Historical Trends, Current Practices and Options for the Future

Union of BC Municipalities Sprinkler Protection Program

Report Completed: September 2005 Released: March 2006

Prepared by: Joanna Merson, Union of BC Municipalities/University of Victoria Research Co-op

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1 Background

1.1 Introduction

As a response to recommendations of the Filmon Review, the Union of BC Municipalities (UBCM) acquired funding in 2004 to develop sprinkler kits.[1] The result was the procurement of three Sprinkler Protection Units (SPUs) (see section 1.3 Sprinkler Protection Units). The primary purpose for these units was to provide protection for structures in forest interface zones from encroaching wildfires. As a secondary purpose, the kits were intended to act as a "best practice" model for communities.[2] At the beginning of the SPUs' second season of use, the UBCM commissioned this report and a catalogue of BC's interface fires from 1994-2004 (excluding 2003) as "a basis for a recommendation of the design of an optimal sprinkler protection unit program".[3]

1.2 Interface Fires

The interface, also referred to as the 'wildland-urban interface'(WUI), describes areas where residential, industrial or agricultural developments are located within or near wildland settings with natural vegetation. Simply put, an interface fire is a fire that has the potential to simultaneously involve buildings and wildland fuels.[4] A fast moving, out of control, wind-driven wildland fire, can quickly spread from the forest and threaten homes, properties and the public's safety.[5] While some maintain that an interface fire is one that impacts a whole community, for the purposes of this report, an interface fire is understood to be any wildfire that encroaches on a community *or* individual structure. This is regardless of the original cause of ignition. For example, the fire may have initially been caused by lightning, an abandoned campfire, a discarded cigarette, or fire spread from a structure fire to brush later threatening additional homes.

Major interface fires which have taken place in BC are the Garnet Fire-1994, the Salmon Arm Fire-1998, and the Okanagan Mountain Park Fire-2003. The 2003 wildfires provided important experiences and lessons for the Province's fire control and emergency responding agencies. The Filmon Review, "Firestorm 2003" examined a number of fire events and provided valuable guidance to mitigate the impact of future interface fires.[6]

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[1] Auditor General. 2004/2005 Report 2: Join Follow-up of 2001/2002 Report 1: Managing Interface Fire Risks and Firestorm 2003 Provincial Review. Pg. 14.
[2] Auditor General. 2004/2005 Report 2:
[3] UBCM. Purpose of research. Scope of Work. UVic Co-op.
[4] Auditor General. 2001/2002 Report 1: Managing Interface Fire Risks. Glossary of Terms. Pg. 102
[5] http://www.mcaws.gov.bc.ca/firecom/ (July 11)
[6] Dave, Ferguson. Fire Safety Officer. Office of the Fire Commissioner, BC Ministry of Public Safety and Solicitor General. Personal Correspondence.

1.3 Sprinkler Protection Units

Initially, Canadian wildland firefighters used sprinklers at the back of cut lines to widen fireguards.[7] While provincial forestry services still employ sprinklers for wildland firefighting purposes, Ontario was the first province to operate sprinklers specifically for structural protection. Now the Yukon, Alberta, Saskatchewan and British Columbia all have province-wide structural sprinkler protection programs.[8] It should be understood that structural sprinkler protection is one of many methods that can be utilized in an attempt to save a threatened structure from an impending wildfire. Sprinkler protection does not guarantee that a structure will be saved. Ownership of an SPU cannot be relied on as a value's primary means of structure protection. SPUs are intended to be used, as a tool, in conjunction with preventative methods (i.e. fuel management and FireSmart building) and additional methods of attack and defence (i.e. back burning, foams, and wraps). Effective structural protection requires "applying water in sufficient quantities and locations to inhibit ignition from a passing wildfire. The volume of water necessary and placement of the water is dependent on building design, construction materials and adjacent forest fuels."[9]

WUI sprinkler protection works on the principal that increased relative humidity (RH) and dampened roofs will prevent a structure fire by preventing ember transfer and radiant heat ignition.[10] To do so, the general rule is that the sprinklers must run for at least two (2) hours.[11] Limitations on SPU use include fire behaviour and weather conditions. For example, it is too dangerous to send a crew into a rank six fire even if structures are at risk.[12]

In July 2004, the UBCM purchased inventory for four (4) Sprinkler Protection Units (SPUs) and three (3) trailers to house and transport the equipment (see *Appendix A.III.i. UBCM SPUs* for unit contents). Each unit is equipped to protect thirty to thirty-five structures.[13] However, this number varies with individual structure size, community concentration, and building material.[14] The SPUs are owned by the UBCM, administered by the OFC and deployed and operated by contractors within the MoF Incident Command Structure (see section 3.*1.2.1 UBCM Owned Equipment*).

[7] Mark Hayes, Just In Case Fire. Personal Correspondence.
[8] Hayes.
[9] Wildland Fire Operations Research Group.
[10] Just-In Case Fire website.
[11] Darren Hutchinson, President/ Chief Operations Officer - Quintech Fire Services. Personal Correspondence.
[12] Hutchinson.
[13] UBCM News Aug 2004 pg 24.
[14] Rob Beugeling, Forest Protection Officer, Cranbrook Fire Zone. Ministry of Forests. Personal Correspondence.

2 Method

An initial listing of interface fires was compiled from the Ministry of Forests and Range (MoF, formerly Ministry of Forests) database. Further data regarding wildland/urban interface fires were searched from the OFC Fire Reports by date of fire and cause of ignition.[*]

Fires were defined as interface if they were reported as such, or if the reported structure damage was over $10,000 and the total control size of the fire exceeded 4 hectares. Additionally, Fire Chiefs, I/Cs and Fire Prevention Officers (MoF) were asked to recall and describe, with the aid of their notes, interface fires that they had attended. This was done via phone/personal interviews, and email/hand delivered questionnaires.

As only wildfires that are given MoF fire numbers are included in this database, some of the fires that occured in municipalities may not be reflected in this data. However, it is unlikely that an interface fire would occur where the MoF would not participate as one of the responding agencies. It may be noted that fire departments can request MoF assistance for interface fires occurring within municipal boundaries. This is usually done if a Rank 2 fire has the protential to increase in rank. Therefore, the data used are useful for providing a provincial picture of wildfire occurrence.

Information was collected by personal correspondence from a diverse group including – wildland firefighters, fire chiefs, contractors, officials from the Ministry of Forests, officials from the Office of the Fire Commissioner, representatives from each province's agencies responsible for their sprinkler protection equipment, and data analysts from NRCAN & the MoF. Additionally, information was gathered at the site of the Monroe Lake Fire to determine what factors can make a deployment successful. [°]

[*] Due to the rarity of interface fires prior to the mid 1990s, neither the Ministry of Forests' (MoF's) *Field Fire Reports* nor the Office of the Fire Commissioner's (OFC's) *Incident Reports* provided a means for indicating interface fire occurances. In 1998, the MoF added a Yes/No check box set to the *Field Fire Reports*. The term 'interface' is not defined in the report booklet. Therefore, the Ministry of Forests Protective Services records do not contain a full listing of interface fires. The OFC's *Incident Reports* still do not include a field for indicating interface fires, although this information may be extrapolated by the "Igniting Object" or "Act or Omission" descriptions.

[°] Dollar figures for structures that were involved in interface fires are taken from the notes or recollection of fire officials involved in the incidents under consideration. Fire Incident Reports involving wildfires could not be correlated with fires indicated as interface in MoF records. This prevented the use of information from OFC Fire Reports such as structure values, damage extents etc. Statistics Canada, BC Assessment and the BC Real Estate Association were unable to provide dollar figures for average property or dwelling values for homes based on fire locations.

3 Current Practices

3.1 British Columbia

3.1.1 Policy and Responsibilities – British Columbia

The Ministry of Forests (MoF) aims to prevent fires from encroaching on values. Values at risk in unprotected areas will receive structural protection, not structural firefighting, from the MoF.[15] That is, "In unorganized areas of the province, where there is no local fire department, the Ministry of Forests takes responsibility for responding to wildfires. However, the ministry does not have the capability [or the mandate] to put out structural fires in any part of the province"[16]. Once a fire reaches values within a protected area, the local fire department will take the lead role in structural protection. A local government may request support from the MoF.[17] The multiple agencies are encouraged to coordinate under Unified Command with guidance and advice from the OFC.

The Lieutenant Governor has legislated authority to the OFC to declare a provincial state of emergency (DEC) under the Emergency Program Act. This act has been enacted twice: 1998 Salmon Arm/Silver Creek and the 2003 Firestorm. Upon a DEC, the OFC has the authority to create a Provincial Fire Department and to second equipment and manpower as needed.[18] The OFC is moving to a governance vs. operational model of function. Under this model, the OFC will not manage equipment outside of a DEC. The British Columbia Wildland/Urban Interface Fire Consequence Management Plan (Interim 2002) states that:

> The British Columbia Ministry of Forests/Forest Protection Branch/British Columbia Forest Service (BCFS) has the primary responsibility for wildland fire protection and response on crown land, outside of organized areas and local jurisdictions.
>
> Local governments have the primary responsibility for fire protection and response within their jurisdiction.... At the provincial level, wildland-urban interface fire support is coordinated by the Provincial Emergency Management Structure using an integrated response model.[19]

Further, the Emergency Management Structure in British Columbia states that:

> When individual ministries are responding to an escalated emergency situation under their mandate (for example, Ministry of Forests responds to wildfires) – a provincial regional emergency operations centre (PREOC) and the provincial emergency coordination centre (PECC) will be activated to coordinate the multi-agency provincial response when the emergency event becomes more complex (such as the case when

[15] Office of the Fire Commissioner. Wildland Urban Interface Fires and the Local Fire Department: A briefing for structural firefighters. July 2005. p. 5.
[16] Auditor General. 2001/2002 Report 1. Pg. 28.
[17] Office of the Fire Commissioner. Wildland Urban Interface Fires and the Local Fire Department. pg. 5.
[18] Office of the Fire Commissioner. Model 01 - Roles and Responsibilities. PowerPoint Presentation. Slides 9-10.
[19] British Columbia Wild-Land/Urban Interface Fire Consequence Management Plan (Interim 2002)

wildfires move into populated areas.)[20]

This differentiates responsibilities between small and large wildland/urban interface fires. Small interface fires outside of 'organized areas and local jurisdictions' fall within the jurisdiction of the MoF. Large interface fires in 'populated areas' become multi-agency emergencies where both the MoF and local fire departments must assume some responsibility for structural protection.

3.1.2 Equipment and operation – British Columbia

3.1.2.1 UBCM Owned Equipment

The UBCM owns inventory for four (4) Sprinkler Projection Units. At the time of printing, the units are located in the Kamloops Fire & Rescue Training Centre, BCFS Chilliwack Equipment Depot, and the North Okanagan Regional Fire Training Center in Vernon. The fourth set of inventory functions as a part supply for the other three units. It is kept in storage at the Chilliwack Forest Services Equipment Depot. When deployed, these units are moved by 'hotshot' towing companies. During the fire season, "the trailers [are] strategically placed across BC, according to weather conditions and fire potential. The UBCM, PEP, MOF and OFC policy agreements allow MOF Incident Commanders access to SPUs for protection strategies".[21]

Each SPU is comprised of a large assortment of firefighting equipment (see *Appendix A.III.i. UBCM Sprinkler Kits*) including twenty (20) Roof Kits, twenty (20) Large Sprinkler Kits and twenty (20) Small Sprinkler Kits. The Roof Kits have hoses and eight (8) sprinkler heads. The Large and Small Kits have 7 large and 12 small sprinkler heads respectively, plus hoses and accessories. Each Unit is designed to protect 30-35 average sized homes.

When the kits are not in use, regional and municipal fire departments may use the equipment for training exercises. The training is conducted by one of the three (3) approved contractors. A standardized training program is currently being drawn up by the OFC in conjunction with the contractors. Based on the training program from the Hinton Training Center in Alberta, this training is intended to facilitate future set-up of the units by increasing the number of qualified operators in the province. Additionally, the hands-on experience is intended to encourage fire departments to purchase their own structural sprinkler protection systems.

Even though the units are owned by the UBCM, they have been entrusted to the OFC who directs their use by the MoF. Therefore, deployment of the units is primarily at the discretion and with prior authorization of the MoF. The MoF agrees to pay costs associated with the deployment of SPUs when used as a tactical resource under command and control of the MoF.[22] The OFC coordinates the requests from MoF Incident Commanders as well as from others, including training of fire departments.[23] The steps involved are as follows:

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[20] Provincial Emergency Program. Emergency Management Structure in British Columbia. May 2005.
[21] Office of the Fire Commissioner. OFC Site Operations Guidelines. Pg 5.
[22] Memorandum of Understanding between MoF and OFC – Tactical Resources Deployment Guidelines. Pg. 1.
[23] Office of the Fire Commissioner. Wildland Urban Interface Fires and the Local Fire Department: A briefing document for structural firefighters.

1. A request for Structural Suppression Support form must be filed with the OFC Ministry Control Center (MCC) by an Authorized Representative of a Fire Protection District.
2. The request will be confirmed with a Purchase Order to support a payment claim(s).
3. The acting MCC director will determine if assistance from a Structural Specialist is needed.
4. The MCC director will initiate mobilization by contacting a Hotshot Contractor to move the SPU or direct an SPU Coordinator to do so.
5. The MCC director will than contact the "next-up" contractor who will physically deploy the unit.[24]

Although these are the published procedures, they are not always followed. For example, on May 30th 2005, one of the units was moved to Vanderhoof. Initially, the OFC was unaware that the unit was in transit. The contractor selected to travel to Vanderhoof was selected during an informal conversation between an official from the OFC and a contractor at the FCABC in Vernon. This method of selection is not in keeping with published policies. As senior authorities, all provincial organizations involved with the sprinkler protection program need to follow prescribed procedures to ensure cooperation from the other parties involved.

Since their creation, the UBCM SPUs have been very successful and have fulfilled their purpose on an operational level. In 2004, they were deployed for a total of 69 days. So far in the 2005 season, although only one unit has been moved to a staging area, it was deployed. It must be noted, the 2005 fire season is likely to be one of the quietest seasons in 20 years.

3.1.2.2 Alternatively Owned

The second purpose of the UBCM units was to be a prototype for local fire departments and communities. The reasoning behind this was that initiatives in community protection work best with community ownership. This purpose has not been fully executed. The provincial government may initiate actions but "local buy-in must take it from there".[25] As of yet, the local buy-in has been minimal. From the original $1 million entrusted to the UBCM, the OFC has used a portion of the money set aside for training to meet all requests for training. However, the availability of the units for training and demonstrations has not been advertised.[26]

In an attempt to facilitate the compatibility of all WUI sprinkler equipment in BC, the OFC has produced the 'Blue Document' as a guideline for technical specifications. The document outlines the specifications of the current SPUs. This document was distribute to UBCM area associations and is posted on the UBCM website.[27] However, it (or an updated version) needs to be further advertised to communities expressing interest in purchasing their own sprinkler equipment. At the time of publishing, few contacts from the fire departments that have purchased equipment as well as the equipment distributors have seen the 'Blue Document', or understand its purpose.

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[24] Office of the Fire Commissioner. Operational Guideline OFC Ministry Coordination Center. Policy 2.2.4
[25] Jim Price, Superintendent Fire Preparedness, Protection Branch, Ministry of Forests and Range.
[26] Robbert Turley, Deputy Fire Commissioner. Office of the Fire Commissioner, Ministry of Public Safety and Solicitor General. Personal correspondence.
[27] Clark.

One contractor has sold 375* Roof Caddy Sets, with four (4) sprinkler heads per set, and twenty (20)† impact sprinklers to fire departments, communities, and private homeowners in:

Abbotsford	Munro Lake	Skookumchuck
Cranbrook	Naksup	Trail
Fort St. John	Nelson	Vernon
Kamloops	Prince George	Wasa Lake

The Errington Volunteer Fire Department has put basic Sprinkler Kits together. Six members of the Errington FD fought fires, for a total of two weeks, in Kelowna in 2003. It was there that they the "gained knowledge and experience" which prompted them to purchase their own WUI sprinkler equipment. Chief Catton of Errington feels the equipment is as an asset to their community and is ready to use it to help any other town in need.[28]

The Errington kits are intended to be used within the local Fire District (69). However, if necessary, the Errington FD is willing to share their kit with other places in the province. The kits are in trailers that must be towed by truck.[29] For a full inventory see *Appendix A.III.ii Errington Kit.*

Port Moody FD has also purchased sprinkler units. Seeing UBCM SPUs in action at Lonesome Lake in July 2004 was the catalyst for Port Moody's decision to purchase their own equipment. The selling point to the city council was the equipment's versatility. If an earthquake knocks out the city's infrastructure, the equipment can be deployed to confine fires. Should fires occur in dense housing, the sprinklers can be set up to protect neighbouring apartment buildings and houses from ember transplant. Additionally, at mill fires, the sprinklers can be used to protect valuable wood piles.[30]

Currently in the first stage of the program and with plans to expand, Port Moody own 2 Kits with 44 sprinkler heads, hose, and accessories each. The first Kit is located in the department's initial attack trailer, which can be connected to a vehicle in approximately 10 minutes. [31] The second Kit is stored in containers at the #1 firehall. Each kit cost about $16,000.[32] Their original plans delineated a fire department engine supplying the sprinkler systems with a large diameter hose; however, each kit may receive its own 2 ½" and 4" hose supply within the next two years. [33] For a full inventory see A*ppendix A.III.iii Port Moody Kit.*

Port Coquitlum Fire Department has purchased 'forestry style' hoses and sprinklers which are set up in parks to stop wildfires. Because Port Coquitlum is densely populated and does not commonly face interface issues, these sprinklers are *not* intended for structural protection.

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* 415 sold in BC less 40 to UBCM.
† 400sold in BC less 380 to UBCM
[28] Colin Catton, Fire Chief, Errington FD. Personal Correspondence.
[29] Catton
[30] Gord Parker, Fire Chief, Port Moody FD.
[31] Parker.
[32] Robb, Leneen. Sprinkler system will help in wildfires, after earthquakes. Coquitlam Now. Newwestminster, BC. July 27, 2005. pg. 6.
[33] Parker.

3.2 Alberta

3.2.1 Policy and Responsibilities - Alberta

In Alberta, "The agency responsible for fire fighting is usually determined by whether the fire originates inside or outside of the Forest Protection Area. The Forest Protection Division (FPD) of the Ministry of Sustainable Resource Development (SRD) is responsible for fighting and extinguishing wildfires within the Forest Protection Area. Outside the Forest Protection Area, municipalities are responsible for acting on and extinguishing wildfires on all lands within their jurisdiction."[34] When in the Forest Protection Area, SRD staff are directed to "fight fires aggressively and safely" without entering structures. To ensure that structures are still protected, the FPD is "in the process of developing strategies with the municipalities to set up sprinklers in hazardous areas within communities when a wildfire threatens a community".[35]

3.2.2 Equipment and Operation – Alberta

The Forest Protection Division of the Ministry of Sustainable Resource Development owns four Sprinkler Trailers. Each one contains 7 large and 10 small Sprinkler Kits to be used for line building and infrastructure protection. For full inventory see *Appendix A.III.iv. Alberta Sprinkler Kit Inventory*.

The four trailers are stored in equipment caches at the four Regional Offices. If one particular area exhibits a high Fire Hazard and a high Fire Risk Occurrence, the trailers will be moved in anticipation of fires.[36]

When the trailers are moved, they are sent with a Structural coordinator. Once a fire breaks out, a Type 1 Hack Unit is sent out. Contractors and Type 1 Hack Units set up the sprinklers. Three contractors are hired for the duration of the fire season to complete assessments, set-up sprinkler kits, liaise between forestry, municipal, and provincial firefighting agencies, conduct cross training and direct the Type 1 Units when required during interface fires. The Type 1 firefighters are trained every spring at the Hinton Training Center. [37] The Hinton Training Center offers various courses including: Basic Wildfire Suppression for Structural Firefighters, and Fire Operations in the Wildland Urban Interface. Both are offered as Train the Trainer courses. [38]

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[34] Public Lands & Forests, Alberta Sustainable Resource Development. Fire Suppression on Provincial Grazing Reserves Information Fact Sheet. Dec, 2003. Pg 2.
[35] John McLevin. Wildland Fire Protection Officer, Wildfire Prevention Branch, Alberta Sustainable Resource Development. Personal Correspondence.
[36] McLevin.
[37] McLevin.
[38] Sustainable Resource Management. Hinton Training Center. Course Description.
http://www3.gov.ab.ca/srd/forests/resedu/etc/wfmos2.html

One of the forces supporting the Alberta Sprinkler Protection Program is the strong interdepartmental cooperation. The Wildfire Protection Branch meets with municipalities at the beginning of every fire season. Talks are given from the wildland firefighters to the structural firefighters and vice versa. Once fires break out, it appears that everyone already knows and trusts each other, and this facilitates smooth running operations.

3.3 Saskatchewan

3.3.1 Policy and Responsibilities - Saskatchewan

The Province of Saskatchewan is responsible for "Wildfire suppression action on all lands within 4.5 km of the Provincial Forest" and "may assist municipalities (if requested) with wildfires (outside the 4.5 km buffer zone from Provincial Forest) on a cost recovery basis, dependant on available resources and requirements in mandated area." [39‡]

When rural municipalities request assistance to suppress a fire, using a Request for Suppression Assistance Form, Saskatchewan Environment and Resource Development will provide assistance so long as its mandated wildfire responsibilities are not jeopardized. All requests for sprinkler deployment are initiated by a Wildfire I/C who has assessed the situation. Depending on the situation, an initial attack crew leader or an aerial observer may assume the role of wildfire I/C.

The Province of Saskatchewan's Fire and Forest Insect and Disease Management Policy Framework states that: "In most instances, fire suppression resources will be adequate and difficult decisions about what to protect will not be necessary. However, fire managers and FPOs [Fire Protection Officers] across the province will be instrumental in developing the 'values at risk' priorities for their areas - should the need to choose among values arise."[40] This policy recognizes that, in some situations, resources will have to be prioritized & allocated, and assigns the task to specific individuals.

3.3.2 Equipment and Operation – Saskatchewan

The Saskatchewan Ministry of the Environment – Forest Fire Management owns most of the inventory available for sprinkler protection in the Province of Saskatchewan - 256 5-head Sprinkler Kits and a portion of a Values Protection Unit. The province is responsible for the deployment, operation, and maintenance of its structural protection equipment.[41] It has, "with some success, encouraged stakeholders to purchase additional equipment"[42].

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[39] Saskatchewan Environment and Resource Development. Wildfire Fact Sheet (June 2003): Wildfire Responsibilities Within Saskatchewan. PDF [Taken from the internet July 13, 2005], 1.
‡ brackets taken from original text.
[40] Saskatchewan Environment and Resource Development. Fire and Forest Insect and Disease Management Policy Framework. Belanger, Buckley. PDF [Taken from the internet July 13, 2005], Pg 4.
[41] Larry Fremont, Education and Prevention Coordinator, Saskatchewan Ministry of Natural Resources. Telephone Conversation, June 28th 2005.
[42] Fremont.

The Sprinkler Kits are distributed throughout the 14 Forest Protection Districts in Saskatchewan.[43] Each kit is designed to protect one or two structures. Located in the central depot, as well as in provincial, regional and district caches, all the kits are mobile and, if necessary, can be relocated by need.[44] (For full inventory see *Appendix A.III.vi. Saskatchewan Sprinkler Kits).*

The Values Protection Unit (VPU) was first put into use in 2002 and was registered with the Canadian Inter-Agency Forest Fire Centre (CIFFC) in 2003. It is used for structure protection, burn out operations, direct attack and indirect attack. The VPU is composed of 6km of hose line, various sprinklers heads, tractors, trucks and trailers. It can be set up in four (4) hours by a 6 man crew.[45] A portion of the VPU inventory is owned by Saskatchewan Environment and Resource Development, while the majority of the equipment is owned by Sand's Drag Hose System, a private contractor. (For full inventory see *Appendix A.III.v Saskatchewan Values Protection Unit*).

The charge to deploy the VPU to municipalities is $3800.00/day. This price covers the crew and equipment. Operation costs $260.00/hour for the main pump and an additional $100.00/hour for the boost pump. [46]

3.4 Ontario

3.4.1 Policy and Responsibilities – Ontario

The Ontario Ministry of Natural Resources (OMNR) is the governing body responsible for emergency response to fires in Ontario. [47] Further, "the fire management program will…assist all municipalities and federal areas to meet their responsibilities for forest fire protection within their boundaries. The fire management program will also maintain agreements with municipalities to strengthen cooperative delivery on both Crown and private land." [48] However, under the Forest Fires Prevention Act, this "mandate to lead forest fire management efforts…does not extend beyond the fire region, i.e. does not extend to all [sections] of Ontario". [49]

Within the fire region, "municipalities are responsible for appropriate fire response on all forest fires to protect life, property and infrastructure. OMNR will provide support to municipalities in event of extraordinary wildland fire situations on a cost-recovery basis when requested. If OMNR is requested to assist a municipality, the cost of OMNR suppression activities will be charged to the municipality".[50]

[43] Marty Ferguson. Fire Prevention Officer, Fire Management Forest Protection Branch, Saskatchewan Ministry of Natural Resources. Telephone Conversation. July 5th 2005.
[44] Fremont.
[45] Values Protection Unit PPT; Fremont
[46] Values Protection Unit PPT
[47] Forest Fire Management strategy for Ontario. Pg 5.
[48] Forest Fire Management strategy. Pg 15.
[49] Forest Fire Management strategy. Appendix C. Pg 62
[50] Forest Fire Management strategy: Appendix A. Pg 34

3.4.2 Equipment and Operation – Ontario

The Ministry of Natural Resources owns Ontario's two types of public sprinkler protection equipment: basic Sprinkler Kits and a larger Structural Protection Team Kit. Based on need, the kits are transported around the province with other equipment by semi-trailer, fixed-wing aircrafts or helicopters.[51]

There are 150-200 Basic 5-head Sprinkler Kits distributed throughout the nineteen (19) Fire Management Headquarters and three (3) provincial equipment caches. Initial Attack Ranger Crews complete an initial assessment of values at risk and then set the kits. When the kits are deployed within the jurisdiction of a local fire department, the initial attack crew creates a diagram of the area with the sprinklers and pumps numbered. The diagram is given to the local agency to 'fire up' the system as needed[52].

The Structural Protection Team Kit is located in Thunder Bay. It contains 750 sprinkler heads, and enough gear for three teams. This manned Kit saved 30+ structures in South-Eastern BC in 2003, where each team's equipment was transported in a 48 foot trailer and six extended cab pickup trucks[53]. For a full inventory see *Appendix A.III.vii Ontario Structural Protection Team Kit contents.* Depending on the location of a threatened structure, requests for deployment are made to the Aviation and Forest Fire Management Branch of the OMNR either directly from the public or from a call from a local Fire Chief.[54]

3.5 Yukon Territory

3.5.1 Policy and Responsibilities –Yukon

"Wildland Fire Management's interaction with the Fire Marshal's Office and the Volunteer Fire Departments (VFD) translates to a superior fire response capability within the wildland/urban interface, which is important given the fuel loading adjacent to or near most Yukon communities".[55] It is Wildland Fire Management policy "To minimize fire losses and the negative impacts of wildfire on communities, property and identified resources in the Yukon".[56]

It was suggested in the 2004 Wildland Fire Review Panel Final Report, that Yukon "VFDs require equipment, particularly 4x4 trucks complete with pumper units, in order to extend their range of effectiveness across the interface zone".[57] It was also recommended that the territory "revise the procedures for reporting fires within the interface zone in order that all fire starts are captured within the database". This is a suggestion that should be headed by all firefighting agencies in Canada.

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[51] Tennis Benoit, Ontario Ministry of Natural Resources. Personal Correspondence, July 4th 2005.
[52] Benoit.
[53] Ontario Structural Protection Assignment British Columbia, Aug 2003. Power Point Presentation. [From Peter Fuglem, Forest Protection Director], 3.
[54] Benoit.
[55] 2004 Wildland Fire Review Panel. Final Report. pg 22.
[56] Campbell.
[57] 2004 Wildland Fire Review Panel. pg 38

In 2005, Wildland Fire Management developed a series of protocols designed to include the VFDs as part of the overall preparedness system. During periods of high to extreme fire indices, the VFDs are to be called out to station and participate in ground patrols and respond to fire or smoke calls within their jurisdiction. These types of patrols are very popular with local residents, as they demonstrate that the VFDs are playing an active role in both prevention and suppression activities.[58]

The territory's EMO, Wildland and Volunteer Fire Departments all fall under the jurisdiction of Protective Services. The Whitehorse and Watson Lake community Fire Departments are not part of that organization, but they work closely with Protective Services. The Organization Chart for the parties involved is as follows:

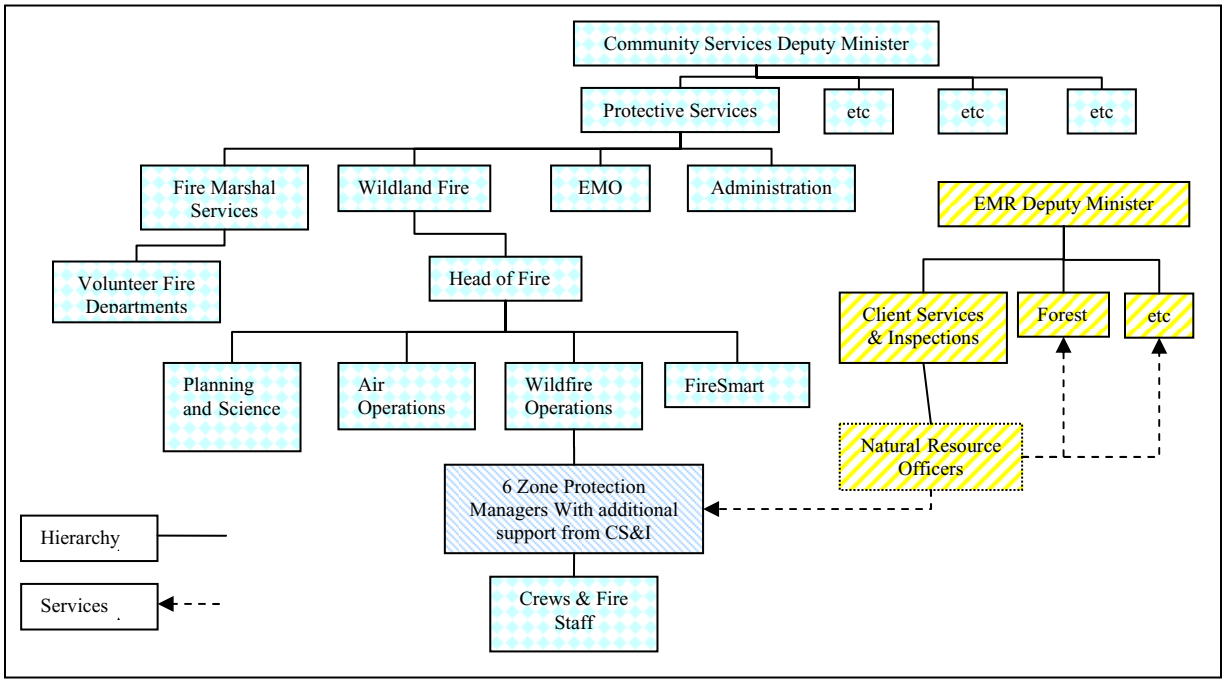

Figure 3.5-1 -3.5-2: 2004 Wildland Fire Review Panel. Final Report. May 2005. pg 20 "Figure 7 Current Organization"
Note: "Volunteer Fire Departments" added to Figure by Mike Sparks.

[58] Sparks.

3.5.2 Equipment and Operation – Yukon

The Yukon Territory's three Sprinkler Trailers are owned by Yukon Protective Services. The larger two trailers have 160 sprinkler heads of varying sizes, hoses, large volume water pumps and other accessories. For a full inventory see *Appendix A. III.viii. Yukon Trailer.* The smaller third trailer has one third of the components of the first two. The larger trailers are housed at the Territorial Fire Centre in Whitehorse. The third trailer is housed at a VFD. All trailers may be repositioned according to fire hazard, a method known as 'prestaging'. The eight Yukon District Fire Warehouses are positioned in eight communities throughout the Territory. Each house ten (10) Sprinkler Kits. These kits each contain 5 sprinkler heads. Each kit could protect 1 – 2 houses. All Fire Managements resources are fluid and can be repositioned as per need or anticipated requirement.[59]

The territory has both a technical and a "practical learning approach"[60] to training. In 2004, several mock emergency exercises were run with cross-training exercises for volunteer fire departments and wildland fire management fire fighters. Training exercises include use of rotor wing and airtankers, Wildland Brush engines and Wildland Fire Management Personnel. Volunteer fire fighters, operate and deploy the Sprinkler Trailers. [61]

Yukon Protective Services does not charge communities for the costs incurred with sprinkler deployment. When additional aid is required from sources outside the Yukon, Protective Services will use the Mutual Aid Resource Sharing Agreement coordinated through CIFFC. Pay rates for deployment costs and personnel follow the CIFFC Flat Rate Cost System.[62] This system was developed to "simplify the cost recovery process for all Provinces Territories and the Federal Government who supply personnel in response to wildland fire activity across Canada through the Mutual Aid and Resource Sharing Agreement (MARS)". [63] Current rates are: Type 1 crew personnel - $475/day and all Overhead personnel - $600/day.

3.6 Quebec, Northwest Territories, Nunavut

In Quebec there is no specific program in place to protect communities from interface fires. Nevertheless, the Ministère des Ressources naturelles et de la Faune Direction de la Conservation des Forêts does promote the FireSmart program.

No publicly owned wildland/urban interface sprinkler equipment is known of at this time in Northwest Territories or Nunavut. Nonetheless, they are able to receive equipment via CIFFC and private contractors.

[59] Sparks.
[60] 2004 Wildland Fire Review Panel. pg 38.
[61] 2004 Wildland Fire Review Panel pg 72.
[62] Campbell. Telephone
[63] Tom Johnson, CIFFC. Personal Correspondence.

3.7 Summary

When in extreme need, provincial fire fighting agencies may request the use of other province's equipment via CIFFC. No rental fees are charged, but replacement and refurbishing costs are. Outside BC, national current best practices consist of sprinkler protection equipment owned by provincial authorities who have an overview of the wildfire situation affecting the entire province:

Alberta- The Forest Protection Division of the Ministry of Sustainable Resource Development
Ontario- The Aviation and Forest Fire Management Branch of the Ministry of Natural Resources
Saskatchewan- Forest Fire Management of the Ministry of the Environment
Yukon- Protective Services of the Ministry of Community Services

Within these organizational structures, the sprinkler kits, trailers, and units are treated like any other wildfire fighting equipment. Their movement is administered and facilitated by provincial forest fire management agencies. Wildland firefighting and a structural firefighting are based on different principals. Therefore, sprinkler kit operators must undergo special training to ensure they can work safely and productively in both environments. To ensure properly trained firefighters are protecting their communities, some provinces choose to hire contractors to man the sprinklers alone or in conjunction with public firefighters. The design of each kit varies by province. These variations in size, content, and container style can be attributed to the diverse fuel types, terrains and population dispersions.

4 Analysis of Need

4.1 Qualitative Information from Primary Sources

Suggestions from qualified, experienced wildland firefighters played a role in determining the extent to which SPUs would have been used in BC in the past ten years, and thus be expected to be needed in the future. Some contacts were very specific about how many SPUs they would have requested, while most of the respondents were more general in their responses. For example, one spoke of "at least a half dozen occasions SPU crews would have been requested", while another said that SPUs "would have been a great tool in protection of at least five of the structures" he had defended. One Senior Protection Officer stated that "over the years there were many homes…that were protected with Air Tankers and Helicopters using retardant, foam and water. Most of these buildings could have been protected at a much lesser cost using SPUs". Additionally, when describing experiences fighting interface wildfires in the past ten years, most interviewees spoke of the SPUs favourably, describing their experiences with the UBCM SPUs as "positive".

Interviewees identified twelve fires where they would have deployed SPUs during the study period had the equipment been available during those times. Several interviewees explained that they would have ordered the units to save values that were lost to interface fires. Interviewees also described instances where they would have deployed an SPU as a precautionary measure on values that were saved by other means. Some estimated values were provided for the structures that they would have protected with the SPUs: see below

Table 4.1-1 shows the occurrences in each fiscal year from 1993/1994 – 2003/2004 of: wildfires, interface fires, and dollar property losses. The 2003 firestorm season which was outside the scope of this study was excluded.

Table 4.1-1: Yearly BC Fire History

	1993/94	1994/95	1995/96	1996/97	1996/97	1997/98	1999/2000	2000/01	2001/02	2002/03	2003/04
Wildfires*	2,861	1,474	1,358	1,175	2,665	1,208	1,539	1,266	1,781	N/A	2,398
Interface Fires†	7	10	172	78	162	65	110	126	107	N/A	121
Dollar Property Losses‡	$11,884,924	$7,337,770	$2,798,557	$17,200	$5,028	$1,021	$1,088	$646	$2,474,250	–	$1,093,141
Deployments	–	–	–	–	–	–	–	–	–	N/A	
Theoretical Deployments††	2	2				7			1	N/A	–
Reported Estimated value protected during theoretical deployments‡‡	$3,150,000	$2,100,000				$33,240,000			$1,000,000	N/A	
* Source: MoF Fire Charts											
† Source: MoF Fire Charts indicated as interface fire or structure damage over $10,000											
‡ Source: Canadian forest Service and National Forestry Database.											
†† Source: Interviews and Questionnaires.											
‡‡ Note: Value may exceed Dollar Property Losses for a given year if structures that would have been protected with SPUs were not destroyed.											

A number of logistics and policy suggestions were formed on the basis of information from the interviews

Logistics:

- SPUs are tools that are ideal for protecting isolated ranches and small clusters of homes.
- Units should be kept in areas with C7 fuel types (Pines with grass) e.g. Merrit, Penticton, Kelowna, Osoyoos, and Cranbrook.
- Units are *not* needed on Vancouver Island, as the many fire departments are able to quickly control fires before they exceed rank 3.
- Units are *not* needed on the coast as these fires differ from those in the interior and are usually contained within a day, before an SPU would have time to arrive.
- Units are *not* needed in the Bulkley Fire Zone in the NW fire center due to the low fire load and population. Typical interface fires there result from grass pile burning and occur over short time frames.
- In the early season (May, June), units are needed in North Eastern BC where the fire season ends earliest.
- In the later season (July, Aug, Sept), units are needed in Southern BC where the fire season starts later.
- All equipment within the province needs to be compatible.

Policy:

- The chain of command relating all involved organizations and positions needs to be clarified so that the responsibilities of each organization and the individuals within that organization may be discerned.
- Training and certification standards need to be finalized, published, and advertised to BC firefighting agencies.
- One or more of the departments involved must step forward and assume responsibility for the protection of the public from wildland/urban interface fires.
- A Structural Branch Director instructional course should be created. It should include a written or practical exam.
- Where possible, there should be a rotating list of qualified contractors available for course instruction and incident response. This sequence must be adhered to. It may be accomplished by allocating the responsibility of contractor assignment to *one* specific person.
- Policy needs to be written to stipulate who decides when an SPU is to be removed from its current assignment based on priority changes within the province. (For example: deploy on a first come first serve basis, unless there is a provincial DEC).

4.2 Quantitative Information

When analyzing historical data, SPU use is considered appropriate for interfaces which burned uncontrolled for two (2) days. This timeline allows for the decision to order SPUs to be made, transport time, deployment time, and the necessary run time.

During the period studied for this report, there were a total of 70 interface fires which were uncontrolled for more that two days. Table 4.2-1, identifies the year and region of each of these fires. It may be noted that due to the small quantity of information available regarding interface fires during the first half of the study period, this estimate is believed to be a minimum estimate.

Table 4.2-1: Number of BC Interface Fires Uncontrolled > 2 days

Year	Coastal	Northwest	Prince George	Kamloops	Southeast	Cariboo	TOTAL
1993/1994	1			4			5
1994/1995			1				1
1995/1996							0
1996/1997							0
1997/1998	1		7	7			15
1998/1999				1	1		2
1999/2000	2				6	1	9
2000/2001	1		1	1	3	3	9
2001/2002	2		1	6	1	2	12
2003/2004	4	2	1	6	1	3	17
TOTAL	11	2	11	25	12	9	70

Historically, the region that could benefit the most from SPUs is Kamloops. Conversely, the northwest fire region has had very few uncontrolled interface fires in the past 10 years. This is likely due to the fuel types and dispersed population. At a regional level, the Northwest Fire region does not need significant interface sprinkler protection equipment.

4.3 Forecasted Risk Assessments

4.3.1 Natural Resources Canada Wildfire Risk Report

The Pacific Forestry Centre of Natural Resources Canada has produced a map of the annual fire probability for British Columbia. In Figure 4.3-1, it is displayed overlaid with Regional District boundaries. The probabilities represent the annual probability (in percent terms) of a wildfire greater than 20 hectares occurring in a 1 x 1 km (100 ha) grid cell. A 1.1% annual probability represents a fire return interval of 1000 years, and 1% represents 100 years. This type of probability can be likened to flood events such as a 'one-hundred year flood'. Regions that have large areas with low fire return intervals are likely to see many wildfires in the coming years. The regions with concentrations of the lowest fire return intervals are East Kootenay, Peace River, Thompson-Nicola, and Okanagan-Similkameen.[**] The regions with the highest percentage of the province's total area with low fire return intervals are Cariboo, East Kootenay, Kitimat-Stikine, Okanagan-Similkameen, Peace River and Thompson-Nicola[††]. Any communities, isolated or urban, located in areas with low fire return intervals are at an increased risk for interface fires. For map, see *Appendix A. IV.i. NRCAN*

The same data overlaid with Forestry District boundaries shows six districts with concentrations of areas with low fire return intervals. These districts, at an increased risk for interface fires, are Cascades Forest District, Kamloops Forest District, Okanagan Shuswap Forest District, Peace Forest District, Quesnel Forest District and the Rocky Mountain Forest District.[***] The districts with the highest percentage of the province's low fire return interval areas are the Peace Forest District and the Rocky Mountain Forest district.[†††]

Mapped by Forestry Fire Centre, the areas with a high concentration of area designated as low fire return interval are the Prince George and Southeast Fire Centres. Areas with the highest percentage of the province's low fire return interval areas are Prince George, Kamloops and the Southeast Forestry Fire Centres.

4.3.2 Ministry of Forests Wildland Urban Interface Spotting Potential Maps

The Fire Protection Branch of the MoF has created maps of the six forestry fire centers that indicate areas with fuel types susceptible to spotting located within 2km of the interface. Because these fuel types, which are likely to spot, are so prominent in BC, the risk for wildland /urban interface fires mainly follows population patterns. According to these projections, the fire centers with the most spotting potential as a percent of their sizes are Cariboo and Kamloops Fire Centers. The regions with the most potential as a percent of the provinces total spotting area Cariboo, Kamloops and Prince George Fire Centers. According to this forecasting the Cariboo and Kamloops and Prince George fire centres require their own SPUs. Maps may be found in *Appendix A.IV.ii 1-6 Ministry of Forests Wildland Urban Interface Spotting Potential Maps.*

[**] Regions with a concentrated area with a probability class of 0.5 to 1.0.
[††] Regions with significant percentages of' the province's probability class of 0.5 to 1.0.
[***] Forestry Districts with a concentrated area with a probability class of 0.5 to 1.0.
[†††] Forestry Districts with significant percentages of' the province's probability class of 0.5 to 1.0.

4.4 Summary of Analysis of Need

Because the distribution of resources is yet to be allocated, Table 4.4-1 summarizes how the analysis of need is broken down into municipality, Forestry District, Forestry Fire Centre, and Regional District.

Table 4.4-1: Need Distributed by Risk Analysis and Location

Name	Boundary Type	Historical Fire Occurrence	Concentrated Risk		Large Percentage of Provinces High Risk Area		Expert's Recommendation
			NRCAN	MoF	NRCAN	MoF	
Cranbrook	City		-	-	-	-	✓
Kelowna	City	✓	-	-	-	-	✓
Merrit	City	✓	-	-	-	-	✓
Penticton	City	✓	-	-	-	-	✓
Osoyoos	Town		-	-	-	-	✓
Cascades	Forestry District	-	✓	-		-	
Kamloops	Forestry District	-	✓	-		-	
Okanagan Shuswap	Forestry District	-	✓	-		-	
Peace	Forestry District	-	✓	-	✓	-	
Quesnel	Forestry District	-	✓	-		-	
Rocky Mountain	Forestry District	-	✓	-	✓	-	
Cariboo	Forestry Fire Centre	-		✓		✓	
Kamloops	Forestry Fire Centre	-		✓	✓	✓	
Prince George	Forestry Fire Centre	-	✓		✓	✓	
Southeast	Forestry Fire Centre	-	✓		✓		

Cariboo	Regional District			-	✓	-	
East Kootenay	Regional District		✓	-	✓	-	
Kamloops	Regional District	✓		-		-	
Kitimat-Stikine	Regional District			-	✓	-	
Okanagan-Similkameen	Regional District		✓	-	✓	-	
Peace River	Regional District		✓	-	✓	-	
Thompson-Nicola	Regional District		✓	-	✓	-	

"✓" signifies need indicated by analysis
" - " signifies analysis not applicable

5 Moving Forward

Two needs have emerged from this study:

1- The administration and deployment of the units must be more efficient: the roles and responsibilities of the parties involved must be clearly defined and

2- The general firefighting population needs to be better educated about sprinkler protection: how to obtain the units (while smaller FDs may have heard of the units, many do not know how to requisition them). They also need to become familiar with when and where sprinkler protection is appropriate. Some I/Cs feel one structure does not warrant requesting an entire SPU while others feel this is an ideal use.

The following 11 points are fundamental to forming plans for future wildland/urban interface protection strategies in BC:

- The purpose of the UBCM is to represent and serve all local governments.
- The OFC's services include administration and enforcement of fire safety legislation, response to major fire emergencies, fire fighter certification, public fire safety education and advice to local governments on delivery of fire protection services.
- Recent changes in the BC government placed both the Fire Protection Branch and the Housing, Building & Safety Department in the Ministry of Forests and Range. The responsibilities of these two departments seem to include the features of an interface fire – wildland fires and building safety.
- UBCM SPU Program was designed to model and encourage municipalities to purchase their own sprinkler systems to contribute to community protection.
- National current best practices consist of sprinkler protection equipment owned and operated by provincial government forest fire management agencies.
- In its mission statement The Provincial Emergency Program (PEP) aims to reduce property loss by coordinating and assisting in response activities.
- Under the current system, the sprinkler systems are shared. They are not for use to protect any one given community. When they are deployed in one area – other areas are left vulnerable.
- If a given area, be-it a community, town, or RD, wants to secure *guaranteed* access to Structural Sprinkler Protection it must purchase its own equipment.
- Optimum WUI sprinkler systems should be compatible with other units within the province This includes the MoF's forestry equipment.
- Greater quantities of equipment do not necessarily equate into a safer province; it must be located and administrated effectively.
- Interface fires are rare occurrences.

Outlined below is list of options regarding information & education, training, distribution & ownership, and funding. Following this list, four action plans termed scenarios are presented. They are examples of ways to combine options based on the above 11-point list. Finally, some pros and cons of each scenario have been provided, but are to be considered inclusive not limiting. The adoption of a scenario is intended to be dynamic in that an entire action plan may be selected, or a different combination of the options provided can be assembled.

5.1 Options

5.1.1 Information and Education

Current information regarding the purpose of SPUs, their availability, when they should be ordered, and how they are ordered needs to be distributed to all fire departments (volunteer and career) located within the province. A summary of the above information should be sent directly to each department (approx. 400). The same information should also be posted on the websites of each of the following organizations:

- The Office of the Fire Commissioner
- MoF Fire Operations
- UBCM
- Housing, Building & Safety Department
- PEP
- Fire Chiefs' Association of BC
- Fire Prevention Officers' Association of BC

Additionally, similar information can be distributed in conjunction with the Community FireSmart Guidelines.

Other sources of information are private contractors who currently operate the SPUs. For example, Protech Fire and Hazard Control Inc., has proposed a 'Sprinkler Protection Unit Workshop'. This one-day presentation would include an introduction to the systems, instruction on how to identify interface danger zones, and hands on instruction on a basic sprinkler loop. There would be a charge associated with this service. Details and cost estimates can be found in *Appendix A.VI Contractor Workshops*.

5.1.2 Training

For firefighter safety, to optimize sprinkler effectiveness, and to combat liability issues regarding damages and injuries, training for firefighters who intend to participate in the deployment of SPUs should be standardized and regulated. It is up to the owner of each sprinkler unit to require its operators to be certified.

As a part of its governance role, the OFC should be the body responsible for establishing training standards. In addition to the standards currently being drafted, the OFC should include model lesson plans and post-training test. Training should involve hands-on as well as theoretical components. The theoretical component should include, but not be limited to: 'retreat and return' methods; plans to

account for no access to water, very short deployment times, and very spread out structures; and limitations on structural sprinkler protection. This training would differ from the existing *S215-Fire Operations in the Wildland Urban Interface* course by focusing specifically on Sprinkler Protection using local equipment. The hands-on training requires access to units not needed for deployment, or a small set of equipment devoted to training exercises. The actual training and certification may be executed by accredited employees of the Forest Protection Branch or by approved contractors.

5.1.3 Technical Specifications

The trailers currently used to transport the equipment are overloaded with equipment and not very maneuverable through back-country roads. Due to weight and terrain restrictions, the units need to be designed to accommodate more equipment in larger appropriate weight bearing containers such as semi-trailers, or each unit needs to consist of a smaller amount of equipment transported in smaller manoeuvrable containers that are able to negotiate logging roads.

Regardless of which other changes are made, the following small changes should be made on the current units. For firefighter safety, basic firefighting equipment should be included in the units. To ease deployment and tear-down, all boxes in the units need to be labelled with laminated, content lists. To speed deployment, decrease equipment weight, and increase compatibility with MoF equipment 2½" threaded hose may be replaced with 2½ " forestry quick coupling hose.

5.1.4 Distribution of Units: quantity and locations

Multiple options exist for the distribution of sprinkler protection equipment in BC as may be seen in the following chart, Table 5.1-1 Distributive Options for Sprinkler Protection Units:

Table 5.1-1: Distributive Options for Sprinkler Protection Units

Distribution Description	Number of Units	Size of Each Unit	Location	Primary Responsibility	Secondary Responsibilities	Notes
Current Distribution	4	20 roof kits 20 large kits 20 small kits plus accessories protects: 30 - 35 homes	Stored at Forestry equipment caches. Moved according to hazard and risk assessments in the province. For example, in the north at the beginning of the fire season, and moved south in the mid-late season.	Values in non-protected areas within the province.	Threatened municipalities within the province.	Transfer contents into 4 appropriate trailers with appropriate weight and carrying capacities.
Forestry Region	6 Coastal Northwest Prince George Kamloops Southeast Cariboo	15 roof kits 15 large kits 15 small kits protects: +/- 25 homes	Stored at Forestry equipment caches. Moved according to hazard and risk assessments in the province.	Values in non-protected areas within region.	Threatened municipalities within region and, if needed, values in other regions.	Divide existing equipment and some new equipment into 6 smaller more manoeuvrable trailers. For example, a 16' cube van (see Figure 1).
Fire District	5 Northwest Northeast Central Southwest Southeast	15 roof kits 15 large kits 15 small kits protects: +/- 25 homes	Stored at Forestry equipment caches. Moved according to hazard and risk assessments in the province.	Values in non-protected areas within Fire District.	Threatened municipalities within fire district and, if needed, values in other fire districts.	Divide existing equipment and some new equipment into 6 smaller more maneuverable trailers. For example, a 16' cube van (see Figure 5.1-1).

Regional District	Max 28	15 roof kits 15 large kits 15 small kits protects: +/- 25 homes	Stored with local firefighting equipment.	Values in non-protected areas within Regional District or partnered Regional Districts.	Threatened municipalities within Regional District and, if needed, values in other Regional Districts.	It is important to have some of theses units in the areas identified in Section 4.3 Forecasted Risk Assessments.
Municipality	Unlimited	Customized to each municipality.	Stored with local firefighting equipment.	Values threatened in municipality.	Values in neighbouring non-protected areas and communities covered by mutual aid agreements.	
Municipal Protection by Province	1	45 roof kits 45 large kits 45 small kits plus accessories protects: 85 - 100 homes	Kept at one of the Provincial Equipment Depots (Chilliwack or Prince George).	Communities and Municipalities threatened by wildfire. Agglomerations of values.	Smaller and remote values.	House equipment in a semi-trailer with 2 4x4s acting as 'pup trailers' to relay the equipment quickly

Figure 5.1-1: Ford E-Series Box Truck

5.1.5 Ownership and Funding

British Columbia's fire service situation is unique in Canada because of the emergence of private firefighting companies. This arrangement, which can be likened to a 'two-tiered' system, allows for ownership of two sources of structural fire protection within BC: Public and Private.

Public ownership of the equipment would be by either a municipal, regional, or provincial level. At local levels, municipalities and regional districts could purchase units for individual or collective use. Funding for equipment would come directly from the municipalities and regional districts or from grants. Alternatively, the existing units could be turned over to the local governments at minimal costs: eg. equipment replacement value or $1.00.

At a larger scale, protection would be provided at a provincial level. This can take two forms:

1- directly by owning the equipment.

In this case, ownership of the equipment could stay with the UBCM. However, based on a) national best-practices and b) their ownership and administration of complementary firefighting equipment, ownership of structural sprinkler protection lies with the MoF, specifically the Fire Protection Branch.

2- indirectly by providing funding to allow municipal and regional bodies with wildland urban interface fire potential to purchase equipment.

To provide funding, grant programs may be set-up individually or collectively from each of the groups with a vested interest in wildland firefighting and/or structural protection: the UBCM, Fire Protection Branch, the Housing, Building & Safety Department, the OFC, PEP, the Ministry of Forests and Range, or the Ministry of Public Safety and the Solicitor General. As a form of incentive, the following should be prerequisite to receiving grant monies: adoption of FireSmart Guidelines, provisions for mutual aid purposes and construction of equipment according to compatibility standards.

5.2 Scenarios

Various combinations of the above options could produce dozens of provincial programs. Based on the information gathered during the course of this study, four scenarios have been outlined.

5.2.1 Scenario 1 - Adapt Status Quo

The UBCM maintains ownership and a supervisory role. A contact at the UBCM must be kept abreast of the SPUs status and location. An MOU must be written to define the extent of the supervisory role.

The equipment is transferred into 4 trailers with appropriate carrying capacities. As the owners of the units, this transfer is paid for out of the UBCM's sprinkler program funds. At the beginning of the 2006 fire season, the units will be distributed across the province according to projected risk and weather factors.

The OFC continues to administer the program. As part of the MCC, OFC staff accepts requests for SPU support and directs deployment accordingly. OFC responsibilities include keeping an updated list of available contractors and determining which to send to each incident. Additionally, the OFC is responsible for ensuring consistency in methods and performance between the contractors.

At the conclusion of the fire season, dates are published for training sessions to run according to the standards established by the OFC. Instead of waiting for FDs to request training, VFDs and FDs are invited to participate in the session to be held at the MoF Fire Center Offices. Training is provided by one of the contractors. Nevertheless, to ensure consistency, one representative from the MoF and one representative from the OFC should be present at the first of each contractor's presentations. Cost coverage for the training sessions is charged to the participating FDs.

During the fire season, the MoF continues to operate the units in conjunction with contractors and volunteer/career firefighters trained on SPU use. MoF I/Cs asses situations and request SPUs from, if active, the MCC or directly from the OFC. SPUs are not to be moved without first contacting the acting MCC director.

Pros

Political

- Involvement of all players, MoF as active firefighting body, OFC as governing body and UBCM representing communities' interests.
- An MOU between the OFC and MoF has been recently completed.
- Government fulfills its responsibility to protect the public

Logistical

- To date, the existing equipment has been able to service those that need it.
- There is not an excess of equipment sitting unused.
- Increasing the number of units from three to four decreases each unit's travel time to fires.

Financial

- Increasing the number of units from three to four decreases the wear on each unit from travelling and while at fires.

Cons

Political

- The inability for the MoF, OFC and UBCM to come to an agreement regarding roles and responsibilities due to Policy and liability issues.
- UBCM currently does not have resources or knowledge to deal with deployment issues, while community protection is not covered by the mandate or budget of the MoF and the OFC is moving away from an operational model.
- No local government involvement.

Logistical

- This scenario does not provide the fastest response times.

Financial

- There is disagreement as to who is responsible for cost coverage if the deployment was not initiated by the MoF.
- FDs may not want, nor have the budgets, to send their firefighters to training sessions.

5.2.2 Scenario 2 – Focus Provincial Sprinkler Protection on Values in Remote Locations

While still charged with producing provincial training standards, the OFC is removed from the administration of the equipment. These responsibilities are transferred to the Fire Protection Program of the MoF. Deployment requests and contracts will all be issued through this department. The primary responsibility of the units is protecting values in remote locations.

As a part of the Fire Protection Program's equipment supply, deployment expenses are the responsibility of the MoF, save for when a municipality has requested aid. In this case, the municipality will reimburse the MoF for costs incurred.

The UBCM maintains ownership and a supervisory role. A contact at the UBCM must be kept abreast of the SPUs status and location. An MOU must be written between the MoF and the UBCM to define the extent of the supervisory role.

The equipment is transferred into 6 smaller trucks or trailers with appropriate carrying capacities. As the owners of the units, this transfer is paid for out of the UBCM's sprinkler program funds. One unit is located in each Forestry Region. When necessary, a unit may be relocated from a quiet region to a highly active one.

The MoF continues to operate the units in conjunction with contractors and volunteer/career firefighters trained on SPU use. In remote locations; when MoF and professional firefighters are busy controlling the spread of a wildland fire; private wildland firefighters such as the Red River Rangers, trained in wildland, WUI, and structural firefighting can set-up the units under the direction of the I/C. Training, which takes place between fire seasons, is instructed by contractors in conjunction with MoF representatives according to the standards laid out by the OFC.

Pros

Political

- Removing the OFC from deployment removes the "middle man" in deployment procedures.

Logistical

- Having one unit in each forestry region lessens travel time to interface incidents.
- The smaller trailers are more maneuverable to increase accessibility to access remote locations.
- The six units have potential to be combined into one large fleet in case of a firestorm.

Financial

- If the contents are in a truck, a towing company is not needed to move the trailers.

Cons

Political

- The budget and mandate of the MoF do not cover structural protection.

Logistical

- There is no link to a structural fire fighting organization.
- If contents are in a truck, a breakdown can prevent the equipment from being transported, whereas a trailer can be pulled by an alternate vehicle.

Financial

- Significant funding, training and FTEs would be required as the MoF executive may not support this option.
- If the truck breaks down, it must be replaced, or its repair may cause delays, whereas with trailers the hauling vehicle, it is the responsibility of the towing company.

5.2.3 Scenario 3- Transfer Sprinkler Protection Responsibility to the Municipal/Rural Fire Departments and the Private Industry

The OFC is relieved of all direct responsibilities regarding structural sprinkler protection. Instead, the OFC will focus on public education regarding FireSmart Guidelines. MoF will still attempt to prevent wildfires from reaching occupied land but will not be involved with the placement of sprinklers on structures.

Municipal and Rural FDs will be encouraged to purchase their own systems customized to the needs of their communities. i.e. based on water access – is a lake/stream accessible or are bladders required? What type of brush surrounds the community?

Fire Departments may hire contractors to train firefighters on how to best use the equipment. Contractors with training in *each of* municipal/structural, urban interface and wildland aspects of firefighting may also be hired to set-up private equipment in conjunction with local FD's equipment. An example of how a private contractor can facilitate hazard assessment, preplanning, and active response to interface fires may be seen in Figure 5.2-1: a flow chart created by Protech Fire and Hazard Control Inc.

Granting monies to pay for assessments and purchase equipment can be made available individually or collectively from the groups with a vested interest including: the UBCM, Fire Protection Branch, the Housing, Building & Safety Department, the OFC, PEP, the Ministry of Forests and Range, or the Ministry of Public Safety and the Solicitor General.

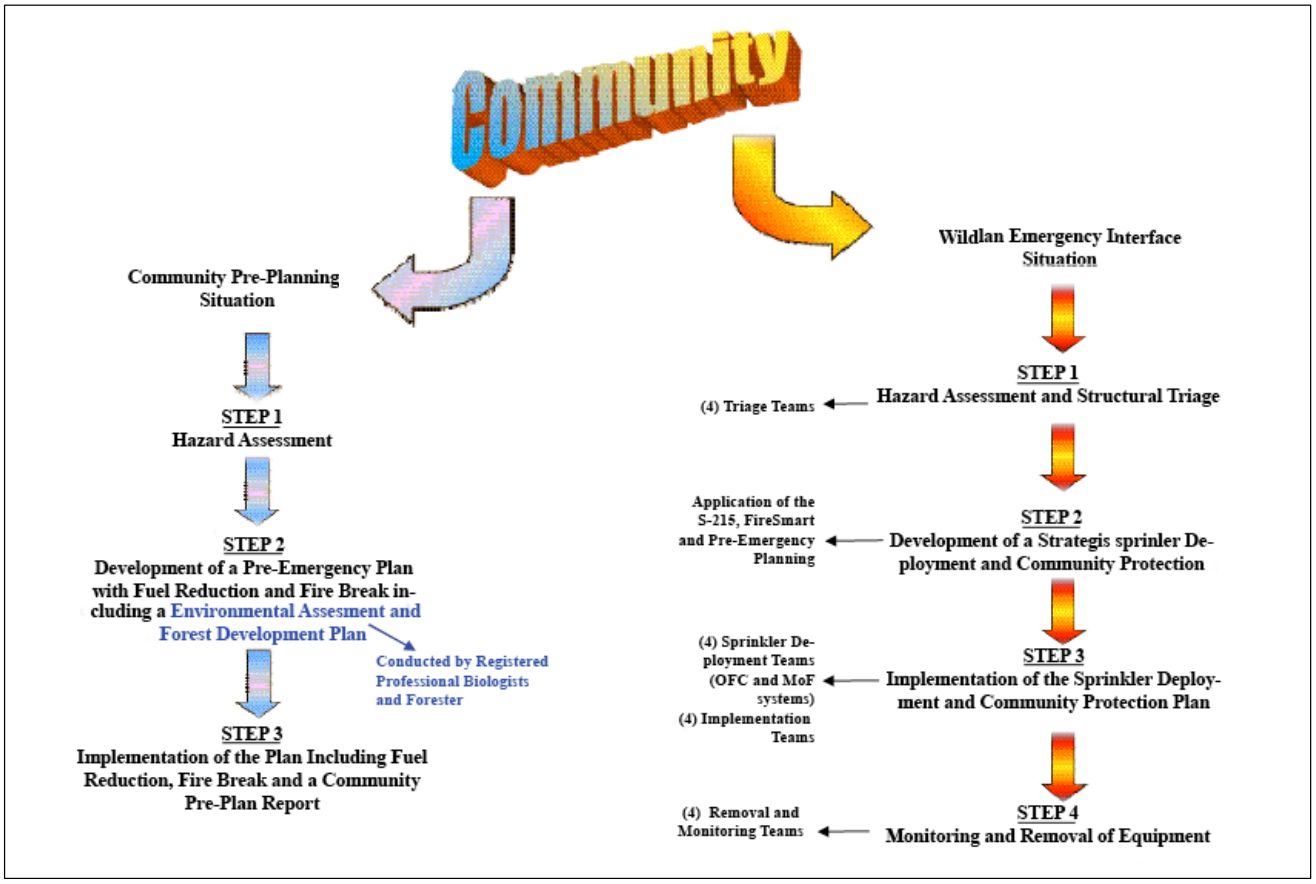

Figure 5.2-1: Protech Fire & Hazard Control and The Métis Provincial Council of BC. SPU Vision Presentation. June 28th 2005. Slide 21.

Pros

Political

- Fewer groups involved reduces conflicts of interest.

Logistical

- Kits are customised to suit municipalities and optimize protection.
- Local personnel can be trained and will facilitate deployment with their local knowledge.
- More units are likely to be built, which would increase the amount of protectable area in the province.
- The private companies are run by individuals with a significant amount of experience in the areas of interface, structural, and wildland firefighting.
- To free up career and volunteer firefighters, contractors may be hired to deploy municipal/regional fire department's units both in out of their jurisdictions.
- Transport time will be minimalized.
- Units can be used locally for other firefighting purposes.

Financial

- During quiet fire seasons municipalities may rent out their kits outside the province/country.
- Because of the rare occurrences of interface fires, municipalities may find it more cost effective to employ contractors instead of purchasing equipment.
- If the MoF requests the use of municipal units, the MoF funds the deployment.

Cons

Political

- Fire protection is generally considered a public industry.
- Properties outside the boundaries of rural and municipal fire departments do not have access to the resources of the private contractors.
- Training from contractors is no longer regulated or standardized.

Logistical

- In a large firestorm, falling embers may land 5-9kms into communities past the line of protected houses.
- Communities who choose not to purchase kits may be left vulnerable.
- Values-at-risk in remote locations do not receive structural fire protection.
- Communities choosing to rely on contractors risk dependence on private companies that could become over-extended during another firestorm year and may not be able to honour agreements with ALL municipalities and regions.

Financial

- Large amounts of municipal money are invested into many kits that are likely to sit dormant for the majority of the fire season.
- Some municipalities may have trouble allocating funds, and there may not be enough grant money to cover demand.

5.2.4 Scenario 4 - Focus Provincial Level Sprinkler Protection on Municipalities

A sizeable amount of wildland interface firefighting equipment is to be stored in a large collection, much like Ontario's Mobile Values Protection Unit. Ownership of the equipment remains with the UBCM, and administration responsibilities remain with the OFC. Deployment is allocated by the OFC to the contractors who will be assisted by any available trained local firefighters. Maintenance of the equipment is the financial responsibility of the UBCM, while deployment costs are charged to municipalities. When not in use for firefighting purposes the equipment is available to other provinces via the CIFFC or to the contractors to rent for training purposes.

As protection within the boundaries of municipalities is not under the mandate of the MoF, the ministry still attempts to prevent wildfires from reaching occupied lands, but is not involved with the placement of sprinklers on structures. In remote locations, structural protection is a homeowner responsibility. This risk associated with living outside protected areas needs to be made clear to homeowners. Following FireSmart guidelines and purchasing sprinklers are steps that can be taken towards reducing this risk. Very basic Homeowner Sprinkler Kits are available for purchase for under $200 from distributors such as Just-In Case Fire Ltd. Much more elaborate Home Protection Systems are available for around $3,500 from FireBreak Canada. The risk with relying on homeowner sprinklers is that, in the case of an evacuation, no one will be present to monitor and maintain the sprinklers. Cost and equipment details of these kits may be found in *Appendix A V Homeowner Sprinklers.*

Pros

Political

- Focusing program on municipalities provides protection a significant portion of British Columbians.

Logistical

- Appropriate for large fires and complex fires that municipal FDs are not equipped to fight.
- 4x4s allow equipment to be moved quickly and efficiently around municipalities.

Financial

- Renting the equipment to contractors and other provinces will help cover costs.

Cons

Political

- Urban centers with Fire Departments who have purchased their own local equipment could be overprotected.
- Discourages fire departments from purchasing their own equipment.
- Municipalities can develop OCPs dependant on the Province's equipment, which could be unavailable at times.

Logistical

- In a large firestorm, embers can pass the line of protected structures on the community's edge.
- Travel time from the equipment depot to a fire can be very substantial
- Not appropriate for small fires in small locations.
- Does not account for simultaneous interface situations within the province.

Financial

- New equipment has to be purchased.
- Large interface fires are very rare occurrences. A great deal of money could be invested into equipment that will not be used very often.

6 Conclusion

Wildland/Urban Interface Fires have been occurring in British Columbia for decades. Over the past two years, the province has taken steps towards minimizing the losses due to this type of fire. This report is intended to be used as a steppingstone in the decision-making processes by those in the position to further provincial defences against interface fires.

An analysis was conducted to determine if and where there is a need for SPU units in BC. This analysis was based on interview data, fire histories, and risk analyses. Consideration at different scales showed that there is a need for multi-jurisdictional wildland/urban interface sprinkler equipment in BC. This may be accomplished by having provincially owned units that operate both in and out of municipal boundaries, or by having compatible locally owned units which are governed by mutual-aid agreements.

Options have been laid out for potential standards and methods to: distribute information & education, provide and standardize training, distribute units across the province, allocate ownership, and provide funding. These options are all to be taken into consideration; however, the most appropriate combinations of options have been sorted into four scenarios. The scenarios are: 1 – Adapt Status Quo, 2 – Focus Provincial Sprinkler Protection on Values in Remote Locations, 3- Transfer Sprinkler Protection Responsibility to the Municipal/Rural Fire Departments and the Private Industry, and 4 – Focus Provincial Level Sprinkler Protection on Municipalities. Each of these scenarios has pros and cons, many of which are listed.

SPUs are a tool intended to be used in conjunction with other preventative and defensive tools and strategies. Regardless of which options are selected the following changes need to be implemented:

- A standard definition of what constitutes a wildland interface/fire needs to be agreed upon.
- Procedures for reporting wildland urban/interface fires based on the above definition needs to be written so that all fire starts may captured within a provincial database.
- All equipment within the province needs to be compatible.
- The chain of command relating all involved organizations and positions needs to be clarified so that the responsibilities of each organization and the individuals within that organization may be discerned.
- Procedures and standards should be advertised to all BC firefighting agencies.
- The administration and deployment of the units must be more efficient: the roles and responsibilities of the parties involved must be clearly defined and
- The general firefighting population needs to be better educated about sprinkler protection: how to obtain the units, and decide when and where sprinkler protection is appropriate.

Summaries of best-practice standards have been laid out regarding comparable programs in the Yukon, Alberta, Saskatchewan, and Ontario. In most cases, wildland/urban interface equipment is administered and deployed by the provincial forest fire management agencies. Based on national best-practice standards and the mandates of the Ministry of Forests and Range, UBCM and OFC, it is the recommendation of this report that Scenario 1, found in Section 5.2.1, moves forward. In this scenario:

- The UBCM maintains ownership of the SPUs,
- The MoF takes the lead operational role with the SPU program by maintaining and deploying the SPUs, and
- The OFC assumes a monitoring role by following its governance operational model which involves producing policies and standards to ensure equipment compatibility and operator competence.

At the conclusion of the very quiet 2005 fire season, there is a risk that British Colombians may be pulled into a false sense of security. However, this break may also be seen as a chance to increase the public's confidence in BC wildland/urban interface firefighting agencies since the 2003 Firestorm. It is hoped that this increased confidence will create an opportunity for communities to support the implementation of the initiatives outlined in this report.

7 Recommended Further Research

If further investment into community wildfire protection is planned, further research is recommended into other technologies available. For example, water cannons as used in Saskatchewan, house wraps, and Foams as used in California. Additionally, more information may be collected regarding the results of combining foams and sprinklers.

As SPUs are deployed to fires during the next few years, data may be gathered and analysed regarding: how often units are deployed, when and where they succeed or fail, expenditures vs values protected. This information can easily be kept in the Ministry of Forests Fire Charts Database, which already captures other wildfire statistics.

8 Additional Resources

Natural Resources Canada, Canadian Forest Service; Alberta Sustainable Resource Development. FireSmart: protecting your community from wildfire. Second Ed. Edmonton Alberta: Partners in Protection, July 2003.

Sprinkler protection units are a tool that can be used, when appropriate, to protect structures from interface fires. Long before an SPU is deployed, before a wildfire even begins, preplanning can save whole communities. The FireSmart manual is a detailed guide for planners, homeowners, emergency services personnel etc. Ownership of fire protection equipment such as SPUs does not alleviate the importance of implementing the measures recommended in this manual.

BC Forest Service, Protection Service. The Home Owners FireSmart Manual. BC Edition. Queen's Printer. n.d.

It is not realistic to try to distribute the eight-chapter FireSmart Manual at the homeowner level. The straightforward recommendations in the smaller Home Owners Manual, focused at BC residents, can easily be followed by individuals and communities. Complete with a Home & Site Hazard assessment, the manual can be used by private homeowners without formal fire hazard training. The steps outlined in the manual would make fire protection tools, such as SPUs, more effective.

National Fire Protection Association, Technical committee on Forest and Rural Fire Protection. NFPA 1144: Standard for Protection of Life and Property from Wildfire. 2002 Ed.