

## DEPARTMENT OF FORESTRY

210 West San Jacinto Street  
Perris, CA 92370



October 24, 1988

United States Forest Service  
Technology and Development Center  
Building #1 Fort Missoula,  
Missoula, Montana 59801

Attention: Ted Putnam

Reference: Incident No: 36400

Dear Mr. Putnam:

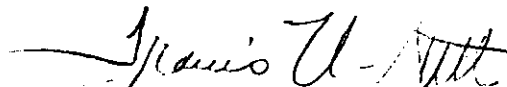
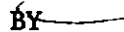
Enclosed are two boxes of safety clothing from the bulldozer operator and fire curtains from the bulldozer.

I would like these materials tested for the amount of heat and the duration of heat that they sustained. I have also enclosed new pieces of material to be compared with the burned material to ascertain the condition of the burned material prior to the fire.

If you have any further questions, or need further information, please feel free to contact me at (714) 657-3183, extension 234.

Sincerely,

RAY HEBRARD  
Ranger-in-Charge

  
BY  TRAVIS U. WITTEN  
Fire Prevention Officer  
Riverside Ranger Unit

je  
(Attachment - 2 boxes)

**HYDE FIRE**  
**OCTOBER 9, 1988**

On October 9, 1988 at 1904 on the Hyde Fire, Dozer 3141 was overrun by fire. This accident resulted in 50 percent burns to HFEO Dave Howard and minor damage to the bulldozer.

Sequence of Events

The original suppression plan in Division C was to widen a short road to TNT Ranch Road, then widen TNT Ranch Road to R3 and fire out, thus, halting the only remaining active portion of the fire and securing the northern perimeter. At approximately 1800 the fire was laying down, at which time the plan was changed to a direct attack with two bulldozers followed by a hoselay from the top of the ridge to Sage Road (R-3), a distance of 1000' with a 43 percent downhill slope.

Dozers 3141 and 3770 were constructing a direct line and had proceeded 414 feet when 3141 encountered a small rock outcropping that he could not traverse. 3141 proceeded to the left through the green to construct 50 feet of line to tie back into the black line. If he had gone to the right there would have been black line outside of the control line. 3770 remained at the outcrop for 3141 to complete the task.

3141 had gone 38 feet when 3770 saw the fire intensity increase and called 3141. At about this time 3141 began backing up. After backing 14 feet, the fire overran 3141 from the right front, with fire going through the cab. The right side fire curtain had been pulled. HFEO Howard exited 3141 on the left side and sat down three feet from the left drive sprocket. 3770, HFEO Ben Anderson, was approximately 17 feet away and witnessed the incident. HFEO Anderson immediately left his bulldozer (3770) and went to HFEO Howard's aid. Seeing HFEO Howard's condition, HFEO Anderson went to 3770 and returned with his burn kit and began applying saline solution, then assisted HFEO Howard to Unit 3770 and exited the scene at which time he announced that the accident had occurred. They traveled 400 feet to the safety island at which time additional medical treatment was administered before HFEO Howard was airlifted to the Sherman Oaks Burn Center.

At the time of the accident HFEO Howard was wearing all of his safety clothing, including Firecraft structure gloves, Nomex pants over JC Penney 50% cotton/50% polyester pants, Nomex shirt over a white tee shirt, his bulldozer operator helmet, and Redwing boots. HFEO Howard sustained 2nd and 3rd degree burns to both arms, his back, buttocks and legs. The right side fire curtain had been pulled and was destroyed by the fire.

## CAUSE OF ACCIDENT

A shift in wind direction and an increase in wind speed caught 3141 and HFEO Howard as he was attempting to retreat to 3770's location, which was a safe location.

## FIRE LINE CONDITIONS

### Fuel

Fuel cover on the Hyde Fire consisted of 5 to 6 foot contiguous chamise with fuel loading of 10-15 tons per acre. Fire history maps indicate the area had not burned since the early 1900's. Drainage cover included mixed scrub oak, oaks and 5 to 6 foot chamise. Fine fuel (grass) undergrowth along St. Johns fuel brake ran from 12 - 18 inches and diminished substantially in the chamise covering. Fine fuel readings from nearby weather stations indicated a fine fuel moisture of 3.

### Weather

A high pressure influence existed creating a mild Santa Ana condition. Local weather statistics observed showed temperature near 100 degrees 10% humidity and northeast to east winds 10 - 15 mph.

### 1800 Hours

One hour prior to incident on scene weather conditions at point of origin were 88° 11% humidity with NE winds of 12 mph. Upper ridge exposures were experiencing 15 - 20 mph winds shifting from northeast to east.

### Topography

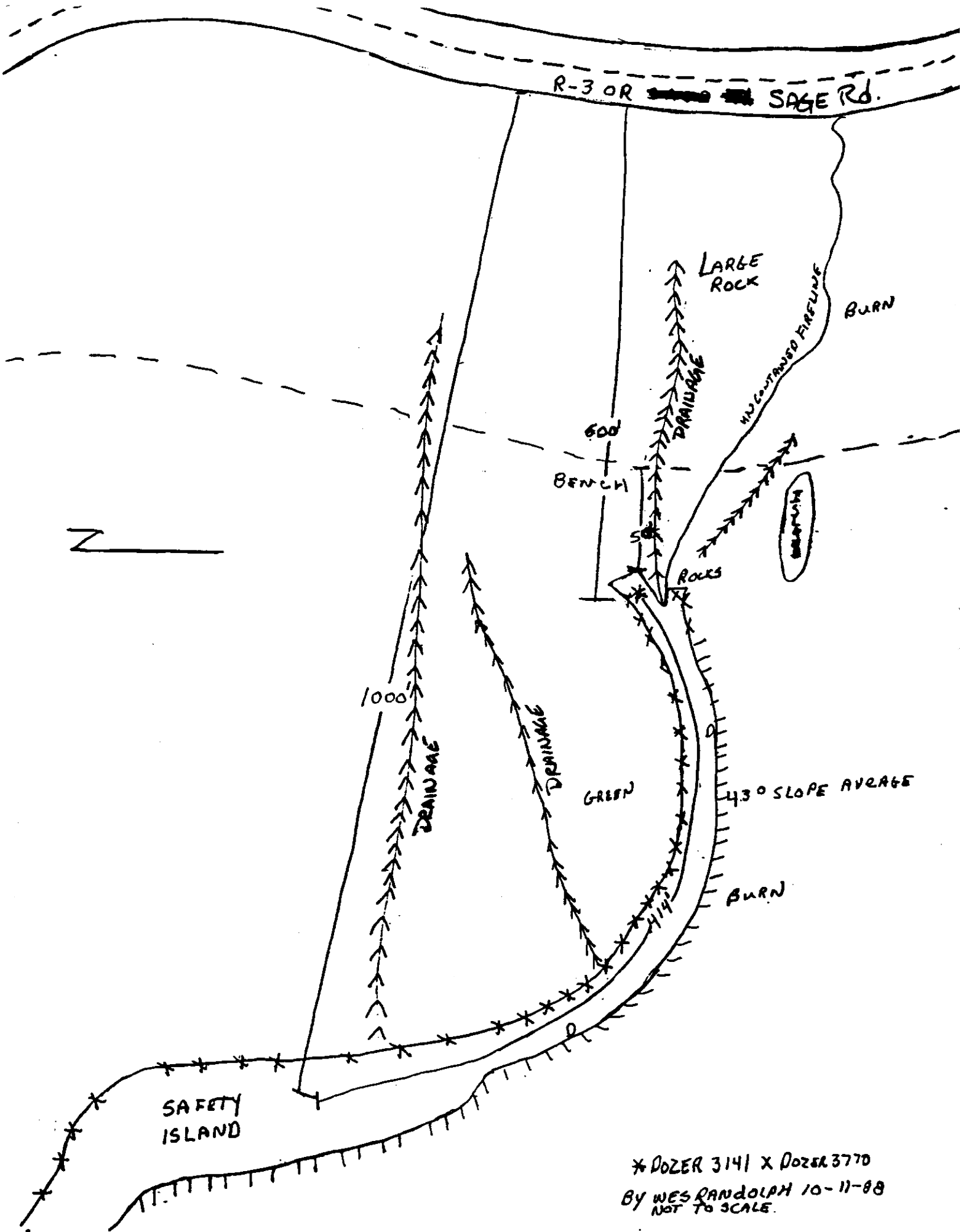
The St. Johns (Sage) drainage is a narrow canyon pass with steep slopes on both the east and west sides. Slope at the accident site was 43% on an east aspect ridge 600' west of Sage Road. Moderate drainages were located just north and south of accident site. Elevation at that point was approximately 2500 feet. Where the accident occurred there was a small depression running east and west approximately 30' to 40' long.

### Fire Behavior

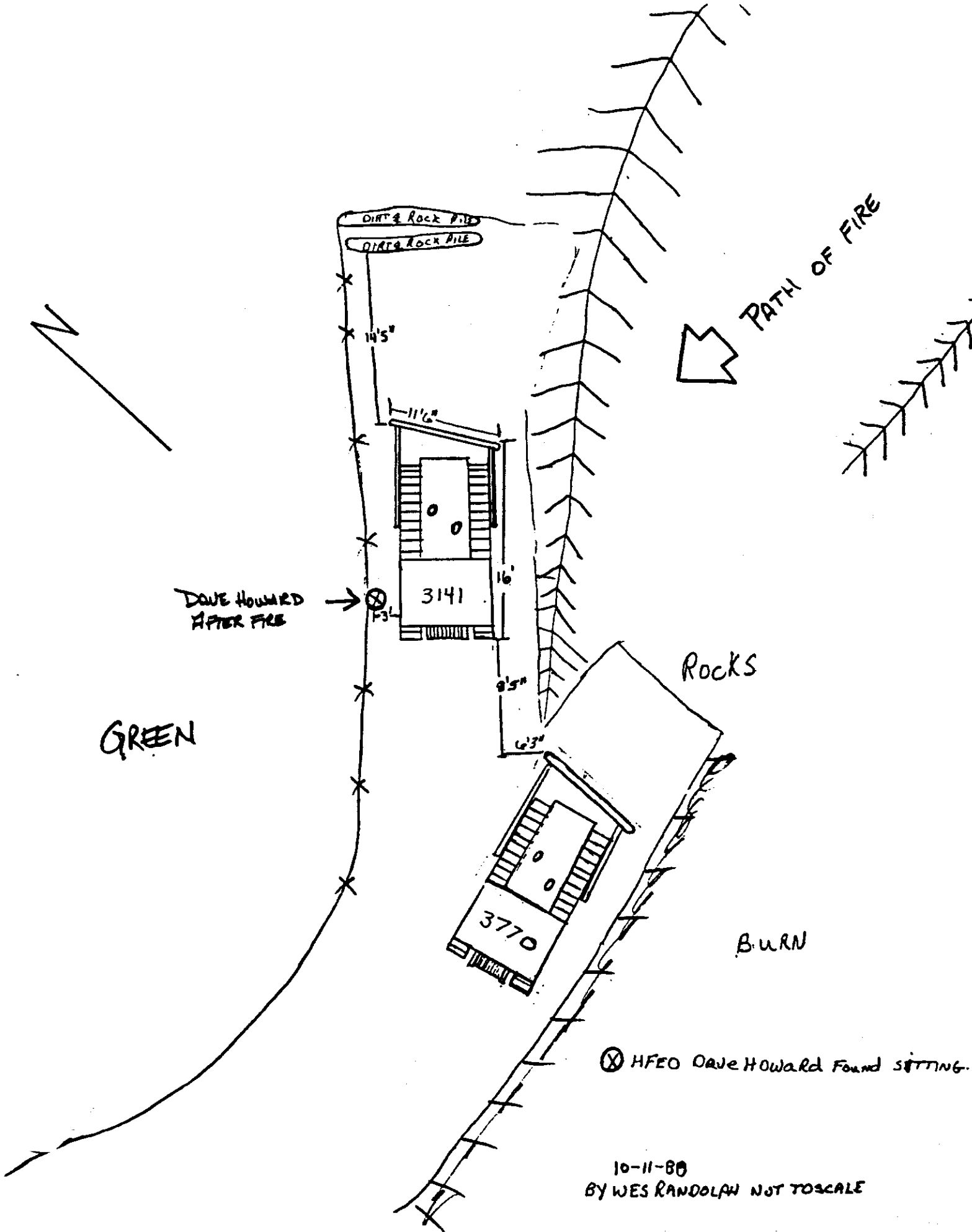
The fire influenced by the northeast winds, was burning in a northerly direction on the east side of Sage Road. Rate of spread was moderate with flame lengths of 25 - 35 feet and some spotting was experienced. At 1800 hours the wind changed from north/northeast to a direct east wind this caused the fire to spot across Sage Road to the west. Just prior to the accident the fire had layed down considerably. Protected from the upper level east wind it was back burning in a northerly direction. As the fire would become exposed to the east wind influence some small active runs were experienced upslope to the west. Ridge top winds were still in the neighborhood of 15 - 20 mph.

### Summary

At the time of the accident (approximately 1904) the wind changed direction and increased in velocity to 35 - 45 miles per hour causing the fire to burn very actively along the north flank. Fire modeling based on the above conditions reflect flame lengths of 19.76 feet, rate of speed 273 ft/min and byrams intensity of 3723 BTU's.



\* DOZER 3141 X DOZER 3770  
 BY WES RANDOLPH 10-11-88  
 NOT TO SCALE.



DAVE HOWARD  
AFTER FIRE

GREEN

DIRT & ROCK PILE  
DIRT & ROCK PILE

PATH OF FIRE

3141

ROCKS

3770

BURN

X HFOO Dave Howard Found sitting.

10-11-80  
BY WES RANDOLPH NOT TO SCALE

## RECOMMENDATIONS:

1. **USE** Fire Shelters for entrapments. Many benefits to being low to ground. Flame contact likely high off ground.
2. **ESCAPE**
  - a. Weakest protection was shirt/upper body. Consider a brush coat for increased protection.
  - b. Fire curtains should be aluminized glass or fiber glass. PFR rayon only good for moderate radiant heat. Fiber glass would be best for high radiant or flame contact. When PFR reaches  $475^{\circ}$  it chars so when have flame contact aluminum melts there's nothing left. ~~Some~~ ~~Glass~~ cloths go  $2000^{\circ}F$  so continue to offer shield and melt substrate even after aluminum is gone.
3. **E**nergy was over  $10.0 \text{ cal/cm}^2$  to cause damage  
2nd<sup>o</sup> Burns with shirt would be in  $\approx 5.5$  sec  
" " ~~with~~ range 5-10 sec

Additional concerns with curtains

a) Aluminum is extremely thin. Therefore will melt very rapidly on flame contact and will oxidize away out in natural environment ~~was~~ rapidly.

b. Rayon with any moisture is subject to mildewing

c. Would expect environmental degradation in normal outdoor use.

5 a) Curtains should be plastic ~~and~~ keep unexposed until use.

b) use foil vs thin vapor deposit

PANT SHELL: Yellow nomex poplin  $\approx$  (4) 602

FRONT: Mostly charred w extensive foaming

Heaviest heat in lap area + bottom of left leg including lower calf on left leg.

Waist band: exposed velcro on front: no heat set

Back: charring towards top, just under waistband, heavier on left

JACKET: Yellow Nomex coarse plain weave  $\approx$  602

FRONT: Zipper ~~to~~ (metal) has adequate under flap of two layers of fabric. Zipper tape melted at top. Appears worn with top unzipped. Zipper tape melted & gone at top? If had closed then failure was due to right tape not caught between fabric layers as on left tape. Pocket velcro melted but no damage inside (back of) pocket. Paper in pocket charred (outer surface only)

Arms. Extensive charring/foaming on all except side towards body. Cuff pile tape melted but caused no extra damage - actually helped as area of nomex covered is uncharred - acted as heat sink.

Back = Almost completely gone.

Most double layers held up well except collar points

Envelope contents: Nomex / T shirt char

Nomex completely charred w/ complete foaming  
Foam is ~~the~~ cotton lightly stuck together  
No melting on either Nomex or "F" shirt.

FIRE  
FRACOR CURTAINS: Aluminized Nomex RAYON (FR), 150  
GENTEX # 1006, 8D, 30

Propable failed rapidly.

Heavy glass cloth would be better, esp  
2200°F + stuff.

Consider GENTEX # 1016 ≈ 2202

|               | 1006      | 1016      | 1018<br><small>BETA</small> | REC (-) ≈ 1015 | X      |
|---------------|-----------|-----------|-----------------------------|----------------|--------|
| BASE          | FR RAYON  | GLASS     | FIBER GLASS                 |                |        |
| WT            | 15.0      | 22.0      | 16.0                        |                | 24     |
| BREAK STR.    | 250 x 150 | 315 x 210 | 550 x 400                   |                |        |
| TONGUE TEAR   | 17 x 17   | 20 x 20   | 18 x 17                     |                |        |
| DST (LIV) 40° | \$14.95   | \$18.65   | \$17.25                     | \$14.95        | \$14.5 |

10/10/88

10/18/88

## DOZER ENTRAPMENT

PAULS WITTEN

DOZER OPERATOR BURNED week ago

- safety clothing

- dozer overan - no shelter, but have curtain

- use forced air

210 W. San Jacinto Ave  
Perris, CA 92730

Send Facilitators guide.

Sent 10/19/88

T VIS WITTEN

CDF

210 W. SAN JACINTO  
PERRIS, CA 92370

T-SHIRT : FRONT : Mostly intact except right sleeve and chest.  
BACK : Completely gone  
100% cotton : (no label)

JEANS: J.C. PENNEY'S LOT # 5454574 CUT # 11534  
# 732-8 P/C 50/50 SIZE 36x30

CHAR: Above left pocket parallel to top edge of pocket. Left bottom cuff.

Heat Set: Tops of both legs, more so on left leg.

HEAT SHROUD: No damage; new condition.

GLOVES: No damage. Kevlar / Leather (split hide)  
Insulated also.

HELMET (Shell blistered to main shell  
Face visor melted (Lexan??) extensive  
small bubbles in plastic.  
Cloth covered foam: cloth charred both sides &  
back. PBI/~~Rayon~~ Rayon?? Light tan. Textured  
Plastic + nylon straps melted.

AVIS WITTEN

CDP

1st red

2nd blister

3rd : butblock & hands

was curtain damage due to flame from outside  
or inside ??

14/01/00

1130

DU QTT,

GENTEX

PFR can mildew & weaken. & can be problem:

Is aluminium still reflective. It is very thin so can oxidize & disappear. so wouldn't reflect. So should be protected from environment. So have a use life once on field. will last longer if under cover.

Could use plastic case w/ tear strip??

Maybe foil + heavy glass would be better.

Who makes and who picks fabric

411/04

TRACTOR CURTAINS

AVIS WRITTEN,

COF

LURE report back by next week.

# FIRE CURTAINS

## RIGHT SIDE

1. Attached at top w/  $1\frac{1}{2}$ " rings & small strap sewn to top of curtain

2. Sides and top still shiny - unoxidized so limited oxid. These are mostly places less exposed to environment
3. Evidence of one fold rubbing off AL on other edge



4. Cloth & AL seem to degrade at same time

5. Mostly only double layers intact i.e. top, sides, bottom & joining seams.

6. Appears curtain was drawn open.

## LEFT SIDE

1. Oxidation or abrasion along NRN or heat melt

2. Appears as had flame front & back and that curtain stayed closed. Foil shiny between folds. More damage at ends and more at right end

## REAR

1. Appears not curtain stayed closed. Foil least damaged of three. NRN. More damage on left edge, 2nd most on right end. Foil shiny between folds and foil edges still shiny.
2. NO evidence of mildew.

