

**Bulkley Valley
Smoke Management Plan
(BVSMP)**

Pilot

August 9, 2013

Term: (10 months) Sept 1, 2013 to June 30, 2014

Approved by:

A handwritten signature in black ink, reading "Greg Tamblyn". The signature is written in a cursive, flowing style.

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1. Introduction and Purpose

The Ministry of Environment (MOE) has the mandate and authority to regulate smoke emissions from open burning under the *Environmental Management Act* (EMA) and the Open Burning Smoke Control Regulation (OBSCR). The OBSCR regulation is currently under revision and the new requirements are not yet set; however, this plan has been created using the most current information about what the requirements will likely be.

Multiple scientific studies have proven detrimental impacts on human health occur due to exposure from wood smoke. The provincial government, the OBSCR, and this Plan recognize and acknowledge this fact. This Smoke Management Plan (“SMP” or “Plan”) has been developed for the Bulkley Timber Supply Area (TSA) as a component of the proposed OBSCR which will enable smoke management planning. The plan strives to provide guidance for burn operators to manage smoke such that they can abate fire hazard in a timely, efficient and effective manner, and to minimize the negative impacts on human health and the environment. This is accomplished through implementation of the following five objectives:

1. Identify a series of smoke management strategies (including the use of custom venting forecasts, best management practices and careful timing of burn activities);
2. Create smoke management zones and develop specific risk-based ignition criteria and smoke release periods to be employed in the zones;
3. Define data collection and reporting tools and requirements;
4. Initiate dialogue with other stakeholders on the subject of open burning, through a consultation process; and
5. Commit to analyzing burn records and comparing them to ambient air quality data and fire hazard ratings.

This Bulkley TSA Smoke Management Plan was implemented as a pilot project during the fall burning season of 2011 to implement and test the effectiveness of the objectives that guided the revision of the OBSCR. This pilot project is based on the concept of adaptive management, and as such we will monitor, record and report on the outcomes. This 2013 version of the Plan incorporates specific recommendations with respect to learning experiences gained from analysis of the 2011 and 2012 Air Quality results. These recommendations include:

1. Giving more consideration to specific meteorological conditions that have the potential to trap/funnel smoke or further decrease visibility with respect to small aircraft operators,
2. Giving more consideration to utilization of other meteorological forecasting tools such as the Graphical Area Forecast (GFA),
3. Giving consideration to increasing burn timing windows where periods of high confidence venting are forecasted, and
4. Direct consultation with small charter aircraft operators to scope out opportunities to reduce the impact of smoke generated from debris burning on flight operations.

More details are incorporated into Section B5:
Short term Planning, Consultation and Notification

2. Scope and Application

This SMP (the Plan) developed for the Bulkley TSA will supersede the default requirements of the OBSCR for those who are signatories to the Plan. For those who are not signatories, they must follow default requirements set out in the OBSCR. The list of Plan signatories can be found in Appendix G.

This Plan applies to all Category 3 debris burn piles, as defined in the Wildfire Regulation (except for those outlined below). All other debris burns (eg: Category 2 burns) must follow default requirements defined by the OBSCR¹.

Out of Scope:

The following fires are exempted by the *Environmental Management Act*, the OBSCR, or require other authorizations and fall outside the scope of this Plan:

- The burning of leaves, foliage, weeds, crops or *stubble* for domestic or agricultural purposes or in compliance with the *Weed Control Act*;
- Fires set or controlled by a person acting under an order of a local assistant, as defined in the *Fire Services Act*, if the local assistant orders the fires for training purposes;
- Fires set for fire control under section 9 of the *Wildfire Act*;
- Resource management open fires under the *Wildfire Act* lit, fuelled, or used in accordance with that Act and the regulations under that Act;
- Campfires;
- Open burning of debris if it has been removed / relocated from the land where it originated;
- Open burning of anything other than timber harvesting or land clearing debris; and
- Open burning approved under a solid waste management plan or other EMA authorization².

Burns Requiring Additional Permitting³:

- Open burning approved under a solid waste management plan or other EMA authorization, may require additional permitting;
- Open burning of debris if it has been removed/relocated from the land where it originated; and
- Open burning of anything other than timber harvesting or land clearing debris.

¹ Refer to the Section 8 for Definitions of Category 2 and 3 Burns

² This is an example list only. There may be other types of burns requiring specific authorizations which are not listed here.

³ This is an example list only. There may be other types of burns requiring specific authorizations which are not listed here.

3. Smoke Management Strategies

Revisions to the Open Burning Smoke Control Regulation (OBSCR) are proposed to reduce or minimize impacts to human health and safety. The Bulkley Valley Smoke Management Plan (BVSMP) is intended to guide and empower burn operators to employ smoke management strategies in such a way that smoke release periods are minimized and smoke emissions from open burning are confined whenever practicable to periods with favourable venting.

3.1. Alternatives to Open Burning

Burn operators agree to consider alternate methods for fuel hazard abatement. Alternatives to open burning will be limited to situations where it is practical and economically feasible to do so as per Appendix B.

3.2. Venting Index and Custom Venting Forecasts

Impacts from smoke are strongly influenced by the atmospheric venting conditions. The OBSCR requires that burn operators conduct their burns during times when venting conditions are adequate for smoke dispersion. This plan recommends and endorses the use of Custom Venting Forecasts (CVF) instead of the Environment Canada Venting Index (EC-VI). For more information on venting, CVF and the EC-VI refer to Appendix C.

3.3. Best Management Practices

Burns operators will follow reasonable and relevant Best Management Practices (BMPs) as outlined in Appendix B to this Plan. BMPs are intended to, as much as possible, promote fast and efficient burns which minimize the amount of smoke generated during overnight periods when venting conditions are generally poor. Failure of a burn operator to meet the intent of the Plan may result in that operator being removed as a signatory to the Plan.

3.4. Burn Programs and the Progression of the Burn Season

Operators will attempt to focus their activities in the Primary (PSSZ) and Secondary Smoke Sensitivity Zones (SSSZ) to take advantage of increased daylight hours and better venting conditions earlier in the fall burning season. If the risk of an escape is too high for burning in the PSSZ and SSSZs, operators may elect to burn in the Tertiary Smoke Sensitivity Zone (TSSZ) where the risk of an escape may be lower.

3.5. Sensitive Time Periods

The following sensitive time periods must be avoided when burning in the Bulkley TSA:

- May, July, August and September long weekends,
- Smithers Midsummer Festival (first weekend in July),
- Smithers Fall Fair (third weekend in August), and
- Telkwa BBQ (Labour Day weekend).

No Category 3 fires will be initiated within two days prior to the start of and during these smoke sensitive time periods.

3.6. Set-back Distances

The proposed OBSCR stipulates that all fires must be setback from residences, businesses, school grounds, hospitals and community care facilities at least the following distances:

- From residences and businesses – 150 m if air curtain incineration is used, and 500 m if not⁴, and
- From school grounds, hospitals and community care facilities – 500 m if air curtain incineration is used, and 1000 m if not⁵.

Setback distances for fires where air curtain incinerators are *not* used can be relaxed to the equivalent distance of an air curtain incinerator if the operator is a Qualified Professional (QP), or is acting under the supervision of a QP and is employing BMPs in such a way as to significantly reduce emissions of smoke and avoid potential impacts to air quality.

⁴ If the Burn Operator (burn registration number- holder) is the same person as the occupied resident, the setback rules do not apply.

⁵ Setback distances from school grounds and hospital grounds apply to the property boundary.

4. Ignition Criteria (IC) and Smoke Release Periods (SRPs)

Ignition Criteria (IC) and Smoke Release Periods (SRPs) are key provisions of the OBSCR and the Bulkley SMP. The proposed, new OBSCR will likely allow for IC and SRPs to be altered through the smoke management planning process for the signatories of the Plan. Altering of IC and SRPs is a results-based process that adds flexibility for burn operators who have signed this Plan.

4.1. Smoke Sensitivity Zones:

The Bulkley TSA has been divided into three Smoke Sensitivity Zones:

Primary (PSSZ):

The PSSZ was created based on population density census data. Both Smithers and Telkwa have population densities greater than 200 people per square km, and a buffer zone of 10 km was put in place surrounding these communities. This is consistent with the proposed OBSCR. The PSSZ was modified slightly where drainage within this zone was in a direction away from the population centres. These modifications are noticeable on the west and east sides of the PSSZ.

Secondary (SSSZ):

The SSSZ encompasses an area of land adjacent to the PSSZ where smoke emitted into the atmosphere could, during periods of poor venting, drain towards the PSSZ.

Tertiary (TSSZ):

The TSSZ encompasses an area of land where, because of topographical features such as mountains, smoke emitted into the atmosphere is unlikely to drain towards the PSSZ.

Refer to Appendix A for a map of these zones.

Table 1 summarizes the specific IC and SRPs that must be followed in each zone.

Refer to Appendix E-1 for more detailed information on Daily Ignition Periods.

Table 1: Summary of Ignition Criteria and Smoke Release Period Requirements in each Smoke Sensitivity Zone

Smoke Sensitivity Zone	Venting Forecast on Day of Ignition*	Venting Forecast on Day After Ignition*	Daily Ignition Period Limits	Smoke Release Period
Primary	Good	Fair or better	Yes	4:00 PM the 1 st day after ignition
Secondary	Good	Fair or better	Yes	4:00 PM the 2 nd day after ignition**
Tertiary	Fair or better	Fair or better	No	4:00 PM the 4 th day after ignition

*Venting forecast is based on the daily afternoon venting forecast, not the morning venting forecast.

**For burns that are located on the border between the Primary and Secondary Smoke Sensitivity Zones, if the forecasted meteorological conditions are such that smoke from the SSSZ will be blown directly into the PSSZ, the PSSZ IC and SRP criteria will apply.

4.2. Smoke Release Period:

Only 10% of the burnt surface area can be emitting visible smoke by 4:00 PM on the day indicated in the above table (specific to each sensitivity zone).

If smoke is being released beyond the SRP from an area greater than 10% of the burnt area then the burn is in non-compliance with this Plan and the proposed OBSCR. In addition to other compliance tools, an officer or official may order the piled debris to be broken apart, scattered, extinguished or re-piled.

Note: As this Bulkley Valley Smoke Management Plan is considered a pilot, the requirement to meet the 10% criteria will be assessed to ensure the requirement is: specific, measurable, achievable, realistic, time-bound and spatially explicit. It is also expected that this assessment will be made where burn operators have applied Best Management Practices (BMPs) as defined by Appendix B.

Refer to Smoke Release Period (SRP) Sampling Procedures – Appendix E-2

The Ministry of Environment conducts air quality monitoring in Smithers and Telkwa and has the authority to issue burn bans and air quality advisories when required. When this occurs, no new piles may be ignited regardless of venting conditions.

Irrespective of venting conditions, ignition of fires must not occur if:

- Open burning restrictions have been issued by a different agency, e.g.: Ministry of Forests, Lands and Natural Resource Operations (MFLNRO);
- Smoke from fires would pose a risk to airports or highways;
- Prohibited materials are contained in the piles (see OBSCR); or
- Setback distances are not met.

5. Registration, Notification and Reporting

5.1. Registration

All burn operators conducting Category 3 burns must obtain a Burn Registration Number (BRN) prior to ignition.

5.2. Notification

All burn operators must notify those on the ***Notification List – Appendix E***, prior to 8:00 AM on the day of ignition of burn piles. This notification will be done by email.

5.3. Reporting

All burn operators conducting Category 3 burns must report the results of the burns to the custom venting forecaster (with a cc to the Ministry of Environment Meteorologist – Barry Watson), prior to 2:00 pm the day after ignition. Reporting requirements include:

- Burn location;
- Date burned;
- # of piles burned; and
- # of piles remaining (not burned).

Receiving ongoing CVFs is subject to the forecaster receiving these reports in a timely manner. Additional reporting comments may be added by the burn operator on a voluntary basis. The information provided through the *Burn Tracking and Reporting Sheet* is mutually beneficial to the custom venting forecaster, the MOE, and the MFLNRO.

The summary of the *Burn Tracking and Reporting Sheet* is to be submitted to the Ministry of Environment (MOE), prior to Feb 28, 2014. Signatories to this plan that do not submit these sheets will be unable to access custom venting forecasts in 2014.

The amalgamation of these reports from all Burn Operators will be used for the post season analysis of air quality and custom venting forecast (CVF) consistency, as per 6.1 and 6.2

For more information, refer to:

Appendix D - Burn Tracking, Reporting and Notification Sheet (excel sheet)

6. Monitoring

The Ministry of Environment maintains two ambient air quality and meteorological monitoring stations in the Bulkley TSA:

- Smithers at St. Joseph's elementary school, and
- Telkwa at the BBQ grounds.

Table 2: List of Parameters measured at each of MOE's Ambient Air Quality and Meteorological Monitoring Station

Smithers St. Joseph's	Telkwa BBQ Grounds
PM _{2.5} (Multiple instruments measuring this)	PM _{2.5} (Multiple instruments measuring this)
NO _x (NO & NO ₂)	N/A
O ₃	N/A
CO	N/A
UV* (Ultra Violet)	N/A
BC* (Black Carbon)	N/A
Temperature	Temperature
Relative Humidity	Relative Humidity
Wind Direction	Wind Direction
Wind Speed	Wind Speed
N/A	Precipitation
N/A	Snow Depth

*UV and BC refer to data captured with an Aethelometer, which after some analysis can *infer* the percentage of PM_{2.5} that has been generated by woodsmoke combustion.

6.1. Air Quality Monitoring, Advisories and Burn Bans

Throughout the burn season MOE will monitor air quality in both communities and may issue air quality advisories and/or burn bans should particulate matter concentrations approach or exceed provincial objectives (based on provincial policy). If an advisory and/or burn ban is issued, burn operators are required to adhere to the terms of the advisory and/or burn ban.

6.2. Post Season Air Quality Analysis

After the burn season ends burn operators will submit a finalized Notification and Reporting Sheet to MOE. An analysis will be conducted by a qualified professional in the spring of **2014** to determine if open burning activities and emissions were likely to have caused elevated particulate matter concentrations in Smithers and Telkwa. Fire hazard ratings and venting data will also be used in this analysis to discern if burn operators maximized burning opportunities throughout the season. This analysis will be used to inform the next phase of smoke management planning and changes to future iterations of the Plan may be made based on the results of this analysis.

6.3. Post Season Custom Venting Forecasting Consistency Analysis

After the burn season ends an analysis of the CVFs issued by FLNRO forecasters will be conducted to:

- Determine consistency of forecasts;
- Compare CVFs with Environment Canada's VI;
- Examine opportunities created or reduced by the CVF service; and
- Provide an overall assessment of the performance and Value of the CVF service.

The analysis will be used to inform the next phase of smoke management planning and changes to future iterations of the Plan may be made based on the results of this analysis.

6.4. Monitoring Indicators for Analysis

1. **Primary Smoke Sensitivity Zone (PSSZ) SRPs : Percentage (%) of piles** that are releasing smoke from ≥ 10% of the burnt surface area of the pile at the end of the Smoke Release Period (SRP). Target = 0%. (*Sampling Protocol- refer to Appendix E-2*) Note it is still a DRAFT
2. **Secondary Smoke Sensitivity Zone (SSSZ)SRPs : Percentage (%) of piles** that are releasing smoke from ≥10% of the burnt surface area of the pile at the end of the Smoke Release Period (SRP). Target = 0%. (*Sampling Protocol- refer to Appendix E-2*) Note it is still a DRAFT
3. **Air Quality:** Number (#) of days where PM 2.5 24-hour average exceeds the Province of BC's air quality objective of 25 ug/m3 in Smithers and Telkwa during the burn season. Target is "zero"
4. **Air Quality:** Number (#) of days where the PM 2.5 24-hour average exceeds 15 ug/m3.
5. **Air Quality:** Average PM 2.5 concentrations during the autumn open burning season (September 15 to December 15). Target is < 8ug/m3.
6. **Air Quality:** Number days that air quality advisories are in place during the autumn open burning season (September 15 to December 15). Target is "zero"

Note 1: "Burning Season" is considered to be (September 15 to December 15)

Note 2: Air quality monitoring readings will be taken in Smithers and Telkwa

7. Consultation and Communication Strategy

The 2012 BVSMP was updated based on comments from the public and from the independent analysis of the debris burning conducted under the 2011 BVSMPs. These changes were considered to strengthen the 2012 plan. This 2013 version of the BVSMP was not publicly reviewed because:

- the 2013 plan is essentially the same as the approved 2012 BVSMP, with no revisions that affect the objectives or responsibilities for reporting and consultation as required by the 2012 BVSMP, and
- the analysis of 2012 air quality during the open burning season⁶ concluded the smoke management plan was successful in avoiding the need for any air quality advisories during the 2012 open burning season.

In order to maintain a degree of communications with the public, copies of the 2013 BVSMP will be sent to the Bulkley Valley Community Resources Board (BVCRB), and to the Bulkley Lakes District & Airshed Management Society (BVLD-AMS), prior to the 2013 burning season.

The BC MOE published “Guidance on Applications for Authorizations under the Environmental Management Act – Consultation (September, 2010)”, which provides guidance regarding the consultation process that must be undertaken to meet provincial regulatory requirements. Because the new OSBCR has yet to be enacted, this guidance does not yet apply to the smoke management planning process. Should the OSBCR be enacted prior to the expiry of this Plan, this Plan will need to be re-signed by the statutory decision maker representing the Director. Statutory decisions may be appealed by aggrieved persons or parties through the Environmental Appeal Board.

8. Review and Amendments

This SMP is a provincial pilot project tied to the revision of the OSBCR. This edition of the SMP will expire on June 30th 2014. Before its expiry, stakeholders will gather to review the plan and make amendments as required.

⁶ Gramann, Uwe. 2013. Smoke Venting in the Bulkley Valley: An examination of the 2012 Open Burning Season.

Definitions and Glossary

The following definitions are for the purposes of this Bulkley TSA Smoke Management Plan-Pilot. *Italicized* font indicates a definition currently in use under the *Environmental Management Act*, the *Wildfire Act*, or regulations under those Acts.

Burn Operator: Anyone conducting a Category 3 burn within the Bulkley TSA that has signed Appendix G of this Plan

Category 1 Campfire: An open fire that meets both of the following requirements:

- (a) the open fire burns material in one pile no larger than 0.5 m in height and 0.5 m in width, and
- (b) the open fire is lit, fuelled or used:
 - (i) by any person for a recreational purpose, or
 - (ii) by a first nation for a ceremonial purpose.

Category 2 open fire: An open fire, other than a campfire, that:

- (a) burns material in one pile not exceeding 2 m in height and 3 m in width,
- (b) burns material concurrently in 2 piles each not exceeding 2 m in height and 3 m in width, or
- (c) burns stubble or grass over an area that does not exceed 0.2 ha.

Category 3 open fire: An open fire that burns:

- (a) material concurrently in 3 or more piles each not exceeding 2 m in height and 3 m in width,
- (b) material in one or more piles each exceeding 2 m in height or 3 m in width,
- (c) one or more windrows, or
- (d) stubble or grass over an area exceeding 0.2 ha.

Debris: Disturbed or undisturbed vegetative matter targeted for management or disposal by open burning⁷.

Ignition Criteria (IC): Outlines the minimum daily venting requirements to initiate an open burn, along with the times within that day when ignition can occur.

NOx: Oxides of Nitrogen (NOx) are produced by high-temperature combustion of fossil fuels and biomass for transport, heating and power generation. Initially, almost all of NOx emissions from combustion are in the form of nitric oxide, NO. However NO is then oxidized in air to the more toxic nitrogen dioxide (NO₂). NO₂ is precursor of ozone and photochemical smog.

⁷ Open burning of cardboard planting boxes is allowed if no non-debris material such as plastic wrapping or other garbage is included in the burn.

O₃: Ozone (O₃) is a gas that occurs naturally in the Stratosphere, where it has the important function of filtering UV radiation. At ground level it is a prime ingredient in smog in cities and many rural areas. Ground level ozone is a secondary pollutant, meaning that it is formed as the product of atmospheric reactions of primary emissions; namely nitrogen oxides and VOCs in the presence of sunlight.

Officer: As defined in the *Environmental Management Act*:

- (a) a person or class of persons employed by the government, a government corporation or a municipality and designated in writing by a director as an officer, or
- (b) a conservation officer.

Official: As defined in the *Wildfire Act*:

- (a) employed in the ministry of the minister responsible for the administration of this [the *Wildfire Act*] Act, who is designated by name or title to be an official by the minister for the purpose of a provision of this Act or of the regulations that is specified in the designation,
- (b) employed in the Oil and Gas Commission and designated, by the commissioner as defined in section 1 (2) of the *Oil and Gas Activities Act*, by name or title to be an official for the purpose of a provision of this Act or of the regulations that is specified in the designation, or
- (c) who is a conservation officer designated by the minister responsible for the *Environmental Management Act*, by name or title to be an official for the purpose of a provision of this Act or of the regulations that is specified in the designation.

PM: Particulate matter (PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

- PM₁₀ refers to all particles with an aerodynamic diameter of 10 micrometers (µm) or less.
- PM_{2.5} refers to all particles with an aerodynamic diameter of 2.5 micrometers (µm) or less.

Qualified Professional: A person who:

- (a) Is registered in British Columbia with an appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association; and, through suitable education, experience, accreditation and knowledge may be reasonably relied on to provide advice within an area of expertise related to this application, or
- (b) is approved by the director.

Smoke: The gases, particulate matter and products of combustion emitted into the atmosphere when debris is open burned.

Smoke Release Period: The period of time which commences at the initial release of smoke from open burning of debris on a parcel of land, and ends after not more than 10% of the burnt surface area continues to release visible smoke.

Stubble: Short stalks of grain remaining in a field after harvest. Stubble does not include land clearing debris.

Ventilation: A measure of the atmosphere's ability to rapidly disperse smoke.

VOCs: Volatile Organic Compounds (VOCs) are a varied group of compounds that are present in the atmosphere mainly as gasses at typical temperatures. These compounds include a variety of hydrocarbons such as alkanes, alkenes, alkynes, aromatics (eg: benzene, toluene), aldehydes (eg: formaldehyde) esters and some chlorinated chemical compounds. The sources of VOCs are diverse and include fossil fuel evaporation and combustion, biomass combustion, solvent use and industrial processes.

9. Acknowledgements

This Bulkley TSA - Smoke Management Plan (SMP) was created through the collaborative efforts and input of the Bulkley Valley Smoke Management Plan - Stakeholders Working Group.

This Working Group included representation from the following organizations:

Government Agencies

- MOE
- NW Fire Centre
- MFLNRO - Skeena-Stikine District
- BCTS

Licensees and Associations - Representing Burn Operators

- PIR - West Fraser Mills Ltd.
- Wetzink'wa Community Forest
- Canfor – Houston Division
- Woodlot Association
- Skeena Stockmen's Association

Special mention and thanks go to:

- Cindy Barden, BCTS – GIS Analyst for producing the GIS data layer, under very limited time constraints

Appendix A:

Map of

Bulkley TSA

Smoke Management Plan

Appendix A-1

Bulkley TSA Map showing:

- **Smoke Sensitivity Zones (SSZs)**
- **Custom Venting Forecast Zones (CVFZs)**

Appendix A-2

Map showing more detail of the Primary Smoke Sensitivity Zone (PSSZ) boundaries

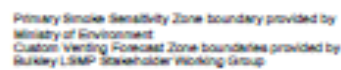
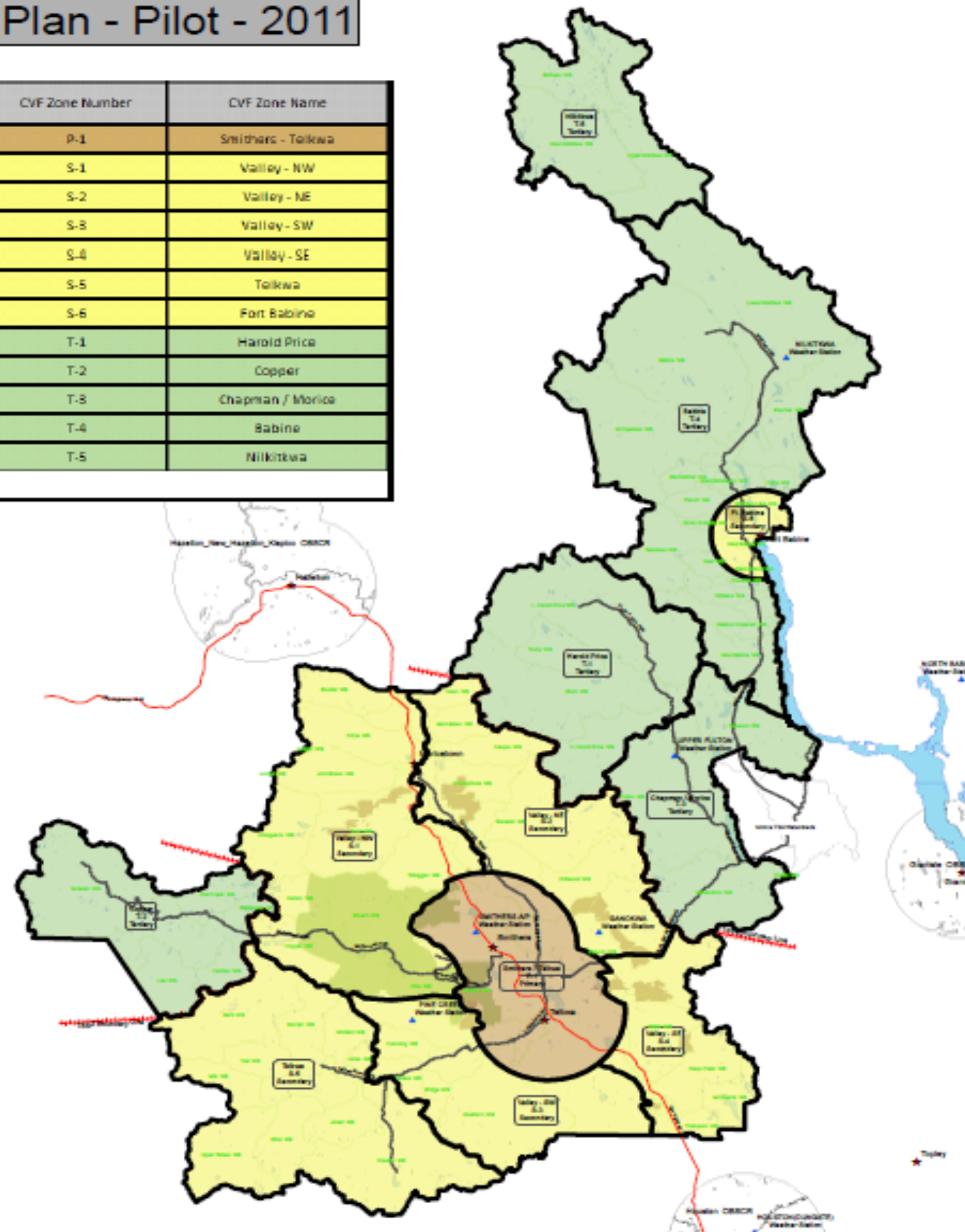
Please note that the maps within this document do not provide an adequate level of detail for operational burning.

Digital PDF copies of these maps and limited hard-copy maps (one copy per burn operator, if requested) will be provided through the office of the Ministry of Environment (MOE) or the Ministry of Forest and Lands and Natural Resource Operations (MFLNRO). These maps may be accessed from the following website address.

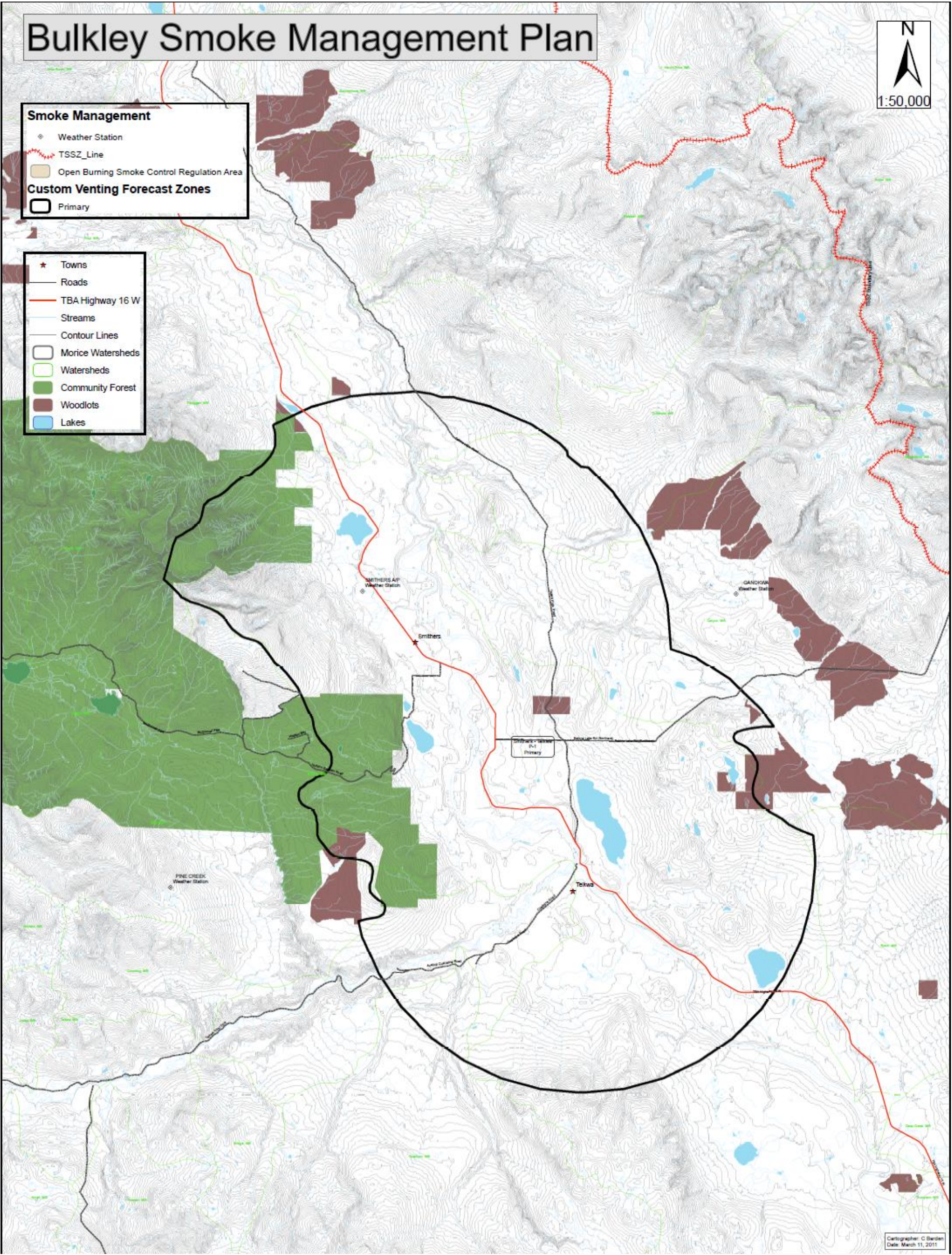
<http://www.for.gov.bc.ca/dss/>

Smoke Sensitivity	Venting on Day of Ignition	Venting on Day After Ignition	Daily Ignition Period Limits (Y or N)	Smoke Release Period	CVF Zone Number	CVF Zone Name
Primary	Good	Fair	Yes	4:00 PM the <u>1st</u> day after ignition	P-1	Smithers - Telikwa
Secondary	Good	Fair	Yes	4:00 PM the <u>2nd</u> day after ignition	S-1	Valley - NW
					S-2	Valley - NE
					S-3	Valley - SW
					S-4	Valley - SE
					S-5	Telikwa
					S-6	Fort Babine
Tertiary	Fair	Fair	No	4:00 PM the <u>5th</u> day after ignition	T-1	Harold Price
					T-2	Copper
					T-3	Chapman / Morice
					T-4	Babine
					T-5	Niikikwa

Smoke Release Period: < 10% of the Burnt Area may be emitting smoke



Map A-2: Primary Smoke Sensitivity Zone (PSSZ) – detailed boundary.



Appendix B: Best Management Practices (BMPs)

The intent of these Best Management Practices (BMPs) is to provide guidance for burn operators conducting Category 3 fires to meet the requirements for minimizing the risks of fire hazard and for reducing impacts on human health caused by smoke. Following BMPs should enable burn operators to minimize Smoke Release Periods.

B.1 Alternatives to Burning

Suggested slight wording update is included below.

Burn Operators agree to consider alternate methods for fire hazard abatement. Alternatives to Open Burning will be limited to situations where it is practical and economically feasible to do so.

Examples of how burning may be minimized or avoided may include doing one or more of the following:

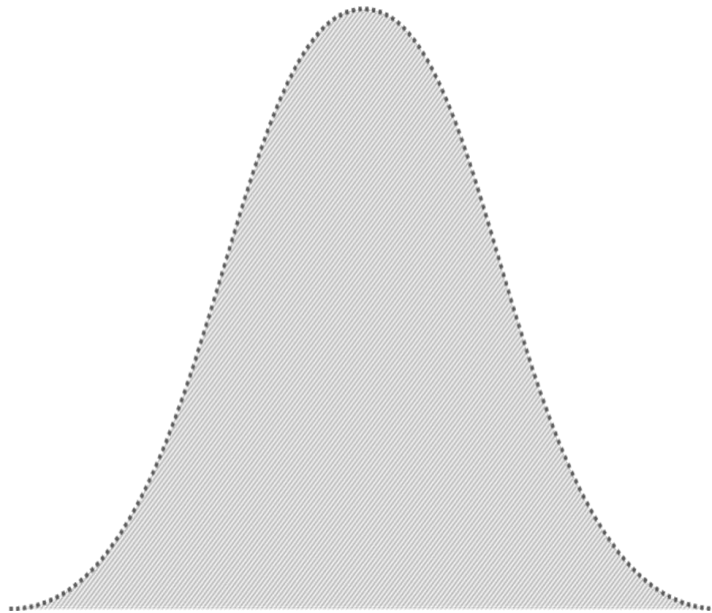
- Processing trees and leaving debris at the stump.
- Scattering and covering debris beside the road as opposed to piling during road right of way harvesting and road construction.
- Scattering debris on-block, where wildfire risk and hazard is low.
- Returning large debris back to the block using skidders or forwarders
- Allowing for opportunities for salvage and other forest products extraction, such as chipping, grinding, and mulching, and subject to Tenure limitations.
- Allowing for firewood to be taken
- Leaving smaller piles for wildlife habitat
- Leaving Small piles on wet sub-zones where Fire Hazard may be low

Where there is a high risk of smoke exposure from open burning within the Primary Smoke Sensitivity Zone, the use of an air curtain incinerator may reduce emissions.

B.2 Pile Construction, Curing and Seasoning:

Objective: To construct piles that achieve easy and safe ignition leading to a rapid, high intensity burn that minimizes both the impact of smoke on nearby populations as well as the risk of fire escapes.

- a. Pile as high as possible while maintaining safety for the machine operator and stability of the pile for subsequent ground crews.
 - base diameter should not be less than 4 meters,
 - height should not be less than 2-3 meters, and
 - fuel should be continuous/compact with mix of sizes.
- b. Place material into a haystack or bell shape to shed water and to increase the chimney/venting effect with height (see diagram following):



- c. Create a mixture of fuel sizes / types. Fines should be mixed with short chunks and non-merchantable stems.
- d. Avoid large stumps and root wads. These should be excluded from piles and dispersed back into the setting where possible.
- e. Avoid piling soils, rocks or any prohibited materials which may increase smoke generation.
- f. Make fewer, larger piles without compromising crew safety.
- g. Piles should be seasoned until they can combust easily. Typically the curing period should be at least one summer.

B.3 Planning for the Burn Season:

a. Burn Registration Numbers (BRNs):

The Wildfire Regulation requires burn operators to obtain Burn Registration Numbers (BRNs). Information contained in the registration includes: BRN, latitude and longitude, # of piles, current status, and other relevant comments.

b. Custom Venting Forecasters

Prior to the burn season, burn operators using the CVF service should send their registration information to the custom venting forecasters, along with additional data including elevation and timing of forecast needs. The custom venting forecasters will compile individual burn operator's registration data into the forecast venting zones established by this Plan.

c. Pre-season Burn Operators Planning Forum

A pre-season meeting may be organized to review all burn operators' registration data to review the SMP, assess potential conflicts within airsheds, and to agree on communication, notification and reporting strategies, as detailed in the Plan.

The proposed date for this meeting is Tuesday September 11th, 2012.

B.4 Crew Training:

Burns operators will ensure all supervisors; ground crews and machine operators are trained in rules and Standard Operating Procedures such as:

- Wildfire Regulation requirements;
- OBSCR requirements,
- Smoke Management Plan – especially smoke management strategies and BMPs,
- All relevant company-related Safe Work Procedures (SWPs),
- Burn pile construction,
- Burn pile ignition,
- Fire fighting,
- Fuel handling , storage and spill reporting, and
- Emergency Response Procedures (ERPs).

B.5 Short term Planning, Consultation and Notification:

This BVSMP pilot project strongly encourages burn operators to utilize custom venting forecasts as they are site-specific forecasts, rather than the broad regional forecasts published by Environment Canada. Once the burn operator chooses the source of venting data for the season, they cannot switch between sources of venting forecasts in search of the forecast which best suit their needs.

- a. If not receiving CVFs**, consult the daily venting forecast (available by phone or on MOE and Environment Canada websites) after 7:00 AM to ensure adequate venting conditions. Operators should consider alternate plans if venting is not adequate for burning in the PSSZ or SSSZ but is acceptable for the TSSZ.

b. Consult local weather forecasts and Custom Venting Forecasts (CVF)

Distance and direction from the burn site to population centres is to be considered when assessing the local wind speed and wind direction. The goal is to avoid and reduce health impacts to nearby population centres

If winds are not favourable, burn operators should consider burning in another area where winds are compatible or burning within the Tertiary Smoke Sensitivity Zone where wind direction may not be a factor.

In order to achieve this objective, when burning within the PSSZ and the SSSZ:

- **Consider the Wind Direction** when burning adjacent to or within the PSSZs.
 - the wind direction reported as direction wind is coming from
 - a line is drawn from the burn location to the nearby populations centre
 - the direction to the population centre is the inverse wind direction
 - even if venting is considered “acceptable”, is the smoke likely to vent towards nearby populations centre?
 - overnight cold air drainage down creeks and rivers
 - mountains (such as Hudson’s Bay Mountain) acting as a topographic curtain to limit smoke dispersal
 - **Consider the Wind Speed :**

Wind speed may increase venting and smoke dispersal, but if the wind is too strong, it may hinder venting, and increase the fire hazard and rate of spread.
 - **Consider the Mixing Heights** when burning adjacent to PSSZs.

As lower mixing height may limit venting
 - **Consider the impacts of strong inversions if forecasted.** This condition can cause late day and overnight smoke levels to rise to unacceptable levels despite venting forecasts of “Good and Fair”.
 - **Consider the impacts of approaching warm fronts**, particularly when snow is forecast. Smoke combined with other weather factors during these periods may lower visibility levels for small aircraft operators to unacceptable levels.
 - If receiving CVFs, and the forecasters are highly confident that conditions of very good venting will prevail, request an extension to the daily burning windows for a specific time period. The intent is to allow more burning during periods of exceptional venting and take the pressure off days where venting is less suitable.
- c. **Notify other stakeholders prior to 8:00 AM** of the day of ignition.

In addition to the email notification list, notifications should be provided to:

 - **Adjacent residences** verbally or in writing to outline burn plans and explain the reasons why burning is required.
 - **Nearby airports and float-plane charter operators** where smoke may potentially impact operations or generate concern for their facilities and user airspace.
 - **Local fire departments** directly prior to burning within or near their area of jurisdiction, or use the coordinated one contact approach established by local government.
- d. **Consult flight plans, if provided** by small aircraft charter operators, to determine if meteorological influences could reduce venting to a point where smoke in combination with other weather conditions could adversely impact visibility.

B.6 Ignition:

- a. **Prior to light-up:** observe local on-site weather conditions to ensure they appear consistent with the forecasted conditions.
- b. **Have Emergency Response Plans (ERPs) in place and reviewed with all crews.**
Ensure burn crews are adequately trained in fire suppression and that suppression resources including tools and equipment are available in accordance with the site-specific risks and conditions.
- c. **Ensure spill kits and emergency response tools and equipment are on-site where applicable.**
- d. **Follow Daily Ignition Times.** These apply only to the PSSZ and SSSZ. Ignition times stipulated in Appendix F are based on Environment Canada data, and are rounded to the nearest 15 minutes per week.
- e. **Ignite a test pile** to validate weather conditions. Monitor the test pile for 15 to 30 minutes after ignition to confirm direction and amount of smoke, ease of ignition, fire intensity and behaviour including risk of escape to adjacent fuel.
- f. **Confirm** that the smoke is having little to no impact on nearby public highways and airports.
- g. **Ensure health and safety of ground crews.**
 - Ensure crew is aware of how to assess pile stability and when to bypass unstable piles;
 - Identify escape routes;
 - Light piles in a direction which minimizes smoke exposure for burn crews.
- h. **Cease operation and re-assess,** if at any time during ignition the weather conditions change (i.e. wind direction/venting) and problems become apparent.
- i. **Ignite pile in a manner that promotes rapid combustion.**
 - Ignition point should be low in the pile and on the upwind side where possible. Ignition source should be of sufficient heat and duration to rapidly ignite the whole pile.
 - During wetter conditions or when pile construction and fuel types are not ideal, consider using a higher BTU-rated ignition source such as a liquid propane torch or Petrogel to ensure more rapid combustion.
 - The accelerant should ensure efficient and rapid ignition, as large amounts of smoke tend to be released during slow start-ups because the pile has not reached a high enough temperature to burn efficiently.

B.7 Document, Report and Follow-up:

- a. **Document:** record all aspects of the burn relating to compliance with these BMPs, and other requirements within the SMP.
- b. **Report:** communicate completion of burning to the MOE and the custom venting forecaster prior to 2:00 PM the day after burn pile ignition.
- c. **Follow-up:** verify success of burning by returning to cut blocks where practical, and record results with photographs.
- d. **Year-end assessment and follow-up:** participate in ongoing discussion with all parties involved in the SMP Pilot to share results and lessons learned.
- e. **Adapt:** amend the SMP or BMPs where applicable in striving for continual improvement.

Appendix C: Venting

Ventilation or ‘**venting**’ is a measure of the atmosphere’s ability to rapidly disperse smoke. It is a product of the height in the atmosphere to which smoke can rise, and the average wind speed within that column of air. Venting conditions are described either as a numerical index value between 9 and 99, or a categorical classification of: poor, fair, or good.

This Pilot SMP encourages the proponents to utilize custom venting forecasts as they are site specific forecasts rather than the broad, regional forecasts published by Environment Canada. Burn operators cannot switch between sources of venting forecasts in search of the forecast which best suits the days needs.

Environment Canada-Ventilation Index (EC-VI):

Environment Canada produces a ventilation index each day at 7:00 AM for specified locations throughout B.C. The index generation is mainly automated, with little forecaster intervention.

Table 2: The EC-VI is split into three categories based on the following values:

Minimum Value	Maximum Value	Category
9	33	Poor
34	54	Fair
55	99	Good

Accessing information:

The EC-VI is uploaded to the web daily by 7:00 AM. The website is: www.env.gov.bc.ca/epd/epdpa/venting/venting.html. Alternatively, the information is uploaded to the **B.C. Venting Index Hotline: 1.888.281.2992**. To obtain the Smithers VI, press ‘6’ for Skeena Region and then ‘1’ for the VI forecast.

Using the appropriate Venting Index:

For venting forecasts in the Bulkley TSA, the Smithers forecast should be used.

Custom Venting Forecast (CVF):

The provincial government (MOE and/or MFLNRO) usually employs meteorologists to issue site-specific venting forecasts during each autumn’s burn season. These venting forecasts are called Custom Venting Forecasts (CVF) because they are tailored to the exact location and elevation of individual burn blocks. They are offered as an alternative to the EC-VI. Forecasters will examine the benefits of incorporating data from the GFA (Graphical Area Forecast).

Costs of Custom Venting Forecasts:

The cost of this service is variable but there is a minimum charge of \$300.00 per season. Licensees with an Annual Allowable Cut (AAC) greater than 200,000m³ pay a fee based on a formula agreed upon at the Burn Operators Forum. BCTS licensees should note that the local BCTS business area may have paid for this service on your behalf.

Benefits of Custom Venting Forecasts:

Results to date demonstrate that this service does, while protecting human health through the reduction of air quality impacts from open burning, offer increased opportunity and flexibility to operators because they are:

- tailored to the geographic location and elevation of individual piles and or cut blocks,
- issued by 5:00 pm the day prior to when they are valid, and
- valid for three days.

How to sign up to receive Custom Venting Forecasts:

To sign up for CVF, burn operators should contact:

Greg Tamblyn at the Ministry of Environment (250.847.7224, or greg.tamblyn@gov.bc.ca)

Once sign-up is complete, the burn operator should provide the following information directly to the custom venting forecaster:

- Burn Registration Numbers
- lot number/location, and latitude /longitude or UTM coordinates
- approximate elevation(s)
- number of piles

How to Estimate (# of Piles and Volume of Waste Debris) for larger operators:

As there are multiple variables contributing to the volume of debris and the size of piles for larger operations, it is easiest to use just one factor:

(NAR * 2 = # of piles), where NAR = Net Area to be Reforested (ha) = Area Harvested

This factor applies to Major Licensees, Woodlot operations, BCTS contractors, and the Wetzink'wa Community Forest. The factor will be monitored over the 2013 burn season and assessed for accuracy in March 2014, and adapted as required.

Ranchers and other smaller operators should provide an actual count of piles.

Burn Operators will work the MOE and MFLNRO over the 2013 and 2014 to develop a standardized and mutually agreed to definition of: *Average Debris Pile Volume (APV)*

BVSMP - Appendix D - Debris Burning Registration, Notification and Reporting Sheet

The Green Columns -Are to be Reported by the Burn Operator to the MOE prior to 2 PM the day following Pile Ignition

[illegible]

Appendix E-1: Daily Ignition Periods

Information below is based on publicly available sunrise and sunset times averaged to the nearest 15 minutes and set on a weekly basis. Ignition can occur after the time identified in the 'All Zones Start' column and no ignition can occur after the time identified in the 'Finish' column.

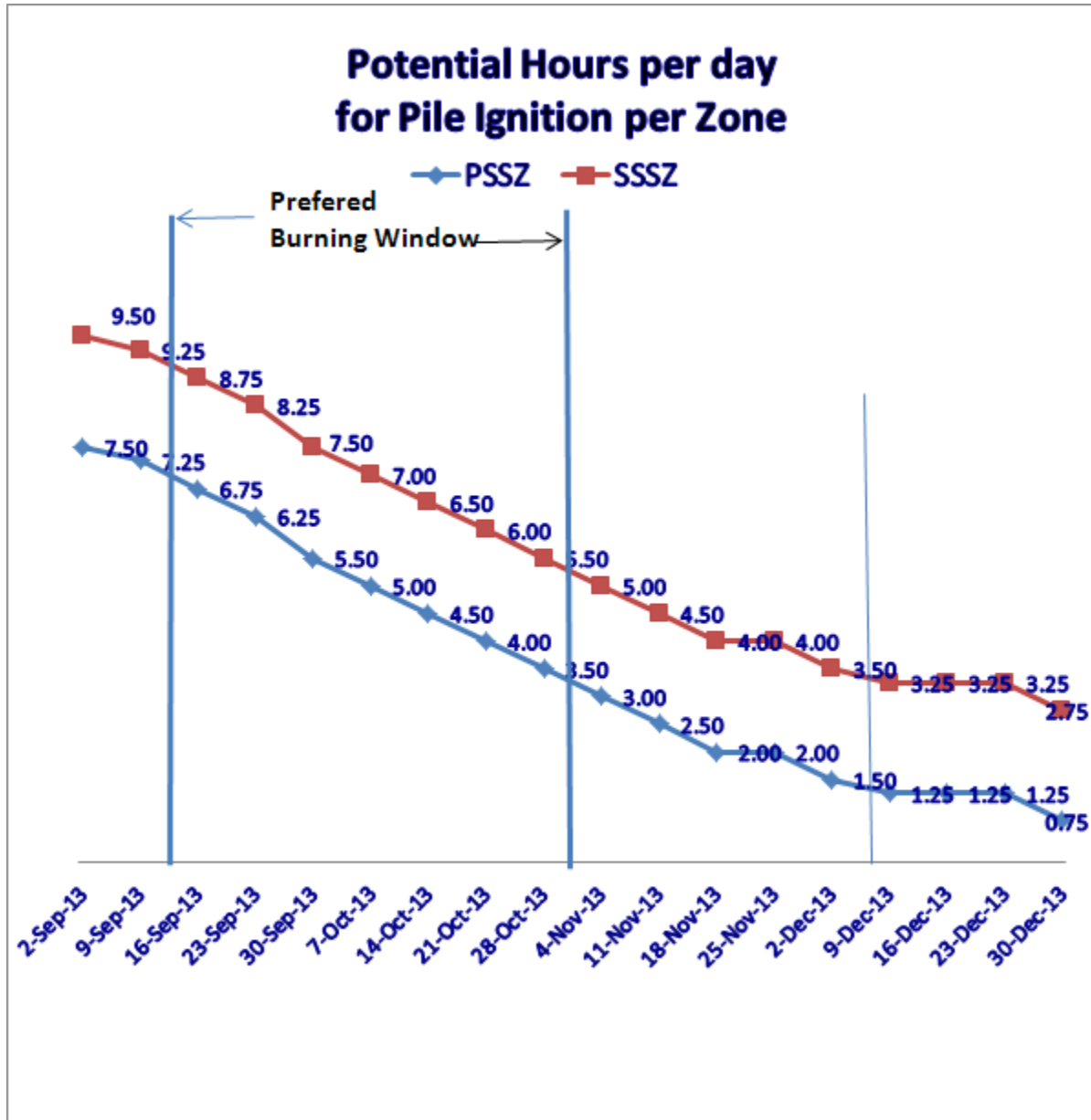
Following the daily ignition periods will ensure that burns occur during the time of day when venting conditions are best, and will allow enough time for burns to emit the majority of their emissions during the day and minimize the release of smoke overnight when venting is generally poor.

Table 3:
2013 Ignition Periods for the Primary and Secondary Smoke Sensitivity Zones

Bulkley Valley Smoke Management Plan -2013								
Appendix E-1 Daily Ignition Periods								
Primary and Secondary Smoke Sensitivity Zones - 2013 Ignition Periods								
Zone		Start one Hour After Sunrise						
PPSZ		Finish 5 - Hours Prior to Sunset						
SSSZ		Finish 3 - Hours Prior to Sunset						
All Zones				PSSZ		SSSZ		
Date	Sunrise	Sunset	Start	Finish	Duration (hrs)	Finish	Duration (hrs)	
2-Sep-13	6:30 AM	8:15 PM	7:30 AM	3:15 PM	7.50	5:15 PM	9.50	
9-Sep-13	6:45 AM	8:00 PM	7:45 AM	3:00 PM	7.25	5:00 PM	9.25	
Preferred Burning Window	16-Sep-13	7:00 AM	7:45 PM	8:00 AM	2:30 PM	6.75	4:30 PM	8.75
	23-Sep-13	7:15 AM	7:30 PM	8:15 AM	2:15 PM	6.25	4:30 PM	8.25
	30-Sep-13	7:30 AM	7:15 PM	8:30 AM	2:00 PM	5.50	4:00 PM	7.50
	7-Oct-13	7:45 AM	6:45 PM	8:45 AM	1:45 PM	5.00	3:45 PM	7.00
	14-Oct-13	8:00 AM	6:30 PM	9:00 AM	1:30 PM	4.50	3:30 PM	6.50
	21-Oct-13	8:15 AM	6:15 PM	9:15 AM	1:15 PM	4.00	3:15 PM	6.00
	28-Oct-13	8:30 AM	6:00 PM	9:30 AM	1:00 PM	3.50	3:00 PM	5.50
DST	4-Nov-13	7:30 AM	4:45 PM	8:30 AM	11:45 AM	3.00	1:45 PM	5.00
	11-Nov-13	7:45 AM	4:30 PM	8:45 AM	11:30 AM	2.50	1:30 PM	4.50
	18-Nov-13	8:00 AM	4:15 PM	9:00 AM	11:15 AM	2.00	1:15 PM	4.00
	25-Nov-13	8:15 AM	4:15 PM	9:15 AM	11:15 AM	2.00	1:15 PM	4.00
	2-Dec-13	8:30 AM	4:00 PM	9:30 AM	11:00 AM	1.50	1:00 PM	3.50
	9-Dec-13	8:45 AM	4:00 PM	9:45 AM	11:00 AM	1.25	1:00 PM	3.25
	16-Dec-13	8:45 AM	4:00 PM	9:45 AM	11:00 AM	1.25	1:00 PM	3.25
	23-Dec-13	8:45 AM	4:00 PM	9:45 AM	11:00 AM	1.25	1:00 PM	3.25
	30-Dec-13	8:45 AM	4:15 PM	10:00 AM	10:45 AM	0.75	12:45 PM	2.75
*Sunday Nov 2, 2013 marks the beginning of Daylight Savings Time								

Note the graph below demonstrates how the available hours per day for igniting piles in the Primary and Secondary Zones becomes more restrictive after late October.

Into November and December, poor venting conditions and snow on the piles makes burning much less favorable



Appendix E-2: Smoke Release Period – Sampling Procedures

Smoke Release Period (SRP): is the period of time which commences at the initial release of smoke from open burning of debris on a parcel of land, and ends after not more than 10% of the burnt surface area continues to release visible smoke.

Note: As this Bulkley Smoke Management Plan is considered a pilot, the requirement to meet the 10% criteria will be assessed to ensure the requirement has **SMARTS**

Specific, **M**easurable, **A**chievable, **R**ealistic, **T**ime-bound and **S**patially explicit.

It is also expected that this assessment will be made where burn operators have applied BMPs as defined by Appendix B.

The 2013 burning season field assessment should include 1 or 2 days of joint assessment with the burn operator, the MOE and compliance and enforcement officers from the MFLNRO.

To test that the Smoke Release Period (SRP) objective of not more than 10% of the burnt surface (black) area is continuing to release visible smoke, an annual sample will be conducted using the following procedures.

Table 3: Smoke Release Period Requirements for each Smoke Sensitivity Zone and “Burn Operator”.

Example:

Smoke Sensitivity Zone	Smoke Release Period	Target % Sample Population	Maximum # Piles to sample	Estimated Total # of piles
Primary	4:00 PM of the 1 st day after ignition	10 %	10	100
Secondary	4:00 PM of the 2 nd day after ignition**	1 %	5	500
Tertiary	4:00 PM of the 4 th day after ignition	0.1 %	3	2200
Total	XXXXXXXXXX	0.6%	18	2800

Procedure:

- Randomly Select Blocks to Sample
- Timing of the sample should occur between 3 PM and 5 PM
- Record: (Time and Date) Location, CP – Block, Burn Reference Number (BRN)
- Divide total length of Road into 6 equal length segments to establish sample points
- Sample the closest burn pile to the sample point
- Take enough digital photos of the blacken burn area to include the entire area. (Preferably in 1 or 2 photos)
- Is this pile burned area continuing to release smoke (Yes or No)
- If Yes: Measure and Record the area releasing smoke as (m*m)= m2 = “S” for Smoke
- Measure and Record the total area burned (m*m)= m2 = “B” for Burned
- Calculate $S/B * 100 = P$... P is the Percent of the area releasing Smoke
- Is P = 10 % (Yes or No)
- **Sum # of piles > 10 % Divided by Total # of piles for each (PSSZ and SSSZ) X 100 = Y. Y is the Percentage (%) of piles that are releasing smoke from ≥ 10% of the burnt surface area of the pile at the end of the Smoke Release Period (SRP). Target = 0%.**
- Include results in the annual summary report to the MOE

Appendix F: Debris Burning Notification List

This Appendix F - Debris Burning Notification List will be updated by the MOE prior to **Friday August 23, 2013**, and the **Annual Burn Operators Forum**

		Bulkley Valley Smoke Management Plan (BVSMP)-2013	
		Notification Email List - DRAFT July 11, 2013	
	Affiliation	Name	Email Address
1	Alpine Lakes Air	Sharon Bruns	alpinelk@bulkley.net
2	Alpine Lakes Air	Wendel Imhoff	info@alpinelakesair.com
3	BCTS	Terry Mackay	Terry.D.MacKay@gov.bc.ca
4	BCTS	Mike Buirs	Mike.Buirs@gov.bc.ca
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6	BL Com For	Holly Siegner	holly_siegner@lakescom.net
7	BVCRB	Dave Stevens	geek@uniserve.com
8	BVLD-AMS	Dave Duncan	Dave.Duncan@gov.bc.ca
9	CANFOR	Keith Jaarsma	Keith.Jaarsma@canfor.com
10	CANFOR	Rebecca Werner	Rebecca.Werner@canfor.com
11	CVF	Uwe Gramaan	weather@uniserve.com
12	CVF - Forecaster	Jennifer Hayek	Jennifer.Hayek@gov.bc.ca
13	CVF - Forecaster	Paul Emmet	Paul.Emmett@gov.bc.ca
14	EMC -	Dean Elmore	emc@xplornet.com
15	Forsite	Mike Bandstra	MBandstra@Forsite.ca
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17	Hampton	Richard Vossen	RichardVossen@HamptonAffiliates.com
18	Hampton	Doug Bysouth	Doug.Bysouth@HamptonAffiliates.com
19	HFP	Albert Seinen	albert.seinen@westfraser.com
20	HFP	Colin Vandergaag	colin.vandergaag@westfraser.com
21	HFP	Steve Williams	steve.williams@westfraser.com
22	HFP	Doug Dawson	doug.dawson@westfraser.com
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24	HFP	Onno Vandenhoek	onno.vandenhoek@westfraser.com
25	HFP	Tom Mackinlay	tom.mackinlay@westfraser.com
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35	NW Fire Centre	Duty Officer	Forests.NorthWestFireCentre@gov.bc.ca
36	PIR	Alan Baxter	alan.baxter@westfraser.com
37	PIR	Byron Becker	Byron.Becker@WestFraser.com
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40	PIR	Gary Quanstrom	gary.quanstrom@westfraser.com
41	PIR	Paul Schwarz	Paul.Schwarz@westfraser.com
42	Smithers Airport	Flight Services	airportadmin@smithersairport.com
43	Smithers Airport	Rob Blackburn	Rblackburn@smithers.ca
44	Smithers Fire Chief	Keith Stecko	kstecko@town.smithers.bc.ca
45	Telkwa Fire Department	Randy Cunningham	randycunningham@xplornet.com
46	Telkwa Fire Department	Corey Kortmeyer	corey.kortmeyer@CBC.com
47	Wetzinkwa Com For	Bill Golding	Bill.Golding@silvicon.com
48	Windfirm	Rick Ness	rick@windfirm.ca
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51	Woodlot	Christoph Deitsfelbinger	info@bearmountaineering.ca
52	Woodlot	Ireanea Weiland	iweiland@telus.net
53	Woodlot	Jay Baker	Jay.Baker@silvicon.com
54	Woodlot	Jon Seinen	jonseinen@hotmail.com
55	Woodlot	Dean Daly	lynx@bulkley.net
56	Woodlot	Mark Adamson	mview@bulkley.net
57	Woodlot	Chris Schippers	schipp@bulkley.net
58	Woodlot	Tim Toman	tstoman@bulkley.net
59	Woodlot	Steve Wright	tutshi1@hughes.net
60	Woodlot	Alan Baxter	Pinehurst@Bulkley.net
61	Woodlot	Charlie Morris	Circle_M_Enterprises@yahoo.ca
62	Woodlot	Bob Storey	CoyoteCattle@xplornet.com
63	Woodlot	Gary Hanson	Gary.Hanson@westfraser.com
64	Woodlot	Toddagan Hodson	Info@RedWillowRustic.ca
65	Woodlot	Janette Daly	janettedaly@gmail.com
66	Woodlot	Mark Adamson	MTNView@bulkley.net
67	Woodlot	M Farkvam	MFarkvam@telus.net
68	Woodlot	Rick Boonstra	RVBoonstra@xplornet.com
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70			august@meutzner.com
71			beepam@telus.net
72			cmfs44@hotmail.com
73			Dave.Snyder@gov.bc.ca
74			dmcrae@bulkley.net
75			DSBurkholder@juno.com
76			DWBMelissa@lakescom.net
77			DYShort@hotmail.com
78			envirobc@telus.net
79			Eric.Pierce@gov.bc.ca
80			forester@citywest.ca
81			forestreeguy@yahoo.com
82			FORFNOP_FCRNW@gov.bc.ca
83			gtstrimbold@telus.net
84		Jennifer Hill	hillbilliegal@yahoo.ca
85		Mike Bandstra	IMCEAEX:O=BCGOVT_OU=Victoria1_cn=Recipients_cn=MABANDST@Victoria1.gov.bc.ca
86			jeffrakochoy@xplornet.com
87			jrakochoy.ccn@lakescom.net
88			kathyleffers@yahoo.ca
89			kathy_waters90@hotmail.com
90			kthomson@houston.ca
91			lorn45@hotmail.com
92			Mike.T.Watson@gov.bc.ca
93			milesf@telus.net
94			mstrimboldh@hotmail.com
95			mwoodroff@hotmail.com
96			nanika@xplornet.com
97			northturn@bulkley.net
98		Paul Wandler	Paul.Wandler@gov.bc.ca
99			pjellett@bulkley.net
100			posselt@telus.net
101			powerverna@yahoo.com
102			sharonbonnett9@msn.com
103			soleil124@hotmail.com
104			tatalrose@xplornet.com
105			ttt@lakescom.net
106			vickhill@telus.net
107			wardrop@bulkley.net

Appendix G: Bulkley TSA Smoke Management Plan – Pilot Burn Operators – Annual Signatory Page

The signatories below agree to abide by the terms set out in this plan for its duration.

#	Burn Operator	Name Printed	Signature	Date
1				
2				
3				
4				
5				
6				
7				
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12				
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14				