FACILITATED LEARNING ANALYSIS

FOREST HEALTH PILE ESCAPE/PICNIC WILDLAND FIRE REVIEW

EXECUTIVE SUMMARY

On January 13, 2012, fire personnel from Northern Hills Ranger District of the Black Hills National Forest ignited approximately 150 hand piles within the Forest Health Unit 1 fuel break. As the three-person burn team completed ignition around noon, the relative humidity dropped rapidly while brisk westerly winds developed. The combined effect of the pre-heating from the burning piles and the drying wind quickly evaporated the two inches of snow covering the heavy fuels immediately upslope from the burning piles. As the fire began to spread by means of spotting from log-to-log, the burn team worked diligently to contain the spots. Buffeted by wind gusts in excess of 35 mph during the afternoon and evening, the fire burned approximately 3.5 acres of private property.

During the escape, the affected landowner became dissatisfied by a perceived lack of regard shown by the Forest Service and shared his frustrations via telephone with the Acting District Ranger who, in turn, advised the off-duty Zone FMO that the fire had burned onto private property. Additional resources arrived on scene. The Forest Health Prescribed Fire was declared a wildfire, and became known as the Picnic Fire. Command transferred from the RXB3 to an ICT4, and the Picnic Fire was declared contained the following day. No structures or improvements were damaged by the fire.

The Black Hills National Forest Supervisor initiated this review process to guide future program actions by minimizing future resource damage and/or preventing future escapes from occurring by gathering knowledge and insight for incorporation into future resource management and prescribed fire planning.

SETTING

In the early 2000's, the Beaver Park Area of the northern Black Hills National Forest became a national focal point for the restoration of healthy forests. The 70-acre Forest Health Unit 1 thinning project was part of the 500-acre Forest Health Project, included in the Beaver Park Area legislation. This legislation was part of a Congressional Act passed in 2002 as an emergency measure intended to expedite the treatment of mountain pine beetle infested trees, as well as the treatment of high fire hazard timber stands next to private property.

Ten years later, the forest is still engaged in an accelerated timber harvest program in response to the ongoing mountain pine beetle epidemic. Machine pile creation is outpacing the number of piles that are being burned each year on the Northern Hills Ranger District. At the time of the Picnic Fire, Northern Hills District fire crew members had burned approximately 350 machine piles and approximately 5,000 hand piles since November 1, 2011. The District has a backlog of 30,000+ piles (both machine and hand), dating back in excess of 10 years. Prior to the Picnic Fire, crews had been focused on burning machine piles.

The Black Hills National Forest has utilized a programmatic burn plan since 2008: ***Forest Wide Pile Burning RXBP (RXBP)***; to guide the implementation of low complexity pile burning projects during periods when a minimum of two inches of continuous snow cover is expected to remain over the project area for at least twenty-four hours. A qualified ICT4 or RXB3 may implement the plan.

Early in the week, the AFMO instructed the crew to burn piles Thursday the 12th and Friday the 13th, if the weather permitted. No hand piles were burned on the 12th. The district had developed a list of 'Top 4' priority areas for hand pile burning. Forest Health Unit 1 was not included on this list. On the morning of the 13th, the RXB3 expressed his intention to burn piles to the Zone FMO (ZFMO), who was also acting as the Duty Officer for the day. The AFMO was on leave for the day. The ZFMO engaged the RXB3 in a brief risk-analysis, which included the lack of available resources due to the holiday weekend, but specific project or location was not discussed. Somewhat satisfied with the discussion, the ZFMO supported the plan to evaluate on-site conditions. The ZFMO was scheduled to leave work at noon, but remained available via cell-phone. The RXB3 plus two crew members headed out to the far southeastern corner of the district to burn piles.

PRESCRIBED FIRE OBJECTIVES

The Forest Health Unit 1 project was designed to reduce crown fire hazard by thinning 70 acres of small diameter trees. The thinning slash was lopped and scattered, adding to the existing surface fuel loads resulting from a snow storm in April of 2000. In order to disrupt the continuity of the heavy surface fuel loadings, a hand-piled fuel break was constructed immediately adjacent to private property. ***RXBP*** prescribed fire objectives: *"Reduce fire hazard by removing at least 80% of each concentrated biomass pile."*

PRESCRIBED FIRE PRESCRIPTION

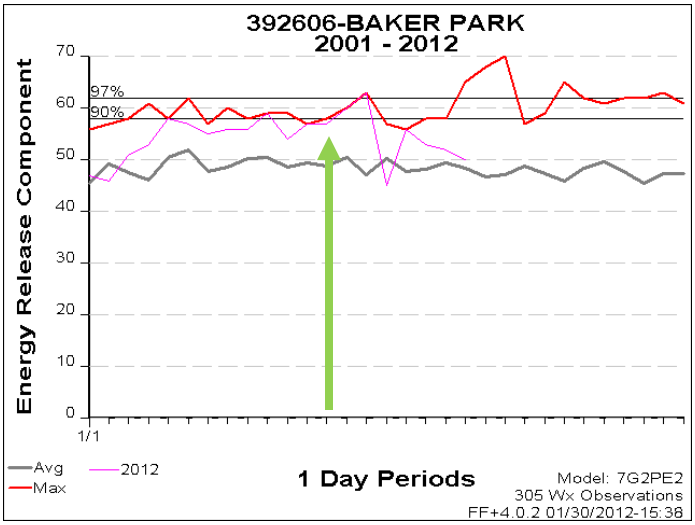
RXBP prescription: *"Two inches of uniform snow cover at the time of ignition is the environmental prescription. General/spot weather forecasts will be used for predicting that uniform snow cover will remain for 24 hours."*

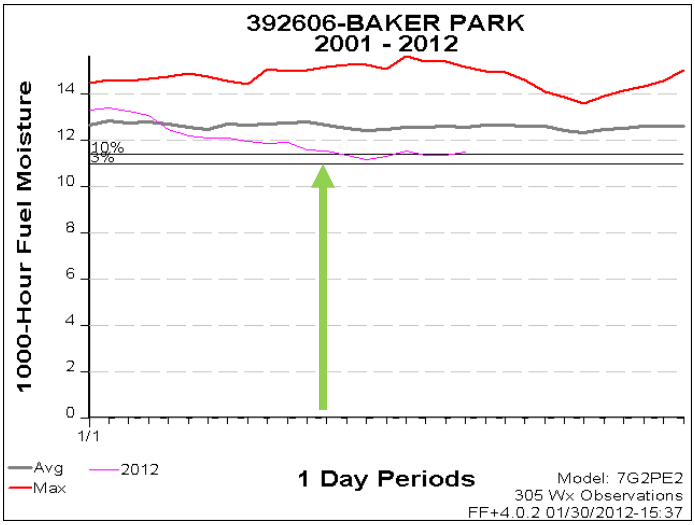
CHRONOLOGY OF EVENTS

Friday, January 13, 2012	
0830	Discussion with ZFMO. Burn Notification sent to Great Plains Dispatch Center (GPC).
1015	Hand pile ignition initiated.
1143	**Pennington County dispatch fire #12392, Rolling Hills.**
1145	Ignition complete. Humidity drops and winds accelerate.
1212	GPC contacts resources regarding smoke.
1230	First spot on private property noticed.
1330	Second spot becomes established south of first spot on private property.
1400	Construction of control line started with hand-tools.
1430	RXB3 contacts ZFMO requesting additional personnel. Updates that fire was moving around within the pile area but was still completely surrounded by snow. Additional resources were contacted by ZFMO.
1500	Acting Ranger hears office chatter regarding the possibility of an escape; notifies District Ranger. Volume of telephone traffic to District office and GPC regarding smoke increases.
1507	**Pennington County dispatch wildfire #12271 Rolling Hills.**
1610 1612	Acting District Ranger takes phone call from landowner reporting fire on private property; advises ZFMO that Rx has crossed private boundary. ZFMO contacts RXB3 to confirm incident status.
1626	Additional resources arrive on scene.
1721	IC transition, wildfire declaration.
1830	ZFMO on scene for Public Contact.
1930	Resources ordered (night shift) arrive on scene.
2200	Fire behavior and winds begin to subside
2230	IC transition to night IC. Burn and IA resources released and return to station.
Saturday, 14 - 1800	**Contained**
Sunday, 15 - 1515	**Controlled**

DISCUSSION OF CONDITIONS LEADING TO WILDFIRE DECLARATION

SEASONAL SEVERITY AND DROUGHT





The Energy Release Component (ERC) at the Baker Park RAWS (12 miles south) trended towards the 97th percentile in the days preceding the Picnic Fire (and actually exceeded the 97th percentile in the days following the fire). Baker Park was chosen to calculate ERC because the Nemo RAWS (5 miles northwest of the Picnic Fire) had been wet flagged (snow covered) for the season. Baker Park RAWS is representative of the Picnic Fire in terms of elevation and local factors influencing weather on the eastern slopes of the Black Hills. Temperatures reached the 60's and 70's in Rapid City (10 miles east) the week before, breaking all-time high temperature records for 3 consecutive days.

During interviews, suppression crews stated several times that high winds and embers spotting from heavy fuel to heavy fuel (initially) carried the fire—usually an indication that long-term drying has occurred. The calculated thousand-hour fuel moistures from Baker Park RAWS were slightly below average during the project implementation.

The U.S. Drought Monitor showed normal conditions in the Black Hills, but abnormally dry conditions are beginning to show on the adjacent plains north and east of the Black Hills. The U.S. Drought Monitor is a broad-scale analysis tool and does not provide site-specific information.

WEATHER

FORECAST

On the morning of the 13th, the RXB3 obtained a general weather forecast from the National Weather Service, Rapid City for the Lead/Deadwood forecast area (22 miles northwest of the project area). The forecast seemed favorable with cloudy skies, high temps slightly above freezing, a chance of snow, and nothing to indicate wind gusts to 35+ mph.

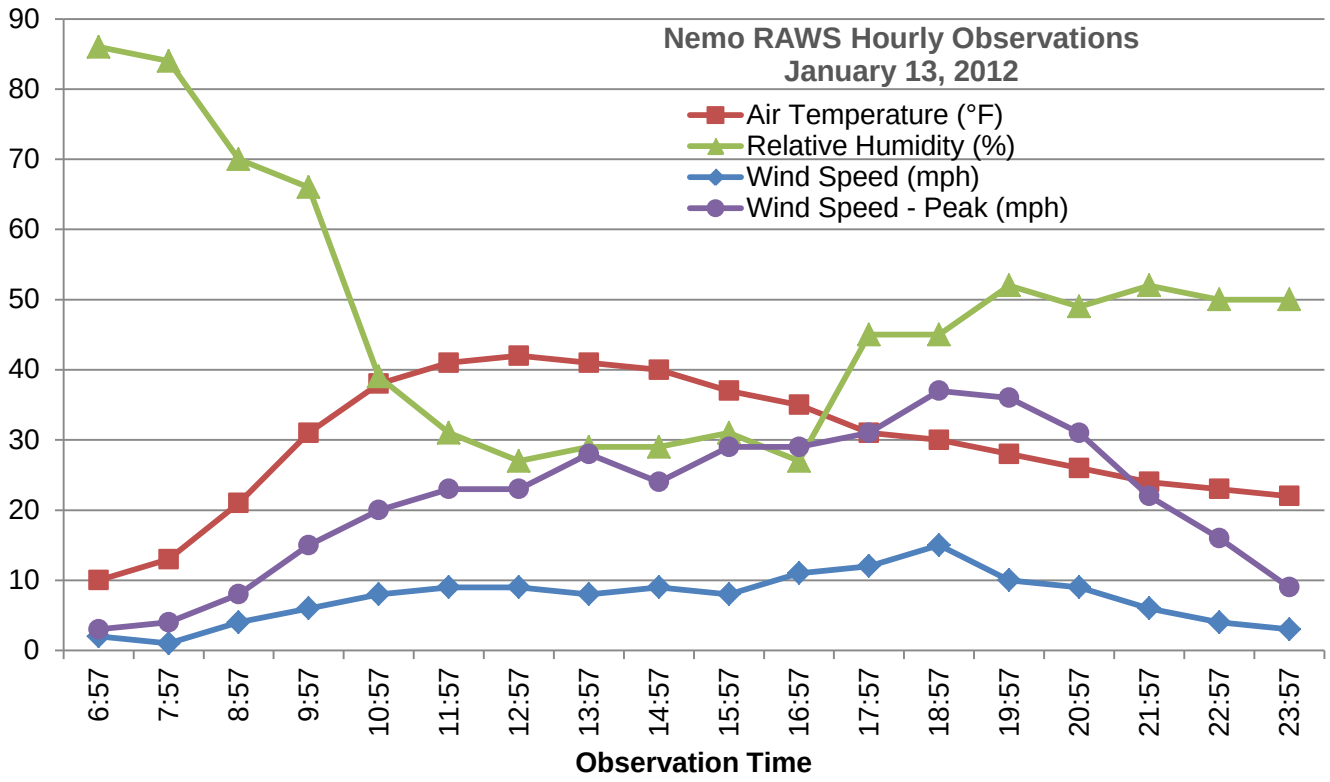
Northern Black Hills including the cities of Lead and Deadwood, SD.

0236 AM MST Friday January 13 2012

Today: Partly sunny scattered snow showers in the afternoon. Highs 32-38.
West winds 5-15 MPH. Chance of snow 40 percent.
Tonight: Partly cloudy. Lows around 17. West wind 10-15 MPH.
Saturday: Mostly sunny. Highs 36-42. West winds 5-15 MPH.
Saturday night: Partly cloudy. Lows 21-27. Southwest wind 5-20 MPH.
Sunday: Mostly sunny. Highs 39-45. West winds 5-15 MPH.
Sunday night: Mostly cloudy with a 50 percent chance of snow, lows around 10
Martin Luther King Day: Mostly cloudy with a 50 percent chance of snow. Highs around 15.
Monday night: 20 percent chance of snow. Lows around 2 above.

OBSERVED WEATHER

On-site weather observations were not taken during the day of the burn due to sub-freezing temperatures. Nemo RAWs station is located less than 5 air miles to the northwest and is representative of the conditions seen at the project area.



Nemo RAWs Observations Jan 13, 2012	6:57	7:57	8:57	9:57	10:57	11:57	12:57	13:57	14:57	15:57	16:57	17:57	18:57	19:57	20:57	21:57	22:57	23:57
Air Temperature	10	13	21	31	38	41	42	41	40	37	35	31	30	28	26	24	23	22
Relative Humidity	86	84	70	66	39	31	27	29	29	31	27	45	45	52	49	52	50	50
Wind Speed	2	1	4	6	8	9	9	8	9	8	11	12	15	10	9	6	4	3
Wind Speed - Peak	3	4	8	15	20	23	23	28	24	29	29	31	37	36	31	22	16	9

Weather data obtained from the Baker Park RAWs for the same time period shows similar trends, although relative humidity values were between 5-10% lower all day. Peak wind speeds at the Baker Park RAWs exceeded 40 mph at 15:35.

The project area had recently received two+ inches of snow. Snow depths ranged from two inches on the southerly aspects to four inches on the shaded, northerly aspects. At the time of ignition, the air temperature was below freezing with light winds.

TOPOGRAPHY AND ASPECT

Approximately fifty feet wide, the fuel break runs from north to south for about a half-mile immediately adjacent to private property. Terrain varies (see map below) along the length of the fuel break, but the middle third cuts mid-slope (underneath the private property) across a west-facing aspect that rises to a wind-exposed ridge top. This became a critical holding area. As the westerly winds lined up with the slope and accelerated, the combined effect of the pre-heating from the burning piles and the drying wind quickly evaporated the two inches of snow covering the fuels immediately upslope from the burning piles.

ADJACENT FUELS

Fuels within the unit consisted of hand-piles and long-needle litter (Fire Behavior Fuel Model 9). Adjacent fuels consisted of long-needle litter and aged slash/storm damage (Fire Behavior Fuel Model 10).

CAUSAL FACTORS/LESSONS LEARNED BY PARTICIPANTS AND REVIEW TEAM MEMBERS

Although the burn team operated within the scope of their duties and in compliance with the RXBP, a number of ‘lessons learned’ surfaced during the analysis:

PROJECT DESIGN

- Though consistent with forest plan guidance (Guideline 4110), hand piling a narrow strip of slash (as a fuel break) along the middle of a slope makes little ‘tactical’ sense. Fuel breaks should offer some sort of (fire suppression) tactical advantage. Additionally, the proximity of the piles to property boundaries (<5 feet) contributed to the complexity of holding operations. Project design in this case exposed the burn team to an elevated risk of the fire burning onto private property.

MISSION PLANNING

- The RXB3 chose to implement a project that had not been identified as a district priority and had not been under consideration for that day. Many were unaware of his chosen location, including the ZFMO. Had the RBX3's intention been more widely known, situational awareness regarding winter weather patterns and pile burning risk in that portion of the district might have been raised.

- A wind event lasting through the afternoon and evening occurred shortly after the crew completed ignition. The weather forecast issued for the Lead/Deadwood area (22 miles northwest) misled the RXB3. The project area was much closer to Rapid City (within 10 miles of downtown). Winter weather varies greatly between Lead/Deadwood and Rapid City.

SITUATIONAL AWARENESS

- Given the history of pile burning escapes on the Black Hills, there appears to be an underestimation of the associated risks/consequences (and given pile backlogs--perhaps an over-reliance on pile burning as a means of fuels reduction). Winter weather in the Black Hills is difficult to predict (especially winds) and changes rapidly.

- Despite the fact that the current U.S. Drought Monitor is showing near normal conditions for the Black Hills, above normal ERC's and fire behavior observed on the Picnic Fire (spotting from log-to-log) provide contrary evidence.

- The burn team was in a 'pile burning mode' and not in a fire suppression mode. The crew initially lacked hand tools to deal with the spot fires. One of the crewmembers made a special trip to a nearby work center to gather tools.

- The Northern Hills District (with the exception of the southeastern corner of the district where the Picnic Fire occurred) receives more snow than any other portion of the forest. Often times, there is too much snow to burn piles.

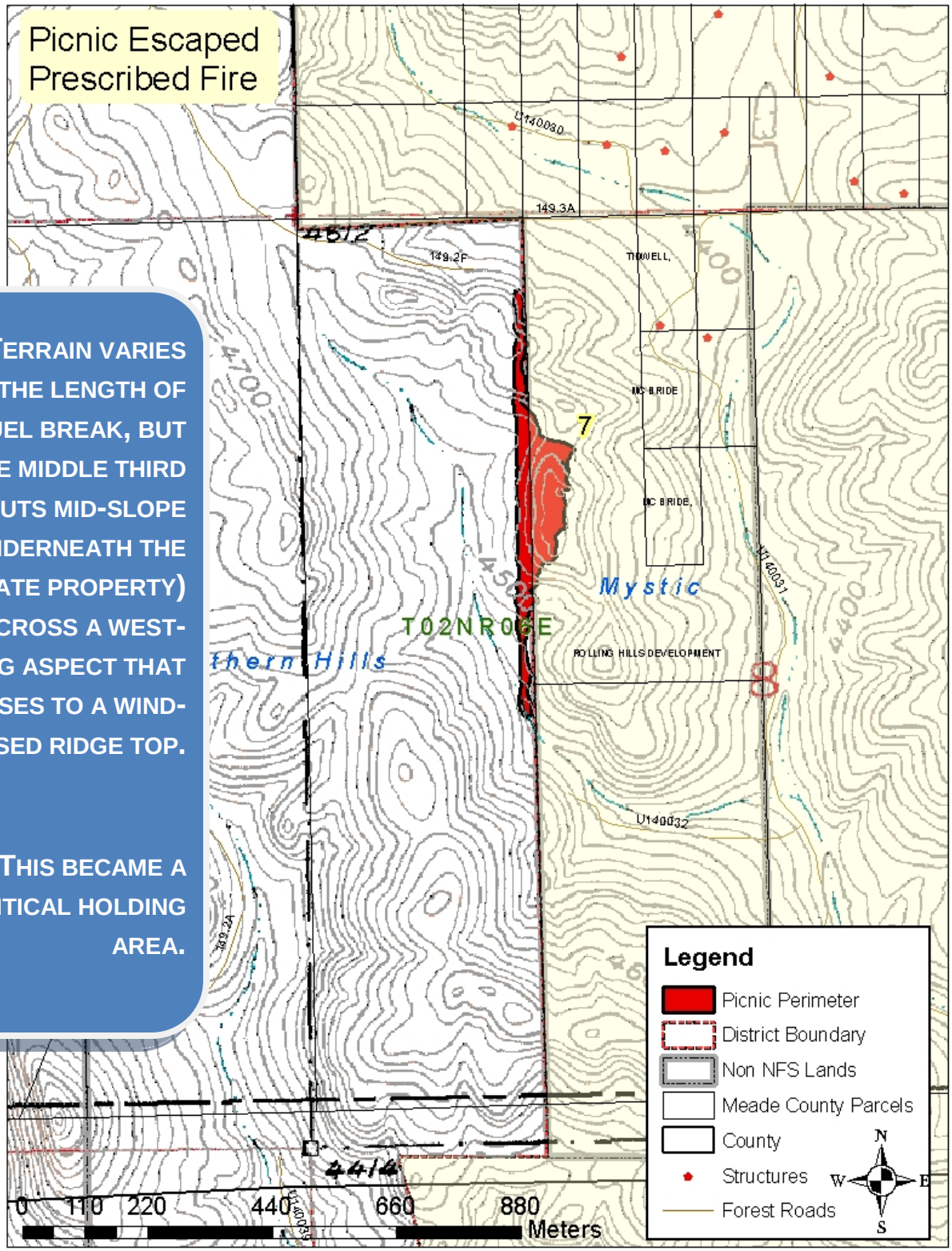
HUMAN FACTORS

- The ***RXBP*** allows for a considerable amount of flexibility in implementation. Burn Bosses need to ensure that they are familiar with the plan. They must also understand the responsibility (and liability) they assume when implementing the plan.

- Having a backlog of 30,000+ piles is a burden that members of the Northern Hills District Fire and Fuels program are eager to be free of. The desire to 'keep up' with an accelerated timber program contributes additional stress.

- As the fire spotted onto private property, the RXB3 (fear of humiliation) delayed notifying the ZFMO of the situation for several hours. Had the notification been more immediate, additional resources would have been ordered sooner, easing the landowner's concerns and (very possibly) affecting the fire's final acreage burned.

MAP



TERRAIN VARIES ALONG THE LENGTH OF THE FUEL BREAK, BUT THE MIDDLE THIRD CUTS MID-SLOPE (UNDERNEATH THE PRIVATE PROPERTY) ACROSS A WEST-FACING ASPECT THAT RISES TO A WIND-EXPOSED RIDGE TOP.

THIS BECAME A CRITICAL HOLDING AREA.

APPENDIX

APPROVING AGENCY ADMINISTRATOR'S QUALIFICATIONS, EXPERIENCE, AND INVOLVEMENT

The Black Hills National Forest Supervisor approved the most recent version of the ***Forest Wide Pile Burning RXBP (RXBP)*** 10/6/10. He has a tremendous amount of fire experience as a Line Officer and participant (as a qualified SOF2 and DIVS) of Incident Management Teams.

QUALIFICATIONS AND EXPERIENCE OF KEY PERSONNEL INVOLVED.

The key personnel possessed the necessary qualifications and experience to implement the ***RXBP***.

COMPLIANCE OF THE PRESCRIBED FIRE PLAN WITH POLICY AND GUIDANCE RELATED TO PRESCRIBED FIRE PLANNING AND IMPLEMENTATION

- The 2010 version of the ***RXBP*** needs a technical review. The cover page is missing the signature block for 'Technical Reviewer.'
- The Agency Administrator Go/No-Go Pre-ignition Approval Checklist was not completed for the 2010 version of the ***RXBP***. The Forest has been operating under the Checklist for the 2008 plan, signed 5/12/08 (with an expiration date of 5/9/14).
- The ***RXBP*** was not reviewed in 2011.
- The ***RXBP*** should follow the template provided in the most recent (2008) ***Interagency Prescribed Fire Planning and Implementation Procedures Guide*** *(the Agency Administrator Go/No-Go Pre-ignition Approval Checklist has changed).*

COMPLIANCE WITH THE PRESCRIPTION, ACTIONS AND PROCEDURES SET FORTH IN THE PRESCRIBED FIRE PLAN.

A review of actions taken during implementation of the Forest Health Unit 1 prescribed burn and consistency with the 2010 ***RXBP*** was conducted. The following items are worth mentioning:

ENVIRONMENTAL PRESCRIPTION (ELEMENT 7)

RXBP: *Historic experience on the BKF suggests that two plus inches of uniform snow cover has been sufficient to inhibit surface spread from biomass concentrations. Two inches of uniform snow cover at the time of ignition is the environmental prescription. General/spot weather forecasts will be used for predicting that uniform snow cover (2 inches) will remain for 24 hours. Historical conditions show that typically Nov-Jan present the best opportunities to use this plan aggressively. Extra attention, planning, and monitoring needs to take place Feb-Apr.*

Implementation resources reported that the project area had two to four inches of continuous snow cover at time of ignition. The general forecast for the Lead/Deadwood area predicted a 40% chance of

additional snow and gave no indication that existing snow would not remain. Due to preheating and un-forecasted weather conditions (high winds, low RH), snow melted, thus contributing to fire spread.

PRE-BURN CONSIDERATIONS AND WEATHER (ELEMENT 9)

ON-SITE:

RXBP: *Place smoke management signs along roads, winter recreational trails, and near sensitive smoke receptors when applicable.*

The burn personnel did not place smoke management signs before or during implementation. The crewmembers were unaware of the proximity to private property and housing development and FS vehicles were parked out of public view. Personnel should be conscious of not only what is directly adjacent to a project area, but also how visible the project will be (smoke), when decisions are made regarding notifications. Although smoke management signs are not explicitly required, strategic placement may have aided with public relations. This element did not contribute to the escape.

OFF-SITE:

RXBP: *The RXBP will be reviewed annually at the S.O. level.*

The plan was not reviewed in 2011. This is outside the scope of this review, but concerns will be reported upward.

RXBP: *Notify Great Plains Dispatch at least 1 day prior to burning.*
RXBP: *Fill out electronic RX reporting form for GPC in advance of burning.*

The proper reporting form and format was emailed to Great Plains Dispatch (GPC) at 0843 hours on January 13th. Submitting notification on the day of the burn is not unusual, as availability of personnel and accessibility of units change daily. GPC had scheduled a service outage, during which time the operation was being relocated to a new facility. GPC did notify all districts of the transitional status and the need for local units to cover communication and dispatching duties during this outage. The NHRD was covering these dispatching duties. Notifications usually made by GPC were not made. The status of GPC made it difficult to provide pertinent information to callers and resulted in the dispatching of two local fire departments to smoke reports in the project vicinity. This action did not contribute to the escape.

RXBP: *Make public contacts with adjacent landowners as needed.*

One contact was made prior to implementation by Fuels personnel to a citizen that had previously requested notification of all prescribed fire activities. Other public contacts were not made prior to ignition. Calls were received by 911, GPC and NHRD regarding smoke. Public contacts on site were also made during suppression efforts. The crewmembers were unaware of the proximity to private property and housing development and FS vehicles were parked out of public view. Personnel should be conscious of not only what's directly adjacent to a project area, but also how visible the project will

be, when decisions are made regarding notifications. This could have aided with local landowners awareness of the situation and avoided some of the negative contacts that occurred.

BRIEFING (ELEMENT 10)

RXBP: *Prescribed Fire Briefing Checklist*

Crew members gave no indication that a briefing took place and stated they were "a little confused" before and during implementation of exact geographic location and boundaries of the project. Briefings should be given and received for every project and should be appropriate for the project complexity. It is the responsibility of all personnel to request a briefing if one has not been provided.

CONTINGENCY PLAN (ELEMENT 17)

RXBP: *TRIGGER POINTS: Determine trigger points that indicate when additional holding resources and actions are needed to ensure the prescribed fire stays within prescription.*

- *Fire ignites on or threatens private land. Burn boss/ICT4 determines difficult to control.**
- *Fire exhibits behavior that leads to undesirable effects.*
- *Loss of uniform snow cover.**
- *Forecasted or observed Chinook winds.**

Three of the four trigger points developed, but only after ignition operations were completed. At this time, the burn was no longer in prescription. The ZFMO was not notified when any of the trigger points were met. Additional resources were requested by the RXB3 approximately two hours after the first spot fire was detected. At this time, the ZFMO was assured by the RXB3 that the burn was still surrounded by snow and no indication was given that a spot fire had crossed onto private land.

WILDFIRE CONVERSION (ELEMENT 18)

RXBP: *A prescribed fire must be declared a wildfire by those identified in the plan when that person(s) determines that the contingency actions have failed or are likely to fail and cannot be mitigated within the next burning period by on-site holding forces and any listed contingency resources. In addition, an escaped prescribed fire must be declared a wildfire when the fire has spread outside the project boundary, or is likely to do so and cannot be contained within the next burning period.*

A determination of an escape will be based on the inability to contain the fire with the resources on site. This decision will be based on the spot weather forecasts, fire behavior observations, and fire growth estimates. If the fire cannot be contained within the first burning period, a WFDSS will be completed to determine the appropriate control strategy.

The Forest Health Unit 1 prescribed fire was converted to a wildfire (the Picnic fire) through a decision reached by the Incoming ICT4 and ZFMO. This conversion occurred during the first burning period. The spread of fire onto private property, the difficulty encountered while trying to contain the fire, and the need for more resources (including fiscal) led to the decision to convert the prescribed fire. Fire

spread was halted during the first burning period and the Picnic fire was officially contained by the end of the second burning period.

SPECIAL THANKS

The FLA team would like to thank and recognize all the participants who took the time to take part in the discussions regarding the unfolding of events during the Forest Health/Picnic Escape review. Our discussions were open, honest and educational. Our team learned many lessons from these discussions and each participant helped clarify how we could learn to better manage operations and improve our communications in the future.

FACILITATED LEARNING ANALYSIS TEAM MEMBERS

Terry Tompkins, District Fire Management Officer, Mystic Ranger District, BHNF – Team Leader

Matt Spring, Fuels AFMO, Hell Canyon Ranger District, BHNF

Jeff Gies, Fuels AFMO, Northern Hills Ranger District, BHNF

Sarah Synowiec, Fuels Technician, Mystic Ranger District, BHNF