NADINA RESOURCE DISTRICT
SMOKE MANAGEMENT PLAN

Term: September 11, 2017 to Dec 31, 2017

Approved By:

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BC British Columbia

BMPs Best Management Practices

BRN Burn Registration Number

CVF Custom Venting Forecast

ECCC Environment and Climate Change Canada

EMA *Environmental Management Act*

ERPs Emergency Response Procedures

IC ignition criteria

MENV Ministry of Environment and Climate Change Strategy

MFLNR Ministry of Forests, Lands, Natural Resource Operations and Rural Development

OBSCR Open Burning Smoke Control Regulation

RD Resource District

SMP Smoke Management Plan

SRP smoke release periods

SSZ Smoke Sensitivity Zones

1. Introduction and Purpose

The British Columbia (BC) Ministry of Environment and Climate Change Strategy (MENV) 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).

Multiple scientific studies have proven detrimental impacts on human health occur due to exposure to wood smoke (Naeher et al., 2007). The provincial government, the OBSCR, and this Plan recognize and acknowledge this fact. This Smoke Management Plan (SMP) has been developed for the Nadina Resource District (RD) as a tool to enable smoke management planning. The SMP strives to provide guidance for burn operators to manage smoke such that they can abate fire hazard in a timely, efficient and effective manner, as well as minimize the negative impacts on human health and the environment. This is accomplished through implementation of the following steps:

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 (IC) and smoke release periods (SRP)s to be employed in each zone;
3. Define data collection and reporting requirements; and
4. Initiate dialogue with other stakeholders on the subject of open burning and smoke generation, through engagement.

2. Scope and Application

This SMP developed for the Nadina RD will adapt specific requirements of the OBSCR for those who are signatories to the Plan. Specifically, Section 8 of Schedule B of OBSCR enables collaboration between an approved Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNR) Burn plan and an MENV SMP. To become a signatory to this SMP, a burn operator should print, sign and email a copy of Appendix F to the appropriate MFLNR and MENV representatives. If this plan is not followed, the default requirements of the OBSCR (and *EMA*) must be adhered to.

2.1 In Scope

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

2.2 Out of Scope

The following fires are exempted by the *EMA*, 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 that 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* authorization.

2.3 Burns Requiring Additional Permitting

Additional authorization from the MENV is required for the following:

- Open burning approved under a solid waste management plan or other *EMA* authorization;
- 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.

3. Smoke Management Strategies

Revisions to the OBSCR are proposed to reduce or minimize impacts to human health and safety. The Nadina RD SMP is intended to guide and enable burn operators to employ smoke management strategies in such a way that SRPs are minimized and smoke emissions from open burning are confined whenever practicable to periods with favourable venting.

3.1 Burning of Forestry and Land Clearing Debris

3.1.1 Material to be Burned

This Plan allows for open burning of piled land clearing debris on the parcel of land from which it originated. This Plan approves the open burning of liquid accelerant for ignition, allows cardboard planting boxes in the piles, but excludes all other materials.

3.1.2 Use of Custom Venting Forecasts

Under this Plan open burning is authorized to occur only when the burn operator has received a Custom Venting Forecast (CVF) issued by a forecaster approved by a Director under the *EMA*. Burn operators burning in accordance with this Plan must use CVFs as they are site-specific forecasts, rather than the broad regional forecasts published by Environment and Climate Change Canada (ECCC). The ECCC venting index (VI) may only be used if a CVF is unavailable.

3.1.3 Location of Open Burning

The location of the open burning is on cutting permit and road permit areas within the Nadina RD.

3.1.4 Smoke Sensitivity Zones

The Nadina RD has been divided into three Smoke Sensitivity Zones (SSZ)s based on geographical location and location of population centres. They are presented graphically in Figure A.1 of Appendix A, and described below:

1. **Zone A:** This SSZ is located around the communities of Houston, Granisle, Burns Lake, Francois Lake and the Highway 16 corridor. An amendment to the previous SMP was adopted to include a corridor of l km either side of the Bulkley River and the Morice River. These areas have high smoke sensitivity
2. **Zone B:** This SSZ is defined by the areas indicated in Appendix A where, because of topographical features, adjacency and location, smoke could impact population centres. This area has moderate smoke sensitivity.
3. **Zone C:** This SSZ is all other areas where, because of topographical features and location, smoke is less likely to impact population centres. This area has low smoke sensitivity.

4. General Requirements

4.1 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.

4.2 Best Management Practices

Burn operators will follow reasonable and relevant Best Management Practices (BMPs) as outlined in Appendix C. 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.

4.3 Burn Programs and the Progression of the Burn Season

Burn operators will attempt to focus their activities in the high and moderate SSZs (Zones A and B) to take advantage of increased daylight hours and better venting conditions earlier in the fall burning season. Because favourable venting forecasts tend to decline sharply after week 43 of the year, burn operators will attempt to conduct burning prior to week 44.

4.4 Operational Requirements for Open Burning

All open burning shall be conducted in accordance with the terms and conditions of the OBSCR, with the exception of the venting requirements for ignition identified in Section

8 of Schedule B of the OBSCR (Favourable Weather for Smoke Dispersion), which are replaced by those listed in Section 4.4.1 below.

4.4.1 Favourable Weather for Smoke Dispersion

Open burning may be initiated in accordance with the IC presented in table 4.1.

4.4.2 Burning Restrictions

Should the MENV impose an open burning ban for a geographic area, no new ignition shall occur in that area until the ban is rescinded.

Table 4.1: Summary of IC requirements in each SSZ.

Smoke Sensitivity Zone*	Venting Forecast on Day of Ignition		Ignition Guidelines
	Day 1**	Day 2 Forecast	
Zone A	Good	Good or Fair	Unrestricted burning as specified in the OBSCR
	Fair	Good, Fair or Poor	No ignition as specified in the OBSCR
	Poor	Good, Fair or Poor	No ignition as specified in the OBSCR
Zone B	Good	Good or Fair	Unrestricted burning as specified in the OBSCR
	Fair	Good, Fair or Poor	Only material dried in piles over at least one summer or from beetle (red / grey) infested stands. No ignition within 1 km of year round residences and / or when smoke is blowing into high sensitivity areas
	Poor	Good, Fair or Poor	No ignition as specified in the OBSCR
Zone C	Good	Good or Fair	Unrestricted burning as specified in the OBSCR
	Fair	Good or Fair	No ignition within 1 km of year round residences, otherwise unrestricted burning.
	Poor	Good, Fair or Poor	No ignition as specified in the OBSCR

* Sensitivity Zones are displayed in Appendix A.

** Day 1 venting refers to the afternoon (4:00 PM) venting forecast supplied in a CVF.

5. Engagement, Monitoring and Reporting

5.1 Engagement Process

It is the intention of the SMP that signatories to the plan will initiate dialogue with other stakeholders on the subject of open burning and smoke control, through a reciprocal engagement process. In this context, engagement includes:

- Notifying stakeholders prior to 9:00 AM of the day of ignition by sending an email to subscribers@openburning.ca;
- Placing physical signage on access roads notifying local permanent residents within 1 km of burn piles the day of ignition;
- Responding to local permanent resident concerns regarding open burn pile fires and smoke, to mitigate impacts in the current burn season;
- Forwarding air quality concerns to the MENV air quality meteorologist as well as the appropriate MFLNR contact person; and
- Considering recommendations brought forward by Nadina RD residents and organizations to reduce the impact of smoke, and implement continuous improvement for future SMPs.

5.2 Complaint Tracking

Upon receipt of a complaint registered by members of the nearby population and / or community, the details shall be submitted via email to EnvironmentalComplaints@gov.bc.ca and / or the RAPP line 1-877-952-7277. The call will be assessed and if warranted, an Officer will investigate as a possible violation of the OBSCR.

5.3 Burn Registration

The burn operator conducting Category 3 burns must obtain a Burn Registration Number (BRN) from the BC Wildfire Service at 1-888-797-1717 prior to ignition.

5.4 Reporting

In Zone A, the burn operator must report results of Category 3 burns to the custom venting forecaster and the air quality meteorologist, prior to 2:00 PM the day after ignition. Reporting requirements include:

- Burn location;
- Date burned;
- Number of piles burned; and
- Number 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 MENV, and the MFLNR.

A summary Burn Tracking and Reporting Sheet (Appendix D) is to be submitted to the air quality meteorologist, MENV, prior to Dec 31, 2017, or as otherwise agreed.

5.5 Wildfire reporting

All wildfires shall be reported to 1-800-663-5555 or *5555 from a cellular phone.

6. Environmental Impact

A person designated as a Director under the *EMA* may require open burning to be extinguished and ignitions to cease if, in his or her opinion, adverse impacts to the environment or public health and safety are occurring or may occur.

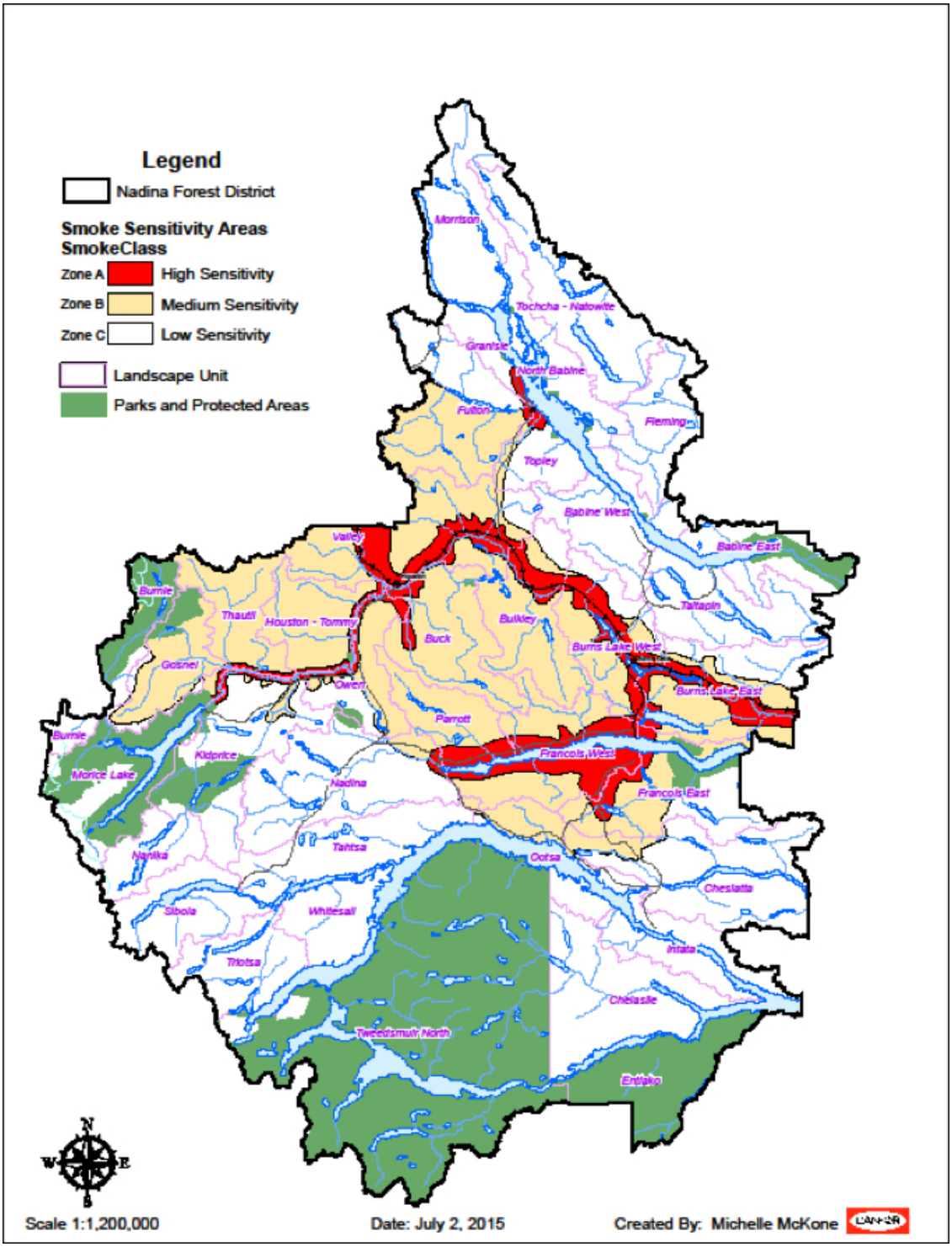
References

Naeher, L., Brauer, M., Lipsett, M., Zelikoff, J., Simpson, C., Koenig, J., Smith, K. (2007). Woodsmoke Health Effects: A Review. *Journal of Inhalation Toxicology*, 19, 67–106.

A. Smoke Sensitivity Map of the Nadina Resource District for 2017

The SMP map was last amended July 2, 2015. The SMP map is presented as Figure A.1. Note that more refined maps can be found at http://www.openburning.ca/.

Figure A.1: Smoke sensitivity zone map for the Nadina RD - 2017.



B. Daily Ignition Periods

Information below in figure B.1 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 “Zones A & B Start” column and no ignition can occur after the time identified in the “Finish” column.

Adhering to 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.

Figure B.1: Ignition periods for the High and Medium SSZs for 2017.

Nadina Smoke Management Plan -2017
Daily Ignition Periods for Smoke Sensitivity Zones A (High) and B (Medium)

	Zones A & B	Start one Hour After Sunrise							
	Zone A	Finish 5 - Hours Prior to Sunset							
	Zone B	Finish 3 - Hours Prior to Sunset			High	High	Medium	Medium	Low
				Zones A & B	Zone A High		Zone B Medium		Zone C Low
	Date	Sunrise	Sunset	Start	Finish	Duration (hrs)	Finish	Duration (hrs)	No Limits
	11-Sep-17	7:00 AM	8:00 PM	8:00 AM	3:00 PM	7.0	5:00 PM	9.0	No Limits
Preferred Burning Window	18-Sep-17	7:00 AM	7:45 PM	8:00 AM	2:45 PM	6.75	4:45 PM	8.75	No Limits
	25-Sep-17	7:15 AM	7:15 PM	8:15 AM	2:15 PM	6.0	4:15 PM	8.0	No Limits
	02-Oct-17	7:30 AM	7:00 PM	8:30 AM	2:00 PM	5.5	4.00 PM	7.5	No Limits
	09-Oct-17	7:45 AM	6:45 PM	8:45 PM	1:45 PM	5.0	3:45 PM	7.0	No Limits
	16-Oct-17	8:00 AM	6:30 PM	9:00 AM	1:30 PM	4.5	3:30 PM	6.5	No Limits
	23-Oct-17	8:15 AM	6:15 PM	9:15 AM	1:15 PM	4.0	3:15 PM	6.0	No Limits
	30-Oct-17	8:30 AM	6:00 PM	9:30 AM	1:00 PM	3.5	3:00 PM	5.5	No Limits
DST	06-Nov-17	7:45 PM	4:45 PM	8:45 AM	11:45 AM	3.0	1:45 PM	5.0	No Limits
		8:00 AM	4:30 PM	9:00 AM	11:30 AM	2.5	1:30 PM	4.5	No Limits
		8:15 AM	4:15 PM	9:15 AM	11:15 AM	2.0	1:15 PM	4.0	No Limits
		8:15 AM	4:15 PM	9:15 AM	11:15 AM	2.0	1:15 PM	4.0	No Limits
		8:30 AM	4:00 PM	9:30 AM	11:00 AM	1.5	1:00 PM	3.5	No Limits
		8:45 AM	4:00 PM	9:45 AM	11:00 AM	1.25	1:00 PM	3.25	No Limits
		8:45 AM	4:00 PM	9:45 AM	11:00 AM	1.25	1:00 PM	3.25	No Limits
	*Sunday Nov 5, 2017 marks the beginning of Daylight Savings Time								

C. Best Management Practices

The intent of these 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 SRPs.

C.1 Alternatives to Burning

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; and
- Leaving small piles on wet sub-zones where Fire Hazard may be low;

C.2 Pile Construction, Curing and Seasoning

The objective of this section is to provide burn operators with information on how 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. When constructing piles, follow the following steps:

(a) Pile as high as possible while maintaining safety for the machine operator and stability of the pile for subsequent ground crews;
(b) Avoid large stumps and root wads. These should be excluded from piles and dispersed back into the setting where possible;
(c) Avoid piling soils, rocks or any prohibited materials which may increase smoke generation;
(d) Make fewer, larger piles without compromising crew safety; and
(e) Piles should be seasoned until they can combust easily. Typically the curing period should be at least one summer.

C.3 Planning for the Burn Season

The following BMPs should be completed prior to the burn season:

(a) Obtain BRNs: The Wildfire Regulation requires burn operators to obtain BRNs. Information contained in the registration includes: BRN, latitude and longitude, number of piles, current status, and other relevant comments.
(b) Contact the Custom Venting Forecasters: Prior to the burn season, burn operators using the CVF service should send their registration information to the custom venting forecaster approved by the Director, along with additional data including: location, elevation, pile quantities, smoke sensitivity zones and timing of forecast needs.

C.4 Short term Planning, Consultation and Notification

The following BMPs relate to planning, consultation and notification:

(a) Consult local weather forecasts and CVFs. 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 Zone C where wind direction may not be a factor. In order to achieve this objective, when burning within Zones A and B:

- Consider the wind direction when burning adjacent to or within Zone A.
  - 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 acting as a topographic curtain to limit smoke dispersion.
- 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 height when burning adjacent to Zone A, 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; and
- If receiving approved 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.

(b) Notifying stakeholders prior to 9:00 AM of the day of ignition by sending an email to subscribers@openburning.ca; In addition to email notification, 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; and
- 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.

C.5 Ignition

The following BMPs relate to pile 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 Procedures (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 Zones A and B. Ignition times stipulated in Appendix B are based on ECCC 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; and
    - Light piles in a direction which minimizes smoke exposure for burn crews.

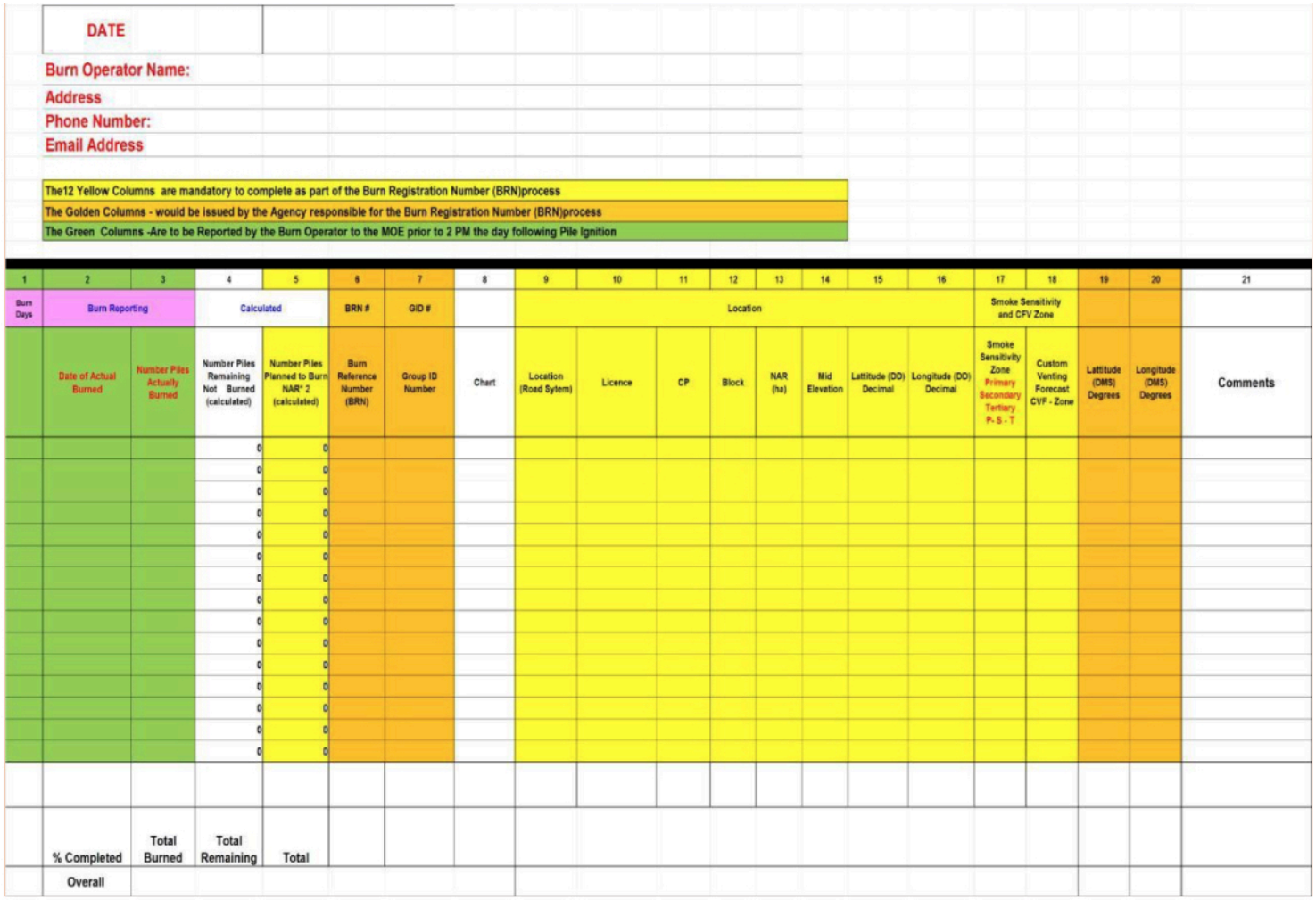
(h) Cease operation and re-assess, if at any time during ignition the weather conditions change (i.e. wind direction / venting) and problems become apparent;
(i) Ignite pile in a manner that promotes rapid combustion:
    - Ignition point should be low in the pile and on the upwind side where possible. Ignition source should be of sufficient heat and duration to rapidly ignite the whole pile; and
    - 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.
(j) 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.

C.6 Document, Report and Followup

(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 MENV 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; and
(d) Year-end assessment and follow-up: participate in ongoing discussion with all parties involved in the SMP to share results and lessons learned.
(e) Adapt: amend the SMP or BMPs where applicable in striving for continual improvement.

D. Debris Burning Registration, Notification and Reporting Sheet

Figure D.1: Debris burning registration, notification and reporting sheet for 2017.



DATE

Burn Operator Name:

Address

Phone Number:

Email Address

The12 Yellow Columns are mandatory to complete as part of the Burn Registration Number (BRN)process

The Golden Columns - would be issued by the Agency responsible for the Burn Registration Number (BRN)process

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

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Burn Days	Burn Reporting		Calculated		BRN #	GID #		Location								Smoke Sensitivity and CFV Zone				
	Date of Actual Burned	Number Piles Actually Burned	Number Piles Remaining Not Burned (calculated)	Number Piles Planned to Burn NAR* 2 (calculated)	Burn Reference Number (BRN)	Group ID Number	Chart	Location (Road Sytem)	Licence	CP	Block	NAR (ha)	Mid Elevation	Latitude (DD) Decimal	Longitude (DD) Decimal	Smoke Sensitivity Zone Primary Secondary Tertiary P- S - T	Custom Venting Forecast CVF - Zone	Latitude (DMS) Degrees	Longitude (DMS) Degrees	Comments
			0	0																
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	% Completed	Total Burned	Total Remaining	Total																
	Overall																			

E. Debris Burning Notification List

In order to receive burning notifications subscribe to the distribution list at http://www.openburning.ca. Authorized burn operators may post their intention to burn by sending an email to subscribers@openburning.ca. To become authorized to post burn notifications, please contact Ben Weinstein at (250) 847-7256 or Ron Donnelly at (250) 847-6378.

F. Signing the Burn and Smoke Management Plan

To become a signatory to this SMP, a burn operator should print, sign and email a copy of this page (including Table F.1 below) to the appropriate MFLNR and MENV representatives. Currently the appropriate representatives are Ron Donnelly at MFLNR (ron.donelly@gov.bc.ca) and Ben Weinstein at MENV (ben.weinstein@gov.bc.ca). If this plan is not followed, the default requirements of the OBSCR (and *EMA*) must be adhered to.

Table F.1: Nadina RD SMP signatory table.

Name	Organization	Signature	Date