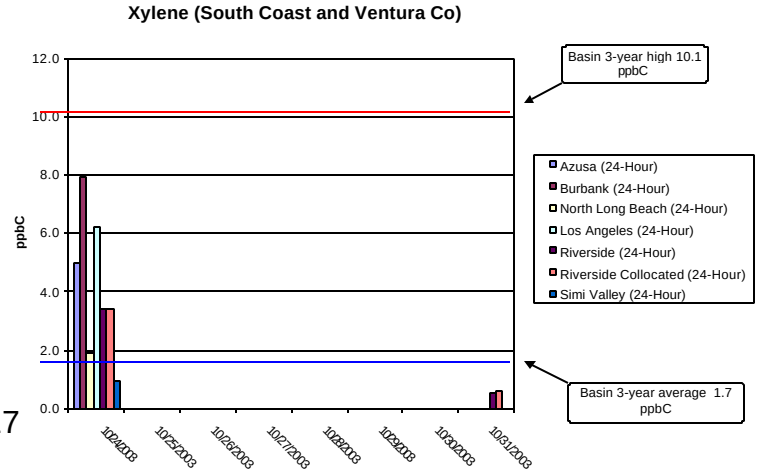
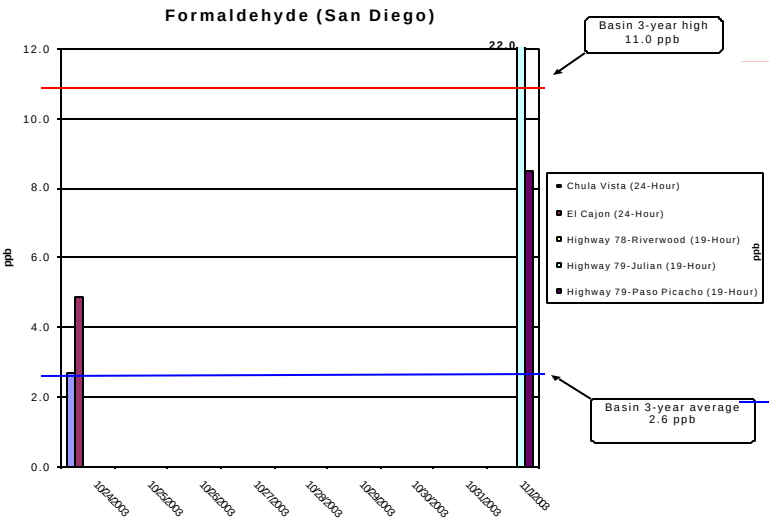
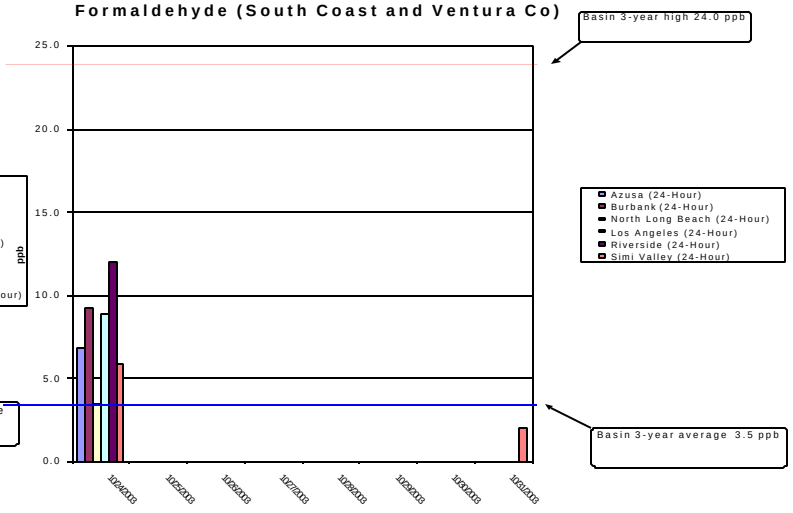
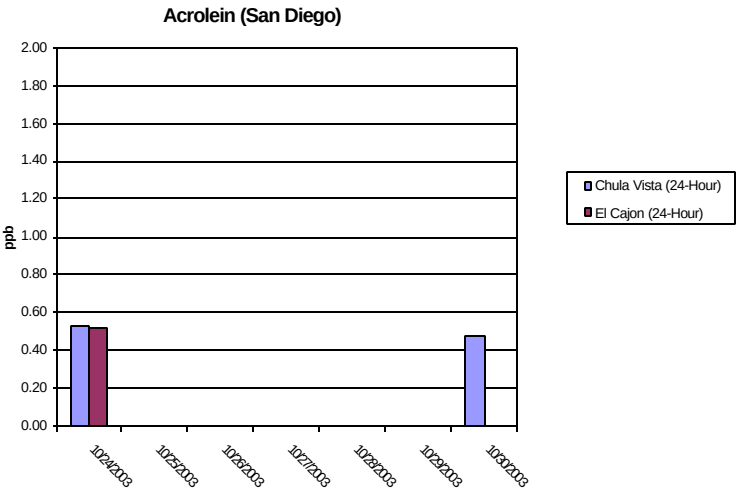


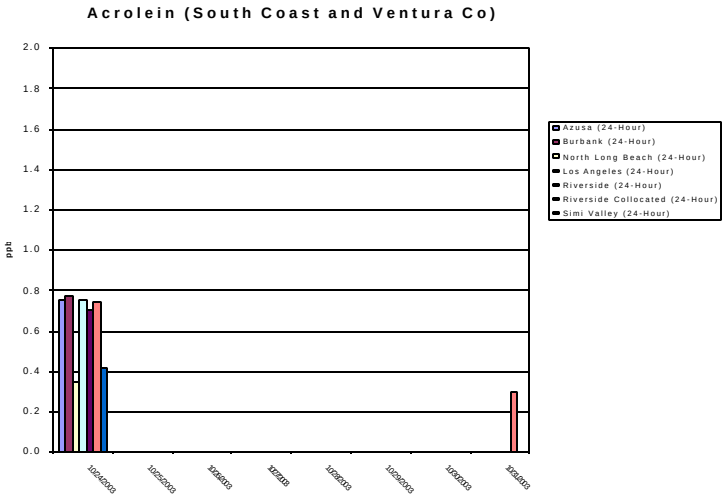
Figure 8

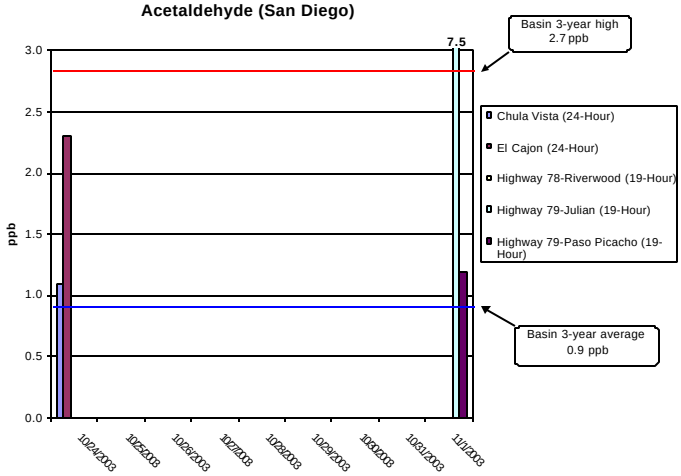
Toxic Gases

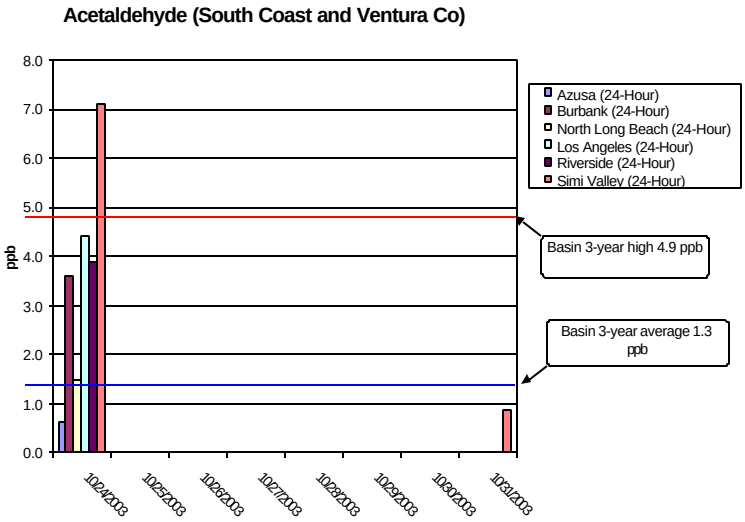












Acetaldehyde in Simi Valley, Figure 8, exceeded the three-year high values (4.9 ppm) for the Southland, and several South Coast sites approached 4 ppb.

2.4.2 Polycyclic Aromatic Hydrocarbons (PAH)

Benzo [a] pyrene has the highest potency of the six reported PAH species, however, it had the lowest reported concentration with respect to its three-year high values. Of the nine BaP samples taken in the San Diego area, only the sample on October 29 at Escondido (1.2 nanograms/cubic meter) was above the detection limit. The three-year high for the basin is 1.4 ng/m3. The five remaining PAH species exceeding their three year high levels, in some cases, by as much as three times.

Table 4

PAH Species

San Diego County

Fire and 3-Year Maximum Concentration

(ng/m3)

	Fire Max	3-year Max
Benzo (a) pyrene	1.2	1.4
Benzo (b) fluoranthene	3.6	1.3
Benzo (ghi) perylene	3.4	2.9
Benzo (k) fluoranthene	0.84	0.23
Dibenz (a,h) anthracene	0.16	0.8
Indeno (1,2,3-cd) pyrene	1.0	0.66

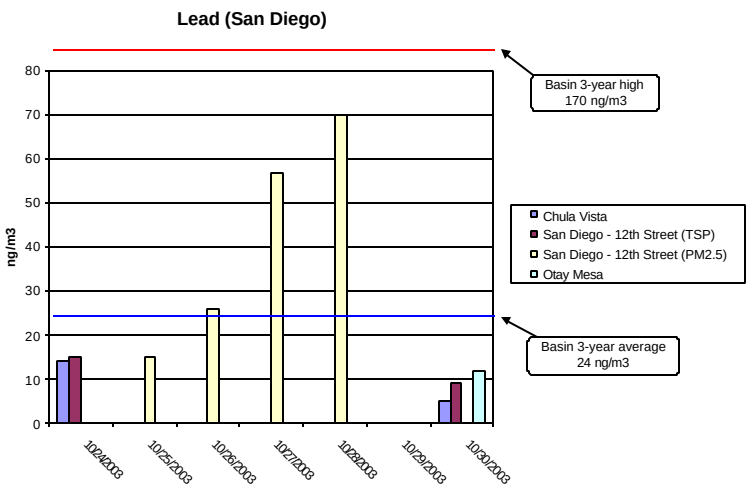
All high values occurred on October 29 in Escondido.

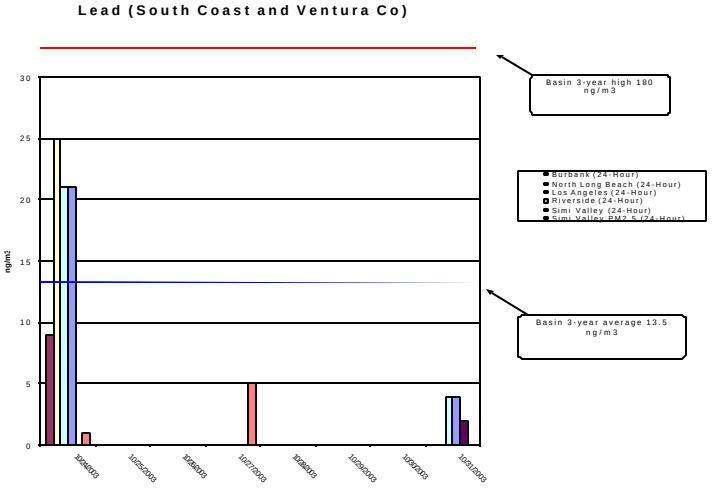
BaP samples collected in Simi Valley in Ventura County on October 24 and the 31 reported concentrations below the limit detection (<lod).

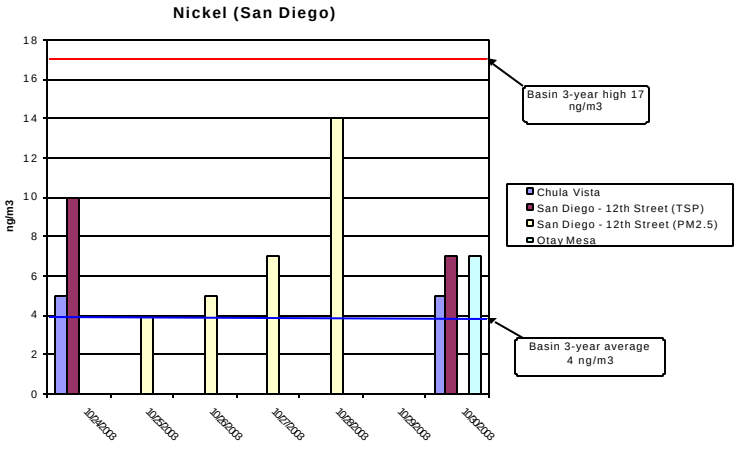
2.4.3 Toxic Metals

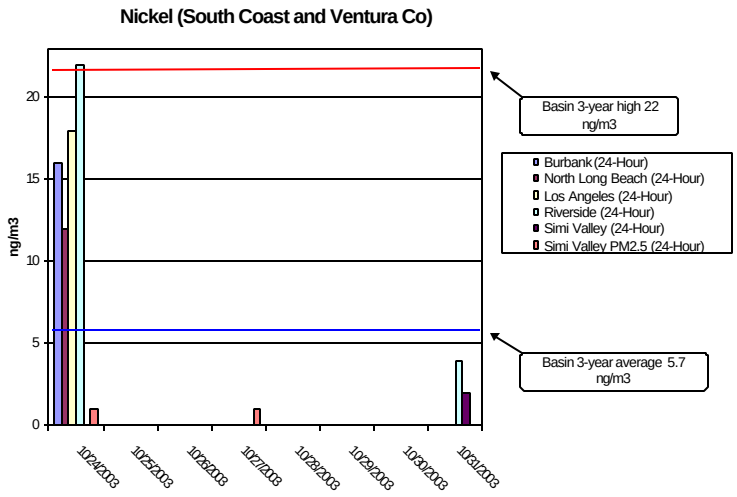
None of the four key toxic metals posed a health concern from samples that were collected in the South Coast and San Diego air basins. None of the reported concentrations exceeded their respective three-year maximum values (see Figure 9). No elemental mercury was detected (lod=0.3ng/m3) in either of two very heavily loaded PM2.5 filters in San Diego County. At the levels reported, the short or long-term risk from exposure to any of these metals appeared to be very low. All metal values in the samples taken by the USEPA-Region 9 were below their detection limit for all metals. A high detection limit in those samples, however, affected the results.

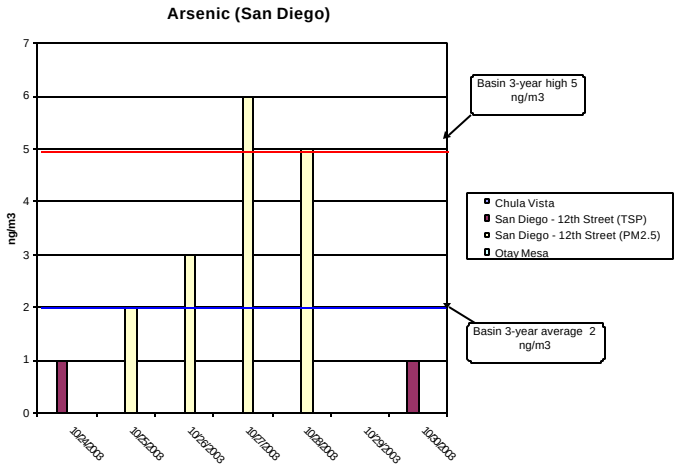
Figure 9
Toxic Metals

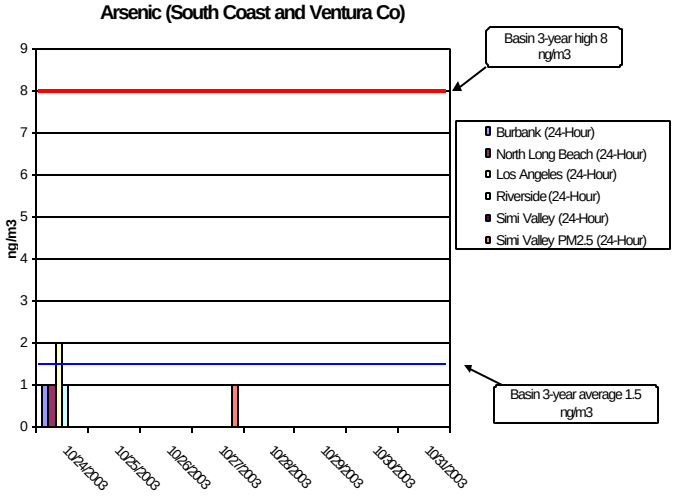












3. *Other Elements*

The air concentrations of other metals were also measured during the fire. In general, they do not cause cancer, with the exception of a type of chromium (hexavalent chromium). Hexavalent chromium is a fraction of the total chromium shown in Table 5. Neither total chromium or hexavalent chromium was released in large quantities by forest fires.

Potassium is emitted in significant quantities in forest fires and is a good marker for biomass burning. It had the greatest increase of all the metals in San Diego County, with fire related levels 10 to 20 times higher than the recent three-year peak values. Zinc levels were elevated slightly, but concentrations were no higher than in the past. All of these metals are normally present particularly in urban air, as shown by the data.

Table 5

San Diego County

Metals

	Before Fire	**3 yr Average**	**During Fire**		**3 yr Maximum**
	24-Oct		27-Oct	28-Oct	
	ng/m3	ng/m3	ng/m3	ng/m3	ng/m3
Potassium	261	549	4992	3106	1100
Iron	610	1380	328	227	3100
Chromium	4	2.4	5	5	24
Zinc	65	44.2	136	121	130
Copper	46	34.5	29	28	170
Manganese	26	25.9	33	22	58

4 . *Carbon Monoxide*

Carbon monoxide (CO) gas is also formed by incomplete combustion of carbon bearing fuels. It can show up in high concentrations near fires, however its primary source is

from motor vehicles. Carbon monoxide is a 'criteria pollutant' and, as such, can adversely affect respiratory and cardiac functions above the level of its air quality standard. It can be harmful both in high concentrations for a short period (1 hour), and at moderate concentrations over a longer period (8 hr).

The highest carbon monoxide concentrations were reported in the city of Escondido during the fire. During an eight-hour interval, between 4 am and noon on October 28, the average carbon monoxide level at Escondido (10.6 ppm) exceeded the state and federal air quality standard (9.0 ppm). No individual hour exceeded the one-hour carbon monoxide standards; 20 ppm (CA), 35 ppm (Federal). Levels at the four other urban locations shown in Table 6 were all low with respect to the standards. This is typical for the area. The region has been formally designated as attaining both carbon monoxide standards.

Table 6

Carbon Monoxide

Maximum 1 hour Values

San Diego County during the Wildland Fires

(parts per million)

	Union St	**Otay Mesa**	**Chula Vista**	**Downtown**	**Escondido**
Oct 26	**4.7**	**-**	**1.5**	**-**	**2.9**
Oct 27	**5.3**	**6.1**	**6.9**	**-**	**5.1**
Oct 28	**6.3**	**5.1**	**6.2**	**-**	**12.7***
Oct 29	**1.8**	**5.4**	**1.5**	**-**	**6.7**
Oct 30	**0.6**	**1.0**	**0.5**	**0.5**	**0.8**
Oct 31	**1.6**	**1.7**	**1.5**	**1.4**	**1.4**

* Also experienced an 8 hr average value of 10.6 ppm. The air quality standard is 9.0 ppm.

5. *Summary/Conclusion*

5.1 Particulate Matter

Particulate concentrations reached very high levels during the wildland fires and at times presented an immediate health threat to the public. The 24-hour health-based air quality standards for PM2.5 and PM10 were exceeded by large margins in many areas. AQI alerts were frequently 'Very Unhealthy' and on at least one occasion listed as "Hazardous.' The one-hour and 24-hour PM values were substantially higher than had been seen in years past for both size fractions of PM.

Data from real time PM samplers in each district proved to be invaluable. They provided air quality staff with an up-to-date understanding of PM levels, and the ability to inform the public about how to minimize their exposure, not just to PM, but other pollutants that were associated with PM in the plumes. AQI alerts were provided through a variety of media outlets, the Internet, and to schools, public health agencies and individuals with respiratory problems.

5.2 Toxics

The levels of some air toxics were high on days impacted by smoke, on the days measured, were generally less than the three year basin high values. Despite a few high concentrations all reported levels had been observed within the past 10 years in the absence of wildland fires. It is clear that additional samples, especially on the most severe smoke days, would have made the data set more complete. The conclusions in this preliminary review are presented with that limitation in mind. Exposure to some toxics for individuals near the fires or near burning structures would likely have been greater. However, it does not appear, from the available data, that the population centers were not unduly exposed to toxic air compounds.

5.3 Carbon Monoxide

Carbon monoxide levels from the fires generally dissipated by the time the plumes reached populated areas. During one intensely smoky period in Escondido, however, carbon monoxide levels exceeded the ambient air quality standard for an eight –hour period. This suggests that levels near the fire lines would most certainly have been higher, and that people working in those areas would be advised to monitor their exposure.

Acknowledgements

Successful air monitoring during an emergency requires the cooperation of many individuals, and organizations working toward the same end. The ARB Emergency Response Team wishes to acknowledge the tireless efforts and cooperative spirit of Mahmood Hoosain at the San Diego County APCD, Tom Parsons and Steve Barbosa at the SCAQMD, Doug Tubbs at the Ventura County APCD and Tony Malone the Mojave Desert AQMD, and their staff and management for their efforts during the fires. Also those of the CAPCOA Public Outreach Committee to assemble the widely used 'Smoke Impact' web page. The ARB staff and management of the Northern Laboratory Branch are recognized for their efforts to expedite all aspects of their operation from analyses to data reporting. We acknowledge also the efforts of John Kennedy in the Air Division at the USEPA-Region 9, and the federal on scene coordinators for mobilizing their resources and for the samples they contributed.

Wildfire Smoke, A Guide for Public Health Officials, was found to be an excellent and invaluable resource on a variety of public health topics during the fires. It was written by Harriet Ammann, Washington Department of Health; Robert Blaisdell and Michael Lipsett, California Office of Environmental Health Hazard Assessment, Susan Lyon Stone, U.S. Environmental Protection Agency; and Shannon Therriault, Missoula County Health Department, with input from individuals in several other state and federal agencies, in particular Jed Waldman of the California Department of Health Services, Peggy Jenkins of the California Air Resources Board, and editorial support from Kate Lynch, Washington State Department of Health.

ATTACHMENT 4

EPA APPROVAL OF REQUEST TO FLAG PM10 EXCEEDANCES AS NATURAL EVENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

JUL 21 2004

Mr. Robert Fletcher, Chief
Planning and Technical Support Division
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Dear Mr. Fletcher:

We have received your request dated April 21, 2004 to designate certain exceedances of the PM_{10} 24 hour National Ambient Air Quality Standard as natural events caused by wildfires.

We have reviewed the supporting documentation submitted with your request and have found that it meets the documentation requirements of EPA's Natural Events Policy (Memorandum from Mary D. Nichols, Assistant Administrator for Air and Radiation to Regional Air Division Directors, May 30, 1996). We will enter a code in the Air Quality System (AQS) database to demonstrate our concurrence with your decision to flag these exceedances as wildfire events. The dates and locations of the exceedances are as follows:

Site Location & AQS ID#	Date of exceedance	Concentration ($\mu g/m^3$)
Calexico - Ethel Street / 06-025-0005	10/24/2003 10/30/2003	214 238
Calexico - Grant Street / 06-025-0004	10/24/2003	174
El Centro - 9th Street / 06-025-1003	10/30/2003	180
Brawley - Main Street / 06-025-0003	10/30/2003	509
Westmoreland - W 1st Street / 06-025-4003	10/30/2003	540
Niland - English Road / 06-025-4004	10/30/2003	402
Escondido - E Valley Pkwy / 06-073-1002	10/29/2003	179
El Cajon - Redwood Avenue / 06-073-0003	11/23/2003	230
San Diego - Overland Avenue / 06-073-0006	11/23/2003	280
Victorville - 14306 Park Avenue / 06-071-0306	10/30/2003	181
Rubidoux - 5888 Mission / 06-065-8001	10/27/2003	164

The next step in the process is for the State to develop a Natural Events Action Plan (NEAP) for each of the areas in which these exceedances occurred. The NEAPs will need to be completed by the end of April 2005 (18 months from the exceedance day), except for San Diego NEAP, which will be due by the end of May 2005.

If you have any questions, please contact Bob Pallarino of my staff at (415) 947-4128.

Sincerely,

Sean Hogan, Acting Chief
Technical Support Office
Air Division

cc: Reyes Romero, Imperial County APCD
Elaine Chang, SCAQMD
Alan DeSalvio, MDAQMD
Judy Lake, SDAPCD
Karen Magliano, CARB
Steven Barhite, EPA Region 9
Amy Zimpfer, EPA Region 9

ATTACHMENT 5

MEDICAL SURVEILLANCE FOR THE SAN DIEGO COUNTY WILD FIRES, 2003

Medical Surveillance for the San Diego County Wild Fires, 2003

Preliminary Report
February 18, 2004

INTRODUCTION

On Saturday, October 25, 2003, one of the largest fires in California history began in a rural part of San Diego County. This fire was further fueled by drought conditions and hot windy conditions known as Santa Ana Winds.

During the days of the fires, air quality levels were the worst in San Diego County history. For two days, all public and private schools were closed, public and private employees were asked to remain home with only essential staff working.

This document describes several medical surveillance efforts conducted during and after the fires. The purpose was to determine impact on the public health and medical systems. Likewise, the information will be instrumental in identifying areas of ongoing needs, gaps in health care and setting the stage for additional assessment of the long-term impact of the fires on the health of residents of San Diego County. At this point, it is not known what the long-term health impact will be or the impact on additional chronic disease outcomes.

BACKGROUND

Fire Timeline

Several fires began during the end of October. These included the Cedar, Dulzura, Paradise and Roblar fires. However, the predominant fire in San Diego County was the Cedar Fire. This fire began October 25, 2003;the cause was attributed to a human origin. Containment of the fire was attained by November 4, 2003. In total, over 350,000 acres were burned, 3,500 homes destroyed, and 14 people died from fire related deaths. During this time, approximately 53,000 people were evacuated from selected parts of the City of San Diego in the Scripps Ranch and Tierrasanta communities.

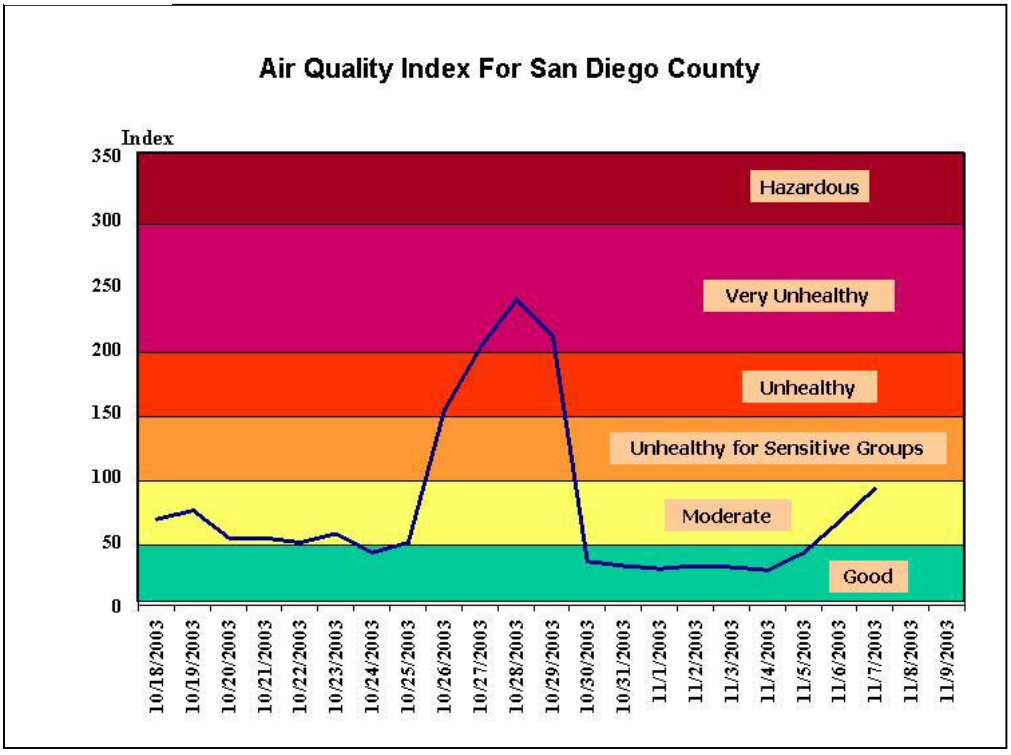
Emergency Operations

Emergency operations were conducted by numerous City, County, State and Federal Agencies. On October 26 2003, the San Diego County Director of Emergency Services issued a Proclamation of Legal Emergency, a result of multiple wildfires in San Diego County. Included in this Proclamation was a request for a Governor's Proclamation that an emergency existed in San Diego County. The Governor Proclaimed a State of Emergency in San Diego County on October 26, 2003 and the President issued a Presidential Declaration of Emergency on October 27, 2003.

Air Quality

Air quality in San Diego County during the fire deteriorated rapidly. Over a period of days, the air quality continued to deteriorate to very unhealthy levels (Figure 1). Specific locations in the county experienced hazardous levels of air quality. Significant levels of ash fell throughout most parts of the county and accumulations of ash prompted subsequent notices of poor air quality during periods of moderate to high winds during the ensuing months. The poor and sometimes hazardous air quality prompted the cancellation of schools throughout the entire county for the week of October 27-31. In addition during October 27-28 (Monday and Tuesday), most major employers in San Diego County advised their employees to stay at home.

Figure 1



Medical Surveillance

Immediately after a county and state emergency was declared, hospitals were queried about bed capacities, emergency department diversions were monitored, paramedic transports were tracked through the prehospital Quality Assurance Network (QA Net) system, and Public Health established a surveillance process in order to monitor potential visits to emergency department that would be fire related and determine the impact on the medical system.

METHODS

On Tuesday, October 28, in response to the fires, smoke and circulating ash, a fire related surveillance process was developed and by the Thursday, October 30, each of the 19 emergency departments in the County (2 Navy Hospitals were excluded from this surveillance) were asked to participate in this fire-related surveillance. San Diego County Public Health Services and the HealthCare Association of San Diego and Imperial Counties made a combined request for hospital cooperation.

A three-week surveillance period was established, including one week of baseline, and two weeks following the fires. Since this surveillance was conducted during the fires, the intent was to capture critical information from a limited time period to quickly assess the impact of the fires.

A number of potential fire related indicators were identified to monitor. These surveillance categories included: Asthma, bronchitis or emphysema, other respiratory conditions with no fever, eye irritation, smoke inhalation, burns, chest pain or cardiac arrests, diarrhea, and total visits. Each hospital was asked to provide necessary data to support these surveillance activities. These data were processed and prepared for analysis.

The surveillance data were analyzed as frequently as necessary, using SAS and Minitab. The analytic methods included times series, process control charts (P-Chart, U-Chart, CUSUM) and expontially weighted moving averages (EWMA). The following is a brief description of each analytic method used:

Descriptive Analysis
Provides a numerical and graphical summary of a variable's distribution. Numerical output of interest includes the mean (average value), standard deviation (average distance a score falls from the mean), minimum, maximum, and quartile scores. The primary graph is a histogram displaying the values the variable takes on (the horizontal axis) versus the frequency with which those values are observed (the vertical axis). The descriptive output is the main tool by which one "gets to know" the behavior of the variable of interest.

Time Series
By plotting evenly spaced time intervals on the horizontal axis (be it days, weeks, etc), and the value of the variable on the vertical axis, this graph depicts how the variable behaves over time.

P-Chart
The P-Chart analyzes the proportion of the total, over time, as it relates to the variable's average proportion (based on a pre-specified baseline period). For example, the chief complaint "Asthma" may, on average, account for 10% of the total number of chief complaints. Thus, daily proportions would be plotted across time with the average proportion (i.e., .10) serving as the centerline. The graph includes 95% and 99% upper and lower confidence limits, providing a measurement of how unusual individual proportions are compared to the average proportion.

U-Chart
The U-Chart analyzes a variable's raw numbers over time as they compare to the variable's average. The approach is the same as that taken by the P-Chart, except the U-Chart is analyzing raw numbers as opposed to proportions of a total. Confidence limits are interpreted the same.

CUSUM
The cumulative sum (CUSUM) chart plots the cumulative sums of the deviations of each value from the target value. Values that are above the target value (i.e., the historic or baseline mean) result in a cumulative increase away from the center line, while values that are below the target value result in a cumulative decrease away from the center line in the opposite direction. The CUSUM-Chart (along with the EWMA-Chart) is designed to detect small process shifts in a variable's mean.

Exponentially Weighted Moving Average.
The EWMA-Chart plots a variable's mean over time while giving exponentially more weight to observations as they get closer to the present day's observation (e.g., yesterday's value is weighted more heavily in calculating the variable's mean than the value from five days ago). The EWMA-Chart (along with the CUSUM-Chart) is designed to detect small process shifts in a variable's mean.

RESULTS

During the surveillance period, 15 (79%) of the 19 hospitals participated by providing the requested surveillance information. The participating hospitals represented geographic diverse locations and included several hospitals near the fire-impacted areas.

As seen in Figure 2, several of the surveillance indicators increased significantly during the periods of the fire. The most dramatic increase was among asthma and other respiratory complaints with no fever. Each of the surveillance indicators is further described below.

Figure 2

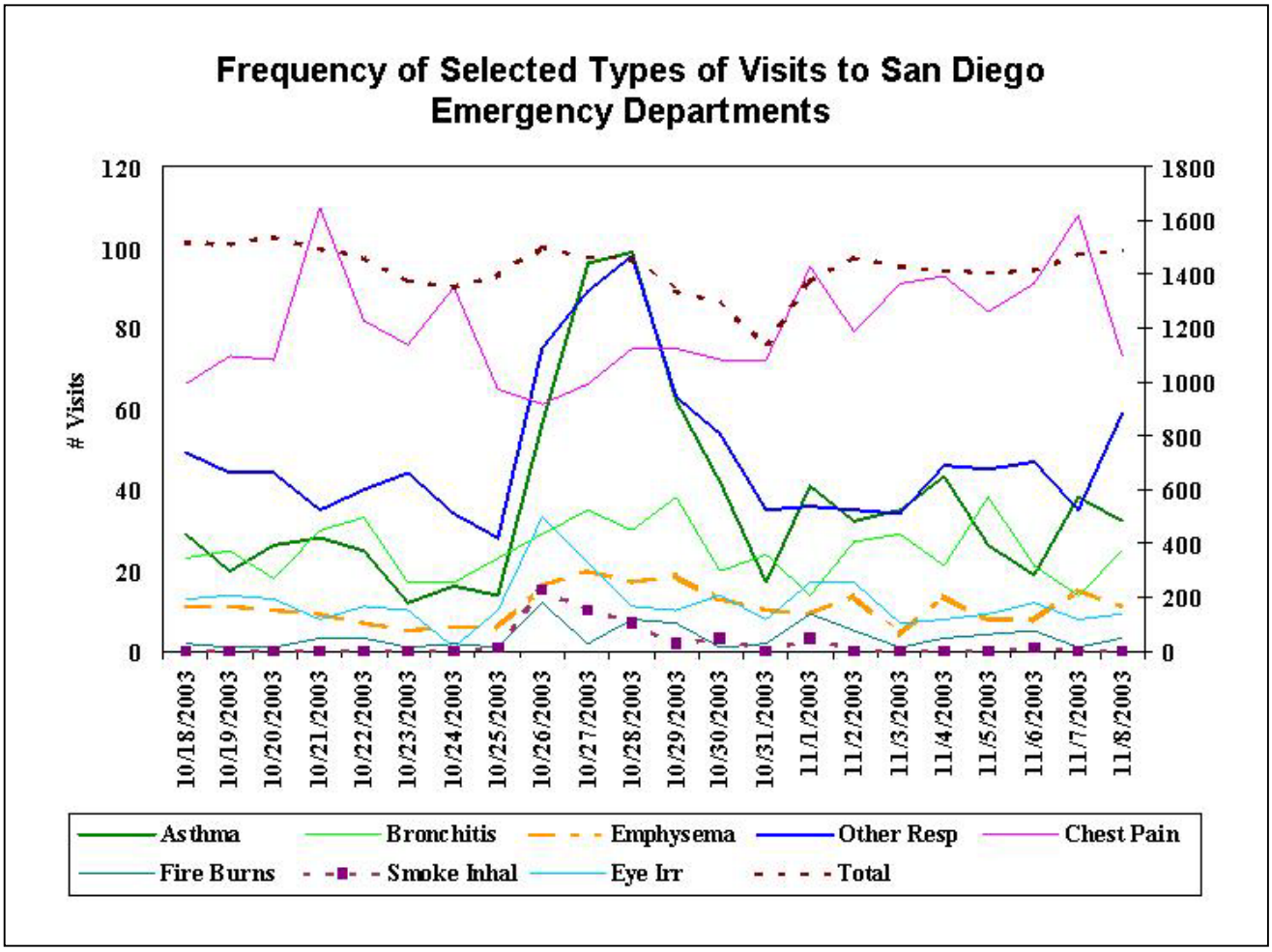
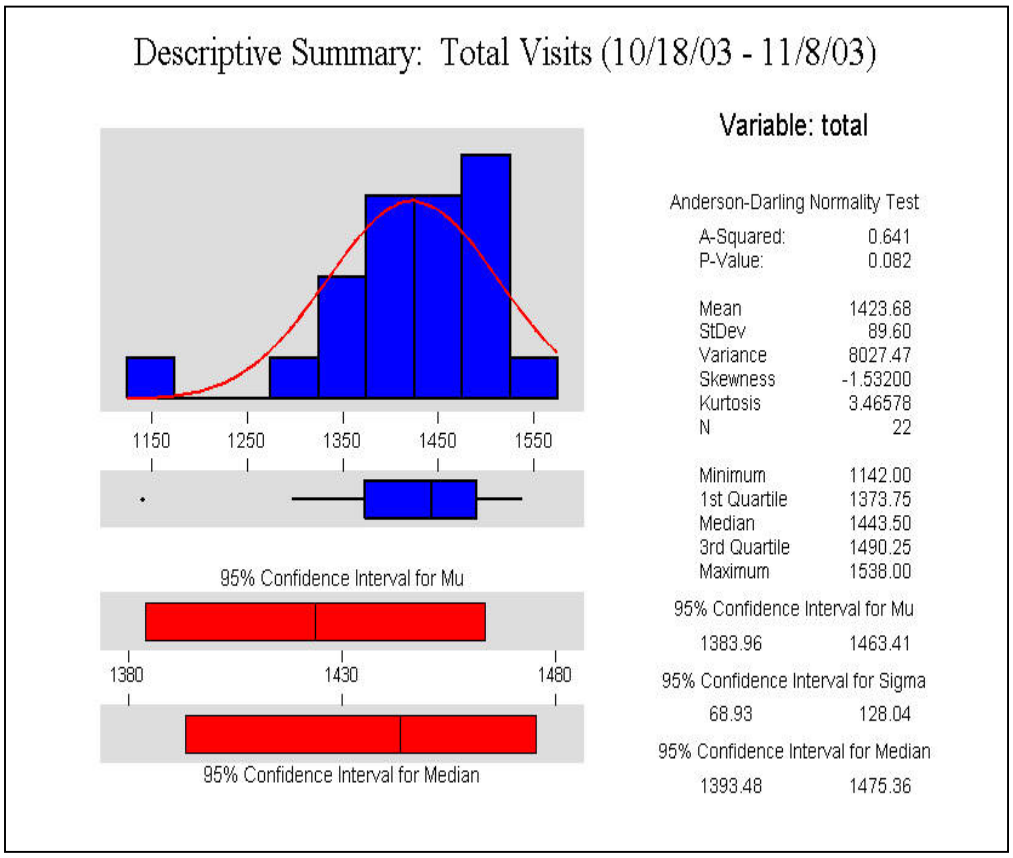


Figure 3.

Total Visits

The impact of the fires on area emergency department visits varied across hospitals. In total, information on 31,321 visits were recorded and analyzed. For the surveillance time period, the mean number of cases was 1,423 visits per day among 15 hospitals (see Figure 3).

In general, the total number of emergency department visits declined (Figure 4) during selected periods of the fire.



The day with the minimum number of total visits was October 31. The period of greatest decrease in total volume of patients corresponds with the days that the schools and employees were asked to remain at home (October 27-31).

When the total visits were analyzed using the EWMA method (Figure 5), the mean number of total visits continued to remain lower at lower levels for over a week after the fires began. During this period, the moving average decreased substantially.

Figure 4

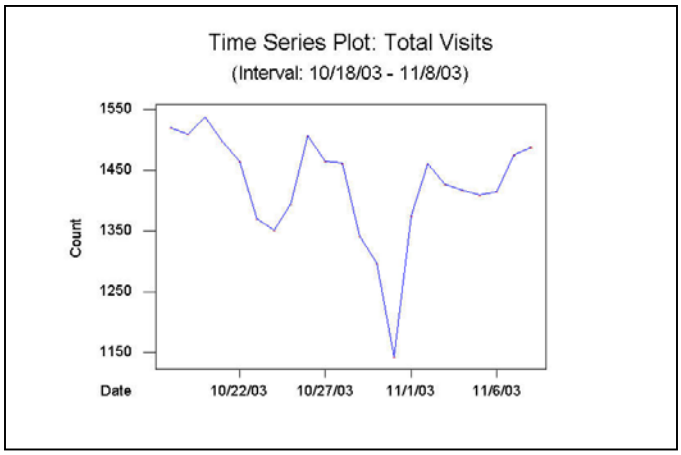
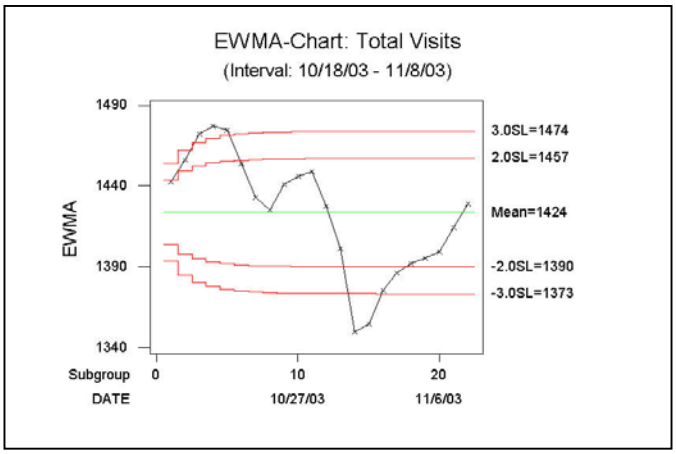


Figure 5



Asthma

Several respiratory indicators were monitored at emergency departments throughout the County and related visits were assessed. In general, each of the respiratory indicators demonstrated significant increases during the fire period with expected post-fire levels approaching pre-fire levels with the decline in the fires and subsequent improvement in air quality. Figure 6 describes the general characteristics of asthma related visits.

Asthma related visits increased significantly, particularly during the days of greatest fire burn and unhealthy air quality. Both the total number of asthma visits and the proportion of asthma visits increased. These increases correspond well with the increases in air quality index. Figure 7 displays the number of asthma related visits over time with the days of greatest number of asthma related visits occurring on Tuesday October 28. Controlling for the total number of visits, Figure 8 includes the proportion of asthma related visits during the surveillance period. Additional information about the asthma related results are detailed in Figure 9 and Figure 10.

Figure 6

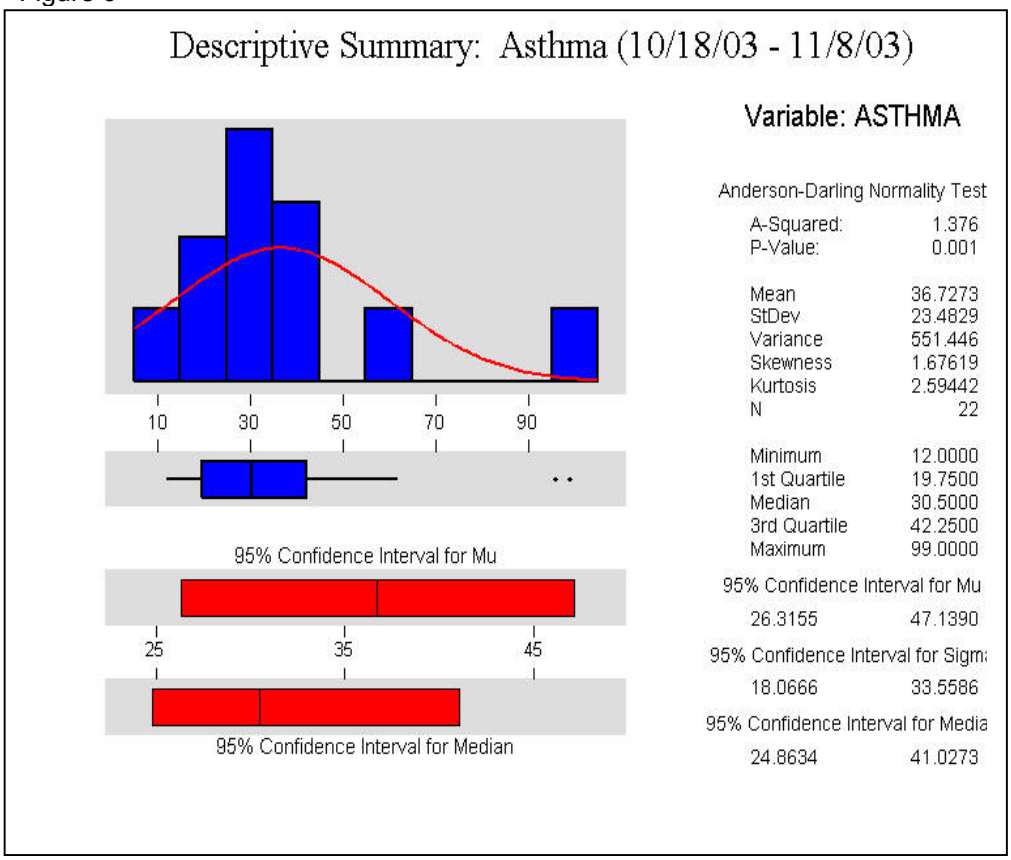


Figure 7

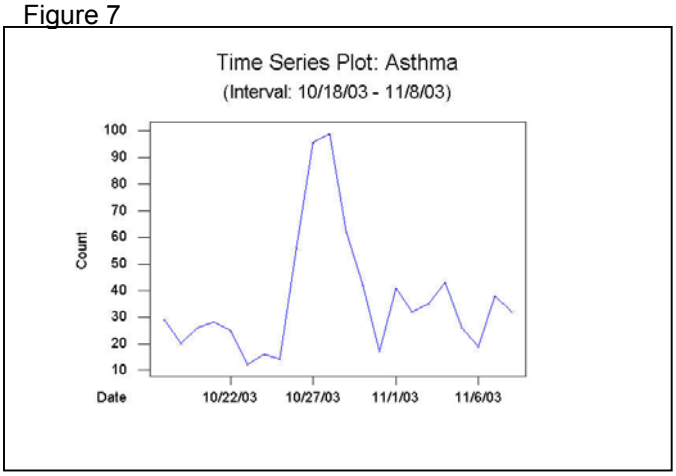


Figure 8

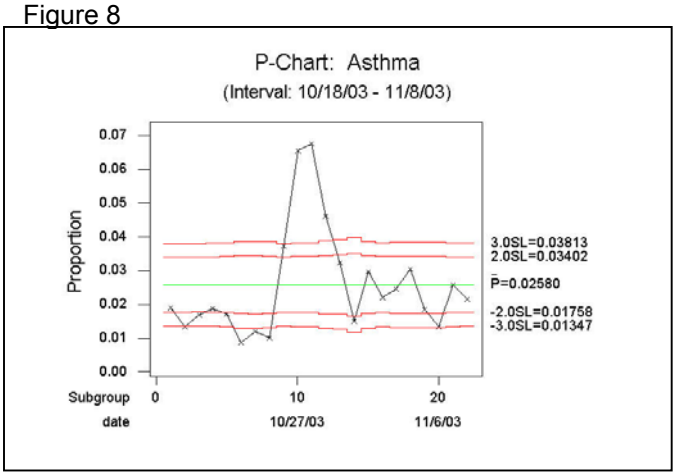


Figure 9

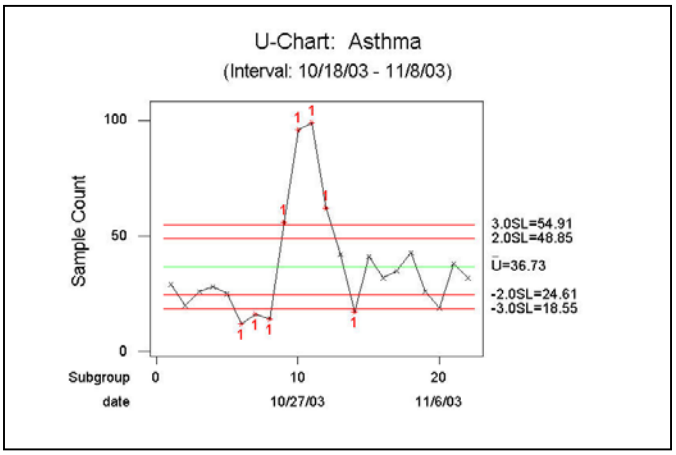
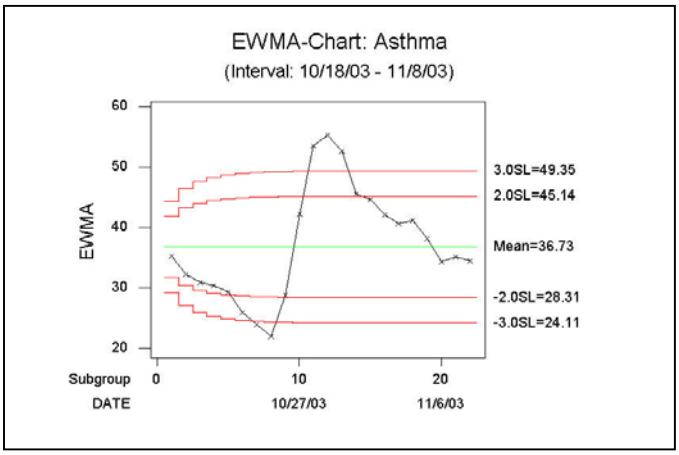


Figure 10



Bronchitis

Bronchitis related visits were monitored and increased slightly during the surveillance period. Figure 11 describes the general characteristics of bronchitis related visits. The mean number of cases across all participating hospitals was 25 per day. A slight increase in bronchitis related visits is displayed in each of the charts in Figures 12-15. However, the increase was neither significant nor sustained.

Figure 11

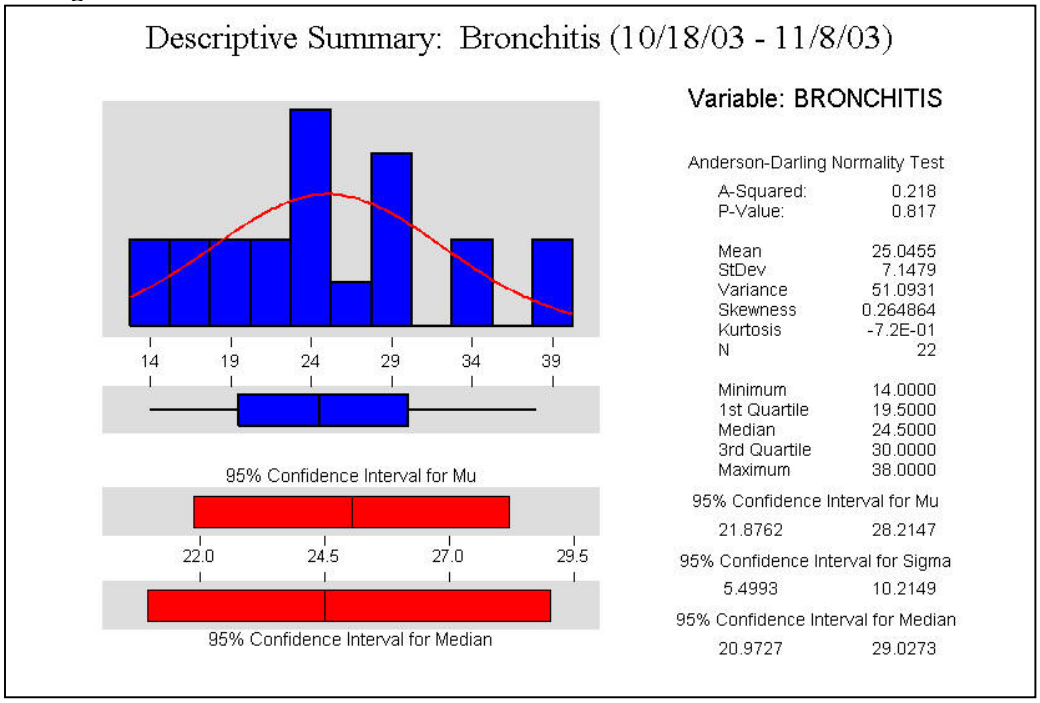


Figure 12

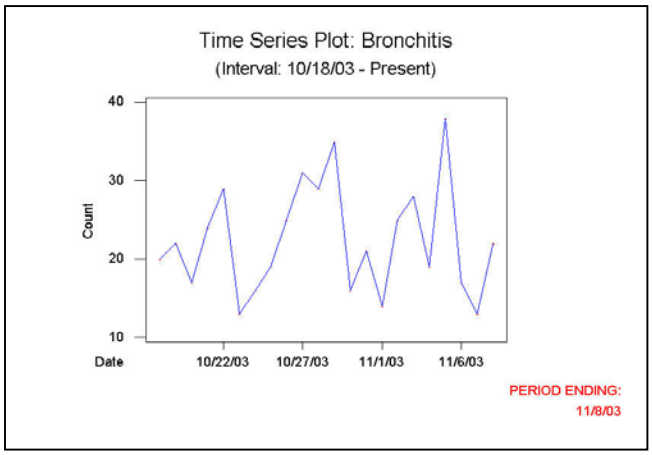


Figure 13

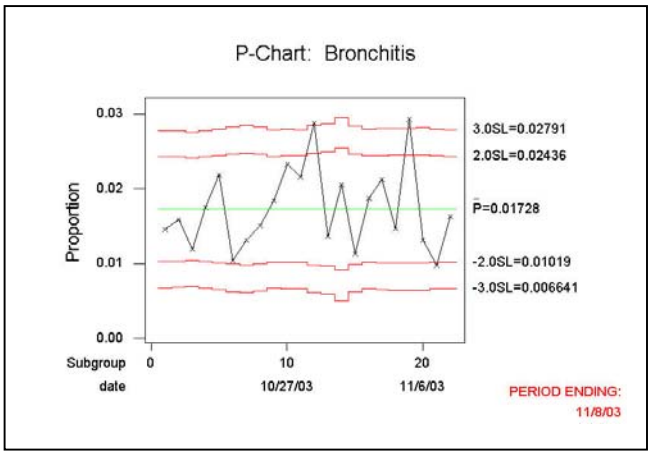


Figure 14

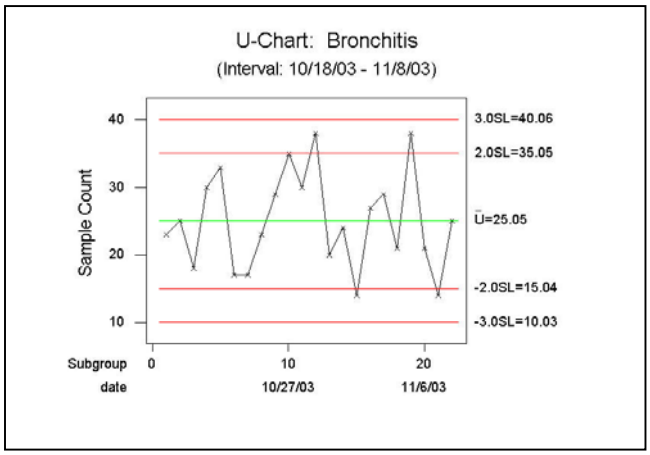
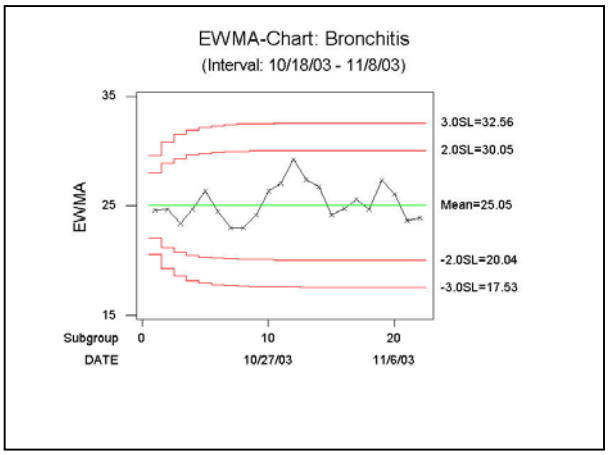


Figure 15



Other Respiratory With No Fever

The surveillance category for other respiratory with no fever related visits were analyzed and the descriptive results are described in Figure 16. The intention of this indicator is to track people with a multitude of respiratory related symptoms not previously identified as asthma, bronchitis or those respiratory infections typically presenting with fever (influenza like, pneumonia, etc). A dramatic increase in visits with chief complaints associated with the other respiratory with no fever visits seen following the beginning of fires on October 25, likely a direct result of the increasingly poor air quality. Analysis of this indicator reveals that both the total number of visits and the proportion of visits increased significantly particularly during the days of greatest fire burn and ash fallout (Figure 17 and Figure 18 respectively). Additional information about this indicator is presented in Figures 19-20.

Figure 16

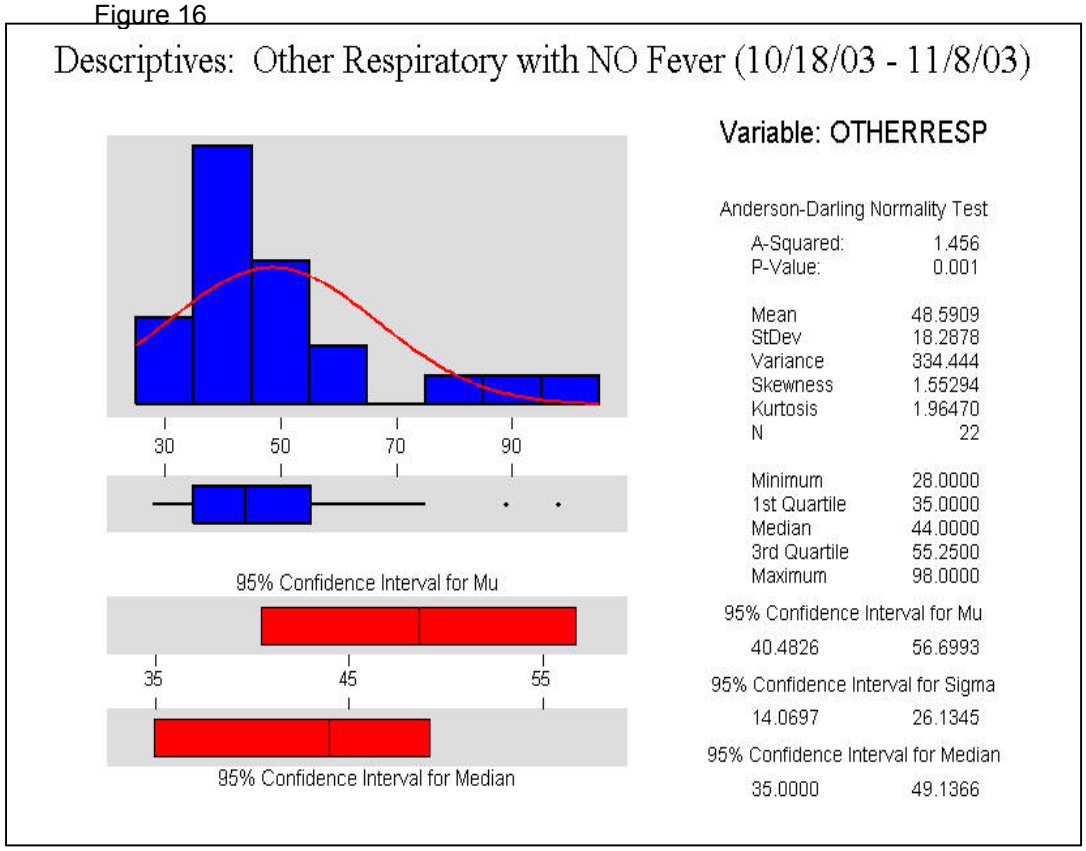


Figure 17

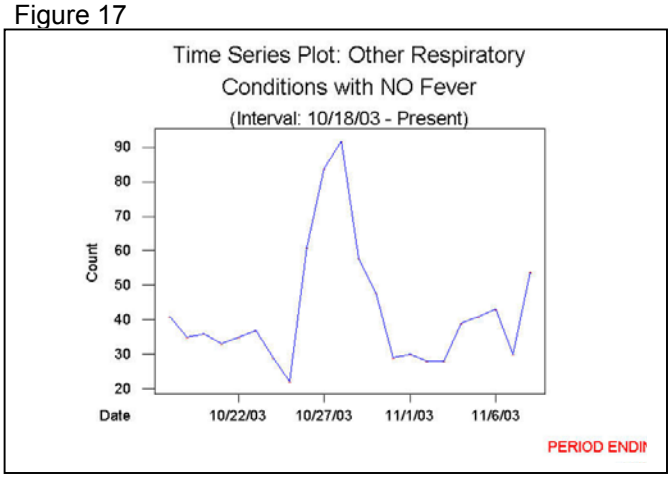


Figure 18

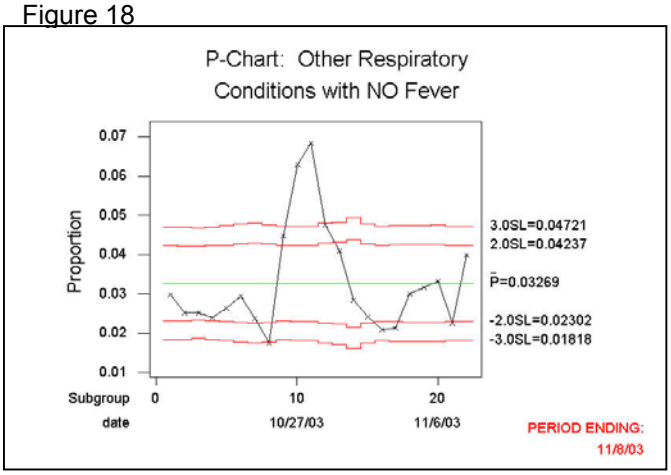


Figure 19

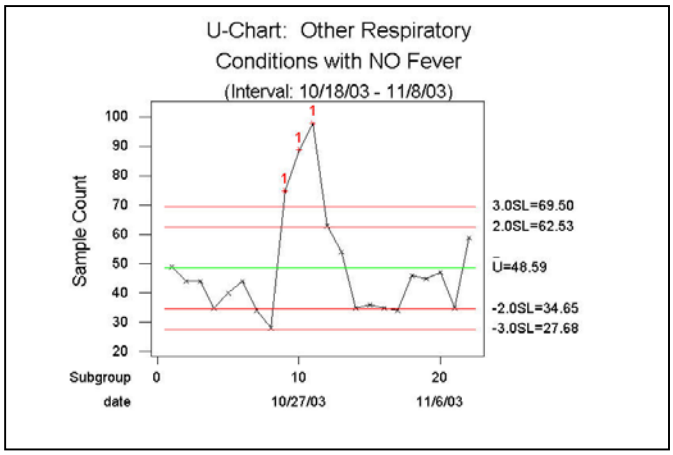
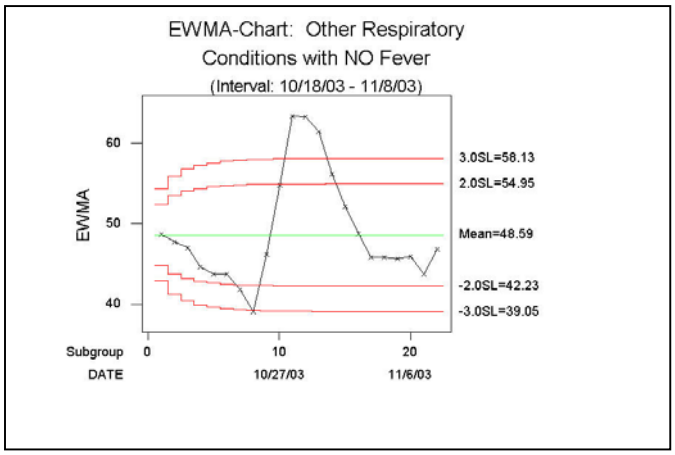


Figure 20



Smoke Inhalation

Because of the large area of fire burn in both densely and rural populated areas, it was expected that hospitals would experience a number of patients with smoke inhalation. Although the overall number of smoke inhalation related visits across participating hospitals was small each day during the surveillance period, smoke inhalation related visits increased markedly. Figure 21 describes the general descriptive information about this indicator. Both the total number of smoke inhalation visits and the proportion of visits increased for a brief period (Figure 22 and Figure 23 respectively) corresponding well to the periods of greatest fire burn. Additional information about these surveillance indicators is displayed in Figures 24-25.

Figure 20

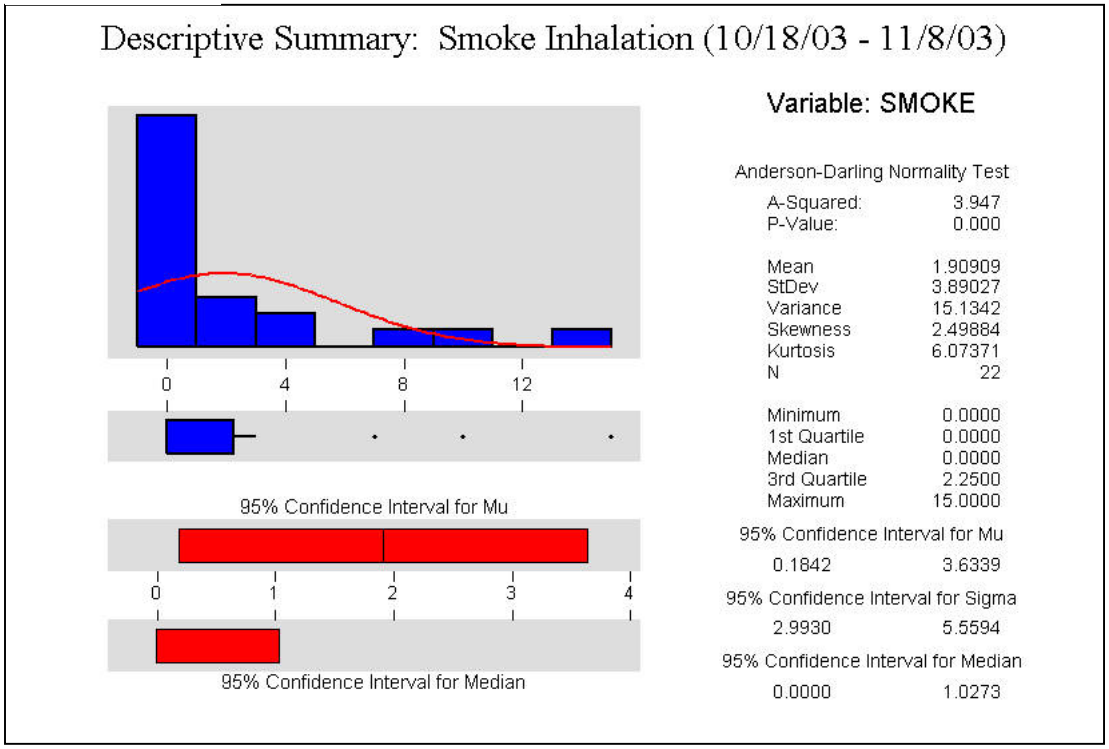


Figure 22

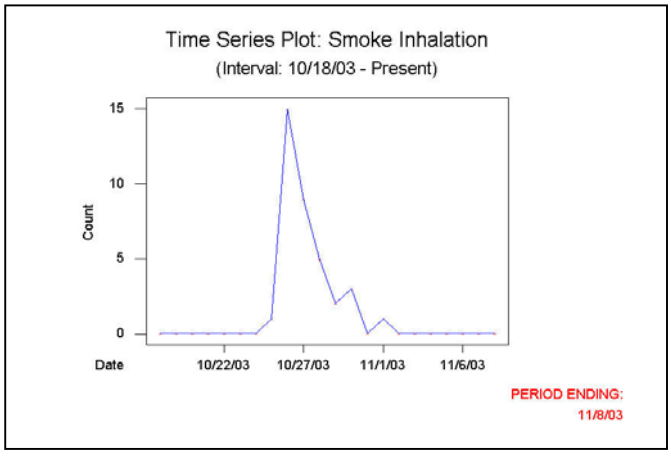


Figure 23

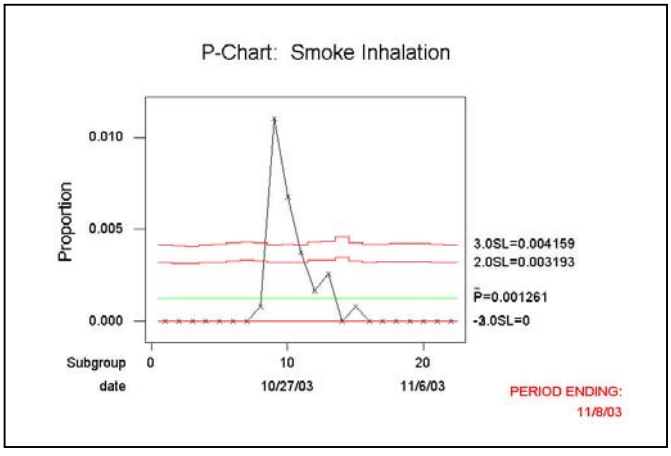


Figure 24

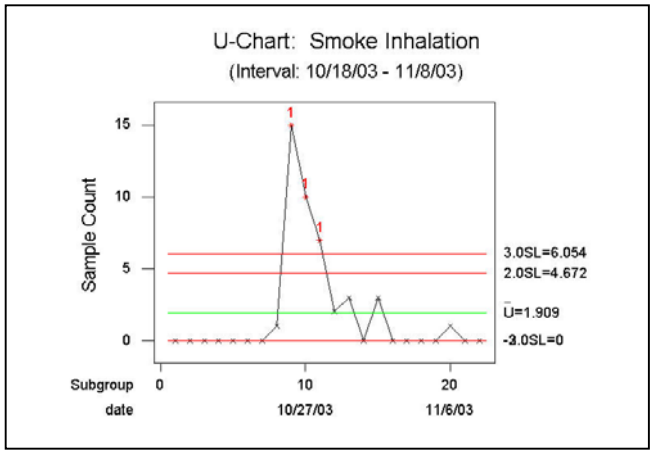
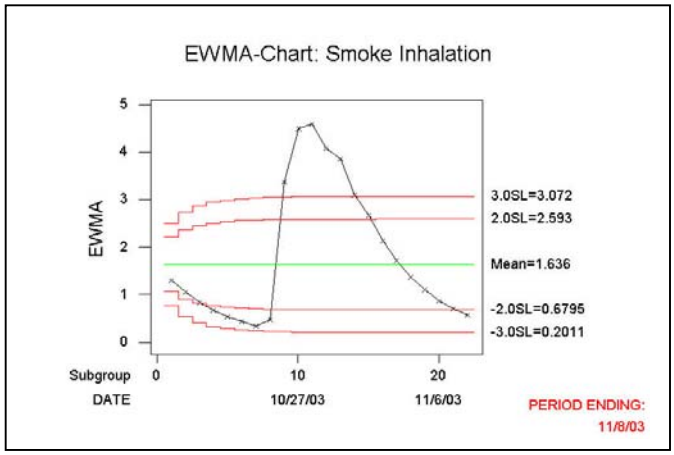


Figure 25



Eye Irritation

Due to several days of large ash fall throughout San Diego County, it was expected that a number of patients would seek treatment for eye irritation at emergency departments. The indicator for eye irritation was analyzed and the general descriptive characteristics are described in Figure 26. Figure 27 and Figure 28 describe the behavior of this variable related to the time series and the proportion of cases. Although very few patients presenting with eye irritation during the pre-fire period, a brief increase of eye irritation was demonstrated associated with the days of greatest fire burn and ash fallout. Additional information about this is displayed in Figures 29-30.

Figure 26

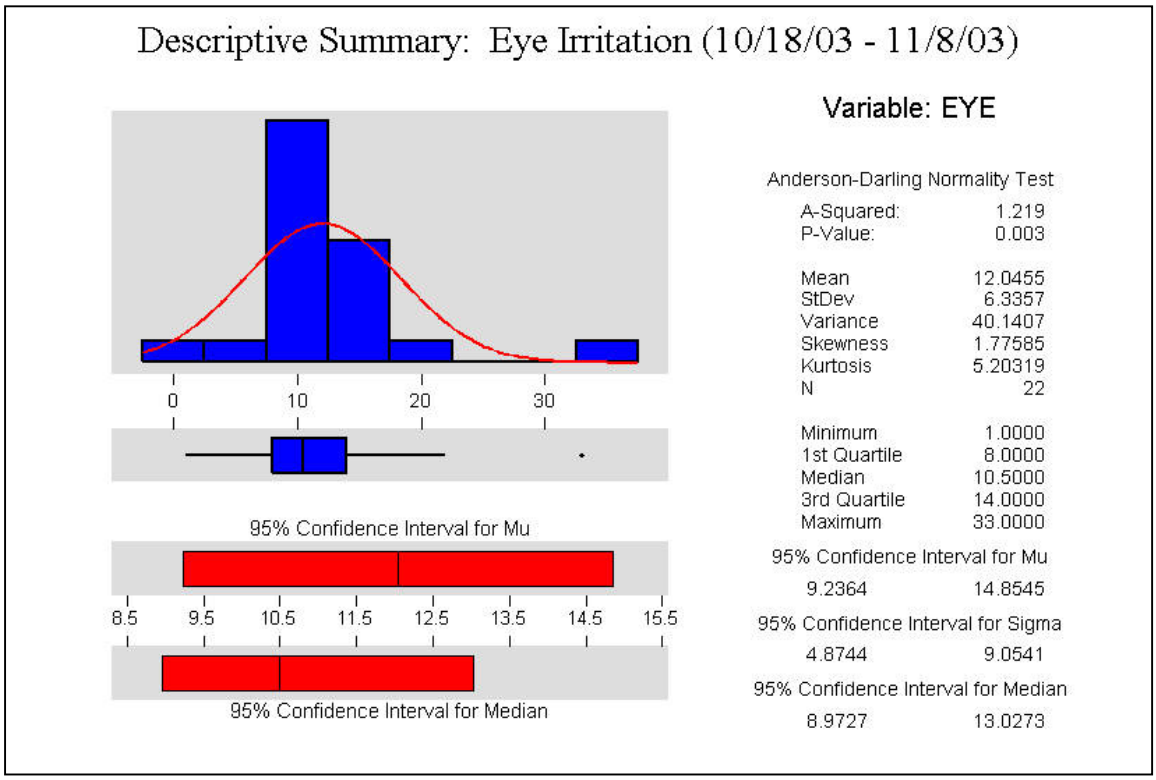


Figure 27

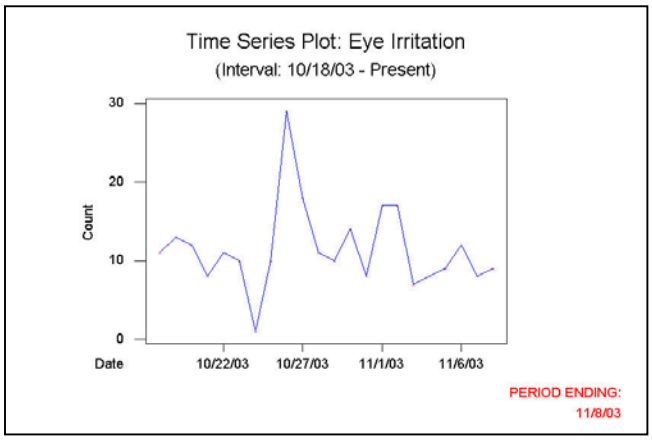


Figure 28

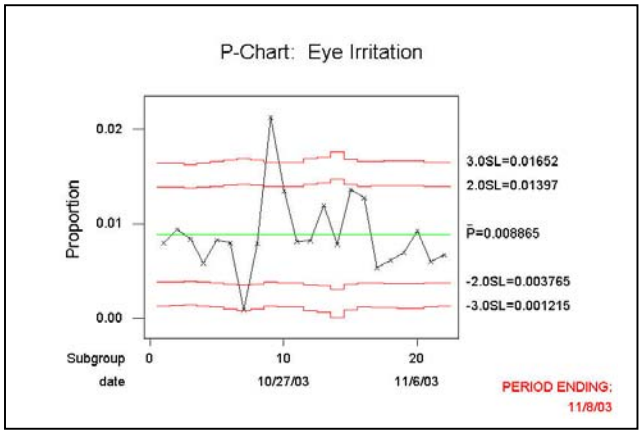


Figure 29

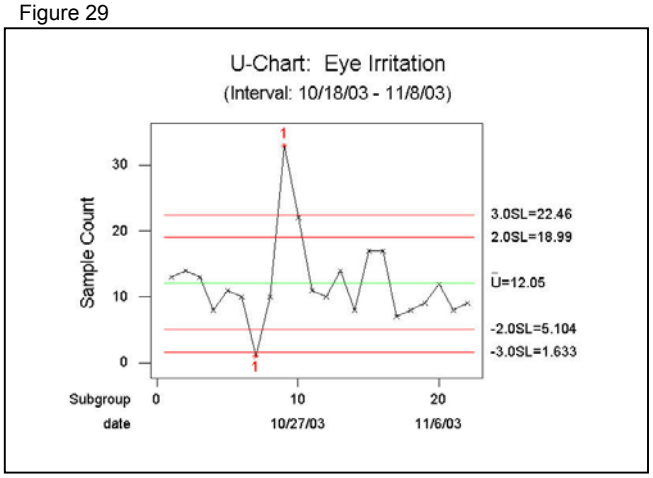
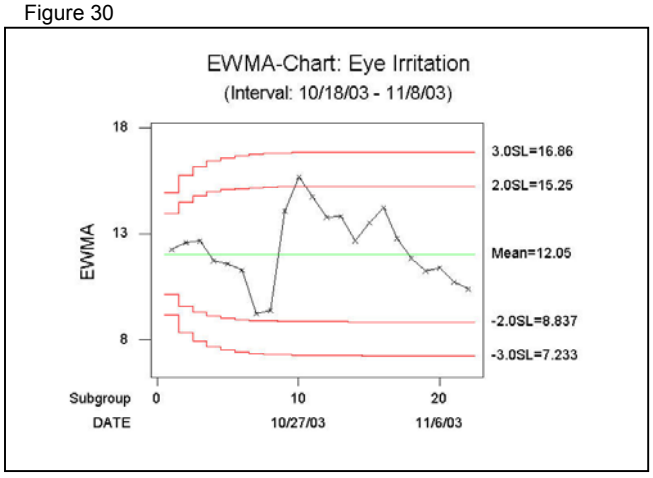


Figure 30



Chest Pain/Cardiac Arrest

Due to the uncertainty of how the fire and air quality would impact patients presenting with chest pain or cardiac arrest, an indicator was selected to assess during the surveillance period. The indicator for chest pain was analyzed and the general descriptive characteristics are described in Figure 31. As seen in Figure 32-33, the number of chest pain and cardiac arrest visits seemed to have no noticeable increase as a result of the fire. Figure 34 describes the U-Chart and Figure 35 the EWMA during this time. Although, the time period is limited to about three weeks, it is difficult to determine is this pattern is typical during non-fire periods.

Figure 31

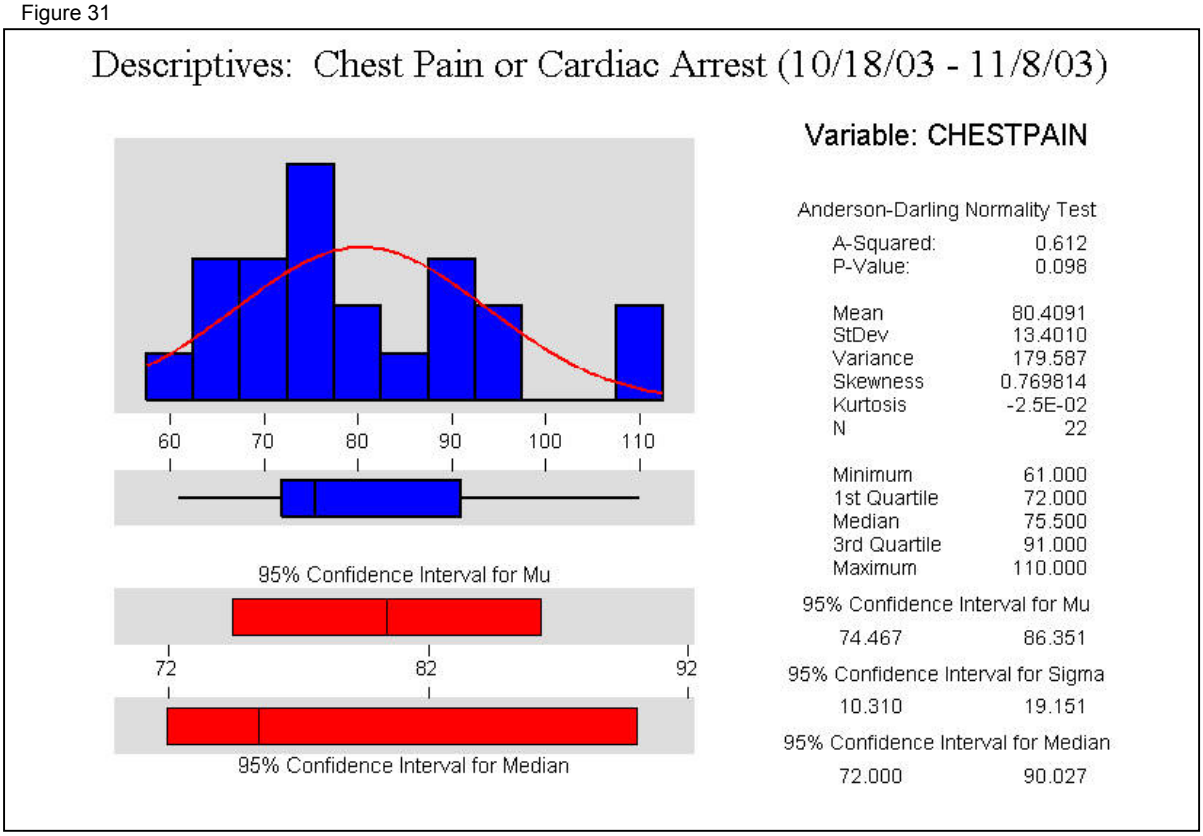


Figure 32

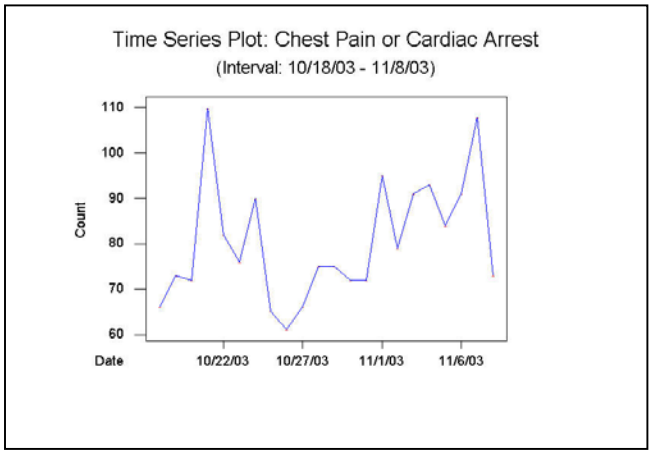


Figure 33

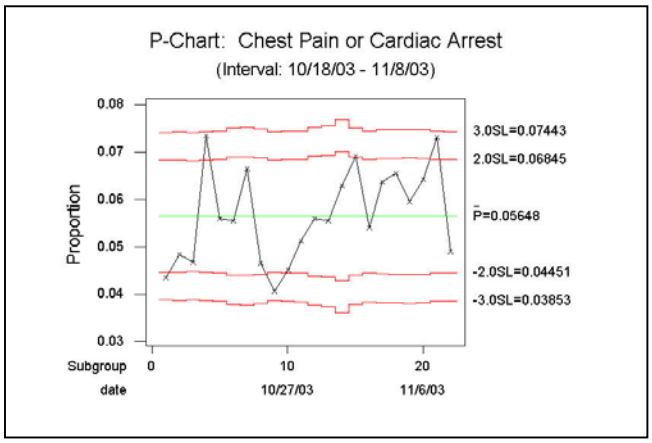


Figure 34

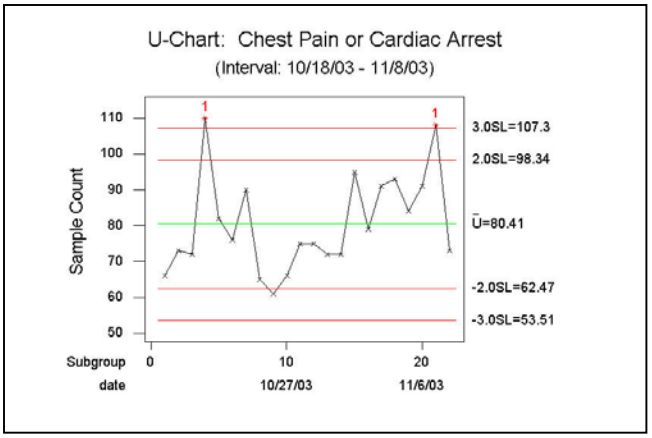
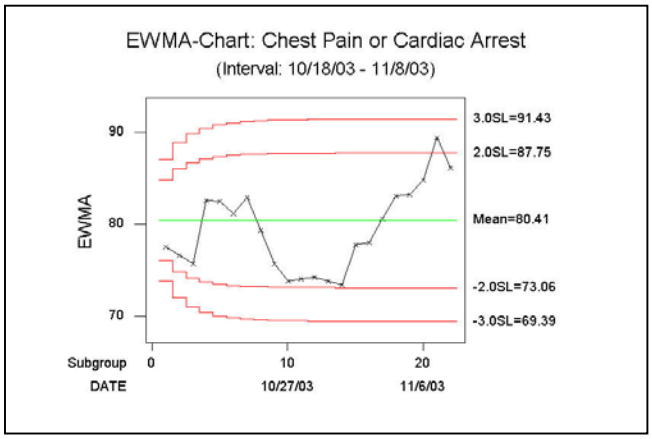


Figure 35



Diarrhea/Gastroenteritis

During the fires, selected parts of the county were without power for several days. Because of the potential for consumption of spoiled food or contaminated water, an indicator for diarrhea/gastroenteritis was monitored. This indicator was analyzed and the general descriptive characteristics are described in Figure 36. Figure 37 and Figure 38 describe the behavior of this variable related to the time series and the proportion of cases. Figure 39 describes the U-Chart and Figure 40 the EWMA during this time. In general, diarrhea related visits during this surveillance period did not increase or decrease different to what was expected.

Figure 36

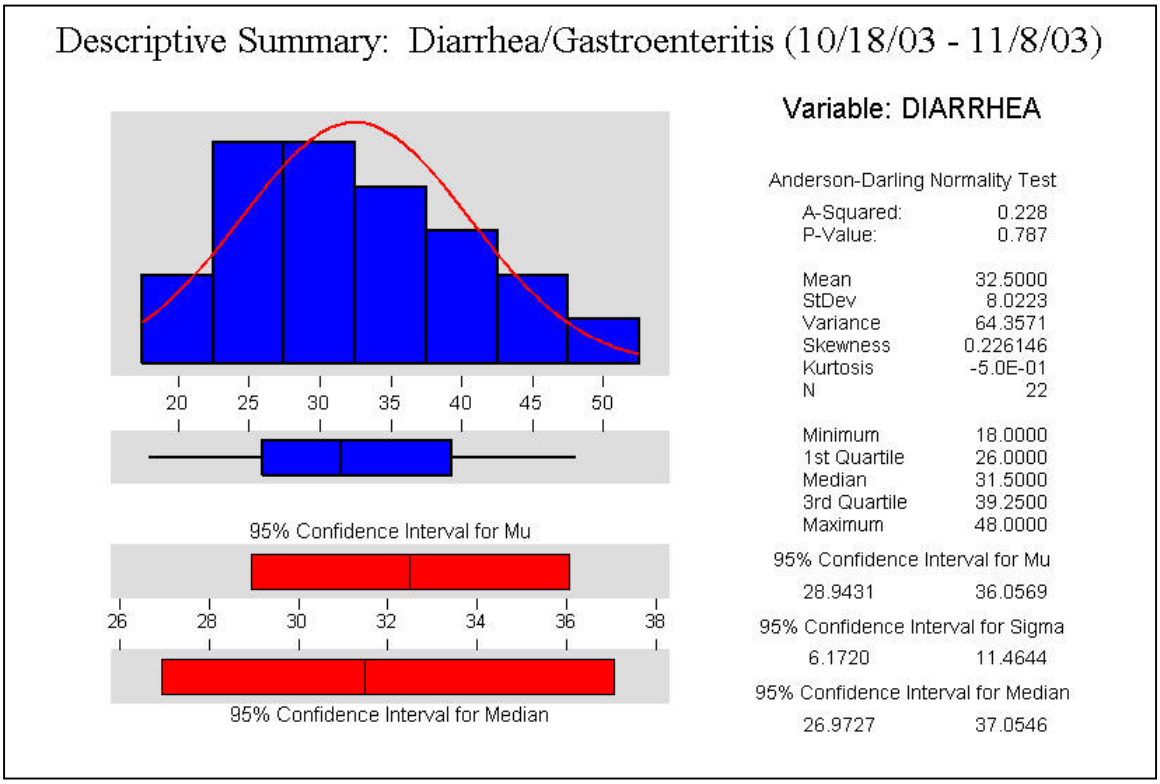


Figure 37

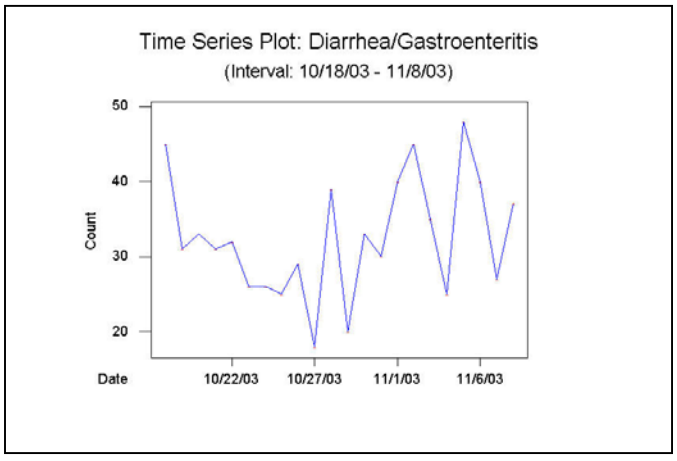


Figure 38

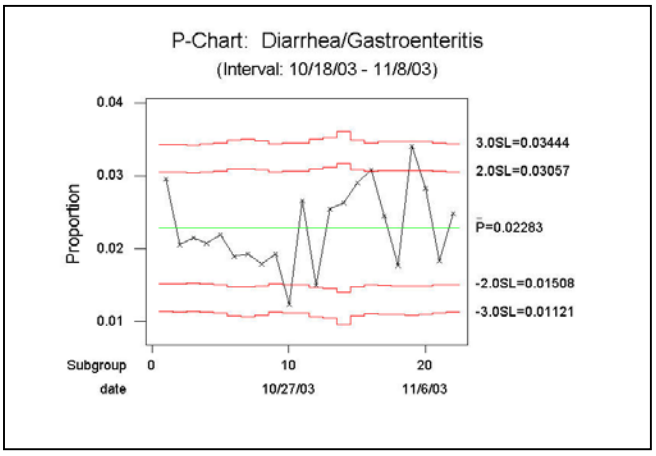


Figure 39

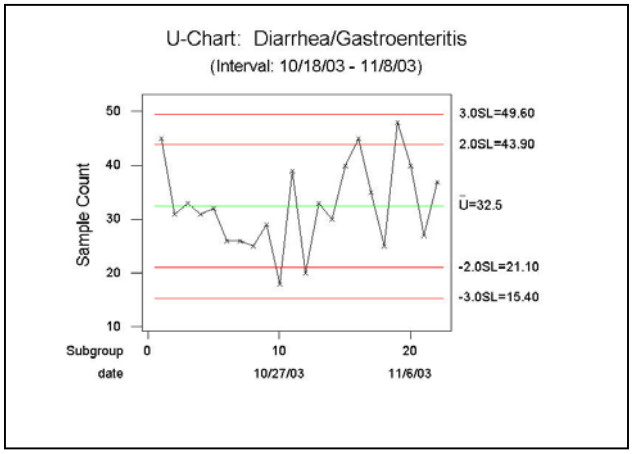
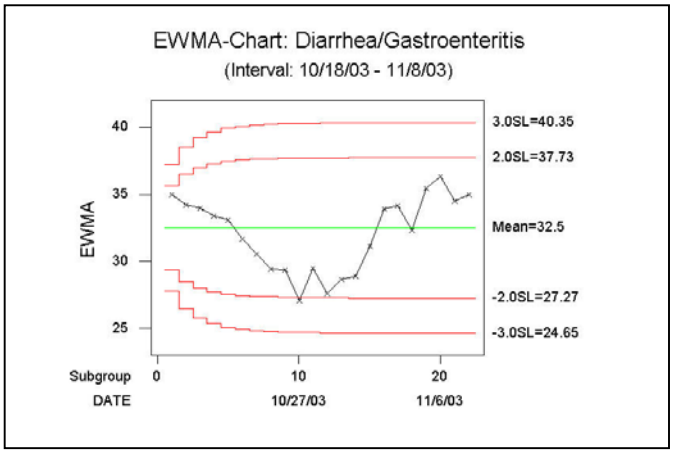


Figure 40



Conclusion

The total number of emergency department visits declined during the period of the fire and these correspond with the days that the schools and employees were asked to remain at home. In addition, many roads and freeways were closed because of the fires. Each of these things likely influenced the behavior of people seeking treatment or refuge at local emergency departments. These results presented here demonstrate that selected increases in certain types of emergency department visits did occur during this period. Particularly, selected respiratory related conditions increased significantly. Communication with various medical providers during the fires did indicate that the ash, smoke and unhealthy air quality did result in an increase in asthma related medical visits and inquiries.

There are a number of limitations associated with an assessment related to the disaster. This surveillance was primarily based upon the patient's chief complaint upon arrival at the emergency department. Since this is not the final diagnosis of the patient's reason for visit, it is possible, though unlikely, that the final results may have been slightly different than presented here.

Additional studies are needed to further assess the impact of the fire on emergency department utilization trends, long-term impact of the fire on health outcomes, and the affect of a local disaster on health service options.

Overall, these surveillance activities document the impact of the fires on San Diego County hospital emergency departments and may assist in future disaster preparations.

Acknowledgements

The Division of Community Epidemiology would like to thank the following for their help with these surveillance efforts.

Health Care Association of San Diego and Imperial Counties
Alvarado Hospital Medical Center

Fallbrook Hospital
Kaiser Hospital
Palomar Medical Center
Paradise Valley Hospital
Pomerado Hospital
Scripps Memorial Hospital Chula Vista
Scripps Memorial Hospital Encinitas
Scripps Mercy Hospital
Sharp Coronado Hospital
Sharp Chula Vista Medical Center
Sharp Memorial Hospital
Tri-City Medical Center
UCSD Medical Center – Hillcrest
UCSD Medical Center – Thornton

For more information about our surveillance activities, please contact Jeff Johnson at 619-531-4945 or Jeffrey.Johnson@sdcounty.ca.gov

ATTACHMENT 6

APCD BROCHURE --
WILDFIRE SMOKE AND YOUR HEALTH

What's in smoke from a wildfire?

Smoke is comprised of small particles, gases and water vapor. Water vapor makes up the majority of smoke. The remainder includes carbon monoxide, carbon dioxide, nitrogen oxide, irritant volatile organic compounds, air toxics and very small particles.

Is smoke bad for me?

Yes. It's a good idea to avoid breathing smoke. If you are healthy, smoke usually does not present a major risk. But there are people who are at risk, including people with heart or lung diseases such as congestive heart disease, chronic obstructive pulmonary disease, emphysema or asthma. Children and the elderly also are more susceptible to smoke.

How does smoke harm my health?

A major health concern of smoke comes from particulate matter, solid particles and liquid droplets found in air. In smoke, these particles often are very tiny, smaller than 2.5 microns in diameter. How small is this? For comparison, the diameter of the average human hair is about 30 times greater.

These particles can build up in your respiratory system, causing a number of health problems including burning eyes, runny noses and illnesses such as bronchitis. The particles also can aggravate heart and lung diseases such as congestive heart failure, chronic obstructive pulmonary disease, emphysema and asthma.

What is the Air Pollution Control District?

The District is a government agency that regulates sources of air pollution within San Diego County. The County Board of Supervisors sit as the Air Pollution Control Board.

Its mission is to protect the public from the harmful effects of air pollution, achieve and maintain air quality standards, foster community involvement, and develop and implement cost-effective programs meeting state and federal mandates, considering environmental and economic impacts.

Why do we need to regulate air quality?

Because it involves the health of our community. All of us face some health risk from polluted air.

Adverse health effects can range from relatively mild temporary conditions such as shortness of breath to serious conditions such as permanent loss of lung tissue.

Safeguarding our air quality is the primary focus of our regulatory system. By controlling pollution, we can all breathe clean, healthful air.

Where can I get more information?

Contact the District at 858-650-4707 or visit www.sdapcd.co.san-diego.ca.us.

AIR POLLUTION CONTROL DISTRICT
COUNTY OF SAN DIEGO

9150 Chesapeake Drive
San Diego, CA 92123
(858) 650-4700
www.sdapcd.co.san-diego.ca.us

Wildfire Smoke and Your Health

Air Quality Index conveys level of health concern

How do I know if I'm being affected?

You may have a scratchy throat, cough, irritated sinuses, headaches, runny nose and stinging eyes. Children and people with lung diseases such as asthma may find it difficult to breathe deeply or vigorously and they may cough or feel short of breath. People with diseases such as asthma or chronic bronchitis may find their symptoms worsening.

What can I do to protect myself?

Use common sense. If it's smoky outside, it's probably not a good time to go jogging. And it's probably a good time for your children to remain indoors. If you're advised to stay indoors, keep your windows and doors closed. Run your air conditioner if you have one. Keep the fresh air intake closed and the filter clean.

Help keep particle levels lower indoors by not using anything that burns such as wood stoves, gas stoves, and even candles. And don't smoke. That puts even more pollution in your lungs – and those of the people around you.

Drink plenty of fluids (not alcohol) to moisten the respiratory tract.

If you have asthma, be vigilant about taking your medications as prescribed by your doctor. If you're supposed to measure your peak flows, make sure you do so. Call your doctor if symptoms worsen.

Do air filters help?

Air filters can be helpful. Indoor air filtration devices with HEPA filters can reduce the number of particles indoors. Make sure to change the filters regularly. Don't use an air cleaner that works by generating ozone. That puts more pollution in your home.

Do dust masks help?

Paper "comfort" or "nuisance" masks are designed to trap large dust particles, not the tiny particles found in smoke. These masks will reduce your total smoke exposure but will not protect your lungs from the fine particles present in wildfire smoke.

Are the effects of smoke permanent?

Healthy adults generally find that their symptoms (runny noses, coughing, etc.) disappear after the smoke is gone.

Further information on lung health can be obtained from the American Lung Association at 888-586-4872 or by visiting their website at www.lungsandiego.org.

What is the AQI?

The Air Quality Index (AQI) was developed to help the public understand what local air quality means to health. Different pollutants affect health at different concentrations. By relating similar degrees of health effects to a uniform scale, an index enables one to easily determine when air pollution levels are high so activities can be modified.

The AQI uses a numerical scale ranging from 0 to 500, with 0 representing pristine air. The higher the AQI value, the greater the level of air pollution and the greater the health danger. An AQI of 100 usually corresponds to the federal standard for that pollutant. So values below 100 are generally thought of as satisfactory. When values are above 100, air quality is considered to be unhealthy – at first for sensitive groups of people, then for everyone as the AQI values get higher.

Air quality is measured by a network of monitors that record actual pollutant concentrations. These raw measurements are converted using a formula developed by the U.S. Environmental Protection Agency (EPA) which relates similar degrees of health effects to AQI's scale.

The AQI scale has been divided into distinct categories, each corresponding to a different level of health concern. In addition a specific color has been assigned to each of the health risk categories to make it easier for people to understand quickly the significance of air pollution levels in their communities.

The AQI is a national index, so the values and colors used to show local air quality and the associated level of health concern will be the same everywhere you go in the U.S.

over 300	Hazardous	Brown
201 to 300	Very Unhealthy	Purple
151 to 200	Unhealthy	Red
101 to 150	Unhealthy for Sensitive Groups	Orange
51 to 100	Moderate	Yellow
0 to 50	Good	Green

ATTACHMENT 7

COUNTY OF SAN DIEGO NEWS RELEASES ASSOCIATED WITH 2003 WILDFIRES

COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE RELEASE
October 28, 2003
Contact: Linda Miller 858-715-2213

HEALTH OFFICER RECOMMENDS CAUTION WITH ASH-FILLED AIR

High-risk people advised to stay indoors; others advised to avoid strenuous activity, drink fluids

Due to the fires, air quality in San Diego County has been compromised, with many people breathing unhealthy air. Most healthy people will recover with no long-term effects, but Nancy Bowen, San Diego County Public Health Officer, says there are concerns for those with heart or lung disease, as well as children and seniors.

"People in these high risk groups need to avoid further smoke exposure by staying indoors with windows closed and air conditioning that does not take in air from the outside, or if it does, has an effective filter," Bowen said. "To conserve power, the thermostat should be set up toward 78 degrees, depending on your tolerance." The use of other appliances should be minimized to conserve energy, she said.

In addition, all strenuous activities should be avoided and people should drink plenty of fluids, Bowen said. Although it is best to minimize outdoor exposure, those who must go outdoors should use a tight-fitting mask, which may be somewhat helpful. "The finer the mesh, and the thicker the mask, the better," she said.

When cleaning up ash, do not sweep it up, as sweeping may make it airborne and add to breathing difficulties, Bowen said. "People can hose ash down briefly or use a damp cloth to remove it," she said. "Remember to be conservative with water use at this time."

People may notice symptoms worsening a day or two after breathing unhealthy air while their bodies respond to and repair the damage, but most people will recover, Bowen said.

People in the risk groups who don't have air conditioning, may get information about "Cool Zone" facilities by calling San Diego County Aging and Independence Services at 1-800-510-2020.

For information about current and future air quality, please visit the Air Pollution Control District Web site at www.sdapcd.co.san-diego.ca.us/air/otoday or call (858) 850-4777.

###

COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE RELEASE
October 28, 2003
1:30 P.M.

Contact: Leslie Ridgeway (858) 715-2213

AIR QUALITY ALERT ISSUED FOR SAN DIEGO AREA

County Air Pollution Control District Forecasts Unhealthy Conditions for Tuesday, Wednesday

The San Diego County Air Pollution Control District has forecast “unhealthy” to “very unhealthy” air conditions for San Diego County on Wednesday, Oct. 29.

The alert comes on the heels of a public health alert issued today by APCD for people living in all areas of San Diego County. As of 10 a.m. Tuesday, fine particulate matter is in the hazardous range in northern inland valleys around Escondido, and in the unhealthy range in downtown San Diego and in coastal areas.

Air quality is designated “unhealthy” when fine particulate in the air reaches a concentration of 65-150 micrograms per cubic meter. “Very unhealthy” indicates a concentration of 150-250 micrograms per cubic meter.

APCD advises that people in areas affected by smoke avoid outdoor activity, stay indoors, and avoid all strenuous activity as much as possible. People are also advised to drink plenty of liquids, which help flush the particulate out of the body.

Smoke can severely irritate eyes and the upper respiratory tract. It poses a high risk to people with asthma or other respiratory diseases. Other symptoms include stinging and tearing eyes, nose and throat irritation, nausea, and vomiting. People whose symptoms worsen should consult with their physician immediately.

This forecast has been provided to school districts in San Diego County for use in their decision-making.

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COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE PUBLICATION
October 30, 2003
Contact: Leslie Ridgeway (858) 715-2213

AIR QUALITY IMPROVED FOR TRICK-OR-TREATING

Parents Should Monitor Their Children and Check Air Quality Index Before Proceeding

The San Diego County Health and Human Services Agency and the American Lung Association of San Diego and Imperial Counties are advising parents that they may want to proceed with outdoor Halloween trick-or-treating plans, with precautions.

Parents of children who have asthma or lung disease may wish to consider outdoor trick-or-treating, but are advised to monitor their children for symptoms.

"If your children have watery eyes, are sneezing, wheezing, or coughing, we recommend indoor activities," said Nancy Bowen, M.D., San Diego County Public Health Officer.

Many people in the San Diego County area have inhaled a large dose of pollutants since the fires started last weekend. It takes time for the body to flush out particulates and toxins. Lungs are sensitive and vulnerable to irritation and infection during this time, especially for those who have existing heart and lung conditions, as well as children and seniors.

Families who choose to trick-or-treat outdoors should go only where the Air Quality Index is at or under 75 (lower end of "Moderate," or "Good" air quality). Parents should check the Air Quality Index on Friday, Oct. 31 for information on the area where they plan to trick-or-treat. Check the Air Quality Index by calling (858) 650-4777. It also is available at www.sdapcd.co.san-diego.ca.us/air/otoday.html or www.lungsandiego.org.

###

HEALTH AND HUMAN SERVICES AGENCY
1700 PACIFIC HIGHWAY, ROOM 203 • SAN DIEGO, CA 92101-2472

COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE RELEASE
November 4, 2003
Contact: Anita Tinsley (858) 650-4707

BE AWARE OF ASBESTOS, OTHER TOXIC SUBSTANCES WHEN CLEANING UP

Contractors, Homeowners Warned to Take Precautions When Removing Ash, Debris

The San Diego County Air Pollution Control District (APCD) warns contractors and homeowners to take precautions before demolishing fire-damaged structures or cleaning up ash.

Buildings may have been constructed with materials that contain asbestos – though most structures built since 1980 should have little if any asbestos.

"There also may be other hazardous substances in ash and debris that can be released in the air in the form of fine particles when handled," says Dick Smith, director, APCD.

APCD is waiving notification and other administrative requirements and fees for all wildfire-related demolitions and debris removal activities at multi-unit residential structures (such as apartment buildings) and at commercial and industrial structures. Routine demolition and renovation activities are NOT included in this special waiver. For more information, check the APCD Web site at www.sdapcd.san-diego.ca.us or call (858) 650-4550.

Use common sense precautions on demolition sites, including:

- Use a tight-fitting particulate mask designed to protect your respiratory system from very fine particles.
- Wear protective glasses or goggles, and protect skin with gloves, long sleeves and long pants. Bag clothing after use and launder before re-use.
- Dampen debris/ash to reduce dust until it has been placed in sealed or closed containers. Wet down structures being demolished. Line bulk containers with heavy duty plastic (e.g. polysheeting) that can be used to completely wrap the debris and ash.
- DO NOT USE LEAF BLOWERS TO CLEAN UP RESIDUAL ASH, DIRT AND DEBRIS.
- Check with your waste-disposal company, with the County Department of Environmental Health or your city on where wildfire ash and debris are being accepted for disposal. The Ramona, Otay, Sycamore and Miramar landfills have been authorized to accept this waste.

###

MEDIA & PUBLIC RELATIONS
1600 PACIFIC HIGHWAY, ROOM 208 • SAN DIEGO, CA 92101

COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE RELEASE
November 7, 2003

CONTACT: Anita Tinsley (858) 650-4707

AIR DISTRICT ADVISES ASBESTOS TESTING FOR PRE-1980 BUILDINGS

Testing Urged Only for Smoke-Damaged Structures Built Before 1980

The San Diego County Air Pollution Control District (APCD) urges people whose homes or structures were built before 1980 and are intact but have suffered smoke damage to take precautions.

Materials containing asbestos were used in construction before 1980. APCD advises home or building owners to first collect samples before having acoustical ceilings scraped or removing ducts, pipe wrap, insulation or other materials that may contain asbestos. Samples should be collected in a sealable bag (e.g. plastic storage bag) and tested for asbestos.

Inhaling asbestos fibers can pose a serious health threat, even many years after exposure.

Asbestos testing services are listed in the Yellow Pages under "Asbestos." The cost for testing is nominal. If asbestos is present, the material should be removed by a certified asbestos removal contactor.

Testing is not necessary if the home or structure has been destroyed by the wildfires and is to be demolished.

###

MEDIA & PUBLIC RELATIONS
1600 PACIFIC HIGHWAY, ROOM 208 • SAN DIEGO, CA 92101

COUNTY OF SAN DIEGO

NEWS RELEASE

FOR IMMEDIATE RELEASE
November 26, 2003

Contact: Bill Brick (858) 650-4640

COUNTY AIR POLLUTION EXPERTS FORECAST UNHEALTHY AIR
Santa Ana Winds Expected To Stir Up Ash on Thanksgiving Day

The San Diego County Air Pollution Control District (APCD) urges residents to exercise caution this Thanksgiving holiday as Santa Ana winds are expected to pick up ash from the recent wildfires and particulate levels are forecast to be unhealthy, predominantly in inland and mountain areas.

County residents, especially children, should curtail strenuous outdoor activity. People with heart and lung disease and/or asthma, or anyone who is bothered by the soot, should stay indoors until the air is clear of the soot. People who must be active outside should take precautions: limit exposure, drink plenty of fluids and, for those who are working outside, consider using a tight-fitting particulate mask designed to filter out fine particles.

For updated information, please visit the Air Pollution Control District Web site at www.sdapcd.co.san-diego.ca.us/air/otoday.html or call (858) 650-4777, and press option 2.

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December 16, 2003

FROM: San Diego County Air Pollution Control District
(858) 650-4707

PRECAUTIONARY WINDBLOWN DUST AND ASH ADVISORY

The San Diego County Air Pollution Control District is issuing a Precautionary Dust and Ash Advisory for Tuesday, December 16, 2003, for areas impacted by windblown dust and ash from the burned areas of San Diego County.

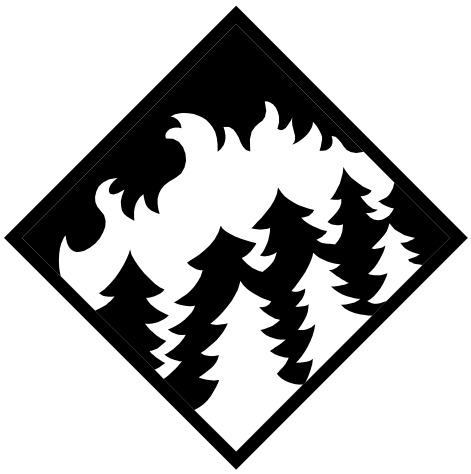
Small microscopic dust and ash can enter the lungs. If you are in an area with dense visible dust or ash, or feel uncomfortable, avoid outdoor exercise and activity. Persons with respiratory or heart disease should remain indoors and limit physical activity.

Schools in affected areas should curtail student participation in strenuous activity.

ATTACHMENT 8

SAN DIEGO COUNTY
WILDLAND FIRE TASK FORCE REPORT

Mitigation Strategies for Reducing Wildland Fire Risks



San Diego County Wildland Fire Task Force
Findings and Recommendations

Report to the Board of Supervisors
August 13, 2003

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EXECUTIVE SUMMARY

On August 13, 2002 (27), at the request of Supervisor Dianne Jacob, the County of San Diego, Board of Supervisors, directed staff to assemble a team of specialists to develop a comprehensive plan for managing wildland vegetation to reduce the severity of wildfires and decrease their impact on residents. Representatives from 24 agencies and organizations have met over the last year, conducting an in-depth analysis of wildland fire issues and developing a comprehensive wildland fire mitigation plan.

The Task Force researched the history and complexities of wildland fires, including weather, topography, fuel (vegetation), multiplicity of owners/managers, wildland-urban interface, and the diseases and pests that can destroy trees weakened by drought. The Task Force members formed subcommittees to analyze major areas of concern and develop wildland fire mitigation recommendations in each area.

The Vegetation Management Subcommittee developed six recommendations regarding annual evaluations of fire risks, defensible space, weed abatement/fuel modification ordinances, grant funding, wildland fire rapid response teams and low cost insurance for prescribed burning.

The Codes and Ordinances Subcommittee developed five recommendations regarding property setbacks, venting and glazing requirements for new construction, weed abatement issues, fire hazards and review of regulatory compliance on County-owned, operated or controlled properties.

The Bark Beetle Management Subcommittee developed two recommendations regarding grant funding for removal of dead and dying trees and establishing priorities for such tree removal efforts.

The Public Education Subcommittee developed four recommendations for education efforts regarding forest health, risks and responsibilities of those living in the wildland-urban interface, defensible space and reactivation of a UC cooperative extension position dedicated to wildland fuel management and education.

INTRODUCTION TO THE WILDLAND FIRE TASK FORCE

The San Diego County Wildland Fire Task Force was formed following the Pines Fire of July/August 2002 to address the continuing wildland fire problem facing the residents of San Diego County. The Pines Fire near Julian was the third largest fire in the County's history, consuming 61,690 acres, destroying 45 structures and damaging 121 structures. It cost an estimated $22.6 million to extinguish.

Following the Pines Fire, the County Board of Supervisors directed staff to assemble a team of specialists from federal, state, and local agencies to develop a comprehensive plan for managing wildland vegetation to reduce the severity of wildfires and decrease their impact on county residents. Topics of specific review included establishing and maintaining firebreaks, performing prescribed burns, clearing hazardous brush, and organizing a "bug crew" to develop a plan to deal with problems associated with the County's bark beetle infestation.

On September 3, 2002, the Department of Agriculture, Weights and Measures sent a letter inviting various agencies and community groups to a meeting on September 18, 2002. A broad base of expertise was recruited including representatives from local, state and federal agencies, as well as members of local environmental groups. Representatives from 24 agencies and organizations attended that initial meeting to provide diverse expertise for an in-depth analysis of wildland fire issues and for the development of a comprehensive wildland fire mitigation plan. (A list of participanting agencies and other stakeholders can be found in Attachment II, and a list of the meetings held is provided in Attachment III.)

Due to the complexities of the issues and the large number of participants, Task Force members divided into subcommittees to develop a full spectrum of strategies that could be used to reduce wildland fire risks in the unincorporated area.

Vegetation Management – Investigate methods of vegetation management including fuel breaks, prescribed burning, mechanical clearing, biological brush control, and chemical brush control.

Codes and Ordinances – Review the existing codes relating to wildfires including building codes and vegetation clearance requirements around structures located in wildland-urban interface areas.

Bark Beetle Management – Investigate methods for bark beetle eradication or control**.**

Public Education – Expand strategies to educate the public on the essential steps for and the benefits of reducing fire risks.

This report of wildland fire issues and mitigation recommendations is generated from meetings held by the full Task Force, subcommittee meetings, and research of the scientific literature regarding the various issues addressed. A glossary of fire-related terms used in this report is provided in Attachment I. A bibliography of the resources utilized in the Task Force's research is shown in Attachment IV.

HISTORICAL PERSPECTIVE

The Natural Fire Regime

Fire is a natural and beneficial part of the Mediterranean ecosystem that makes up the mountains and valleys of San Diego County. Cool wet winters and warm dry summers preclude the rapid decomposition of organic material common in other climates of the world. Here, fire recycles nutrients and stimulates new growth.

Fires in the forests and brush lands of San Diego County have been a recurring part of the ecosystem for thousands of years. Early inhabitants used fire in hunting, for enhancing plant yields, and for insect control, as well as for cooking and warmth. Fires were commonly set by Native Americans to enhance the following year's crop of seeds or to force game from thickets into a hunter's path. Burned areas attracted deer to feed on the tender sprouting plants and provided access for hunting. Fire cleared grounds around villages, minimizing the risk to young children from snakes and became an early form of insect control. Frequent fires set by early residents or lightning provided a natural mosaic of different ages of brush. The mosaic landscape tended to limit the size of fires because young brush is generally less dense and less likely to burn.

Fire Exclusion Practices

Europeans brought a contrasting view of fire to the region. They looked upon fire as destructive -- a force to be prevented, controlled, and suppressed. Europeans considered Native Americans' burning for improving seed production to be wanton destruction of livestock feed, attested to by the following viewpoint.

> *With attention to the widespread damage which results...I see myself required to have the foresight to prohibit...all kinds of burning, not only in the vicinity of the towns, but even at the most remote distances... Therefore I order...to take whatever measures they may consider requisite and necessary to uproot this very harmful practice of setting fire to pasture lands...and in case some burning occurs, they are to try immediately to...stop the fire, or failing that, to direct it into another direction which may result in less damage…"*
>
> *Don Jose Joaquin de Arrillaga, Captain of Cavalry, Interim Governor and Inspector Comandante of Upper and Lower California. Santa Barbara, May 31, 1793.*

By the early twentieth century, fire exclusion was the accepted practice. However, what was seen as a good policy to protect lives and property from fire began to have unexpected consequences. A fire regime of smaller, more frequent fires was being replaced by one of fewer, larger and more intense fires. In spite of advances in wildland firefighting technology and resources, the average number of acres burned annually in San Diego County between 1910 and 2000 remained constant at approximately 25,000 acres. A bar chart of average acres burned, by decade, is shown in Figure 1. A statistical analysis of the trendline found that the slight upward slope of the trendline is not statistically significant.

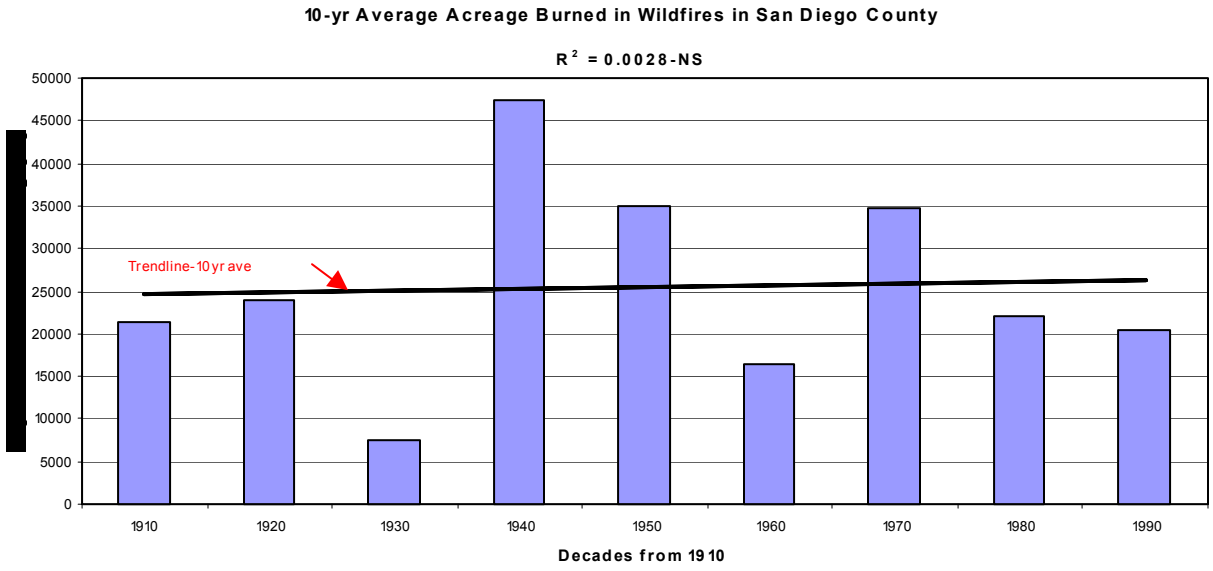

Figure 1. Note: There is no statistical significance to the slight upward slope of the trend line.

The following is a summary of major wildfires that have occurred in San Diego County in recent history. (See Figure 2.)

Examples of Major Wildfires in San Diego County

FIRE NAME	DATE	ACRES BURNED	STRUCTURES LOST	STRUCTURES DAMAGED	DEATHS
Conejos Fire	July 1950	62,000	Not Available	Not Available	0
Laguna Fire	October 1970	190,000	382	Not Available	5
Harmony Fire (Carlsbad, Elfin Forest, San Marcos)	October 1996	8,600	122	142	1
La Jolla Fire (Palomar Mtn)	September 1999	7,800	2	2	1
Viejas Fire	January 2001	10,353	23	6	0
Gavilan Fire (Fallbrook)	February 2002	6,000	43	13	0
Pines Fire (Julian, Ranchita)	July 2002	61,690	45	121	0

Figure 2.

COMPLEXITIES OF WILDLAND FIRE RISK FACTORS

Wildland fire spread is influenced by three primary factors – weather, topography, and fuel. In addition, other factors complicate the issues including diversified responsibility for wildland management, the wildland-urban interface, and destructive insects, diseases and parasites. All of these factors are addressed below.

Weather

Wind and drought are the major weather-related factors that increase wildland fire dangers. Many of the destructive fires of the past 50 years have occurred under fall and winter Santa Ana wind conditions, such as the Laguna/Boulder, the Viejas, and the Gavilan fires. Some fire experts believe that wind is the single most important factor in wildland fires. Dr. Jon Keeley, formerly of Occidental College and now with the National Park Service, describes fires as wind-driven, not fuel-driven, events.

However, many other destructive fires of the past 50 years have burned under normal winds in summertime conditions, such as the Conejos, the La Jolla, and the Pines fires. (See Figure 3.) Some experts assert that another factor, fuel, is demonstrated in these fires. Fuel is discussed below as one of the other factors in the complexities of wildland fire risk.

Conditions	Fire	Year	Acreage
Summer Heat Waves	Conejos	1950	62,000
	La Jolla	1999	7,800
	Pines	2002	61,690
Fall & Winter Santa Ana Winds	Laguna/ Boulder	1970	190,000
	Viejas	2001	10,353
	Gavilan	2002	6,000

Figure 3. Fires under differing climate conditions.

The recent four-year drought has impacted the potential fire problem by increasing the amount of dead fuel in the already dry forests and brush lands. Most vegetation is under stress from lack of water, which makes it vulnerable to attack from beetles and plant diseases.

Many people believe that annual rainfall has a significant impact on fire risks. However, annual winter rainfall has no statistical correlation with wildfire acres burned in the following fire season. (See Figure 4.)

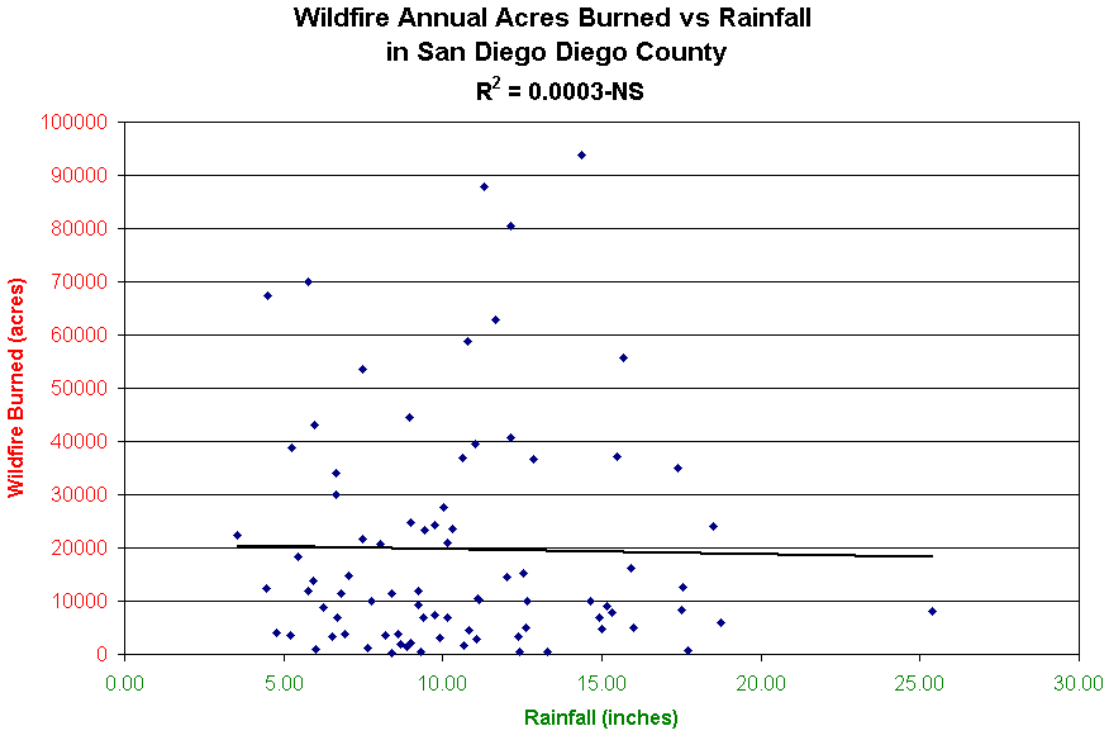

Figure 4.

Topography

Topography, or the "lay of the land," greatly influences fire intensity and the direction of spread. Fires generally spread much faster up hill because convective heat rises, preheating the vegetation ahead. Aspect, or the direction that a slope faces, determines the type and moisture content of the vegetation. South facing slopes are drier and consequently have lighter vegetation than north facing slopes. Therefore, southerly exposures generally burn faster but with less intensity. Canyons and saddles funnel winds, increasing wind speed and consequently increasing fire spread. Consequently, homes built in steep, narrow canyons and at canyon rims face an increased risk from fires.

Fuel

Dr. Jon Keeley, mentioned above, argues that fires are wind driven events and more frequent smaller fires are not ecologically necessary. However, the preponderance of evidence favors fuel as the limiting factor.

Studies conducted by Dr. Richard Minnich of UC Riverside and Dr. Thomas Bonnikson of Texas A&M conclude that fires in pre-European times were more frequent, less intense, and generally burned during the summer. They concluded that the age of fuel was the limiting factor in fire spread.

The vegetation in San Diego County's fire prone area is primarily chaparral with some coniferous forests and oak woodlands. These vegetation types are fire-adapted, that is, they have evolved with fire and require fire to maintain healthy, functioning ecosystems.

During the last century, greater emphasis was placed on fire prevention, and professional firefighting forces continued to improve fire suppression methods. One side effect of those efforts was that the average age of wildland vegetation increased, and as it aged, it became increasingly dense. Recent studies indicate that southern California forests currently have three to ten times the vegetation density that existed 100 years ago. The increase in fuel density adds to the problem of controlling fires because more fuel results in more intense wildfires.

Recently burned chaparral and trees will not carry fire for five years post fire. From six to 20 years, these fuels can burn during extreme weather conditions. From 21 to 50 years these fuels will burn well under normal summer and fall conditions, making strong uphill afternoon runs but generally slowing down at night, allowing fire crews to gain control. After 50 years, the amount of dead branches and shrubs exceeds 50% of the available fuel, resulting in very hot fires, extreme fire behavior, long range "spotting" (throwing off embers ahead of the fire) and increased resistance to control. Add Santa Ana conditions to old fuel and the result is the classic southern California firestorm.

At UCLA, two mathematicians (Peng and Schoenburg) analyzed the Los Angeles Malibu fire regime from a statistical and physics perspective. They were aware of the debate over fuel-driven fires versus wind-driven fires and they concluded that, statistically, fuel was the limiting factor. Their illustration below provides a dramatic illustration of the difference between a landscape shaped with almost no fire suppression activity in Baja California compared to San Diego County's landscape, where highly efficient fire suppression forces are employed. Fires in Mexico rarely exceed 10,000 acres although fire starts are abundant. (See Figure 5.)

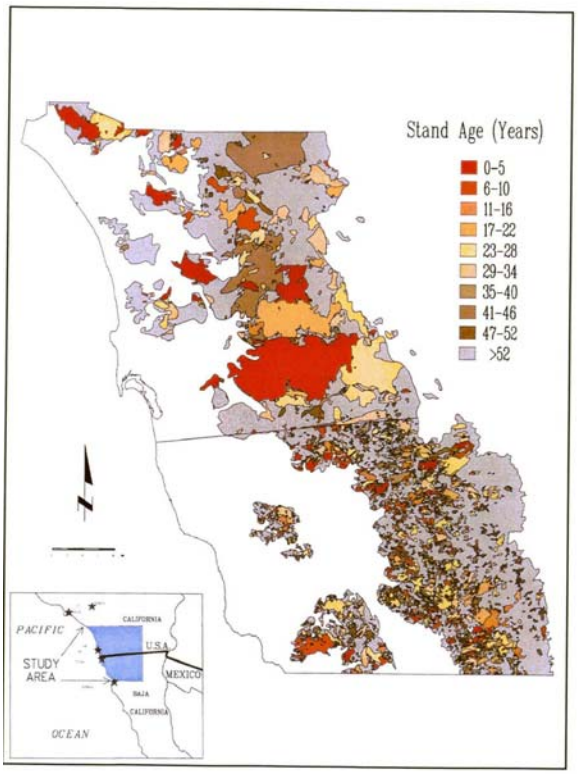

Figure 5. Map comparing fire size of San Diego County and Baja California 1971 (utilizing the most recent comparative data available).

Frequent smaller fires result in a mosaic of differing aged vegetation, so fires become somewhat self-limiting. San Diego's huge areas of aged fuel, on the other hand, can lead to vast acreages burning in a single summertime event like the 61,690 acre Pines Fire of 2002 or the 62,000 acre Conejos Fire of 1950. Santa Ana winds and old fuel can result in conflagrations like the record-setting 190,000 acre Laguna/Boulder Fire of 1970.

Presently, almost one-half of the vegetation in San Diego County's wildland is over 50 years old. Another 30% is over 20 years old. This means that almost 80% of the wildland areas in San Diego will burn

explosively under typical periods of high fire danger. (See Figures 6 and 7.)

San Diego County Fuel Age Classes		
Age	**Wildland Acres**	**Percent of Wildland Acres**
0-20 years	290,508	21.54%
21-50 years	413,113	30.63%
51+ years	645,009	47.83%
Total	1,348,630	100.00%

Figure 6.

Wildland Management Responsibility

One of the significant complexities of wildland management is the multiplicity of owners and land managers. Because land management responsibilities are divided between these groups, effective public education and ongoing interagency coordination are critical for effective fire mitigation efforts countywide.

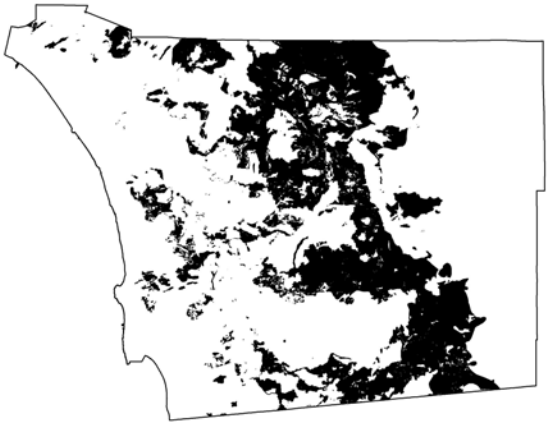

Figure 7. Vegetation older than 50 years.

The chart below shows responsible parties and the number of wildland acres with 50+ year-old vegetation under their control. (See Figure 8.)

Ownership of land with fuels over 50 years old*			
OWNERSHIP	**ACRES**	**SQ_MILES**	**PERCENT**
Private	246,592	384.56	38.23%
U.S. Forest Service	122,205	190.86	18.95%
Tribal Lands	73,213	114.39	11.35%
California Department of Parks and Recreation	66,856	104.46	10.37%
Bureau of Land Management	65,508	102.34	10.16%
Water Districts	26,188	40.78	4.06%
Cities	12,214	18.93	1.89%
Military Reservations (Camp Pendleton, Miramar)	12,242	19.11	1.90%
County Parks and Open Space	12,106	18.84	1.88%
State	4,775	7.46	0.74%
State (CalTrans)	1,126	1.66	0.17%
California Department of Fish and Game	931	1.46	0.14%
U.S. Fish & Wildlife Service	331	0.52	0.05%
Other	720	1.02	0.11%
	---	---	---
Totals	645,009	1006.41	100.00%

Figure 8. * Based on the most recent GIS layer.

The set of four maps below shows the geographic distribution of wildlands with fuel over 50 years old in San Diego County by responsible land manager. (See Figure 9.)

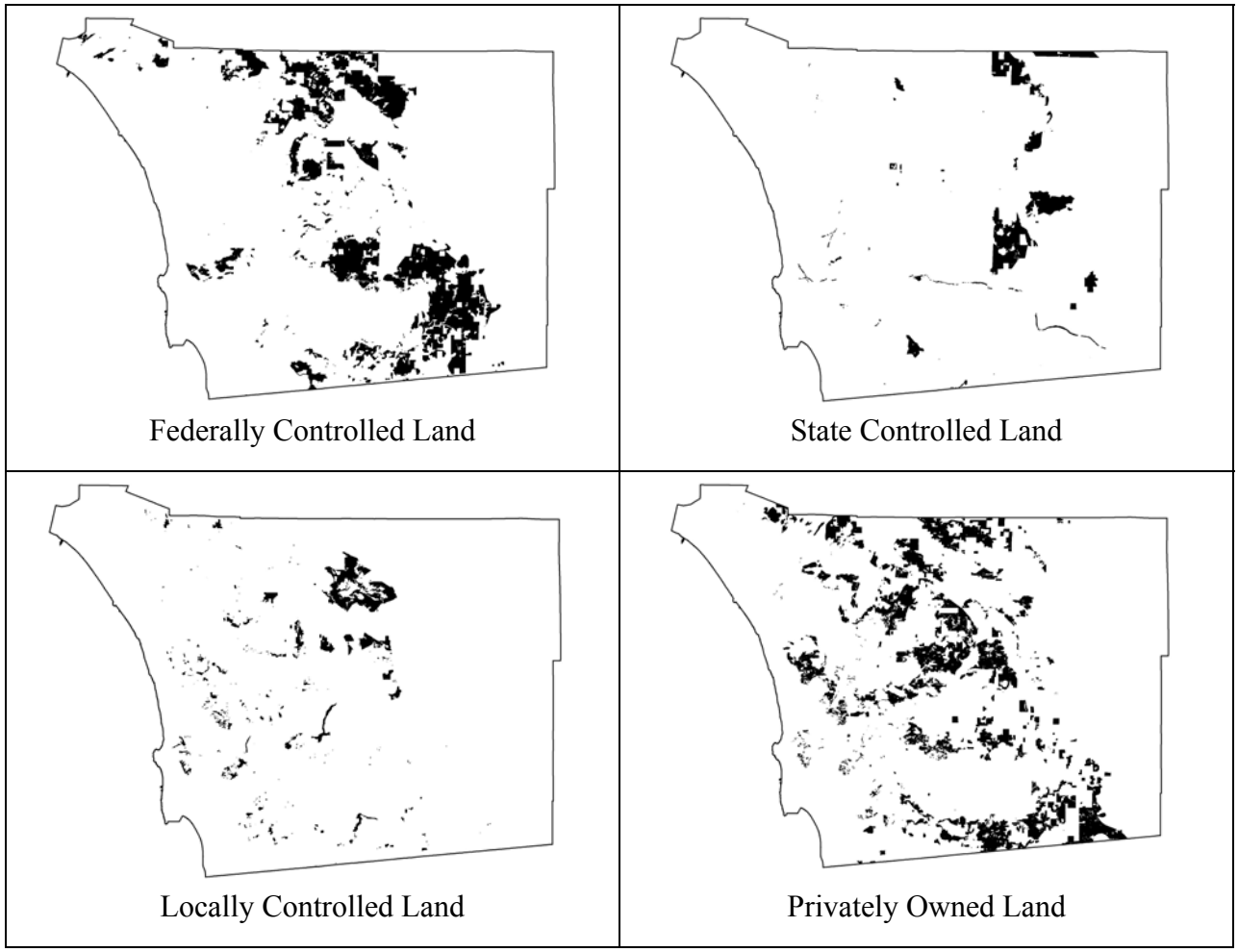

Figure 9. Wildlands with fuel over 50 years old.

Wildland-Urban Interface

The addition of hundreds of new houses each year to "wildland-urban interface" areas adds to the complexity of wildland fire mitigation. These structures may limit the ability of fire managers to pick the most effective location to stop wildland fires and may require firefighters to limit perimeter control activities in order to concentrate on defending homes. The situation is further complicated when homeowners have not maintained an area of reduced vegetation around their homes. This "defensible space" around structures allows firefighters a safe place to operate under the extreme fire conditions that accompany many recent wildfires.

Flammable roofing material is perhaps the most significant factor in the loss of homes in wildland-urban interface fires. Shingles not only catch fire easily, they break free and sail upward to be deposited as fire-starting embers downwind. Conclusions below regarding major factors in wildland-urban fires put flammable roofing material at the top of the lists. Fortunately, building

codes have been updated in recent years to prohibit the wood shingle roofs that caused so many homes to be lost in the past.

Oakland Hills Wildland-Urban Interface Fire Issues in 1923

The state's first wildland-urban interface fire occurred in the Oakland Hills of Berkeley, California in 1923. This fire destroyed 584 structures. In the past 80 years there have been fourteen large-scale fires in the Oakland Hills, eight of them in the same Parkland canyon including the 1991 Oakland firestorm.

After the 1923 fire, a committee was formed to identify the factors that contributed to the structure loss, in an effort to prevent future structure loss in wildland fires. The committee identified six major factors. In order of significance they were:

1. Flammable roofing materials
2. Inadequate clearance between combustible vegetation and structures
3. Extreme wind conditions
4. Inadequate access – narrow winding roads
5. Inadequate water supplies
6. Lack of modern fire fighting equipment

San Diego County Wildland-Urban Interface Fire Issues

The 1970 Laguna Fire was the most deadly and destructive wildland-urban interface fire in San Diego County history. The fire burned 190,000 acres over seven days, killing five people and destroying 382 homes. The more recent 1996 Harmony Grove Fire was also extremely destructive. The fire injured many firefighters and took the life of one resident. It burned 8,600 acres, destroyed 122 residences and damaged an additional 142 residences in less than eight hours. Task Force members agreed that the major reasons for structure loss in both of these fires and other recent fires were:

1. Flammable roofing materials
2. Inadequate clearance between combustible vegetation and structures
3. Extreme wind conditions
4. Inadequate access – narrow winding roads
5. Inadequate water supplies
6. Improper structure design

Comparing this list with the 1923 Berkeley Fire, most of the major factors have remained the same over the 80-year period. Only 1923 factor number 6 has changed from "Lack of modern fire fighting equipment" to "Improper structure design." Over the past 80 years incremental improvements have occurred but the primary problems remain the same.

Insects, Diseases and Parasites

Decades of active fire suppression have created overstocked forests. Four years of drought have weakened those forests, leaving them stressed and at risk for insect attack, disease or parasites. Whereas a healthy tree may be able to recover from these threats, the combination of these destructive agents with drought greatly increases tree mortality. Local forests are riddled with root rot, parasites and at least three different types of bark beetles. In fact, US Forest Service experts estimate that 35% of the trees in San Diego's forests are dead or dying.

VEGETATION MANAGEMENT

This subcommittee agreed that fuel or vegetation management is probably the single most effective tool available to mitigate fires. Prescribed burning, chemical treatment, mechanical treatment, biological treatment, fuel breaks, and defensible space around structures are all forms of vegetation management.

Methods of Reducing Vegetation

Prescribed Burning

Prescribed burning is the intentional introduction of fire, under favorable weather and fuel conditions, in order to remove old vegetation (fire fuel). Some experts believe that prescribed burns, set under carefully monitored conditions, can safely remove old fuel and present a barrier to the spread of wildfire while minimizing erosion potential and improving habitat. However, other experts believe that any man-imposed action upon wildlands is unnecessary and possibly detrimental.

Proponents of prescribed burning observe that in areas with more frequent fires, especially forests and woodlands, vegetation tends to consist of fewer but larger trees, enhancing drought survival capabilities. In addition, some studies have shown that more frequent, smaller, and less intense fires favor animal populations by increasing plant and habitat diversity.

The U.S. Forest Service has successfully conducted prescribed burns on lands north of Pine Valley and on the eastern slopes of Palomar Mountain. However, private landowners sometimes are reluctant to allow projects on their lands due to liability concerns. Therefore, some large beneficial projects are halted because one landowner refuses permission to allow his/her land to be burned.

Currently, in San Diego County, all land management agencies annually perform prescribed burns on less than 3,000 acres total. Proponents estimate 27,000 acres annually would be needed to have a significant impact on the fire situation.

Chemical Treatments

Herbicides have been successfully used to convert some chaparral-covered areas to grasslands and to reduce the understory vegetation load in forests. They may have some use in maintaining clearance around structures and in reducing the cost of maintaining fuel breaks. Herbicides can provide advantageous affects when applied to cut brush stumps to maintain clearance around structures. However, the policies of many land management agencies preclude pesticide use in quantities large enough to have any significant impact on the overall fuel problem.

Mechanical Treatment

Mechanical methods of vegetation management include bulldozing, crushing, chaining, large brush crushers, other specialized devices, and hand clearing. Many of these methods rely on burning the crushed brush in the winter during periods of damp weather. Hand cutting or "chipping," with the chips being reapplied to the site, is feasible for small areas but

becomes prohibitively expensive on large projects.

Biological Treatment

Goats, sheep, and cattle have been suggested for years as a means of reducing the fuel load, especially near developed areas. Cattle and sheep are an economical and effective method of reducing the annual grass crop, but they do not eat chaparral. Grazed lands are less likely to ignite and the intensity and spread-rate of fires are greatly reduced. However, history has shown that the chaparral and forest fire regime is driven by the age of the fuel rather than ignition sources.

Fuel Breaks

Fuel breaks are generally strips of land many miles long and 200 to 400 feet across where the vegetation is greatly reduced but not completely removed. They are designed to be places where a fire's intensity will be greatly reduced, giving fire fighters an opportunity to halt its progress. Fuel breaks may be covered in grasses and low growing shrubs found in chaparral. Within a forest, they may be constructed by removing the lower branches of trees and clearing the understory vegetation.

Fuel breaks can be helpful as locations to control prescribed burns or wildfire flanks. However, they have not proven particularly successful in directly stopping wind or fuel-driven fires, since these fires spread by throwing embers up to ½ mile in front of the flame front, starting new "spot" fires.

Following World War II, great emphasis was placed on constructing fuel breaks as a proactive way to limit the size of wildfires. In the 1960s, the Sunrise Fuel Break was constructed from Banner Grade to Cuyamaca Lake to protect Julian. Due to costs and development, this fuel break is no longer maintained. At this time, only one fuel break is being maintained, the International Fuel Break, which lines the American side of the border from Otay Mountain to Jacumba. This provides an opportunity to halt fires at the International Border.

The fuel break system was envisioned as a grid so that fires would be limited in size by running into a break where they would be controlled. Fuel breaks proved helpful along the flanks of a fire but were not effective in stopping the frontal assault of a wildfire, where the fire-building effects of topography and prevailing winds overcame the limiting effects of the firebreaks. Fuel breaks are labor intensive and, therefore, expensive. In recent years wildland agency monies have been directed away from fuel breaks toward prescribed burning across large tracts of old fuel or vegetation.

Defensible Space

Inadequate clearance around structures has been repeatedly identified as a major factor in the destruction of homes in wildfires. Defensible space is an area around a structure where vegetation is treated, cleared or reduced to slow the spread of wildfire toward the structure. The reduced volume of fuel results in a reduction in fire intensity, allowing fire fighters to remain with the structure during a wildfire.

Recommendations for adequate defensible space vary depending on factors such as proximity to wildland vegetation, type and age of the wildland vegetation and slope of the land. Within San Diego County, most

jurisdictions require a fire "clearance" area around homes. Clearance is defined as the removal of native shrubs and grass within 30 feet of a structure. Irrigated ornamental plants are allowed within the 30-foot clearance zone. Most jurisdictions also require trimming, pruning, mowing, and selective removal of non-irrigated shrubs in the area between 30 and 100 feet from the structure, which is called the fuel modification zone. Figure 10 shows the 30-foot clearance zone and the 100-foot fuel modification zone. This drawing illustrates the required clearance zones around a house.

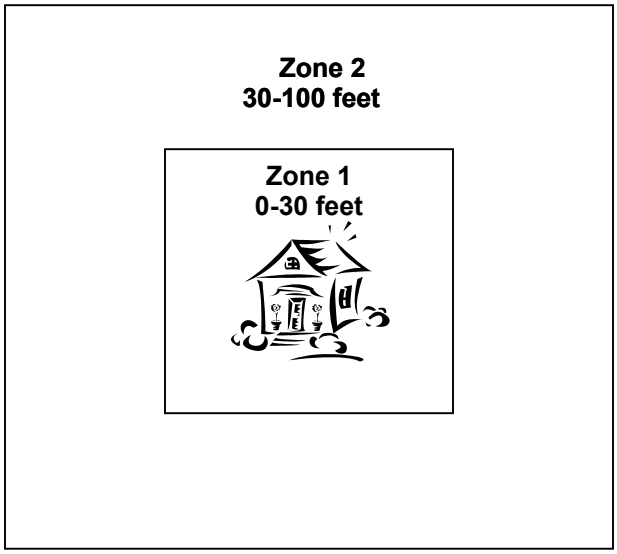

Figure 10. Defensible Space

Unfortunately, many homeowners ignore the need for defensible space, because they misunderstand the "clearance" concept. They believe it to mean the complete removal of any vegetation on the land around their homes. Other homeowners do not want to touch any native vegetation for environmental or aesthetic reasons. Other homeowners do not have the time or money to remove and dispose of vegetation, which could involve costly tree trimming and landfill charges. Prescribed burning is a less costly option for creating defensible space, but smoke can be a nuisance, especially in the more densely populated areas.

Chipping

Chipping is the mechanical reduction of large vegetation into small pieces. Chipping the brush and returning the chips to the area is an ecologically sound method of disposal. Chippers are complex and potentially dangerous machines that require a skilled operator. They are also expensive, and are not generally available at rental yards.

In February 2002, the Fire Safe Council, in cooperation with the Resource Conservation District of Greater San Diego, began to provide a free residential chipping service, funded by a federal grant from the Bureau of Land Management. The response was overwhelming and they could not begin to meet the demand. Over 640 sites, a total of 3,300 acres, were chipped. The cost was $208,513 or about $325 per site. The majority of the chipping was done by a contractor with paid crews. Chip disposal was not a problem. Most residents wanted the chips spread on their property for erosion control and/or mulch. In the few instances where the owner did not want the chips, neighbors were more than happy to accept them.

The Fire Safe Council's pilot chipping program revealed several issues. Scheduling chipping crews over the entire county was an enormous task. Limited staff made it impractical to prioritize locations based on need, fire danger, and other factors, so crews were dispatched on a first call, first serve basis. Many residents were disappointed when they called for a chipper, only to find out that the program had expended the grant and could not respond to their needs.

One of the lessons learned from the pilot program is to prioritize the limited chipper availability based on risk factors. Local fire districts or the local wildland agency would be better positioned to set community priorities for chipping services.

Options for future chipping programs include:

- Purchasing chippers with grant funds for individual fire districts or community-based groups. Issues of operator training and liability would need to be addressed if the machine were not operated by district personnel.

- Using grant funds to contract with private companies to provide community "chipper days." Days would be scheduled, community groups and members notified, and residents would cut and stack for chipping ahead of time.

- Developing and implementing a system of partial cost sharing, with residents paying a portion or all of the costs. Government would provide the service directly or with contracted help, charging on a cost recovery basis. Economies of scale would allow efficient use of resources, reducing costs to residents. Reduced costs may encourage residents to maintain their vegetation in a fire-safe manner.

- Some combination of all of the above could be implemented. San Diego County is diverse geographically and biologically. One method that would work in a mountain community may not be successful in an inland valley community.

Recommendations

Recommendation 1. At the end of each fire season, evaluate the status of fire risks for San Diego County, and as appropriate, prepare a status report of mitigation efforts accomplished in the prior year for the Board of Supervisors.

Recommendation 2. Continue to enforce legal requirements for defensible space (fuel modification zones) around structures.

Recommendation 3. Develop model weed abatement and fuel modification ordinances for existing structures located in wildland areas.

Recommendation 4. Continue to seek grant funds for chipping while exploring the various cost-saving chipping program options listed above.

Recommendation 5. Research options for providing low cost insurance to cover landowners who allow prescribed burning on their lands.

Recommendation 6. If wildland fire damages personal property, continue to assist residents whose property has been damaged or destroyed by providing a rapid response multi-departmental damage assessment team.

CODES AND ORDINANCES

County codes relating to wildfires include building codes and vegetation clearance requirements around structures located in areas of wildland-urban interface.

The wildland-urban interface fire problem is a national, state, and county issue. Local regulatory agencies must meet state and federal mandates and standards for issues ranging from biological preserves to fire protection. However, the issues are different from area to area. To resolve the wildland fire problem, the regulatory codes and standards must address the issues for the specific areas where they are enforced.

San Diego County has been a leader in both the state and nation regarding wildland–urban interface fire safety. Board actions in 2001 and 2002 have fostered strategic partnerships with the stakeholders of the region and a wide range of improvements have been realized. San Diego County continues its longstanding effort to upgrade regulatory codes and standards as they relate to fire. (See Figure 11.)

Regulatory Codes And Standards Improvements

YEAR	REGULATORY CODE /STANDARD
1991	Adopted County Fire Code - Revised every 3 years.
1996	Adopted County Building Code - Class "A" roof requirement
1997	Approved Memorandum of Understanding between county fire agencies and wildlife agencies.
1998	Developed "Fire, Defensible Space and You" brochure.
	Developed list of suggested plants for fire-prone areas and added to county website: http://www.sdcounty.ca.gov/cnty/cntydepts/landuse/plantlist.html.
1999	Updated San Diego County fire-related standards for private roads – Increased access width from 20 to 24 feet and reduced grade from 25% to 20%.
	Established 100-foot fuel modification zone around structures and a variable width fuel modification zone along county roads.
2000	Completed the LAFCO fire response standards for the unincorporated area of San Diego County.
2001	Ratified Consolidated Fire Code incorporating Ordinances of the 17 Fire Districts in San Diego County.

Figure 11.

Recommendations

Evaluate for amendment of county codes and standards as follows:

Recommendation 1. Review the County's Zoning Ordinance for all setbacks on large parcels and setbacks from edge of slopes to structures.

Recommendation 2. Review the County's Building Code. Recent fires have highlighted some deficiencies in the venting and glazing requirements for new construction.

Recommendation 3. Review and update the County's Weed Abatement Ordinance to mirror standard Fire Districts' ordinances.

Recommendation 4. Evaluate feasibility of a new ordinance or revisions to existing weed abatement ordinance to declare dead or substantially dead orchards, groves, vines, and trees as fire hazards.

Recommendation 5. Review existing County-owned, operated, or controlled properties for compliance with existing regulatory codes and standards for wildland fire protection.

BARK BEETLE MANAGEMENT

In November 2002, the County Board of Supervisors declared that a state of emergency existed in the forested areas of San Diego County due to the risk to lives and property from the overwhelming number of dead and dying trees. Similar declarations were made in Riverside and San Bernardino Counties. In March of 2003, the Governor declared that a state of emergency exists in these southern California counties.

In researching the possibilities for eradicating bark beetles, the Task Force learned that, according to U.S. Forest Service health experts, bark beetles are native, usually present, and only abundant now because of the large number of dying trees available for colonization. According to forest health experts, a bark beetle infestation is a symptom of an unhealthy forest, not the cause. The Task Force, therefore, concluded mitigation efforts should focus on the removal of dead and dying trees.

The USDA Natural Resource Conservation Service, in cooperation with the County of San Diego, has applied for a $30 million watershed protection grant for emergency tree removal. Similar applications were filed in Riverside and San Bernardino Counties. Awards for these grants are expected by the end of 2003.

In response to the declared State of Emergency in San Diego, Riverside and San Bernardino due to bark beetles, drought and other conditions, the U.S. Senate has approved $25 million for emergency actions to reduce the danger of catastrophic fire from dead and dying trees. The funds are to go toward clearing of evacuation routes, clearing around emergency shelter locations, clearing around emergency communication sites and clearing buffer zones around highly populated communities in order to prevent fire from sweeping through such communities.

After months of research and discussion by members of the Bark Beetle Management Subcommittee, in June 2003, the California Department of Forestry sponsored the formation of the San Diego Forest Area Safety Task Force (FAST). To avoid duplication of effort, members of the County Bark Beetle Management Subcommittee agreed to merge into FAST.

Recommendations

Recommendation 1. Continue to seek additional grant funding to remove dead and dying trees.

Recommendation 2. Establish a set of priorities for tree removal efforts emphasizing public safety factors such as maintenance of mass evacuation and emergency response routes, protection of emergency communication infrastructure, etc.

PUBLIC EDUCATION

This subcommittee explored public education concerns, because almost 40% of San Diego's wildlands with 50+ year-old fuel are privately owned.

The need for public education regarding wildland fire issues is not unique to San Diego. In 2001, the U.S. Congress directed the Secretaries of the Interior and Agriculture to work with the nation's Governors to develop a strategy for reducing wildland fire risks to communities. A 10-year comprehensive strategy developed from that directive, recommending a collaborative approach to reducing wildland fire risks. The comprehensive strategy includes the following action items:

- Promote public knowledge and understanding of wildland fire, including risks and the role of fire in natural ecosystem processes.

- Increase incentives for private landowners to address defensible space and fuels management needs on private property through local use policies.

Rural Migration

As people migrate from cities to rural areas, they bring with them expectations of city-type infrastructure and support services. Many do not realize the role of fire in the natural ecosystem around them and the increased need for personal responsibility relating to fire in wildland-urban interface areas. They often do not understand that their homes and possibly their lives are at stake. The public needs to understand that creating survivable homes and protecting the environment in a wildland-urban interface area is a partnership between fire agencies and homeowners, a partnership that requires not only homeowner participation but also financial commitment.

Defensible Space

The County has produced a brochure entitled, "Fire, Defensible Space, and You" that provides local residents important information on how to landscape in a fire-safe manner. The term "defensible space" describes an area where the vegetation is planned or modified to act as a barrier to an advancing fire.

Currently, the 100-foot standard for defensible space around wildland structures is uniform throughout the unincorporated area. In the past, differing standards have contributed to public confusion over defensible space. Historically, the 17 fire districts in San Diego County had varying standards for defensible space clearance. Some required 30 feet, some 50 feet some 60 feet and others 100 feet of clearance. Therefore, residents received a mixed message in newspapers, television news and public service announcements. Often, residents would take recommended action and then find out that their efforts did not meet the local standard. In 1999, fire districts arrived at an agreed upon standard of 100 feet of defensible space, removing much of the confusion. However, the California Department of Forestry and Fire Protection maintained a standard of 30 feet defensible space until 2002. Continuing public education is needed to ensure all residents are aware of the 100-foot standard.

Many fire districts have an effective enforcement program for defensible space. They regularly inspect properties, issue notices of non-compliance and contract for

clearance on non-compliant properties. Fire district ordinances give them the authority to clear properties that do not comply with the 100-foot standard and then add the cost of clearance to the owners' property tax bills. However, some geographically large fire districts do not have adequate staffing to conduct needed inspections. Therefore, public education is needed to convey to homeowners that creating defensible space is in their own best interest.

Vegetation Management

San Diego's concentrations of old wildland vegetation (fire fuel) pose a significant danger to rural and wildland interface communities. Public education is needed to ensure the public understands that old, dense vegetation becomes stressed, diseased, and dying vegetation, which, if ignited, fuels explosive wildfires. It is hoped that an informed public will voluntarily increase vegetation management efforts. As public policy makers move toward promoting the environmental benefits and cost efficiencies of prescribed burning, public education is also needed to offset misconceptions caused by the rare but sensational media stories of prescribed burning gone awry.

Bark Beetle

There is also a critical need to educate the public to ensure they understand that once a tree's needles turn brown from a bark beetle infestation, the infested tree will not survive. Some homeowners have objected to the prompt removal of infested trees, because the tree still showed signs of life. Failure to remove all bark beetle infested trees at the same time drives up the mitigation costs and prolongs wildfire risks for that property and neighboring properties.

Following the Laguna fire of 1970 that burned 190,000 acres, the University of California Cooperative Extension created a fulltime position to address wildland fire issues and develop an education program for citizens and land managers. Unfortunately, that position was vacated during the 1991 budget dilemma and was never reactivated. Since 1991, the need to manage the wildlands for public safety and the obligation to comply with the myriad environmental laws and regulations has become much more complex.

Recommendations

Recommendation 1. Promote educational efforts to inform the public about forest health issues.

Recommendation 2. Support public education efforts by citizen based groups such as the Fire Safe Councils to increase the level of public and government understanding of the risks of living in the wildland-urban interface and their responsibilities in protecting their property.

Recommendation 3. Expand efforts to educate the public regarding the benefits of and guidelines for defensible space.

Recommendation 4. Prepare a request to the University of California Cooperative Extension to reactivate the position dedicated to wildlands fuel management and education.

SUMMARY OF RECOMMENDATIONS

The following recommendations have been made by the **Vegetation Management Subcommittee** of the Task Force:

Recommendation 1. At the end of each fire season, evaluate the status of fire risks for San Diego County, and as appropriate, prepare a status report of mitigation efforts accomplished in the prior year for the Board of Supervisors.

Recommendation 2. Continue to enforce legal requirements for defensible space or fuel modification zones around structures and seek a minimum distance of 100 feet.

Recommendation 3. Develop model weed abatement and fuel modification ordinances for existing structures located in the wildland areas.

Recommendation 4. Continue to seek grant funds for chipping while exploring the various cost-saving chipping program options listed above. (Options are listed on page 15 of this report.)

Recommendation 5. Research options for providing low cost insurance to cover landowners who allow prescribed burning on their lands.

Recommendation 6. If wildland fire damages personal property, continue to assist residents whose property has been damaged or destroyed by providing a rapid response multi-departmental damage assessment team.

The following recommendations have been made by the **Codes and Ordinances Subcommittee** of the Task Force:

Evaluate for amendment county codes and standards as follows

Recommendation 1. Review the County's Zoning Ordinance for all setbacks on large parcels and setbacks from edge of slopes to structures.

Recommendation 2. Review the County's Building Code. Recent fires have highlighted some deficiencies in the venting and glazing requirements for new construction.

Recommendation 3. Review and update the County's Weed Abatement Ordinance to mirror standard Fire Districts' ordinances.

Recommendation 4. Evaluate feasibility of a new ordinance or revisions to existing weed abatement ordinance to declare dead or substantially dead orchards, groves, vines, and trees as fire hazards.

Recommendation 5. Review existing County-owned, operated, or controlled properties for compliance with existing regulatory codes and standards for wildland fire protection.

The following recommendations have been made by the **Bark Beetle Subcommittee** of the Task Force:

Recommendation 1. Continue to seek additional grant funding to remove dead and dying trees.

Recommendation 2. Establish a set of priorities for tree removal efforts emphasizing public safety factors such as maintenance of mass evacuation and emergency response routes, protection of emergency communication infrastructure, etc.

The following recommendations have been made by the **Public Education Subcommittee** of the Task Force:

Recommendation 1. Promote educational efforts to inform the public about forest health issues.

Recommendation 2. Support public education efforts by citizen based groups such as the Fire Safe Councils to increase the level of public and government understanding of the risks of living in the wildland-urban interface and their responsibilities in protecting their property.

Recommendation 3. Expand efforts to educate the public regarding the benefits of and guidelines for defensible space.

Recommendation 4. Prepare a request to the University of California Cooperative Extension to reactivate the position dedicated to wildlands fuel management and education.

ATTACHMENTS

Attachment I

Glossary

Defensible Space. An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources.

Fire Break. Any natural or constructed discontinuity in a fuelbed utilized to segregate, stop, and control the spread of fire or to provide a control line from which to suppress a fire.

Fuel. Any vegetation (including ornamental) that will burn during a wildfire, including grass, brush, trees, and structures.

Fuel Break. A fuel break is generally a strip of land many miles long and 200 to 400 feet across where the vegetation is greatly reduced but not completely removed.

Prescribed Burn: Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and National Environmental Policy Act (NEPA) requirements must be met, prior to ignition.

Santa Ana Winds. Warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California. Santa Ana winds often blow with exceptional speed. Forecasters usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots (28.8 mph).

Spotting. Embers generated from an intense wildfire are carried up in the smoke column and dropped back to earth in front of the main fire body, starting new “spot” fires.

Wildland-Urban Interface. That line, area, or zone where structures and other human development meet, or intermingles with undeveloped wildland or vegetative fuels.

Attachment II.

Participating Agencies and Other Stakeholders

The following agencies and other stakeholders participated in the Wildland Fire Task Force:

California Department of Fish and Game
California Department of Parks and Recreation
California Department of Forestry and Fire Protection
California Native Plant Society
City of Carlsbad, Fire Department
City of San Diego, Fire Department
County of San Diego, Air Pollution Control District
County of San Diego, Board of Supervisors, District 2 (Dianne Jacob)
County of San Diego, Board of Supervisors, District 5 (Bill Horn)
County of San Diego, Department of Agriculture, Weights and Measures
County of San Diego, Department of Parks and Recreation
County of San Diego, Department of Planning and Land Use
County of San Diego, Department of Public Works
County of San Diego, Office of Emergency Services
East County Fire Protection District
Fire Safe Council - San Diego
The Nature Conservancy
North County Fire District
Palomar Mountain Volunteer Fire Department
San Diego County Fire Protection Districts Association
San Diego Gas and Electric
San Diego County Fire Chiefs Association
California State Senate District 38 (Bill Morrow)
Resource Conservation District of Greater San Diego
US Border Patrol – San Diego Sector
US Department of Agriculture, Forest Service, Descanso District
US Department of Agriculture, Forest Service, Palomar District
US Department of Agriculture, Natural Resource Conservation Service
US Department of Defense, Naval Facilities Engineering Command
(Camp Pendleton and Miramar)
US Department of Interior, Bureau of Land Management
University of California Cooperative Extension
Watershed Fire Council of Southern California

Attachment III.

Meetings

September 18, 2002	General Meeting
October 12, 2002	Education Subcommittee meeting
October 16, 2002	Vegetation Subcommittee meeting
October 30, 2002	Vegetation Subcommittee meeting
October 31, 2002	Codes and Ordinances Subcommittee meeting
October 31, 2002	Education Subcommittee meeting
November 18, 2002	Education Subcommittee meeting
November 20, 2002	Vegetation Subcommittee meeting
December 17, 2002	Codes and Ordinances draft report
January 8, 2002	Tri-County Bark Beetle meeting
January 16, 2003	Bark beetle meeting with State Office of Emergency Services
January 22, 2003	Bark beetle meeting –Temecula
January 30, 2003	Tri-County Bark Beetle meeting
February 12, 2003	Education committee draft report
February 26, 2003	Bark beetle meeting with Riverside and San Bernardino County
March 5, 2003	Beetle meeting with OES, Riverside. & San Bernardino
April 9, 2003	Beetle meeting -Mt Laguna
April 10, 2003	Beetle meeting- CDF, NRCS, and 2nd District Supervisor's staff
April 15, 2003	Emergency Watershed Protection Grant
May 14, 2003	Beetle Subcommittee Meeting
June 19, 2003	F.A.S.T. meeting
July 24, 2003	F.A.S.T. meeting

Attachment IV.

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