Accident Investigation Final Report

Committee Drive Fire Burnover

Brunswick County

October 7, 2008

Accident Investigation Team
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Description of Incident: On October 7, 2008, at approximately 1230 hours, the local Fire Department personnel initial attacked the Committee Drive fire in Brunswick County. Estimate of size at initial attack was 5 acres. The local Fire Department was first on the scene to begin size-up and resource order requests. The Assistant Fire Chief assumed the responsibility as Incident Commander and immediately requested a second engine (Engine B for this report) for support. Upon arrival, the IC committed engine A on the Alpha flank and engine B on the Charlie flank. Given the forward spread of the fire and progression into denser timber, a request was made for four mutual aid engines (engines C, D, E, & F for this report) and the NC Division of Forest Resources (NCDFR). Upon their arrival, engine C was staged for structure protection closer to the origin, while the other three units (engines D, E, & F) were directed to go to the tower site to "do what they could." At the time of this directive, winds were evidenced more from an easterly quadrant. This allowed two of the mutual aid engines (engines D & E) to attack the Alpha flank from the east-west road adjacent to the tower, while engine F attempted to wet down fuels in front of the head. At 1255 hours, the local NCDFR representative arrived on the scene and commenced to get debriefed by the Assistant Fire Chief. While in route to the scene and seeing the smoke column, a second tractor/plow unit was requested. At approximately 1330 hours, there was a witnessed wind shift more out of the north/northeastern quadrant causing the fire to make a run towards the vicinity of the three latter mentioned mutual aid engines. At this time, engine F decided to cut the pump off and pull back further in front of the head (approximately 150 feet away) along a path adjacent to a woods line to continue again with the spraying operation. While trying unsuccessfully to restart the pump for spraying, engine F's motor stalled out and could not be restarted after multiple attempts. Also during this time, engines D & E were short of water, coupled with extremely dense smoke and approaching flames, causing them to retreat to the tower site. Upon their retreat, they heard radio traffic with regards to engine F and the mechanical malfunctioning. An attempt was made to utilize engine D or E to hook to and pull out engine F, but at that time, the fire had spread to engine F's site and started to engulf it. The Fire Department personnel at the scene and engines D & E retreated to a safety zone near the tower site resulting in no personal injuries, but a total loss of engine F. At about this time, 1330 - 1340 hours, the first NCDFR tractor/plow unit was unloaded, anchored in, and started making progress. The local NCDFR representative made contact with the Assistant Fire Chief to inform about the committing of NCDFR equipment, and to have fire department resources focus on structure protection. The Assistant Fire Chief, per protocol, relayed to fire department resources via radio to pull back since NCDFR equipment had arrived on the scene. This radio traffic was never confirmed. While on scene, the local NCDFR representative also requested two additional tractor/plow units and a patrol plane. As the fire began to build in intensity due to the evidenced wind shift, and taking into account past fire experiences in this area involving urban interface, two additional tractor/plow units were requested along with NCDFR Single Engine Airtankers and one Helicopter (which was later cancelled due to time/distance factor).

Weather Data: The observed unusual fire behavior for this time of the year was consistent with recorded NFDRS indices. However, the observed wind speeds were significantly higher than forecasted by the National Weather Service. In addition, this

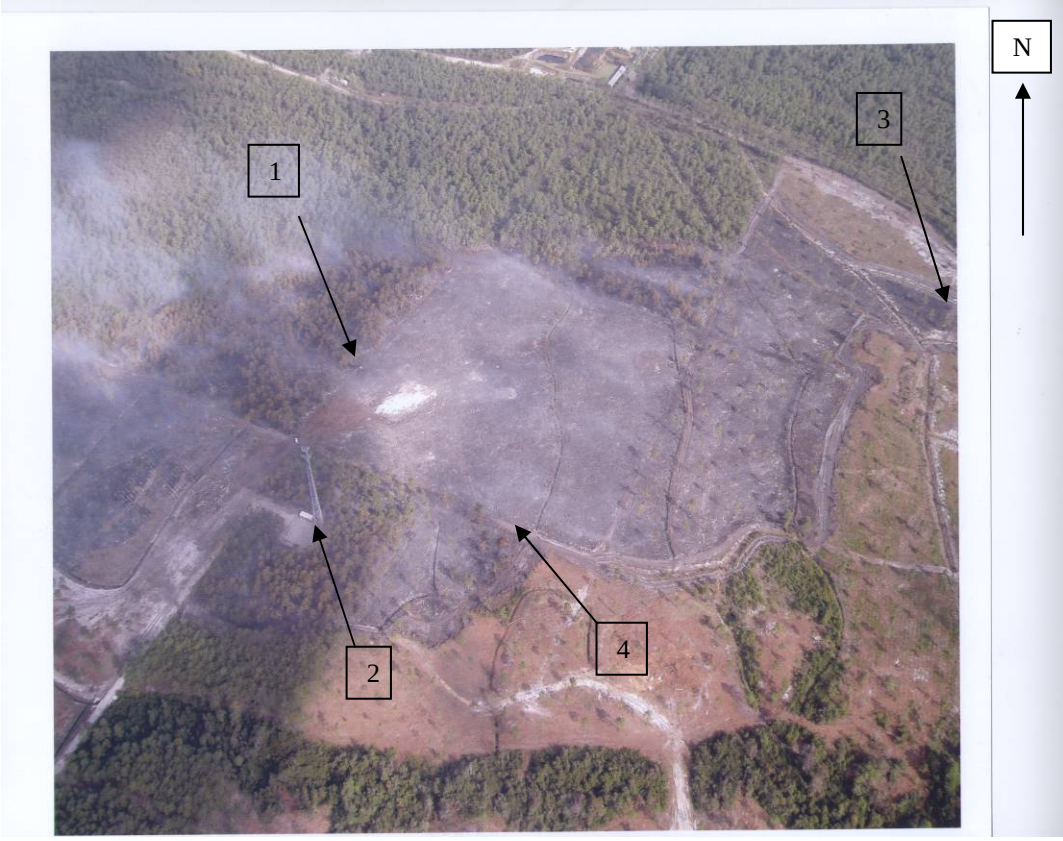
area is typically prone to seabreeze effects which contributed to the observed changes in spread direction. With respect to comparing the NFDRS indices from the two stations below, the Sunny Point site is in closer proximity to the incident, however, experience has shown that the indices are not a true reflection of what can be expected regarding fire behavior. This station is historically influenced by the surrounding water bodies which lends itself to more "conservative" readings than can be experienced.

NWS Forecast for Brunswick County

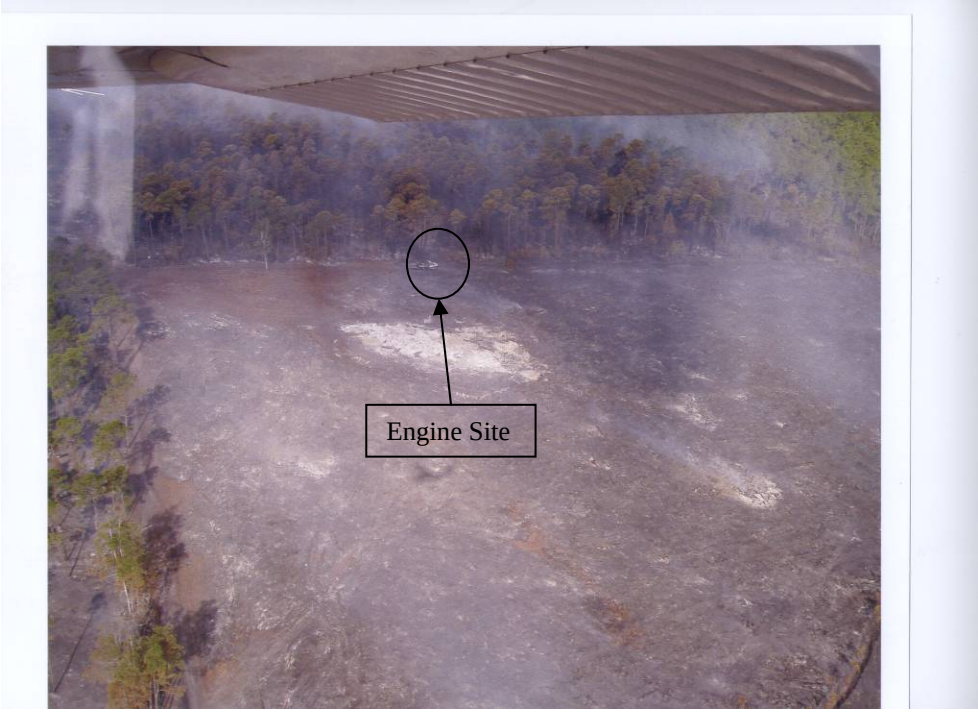
3:15 A.M.		**1058 A.M.**	
Max/Min Temp	77°	Max/Min Temp	77°
Winds (early)	NE 8 mph	Winds (early)	NE 5 mph
Winds (late)	NE 10 mph	Winds (late)	NE 8 mph
Min/Max RH	48%	Min/Max RH	46%
Mixing Height	4,700'	Mixing Height	4,700'
Transport Winds	NE 17	Transport Winds	NE 17
Ventilation Rate	79,900' (BC 4)	Ventilation Rate	79,900' (BC 4)

NFDRS Readings – 1400 P.M.

Nature Conservancy		**Sunny Point**	
Temp	79°	Temp	75°
RH	49%	RH	75%
Winds	NE 5 mph	Winds	NE 6 mph
Max/Min Temp	84°/50°	Max/Min Temp	80°/59°
Min/Max RH	30%/98%	Min/Max RH	56%/100%
1 Hour Fuels	7%	1 Hour Fuels	11%
10 Hour Fuels	8%	10 Hour Fuels	12%
100 Hour Fuels	14%	100 Hour Fuels	18%
1,000 Hour Fuels	19%	1,000 Hour Fuels	23%
IC	6	IC	3
SC	3	SC	3
ERC	40	ERC	29
BI	28	BI	24
BU	27	BU	16
KBDI	342	KBDI	441



1. Site of engine burnover
2. Tower site
3. Near the point of origin
4. Road adjacent to tower where mutual aid resources responded



Investigation Team Findings: The Investigation Team met with the Assistant Fire Chief-Initial Attack IC, Fire Department Engine Operators (including mutual aid resources), and the NCDFR local representative-IC. The site of the burnover was examined to determine what had occurred, based on the burn patterns which were present, recorded weather data, and what the involved fire fighters said.
The Team feels that all resources were qualified to function in their assigned capacity. The first responding fire department was well familiar with the area due to several recent responses to the site as a result of ongoing prescribed burning activities, escaped fire previously in the area, and citizen complaints due to smoke and witnessed flames. The NCDFR readiness plan (staffing level) for the day was commensurate with the time of year, lack of significant fire activity, and weather parameters.
It is NCDFR policy to coordinate efforts with the fire departments and to have those cooperators pull back for structure protection upon NCDFR equipment arrival. This effort was effectively communicated between the two Incident Commanders, however, the Assistant Fire Chief stated he did not receive confirmation from his resources after his radio transmission. Statements from Engine F operators were they received the direction, but to their recollection, the burnover incident had already happened. The Investigation Team interviewed the Engine F operators about their location at the time of the incident, and inquired if they felt they were in a safe area with an adequate escape route. Their opinion was since the fire was approaching from the front of them and there was a safety zone behind them (tower site), they were in no eminent danger. It is the opinion of the Investigation Team that since Engine F was facing forward in the direction of the flaming

front (vs. backing in for quick egress), no structures were within the near proximity, and an aggressive approach to firefighting which might have led the engine further down the woods path (barring the mechanical failure), this could have created the potential for a more catastrophic event to be investigated. Additionally, the Investigation Team interviewed the mutual aid resources (Engine D or E). Their statements also raised some concern of this team due to the aggressive nature in trying to save Engine F. There were some apparent high dollar valuables and personal gear inside Engine F. A mutual aid firefighter was already in PPE, therefore he was "wet down" and proceeded to go to Engine F and attempt to start it and possibly retrieve some of the aforesaid mentioned items. During his attempt to start the engine, the tires blew due to already being engulfed by the flaming front. The firefighter then exited the engine and proceeded back to the safety zone with the other operators. It is the opinion of the Investigation Team that although a valiant attempt to save some equipment, situational awareness and risk mitigation was compromised and could have resulted in a more catastrophic event to be investigated.

Review of Standard Fire Orders and 18 Situations That Shout Watch Out: It is protocol for wildland firefighting that all personnel are expected to comply with the Standard Fire Orders and conduct fireline operations in a way that mitigates the risks identified in the 18 Situations That Shout Watch Out. This review indicated that this was not done on this fire and probably contributed to the accident.

Fire Orders:

1. Keep informed on fire weather conditions and forecasts. There was a general knowledge of this information, but an apparent surprise as to the wind shift which is typically common with this area due to the seabreeze effect.
2. Know what your fire is doing at all times. This was generally complied with.
3. Base all actions on current and expected behavior of the fire. Actions were based on the current behavior of the fire. However, the tactical decision to aggressively suppress 30 acres with a substantial flaming front via frontal assault with an engine compromised safety.
4. Identify escape routes and safety zones, and make them known. This was complied with. However, the aggressive nature of the suppression activity compromised the effectiveness of the escape route.
5. Post lookouts when there is possible danger. The patrol/scout plane was requested and was over the fire, but not during the time of the burnover.
6. Be alert. Keep calm. Think clearly. Act decisively. This was generally met. There is a concern over the decision to have the mutual aid firefighter in PPE going back to Engine F with the flaming front in close proximity.
7. Maintain prompt communications with your forces, your supervisor and adjoining forces. This was not met. The Assistant Fire Chief stated he had substantial problems communicating with the mutual aid resources and dispatch. There was a constant need to switch frequencies back and forth between resources. There was a lack of confirmation from the engine operators when directed to pull back. There was a delay between the time of the burnover and the time the IAIC received notification of the incident.

8. Give clear instructions and insure they are understood. This was generally met. However, there is a concern over the statement from the IAIC to Engines D, E, & F to "go to the tower site and do what you could." This open ended statement is subject to interpretation and cannot be defended since no structures were near their site.
9. Maintain control of your forces at all times. This was generally met.
10. Fight fire aggressively, having provided for safety first. This was not met. Though no injuries occurred, the lack of situational awareness on two occasions due to an over-aggressive nature could have resulted in potential fatalities.

Watch Out Situations

1. Fire not scouted and sized up. Fire was sized up by the Initial Attack IC, and then again upon NCDFR assuming command. Requests were made for significant resources, recognizing the fire's potential. One of the resources requested was a scout plane.
2. In country not seen in daylight. This was not applicable. The resources were very familiar with this area due to recent escaped fire/smoke responses, as well as past fire history.
3. Safety zones and escape routes not identified. Escape route/safety zone was known, however, gave a false sense of security considering the applicable tactics utilized.
4. Unfamiliar with weather and local factors influencing fire behavior. The fire behavior observed was more intense than expected given the time of day and time of year. The winds were significantly higher than forecasted for the day, and apparently, the seabreeze effect caught the fire department resources off-guard.
5. Uninformed on strategy, tactics and hazards. There was a lack of complete instructions from the IC to the mutual aid resources.
6. Instructions and assignments not clear. There was a lack of complete instructions from the IC to the mutual aid resources.
7. No communication link with crew members/supervisor. There was a consistent need to switch frequencies whereby causing a gap in communications with critical resources. In addition, no confirmation from the resources was received by the IC after broadcasting orders. There was a time delay from the time of the burnover to the time when the IC received notification.
8. Constructing fireline without safe anchor point. Fireline was safely anchored at the origin.
9. Building fireline with fire below. This was not applicable.
10. Attempting frontal assault on fire. Given the unclear assignment, the aggressive attempt to suppress the fire, and an unrealistic idea of an escape route, a frontal assault was the contributing factor to the burnover incident.
11. Unburned fire between you and the fire. The tactic to wet down the fuels during the frontal assault compromised this watchout situation.
12. Cannot see the main fire, not in contact with anyone who can. This was not applicable.
13. On a hillside where rolling material can ignite a fire below. This was not applicable.
14. Weather is getting hotter and drier. This was not applicable.

15. Wind increases or changes direction. Winds were witnessed as being higher than forecasted by the NWS. The seabreeze effect caused a significant wind shift causing the mutual aid resources to pull back.
16. Getting frequent spot fires across line. This was not applicable.
17. Terrain and fuels make escape to safety zones difficult. This was not applicable.
18. Taking a nap near the fireline. This was not applicable.

The Four Major Common Denominators of Fire Behavior on Tragedy Fires

1. Most incidents happen on *small* fires *or* on *isolated sections* of large *fires*. This burnover occurred on the head of the fire mainly due to mechanical failure of the equipment and the lack of an adequate escape route.
2. *Flare-ups* generally occur in deceptively *light fuels*, such as grass and light brush. This flare-up occurred in heavier fuels as a result of the approaching flaming front.
3. Most fires are innocent in appearance before unexpected *shifts in wind direction and/or speed* resulting in flare-ups. Sometimes, tragedies occur in the mop-up stage. The flaming front gathered intensity and speed upon reaching the heavier fuels. By this time, it was too late to rescue the engine involved in the incident.
4. Fires respond to large and small-scale *topographic conditions*, running uphill surprisingly fast in chimneys, gullies and on steep slopes. This was not applicable.

Factors Contributing to the Burnover

1. The lack of clear instructions led to local interpretation by the engine operators to aggressively attempt a frontal assault.
2. Attempting a frontal assault on a 30 acre wildfire with an engine containing approximately 250-300 gallons of water.
3. Drought conditions had the fuels more volatile than is normal for this time of year in southeastern North Carolina. Normally, there would have been enough rain to harden off the pocosin fuels and reduce their volatility. The rains had not occurred at the time of this fire, and the fuels responded accordingly.
4. Extreme fuel conditions and the erratic winds brought on by the sea breeze allowed the head and flanks to make significant runs. The flare-up was intensified by the heavy brush fuel load.
5. An unrealistic comprehension of an adequate escape route. This should be paramount to allow for unforeseen problems such as mechanical failures.

Recommendations to Prevent Recurrence

1. Improve training for Fire Department resources so that they understand their role and importance in cooperating with wildland fire suppression. There needs to be a better understanding of limiting factors involved with engine tactics.
2. Improve training for all Fire Department resources on local weather patterns, such as seabreeze, and their effects on fire behavior and fuels susceptibility.
3. Improve training for all Fire Department resources with the emphasis on safety. Focus on the importance of adhering to the 10 Fire Orders and LCES, and mitigating the 18 Watchout Situations.