

CHISHOLM WILDFIRE ENTRAPMENT INVESTIGATION

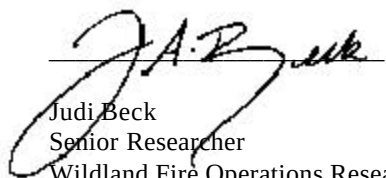


The Incident Investigation Team

The investigation of this fire entrapment and shelter deployment was requested by the Fire Boss, Alberta Land and Forest Service, and the Provincial Fire Control Officer, British Columbia Forest Service. An incident review team was established and mobilized to begin on site investigations within 24 hours of the incident.

The chronology and causal factors associated with the entrapment are detailed in this report, which also includes remedial and preventative recommendations, as well as support documentation. Reference is made to those individuals involved by their organisational function rather than by name, since the purpose of this investigation is to identify successes as well as areas that could benefit from improvement, and to encourage others to learn from these experiences so they are not repeated.

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Narrative

Fire **LWF-063** started in the evening of Wednesday May 23, 2001, just north of Flatbush Alberta. The Escaped Fire Analysis Strategy is given in Appendix I. Over a period of three days the fire grew to approximately 15,000 ha in size due to extremely dry, volatile fuels and strong winds. The fire exhibited very aggressive behaviour during its early stages. Numerous resources were requested and assigned to the fire, including fire suppression crews from British Columbia.

Fire Behaviour Summary

Fuels

Fuels in the incident area consisted of a mixture of mature black and white spruce conifer and deciduous timber types. The foliar moisture content in conifers was at its annual spring low. Of note, is the fact that the understory herbaceous plants and grasses were still in a dormant cured stage even though overstory green-up had occurred in the deciduous timber. Dozer guard construction had resulted in heavy slash accumulations, and significant pockets of partially burned fuels existed along the dozer guard in the vicinity of the incident.



Figure 1. Dozer guard construction had resulted in heavy slash accumulations in the vicinity of the entrapment site. The entire forest floor was very dry, which resulted in deep burning and almost complete duff consumption at the base of standing trees.

Weather

The weather that preceded the incident included below normal over-winter precipitation followed by a very dry spring. The weather conditions that were forecasted for the fire site on May 27th, 2001 included high temperatures (27 °C), low relative humidities (25%) and winds were forecast to increase to 25 km/h (gusting to 50 km/h) from the east-southeast. A fire weather advisory was in effect for May 27th, 2001 (see the Afternoon Spot Forecast given in Appendix II).

Topography

Terrain in the area of the incident was flat.

Fire Behaviour Analysis

In the Fire Behaviour Forecast (Forecast #2) for Sunday May 27, 2001 the Fire Behaviour Specialist assigned to Fire #63 noted (the Fire Behaviour Forecast that was issued is included in Appendix III):

- all fuels were at a critical state of dryness;
- Fire Weather Indices were: FPMC 90, DMC 95, DC 380, ISI 15, BUI 117, FWI 43;
- forecast winds (SE 30 gusting to 60 km/h) would result in intense burning conditions in all fuel types;
- crown fires were expected in all coniferous fuel types (C2), while deciduous stands (M1) and grassy fuels (O1b) would support very vigorous surface fires;
- long range spotting would occur;
- the fire would make significant excursions (i.e. “runs”); and,
- fire behaviour would be erratic.

Documented Fire Behaviour for May 27, 2001

Rates of spread in metres/minute in boreal spruce (C2) fuel types with some cured grass (O1b):

Time	Rate of Spread
1600 -1800	54 m/min (3.2 km/h)
1800 - 2000	54 m/min (3.2 km/h)
2000 - 2021	76 m/min (4.6 km/h)

Incident Description

On the morning of May 27, 2001, fourteen people were instructed to mop-up 30 – 50 metres inside a dozer guard that had been established along the eastern flank of Sector 5, Division 2, Fire #63. The fourteen personnel were comprised of: one (1) three-person Initial Attack crew from BC, eight (8) Type III Emergency Firefighters from Alberta, and three (3) equipment operators (two Nodwells and one Buggy ground tanker). Only the three Initial Attack firefighters from British Columbia were carrying fire shelters. The dozer guard the firefighters were working on had been tight-lined and it had not yet been secured.

Bucketing commenced on the sector at approximately 0730 hours and spots were noted outside the dozer guard at approximately 0846 hours. These spot fires were actioned by helicopters with buckets. As the day progressed, firefighters and equipment proceeded south along the dozer guard carrying out their assignment. Between 1130 and 1200 hours, the Division Boss contacted the Crew Boss and instructed him to proceed approximately 1 kilometer further south along the dozer guard to evaluate hotspots at that location. The crew then left the safety of their anchor point and proceeded south to the hotspots. Safety Zones and Escape Routes were discussed over the radio by the Sector Boss and the Crew Boss. By 1400 hours the Sector Boss and Crew Bosses realized that the burned area could no longer be considered a “Safety Zone” due to the risk of trees falling as a result of strong winds and complete duff consumption at the base of trees.

At approximately 1432 hours, a flare-up to the north of the crew blocked access to their original anchor point. By this time, the ground water tankers being used by the crew were nearly empty and unable to return north to be refilled. By 1500 hours the crew had traveled south and established a new Safety Zone. Trees laying across the guard to the south prevented the Sector Boss from reaching the crew via ground transportation, and he requested a helicopter Bird Dog Officer (BDO) to check on the crew between 1532 and 1535 hours.

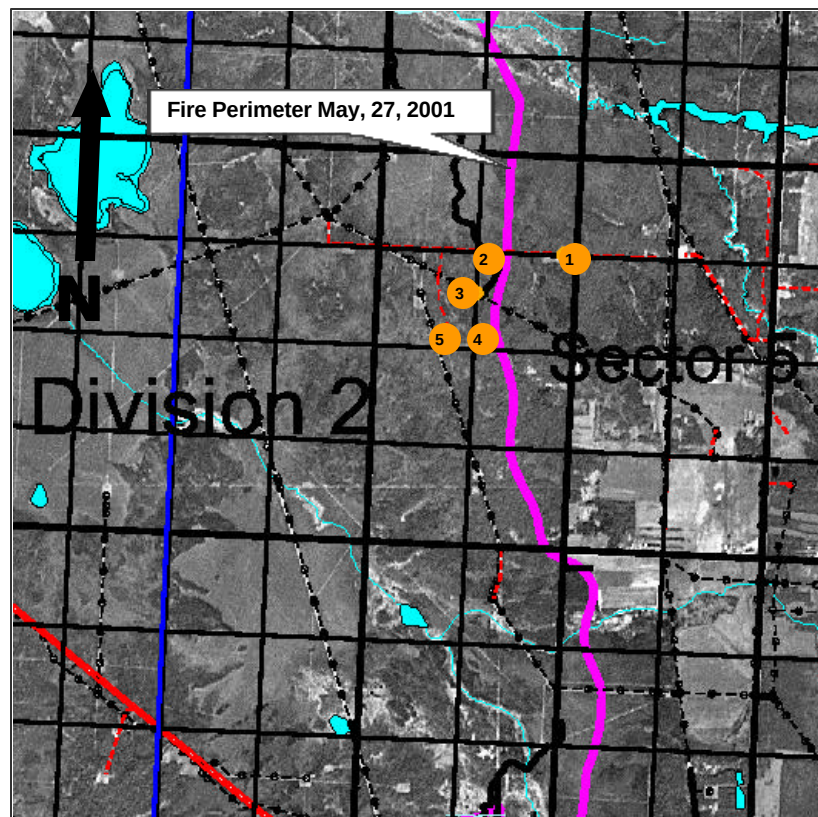
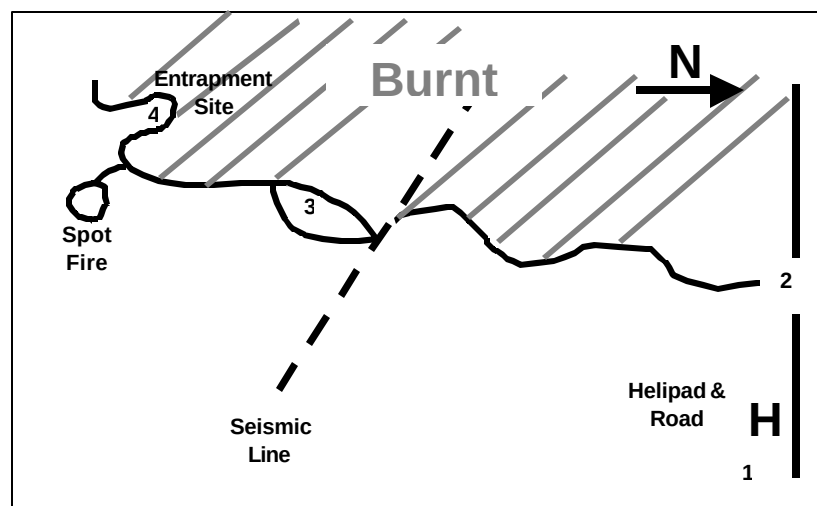


Figure 2.

Digital orthophoto and crew bosses schematic overview of the entrapment site:

- 1) Crews deployed via helicopter TNP in the morning, and then walked the main road west to the dozer guard
- 2) Original Anchor Point at the junction of main road and dozer guard where crew began work for the day
- 3) Midway meeting point where the Crew Boss reassessed options after the fire jumped the dozer guard to the north
- 4) Second Safety Zone, helipad and entrapment site
- 5) Secondary extraction site

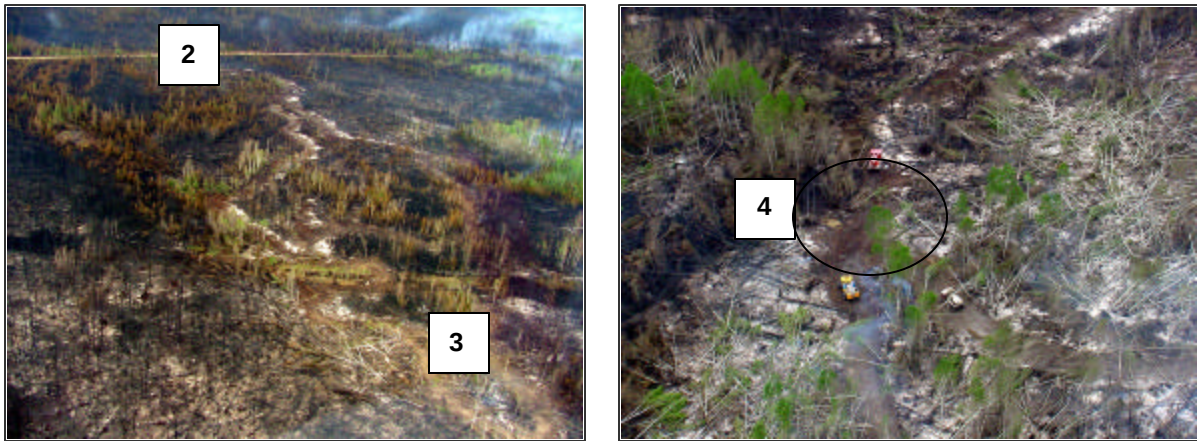


Figure 3. Significant pockets of partially burned fuels existed along the dozer guard, which had been tight-lined (see Figure 2 for location details). Note that these photos were taken one day after the entrapment occurred.

The Bird Dog Officer assessed the situation and advised the Sector Boss that the crews were in a safe area. A further radio transmission from the BDO to Chisholm Base Camp at 1555 hours indicated that the crew was trapped between two smokes and a helicopter with bucket was requested to assist. The Division Boss then called the Bird Dog Officer for a report on the status of the crew. The Bird Dog Officer informed the Division Boss that the crew was in no immediate danger but needed bucket support. The Bird Dog Officer then instructed the crew to stay where they were, and not to head north. Discussions between the BDO and Crew Boss resulted in the construction of a helipad for evacuation. At approximately 1600 hours fire shelters were deployed in the helipad area as a precautionary measure to protect the crew from radiant heat, and were shared amongst fourteen personnel on the ground. Following the deployment, five of the crew were evacuated from the site by helicopter (~1615 hours). The remaining nine personnel were guided through a burned area (black) to a designated helicopter pick-up site (1635 hours).



Figure 4. Fire shelters were deployed as a precautionary measure to protect firefighters from radiant heat.

None of the individuals involved in the incident were physically injured, and all willing participants received critical incident stress counseling following the incident.

Incident Chronology

This chronology attempts to depict, first and foremost, the sequence of pertinent events as they took place. The actual time of a given event can only be inferred for weather observations and radio transmissions. During the incident, a single radio operator at Chisholm Base recorded air-to-base (Channel 8) and ground-to-base (Channel 4) radio transmissions in the station log. Air-to-base transmissions are usually carried out between the base dispatcher and the helicopter pilots, and are often logged by helicopter identifier. Weather observations were taken by an automatic weather station at Chisholm Base. The Crew Boss also took weather observations on the line throughout the day, and these were logged in his fire diary.

Time	Event	Information Source	Temp (°C)	RH (%)	10 m Open Wind		
					Bearing	Cardinal Direction	Speed (km/h)
0700		Chisholm Base Wx Stn	11	85	90	E	9
0700-0800	Crew Bosses briefed by Sector Boss in Whyte Road line camp.	Sector Boss/Crew Boss/Equipment Operators					
0728	VEL off camp to begin bucketing in Division 2	Station Log					
0739	Division and Sector Bosses carry out aerial reconnaissance of Sectors 4 and 5. Sector Bosses requested that a helicopter be dedicated to their sectors, but were told this was not possible although someone would be in the air overhead monitoring channel 8.	Station Log/Sector Boss					
0800		Chisholm Base Wx Stn	13	73	135	SE	10
0846	VEL checks spots across dozer guard in Sector 5	Station Log					
0900		Chisholm Base Wx Stn	15	65	135	SE	10
0900	Equipment operators arrived on the fireline.	Equipment operator					
0940	Crews deployed on fireline by TNP.	Station Log					
1000		Chisholm Base Wx Stn	18	53	135	SE	12
1010	On-site safety/work assignment briefing of crews & operators. Commenced work assignment working south on fireline.	Crew Boss/Crew Members/Equipment Operator					
1010	The Fire Boss was advised by the Fire Behaviour Specialist that a low level jet was expected to surface in the fire area at 10:30, and he advised the Line Boss of this by radio	Fire Boss					
1015	Belt Wx readings by Crew Boss.	Crew Boss	19	64			
1100		Chisholm Base Wx Stn	20	45	135	SE	12
1110	Fire Boss advised by Fire Behaviour Specialist that winds to 21 km/h gusting to 44 km/h were expected. Danger of falling trees and spotting distances to ½ km were anticipated. Fire Boss passed this information on to the Line Boss via radio.	Fire Boss					
1130		Chisholm Base Wx Stn	20	43	135	SE	12
1130-1200	Division Boss south of crew with bucketing helicopters. Division Boss instructed Crew Boss to move/evaluate hotspots ½ mile south of where they were working.	Crew Boss					
1130-1200	Crew Boss & Sector Boss discuss need for dozer to clear dangerous trees from fireline. Sector Boss unable to establish radio contact with Division Boss to request dozer.	Crew Boss/Sector Boss					
1130-1200	Sector Boss tries to come to crew on fireline from south. Trees across the fireline mean he cannot reach these crews via ground access.	Sector Boss					
1130-1200	Whole crew moving south to hotter spots.	Crew Boss/Crew Members/Equipment Operator					
1200	Belt Wx readings by Crew Boss.	Crew Boss	22	52			
1203	YHB and Line Boss working in the south, Ops Normal	Station Log					
1200-1215	Line Boss requests helicopter BDO to act as Lookout for Sector 5	Line Boss					

Time	Event	Information Source	Temp (°C)	RH	Wind		
					Bearing	Cardinal Direction	Speed (km/h)
1232	SML working Sectors 4 & 5 with BDO	Station Log					
1245		Chisholm Base Wx Stn	21	38	135	SE	31
1300	YHB and Line Boss land at Base Camp	Station Log					
1303	SML working Sectors 4 & 5 with BDO	Station Log					
1300		Chisholm Base Wx Stn	22	36	135	SE	30
1300	Belt Wx readings by Crew Boss.	Crew Boss	24	42			
1316	SML lands at Sector 5	Station Log					
1321	BDO & Sector Boss conduct reconnaissance of Sector 5 in SML. BDO to arrange for sling load of equipment for crews on Sector 5, BDO noted location of crews.	Station Log/Sector Boss					
1321-1332	During reconnaissance, Sector Boss advised Crew Boss to “ensure that all crew members are aware of their escape routes & that Crew Leaders continue to assess them. Patches of spruce that flare up can be left to burn out if they are not across the guard from more spruce.	Sector Boss					
1330	Saw operator further south instructed by Crew Boss to return to others.	Crew Boss/Crew Member					
1332	Reconnaissance of Sector 5 by BDO & Sector Boss completed.	Station Log					
1338		Chisholm Base Wx Stn	22	34	90	E	33
1340	Line Boss leaves Base Camp in YHB for Sector 1	Station Log					
1345-1400	Alberta Crew Boss noted that there was an out of control blaze in the green outside the fireline to the north.	AB Crew Boss statement					
1345-1400	Sector Boss moves 16 Type III firefighters off fireline south to an open field due to high winds which were making burnt area unsafe as a safety zone due to potential for falling trees.	Sector Boss					
1400	Belt Wx readings by Crew Boss.	Crew Boss	27	32			
1400-1410	Flare-up started on the North side of the guard. Flare-up was allowed to burn out.	Crew Bosses					
1400-1410	Crew Boss noted Nodwell’s water supply getting low. Inadequate water to deal with the flare up.	Crew Boss					
1400-1410	Flare-up jumped the guard. Walked back to re-evaluate line. Crew Boss requested Saw operator to bring crews down to assist with flare up suppression on his way back.	Crew Boss					
1409	YHB and Line Boss working Sector 1	Station Log					
1410	BDO in SML departs Sector 4 for Base Camp	Station Log					
1411	SML lands Base Camp	Station Log					
1418	Division Boss working mediums CAN and VEL on Sector 6	Station Log					
1430	Crew Boss called Sector Boss. Requested bucketing support for the flare up that jumped the guard.	Crew Boss/Sector Boss					
1432	Crew Boss called Sector Boss. Requested air tanker support for the flare up that jumped the guard.	Crew Boss/Sector Boss					
1432-1500	Sector Boss attempted to contact Division Boss for aircraft support – No Contact.	Sector Boss					
1432-1500	Sector Boss requested bearing of the direction of fire movement from the flare up. Crew Boss reported flare up travelling towards the northeast.	Crew Boss/Sector Boss					
1432-1500	Crew continued south to establish a new “anchor point” and foamed the edge of the guard as they moved south.	Crew Bosses/ Crew/ Equipment Operator					
1458	SML lifts off from Base Camp with sling for equipment drop in Sector 5	Station Log					
1500	Crew arrives at second area to be established as a Safety Zone. Felled 3 dangerous trees. Parked Equipment (2 Nodwells and 1 Buggy) in safe spot. Discussed the Safety Zone as a new anchor, and pointed out escape route into the black to be established	Crew Bosses/ Crew/ Equipment Operator					
1510	Line Boss in YHB working Chisholm	Station Log					
1512	SML lands Sector 5	Station Log					

Time	Event	Information Source	Temp (°C)	RH	Wind		
					Bearing	Cardinal Direction	Speed (km/h)
1516	SML lifts off Sector 5 to commence bucketing	Station Log					
1530–1620	Fixed-wing BD13 arrives and provides air tanker support for the south end of Sector 6	Station Log					
1532	SML returning to Base Camp	Station Log					
1538	SML lands Base Camp	Station Log					
1540	WHO lifts off Base Camp with Division Boss for Sector 6	Station Log					
1535		Chisholm Base Wx Stn	24	28	135	SE	33
1535–1542	Sector Boss requests BDO to check crews in Sector 5.	Sector Boss					
1538	YHB with Line Boss on board land at north bowser for fuel	Station Log					
1542	BDO in SML lifted off camp for Sector 4 & 5.	Station Log					
1542–1552	BDO advises Sector Boss that crews are in a safe area.	Sector Boss					
1542–1552	BDO advises Sector Boss that a Water Tanker and 2 Pick up trucks on the road north need to be moved due to fire activity in the area.	BDO/Sector Boss					
1546	YHB lifts off north bowser with Line Boss for Camp	Station Log					
1552	BDO in SML looking for Line Boss.	Station Log					
1553	YHB lands at Base Camp with Line Boss (YHB is done for the day)	Station Log					
1555	BDO advises Base that a crew is trapped between two spots. Requests helicopter with bucket.	Station Log					
1555–1600	Division Boss asked BDO if they were all right and BDO informed him they were in no immediate life threatening situation but needed bucket support.	BDO					
1555–1600	BDO advises Crew Boss to stay put and that they are NOT to go north. Safety Zones and evacuation into the black was discussed. Crew boss suggested they could build a helipad for evacuation and BDO told them to proceed with its construction.	BDO/Sector Boss/Crew Boss					
1555–1600	BC crew members instructed to put fire shelters on belts and Crew Boss explained to Alberta crew members what the shelters were for and how 14 people were to use 3 shelters.	Crew Boss/Crew Members					
1600		Chisholm Base Wx Stn	25	27	135	SE	31
1600–1602	Flare-up and breach of fireline south of crew occurred.	Crew Boss					
1600–1602	Crew Boss noted smoke color change to yellow.	Crew Boss					
1600–1602	Crew Boss called Sector Boss for evacuation.	Crew Boss/Sector Boss					
1602	Request from Sector Boss to Base for 2 medium helicopters: 1 for crew evacuation and 1 for bucketing.	Station Log					
1605	TNP dispatched to evacuation site for bucketing.	Station Log					
1605–1615	Crew Boss advised Sector Boss they were deploying shelters. Crew Boss' rationale was to deploy mainly to protect crew members from radiant heat.	Crew Boss					
1605–1615	First attempt by SML to evacuate Crew but there was not enough room for him to land and he wanted the Nodwell moved. The BDO attempted but had no radio contact with the crew on the ground.	BDO					
1605–1615	After a first attempt to land, BDO reports to Division Boss that no shelters had been deployed. The shelters had not been visible due to the fact that Crews had grabbed them and moved off the helipad when SML approached to land.	BDO					
1605–1615	Crew returned to shelters on the helipad when SML aborted his first attempt to land.	Crew Boss					
1605–1615	Second attempt by SML to evacuate crew. Extracted 5 personnel.	BDO/Crew Boss					

Time	Event	Information Source	Temp (°C)	RH	Wind		
					Bearing	Cardinal Direction	Speed (km/h)
1605–1615	Nine crew members return to shelters.	Crew Boss					
1605–1615	Bucket drops on fire adjacent to deployment site. The 1 st was a string drop and then TNP dropped a second bucket load on open flame on the back of one of the Nodwells.	Crew Members & Pilot					
1615	Sector Boss advises Base that shelters have been deployed. Bucket R/W requested of Base and advised that aircraft support should contact ground crews on Channel 4.	Station Log					
1616	Fire Boss attempts to contact Sector 5 from Base on Channel 4 - no contact.	Fire Boss					
1620		Chisholm Base Wx Stn	25	28	135	SE	37
1624	TNP leaving Sector 5 for fuel.	Station Log					
1624	BKH lifts off camp with Line Boss for Sector 5.	Station Log					
1634	WHO with Division Boss working Sectors 5 & 6.	Station Log					
1634–1645	SML/WHO over deployment site.	BDO					
1634–1645	Division Boss suggests that BDO guide Crew into the black to another extraction site.	Division Boss/BDO					
1634	TNP lifted off the fueling site for Base camp.	Station Log					
1635	SML pulling Crews off Sector 5.	Station Log					
1636	TNP lifted off camp for Sector 5 and was instructed to contact SML upon arrival.	Station Log					
1641	CAN bucketing Sector 5.	Station Log					
1634–1645	BDO in SML directs crew to walk out through burned area to an alternate extraction site.	BDO/Crew Boss					
1645	BDO in SML confirms all Crew Members have been evacuated and are enroute to camp.	Station Log					
1700	Fire Boss issued the order for the Line Boss to pull all crews off the fireline as fire behaviour was erratic”.	Fire Boss					
1700		Chisholm Base Wx Stn	25	28	135	SE	36

Contributing Factors

I – Fire Behaviour & Environmental Factors	Comments
Fuels	Fireguard was constructed in spruce and aspen timber types. The dozer guard was tight-lined, convoluted and crooked, with considerable amounts of partially burnt and unburned fuel along the dozer guard.
Weather: Actual	Forecast conditions for the afternoon of May 27 th were for a maximum temperature of 27 °C, a minimum relative humidity of 25% with forecast to increase to 25 km/h (gusting to 50 km/h) from the east-southeast.
Forecast	Actual winds were even stronger than forecast and reached 37 km/h at 16:20 at the Chisholm Base weather station.
FWI	A BUI of 117 indicates that forest floor fuels are readily available for combustion with complete duff consumption at the base of standing trees and snags. This, coupled with strong winds, resulted in a high potential for falling trees and snags.
Topography	Difficult to establish a "Lookout" without an aircraft overhead in flat terrain.
Fire Behaviour: Predicted Observed	Extreme burning conditions were forecasted and realised.
Seasonality	Low foliar moisture content and early spring burning conditions contributed to crown fire potential. Although leaves had flushed in the deciduous overstory, the herbs and grasses in the understory were fully cured and had not greened up yet.
Time of Day	The incident took place at the peak of the burning period.
Smoke and Visibility	Crews had poor visibility along their guard due to smoke.

II - Crew Tactics	Comments
Safety	Fire Crew members discussed safety concerns regularly. British Columbia personnel although familiar with LCES, were unfamiliar with requirements for an Anchor point (LACES), and used the term Anchor Point and Safety Zone synonymously.
Safe Work Directives	In this situation, British Columbia's Safe Work Standards meant that without the assessment and falling of danger trees, severely burnt areas could not be used as a Safety Zone.
Communications/Instructions Briefings	Individual sectors were not issued written work assignments from the Line/Division Boss, and specific strategies and tactics were not issued by sector.
Tactics	Walking past smoke to put out smoke overextended crews along the guard. LACES was breached.
Resources	A dozer for tree removal and additional crews were requested but unavailable. An additional saw requested by the Alberta Type III Crew could not be made available. A request for a helicopter to be assigned to Sector Bosses 4 and 5 was made the morning of the incident but was not made available.
Ongoing Evaluations	The Crew Boss took regular weather observations and was aware of increased fire activity. The Crew's Primary escape route was not flagged or maintained, and a Secondary Escape Route and Safety Zone were not scouted.

III - Command & Control Strategy	Comments
Safety	<p>The message issued by the Fire Boss at the Strategy Team meeting the evening prior stressed the severity of the burning conditions anticipated and that the safety of firefighters was paramount. He stated "Tomorrow's fire behaviour will be very extreme and violent, every firefighter must have two feet in the black and there will not be "green" between any firefighter and the fire. No fire is worth the life of a firefighter and if anyone feels at all uncomfortable with the situation they should pull themselves off. Use your LACES." Sector Bosses in sectors 4, 5 and 6 were not present during the Strategy Team meeting and this message was not issued down the line, although other crews within the Sector and Division did remove themselves from the fireline safely.</p> <p>General safety messages were issued from the line down without full analysis of the situation at hand and without field audits to ensure that crews had implemented what was required on the ground. "Two feet in the black" couldn't be applied universally due to dangerous snags and trees. Safety Zone and Escape Route requirements change depending on the fire behaviour conditions forecast.</p>
Command	<p>While the Division Boss was occupied with activities and air tanker operations on Sector 6, "Lookout" responsibilities for Sectors 4 and 5 were transferred from the Division Boss to the Line Boss, and then from the Line Boss to a helicopter BDO. Line Boss and then BDO contacted Sector Boss to inform him that they would be acting as a Lookout for Sector 5. The Crew Boss and crew members were unaware of this situation. The Lookout departed Sectors 4 and 5 prior to the incident without informing the Sector Boss or arranging for a replacement Lookout.</p>
Span of Control	<p>Crew deployment and resource allocation for Sector 5 was inadequate for securing dozer guard under active burning conditions. The EFAS plan objectives for the day could not be achieved.</p>
Values at Risk	<p>Given the tactical focus for the protection of Chisholm, efforts at the headfire near Chisholm meant that the tactical anchor point for the fire - and a logical, sequential progression of work from that anchor point - was not pursued on this day.</p>
Organisational Development	<p>The entrapment occurred during a building phase of the incident with dynamic and escalating conditions, before a fully functional and organised command structure was in place. The Division Boss arrived the night before the incident.</p>
Policy	<p>The Command Team used Type III (Emergency Firefighters) crews to secure guard under extreme burning conditions. These conditions were well beyond the crew's level of expertise and comfort, and this compromised their safety and that of others. No communication policy or procedures were in place for the evacuation of crews.</p>
Communications/Instructions Briefings	<p>Tactics and strategies were not discussed in detail for specific sectors due to time constraints during the escalating situation.</p> <p>The Fire Weather Advisory that was issued was not included in the Daily Fire Suppression Plan, and neither a Fire Behaviour Advisory nor an Extreme Fire Behaviour Warning was issued.</p> <p>Organisational SOPs and typical working conditions differ somewhat between agencies and these need to be clarified.</p>

IV – Personnel	Comments
Training/Qualifications/Experience	British Columbia crews had little experience in this fuel type and were unaccustomed to fighting fire on flat terrain.
PPE	All crew member wore appropriate PPE. Fire shelters were deployed as a precautionary measure only, in the event they needed to protect themselves from radiant heat.
Human Factors	Crews were reluctant to withdraw despite knowing that LCES/LACES had been compromised.
Team Cohesion	British Columbia Initial Attack and Alberta Type III crews were mixed and assigned to secure line, the tasks of which were beyond their normal work assignments and realm of experience.
Leadership	The Crew Boss was commended by crew members and an equipment operator for his calming influence on others, which contributed significantly to a positive outcome.

V – Equipment	Comments
Availability	Provisions were not made for a temporary replacement Lookout Aircraft when that allocated was being used elsewhere.
Communication Network	The number of radio frequencies for air traffic was inadequate, and an unreasonable workload was allocated to a single radio operator at Chisholm Base. As a result, the Base radio operator was unable to clear traffic during the evacuation.

Recommendations

Fire crew members discussed safety concern regularly, but continued to work despite having knowingly breached LCES/LACES. The crew did not designate a Lookout to ensure that their primary Escape Route was maintained. Contrary to training, the crew's primary Escape Route was not flagged or effectively communicated to all crew members and equipment operators, and a secondary Escape Route was not scouted.

1. Fire management agencies should review their training programs and SOPs associated with the construction and evaluation of Escape routes and Safety Zones, giving due consideration to the fact that the travel time along Escape Routes to a Safety Zones that is adequate in size varies according to anticipated environmental and fire behaviour conditions. Specific recommendations for the establishment thereof should be issued on a Sector by Sector basis, perhaps by way of the Safety Plan or the Fire Behaviour Forecast. Consideration may also be given to the establishment of Safety Zones at appropriate intervals while fireguards are being constructed, if adequate natural Safety Zones do not exist.

British Columbia personnel although familiar with LCES are unfamiliar with LACES, and neither LCES nor LACES are defined in the Glossary of Forest Fire Management Terms (CIFFC, 2000). Current LACES training material for Type III Emergency Firefighters is given in Appendix IV. Alberta's SOPs require that an Anchor point must be established when head fire intensities are anticipated to reach or exceed 10,000 kW/m.

2. Fire management agencies should develop and implement training material that can be used to teach incoming crews what LCES and LACES mean, and specifically what and how SOPs are to be applied to ensure that LCES and LACES are not breached (see for example, Environmental Training Centre, 2001). Crews need to understand what an Anchor point is, and how guard construction, securing line and mop-up activities are to be carried out progressively from this location.

Crew members and equipment operators were aware of the potential for extreme fire behaviour on the day of the incident, but they were unaware of the fact that a Fire Weather Advisory had been issued. Unlike Alberta, British Columbia's SOPs require the issuance of Wind Advisory, a Fire Behaviour Advisory, or an Extreme Fire Behaviour Warning (see Appendix V). The Crew Boss took regular observations of temperature and relative humidity but did not note fire behaviour characteristics, and it was unclear to what purpose he used these observations.

3. All Line staff including Sector Bosses, crew members and equipment operators must be made aware of the fact that a Fire Weather Advisory has been issued and everyone should have a clear understanding of the significance thereof. Management should reinforce their expectation for crews to withdraw safely well before fire behaviour characteristics are beyond the capability of direct attack resources, and crews should know when this can be expected to occur and for how long. Line staff should monitor weather and fire behaviour characteristics, confirm that forecasted weather and fire behaviour are being realized, and take appropriate action. In the absence of a national standard, receiving agencies should introduce incoming personnel to any SOPs associated with the dissemination of weather and fire behaviour forecasts.

The crews were instructed to mop-up a dozer guard that had not yet been secured and presented little opportunity for success given the resources and tactics at hand, the number of pressure points along the guard, and the amount of partially burnt fuel present and its potential for reburn.

4. Command and Line staff should ensure that potential pressure points, significant pockets of unburnt fuel, and partially burnt fuels are identified systematically sector by sector. The responsibility for this will hopefully be clarified when Alberta adopts the Incident Command System (ICS), in which the Operation Section Chief (Line Boss) is responsible to ensure that tactical operations are safe.

During this, and many other entrapment incidents (Beaver, 1998), those engaged in wildfire suppression were reluctant to withdraw from their assignment. The crews involved in the entrapment were assigned duties beyond their capabilities, and they were obviously disturbed by events as they transpired. The Initial Attack Crew Boss was assigned 13 staff, 3 pieces of equipment, and a small section of a large, active fireline in a fuel type he was not familiar with, under weather conditions that would lead to fire behaviour he had never experienced. The individuals involved, however, did not offer they were out of their element and did not assert themselves to take any immediate action to address their concerns.

5. The option to discuss, clarify and redefine the tactics of an assignment should be part of the daily briefing at the sector level. Fire management agencies should review the mechanisms that are in place to support staff who wish to decline or re-negotiate an assignment for valid reasons (e.g. inadequate level of experience), without any adverse consequences associated with the process including economic reprisal. Although Alberta introduced a "Right to Refuse" Policy in 2000 that gives employees the right to refuse to work if it poses an "imminent danger" (Appendix VI), the Emergency Firefighters, equipment operators and out-of-province personnel involved in the incident were aware of this policy. Training programs and safety campaigns could be developed to assist with this process.

Single purpose crews were given and accepted assignments that they were not qualified to carry out, based on their level of training and experience. This situation may have been avoided if these levels of experience and training had been conveyed and reviewed properly.

6. Alberta crew assignments were not reviewed to ensure they were commensurate with their levels of training and experience. The responsibility for this function should be clarified, and should probably rest with the Safety Officer.
7. Firefighter training and experience records must not only be presented by the donating Agency's Representative (ICS), but must also be expected by the receiving agency's Liaison Officer (ICS). The donating Agency's Representative is in the best position to review their crew assignments to ensure they are commensurate with training and experience levels, and this information should be presented and evaluated at every change in assignment or significant change in expected fire behaviour. Moreover, the Liaison Officer and Agency Representatives need to ensure that all imported personnel understand and can implement, respond and comply with any required SOPs (see Recommendation 15). Fire management agencies should review the roles and job descriptions of Liaison Officer and Agency Representative and amend these as required.
8. Training and experience records should be available and presented in a detailed, standardized format at the time of initial assignment or changes therein. Fire management agencies should consider the development of a system to facilitate this.

The Command Team used Type III (Emergency Firefighters) crews to secure guard under extreme burning conditions. These conditions were well beyond the crew's level of experience and comfort, and compromised their safety and that of others.

9. Alberta should review certification requirements and the job description for Type I through Type III crews.
10. Alberta should review existing policy or develop new policy regarding the use of trainees on crews that may have to deal with active fire behaviour on the line.

In this case, British Columbia Initial Attack crews were used for sustained action with inexperienced Type III firefighters and this resulted in inadequate decision making.

11. Fire management agencies must ensure that leadership requirements are met and that team cohesion is adequate when crew types or agencies are mixed.
12. British Columbia's policy regarding the use of single purpose crews needs to be reviewed. The use of Initial Attack crews on project fires needs to be clarified. Initial Attack Crews should only be reconfigured as Sustained Action Crews

when leadership requirements and experience levels are adequate. Similarly, policy allows for British Columbia's Sustained Action Crews to be reconfigured into Initial Attack crews and this policy also needs to be reviewed.

All persons involved in this entrapment used their personal protective equipment as required. British Columbia has an Operational Safe Work Standard that details the requirements for their personnel to be issued fire shelters (Appendix V). The shelter deployment on LWF-063-2001 was a precautionary measure taken to offer firefighters some protection from radiant heat and blowing embers. The fire shelters showed no sign of damage, defects or exposure to intense heat, although this is not to imply that their deployment was unwarranted.

13. Fire management agencies should review their entrapment avoidance training programs.

The two fire management agencies involved have a number of significantly different policies, procedures and regulations (Occupational Health and Safety and Workers Compensation Board) that govern safe work practices. Notable differences, for example, include: practices surrounding danger trees; LACES (Alberta) versus LCES (British Columbia); the issuance of Fire Weather Advisories and Fire Behaviour Warnings; and, the mandatory use of different PPE such as fire shelters, steel toe boots, and side impact hard hats.

14. The different policies, procedures and regulations that are associated with the safe work practices of various fire management agencies need to be discussed prior to the deployment of imported resources, and such discussion should take place at the Command level. Discussions at the CIFFC level need to explore the possibility of moving these differences towards a set of national standards for wildland firefighters.

The strategies and tactics chosen by the Crew Boss and Sector Boss, that were approved by the Division and Line Boss, were not appropriate given the fuel type and expected fire behaviour.

15. Fire management agencies should review their training programs and where required develop reference material to illustrate appropriate firefighting strategies and tactics under different environmental conditions. Moreover, a national approach to address these issues for the 16 fuel types in the Canadian Forest Fire Danger Rating System (Forestry Canada Fire Danger Group, 1992) would be beneficial.

The message issued by the Fire Boss at the Strategy Team meeting the evening prior to the entrapment stressed the severity of the burning conditions anticipated and that the safety of firefighters was paramount. He stated that "Tomorrow's fire behaviour will be very extreme and violent, every firefighter must have two feet in the black and there will not be "green" between any firefighter and the fire. No fire is worth the life of a firefighter and if anyone feels at all uncomfortable with the situation they should pull themselves off. Use your LACES." This safety message was not received at the crew level.

General safety messages were issued from the line down without full analysis of the situation at hand and without field audits to ensure that crews had implemented what was required on the ground. "Two feet in the black" couldn't be applied universally due to dangerous snags and trees, and Safety Zone and Escape Route requirements change depending on the fire behaviour conditions forecast.

16. Command and Line staff must concern themselves with environmental conditions and potential hazards on the line by way of ground reconnaissance missions. It is imperative that Command and Line staff have a responsibility to monitor compliance with the application of LCES/LACES on the ground daily, especially when out-of-province or inexperienced crews are being used, to ensure that appropriate safe work practices are being implemented. The responsibility for this will hopefully be clarified when Alberta adopts the Incident Command System (ICS), in which the Safety Officer is responsible for the identification of fireline hazards.
17. Fire management agencies should review and refine procedures for the issuance of safety messages and establish procedures to confirm receipt of the same at the crew level. Agencies should standardize the audit process, including

who is responsible for auditing the effectiveness of briefings and communications, which should probably rest with the Safety Officer.

Given the tactical focus for the protection of Chisholm, efforts at the headfire near Chisholm meant that the tactical anchor point for the fire and a logical, sequential progression of work from that anchor point was not pursued on this day. Emphasis on interface values and the threat to the Chisholm community compromised suppression activities elsewhere on Division 2.

While the Division Boss was occupied with activities and air tanker operations on Sector 6, Lookout responsibilities for Sectors 4 and 5 were transferred from the Division Boss to the Line Boss, and then from the Line Boss to a helicopter BDO. The Line Boss and then the BDO contacted the Sector Boss to inform him that they would be acting as a Lookout for Sector 5.

The Crew Boss and crewmembers were unaware of the fact that the lookout and in fact command responsibilities for Sectors 4 and 5 had been temporarily transferred to a helicopter BDO. During the incident, there was some confusion as to who to contact for aerial intelligence information and command direction.

18. An alternative approach to handing off lookout and command responsibilities to the helicopter BDO would have been to provide the Sector Bosses with a helicopter during the time that Division Boss was involved with action in Sector 6.
19. When communities are at risk, consideration should be given to treat each community involved as a separate entity within the management organisation. For example, resources allocated to the Chisholm community would have been managed as another Division.

Provisions were not made for a temporary replacement Lookout Aircraft when the allocated aircraft was being used elsewhere.

20. Procedures should be established for situations where aircraft are not able to continue to act as a lookout.
21. The availability and reliability of aircraft during suppression operations is rarely tenable and fire management agencies must develop alternatives to the use of lookout aircraft.

The number of radio frequencies for air traffic was inadequate, and an unreasonable workload was allocated to an inexperienced radio operator at Chisholm Base. As a result, the Base radio operator was unable to clear traffic during the evacuation. Fireline personnel had difficulty establishing ground-to-ground radio communications between crews and sectors, and radio traffic at the time of the entrapment added to the confusion of the situation.

22. Fire management agencies should consider developing procedures to resource order radio operators based on the number of aircraft assigned to fire. They should also review the practice of assigning inexperienced radio operators to the initial stages of a level I fire operation.
23. Fire management agencies should develop formal policy and procedures for the emergency evacuation of fireline staff, perhaps similar to those established for medical evacuation with a dedicated radio channel and pre-designated aircraft.
24. The performance of radio equipment in Alberta should be reviewed but, in the long run, fire management agencies should consider the development of alternative forms of two way messaging and communications.

Radio traffic is logged primarily for the safety of aircraft, and fire line staff were largely unaware of this fact.

25. Alberta should consider establishing daily ground check-in/-out and event tracking procedures for fireline personnel including equipment operators.

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Appendices

Appendix I – Escaped Fire Analysis Strategy



LWF-063-01 May 24, 2001



Submit when fire is NOT anticipated to be **BH** by 1000 hrs the following day.

RECORD OF OBSERVATIONS AND CURRENT FIRE BEHAVIOR

1. Fire Number	LWF-063	2. Date	24-may-01	3. Time	1530 hrs.
4. Size (ha.)	3600 ha. +	5. Fire Origin (ATS Location)	1-26-67-2-W5		
6. EFAS # for this fire	# 1				
7. Observed Fire Perimeter Behavior	30	% Crowning	10	% Candling	30
	10	% Smouldering	20	% Obscured by Smoke	
Spotting Distance	200 M	(meters)	GPS of Spots	No GPS taken, as main fire caught up to spots during assessment period.	
10	% of perimeter contained (natural barriers, streams, fuel types)		Describe	Athabasca River acting as natural fire break to north and west sides. 40 ha. Spotfire on W side of river.	

8. Fire Behavior, Fuels, Topography

(counter-clockwise orbit of fire starting at rear)

	Rear	Right Flank	Head	Left Flank
Cardinal Direction	N	W	S	E
GPS Location				
Fuel Types Burning	M1, C2, O1A (mixed)	C2, M1, mix of Sb and open meadows	C2, M1, mix of pine & spruce	C2, open muskeg Sb, mix of pine & spruce types
Fuel Ahead of Fire	same - mixed fuels	same - mixed fuel types	same - mixed fuels	same - mixed fuel types
Fuel Continuity Characteristics	variable, but good types next to Athabasca River	variable, some intermittent C2	variable, continuous in spots, roads there	variable; some continuous spruce/pine types to farms
ROS - Present (m/min)	2 - 5	5 - 10	15 - 30 +	5 - 20
Topography	flat; slopes down to river	flat, slopes down to Athabasca River	flat; opens to farmland 2 miles to the south	flat out to farmland 2 miles to east

9. Present WX Wind Dir **NW** Speed **20** Temp **18C** RH **35** Precip **nil** CBs present **prev**

VALUES AT RISK

EFAS1
FP210 p2

10. Values at and in vicinity of the fire

	Rear	Right Flank	Head	Left Flank
	Indicate distance in kilometers from current fire perimeter			
Life			farms to south	farms to east
Communities within the FPA	town of Chisholm 3 miles to N		Flatbush is to the south	
Watershed / Soils				
Natural Resources	merch timber & cc	merch timber & scarif. cutblock		some merch timber
Infrastructure			CNRL plant	

FORECASTED WEATHER AND FIRE BEHAVIOR FOR THE NEXT THREE DAYS

(preferably completed by Fire Behavior Officer)

11. Three Day PM Weather Forecast (day fire escapes is the first burning period)

	2nd Burning Period	3rd Burning Period	4th Burning Period
Wind Direction	NW	S / SE	SE
Wind Speed	20 G 35	15 G 35	20 - 25
Maximum Temperature	22		
Minimum Relative Humidity	30		
Precipitation Amount	light if any w/ TRW-	RW / TRW - light	light if any w/ TRW-
Extreme Fire Behavior Indicators	gusty winds & wind shifts & high indices in area	gusty erratic winds; extreme BUI, ISI, DC	strong sustained winds, extreme ISIs
Comments (significant weather events):			

12. Estimated Fire Size Projections to 1000 hrs.

	1st burning period	2nd burning period	3rd burning period	4th burning period
Estimated Fire Size	4000	6900	12,000	13,500
Estimated Perimeter				

ATTACH CALCULATIONS TO EFAS

PLANNED STRATEGIES AND TACTICS

13. General Strategy

☐ Fire located in appropriate action zone. ☐ No direct action at this time.

☒ Full control action. ☒ Specific action to protect high values.

☒ Limited flanking action. ☒ Steering or holding action to utilize fuel breaks.

Remarks: Anticipate NW winds 24-may-01 to probably double fire size. Wind shift to S/SE may be favorable by burning back on itself towards the Athabasca River to the north and west sides of the fire. Priorities are settlement to the east and south. Town of Chisholm 3 miles to north #1 if fire burns to the north. Timber & cutblocks to west & across river.

PLANNED STRATEGY AND TACTICS

EFAS1
FP210 p3

14. Tactics

	Rear	Right Flank	Head	Left Flank	Briefly Explain Tactics
Full Control Action				X	Full suppression possible to support air tanker guard burned out by aerial ignition team afternoon of 24may01 on east perimeter.
Specific Action To Protect High Values		X	X		Secure houses with dozer guard supported by water trucks. Property to E & S sides. Town of Chisholm is 3 miles N of N perimeter. Fire presently burning to the south.
Limited Flanking Action		X			Athabasca River to the west may act as natural break. Support resources may be safer on this flank for the immediate future.
Steering or Holding Action				X	East flank action with aerial ignition. Support resources may action if fire behavior lessens.
No Direct Action At This Time					Fire behavior determines where no direct action will occur due to ineffectiveness or safety concerns.

15. Air tankers required for support action?

Yes ☒

Type

Ground based AT working best due to long skimmer turnaround times.

Date and Time

All day 24may01 and as often as available 25may at least.

No ☐

ATTACH MAP OR DIGITAL PHOTO

16. RESOURCES

	Overhead	WFU Units	Light R/W	Int R/W	Med R/W	Heavy Equipment	Pumps	Hose	Camp	Other
1. Currently deployed on fire	8	2	2	1	2	9	3	9000	1	
2. Ordered or enroute	8	20	2	1	1	21	7	9000		
3. Required in addition to 1+2	8	5	1	1	1	3	5	30000	3	
4. TOTAL RESOURCES (1+2+3)	24	27	5	3	4	33	15	48000	4	0

17. Total resources (#4 above) will place fire BH by the following date:

22. Comments of Fire Boss completing EFAS1

Fire behavior at 1200 hrs. much like 1700 hr. behavior on relatively normal conditions. Some pump chances with lakes and creeks in area. Priorities are properties & community of Chisholm for the present. Fireguarding of properties in progress at time of assessment (24may01 from 1000 - 1200 hrs.). Extreme BUIs and DC will give suppression & mop-up problems. Fire was burning through parts of the long term retardant.

Signature of Fire Boss completing EFAS1

Fire Boss 2

23. FPO comments (suppression costs, values at risk, strategy)

FPO signature

24. Fire Manager comments

Strategy today laying retardent line and foam line and burning back from that seems to be working with some success. Concur with strategy of then working to secure dozer line around perimeter. The portion of fire on east flank is working well with strategy. The spot fire west of river is contained with retardent and dozers are now on site building line. The values at risk are very critical with farms, homes community of Chisholm at risk. Vanderwell FMA to the west is a concern plus the private lands that the company has planted trees. Fire Management Team will update this EFAS tonite. Agree with assessment.

Fire Manager signature

25. PFFC comments and/or modification

PFFC signature

26. Director FPD comments (if estimated costs exceed \$1,000,000).

Director PFD signature

27. Fire Boss comments at time of handoff to Overhead Team

Fire Boss signature

Note that EFAS costs are not relevant to this entrapment investigation and have therefore been excluded.

Appendix II – Afternoon Spot Forecast



LWF-063-01 May 24, 2001

To: Slave/LLB fire ops
Issued: May 26, 2001

Afternoon Spot Forecast

For tonight and Saturday
For: Chisholm Fire 63

Synopsis:

Very light shower activity that affected the zone near noon has moved to the northeast and clearing is occurring this aftn. The higher RH values at noon have given some slight FFMC relief. Dewpoints near 6 deg are expected by late aftn and will allow minimum RH values late in the burning period of 35%. Air mass remains unstable and a risk of TRW RW will persist into the evening. Winds increasing this aftn and evening as a strong pressure gradient begins to develop with the formation of a new low pressure system over north-central BC and the surface high pressure area remains over northern Alta. Moderate E-SE winds of 15-20 km/h likely persisting overnight. Good ventilation overnight. Strong SE winds, lower RH values and high temperatures Sunday will generate very easy burning conditions and possible erratic fire behaviour given the extreme BUI values of 118 expected Sunday. FIRE WEATHER ADVISORY WILL BE IN EFFECT ON SUNDAY.

Low Temp tonight: 10°C
Max RH tonight: 70%
Wind tonight: E-SE 15-20 km/h persisting overnight

Max Temp tomorrow: 27°C
Low RH tomorrow: 25%
Wind tomorrow: E-SE 25-50 km/h possible gusts to 60 km/h
Pcpn chance (%), amount, and type during next 24 hours: 30L TRW/RW
(Note L means 0.5-5mm, M means 5-20mm, and H means over 20mm in next 24 hours)

LFS WX

Appendix III – Daily Fire Suppression Plan



LWF-063-01 May 24, 2001

DAILY FIRE SUPPRESSION PLAN

FIRE NUMBER: LWF-063-01 **DATE:** 01/05/27

Fire Size: 14 801 ha Temperature: 27⁰C Relative Humidity: 25 %

State of Control: O/C 65% containment (river and dozer guard) Winds: E-SE 20 G 60 Precipitation: 0 %

Outlook: Cold Front Passage Monday afternoon. Winds shifting to W-NW Monday afternoon.

Priorities for the day:

1. Secure all values at risk in hamlet of Chisholm.
2. Secure and hold line established around excursion on west side of Athabasca river.
3. Secure SW corner and re-inforce dozer guard in the Pembina river corner. Establish manpower presence in this corner.
4. Reinforce dozer guard built on east side, widen, straighten and burnout fuels between guard and fire edge.

Safety awareness is critical in light of extreme fire behaviour conditions.

Lookouts

Anchor Points

Communications

Escape Routes

Safety Zones

"LACES" adherence is Mandatory with current fire behaviour indices. Crewbosses WILL verify "LACES" compliance at all times with crews.

Objectives by Priority:

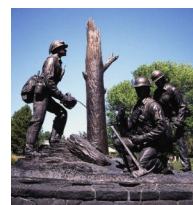
Secure hamlet of Chisholm from further fire threat.
Contain west side of Athabasca river excursion inside existing guard.
Establish control of south west corner near pembina river.
Hold line established along east side of fire.
Minimize timber losses in Vanderwell FMA

Work Instructions:

COORDINATE ALL EFFORTS IN VIEW OF EXTREME FIRE HAZARD LEVELS AND ANTICIPATED WEATHER CONDITIONS

- ALL UNITS ON LINE STARTING 05:30
- CONCENTRATE ON STRENGTHENING ESTABLISHED LINE ON ALL SECTORS.
- BURNOUT LINE TO FIRES EDGE WITH HAND OR AERIAL IGNITION AS MUCH AS POSSIBLE.
- BUCKETING, AT SUPPORT AND AI SUPPORT AVAILABLE ON REQUEST.

Storm King Mountain Monument



PLANS CHIEF.

Time: 06:00 HOURS

DATE: 01/05/27

FIRE NUMBER: WF-063-01

CHISHOM BASE LOCATION:
SE – 31 – 066 – 01 – W5M
54° 45.183 N 114° 07.709' W

FREQUENCY ASSIGNMENTS	CH	Frequency
AIR ADVISORY		VHF-AM 128.950
Primary Aircraft: Air-to-Ground	Ch. 5	VHF 153.890
Dozer Crews	Ch. 18	VHF 152.390
Service and Supply // Camp	Ch. 19	VHF 152.930
Forest Area Contact (if rotor-wing is working or commuting outside the fire zone)	Ch. 17 Simplex	UHF 415.5125
Division 1		
AIR ADVISORY: Pilot to pilot, not monitored at base camp		VHF-AM 128.950
Sector 1	Ch. 1	VHF 150.470
Sector 2	Ch. 2	VHF 151.910
Sector 3	Ch. 1	VHF 150.470
Division Air-to-Ground / Air Attack (if required)	Ch. 7	VHF 167.070
Division 2		
AIR ADVISORY: Pilot to pilot, not monitored at base camp		VHF-AM 128.950
Sector 4	Ch. 3	VHF 153.110
Sector 5	Ch. 4	VHF 153.470
Sector 6	Ch. 3	VHF 153.110
Division Air-to-Ground / Air Attack (if required)	Ch. 8	VHF 167.610

NOTES:

- 30 minute aircraft position checks must be called in on the primary aircraft channel.
- Bird Dog aircraft will call in to base camp on the primary aircraft channel, then monitor that same channel.
- Primary aircraft channels can be used by ground personnel for emergencies and to initiate communication with pilot, but must not be used for lengthy fire communications activity. Move to assigned Sector/Dozer channels for firefighting.

Fire Safety Briefing Location: Chisholm Fire (LWF-063-01) for Time 1700 peak burn Date: 01/05/27

Weather Forecast

Max Temp	Low RH	Crossover	Wind	Precipitation	Lightning	Trend
27° C	25%	Yes	E-SE 20G60	No	M	LC

Comments: Strong gusting SE winds up to 60 km/hr. Expect extreme spread rates and extreme fire behaviour. Fire blow-up, spotting and falling trees will be constant hazards.

Fire Behaviour (Note: These predictions are based on the weather forecast above and are specific to the location and time mentioned above. Any changes in the weather and/or time of day may cause changes in fire behaviour. Fire Behaviour is considered accurate + or - 20% based on the indicated values.)

Location	FFMC	DMC	DC	ISI	BUI	FWI
Chisholm	90	95	380	15	117	43

FBP Fuel Type	Description	HFI Rank	Rate of Spread (m/min)	Type of Fire(Creeping, Running, Torching, Intermittent Crown, Active Crown)	Approximate Flame Height (m)
C2	Boreal Spruce	6	25	Crown	2x tree ht.
C3	Mature Pine	6	20	CROWN	Up to 1 x tree ht.
M2 -25% conifer	Mixed Wood - 25% coniferous	6	19	Surface/candling	Up to tree height
O1b	Standing grass, fully cured	6	52	Vigorous Surface	3 metres

HFI 1-2	HFI 3	HFI 4-5	HFI 6
Flame lengths <2m Minimal spotting Direct Attack OK	Flame lengths 2 – 2.5m Short range spotting Direct attack	Flame lengths 2.5-5m Possible long range spotting Parallel or indirect attack Should ANCHOR	Flame lengths >5m Long range spotting All suppression efforts likely to fail MUST ANCHOR

Other Safety Concerns:

Falling Snags (winds over 20 km/h or DC over 300 or observed)	Topography – slopes greater than 10%, saddles, chutes, canyons
Heavy Equipment – give briefing daily	R/W Transport Date crew had last R/W Briefing _____
Air-tanker/Heli-tanker support – Date of last briefing _____	Dehydration
Bears	

LACES (If work assignments change, LACES must be re-evaluated)

LOOKOUT: L _____
 Who is it? _____
 ANCHOR POINT: A _____
 HFI 4+ You must anchor _____
 COMMUNICATIONS: C _____
 Who do you have contact with? How? _____
 ESCAPE ROUTE(S): E _____
 How do you get to your safety zone? _____
 SAFETY ZONE(S): S _____
 Where is it? _____

Accidents/Injuries/Near Misses :

Were there any incidents within the last 24 hrs? Y N

Details _____ NAME OF 1st AIDER _____

Reported to _____ A first aid record must be filled out for all injuries. Failure to do so may cause a WCB claim to be rejected

Reported to fireline/safety officer? (yes/no). ____ Accident report completed? (yes/no) ____ Entered in FIRES (YES/NO). ____

Crew Concerns:

Sector Boss/Leader _____

AIRCRAFT ASSIGNMENTS FOR DAILY FIRE SUPPRESSION PLAN

FIRE NUMBER: **LWF063 - Chisholm Fire**

DATE: **27-May-01**

FIRE AIR ADVISORY VHF - AM 128.95	Base Camp	BASE CAMP SECURITY MEDICS	DIVISION 1			DIVISION 2		
			SECTOR 1	SECTOR 2	SECTOR 3	SECTOR 4	SECTOR 5	SECTOR 6
Air to Air (Airspace Control)	F10 VHF 166.170		F7 VHF 167.070			F8 VHF 167.610		
Air to Ground Primary F5 VHF 153.890	F10 VHF 166.700	F5 VHF 153.890	F1 VHF 150.470	F2 VHF 151.910	F1 VHF 150.470	F3 VHF 153.110	F4 VHF 153.470	F3 VHF 153.110
Ground to Ground	F5 VHF 153.890	F19 VHF 152.930	F1 VHF 150.470	F2 VHF 151.910	F1 VHF 150.470	F3 VHF 153.110	F4 VHF 153.47	F3 VHF 153.11
CATS/NODWELLS			F18 VHF 152.390	F18 VHF 152.390	F18 VHF 152.390	F18 VHF 152.390	F18 VHF 152.390	F18 VHF 152.39

LIGHTS

TIME	A/C REG	A/C TYPE	PILOT Company	ASSIGNED TO	ASSIGN:
8:30	GDJW	Bell 206B	Delta		Dozer Support
5:30	FYHB	Bell 206B	Yellowhead	Line Boss	Suppression
7:00	GPGF	Bell 206 B	Great Slave	Div. Boss	Suppression
9:30	FBKH	Bell 206B	Airborne Energy		Fire Recon. Mapping
8:00	GJJA	Bell 206B	Highland		BirdDog

EASTTRACK ODD ADD 500
WEST TRACK EVEN ADD 500

INTERMEDIATES

7:30	FOZT	ASTAR BA	Heli-Excel		Division 1
5:30	GTVH	ASTAR BA	Canadian		Dozer Support MEDIVAC
7:00	GWHO	Bell 206 L-R	Wildcat		Division 2
9:30	GLHH	Bell 206 L	Highland		Torch

MEDIUMS

5:30	GTNP	Bell 204	Delta	Division 2	Crew Moves
7:30	GVEL	Bell 204	Great Slave	Division 2	Bucket Support
5:30	FCAN	Bell 212	Wildcat	Division 1	Crew Moves
5:30	GFQN	Bell 212	Campbell	Division 1	Crew Moves
7:30	GAHO	Bell 212	Alpine	Division 2	BucketSupport

HEAVY

8:00	FPZR	Sikorsky S61	Canadian	Division 1	Bucket Support
8:00	GURI	KamovKA32	Van. Isl. Helicopters	Division 1	Bucket Support

NOTE: (A) This plan may change at anytime due to priorities.

(B) Please give total flying time and down time for night to Base Camp Radio Operator.

(C) Flight logs must be completed daily and signed by the AOB/AMO.

Additional Comments:

A REMINDER TO PLEASE REMEMBER TO DO YOUR 30 MINUTE CHECK-INS, AS WELL PLEASE CALL IN ANY CHANGES OF LOCATION.

LEGAL UP & DOWN TIMES: MAY 27TH 04:48 & 22:32

ALTIMETER SETTING AS PER CHISHOLM RADIO ROOM

ALL MEDIUM R/W ARE CONSIDERED 2ND MEDIVAC R/W

FUEL BOWSER STAND TO 06:30

FIRE BEHAVIOUR FORECAST #2

Name of Fire: Chisholm LWF-63

Prediction for: 1700 May 27, 2001

Fire Management District: Lac La Biche

Shift Date: Sunday, May 27, 2001

Forecast Issued: 1900 May 26, 2001

Signed: Fire Behaviour Officer

Weather Summary:

RH recovery into the 70's tonight with winds persisting E-SE 15-20 km/h and low temp of 10 degrees.
Sunday: Max temp 25 %, Low RH 25 %, Winds E-SE 25g50 km/h. Convective cloud development likely.
There is a cold frontal passage forecasted to occur over the fire Monday afternoon.

Fire Behaviour General:

C2: HFI 33,000kW/m/min, ROS 25 m/min, CFB 100%, Continuous crown

M2: HFI 21,000 kW/m/min, ROS 19 m/min, CFB 98%, High Intensity surface fire

O1b: HFI 4,800 kW/m/min, ROS 54 m/min, High intensity surface fire

Fuels are continuing to dry. All fuel types have reached a critical stage of dryness. This increase in wind speed to 25 km/h will result in very intense burning conditions in all fuel types.

Specific:

Crown fire in all coniferous fuel types. Deciduous stands will support very vigorous surface fire with torching of embedded conifer. Long range spotting due to wind speeds likely if significant excursions occur. Erratic fire behaviour must be expected due to the extreme BUI values of 118 today.

Air Operations:

Smoke conditions should not be a problem in the AM as winds will be persisting overnight will limit the likely hood of an inversion. Gusty surface winds and atmospheric instability will contribute to turbulent conditions.

Safety:

LACES adherence is mandatory in all suppression operations. High spread rates in all fuel types are the primary safety factor today. With the increase in wind speeds the probability of falling of root burned trees also increases. Effective AM meetings with all fireline staff highlighting these / other safety issues must be conducted.

LWF-063-2001

Boundary GPS'ed May 26, 12:30

14,801 ha

Lakes and Rivers
Camp Location

Helipad

Fire Bdy. May 26, 12:30hrs

Cat Guard

Township

Fire Grid

Quartersection

Transportation

Gravel Road

Gravel Road - 1 Lane Each Way

Gravel Road - Primary Highway

Gravel Road - Secondary Highway

Paved Road

Paved Road - Primary Highway

Paved Road - Secondary Highway

Road - Unimproved

Trail

Rail Line - Single Track

Rail Line - Spur

Seismic Line

Utilities

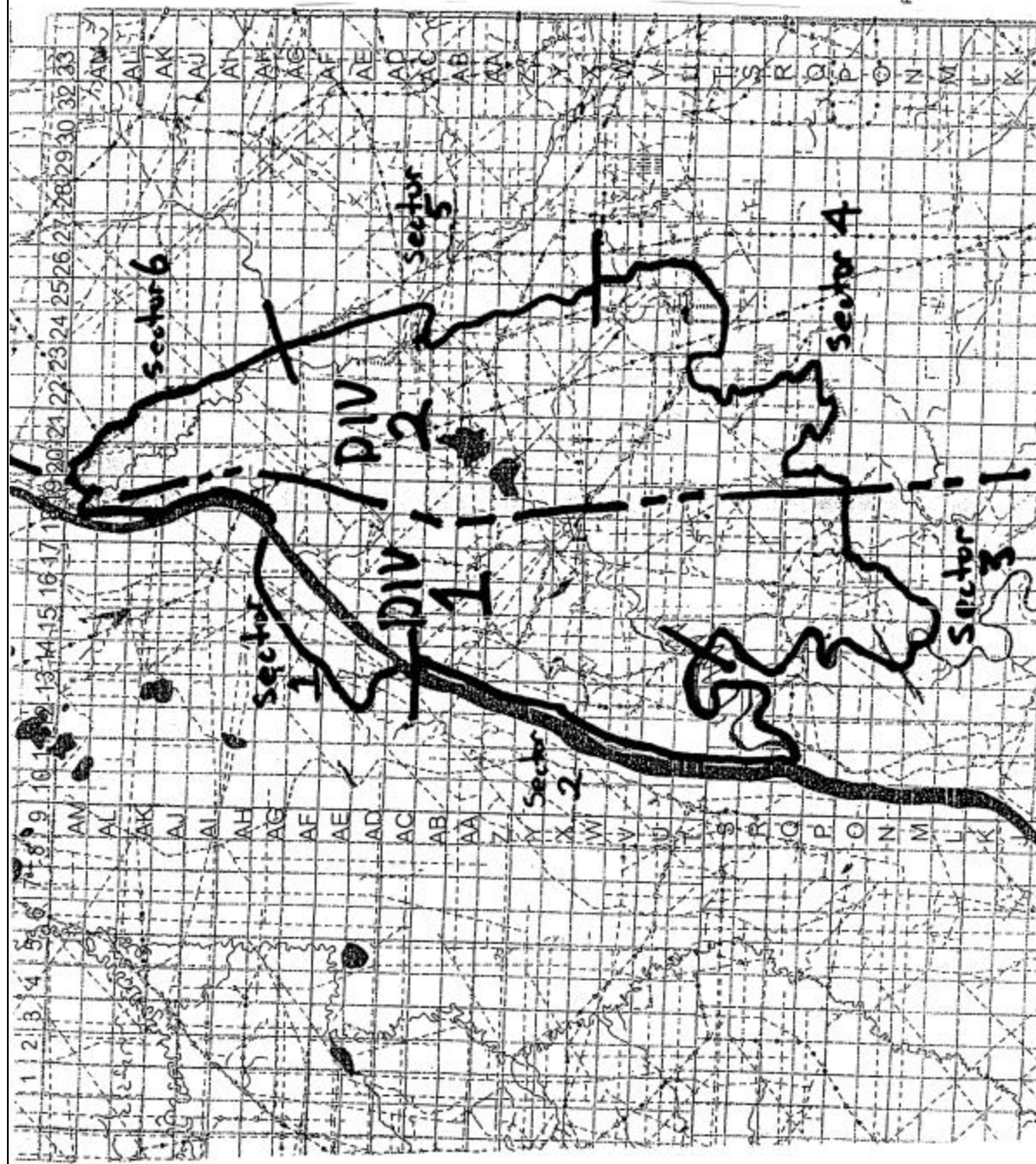
Line - Transmission

Pipeline

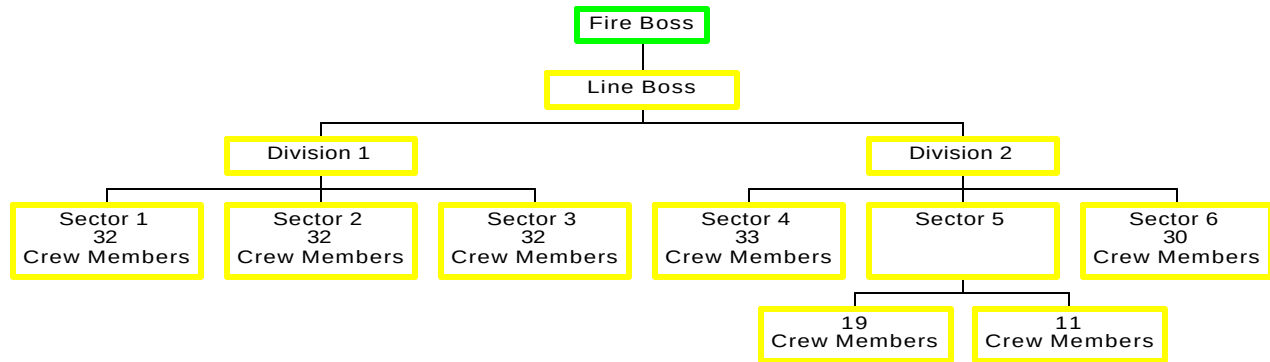
Lakes and Rivers

1:100000

Produced by Timberline Forest Inventory Consultants Ltd.



Organizational Chart
May 27, 2001
LWF - 063



Note: In order to maintain the anonymity of those involved, the organisational chart has been simplified to illustrate line operations section of command. The complete communication plan has been excluded from the Daily Fire Suppression Plan.

Appendix IV - LACES Training Material for Type III Emergency Firefighters
(Environmental Training Centre, 2001)



LWF-063-01 May 24, 2001

Safe Work Procedures

“L A C E S”

Lookouts

Lookouts must be trained wildland firefighters capable of assessing wildland fire hazards.

The number of lookouts used will be determined by the Crew Leader.

When fireline hazards endanger the crew, lookouts warn wildland firefighters and notify the Crew Leader.

Wildland firefighters should remove themselves from any immediate danger and await further instructions from their Crew Leader.

Anchor Points

Anchor points are defined as advantageous locations, usually a barrier to fire spread, from which to start or finish construction of a control line”.

Anchor points selected or used must meet the criteria to effectively accomplish the task.

Guideline:

When fire behaviour potential indicates head fire intensity (HFI) greater than 4000 kw/m (BUI > 60 and ISI > 5), wildfire resource *should* work from an anchor point.

When HFI is greater than 10,000 kw/m (BUI > 80 and ISI > 8), wildfire resources *must* work from an anchor point.

Communications

Crew Leaders are trained to give clear instructions and ensure that they are understood.

Wildland firefighters must understand all instructions or ask for clarification when uncertain.

Every wildland firefighter must be in communication with the crew - working alone or out of earshot of other crew members is not allowed.

Every wildland firefighter is responsible for alerting other wildland firefighters to any fireline hazard.

Communications must be prompt and clear, whether by radio or verbal.

Escape Routes and Safety Zones

Escape routes are retreat paths that provide rapid access to safety zones.

Safety zones are locations where wildland firefighters can shelter from threatening fireline.

The most common escape route, or part of one is the fireline.

Escape routes lead away from the fire – downhill or opposite the fire's direction of spread.

There should always be more than one escape route that leads to an effective safety zone. A single escape route may be cut off. All wildland firefighters are responsible for knowing the locations of escape routes and safety zones.

Safety Zones

Water sources (rivers/creeks/ponds).

Marshy or boggy sites.

Large, rocky areas or cliff bands.

Large clearings or areas of sparse fuel, particularly deciduous.

The burned area.

Down slope from the fire.

Note: Avoid using caves - fire outside the cave will pull the cool air from the cave and replace it with smoke and hot gases.

Appendix V – BCFS Safe Work Standards



LWF-063-01 May 24, 2001

WILDFIRE DANGEROUS TREES

Applies to	PERSONNEL EMPLOYED BY THE FOREST SERVICE AND INVOLVED IN GROUND FIRE SUPPRESSION OPERATIONS.
Purpose	<p>To provide a safe work environment and to meet Workers' Compensation Occupational Health & Safety Regulations.</p> <p>The Forest Service will have Safe Work Standards that constitute safe methods, conditions and requirements for workers involved in fire line suppression operations.</p>
Critical Safety Statements	Any suspected dangerous tree must be removed unless a tree assessor determines that the tree will not be dangerous to workers during the planned activity.
Exceptions	If conditions call for deviation from these standards, an amending written practise will be developed to address the specific situation and ensure the safety of personnel. The appropriate Fire Centre Manager or the Director must approve this practise.
Contact	Mel Dunleavy: mel.dunleavy@gems3.gov.bc.ca or (250) 992-2144
DEFINITION(s)	
Dangerous Tree	Any tree that is hazardous to workers because of location or lean, physical damage, overhead hazards, deterioration of limbs, stem or root system, or a combination of these.
PROCEDURES	
Hazards	During the initial site survey and fire attack planning process, hazards (including potentially dangerous trees) will be disclosed to workers. Appropriate action will be taken to avoid or mitigate hazards.
Assessment	<p>A qualified dangerous tree assessor will rate the tree as:</p> <p>Safe The tree can be left standing (e.g., less than 50% stem damage to coniferous tree or less than 50% severed roots cut by heavy equipment, fire, decay or any combination.)</p> <p>Dangerous The tree must be removed or a No Work Zone must be established around it.</p> <p>Assessment for dangerous trees is required for the active work area, the perimeter of the work area (within 1 ½ tree lengths or greater, depending on site factors such as slope), and other locations including but not limited to rest areas, staging areas, access and egress routes.</p>
Communication	<p>ONCE AN ASSESSMENT IS COMPLETE, THE FOLLOWING DETAILS MUST BE COMMUNICATED TO THE APPROPRIATE PERSONNEL WORKING IN THE AREA:</p> <ol style="list-style-type: none"> 1. The areas that have been assessed for dangerous trees; 2. The marking method used for trees assessed as “dangerous” or “safe”; 3. The location and marking method used for No Work Zones; 4. THE TYPE OF WORK ACTIVITY THE AREA HAS BEEN ASSESSED FOR.

Re-assessment	<p>Re-assessment of previously assessed areas should occur if:</p> <ol style="list-style-type: none"> 1. Buildup Index values increase significantly in areas of active burning, or 2. More than three days have passed since the last assessment; 3. The activity in the area creates more disturbance than what the area was originally assessed for.
Falling Danger Trees	<p>No person will fall dangerous trees unless they have formal training in falling and have demonstrated competence in falling dangerous trees. No person will blast dangerous trees unless they have formal blasting training. Any machinery used to fall dangerous trees must be equipped with a Falling Objects Protection System (FOPS.)</p> <p>Machine-constructed fire guards do not normally require pre-falling of Dangerous Trees because of short exposure time and Roll Over Protection Systems on heavy equipment.</p>
FAQ's	
Q1. A1.	<p>Do all areas of a fire, where there will be workers, need to be assessed?</p> <p>No, but to comply with WCB Regs. either all suspect trees are felled or a dangerous tree assessor assesses the area.</p>
Q2. A2.	<p>Requiring approval of exceptions by a Fire Centre Manager or Director ties the Incident Commander's hands.</p> <p>It needn't, a documented phone call to the Fire Centre Manager could serve as the approval. The Fire Center Manager could follow-up in writing.</p>
<p>Original signed by May 30, 2001 Dave Hames, Director</p>	
Protection Branch	
<p>Director's Approving Signature Approval Date</p>	

FIRE CREW DEPLOYMENT

Applies to	Personnel employed by the Forest Service and involved in ground fire suppression operations.
Purpose	To provide a safe work environment and to meet Workers' Compensation Board Occupational Health & Safety Regulations. The Forest Service will have Safe Work Standards that constitute safe methods, conditions and requirements for workers involved in fire line suppression operations.
Critical Safety Statement	Regular and auxiliary Protection staff will be trained in and practise avoidance of circumstances that may require a fire shelter deployment.
Exceptions	If conditions call for deviation from these standards, an amending written practise will be developed to address the specific situation and ensure the safety of personnel. The appropriate Fire Centre Manager or the Director must approve this practise.
Contact	Dave Tweedhope: Dave.tweedhope@gems8.gov.bc.ca or (250) 554 5533

PROCEDURES

Fire Shelters	<p>All regular and auxiliary staff assigned to active fireline duties will be trained in the use of and will carry approved fire shelters.</p> <p>Supervisors will ensure untrained and unequipped personnel are not exposed to conditions that require use of a fire shelter during fireline duties.</p> <p>Personnel required to carry approved fire shelters will receive adequate training annually on the correct use of fire shelters.</p> <p>Fire shelters will be inspected at least once a month for wear holes and overall integrity. Faulty shelters will be immediately taken out of service and replaced.</p>
Strategies and Tactics	<p>Strategies for attacking a fire will incorporate predicted fire behaviour in order to minimize the risk to workers. The Incident Commander or his designate must approve any deviations from daily crew assignments.</p> <p>Fire work areas will have at least one and preferably two scouted escape routes. Escape routes will be communicated to all crew members and will be continually assessed for suitability. Helipads/helicopters will not be considered as primary escape routes.</p> <p>If no escape route can be identified, alternative attack strategies MUST be incorporated to ensure crew safety. When there is the potential for extreme fire conditions (fire intensity class greater than Intensity Class 4), the Incident Commander will appoint a lookout whose primary task will be to monitor fire behaviour and potential threats. Escape routes and weather monitoring will be undertaken hourly.</p>

Training All fireline workers will receive training in S-185 Fire Entrapment Avoidance and Fire Shelter Deployment. In emergency situations of short duration (less than one day), emergency fire fighters may receive tailgate training and be adequately supervised. Tailgate training should consist of, as a minimum, a briefing of who is the worker's supervisor, the specific tasks of the individual worker, safety concerns specific to this fire and the contents of the Emergency Fire Fighter Pamphlet FS1001.

All Protection fire crewmembers will be trained to a high standard and must meet a physical fitness standard. This level is outlined in the *Protection Fire Crew Training Standard*.

FAQ's

- Q1. Are fire shelters issued to EFF's, including Fire Wardens?
A1. No, regular and auxiliary staff assigned to active fireline duties will be trained in the use of and will carry approved fire shelters. Supervisors will ensure untrained and unequipped workers are not exposed to conditions that could require use of a fire shelter.
- Q2. Do I need to carry a shelter during mop-up?
A2. See "Exceptions" on previous page.

Original signed by May 30, 2001
Dave Hames, Director
Protection Branch

Director's Approving Signature

Approval Date

FIRE BEHAVIOUR ADVISORIES & WARNINGS

Applies to	Personnel employed by the Forest Service and involved in field work including projects, fire suppression operations and use of aircraft.
Purpose	<p>To provide a safe work environment and to meet Workers' Compensation Board Occupational Health & Safety Regulations.</p> <p>Continuously monitoring, updating and distributing weather and fire behaviour forecasts and feedback from on-site personnel can help predict potential fire behaviour. Strategies and tactics must be adjusted to ensure crew safety.</p> <p>The Forest Service will have Safe Work Standards that constitute safe methods, conditions and requirements for workers involved in fire line suppression operations.</p>
Critical Safety Statement	Wind and Fire Behaviour must be anticipated and forecast wind and fire behaviour must be communicated to workers who may be at risk due to wind or fire behaviour.
Exceptions	If conditions call for deviation from these standards, an amending written practise will be developed to address the specific situation and ensure the safety of personnel. The appropriate Fire Centre Manager or the Director must approve this practise.
Contact	Dave Marek: dave.marek@gems8.gov.bc.ca or (250) 847-6613
DEFINITION(s)	
Wind Advisory	A wind advisory is issued when wind conditions are forecast to present hazards (e.g., wind throw, hazardous flying conditions for aircraft) or conditions that exceed safety limits for transportation of workers. This advisory includes: severe turbulence; strong winds; downbursts; and hail. Wind advisories may be issued in the absence of aggressive fire behaviour.
Fire Behaviour Advisory	A Fire Behaviour Advisory is issued when intensities in excess of Intensity Class IV for a particular fuel type are forecast. These fire behaviour characteristics in excess of 4000kW/m will likely challenge direct suppression efforts.
Extreme Fire Behaviour Warning	<p>An Extreme Fire Behaviour Warning indicates that fire behaviour is expected to exceed Intensity Class IV for a particular fuel type. And conditions may escalate rapidly in association with one of the following: passage of a cold front; significant change in wind direction (> 90 degrees); severe localized thunderstorms and downdrafts; and development of low-level jets.</p> <p>An Extreme Fire Behaviour Warning is issued independently of any other advisory. These conditions pose the greatest threat to worker entrapment.</p>

PROCEDURES	
Responsible Parties	It is the responsibility of operational and key administrative staff (such as dispatchers) to be aware of potential threats to personnel and air operations. It is the Fire Control Officer's responsibility to ensure adequate Advisories and Warnings are issued. When personnel are dispatched to an area for which an Advisory or Warning has been issued, the dispatch information must include the Advisory or Warning. Incident Commanders or project leaders must confirm their understanding of the situation and provide the dispatch centre with feedback on actual conditions.
Notification	When an Advisory or Warning is issued, ALL affected resources WITHIN and ADJOINING the AFFECTED AREA will be advised by the most expeditious means. Radio Operators transmitting Advisories or Warnings must receive acknowledgements from personnel intended to receive it. An applicable Advisory or Warning CANNOT BE IGNORED.
Key Components	<p>Every Advisory and Warning must include:</p> <ul style="list-style-type: none"> ▪ type of Advisory or Warning; ▪ date and time of issuance; ▪ applicable geographic area (simple geographic description of the specific area affected); ▪ expected arrival time and duration of disturbance; ▪ description of conditions expected; ▪ Who should receive it and how it is to be distributed (e.g., radio, telephone, or fax to all Zones, bases, active Fires, PATC, PFCO and neighbouring Fire Centres).
Wind Advisory	<p>A Wind Advisory is issued to alert personnel that forecast conditions may present hazards to air operations, fireline or project operations.</p> <p>A Wind Advisory must include:</p> <ul style="list-style-type: none"> ▪ type and intensity of disturbance (e.g., outflow winds gusting to 50 km/h).
Fire Behaviour Advisory	<p>Issuing Offices must adopt a format that highlights the period during which forecast conditions are expected to exceed Intensity Class IV.</p> <p>A Fire Behaviour Advisory must include:</p> <ul style="list-style-type: none"> ▪ relevant fuel type(s).
Extreme Fire Behaviour Warning	<p>An Extreme Fire Behaviour Warning must include:</p> <ul style="list-style-type: none"> ▪ intensity of disturbance (e.g., generating 70 km/h winds); ▪ expected effect on fire behaviour (e.g., change in spread direction or fire intensity); ▪ relevant fuel type(s); ▪ if extreme fire behaviour is imminent, all personnel must be fully prepared to follow any specific instructions issued by the Incident Commander.
Issuance	Three levels of the organization can initiate an Advisory or Warning: Provincial Fire Centre (PFCO), Fire (IC) and Fire Centres (CFCO).
Response	<p>Suppression strategies and tactics must be adjusted accordingly to ensure personnel safety is not jeopardized.</p> <p>Staff should report actual on-site weather conditions and fire behaviour characteristics to the Dispatch Centre to confirm or correct forecast information. Updates can then be passed on to others. The issuer should provide an explanatory note when forecast conditions do not occur. Advisories and Warnings must be retracted if forecast amendments mitigate the situation.</p>

If in doubt — back out!

FAQ's

Q1. What do I do if the forecast advisory or warning do not occur on my fire?

A1. **Provide feedback to the issuing office and take the opportunity to find out why it didn't occur at your fire.**

Original signed by May 30, 2001
Dave Hames, Director
Protection Branch

Director's Approving Signature

Approval Date

Appendix VI – Right to Refuse Policy



LWF-063-01 May 24, 2001

POLICY

All Employees have the right to refuse to work If the work poses an “imminent danger. This is in accordance to section 27 and 28 of the Occupational Health and Safety Act.

PERFORMANCE STANDARD

Imminent danger is any danger not which is not normal for that occupation, or a danger under which a person engaged in that occupation would not normally carry out his work.

No worker shall

- Carry out any work if, on reasonable and probable grounds, he believes that there exists an imminent danger to the health or safety of that worker,
- Carry out any work if, on reasonable and probable grounds, he believes that it will cause to exist an imminent danger to the health or safety of that worker or another worker present at the work site, or
- Operate any tool, appliance or equipment if, on reasonable and probable grounds, he believes that it will cause to exist an imminent danger to the health or safety of that worker or another worker present at the work site.

RESPONSIBILITIES

Senior Management supports an Employee's right to work in a safe environment where precautions are taken to minimize any hazards pertaining to their area of expertise.

1. Manager

- **Be aware that no Employee who refuses to work where there is imminent danger, or who refuses to break any of the Occupational Health and Safety legislation cannot be terminated or disciplined.**
- Review a record of the Employees notification, the investigation and the action taken. When necessary, assist the Supervisor in identifying what action to take.

2. Supervisor

- Be aware of the conditions in which an Employee has the right to refuse to work.
- Promptly upon notification, investigate and take action to eliminate the imminent danger.
- Ensure the safety of the Employees during the investigation.
- Prepare a written record of the Employees notification, the investigation, and the action taken. Copies are made for the Employee who is refusing to work, Manager and for the department records.

3. Employee

- Who refuses to carry out work, or to operate a tool, appliance or equipment due to imminent danger; shall, as soon as practicable, notify his employer at the work site of his refusal and the reason for his refusal.
- Return to work once the imminent danger has been eliminated.

4. Safety Facilitator

- Be aware of legislation - the right to refuse.
- Support Supervisors in the right to refuse procedures.
- Act as a resource and mediator in situations where there are no grounds for refusal.

Right to Refuse Procedures

Once the Employee has notified his/her Supervisor, the following steps need to be taken:

- Investigate and take action to eliminate the imminent danger.
- Ensure that no Employee is assigned to use or operate the tool appliance, or equipment, or to perform the work for which an Employee has made a notification unless:
 - The Employee to be so assigned is not exposed to imminent danger.
 - The imminent danger has been eliminated.
- Prepare a written record of the Employee's notification, the investigation and action taken.
- Give the Employee who gave the notification a copy of the record described.
- A copy of the report is to be given to the Area/Regional Office and a copy sent into the PFFC Division attn: Safety Program Coordinator.
- Employee who gave the notification may be asked to remain at the worksite and may be assigned temporary to other work assignments that he is reasonably capable of performing. Note: - In a temporary assignment there is no loss in pay, it is not disciplinary action.

Notes:

- The Employee's record will not refer to the exercise of the Right to Refusal.
- Where an Employee continues to refuse to work despite a decision by the Supervisor that there is no ground for refusal, the Department Human Resources Section and the Occupational Health and Safety Office **shall** be notified.

Record of Refusal

Employee's Name: _____

Reasons:

Investigation Findings:

Action Taken:

Date: _____ **Supervisor:** _____

1 Copy for employee – 1 Copy for Area/Regional Office – 1 Copy for Safety Program Coordinator PFFC