

2/8/04



Prescribed Fire Behavior Analyst

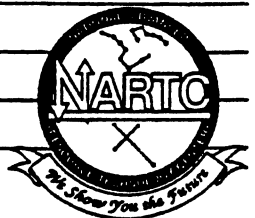
These are some of the many documents that I followed the Buchanan R. fire accident in which an employee was killed when the fire turned over him.

There are 5 packets here:

1. Final letter of notification of Unsafe or Unhealthy Working Conditions. OSHA issued a preliminary letter of notices right after their investigation. Administrative process calls for conferences to develop the final notices. The preliminary notices are quite different from the final notices.
2. The FS. responded to the notices using the OSHA guidance provided in the notices. This ~~was~~ ^{is} the letter from WO Fire & Aviation Mgt.
3. This is the letter of responses done by the Region 3 Regional Office.
The W.O. Safety & Health group has also responded but I could not get a copy of that letter.

OSHA accepted the 3 responses and has closed the case.

4. A mid-summer summary of the accident
5. A sequence of events done shortly after the accident for general information. The map on the back is a FAX copy of a photocopy and is poor quality but it shows the key points referenced in the text.



COPI

1.

U.S. Department of Labor
Occupational Safety and Health Administration
505 MARQUETTE AVE., NW, SUITE 820

Albuquerque, NM 87102
Phone: (505)766-3411 FAX: (202)777-3333

THIS IS THE FINAL SET OF "CHARGES"
FROM OSHA FOLLOWING
MEETINGS OF OSHA AND
THE F.S. MANY OF THE
ORIGINAL NOTICES WERE
DROPPED AFTER DISCUSSIONS AND
EXPLANATIONS - OTHERS WERE RE-WRITTEN.
THESE ARE WHAT THE F.S. HAD TO RESPOND TO



Notice of Unsafe or Unhealthful Working Conditions

To:
U.S. Dept. of Agriculture - Forest Service
517 Gold, SW
Albuquerque, NM 87102

Inspection Number: 103621652
Inspection Date(s): 04/26/93-06/11/93
Issuance Date: 02/02/94

The violation(s) described in this Notice is (are)
alleged to have occurred on or about the day(s) the
inspection was made unless otherwise indicated within
the description given below.

Inspection Site:
Pajarito Peak, Zia Indian Reservation
Jemez Pueblo, NM 87024

This Notice of Unsafe or Unhealthful Working Conditions (Notice) describes violations of the Occupational Safety and Health Act of 1970, the Executive Order 12196, and 29 CFR 1960, Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters. You must abate the violations referred to in this Notice by the dates listed unless within 15 working days (excluding weekends and Federal holidays) from your receipt of this Notice you request an Informal Conference with the U.S. Department of Labor Area Office at the address shown above.

Posting - The law requires that a copy of this Notice be posted immediately in a prominent place at or near the location of the violation(s) cited herein, or, if it is not practicable because of the nature of the employer's operations, where it will be readily observable by all affected employees. This Notice must remain posted until the violation(s) cited herein has (have) been abated, or for 3 working days (excluding weekends and Federal holidays), whichever is longer.

Notification of Corrective Action - You should notify the U.S. Department of Labor Area Office promptly by letter that you have taken appropriate corrective action within the time frame set forth on this Notice. Please inform the Area Office in writing of the abatement steps you have taken and of their dates, together with adequate supporting documentation, e.g., drawings or photographs of corrected conditions, purchase/work orders related to abatement actions, air sampling results, etc.

Employer Discrimination Unlawful - The law prohibits discrimination by any person against an employee for filing a complaint or for exercising any rights under this Act. An employee who

COPY

**U.S. Department of Labor
Occupational Safety and Health Administration**



NOTICE TO EMPLOYEES

An informal conference has been scheduled with the Occupational Safety and Health Administration (OSHA) to discuss the Notice of Unsafe or Unhealthful Working Conditions (Notice) issued on 02/02/94. The conference will be held at the OSHA office located at 505 MARQUETTE AVE., NW, SUITE 820, , Albuquerque, NM, 87102 on _____ at _____. Employees and/or representatives of employees have a right to attend an informal conference.

COPY

U.S. Department of Labor
Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 1 Type of Violation: **Serious**

Section 1-201(a), Executive Order 12196 of February 26, 1980: The head of the agency did not furnish to employees places and conditions of employment that are free from recognized hazards that were causing or were likely to cause health or serious physical harm:

On or about April 22, 1993 an employee of the U.S. Forest Service was fatally injured when exposed to extensive smoke and burns from a prescribed burn in the Jemez mountains in New Mexico.

The Forest Service did not inform all employees of changes in the firing plan.

Methods of corrections include but are not limited to the following: Forest Service will direct Forest Supervisors to reemphasize the need to keep all employees working on prescribed fires informed about changes in the firing plan that will affect the employee's work and their safety and health.

Date By Which Violation Must be Abated: 02/25/94

*Letter signed
by Richard Adams 2/7/94
5100 memo (enclosed)*

See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.

COPY

U.S. Department of Labor
Occupational Safety and Health Administration

Inspection Number: 103621652
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Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 2 Type of Violation: **Serious**

Section 1-201(a), Executive Order 12196 of February 26, 1980: The head of the agency did not furnish to employees places and conditions of employment that are free from recognized hazards that were causing or were likely to cause health or serious physical harm.

On or about April 22, 1993, employees of the U.S. Forest Service involved in the Buchanan Prescribed Burn, were required to perform fire fighting operations without personal protective equipment required by the Buchanan Prescribed Burn's Job Hazard Analysis, and Part 1960.8(d). Personal protective equipment required by the Job Hazard Analysis included, but was not provided:

- a) Eight inch high lace leather boots with non-slip soles required to be worn in all aspects of burning, during overland travel on foot, in case of roll-over of all-terrain vehicles in wooded areas, during the construction of hand lines, and in the event of exposure to uncontrolled wildfire.
- b) Eye protection required to be worn during travel to fire on foot, during the construction of hand lines, in the event of exposure to uncontrolled wildfire, and in the event of falling/burning snags.
- c) Hard hats with chin straps required to be worn when handling flammables, in case of roll-over of all-terrain vehicles, during the construction of hand lines, and in the event of falling burning snags.
- d) Brush jackets required when handling flammables.

Methods of correction include but are not limited to the following: Forest Service will direct Forest Supervisors to reemphasize the need to be sure that all employees assigned to prescribed fires are provided with the protective equipment that is included in the Job Hazard Analysis for tasks the employee will be performing. Also reemphasize that the employees shall be trained to use the protective equipment and that work supervisors monitor to determine that employees are using the protective equipment when performing a task requiring such equipment.

*5100 Memo
Signed by Adams
responded.
(enclosed)*

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Occupational Safety and Health Administration

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Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

~~Date By Which Violations Must be Abated: 02/25/94~~

Citation 1 Item 3 Type of Violation: **Serious**

Section 1-201(a), Executive Order 12196 of February 26, 1980: The head of the agency did not furnish to employees places and conditions of employment that are free from recognized hazards that were causing or were likely to cause health or serious physical harm:

a) In that the Safety and Health specialist and the Regional Office Safety Officer were not provided with the training and necessary equipment to conduct thorough inspections of the work place as required by Part 1960.25(a).

b) In that the Forest Service failed to adequately inform employees of the Forest Service Occupational Safety and Health Program.

Methods of corrections include but are not limited to the following: Forest Service shall direct all its Regional Safety Officers to attend the Occupational Safety and Health Administration's training course for collateral duty safety officers. Forest Service will reemphasize the importance of each Safety and Health Specialist being informed of the Bloodborne Pathogen Plan and Hazardous Materials Communications Plan for the Forest Service Unit where they are assigned.

~~Date By Which Violation Must be Abated: 02/25/94~~

*Letter by
Judy Hudson 2/7/94
Responded to by R3 (enclosed)*

See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.

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Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 4 Type of Violation: **Serious**

SECTION 1-201(j) of Executive Order 12196, February 26, 1980: The head of the agency did not operate an occupational safety and health management information system in that the employees were not provided with occupational safety and health program information as required by Part 1960.12(a):

Management and employees of the U.S. Forest Service were not familiar with the OSH Act. Executive Order 12196, and other program elements as required by 1960.12(a) through (e).

Methods of corrections include but are not limited to the following: Forest Service shall direct all its Regional Safety Officers to attend the Occupational Safety and Health Administration's training course for collateral duty safety officers. Forest Service will reemphasize the importance of each Safety and health Specialist being informed of the Bloodborne Pathogen Plan and Hazardous Materials Communications Plan for the Forest Service Unit where they are assigned.

~~Date By Which Violation Must be Abated: 02/25/94~~

*WO Safety responded
letter not enclosed*

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Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 5 Type of Violation: **Serious**

SECTION 1-201(j) of Executive Order 12196, February 26, 1980: The head of the agency did not operate an Occupational Safety and Health Management Information System, which includes the maintenance of such records as the Secretary may require:

- a) 175 of 240 injury/illness instances for FY 1991 were misrecorded or not recorded on the OSHA 200 log or it's equivalent form as required by 29 CFR 1960/67 and OSHA booklet 2014. The instances include lost workdays, injuries/illnesses that resulted in restricted activity, and/or medical treatment.
- b) 34 of 65 injury/illnesses instances for FY 1992 were misrecorded or not recorded on the OSHA 200 log or it's equivalent form as required by 29 CFR 1960.67 and OSHA booklet 2014. The instances include lost workdays, injuries/illnesses that resulted in restricted activity, and/or medical treatment.

~~Date By Which Violation Must be Abated: 02/05/94~~

R3 responded

See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.

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U.S. Department of Labor
Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 6 Type of Violation: **Serious**

29 CFR 1910.1030(c)(1)(i): The employer having employee(s) occupational exposure did not established a written Exposure Control Plan designed to eliminate or minimize employee exposure:

provided Regional Bloodborne Pathogen Standard letter of 1/17/93 from Volk

On or about April 22, 1993, Emergency Medical Technicians and Law Enforcement Officers required to provide emergency medical services to injured employees involved in the Buchanan Prescribed Burn, were not protected by the requirements of a written Exposure control Plan designed to eliminate or minimize employee exposure to bloodborne pathogens.

~~Date By Which Violation Must be Abated~~ 02/25/94

Citation 1 Item 7 Type of Violation: **Serious**

29 CFR 1926.29(e)(1): The employer did not develop, implement, and maintain at the workplace a written hazard communication program which described how the criteria specified in 29 CFR 1926.59(f), (g), and (h) would be met:

The U.S. Forest Service failed to develop and implement a Hazard Communication program that described the hazards associated with the use of diesel fuel, gasoline and Alumagel Powder mixture used in the terra-torch and drip torches.

provided plan signed on 2/3/94

~~Date By Which Violation Must be Abated~~ 02/25/94

See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.

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U.S. Department of Labor
Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 8 Type of Violation: **Serious**

29 CFR 1926.59(g)(8): The employer did not ensure that material safety data sheets were readily accessible to the employees in their work area during each work shift:

The employer did not provide Material Safety Data Sheets (MSDS) on the diesel, gasoline, and Alumagel Powder mixtures used in the terra-torch and drop torches on the prescribed burn in the Jemez Mountains.

Provided on 2/1/94 - 5100 memo enclosed

~~Date By Which Violation Must be Abated~~ 02/25/94

See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.

OSHA

U.S. Department of Labor
Occupational Safety and Health Administration

Inspection Number: 103621652
Inspection Dates: 04/26/93 - 06/11/93
Issuance Date: 02/02/94



Notice of Unsafe or Unhealthful Working Conditions

Company Name: U.S. Dept. of Agriculture - Forest Service
Inspection Site: Pajarito Peak, Zia Indian Reservation, Jemez Pueblo, NM 87024

Citation 1 Item 9 Type of Violation: Serious

29 CFR 1926.59(u): Employees were not provided information and training as specified in 29 CFR 1926.59(h)(1) and (2) on hazardous chemicals in their work area at the time of their initial assignment and whenever a new hazard was introduced into their work area:

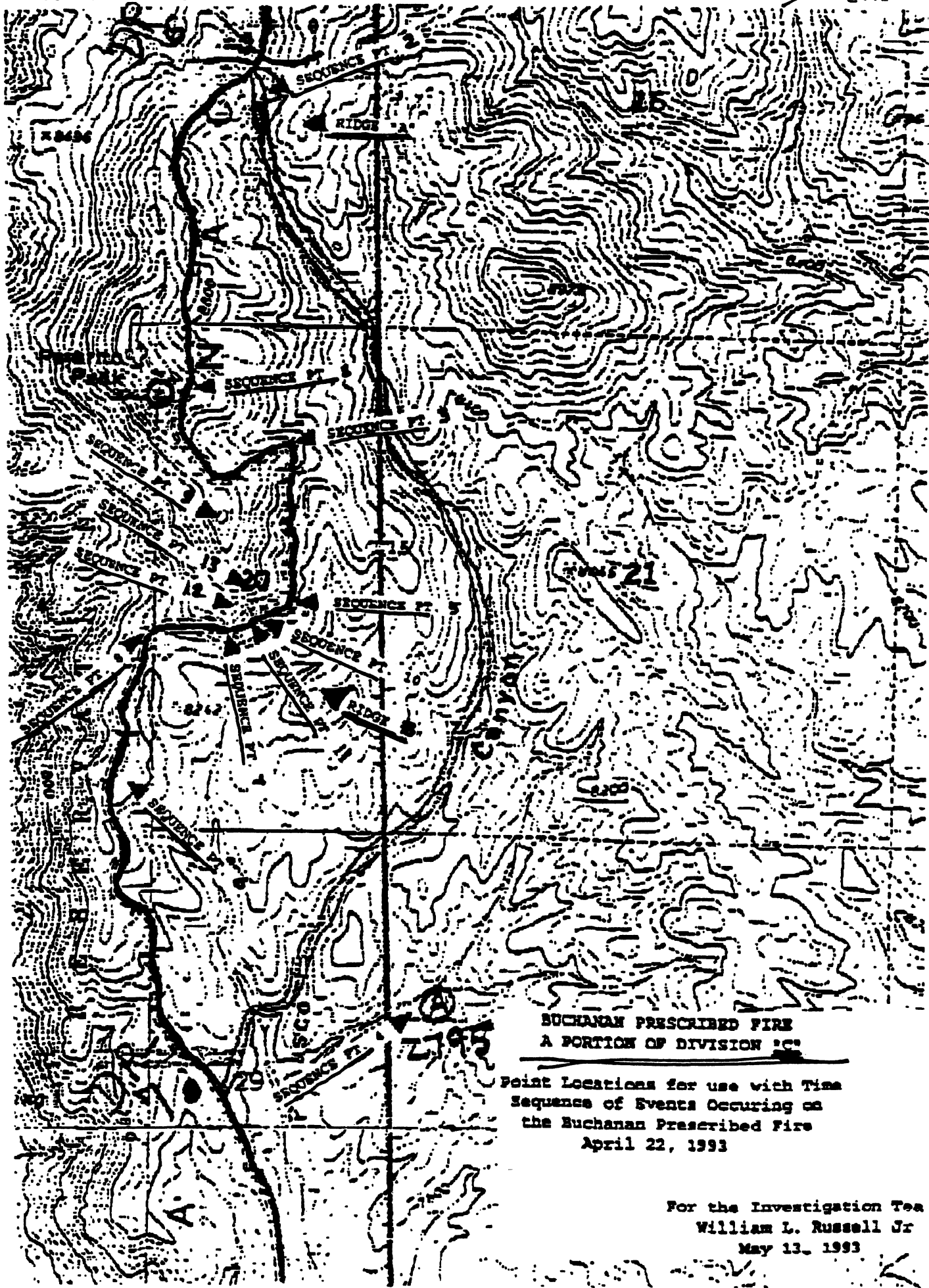
The employer did not provide training on Hazard Communication to employees who were required to use a terra-torch and drip torches and who were potentially exposed to diesel fuel, gasoline, Alumagel powder and carbon monoxide during a prescribed burn in the Jemez Mountains in New Mexico.

~~Date By Which Violation Must be Abated: 02/25/94~~

RS
Judy Hudson 2/7/94 letter

Edward J. Cosgrove
EDWARD J. COSGROVE
Area Director

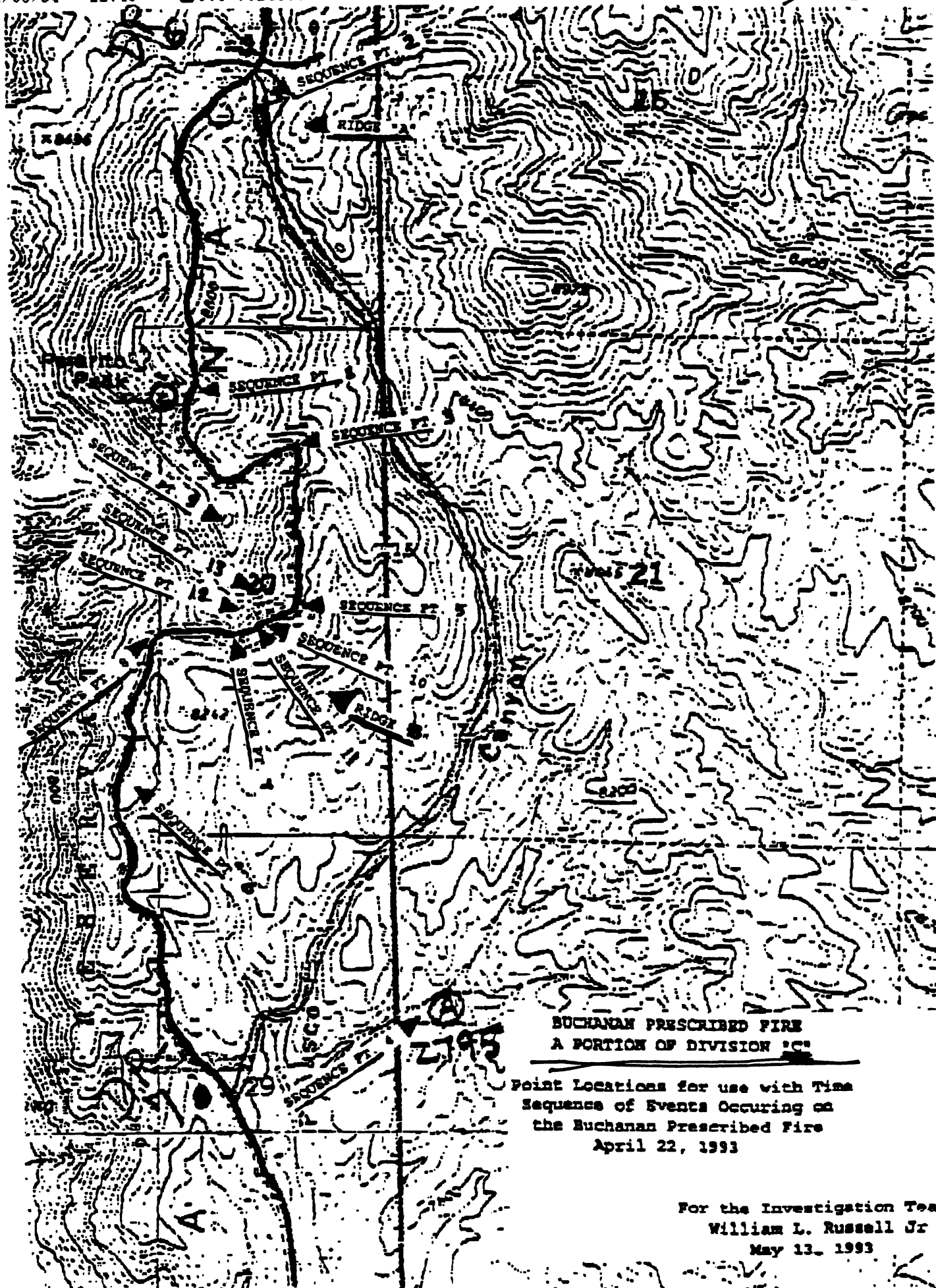
See pages 1 through 3 of this Notice for important information on employer and employee rights and responsibilities.



**BUCHANAN PRESCRIBED FIRE
A PORTION OF DIVISION 'C'**

Point Locations for use with Time
Sequence of Events Occuring on
the Buchanan Prescribed Fire
April 22, 1993

For the Investigation Team
William L. Russell Jr
May 13, 1993



**BUCHANAN PRESCRIBED FIRE
A PORTION OF DIVISION "C"**

Point Locations for use with Time
Sequence of Events Occuring on
the Buchanan Prescribed Fire
April 22, 1993

For the Investigation Team
William L. Russell Jr
May 13, 1993

Reply to: 5100

Date: February 7, 1994

Subject: Fire Management Operations

To: Regional Foresters, Station Directors, and Area Director

As you all realize, there was a tragic accident on the Buchanan Prescribed Fire in Region 3 last spring. It was investigated by the Bureau of Indian Affairs, the Forest Service, and the Occupational Health and Safety Administration (OSHA). A great deal of effort has gone into the investigations and the process of analyzing and evaluating the facts of the accident. The conclusion was that the accident was caused by a sudden, brief, unexpected, and unpredicted wind with speeds up to 45 mph that hit a small, isolated part of the burn perimeter. As we worked with OSHA and other personnel involved with the project, we identified a number of areas that need to be emphasized in the interest of safety. Please distribute this memorandum to all fire going personnel under your jurisdiction.

Ignition Plan Implementation. The specificity of the ignition pattern can vary greatly with burn size and complexity. Key overhead are required to be briefed prior to the operation and they in turn must provide an appropriate briefing for those they supervise. During ignition, the affected people must be continually updated on the status of the ignition so they can plan for their safety and tactical operations. Adequate numbers of radios are needed in the hands of the right people to maintain contact with those directing the ignition as well as the operations personnel on the line. Information such as, but certainly not limited to, fire behavior, source of smoke over a crew/engine/strike team/division/ speeding up/ slowing or any alteration of the lighting/ beginning or ending aerial ignition flights, or control status may be important to those who cannot see the "big picture". It is incumbent on the personnel who "need to know" to communicate with their supervisors when they are not getting the information needed to safely and effectively do their assigned jobs. All of the above are covered in our training and operational guides. We need to re-emphasize the importance of keeping personnel informed in a timely manner.

Personal Protective Equipment. Personal Protective Equipment required by policy or through a Job Hazard Analysis (JHA) must be made available and properly worn/used. All employees (including volunteers, contractors and others) must know the requirements and they must be checked to make sure they are in compliance.

Employees have to know what is required. Our sources of employees are many and there are lots of ways to notify them of what is expected prior to their arrival at the project site.

First line supervisors have the responsibility for checking employees they supervise. In addition, safety officers, safety technical specialists, and other overhead on a project should make spot checks and remedy problems.

Inspection of boots to assure that they are made of leather may require the employee to remove the boot so the manufacturer's tag stating the composition of the materials can be seen. Some of the new synthetic materials used in boot construction look very much like leather but they are not compliant with our boot policy.

Job Hazard Analyses must be specific. They need to be specific as to what is needed, by whom, for what, and once the JHA is approved they need to be followed.

We need to re-emphasize to first line supervisors that it is their responsibility to make sure all safety requirements are met by all they supervise.

Material Safety Data Sheets (MSDS). Employees have the right to know what hazardous materials they are working with and around and the specific information about how to deal with them. MSDS's are published by the manufacturers of products that contain or meet the definition of a hazardous material. The Forest Service must make the sheets available on the job. Copies of MSDS's for some of the materials commonly used on prescribed and wildfires will be sent under separate cover. Please distribute them to all Forests, safety officers, and other appropriate persons.

The old adage that, "safety is no accident" is as applicable today as the day it was coined. We have very elaborate management systems, policies and procedures supported by excellent qualifications and training systems. Our technology and equipment are first class. The human element is the part that makes it come together. We need to make sure that we are emphasizing and evaluating job performance in training and project planning and implementation. I'm asking you to make it a priority to emphasize that safety is the way of life in the Forest Service.

/s/ Richard Adams (for)

MARY JO LAVIN
Acting Director
Fire and Aviation Management

United States
Department of
Agriculture

Forest
Service

Southwestern
Region

517 Gold Avenue SW.
Albuquerque, NM 87102-0084
FAX: (505) 842-3800
V/TTY: (505) 842-3292

Reply To: 6700

Date: February 7, 1994

Mr. Edward J. Cosgrove
Area Director
U.S. Department of Labor
Occupational Safety & Health Administration
Western Bank Building
505 Marquette NW, Suite 820
Albuquerque, NM 87102

Dear Mr. Cosgrove,

This letter documents the abatement actions I have taken to abate the nine items included in your Notice of Unsafe or Unhealthful Working Conditions, inspection number 103621652. Our abatement actions for each item are as follows:

Item 1 - I gave you a copy on February 7, 1994 of Richard Adams' letter of February 7, 1994 directing each Regional Forester to see that Forest Employees working on prescribed fires are kept informed about changes in the firing plan that will affect the employee's working conditions.

Item 2 - Richard Adams' letter of February 7, 1994 also directs that all employees assigned to prescribed fires are provided with the personal protective equipment required in the Job Hazard Analysis for tasks the employee will perform. Mr. Adams' letter further directs that work supervisors will monitor employees to determine that the employees use the personal protective equipment issued to them.

Item 3 - On February 7, 1994 Judy Hudson gave you her letter requesting you to provide the Occupational Safety and Health Administration's training course for collateral duty safety officers during the week of April 4-8, 1994.

Item 4 - Judy Hudson's request given to you on February 7 for training of Forest Service collateral duty safety officers is direction to all the Forest Service collateral duty safety officers in this Region that they will attend the training. The training will include discussions on how to better inform management and employees about the Occupations Safety and Health Act.

Item 5 - The Santa Fe National Forest is now maintaining records for injury/illness on OSHA approved forms and copies of these records have previously been furnished to you.

Item 6 - On February 7, 1994 Judy Hudson provided you with a copy of this Region's current Bloodborne Pathogen Standard, with a cover letter of September 17, 1993 signed by me.

Item 7 - John Fehr on February 7, 1994 gave you a copy of the Hazard Communication Plan for the Santa Fe National Forest. This plan was approved by Jose Martinez for the Forest Supervisor on February 3, 1994.

Item 8 - John Fehr provided you with copies of the material safety data sheets for diesel, gasoline, and Fire TROL (which is Alumagel) on February 7, 1994. These material safety data sheets are on file in the Supervisor's Office of the Santa Fe National Forest and the Jemez Ranger District Office of the Santa Fe National Forest.

Item 9 - On February 7, 1994 Judy Hudson gave you a second letter documenting the Hazard Communication training the Forest Service provided to its employees.

I think the above abatement actions are sufficient to abate all nine of the items listed in your Notice of Unsafe or Unhealthful Working Conditions for inspection number 103621652 and I request the case be closed as fully abated.

Respectfully,

/s/ Judy Hudson for
LOUIS VOLK, JR.
Deputy Regional Forester

cc:
Chief
Santa Fe NF
John Fehr

ACCIDENT INVESTIGATION REPORT SUMMARY
BUCHANAN PRESCRIBED FIRE
June 28, 1993

NO MAP FOR
THIS WRITE UP

7.

Background

Santa Fe National Forest personnel planned the Buchanan Prescribed Fire project over a period of 18 months. The planning was assisted by Forest Service Regional Office specialists in consultation with interested federal and state agencies and included public involvement and several public meetings.

Objectives included reducing buildup of down, woody material that can lead to major wildfires; creating openings in heavy timber to improve wildlife habitat; regenerating oak brush stands, grass, and forage to improve nutritional value of wildlife browse; and improving timber stands and watershed conditions.

This was a large, complex prescribed fire, covering 15,400 acres on Santa Fe National Forest and on Pueblo of Jemez and Pueblo of Zia land. Both Pueblos cooperated with the Forest Service in burning portions of their land to meet Pueblo resource objectives and to take advantage of topography and roads. Project planning was in order and well-documented.

Crews ignited the fire by hand and from helicopters using several methods.

Some ground crews used "drip torches" to ignite fires. Drip torches contain a diesel-gasoline mix dripped from hand-held torches to ignite fires.

Other crews used terra-torches. These are containers mounted on vehicles that pump and ignite a jellied gasoline mixture from a hand-held wand. They are used along roads or where there is vehicle access.

Inaccessible portions of the fire were ignited from helicopters with "helitorches" and "ping pong ball machines." A helitorch is a large container suspended beneath a helicopter that drops jellied gasoline. A "ping pong ball machine" is a device that injects ethylene glycol into plastic spheres filled with potassium permanganate powder that ignite after they reach the ground.

The Buchanan Prescribed Fire was conducted from April 20-23. The project proceeded without incident until Thursday, April 22, at 3:40 p.m.

Events of Thursday, April 22, 1993 (See Diagram)

Crews with drip torches began igniting fires at 10:30 a.m. at the junction of Pajarito Peak Road and Peñasco Canyon. Terra-torch operations began at 11:30 a.m. in the bottom of Peñasco Canyon. A change in wind direction caused the terra-torch crew to stop firing at 11:45 a.m. At 12:15 p.m., the wind direction was once again favorable and the terra-torch crew began firing operations along the east side of the road in Peñasco Canyon. The terra-torch ran out of fuel at 1:30 p.m. and the crew began returning to Pajarito Peak Road.

A fire that crews from Engines 3 and 5 had started to protect Archaeological Site 2795 was visible from Pajarito Peak Road at 1:30 p.m. The terra-torch crew

arrived at this fire at 2:00 p.m. The fire was about two acres and very active.

Helicopter 300 dropped ping pong balls east of Pajarito Peak Road in a series of three north-south runs of approximately 1/4 mile each at 2:45 p.m. The south end of each run was even with Site 1. This drop was made to help strengthen the fire line below Pajarito Peak Road. Crews igniting fires by hand from the road had not made much progress because of sparse ground fuels. Following these three runs, Helicopter 300 dropped ping pong balls at 3:00 p.m. in one run approximately 100-150 feet below the road from Site 1 to Site 3.

At 3:15 p.m., a single piñon tree below Site 1 ignited, throwing sparks onto the slope above the road. About 10-15 spot fires mostly 2-3 inches in diameter started, but were controlled by the Engine 9 Crew and Jemez Crew. The largest spot fire grew to three feet in diameter before it was controlled.

Because there was no great concern about the Jemez Crew's or Engine 9 Crew's ability to locate and control spots, Engine 5 was moved to Site 2 at 3:15 p.m. At this time, there was little wind but the smoke was very thick. Two squads from the Jemez Crew were on the slope above Pajarito Peak Road looking for and suppressing spot fires.

A "major wind event" was reported at 3:38 p.m. at Site 1. At 3:40 p.m., the wind increased to 40-45 miles per hour and shifted from west to southwest, causing the ground fire in the area below the road at Site 3 to ignite the tops of the trees and make a short run east. This fire then crossed the road at Site 4 and moved at about a 45-degree angle northeast across the south-facing slope.

At this time, 16 crew members were threatened or trapped by the fire. Four people at Site 2 successfully used three fire shelters. Ten people chose to not use their fire shelters and escaped the flame front by getting to the road north of Site 1 or behind Engine 9 at Site 1. One man at Site 2 had difficulty opening his shelter and chose to move down below the road to an area already burned. One person above Pajarito Peak Road, Frankie Toledo, did not escape the flame front.

Toledo, a tribal member of the Pueblo of Jemez, was above the road searching for spot fires. Because of the wind's sudden shift and increased speed, he had virtually no warning. As he ran uphill toward a ridge line, he tried to open and enter his fire shelter just before the flame front reached him, but could not. The fire had spread too quickly up the steep slope for him to outrun the flame front.

Analysis of physical evidence at the fatality site showed that the fire burned at temperatures from 1,500-2,000 degrees Fahrenheit, which is not survivable even in a fire shelter, unless used in a large clearing. At these temperatures, protective fire clothing fails in 10-16 seconds and a fire shelter in about 25 seconds. This evidence indicates, that at the fatality site, even if Frankie Toledo had had adequate time to deploy and enter his fire shelter, he could not have survived the conditions of the fire.

Between 3:40 p.m. and 3:50 p.m., several flame fronts passed over the people near Engines 5 and 9. Three men near Engine 5--Leonard Magdalena, John Martinez, and Michael Shije--were able to successfully open their fire shelters

on the road about 100 feet east of Engine 5 and enter them. Richard Duran was unable to open his fire shelter because his gloves were oversized and oily. Richard entered Leonard Magdalena's shelter with Leonard. Ken Seonia had difficulty getting his shelter out of its plastic case and decided to go over the road embankment toward the safety of an already burned area that he could see below the road. A flame front passed over him as he hid behind a large rock.

At 3:45 p.m., the four men in fire shelters emerged. Carrying their shelters, they moved toward Engine 5.

At 3:46 p.m., another fire front approached from the southwest. They re-entered their shelters about 20-30 feet in front of Engine 5. Duran and Magdalena again shared one shelter. Seonia remained behind the rock.

The wind slowed at 3:48 p.m. and Seonia began to move through the burned area back up to Pajarito Peak Road. Duran, Magdalena, Martinez, and Shije remained in their fire shelters until the smoke cleared, then emerged at 4:07 p.m.

At 4:00 p.m., Life Flight, a medical emergency helicopter stationed at an Albuquerque hospital, was requested for a man with an injured knee. The flight was later cancelled and the man was driven to the hospital.

When a roll call of all personnel in the area was completed at 5:00 p.m., it was determined that Frankie Toledo was missing and a grid search began. Frankie Toledo's body was located at 5:53 p.m.

Investigation Teams

The Bureau of Indian Affairs' Albuquerque Area Office completed a criminal investigation, determining the fatality was an accident.

The U. S. Department of Labor's Occupational Safety and Health Administration is conducting an investigation.

A 12-person Forest Service investigation team, headed by Arvin L. White, has completed its investigation. This team included: forest fuels and fire planning specialists who reviewed project planning; specialists from the Missoula Technology and Development Center who photographed and reviewed physical evidence related to use of fire shelters and estimated temperatures at the accident site; and other fire specialists who interviewed witnesses and examined physical evidence to determine what caused the accident. Members of this team spent about 175 days conducting their investigations.

Findings of Forest Service Investigation Team

-- Personal Protective Equipment

All personnel associated with the fire shelter deployment and entrapment on the Buchanan Prescribed Fire were equipped with appropriate personal protective equipment (PPE) which functioned within design limits. The PPE used by these individuals exceeded the proposed National Fire Protection Administration wildland fire standards. The fire shelters that were opened

on the road functioned properly, including those used simultaneously by two firefighters. Two individuals had difficulty removing their fire shelters from the polyvinyl outer pouch containing the shelters. Two shelters showed signs of abrasion and wear before use. One of these shelters suffered horizontal tears that were 2 to 3 feet long on both sides but was deployed on the Pajarito Peak Road successfully and protected the two firefighters who shared it. The other fire shelter was successfully deployed on the road and functioned within design standards.

Heat conditions at the fatality site above Pajarito Peak Road exceeded the design criteria for personal protective equipment, making this an unsurvivable deployment site.

-- Training and Qualifications

All personnel on the Buchanan Fire met qualifications for the positions they filled. All members of the Pueblos of Jemez and Zia who were hired as temporary Forest Service employees for the Buchanan Prescribed Fire had received all required fire training and were experienced members of the Southwest Firefighter program. The governors of the Pueblos of Jemez and Zia personally knew and recommended the individuals hired for the Buchanan Prescribed Fire.

Frankie Toledo was 44 years old and had 11 years' experience in fighting wildfires, including four fires in 1992. He was qualified for his job and had passed his aerobic fitness test, running 1-1/2 miles in 10 minutes and 20 seconds. (The minimum requirement is 11 minutes and 40 seconds.) Throughout the Buchanan Prescribed Fire and at the time of the tragedy, he was wearing proper protective clothing and equipment.

-- Weather

The National Weather Service fire forecaster on site prepared fire weather forecasts for the prescribed fire area for Thursday, April 22. Fire weather observations were taken on the prescribed fire site throughout the day. The fire weather forecast for the project on April 22 was reviewed by the National Weather Service's regional office in Fort Worth, Texas, and found to be complete and correct.

At 3:38 p.m., a rapid increase in wind speed followed by a change in direction occurred in the immediate vicinity of the accident site and lasted 8-10 minutes. As the wind abated, the fire above the Pajarito Peak Road stopped spreading and went out.

-- Project Management

Project planning complied with the Santa Fe National Forest Land Management Plan and Forest Service direction for prescribed fire planning. The Buchanan Prescribed Fire Plan met required standards. All aerial ignitions were conducted within the prescribed fire boundary and only after ensuring that no ground personnel were present. Aerial ignition provided a highly accurate and tightly controlled method of placing fire when and where the Firing Boss directed. All aerial ignitions were conducted under the direct visual supervision of qualified firing personnel.

Conclusion

A rapid, unexpected, and very localized increase and shift in the wind, lasting 8-10 minutes, caused the ground fire below Pajarito Peak Road to become a "crown" fire, moving from treetop to treetop and across the road. This sudden wind event placed 16 people in a dangerous situation and resulted in a tragic fatality.

SEQUENCE OF EVENTS
BUCHANAN PRESCRIBED BURN
APRIL 22, 1993, DIVISION C

*SEE MAP OF
SECTION OF
DIVISION C*

The investigation team wishes to express sincere appreciation to all those who provided information for this time sequence. Some times are approximated by the investigation team. Other times may vary slightly, as estimated by the witnesses.

<u>TIME</u> <u>24 HR</u>	<u>INTERVIEW</u> <u>REFERENCE</u>	<u>EVENTS OCCURING ON DIVISION C</u>
1000	Rudolph Shirkey & Others	Division C Group Supervisor Rudolph provided briefing to crews assigned to Division C.
1030	Shirkey	Lighting Boss Robert Shirkey began the firing operation down the Pajarito Peak Road south from Drop Point (DP) 6.
	Eckstein	At the same time, Dan Eckstein, as a lighter, took two Jemez lighters down the ridge from DP-6 southeast into the bottom of Penasco Canyon, firing the ridgeline as they went (Ridge A).
	Chinana	By this time the Jemez Crew was stretched from DP-6 to Point 1. As the hand firing progressed, the Jemez Crew moved along, watching for spots above the road. As the day progressed, the crew began to be stretched farther and farther apart. Crew instructions were to remain in eye contact with each other.
1100	Shirkey	John Lissoway and Carl Linderman began firing the Pajarito Peak Road south of the original lighters at a point in the "bowl" (Point 1).
1130	Shirkey Schuckert	Bill Schuckert and Duane Archuleta began terra-torch operations in the bottom of Penasco Canyon east of DP-6 (Point 2).
1145	Eckstein	(Time approximated by investigation team.) Dan Eckstein and his two Jemez lighters were picked up by Dave Rudolph in the bottom of Penasco Canyon.
	Schuckert	Adverse winds cause the terra-torch crew to stop firing.
1200	Eckstein	(Time approximated by investigation team.) Eckstein and Rudolph met with members of Engines 3 and 5 at the archeological site.

Seonia While the crews of Engines 3 and 5 were eating lunch at the archeological site, Dave Rudolph told the crews to finish lunch and fire around the site (Point 4).

1215 Schuckert Winds were once again favorable, and the terra-torch crew began firing operations along the east side of the road in Penasco Canyon. Division Supervisor Rudolph was informed of this by radio.

1230 Shirkey The hand lighting crew reached Point 3 and held up while the video crew was working from this point. The Firing Boss felt it was not safe to be firing the area immediately below the video crew and miscellaneous observers.

1300 Eckstein Dan Eckstein tied in with Robert Shirkey at Point 3.

Toledo Clemente Toledo and his squad had lunch near Point 1.

1330 Buchanan Engines 3 and 5 appeared to have fired out around Archeological Site #2795 in Section 28 about this time. The fire began to build visibly from the Pajarito Peak Road. At this time, Les Buchanan observed that the terra-torch operations appeared to be about half-way down Penasco Canyon.

Schuckert The terra-torch crew ran out of fuel at about the half-way point in Penasco Canyon and began driving on down-canyon on their way up to Pajarito Peak Road.

1331 Buchanan Les Buchanan began to get concerned about the possibility of the fire from the archeological site crossing Penasco Canyon and possibly making a hard run at the Pajarito Peak Road where all the personnel in Division C were concentrated. Les requested Helicopter 300 to get airborne and check out the situation in Penasco Canyon. The helibase log confirms that H-300 lifted off at 1331 for Penasco.

1400 Eckstein The hand firing crew began firing along the Pajarito Peak Road from Point 3 to Point 5.

Chinana The Jemez holding crew was now stretched along the road from Point 3 to Point 5.

Schuckert
Rudolph (Time approximated by investigation team.) The terra-torch arrived at the archeological site, Point 4. When the terra-torch crew arrived at the site, the fire around the site was about 2 acres and beginning to get very active.

- 1415 Tolle (Time approximated by investigation team.) A radio message from Schukert to Dave Rudolph confirmed that the terra-torch crew was out of fuel and were moving on down Penasco Canyon on their way up to the Pajarito Peak Road.
- 1430 Shirkey Robert Shirkey heard Les Buchanan on the radio
Buchanan request that Helicopter 300, with the ping pong ball machine, come to Penasco Canyon to look at the fire to make sure it was still on the east side of the canyon. "Eppler" was heard to reply that the fire was still on the east side but that the road probably would not stop it.
- 1435 Buchanan (Time approximated by investigation team.) Buchanan requested that Helicopter 300 lay a line of ping pong balls down Ridge B in order to take the sting out of any potential run the fire might make coming out of Penasco Canyon.
- 1440 Eckstein The hand firing crew working along the Pajarito Peak road had progressed to Point 5, where the firing was again held up because of the video crew.
- 1445 Eppler After discussion with Les Buchanan, Helicopter 300 dropped ping pong balls in a series of three north-south runs of approximately 1/4 mile each, with the south end of each run being even with Point 5. This effort was made in order to help strengthen the black line below the Pajarito Peak Road. The hand firing from the road downhill had not made much progress because of sparse ground fuels.
- 1450 Chinana (Time approximated by investigation team.) Nathan Chinana met with Clemente Toledo and told him to move his squad around the curve (Point 8) to help protect the power lines. He then visited with Mary Tsosie, Stephen Tafoya, and Calvin Toya and told them to split up and watch for spots. Nathan then walked about half-way between Point 3 and Point 5 as the ping pong balls were being dropped below the road.
- Woodworth (Time approximated by investigation team.) Helicopter 300 began a ping-pong ball dropping run from Point 5 to Point 6, with a target of 1 to 1-1/2 chains below the road.
- 1452 Buchanan (Time approximated by investigation team.) Helicopter 300
Woodworth completed dropping one line of ping pong balls below
Eppler the road.

- 1505 Buchanan (Time approximated by investigation team.) Helicopter 300 departed Division C area going to Division A area to check on the safety of two persons near a Jemez religious site. They were alright and had completed protection of the site. Their ATV's were left on a ridge above the site. They and Larry Eppler agreed that the two could walk out a trail to the southeast and retrieve their ATV's later from the top.
- 1515 Shirkey The hand lighting crew completed ignition of the area below the power line (south of Point 8). At this time a few small fires were just beginning to pop up downslope from the road. The spacing of the fires indicated they were the result of the ping pong balls dropped earlier.
- Schuckert A single pinyon below Point 5 torched out, throwing sparks onto the slope above the road. Approximately 10 to 15 spots were started, but were controlled by the Engine 9 Crew and Jemez Crew, mostly at 2 to 3 inches. The largest spot got to 3 feet before control. With no great concern about the holding crew or engine crew's ability to pick up and control spots, Engine 5 was moved to Point 7 by Holding Boss Duran. At this time there was little wind and the smoke was getting very thick.
- 1520 Info Center A message was received from Les Buchanan via the helibase and transmitted on to the power company to cut off power to the line going up to Pajarito Peak.
- 1525 Toledo (Time approximated by investigation team.) Clemente Toledo visited with Frankie Toledo while patrolling at the end of his squad area (approximately below Point 12). Clemente told Frankie the winds were going to pick up and get bad.
- 1538 Schuckert Buchanan (Time approximated by investigation team.) Schuckert, from Point 5, reported on the radio a "major wind event taking place."
- McKinney The visitor group, from the top of the hill at Point 9, felt a sudden and major increase in wind velocity. The wind increased from 20 mph to 30 or 40 mph and changed direction from west to southwest.
- 1539 Buchanan Woodworth (Time approximated by investigation team.) Helicopter 300 approaches Point 8 from the southeast and encounters a strong southwest wind blowing at approximately 40-45 miles an hour. The helicopter was "yawed" around by the unexpected velocity and direction of the wind.

1540 Tolle The strong southwest winds caused the fire in the area below the road at Point 8 to jump into the crown, make a short run east through the crowns, then immediately jump across the road at Point 7 moving at approximately a 45-degree angle across the south-facing slope. Dave Tolle heard some garbled radio traffic, which he later thought related to Engine 5 crewmembers deploying their shelters.

Hibbetts Jim Hibbetts was standing at Point 8, where he felt an increase in the wind and saw the fire begin to blacken in front of him and heard the resulting crown fire move west to east and then turn uphill (Point 7).

Rudolph Division Supervisor Rudolph was sitting in his truck in the saddle (Point 8), when the wind suddenly increased, shaking the truck. The fire in front of him immediately increased in intensity, crowned, and began a run eastward.

Marquez Gilbert Marquez, operating the ping-pong ball machine, reported to Larry Eppler that he could see people on the slope (in the vicinity of Point 12 to Point 13).

Eppler
Buchanan
Eckstein Larry Eppler broadcast over the Command Net for anyone on the slope to get out of the way of the oncoming fire.

1541 Schuckert After hearing Larry Eppler yelling on the radio to get everyone off the slope, Bill Schuckert yelled for all those on the ridge point above Point 5 to get off the mountain. Looking toward Engine 9, Bill saw a flame front 20 feet high leaping up over the road from the southwest, moving in a northeast direction. Everyone got down on the road bed behind Engine 9.

Rudolph After hearing Larry Eppler's message to get off the slope, Dave Rudolph broadcast in the blind to Engines 5 and 9 to get out of there.

Woodworth
Eppler Tom Woodworth and Larry Eppler watch the flame front race across the slope toward Frankie Toledo, who was attempting to move mostly uphill (from Point 11). The helicopter "yawed" around again, and when the line of sight comes back to the hill, the flame front had overrun the point where Frankie Toledo was last seen (Point 12).

Duran Richard Duran was moving across the slope above Engine 5, (Point 7) going toward the power line, to check on actions taken to protect the line. As he approached the little ridge above Engine 5 (parked just on the east side of the crest), without warning, a large flame front ran over the

ridge at him and Michael Shije. Richard and Michael jumped down to the road in front of Engine 5. At this time there was still unburned vegetation below Engine 5. Engine 5 could not be moved in either direction, because Richard could see fire across the road both ways.

- Gallegos Ron Gallegos reported he heard a hysterical voice on the radio. Ron called Nathan Chinana and got an "all's ok" response. This was followed by a repeat of the hysterical voice.
- Toledo Clemente Toledo reached his lead crewmember just as the fire went over the hill. Clemente tried to call Nathan Chinana, Frankie Toledo, and Donald Fragua, but couldn't get anyone.
- Gallegos Jemez crew persons, Calvin Toya, Mary Tsosie, Phillip
Toya Salas, Carlos Shije, and Tony Baca, were above the road
Tsosie between Point 5 and Point 13 when the fire came from
Salas the southwest across the slope and over the ridge. In
Shije, C. the initial move to escape the fire front, Mary Tsosie's
Baca pack strap caught on an oak branch. Brian Poturaski
pulled Mary and broke the branch, allowing her to run
free. Brian then went down the ridge to Engine 9 located
at the curve of the road (Point 5). The rest of the crew
(squad 3) was stretched out north of them along the slope
with Crew Representative Ron Gallegos. All of these
individuals wound up on the Pajarito Peak Road. Ron and
eight Jemez crew members went up the smokey road to
Point 3. Mary Tsosie, Carlos Shije, Manuel Tosa, Tony
Baca, and Phillip Salas wound up with Engine 9 at Point 5.
- 1542 Schuckert A second flame front passed over the personnel on the road
bed behind Engine 9. This front originated just to the
north of the engine and ran to the northwest up and over
the road.
- Eppler From H-300 Eppler requested Helibase have H-308 prepare
Helibase Log for medivac.
- Duran Investigation team approximates this time as the time of
Shije, M. the first shelter deployment, approximately 100 feet in
front of Engine 5 (Point 10). Michael Shije, John
Martinez, and Leonard Magdalena were able to successfully
deploy and enter their shelters. Richard Duran had
trouble opening his shelter because he was wearing slick,
oily, oversized leather gloves. Richard shook off the
gloves, but by this time he was running out of time, and
chose to enter an already deployed shelter with Leonard
Magdalena. During this deployment, Richard could see one
of the tears later confirmed in this shelter, but the
shelter successfully protected both individuals during
this first deployment.

- Seonia As the four individuals that wound up in shelters were getting their shelters out, Ken Seonia had trouble getting his shelter out of the plastic case and decided to go over the road embankment toward a burned area he could see through the green just below the road. A fire flame front passed over Ken as he reached, and was forced to hide behind, a large rock. He still did not have time to deploy his shelter, because he had been chasing his hard hat down the hill. The large rock was approximately 20 yards below Engine 5, sitting at Point 7.
- 1545 Martinez (Time approximated by investigation team.) The four
Duran individuals in the fire shelters came out of their
Shije, M. shelters and moved toward Engine 5, carrying their
shelters with them. John Martinez climbed up and got
his canteen of water off the back of the engine just
before the next wave of fire approached from the rear of
the engine.
- Pennington National Weather Service Fire Weather Forecaster Roy
Pennington was located on the Pajarito Peak Road south of
Point 8 approximately even with Point 6. His measurements
of the winds never picked up an increase or change in
direction as reported by others located to the north of
his position. Measurements at this time showed winds from
the southwest 15 to 20 mph, with gusts to 28 mph. Winds
decreased rapidly as he moved eastward away from the
ridge.
- 1546 Martinez (Time approximated by investigation team.) The four
Duran individuals re-entered their shelters approximately 20-30
Shije, M. feet in front of Engine 5. Leonard Magdalena opened and
deployed the shelter that Richard Duran had been unable to
open for the first deployment. Richard again entered the
shelter with Leonard. Everyone reported that this time in
the shelter was hotter than the first, partly because the
second deployment took place on a section of road that had
been heated during the first time in the shelters.
- Seonia As Ken Seonia hid behind the same rock, a second wave of
fire passed over him. This also came from the west and
was more intense than the first.
- 1548 Eppler (Time approximated by investigation team.) Eppler talked
with Leonard Magdalena, who was inside the fire shelter
with Richard Duran. Leonard requested a water drop.
Eppler told him they couldn't do that now and to stay put
in the shelter until someone came for them.

	Seonia	After the second fire front passed over him, Ken Seonia began to move away from his rock shelter through the burned area back up to the highline road. There was still a lot of fire around, but the wind had died down.
1550	Tolle Shirkey Eckstein	Dave Tolle, Robert Shirkey and Dan Eckstein attempted to move up the Pajarito Peak Road (from Point 8) through the burn area to find the persons in the fire shelters. They could only make it to Engine 5, located at Point 7. Shirkey confirmed no one was in the engine, and then the three had to retreat back down the road to wait for the smoke and heat to clear. From Engine 5 they could see three shelters deployed close to the front of the engine. On the way to Engine 5 they met Ken Seonia coming down the road.
	Schuckert	Tony Baca approached Engine 9 and requested help for Carlos Shije who had an injured knee. The engine crew went up the road and found Carlos plus two other Jemez crew members and brought them back down to the engine.
1600	Eppler Woodworth	Helicopter 300 contacted helibase and requested a Life Flight out of Albuquerque.
1607	Tolle Shirkey Eckstein	Dave Tolle, Shirkey, and Eckstein again went up the road and this time got to the shelter deployment area (Point 11). The four persons in the shelters were just getting out. They helped the four to move back down the road toward Point 8.
1630	Tolle	Dave Tolle, Robert Shirkey, and Dan Eckstein went back up the road and proceeded past the shelter deployment area and on to Point 5, where they located Engine 9, the terra-torch vehicle, and five personnel. They moved these individuals and equipment back down the road to Point 8, moving Engine 5 in the process to allow Engine 9 and the terra-torch vehicle to get past. Engine 5 was moved to Point 8. The injured Carlos Shije was transported on down the mountain for treatment.
1700	Rudolph Shirkey	A roll call was begun to determine the location of all persons on the Jemez Crew. Radio contact was made between Nathan Chinana and Ron Gallegos. Ron had eight crewmembers with him at Point 3. This, along with those with Nathan, accounted for all but three crewmembers. Two were determined to be the two firing persons left north of the "bowl" earlier in the day. Mike Wirtz and John Lissoway confirmed that these two were still at the point where they had been dropped off earlier in the day.

Toledo Clemente Toledo reported to Nathan Chinana that Frankie Toledo was not answering his radio.

Tolle After confirming that Frankie Toledo was the only person missing, a grid search of the area above the shelter deployment area was begun.

1753 Tolle Dave Tolle discovered the body of Frankie Toledo at Point 13.