

PRESCRIBED FIRE REVIEW: GREAT DIVIDE WILDLIFE OPENINGS

GREAT DIVIDE RANGER DISTRICT, CHEQUAMEGON-NICOLET NATIONAL FOREST

IGNITION DATE: APRIL 9, 2010

REVIEW COMPLETED: MAY 12, 2010

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OBJECTIVES OF THIS REVIEW

Chequamegon-Nicolet National Forest (“CNNF”) Acting Forest Supervisor requested the Review Team to determine the events leading to the escape, review the Prescribed Burn Plan (RX burn plan), and determine areas of improvement in prescribed burn planning and implementation.

According to the *Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide*, the objectives of this Review are to:

- Determine if the RX burn Plan was adequate for the project, and complied with policy and guidance related to prescribed fire planning and implementation.
- Determine if the prescription, including actions and procedures, set forth in the RXB Plan were followed.
- Describe and document factual information pertaining to this Review.
- Determine if overall policy, guidance, and procedures relating to prescribed fire operations are adequate.
- Determine the level of awareness and understanding of the personnel involved in regards to procedure and guidance.

The Review Team was briefed on their assignment on April 19 and 28 by CNNF Forest Fire Management Officer/Fire Staff Officer. In accordance with FSM 5140, the Team was directed to analyze the following 7 elements:

1. Seasonal severity, weather events, and on-site conditions leading to the wildfire declaration
2. Actions taken prior to the wildfire declaration for consistency with the RXB Plan
3. RXB Plan consistency with established policies
4. RXB prescription and associated environmental parameters
5. Approving Line Officer’s qualifications, experience, and involvement
6. Qualification and experience of key personnel
7. Causal agents contributing to the wildfire declaration

SUMMARY

The prescribed burn was well planned, organized, and conducted safely. It appears to have met most or all of the plan objectives. Nevertheless, it escaped on Day 2 (April 10).

Prescribed burns demand a constant high level of awareness, articulated by the need to frequently reassess anything that is unpredicted, unexplained, or unusual. During the day of the prescribed burn, there were two situations that could have, and should have, received greater scrutiny: the on-site weather observations that were

significantly inconsistent with same-time reports from the nearby Clam Lake weather station, and the late evening slop-over in Unit 5.

The relative humidity disparity could have been addressed on-site by asking another individual to double-check the weather readings and/or by requesting an updated spot weather forecast from the National Weather Service (as suggested in the RXB Plan). There is no indication of a second spot weather request in the Dispatch log. Confirmation of the on-site weather would have enabled the Burn Boss to make a fully informed decision about continuing the burn(s) or modifying mop-up and patrol strategies.

Secondly, the “discovery” of a small (30' x 30') slop-over in Unit 5 about 1930 should have alerted the Burn Boss to the potential for more the following day. That risk was increased by the distance between Units 2 & 3, and Unit 5. The risk of escape could have been addressed by the Burn Boss on the evening of April 9 by requesting a minimal number of additional resources to patrol and monitor the all the burned units earlier following morning. The final, and related, point of awareness came the following morning, when, according to the Burn Boss’ report, he observed that the RH “recovery” had been extremely poor.

Disputed daytime RH calculations, very low nighttime RHs, and an unexpected slop-over (minimal size) are clear indications of the potential for the prescribed fire to become problematic. These factors should enable astute Burn Bosses and fire managers to predict the need for additional situational awareness in order to avoid unfavorable outcomes. In this particular case, the wildfire that resulted was of minimal size and caused minimal resource damage. The most dramatic consequence of this experience seems to be a greater understanding of the need for more flexible thinking and quicker response to the unexpected.

SUMMARY OF EVENTS

On the morning of April 9, the RXB3 and one of the burn crew prepared for the prescribed fire by obtaining the fire weather forecast, the key elements of which were low RH 15-20% and light westerly winds. The overnight forecast was RH recovery of 80-85% and a 20% chance of rain. A belt weather kit would be (and was) used throughout the day to monitor site-specific weather conditions by a designated weather observer. In addition, a spot weather forecast was obtained via the fire dispatch office from the NWS and compared to the Clam Lake Weather Station readings, approximately 5 miles east of the proposed Rx Fire.

Appropriate Forest notifications were made along with a call to the Hayward WDNR Fire Ranger. The “Go-No Go” checklist was reviewed and signed by Great Divide District Ranger at 0800.

At 0930, a briefing was conducted for all assigned personnel. The burn roster of 8 exceeded by 1 the Rx Plan’s requirements for 7 employees. According to the Unit Log prepared by the RXB3, the briefing included the predicted weather and fire behavior, local maps, burn objectives, assignments, the ignition and holding plan, the contingency plans (including other available resources), safety and medical arrangements, communication plan, smoke concerns, escape routes and safety zones, and wildfire conversion procedures.

Unit 5 was test-fired, and burned successfully by 1200. Approximately 90 minutes later, the Unit had been mopped-up to Burn Boss’ satisfaction and all RXB personnel relocated to Unit 3. Unit 3 burns without incident.

By 1630, test-firing of Unit 2 has begun. The burn was completed in just a half-hour, with minimal residual “smokes” and mop-up.

At 1800, the RXB3 conducts an After Action Review and releases nearly all operations personnel. He reassesses Units 2 & 3, then re-checks Unit 5. At approximately 1935, the RXB3 discovers a minor slop-over in Unit 5. The [now]minimal staffing and distance between this unit and the others provides some challenge in containing the minor spread of the fire beyond its original control lines. He and the remaining engine depart Unit 5 at about 2200.

At 0845 April 10, the RXB3 reports for duty and notices that the relative humidity had remained at a very low and unpredicted level throughout the night (30-53%). By about 0930, the RXB3 and another Engine have returned to Unit 5 to recheck the slop-over. There are 8-10 “smokes” throughout the unit. Units 2 & 3 have not yet been checked.

At approximately 1100, the RXB3 is contacted by aerial patrol and notified that the prescribed fire escaped Unit 2 and upon growing in size, is declared a wildfire by noon.

SEASONAL SEVERITY, WEATHER, & ON-SITE CONDITIONS

FINDINGS

The US Drought Monitor had forecasted abnormally dry conditions preceding the RX Burn. The Drought Monitor had also identified the area as sustaining “moderate to severe drought” for several months before. As a result, the Forest had been staffing for wildfire suppression since mid-March, considerably early for the CNNF.

The day of the RXB, the Great Divide RD was predicted to have mild temperatures and low RH (17%); the RXB Plan RH was 20-50%. The winds were predicted to be South at 5 mph, increasing to 10 mph in the afternoon.

The evening forecast (4/9/2010) was “partially cloudy, becoming mostly cloudy, with a slight chance of rain after midnight”. The predicted minimum temperature was 35° with a maximum humidity of 79%; wind direction South at 5-9 mph, decreasing late.

A spot weather forecast was issued at approximately 1030 by the National Weather Service, Duluth.

The Clam Lake Remote Weather Station is 5 miles east of the RX burn area and is in similar fuel types. Weather parameters were recorded hourly by the RAWS and are on file. In general, the maximum temperatures on the day of and for 2 days following the RX burn were in the upper 50s to low 60s, with no precipitation, and minimum RH on 4/9 at 12% (1700 hrs.).

While the recorded temperatures at both locations was consistent, the RH values at Clam Lake contrast sharply (almost half) of the on-site weather observations before and during the RXB by the designated weather observer:

Time	On-Site RH	Clam Lake Wx RH
1330	33%	16%
1430	32%	16%
1500	36%	15%
1600	23%	16%

RECOMMENDATIONS

According to the Forest FMO/Staff Officer, routine maintenance at the Clam Lake Weather Station was conducted earlier that spring, in accordance with USFS policy. However, the disparity between the on-site observations and that of the weather station should have prompted the Burn Boss or Dispatch to contact the National Weather Service to request an updated Spot Weather Forecast and/or to further investigate the cause of the variances in readings.

To facilitate documentation of the weather conditions and prescribed fire behavior during the operation, the RX burn plan should have included a suitable form for recording these parameters. A second on-site weather observer might have provided validation of either the RXB location or the weather station data; assigning this task should be considered in the future.

PRESCRIBED FIRE PRESCRIPTION & ASSOCIATED ENVIRONMENTAL PARAMETERS

FINDINGS

The differences from the on-site observed weather and the Clam Lake Weather Station make it impossible to determine if the burn was conducted outside the prescribed parameter for Relative Humidity.

Environmental Parameter	RX burn Plan	Compliance
Temperature	35-80°	Met prescription
Relative Humidity	20-50%	Undetermined (see above)
Mid-flame Wind Speed	0-15 mph	Met prescription
Wind Direction	All	Met prescription
Dispersion Index	Fair+	Met prescription

According to his Unit Log, the RXB3 considered the predicted low RH at approximately 0700 but stated he decided to proceed based on the “cooler” (56°) temperatures and light wind speeds. The RXB3 indicated that firing operations would cease if the on-site RH crossed below the lower limit in the Plan. Unfortunately, the conflicting weather data did not provide the RXB3 with an accurate assessment of the actual conditions. This eliminated his ability to make an informed decision about proceeding with the prescribed burn (or portions thereof).

ACTIONS TAKEN PRIOR TO DECLARATION OF THE WILDFIRE

CONSISTENCY WITH RX BURN PLAN

The prescribed burn plan was developed using the guidance contained set forth in the Interagency Prescribed Fire Planning and Implementation Reference Guide, 2008 as well as those set forth in Forest Service Manual (FSM) 5140. Comments are included by element:

Element 1: Signature Page - All required information and signatures were obtained.

Element 2: Go/No-Go Checklist – The Agency Administrator checklist was completed, however the Prescribed Fire Checklist was not completed. *Recommendation* - For each day of active ignition on a prescribed fire, a separate daily Go/No-Go checklist is required.

Element 3: Complexity Analysis Summary – Sub-elements will be discussed individually.

1. Potential for escape – Sufficiently met the intent of the analysis.
2. The number and dependence of activities - Sufficiently met the intent of the analysis.
3. Off-site values – The consequences of potential damage to off-site timber resources could have been identified as a moderate value due to the lower value of charred timber in local timber product markets.
4. On-site values - Sufficiently met the intent of the analysis.
5. Fire behavior - Sufficiently met the intent of the analysis.
6. Management organization - Sufficiently met the intent of the analysis.
7. Public and political interest - Sufficiently met the intent of the analysis.
8. Fire treatment objectives - Sufficiently met the intent of the analysis.
9. Constraints - Sufficiently met the intent of the analysis.
10. Safety - Sufficiently met the intent of the analysis.
11. Ignition procedures/methods - Sufficiently met the intent of the analysis.
12. Interagency coordination - Sufficiently met the intent of the analysis.
13. Project logistics - Sufficiently met the intent of the analysis.
14. Smoke management - Sufficiently met the intent of the analysis.

Element 4: Description of the Prescribed Fire Area – Sufficient physical description of the proposed burn units and project area. Sufficient vegetation and fuels description. No unique features to discuss within the project area. Sufficient location and units maps included.

Element 5: Objectives – Sufficient description of project objectives including measurable parameters to determine the level of success.

Element 6: Funding – Sufficient description of per acre cost estimate as well as identified funding code. Consider utilizing additional fire training funding in order to support trainee positions.

Element 7: Prescription – Sufficient range of measurable criteria and environmental conditions during which the prescribed fire may be ignited. Good narrative summary of expected fire behavior inside and outside of the burn units based on fire behavior modeling runs.

Element 8: Scheduling

- a) Ignition Time Frames/Season(s) – *Recommendation:* Although the language “The burn can be accomplished anytime conditions allow objectives to be met”, allows for a tremendous amount of flexibility to implement the burn(s), it doesn’t adequately describe when the preferred window of opportunity to optimally achieve the project objectives would exist and/or when implementation may actually do more harm than good (example: following green-up??). Consider a bit more specificity in future RX plans.
- b) Project Duration - *Recommendation:* Consider a longer duration for implementation to account for hold-over vegetation, stumps, downed materials and any logs etc.
- c) Constraints - See comments (a) above.

Element 9: Pre-Burn Considerations

- A. Considerations (On-Site and Off-Site) – *Recommendation:* Consider the use of a minimal hand-line or other method fire line construction around the burn units in addition to the use of a wet line, especially in abnormally dry year.
- B. Method and frequency for obtaining weather and smoke management forecast(s) – *Recommendation:* An additional spot weather forecast should have been obtained as well as consultation with the weather service regarding the difference of on-site versus local weather station RH parameters as per the direction in the burn plan.
- C. Notifications – sufficient pre-burn notifications were made.

Element 10: Briefing – an adequate pre-burn briefing was given to all personnel.

Element 11: Organization and Equipment – minimum organization and equipment guidelines were met with fully qualified personnel.

Element 12: Communication – Sufficient radio and telephone communications channels were identified in the burn plan. Some personnel discussed poor communications issues during the implementation phase of the burn.

Recommendation: Consider requesting a Forest-wide radio coverage analysis and upgrading the radio system to ensure effective communications.

Element 13: Public and Personnel Safety, Medical – Adequate procedures and process for medical emergencies were identified in the burn plan.

Element 14: Test Fire – An adequate description of the location and documentation procedures of the test fire was included in the burn plan.

Element 15: Ignition Plan - An adequate description of the firing methods, devices, techniques, sequences, patterns, and ignition staffing was included in the burn plan.

Element 16: Holding Plan – All aspects of the holding plan as written should have been sufficient for successful completion of this project, under normal weather and drought conditions. However, under abnormally dry conditions such as are being experienced this year, it would be appropriate to utilize additional mop-up and patrol standards. *Recommendations:* utilize a minimal hand line around all burn units in addition to the wet line.

Additionally, per the burn plan, all slop over's should have been extinguished or lined the evening of the burn. Finally, consider modifying the second days patrol plan to include an additional patrol unit given the distance between the burned units as well as having patrol resources start earlier in the day.

Element 17: Contingency Plan – All aspects of the contingency plan element were sufficient as written, however, one *recommendation* would be to give the burn boss and holding resources an opportunity to deal with unexpected slop over's by moving the contingency boundaries a little further away from the burn units (if possible). The fact is, a contingency plan is just that, in the event of an unintended slop over, where is a likely place to be able to re-establish control over the prescribed burn. There is never an intention to utilize the contingency plan under normal circumstances and therefore absent other constraints or limiting factors (such as private lands or sensitive areas), RX planners should give the prescribed burn team sufficient space to be successful.

Element 18: Wildfire Conversion – all aspects of the wildfire conversion element were sufficient as written.

Element 19: Smoke Management and Air Quality – *Recommendation* – include a smoke dispersion map which shows the probable dispersion of the plume given the acceptable wind directions in order to help identify potential smoke sensitive targets.

Element 20: Monitoring – *Recommendations* - On-site fire behavior estimates, weather observations, and smoke dispersal should be documented within the burn plan by the RXB or designee. Consider utilizing pre and post photo points to document changes in vegetation and including these in the burn plan file.

Element 21: Post-Burn Activities – Sufficient as written.

RXB PLAN CONSISTENCY WITH FOREST POLICIES

The approved burn plan met FSM 5142.2 requiring a site specific RX burn plan and the plan addressed all elements described in the Interagency Prescribed Fire Planning and Procedures Guide (2008) and the FSM 5140.

QUALIFICATIONS OF KEY PERSONNEL

A review of fire qualifications of personnel integrally involved in conduction and approving the GDWO Rx Burn indicates all personnel were found to be qualified for the positions each held during the prescribed fire.

Qualification is based on the IQCS records provided by the CNNF.

POSITION ON RX FIRE	QUALIFICATION(S)
Agency Administrator (District Ranger)	Qualified
RXB3	Qualified
FIRB	Qualified
Igniter; RXB3(t) on Unit 3	Qualified
ENGB, Holding Boss	Qualified
FFT2, ENGB, Holding Boss (t)	Qualified
FFT2, Weather obs.	Qualified (FOBS(t))
FFT2	Qualified
FFT2	Qualified

The examination of qualifications revealed adequate to extensive training and experience for suppression activities for primary fire personnel and other employees who perform suppression duties.

CAUSAL AGENTS AND CONTRIBUTING FACTORS

Exclusive use of foam wet lines may have contributed to fire spread in Units 5 and 2. *Recommendation:*

- Consider use of a hand and/or dozer line around each unit, especially when patrol staffing is minimal or seasonal drought indices are dryer than normal.
- Assign separate personnel to patrol and monitor each unit the following day; a unit located adjacent to another might be monitored by one patrol

Unpatrolled burn units were separated by distances of up to 5 miles/15-20 minutes. *Recommendations:*

- Assign patrol personnel to monitor each burned unit after the ignitions and holding operations teams have relocated to the next unit.
- Consider additional multiple funding opportunities, particularly when trainee assignments are being provided to fire personnel to improve their qualifications.
- Retain all resources after the last ignition until each burned unit has been checked for lingering hot spots and heavy fuels that are still burning.

On-site weather observations were inconsistent with the Spot Weather Forecast and the Clam Lake Weather Station. *Recommendations:*

- Assign a secondary on-site weather observer; request an updated spot weather forecast when inconsistencies exist.
- Document weather and fire behavior, including flame length and rate of spread in the burn plan.
- Continue taking on-site weather throughout the duration of the operational period, including the patrol and mop-up phase.
- When nighttime humidity recovery is significantly less than predicted, anticipate that any remaining fuels will require additional resources.

During the Review, it became apparent that current radio communications at the prescribed fire site and other locales on the Great Divide RD are scratchy and difficult to understand. The existing system may be insufficient to ensure reliable relay of messages between personnel and with Dispatch. *Recommendations:*

- Request an immediate comprehensive Forest-wide radio coverage analysis.
- Until the poor communication issues are resolved, personnel must remain diligent in following-up on radio conversations.