STATE OF FLORIDA
DOYLE CONNER, COMMISSONER

FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES

DIVISION OF FORESTRY ▪ 3125 CONNER BLVD. ▪ TALLAHASSEE, FLORIDA 32399-1650

FC

DO-2650
October 25, 1989

MEMORANDUM

TO: Harold K. Mikell, Director

FROM: C. Charles Maynard, Assistant Chief, Fire Control CM

SUBJECT: Donald J. Armstrong Burn Incident Report

Attached is our Review Team's Report on the Don Armstrong Burn Over Incident.

We are available at your convenience if you wish to discuss this report, or if you have any questions.

JMP:je

cc: Deputy Director
Division Training & Safety Officer
Chief, Fire Control
Withlacoochee Forest Center Manager

... trees are the answer ...

GENTILLE FIRE REVIEW
Fire Shelter Deployment Incident
Forest Ranger Donald J. Armstrong Burn Injury
Lake County, Florida
May 31, 1989

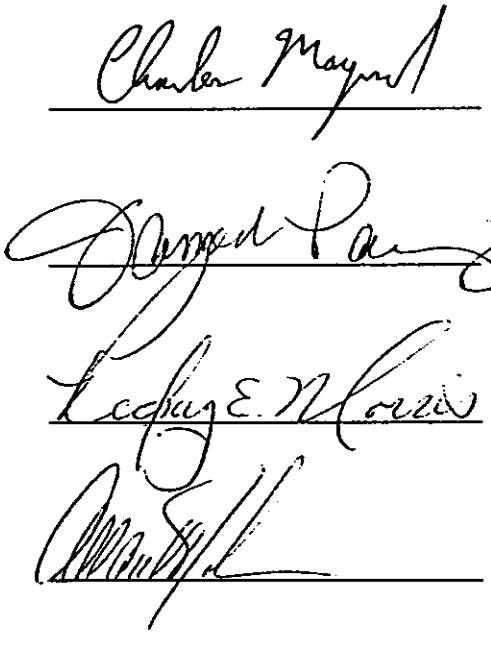
INCIDENT REVIEW TEAM

C. Charles Maynard
Assistant Chief,
Fire Control Bureau, Tallahassee

James M. Parry
Assistant Division Training & Safety Officer
Director's Office, Tallahassee

Rodney E. Morris
Law Enforcement Investigator II
Withlacoochee Forestry Center

Allen R. Johnson
Law Enforcement Investigator II
Withlacoochee Forestry Center



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SUMMARY

Forest Ranger Don Armstrong Burn Incident

On Wednesday, May 31, 1989, WFC Forest Ranger Don Armstrong was seriously burned on the Gentille Fire in NE Lake County. He was transported by medical evacuation helicopter to Orlando Regional Hospital where he was listed in serious but stable condition. Burns were sustained over 60% -70% of his body.

On Thursday, June 1, 1989, Assistant Fire Control Chief Charles Maynard, Assistant Division Training and Safety Officer Jim Parry, Law Enforcement Investigator Rodney Morris, and Law Enforcement Investigator Bob Johnson began investigation of the incident. The following is a summation of conditions and events related to the incident:

1. The fire was approximately 60 acres at initial attack, burning in medium (3'-6') palmetto - gallberry fuels with an overstory of scattered slash pine. Initial attack was at approximately 1400 hrs. Fire behavior was described as "routine", which meant moderate spread, 8' flame length, little or no spotting, and no torching or crowning. Wind direction was variable.

2. Ranger Armstrong made initial attack on a new JD-650 tractor with dozer blade and two-disc fire plow. Senior Forest Ranger Gary Schrieber was the Incident Commander and stayed by the transport to direct the attack.

3. The first attempt to cut off the head failed and two additional crews were dispatched.

4. Ranger Armstrong began to plow along the left flank after tying his line into a road.

5. As Armstrong was plowing along the left flank (The right flank was burning into a swamp.) the head switched direction about 45 degrees to the right, and he turned right to follow the flank. Then, the head switched back left again, burning directly toward Armstrong. He then turned left and the plow line changed from a deep, good line to one that is very shallow with lots of skips.

6. He continued this direction for 100'-200' and made an abrupt loop and started back in the direction from which he came.

7. After plowing back approximately 100-150 yds., he stopped the tractor and deployed his fire shelter in the plowed line immediately behind the tractor.

8. After being burned, Armstrong abandoned his position and moved back through the burn, carrying his shelter with him to a road.

9. He continued following the road until he got into a cooler area where he abandoned the fire shelter. He continued a short distance until he was out of the fire area and made contact with Schreiber where he collapsed.

FINDINGS

1. The "Gentille" Fire occurred Wednesday, in the early afternoon of May 31, 1989, in NE Lake County. The Fire Readiness Level for the Withlacoochee Forestry Center (WFC) was set at "2".

2. The cause of the Gentille Fire was determined to be a break-out from a lightning fire, fought one week earlier.

3. The danger station p.m. weather observations at WFC (approximately 50 miles from the fire) were:

Temperature	89°
Relative Humidity	49%
Wind Direction	East @ 6 m.p.h.
Build-up Index	High
Spread Index	Moderate

4. Rainfall recorded in the Gentille Fire area measured .45" on May 28, 1989, at the Ocala Fire Center (within 20 statute miles). Orange City Fire Tower (5 miles NE of the incident site) measured 1.5" on May 25, and .50" on May 30.

5. Initial attack was made with a two-man crew (Forest Ranger Don Armstrong and Senior Ranger Gary Schreiber) in a medium transport hauling a new John Deere 650-G. Ranger Armstrong was the tractor operator on the Gentille Fire. His exposure to the operating features of the JD-650 prior to this incident was limited to experimenting with it and familiarizing himself with the controls on one very brief occasion at the Leesburg Work Center. (This tractor was not Armstrong's regularly assigned equipment).

6. The tractor was equipped with hand tools, but did not have a drip torch. There was no water protection system in place.

7. Armstrong had his personal protective equipment, with the exception of fire pants. (He was wearing 100% cotton blue jeans)

8. The fuel was a continuous bed of medium class palmetto/gallberry (3-5') with a scattered slash pine overstory. (See "Fire Behavior Analysis" for fuel change description at burn-over site).

9. There were no known communication problems.

10. Because of the relatively high fuel loading, the Gentille area is generally considered to be a two crew (or more) response region by the WFC.

11. Armstrong and Schreiber discussed strategy, and the need for additional resources prior to the burn-over. (Another crew was already enroute, and was expected to arrive shortly).

12. The fire suppression effort had been in progress approximately one hour prior to the accident.

13. The burn-over occurred just moments after the face to face strategy discussion by Armstrong and Schreiber.

14. Based on experience, both crew members perceived fire behavior prior to the burn-over to be routine--other than dealing with variable winds.

15. Schreiber was familiar with the Gentille fire area, as he had fought fire in the same vicinity during the past several days.

16. Burn indicators showed that a significant wind shift and flare-up occurred in the same location the tractor was found.

17. Evasive action was evidenced by an abrupt change in plowing direction at the point of the flare-up.

18. There was a broken, poorly constructed fireline from the point of the flare-up to the location of the stopped tractor.

19. Armstrong stated that he had trouble getting the plow to come up. It was discovered later that the "float" on the hydraulic plow lever was manufactured in an opposite manner from the Division's standard design.

20. Armstrong deployed the fire shelter just prior to burn-over, immediately behind the fire plow, in a clean portion of the fireline.

21. After sustaining burns while under the fire shelter, Armstrong made the decision to move from the deployment site to a new location on the burn. His stated reason for moving was that his pant legs were on fire. (Later examination of his blue jeans showed the lower legs had burned).

22. The following evidence was recovered at the burn over site and departure route:

    A. Several fragments of fire shelter between the right side of the tractor and deployment site.

    B. Remnants of the fire shelter belt (found in the fireline) and completely melted yellow hard hat (found outside the fireline, right side) and fragments of the shelter were found at the deployment site.

    C. Approximately 50' from the deployment site, along the departure route, both unburned gloves, his left lens out of his prescription glasses, and additional fragments of the shelter were found.

    D. Along the remainder of Armstrong's departure route, the right lens and remainder of the shelter was found.

*All evidence recovered was identified, measured, photographed, sketched, and is available for full review in the official file.

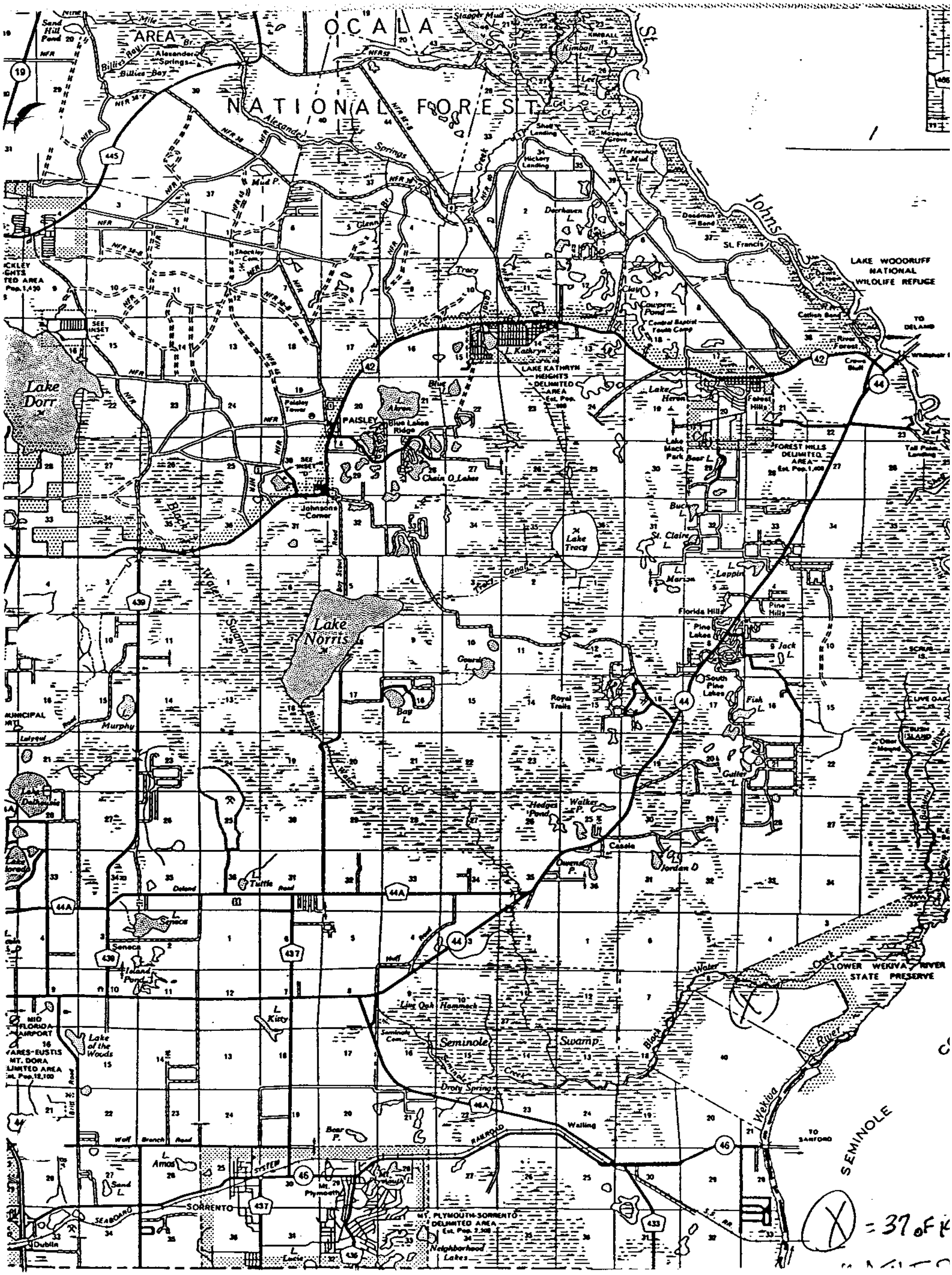
23. Armstrong suffered first, second, and third degree burns over 60% of his body. At the time of this report, he is undergoing physical therapy in the Treasure Coast Rehabilitation Hospital, Vero Beach, Florida.

24. There was confusion with Division of Forestry communications in acquiring emergency medical care and helicopter evacuation for Armstrong.

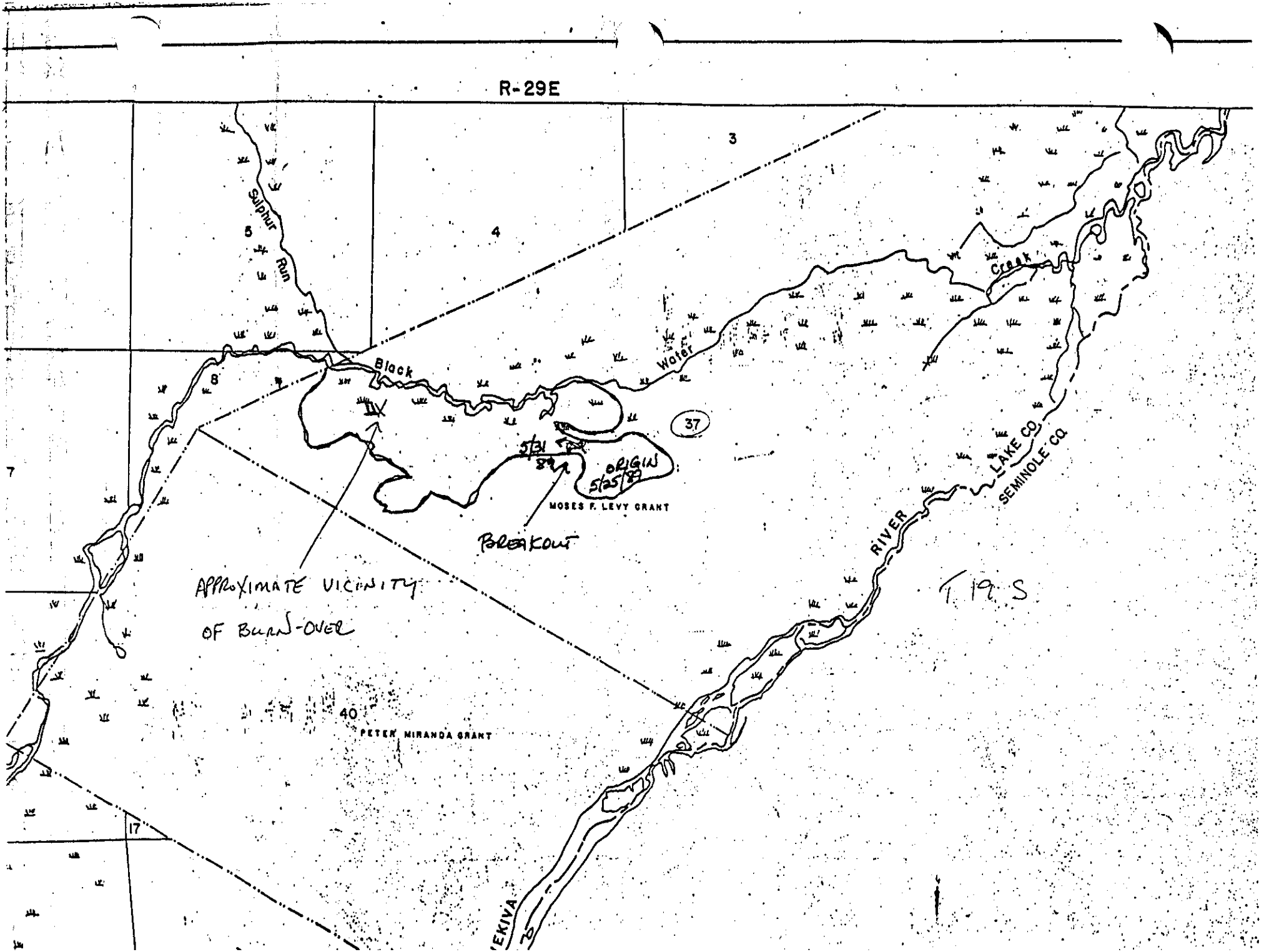
25. The tractor, in general, sustained light damage. Exposed hydraulic lines, electrical wiring, plastic radio components, and plow tires were burned. (Mechanic report attached)

26. Armstrong was employed in April, 1970, and was assigned to this area in March, 1976. Armstrong had completed Basic Ranger Training at Camp Blanding in October, 1972. He also successfully completed the "Standards for Survival" Fireline Safety Training course May 16, 1989.

##########



OCALA
NATIONAL FOREST
AREA
Alexander Springs
Billies Bay
Sand Hill Pond
Stagger Mud
Kimball
Shell Landing
Mosquito Grove
Hickory Landing
Horseshoe Mud L.
Mud P.
Glenn Br.
Deerhaven L.
Dead Man Bend
St. Francis
Johns
LAKE WOODRUFF NATIONAL WILDLIFE REFUGE
TO DELAND
Shockley Com.
Tracy
Clay L.
Cowpen Pond
Central Baptist Youth Camp
River Forest
Crows Bluff
SEE INSET
L. Kathryn
LAKE KATHRYN HEIGHTS DELIMITED AREA
Lake Heron
Forest Hills
Lake Dorr
Paisley Tower
L. Akron
Blue L.
PAISLEY
Blue Lakes Ridge
Chain O Lakes
Lake Mack Park
Bear L.
FOREST HILLS DELIMITED AREA
Tall Palm Landing
Johnsons Corner
Black Water
Lake Tracy
Buck L.
St. Clair L.
L. Marion
L. Lapping
Tracy Canal
Bay Street Road
Lake Norris
Swamp
Florida Hills
Pine Hills
Pine Lakes
Jack L.
Gourd L.
Bay L.
Royal Trails
South Pine Lakes
Fish L.
Murphy
Otter Mound
Hedges Pond
Walker P.
Cassia
Jordan D
Owens P.
Gulter L.
L. Tuttle
Deland Road
L. Seneca
Seneca
Island Pond
Huff
Live Oak Hammock
LOWER WEKIVA RIVER STATE PRESERVE
Creek
Water
L. Kitty
MID FLORIDA AIRPORT
Lake of the Woods
TAVARES-EUSTIS MT. DORA DELIMITED AREA
Seminole Com.
Seminole
Swamp
Seminole Creek
Droty Springs
River
Wekiva
SEMINOLE
Wolf Branch Road
Bear P.
Walling
TO SANFORD
L. Amos
Sand L.
SORRENTO
SEABOARD
MT. PLYMOUTH-SORRENTO DELIMITED AREA
Mt. Plymouth
Neighborhood Lakes
L. Lucie
Dublin
19
445
42
44
439
44A
437
46A
46
433
(X) = 37 of K

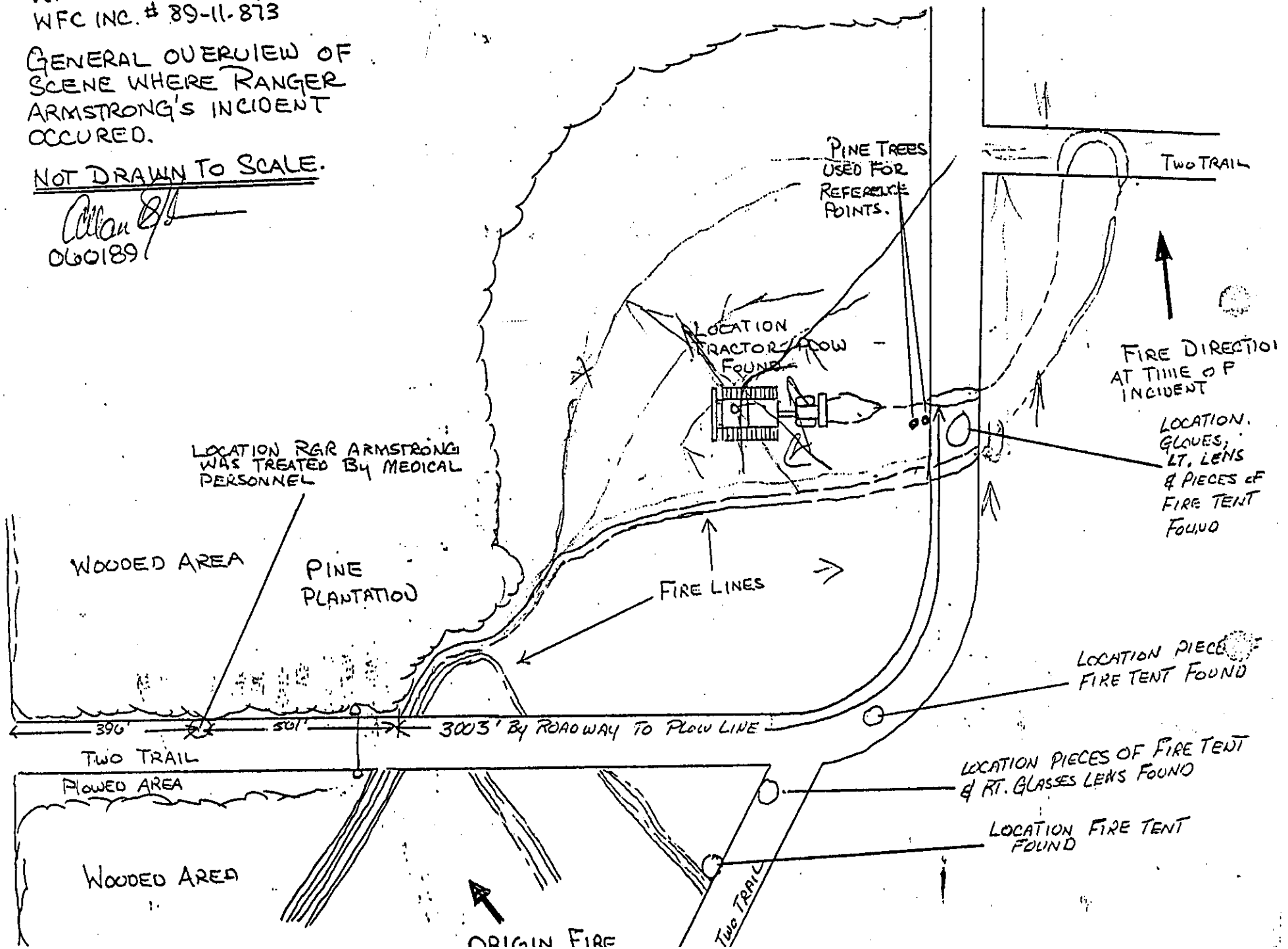

R-29E
3
4
5
8
7
17
40
Sulphur Run
Black Water
Creek
37
5/31
ORIGIN
5/25/89
MOSES F. LEVY GRANT
Breakout
APPROXIMATE VICINITY
OF BURN-OVER
PETER MIRANDA GRANT
LAKE CO.
SEMINOLE CO.
RIVER
T 19 S
EKIVA

CASE # 11-35-0589-410
WILDFIRE INVESTIGATION
WFC INC. # 89-11-873

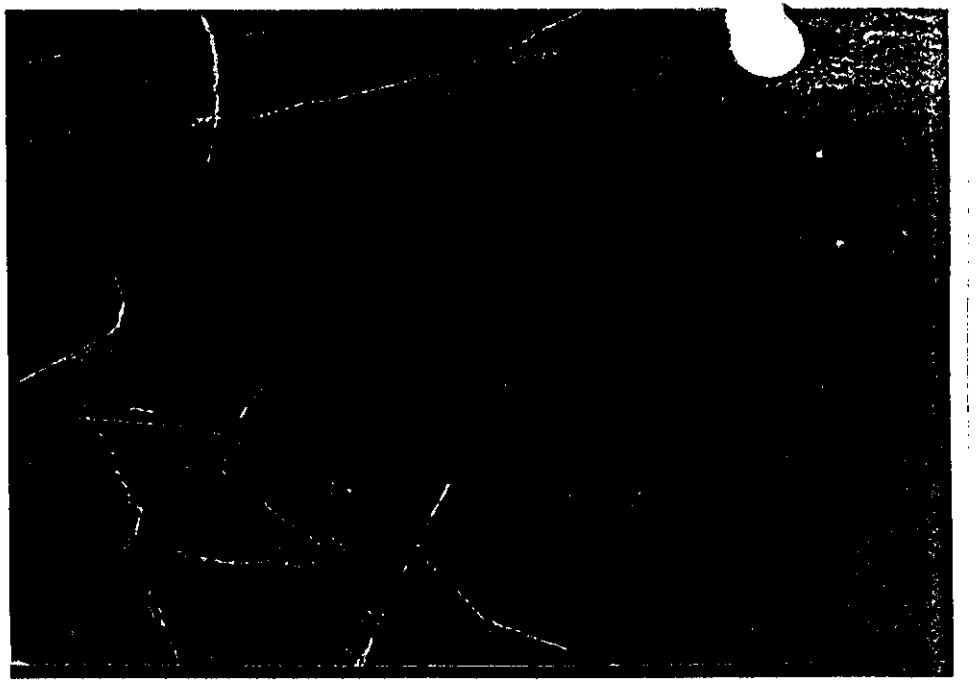
GENERAL OVERVIEW OF SCENE WHERE RANGER ARMSTRONG'S INCIDENT OCCURED.

NOT DRAWN TO SCALE.

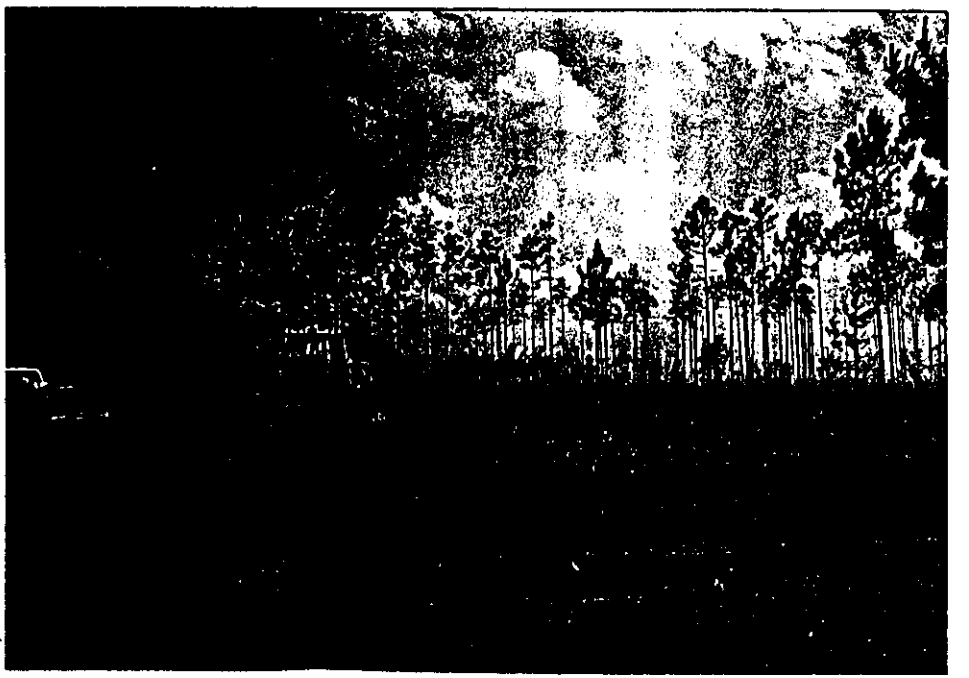
Allan
060189



Fire Spread Direction From Left to Right
Arrow Depicts Location of Stopped Tractor,
and End of Plow Line

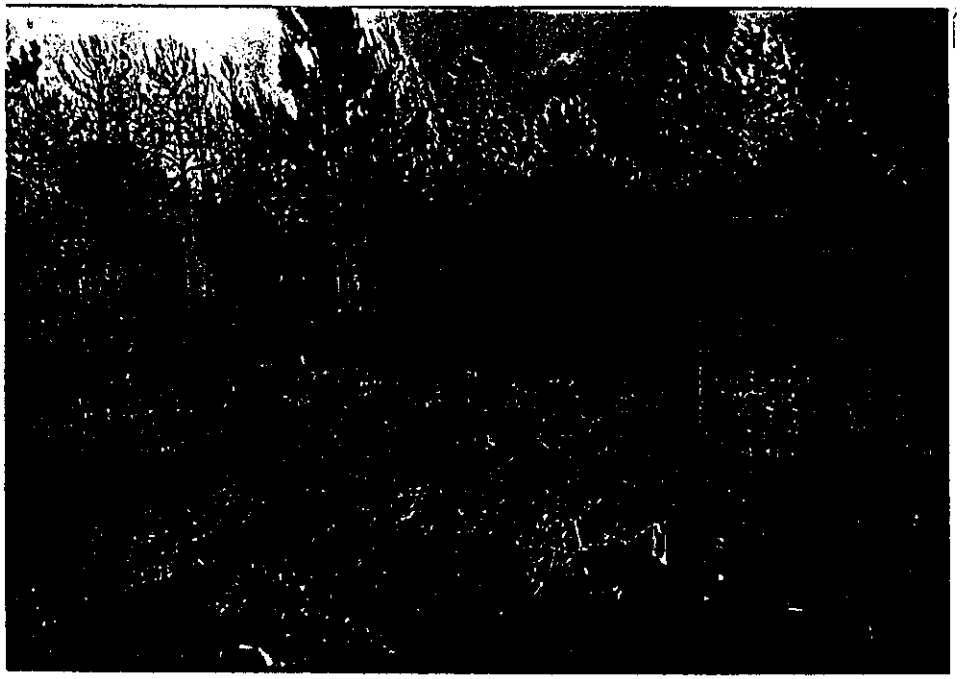


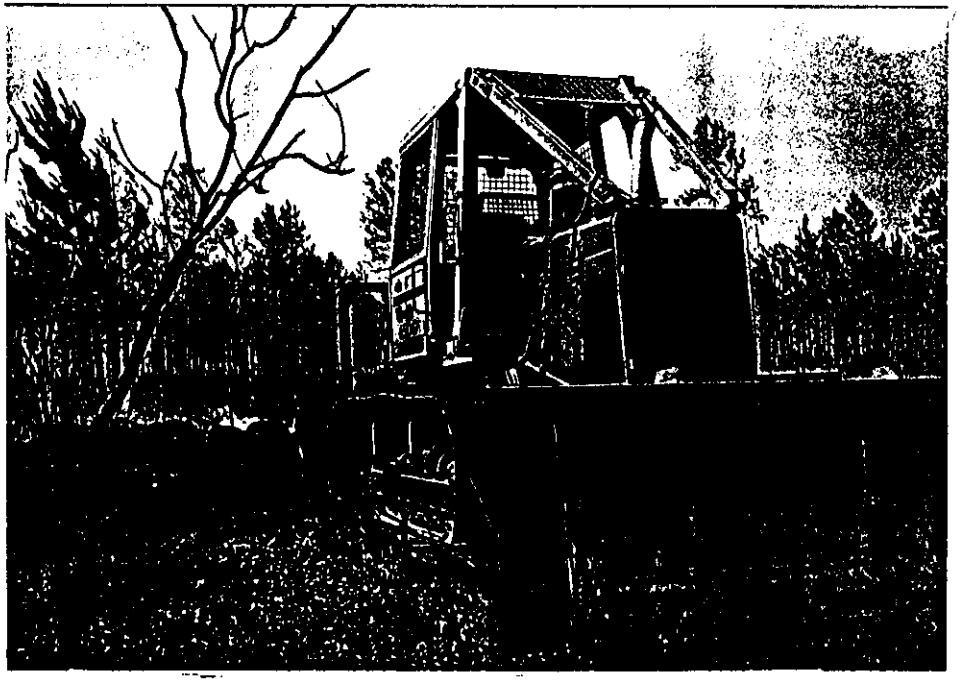
(Opposite View) Fire Spread Direction From
Right to Left



Deployment Location, In Fireline Behind Plow

Windward Perspective





11-35-0789-88

Form FC-5500-1
(Revised December, 1988)
SN 4400

Florida Department of Agriculture and Consumer Services
Divison of Forestry
Individual Fire Report

Incident Number: 0873

Prepared by: R. Duty Date: 6/30/89

Reviewed by: R Duty Date: 6/30/89

- I - Location

Forestry District: 11
County Code: 35
Fire Number: 0485
Section / Grant: 37
Township: 19S
Range: 29E

Name of Landowner: UNKNOWN

Address:

City:

State: ZIP:

Telephone Number (with Area Code):

Ownership Type: State ..... 1, Private ..... 2, Federal ..... 3 — Enter Number in box: 2

Fire Discovered by (Name): R. Hewitt

Telephone Number (with Area Code): UNKNOWN

Discovery Code: 6800

- II - Fuel Type

Palmetto - Gallberry ... 1, Dense Pine ..... 2, Swamp ..... 3, Blowy Leaf ..... 4, Grass ..... 5, Muck ..... 6, Other ..... 7 — Enter Number in box: 1

- III - Fire Behavior

	0	1	2	3	4	5	Enter Number in box.
Forward Rate of Spread (miles per hour):	Not Obs.	0-1 mph	2 mph	3 mph	4 mph	5+ mph	5
Flame Length (feet):	0 Not Obs.	1 0-2 feet	2 3-4 feet	3 5-8 feet	4 9-10 feet	5 10+ feet	5
Spotting Distance (feet):	0 Not Obs.	1 0-3 feet	2 4-10 feet	3 11-100 feet	4 101-299 feet	5 300+ feet	3

- IV - Fire Danger (From nearest Weather Station)

Wind Speed (mph): 03
Build-up Index: 066
Wind Direction: (N, NE, E, SE,...) NE
Spread Index: 019
Relative Humidity (%): 43
Fire Readiness Level: (1-5) 3

Forest Area Supervisor Number: 8

- V - Acres Burned

	0.1 acres
Commercial Forest: (acres)	224.0
Non-Commercial Forest: (acres)	
Non-Forest: (acres)	
Total Acres Burned:	224.0
Limited Action: (acres)	

- VI - Estimated Size of Fire at Initial Attack

Acres: 000,015.0 (0.1 acres)

- VII - Fire Cause

Lightning ..... 1, Campfire ..... 2, Smoking ..... 3, Debris Burning ..... 4, Incendiary ..... 5, Equipment ..... 6, Railroad ..... 7, Children ..... 8, Unknown ..... 9, Miscellaneous ..... 10 — Enter Number in box: 9/1

Specify if Miscellaneous:

- VIII - Time

	Month	Day	Year	Time (2400 Clock)
Started: Estimated ☑ Actual ☐	05	25	89	2200
Discovered:	05	26	89	0808
Reported:	05	26	89	0809
Departed:	05	26	89	0825
Arrival:	05	26	89	0924
Controlled:	05	26	89	1444
Mopped Up:	06	30	89	1439

- IX - Incident Commander

Name: G. Schreiber

- X - Person Responsible

First Name: UNKNOWN Last Name:

Address:

Telephone Number (Area Code)

F 89 O 18 January, 1989

- XI - Referred To

Investigator:	Forester:	Landowner	Other (if "none", write NONE):
☑	☐	☐	

- XII - Personnel and Equipment

Date	Number of Men - or - Equipment Number	Time Departed from District	Time Released from Fire
	See Incident Cards		

INCIDENT NO 0873
DATE RECEIVED COMM. CTR. 6-30-89
☐ CHK'D FIRE LOG ☑ REMOVED DAILY LIST
DATE ENTERED COMPUTER 6-30-89
ENTERED BY [illegible]
DATE RECEIVED BY INV 070289
REVIEWED BY [illegible]
CASE LOGGED # 11-35-0789-483
☑ STR FILE ☐ MTHLY FILE
☐ MAPPED - DATE

- XIII - Law Enforcement

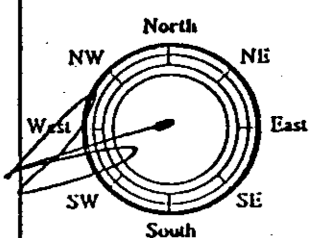
Notice of Violation Issued:	Yes ☐ No ☑	Remarks:
Evidence:		Fire Broke out

- XIV - Map

1. Include the Roads leading to the fire.

2. If the WINDS are Variable, write VARIABLE WINDS.

3. Indicate the WIND Direction At the Fire by drawing and arrow from the center of the compass rose TO the direction the wind was blowing TOWARD.



See W-8

FIRE BEHAVIOR ANALYSIS

GENTILLE FIRE--MAY 31, 1989

The following report is a reconstruction of the probable fire behavior on the "Gentille" fire, May 31, 1989, in Lake County, Florida.

GENERAL CONDITIONS:

The most accurate indication of drought severity in the Gentille fire vicinity is provided by the U.S. Forest Service, Ocala Fire Center office. This office is located within 20 statute miles of the incident site.

Records indicate that .45" of rain fell on May 28, 1989, at this facility. The Cumulative Severity Index (CSI), scale from 0-800, was given at 608 on May 31, the day of the burn-over incident. This represents the top 6 of 8" of the earth's surface was dry on that date.

FIRE WEATHER:

Official weather information was recorded within 20 statute miles of the incident site, and within the same hour of the burn-over accident. This fire weather data, used in the reconstructed fire behavior analysis, was obtained from the U.S. Forest Service Ocala Fire Center, and is considered to be very reliable.

The following readings were taken at 1400:

sky condition	scattered clouds, up to 50%
relative humidity	39%
dry bulb	94°
wet bulb	74°
wind	S.W. @ 5 m.p.h.
cumulative severity index	608 (scale 0-800)
**1-hr fuel moisture	5%
10-hr fuel moisture	9%
100-hr fuel moisture	14%
live woody	100% (drought affected low)

**figure verified by manual calculation, fine dead fuel moisture worksheet, advanced fire behavior field reference guide.

Wind speed was the only component of the weather where mixed opinions were expressed. While the Ocala Fire Center reported 20' winds out of the southwest at 5 m.p.h., a firefighter on the site reported variable winds and estimated the mid-flame (eye-level) wind speed to be about 8 m.p.h. A supervisor at the same site estimated the mid-flame wind speed at 10 m.p.h.

This fire behavior analysis includes 3 different wind speed inputs of 5, 7, & 10 m.p.h. at mid-flame. Wind speeds in this range, considering an average between the partially sheltered and exposed fuels adjustment factor, would have been nearly 20 m.p.h. at the 20' level. I suspect that these wind speeds represent the upper limits, based on site evidence and fire behavior description by the firefighters.

FUELS:

The fuels on the Gentille fire for the most part, including the proximity of the burn-over, represents a classic Fuel Model 7, as described in a nationally recognized forest fuels modeling system. Fuel Model 7 is primarily a southern rough, or shrub strata of Palmetto-Gallberry and other plant species. The Division of Forestry has arbitrarily segmented Palmetto-Gallberry into the following 3 classifications:

light rough------vegetative strata up to 3' in height
medium rough-----vegetative strata averaging 3-6'
heavy rough------vegetative strata averaging > 6'

The fuel on the Gentille fire is most closely represented by the medium rough classification.

The arrangement of the fuels was continuous horizontally, and mostly even in height. The chemical content is generally high in the live foliage of Palmetto-Gallberry, and usually very volatile in the spring growing season.

There were scattered Slash Pines on the site, estimated to be 15-20 years old. In the general vicinity of the burn-over, younger, shorter (10-15'), Pines were more abundant.

FIRE BEHAVIOR:

Fire behavior, as described by Forest Rangers Don Armstrong and Gary Schrieber, suggests that there was nothing unusual about the Gentille fire. Gary commented "I talked to him (Don Armstrong) face to face...everything was calm, and it was just so routine..." (Don was the firefighter; Gary was only able to make peripheral observations of fire behavior due to scouting limitations with his transport.

Don and Gary's description of fire behavior on the Gentille fire is also consistent with most of the fire behavior worksheet outputs. (confidence levels are high on the worksheet inputs)

Torching/Spotting: Short distance spotting was present, according to Armstrong. This was a likely occurrence as predicted by the fire behavior calculator in the given fire environment.

The only evidence of torching was in the windward vicinity of the burn-over site. The flare up at this location would not have been unusual, given:

- a gentle upslope position
- an abundance of highly volatile fuels
- closely spaced younger pines
- gusty winds

Rate of Spread: 3 different mid-flame wind speed figures (5,7,10 m.p.h.) were used as inputs in the HP-71-B Fire Calculator. According to a Direct program worksheet, the rates of spread ranged from 30-72 chains per hour. (average of < 1 m.p.h.) This is consistent with the assessment that the rate of spread was "moderate".

Intensity: As in this case, fires will ordinarily burn through the surface and shrub strata of Fuel Model 7 with ease, in consideration of the especially low fine fuel moisture and high chemical content of the Palmetto/Gallberry complex. Indicators, i.e. "frozen" scorched Pine needles supported the on-site observations that the winds were variable. In the vicinity of the burn-over, evidence of a significant clockwise windshift was present. These indicators were:

- Flashy fuels only scorched in the normal fire path, whereas before the same fuels were completely consumed.

- At the same location, tell-tales i.e. scorched pine needles freezing in a new position, approximately 60^{o} clockwise from the general pattern of indicators.

- Noticeable change in plowing direction, corresponding to the new spread direction.

A summary analysis on the behavior of the Gentille fire suggests that it was mostly even-tempered, with respect to intensity and rate of spread. For the most part, the fuel bed was homogenous. The exception noted would be in the vicinity of the burn-over, where a significant wind shift occurred. That situation, coupled with more available fuel and wind gusts, would have resulted in an accelerated spread rate, torching, higher intensity, and higher probability of spotting.

Prepared by Jim Parry, FBA

SN 4413

INCIDENT CARD

DATE: 5-31-89 | INCIDENT #: 873 Control

CREW #:	RANGER INIT:	FIRE #:
W-30	G.S. & D.A.	

SEC.	TWS:	RNG:	SUPERVISOR:
37	19	29	DUTY

GEN DIRECTIONS: Gintilly Property Wekiva River

REPORTED BY: Lester Faircloth | PHONE: 383-0740

CAUSE: | ACRES:

WS	WD	BUI	SI	RH	TEMP	DISP. RTO:
						KK

W-30	W-34	W-7	W-25	
1258	1350			RECEIVED
1259	1351			REPORT TO RANGER
1301	1353	1436	1446	CREW STARTED
1353	1445	1546		CREW ARRIVED
Rel. 2234	Rel 2234	Rel 2234	Rel. 1721	CONTROL TIME
				MOPPED UP

TIME:	REMARKS:
	Mr Faircloth called
	& said a couple of
	surveyors on the
	Gintilly property
	noticed open flame
	in area of old burn
	from last week
	W-30 enroute from LWC
1400	W-30 advises he needs
	another crew.
	W-13 & W-40 enroute
	from Wildwood to
	Bunnell
1411	Requesting crew from
	Plymouth-Orlando
	District
	Estimated at 60
	acres - it is head
	fire
1418	Plymouth coming down
	from tower & responded
	to Wekiva River fire
1456	W-13 enroute to fire
1457	W-40 arrived at LWC
1506	W-30 burned over
	no information on
	ranger
1507	Called Bunnell to
	dispatch Orange City

FC-5500-3

SN 4413 **INCIDENT CAR**

E: 5-31-89 | INCIDENT #: 873 Central

CREW #:	RANGER INIT:	FIRE #:

SEC.	TWS:	RNG:	SUPERVISOR:
37	19	29	

GEN DIRECTIONS: Gentilly Property

REPORTED BY: | PHONE:

CAUSE: | ACRES:

WS	WD	BUI	SI	RH	TEMP	DISP. RTO:
						KK

0-50	0-36	W40	"	RECEIVED
1519	1411			REPORT TO RANGER
1520	1425			CREW STARTED
16	1455	1556		CREW ARRIVED
ECL 2234	ECL 2234	ECL 2227		CONTROL TIME
				MOPPED UP

TIME:	REMARKS:
1517	W-31 tractor Unit and Unit Ranger Rimstring in - OK - Per W-25
1528	W-25 requesting medical air lift for R-32
1530	Called Forte EMS they refused to send
	Helicopt. to scene - W only send ambulance
1540	Called for helicopt. fr U.S.F.S.
1544	EMS - Air Care Unit Enroute
1540	Tac. & W-3 Notified accident & fire being 150-
1540	W-15 enroute.
1603	medivac has arrived Ranger cancelled U.S.F.S. hi W-25 & by phone to C
1603	Adv. Ch. 6 to get Twin helicopter out o area
1611	Transporting Rangers t Orlando Regional Medical Cen Burn Unit
1615	R30 enroute to pic up R-32 Life and ta to hospital

NFC

DIVISION OF FORESTRY
SUPERVISOR'S INCIDENT INVESTIGATION REPORT

ACCIDENT NUMBER 4

1. STATE OFFICE/DISTRICT/STATE FOREST/NURSERY	2. LOST TIME/NON-LOST TIME			
Withlacoochee Forestry Center	Lost Time			
3. EXACT LOCATION OF INCIDENT	4. DATE OF OCCURRENCE	5. TIME	( ) AM (X) PM	6. DATE REPORTED
Sec. 37, T. 195, R. 29E Lake Co.	05/31/89	3:06		05/31/89

INJURY OR ILLNESS	PROPERTY DAMAGE		OTHER INCIDENT	
7. INJURED'S NAME/& JOB TITLE Donald J. Armstrong	13. PROPERTY DAMAGED Tractor T-081		19. PERSON REPORTING INCIDENT	
9. PART OF BODY AFFECTED? Face, hand, torso, legs	14. ESTIMATED COSTS $2,200	15. ACTUAL COSTS	20. JOB TITLE	21. COST (If Applicable)
10. NATURE OF INJURY/ILLNESS 1st,2nd,3rd degree burns	16. NATURE OF DAMAGE Fire Damage		22. NATURE OF INCIDENT	
11. OBJECT/EQUIPMENT/SUBSTANCE INFLICTING INJURY/ILLNESS Wildfire	17. OBJECT/EQUIPMENT/SUBSTANCE INFLICTING DAMAGE Wildfire		23. OBJECT/EQUIPMENT/SUBSTANCE RELATED	
12. PERSON WITH MOST CONTROL OF ITEM 11 Ranger Armstrong	18. PERSON WITH MOST CONTROL OF ITEM 17 Ranger Armstrong		24. PERSON WITH MOST CONTROL OF ITEM 23	

DESCRIPTION

25. DESCRIBE CLEARLY HOW THE INCIDENT OCCURRED

Employee was working to suppress wildfire. Erratic fire behavior caused a shift in direction and speed of fire which overtook Ranger Armstrong.

ANALYSIS

26. WHAT ACTS, FAILURES TO ACT AND/OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS INCIDENT?

Changing, erratic winds exacerbating wildfire intensity.

27. WHAT ARE THE BASIC OR FUNDAMENTAL REASONS FOR THE EXISTENCE OF THESE ACTS AND/OR CONDITIONS?

The inherent dangers in suppressing a wildfire.

EVALUATION: 28. LOSS SEVERITY POTENTIAL	29. PROBABLE RECURRENCE RATE
(X) Major ( ) Serious ( ) Minor	( ) Frequent (X) Occasional ( ) Rare

PREVENTION

30. WHAT ACTION HAS OR WILL BE TAKEN TO PREVENT RECURRENCE? NUMBER ALL ITEMS IN SEQUENCE

1) Intensify safety precautions
2) Maintain high level of training in fire suppression tactics.

31. CIRCLE NUMBER AND GIVE DATE OF INTERMEDIATE ACTION. "X" OUT NUMBER (AND GIVE DATE) WHEN COMPLETED.

INTERMEDIATE 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____

COMPLETED 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____

32. INVESTIGATED BY	33. DATE	34. REVIEWED BY	35. DATE
[signature] 6/8		[signature]	6/6/89

STATE OF FLORIDA
DOYLE CONNER, COMMISSIONER

FLORIDA DEPARTMENT OF AGRICULTURE & CONSUMER SERVICES

DIVISION OF FORESTRY ■ 15019 BROAD STREET . BROOKSVILLE, FLORIDA 34601

8212
October 4, 1989

MEMORANDUM

TO: Larry Scott, Operations Administrator, WFC

FROM: Timothy A. Cashdollar, AES

SUBJECT: Tractor T081 (Armstrong's), Ser. #757785

Listed below are items that the Shop found to be possible contributing factors involving the equipment used by Ranger Armstrong resulting in his injury incident.

1. TRACKS: Reduced power due to very tight tracks.
2. HYDRAULIC LINES: On the right side of the tractor, the hydraulic lines for the lift blade, swing and tilt were burned into.
3. HYDRAULIC CYLINDER: Hydraulic oil from the cylinder was dripping on the hydraulic line mentioned in item 2.
4. RADIATOR: Two small holes were found on the backside of the radiator (fan side). At the time repairs started, there was no water in the radiator.
5. WIRING: The engine wiring and alternator were burnt up.
6. RADIATOR HOSE: Lower radiator hose had burst but was not burned at all.
7. FLOAT POSITION: See memorandum for July 20, 1989, on modification of John Deere 550G and 650G tractors.

All parts have been replaced with the exception of the alternator which is here for your inspection.

TAC/ek

cc: Charles Frogge, Maintenance Administrator

STANDARDS FOR SURVIVAL

"WATCH OUT" SITUATIONS

(SURVIVAL CHECKLIST)

_____ 1. FIRE NOT SCOUTED AND SIZED UP

_____ 2. IN COUNTRY NOT SEEN IN DAYLIGHT

✓ 3. SAFETY ZONES AND ESCAPE ROUTES NOT IDENTIFIED

_____ 4. UNFAMILIAR WITH WEATHER AND LOCAL FACTORS INFLUENCING FIRE BEHAVIOR

_____ 5. UNINFORMED ON STRATEGY, TACTICS AND HAZARDS

_____ 6. INSTRUCTIONS AND ASSIGNMENTS NOT CLEAR

_____ 7. NO COMMUNICATION LINK WITH CREW MEMBERS/SUPERVISOR

_____ 8. CONSTRUCTING FIRELINE WITHOUT SAFE ANCHOR POINT

_____ 9. BUILDING FIRELINE DOWNHILL WITH FIRE BELOW

_____ 10. ATTEMPTING FRONTAL ASSAULT ON FIRE

✓ 11. UNBURNED FUEL BETWEEN YOU AND THE FIRE

_____ 12. CANNOT SEE MAIN FIRE, NOT IN CONTACT WITH ANYONE WHO CAN

_____ 13. ON A HILLSIDE WHERE ROLLING MATERIAL CAN IGNITE FUEL BELOW

_____ 14. WEATHER IS GETTING HOTTER AND DRIER

✓ 15. WIND INCREASES AND/OR CHANGES DIRECTION

_____ 16. GETTING FREQUENT SPOT FIRES ACROSS LINE

✓ 17. TERRAIN AND FUELS MAKE ESCAPE TO SAFETY ZONES DIFFICULT

_____ 18. TAKING A NAP NEAR THE FIRELINE

✓ 19. PERSONAL PROTECTIVE EQUIPMENT NOT AVAILABLE OR PROPERLY UTILIZED

FIRE ORDERS

F **FIGHT** fire aggressively but provide for safety first.

I **INITIATE** all action based on current and expected fire behavior.

R **RECOGNIZE** current weather conditions and obtain forecasts.

E **ENSURE** instructions are given and understood.

O **OBTAIN** current information on fire status.

R **REMAIN** in communication with crew members, your supervisor, and adjoining forces.

D **DETERMINE** escape routes and safety zones.

E **ESTABLISH** lookouts in potentially hazardous situations.

R **RETAIN** control at all times.

S **STAY** alert, keep calm, think clearly, act decisively.

CONCLUSIONS

Based upon the objective facts obtained during the review of the Gentille Fire, it seems reasonable to infer that:

1. A major contributing factor to this burn-over incident was the firefighter's unfamiliarity with the John Deere 650-G Tractor. (Notably, the "float" position on the hydraulic plow lever, and the effective plowing speed).

2. The firefighter's tactics did not provide him with sufficient space from the fire to be able to effectively react to wind changes and the flare-up to take proper evasive action.

3. There was no conclusive evidence that a malfunction in the equipment contributed to the incident.

4. Physical evidence suggests that the fire shelter was torn during deployment or while the firefighter moved from the tractor to the deployment site. (Perhaps snagged by the waist high palmettos).

5. Armstrong's statement that his legs were on fire while under the shelter suggests that the shelter sustained direct flame contact. This would explain his lower legs possibly being exposed to direct flame where the shelter was damaged earlier, causing his blue jeans (100% cotton) to ignite.

6. Melted remnants of the yellow hard hat found adhered to the interior of the fire shelter indicate that temperatures exceeded 500^{o}F in the shelter. (Based on known melting point of the plastic hard hat)

RECOMMENDATIONS

1. Under no circumstances should a firefighter be dispatched to work a fire unless he/she has all required items of Personal Protective Equipment.

2. Personnel must be certified to competently operate specific pieces of equipment prior to being dispatched to any fire.

3. Require all firefighters to maintain currency in first aid skills, and increase training emphasis on handling burn injuries in the field.

4. Provide commercially available burn dressings for supervisory vehicles to accelerate emergency burn care in the field.

5. Provide Duty Officers with additional training in communication skills and message handling when faced with stressful situations.

6. Update base station consoles to include an emergency tone alert system, for restricting non-essential communications.

7. Provide all firefighters with a more advanced level of fire training to enhance their fire behavior prediction skills.

8. All fire supervisors should place a higher emphasis on the importance of safety zones and escape routes for any fireline operation.

9. Explore the feasibility of providing fire crews with a high visibility signaling device to make it easier to locate crews in emergency situations.

10. Establish a plan that will provide for immediate trauma or stress debriefing for employees involved in a critical incident.