West Zone Pile Burn Prescribed Fire
Drum Wildfire
Escaped Prescribed Fire Review

November 20, 2018

Pacific Northwest Region (R6)
Mt Hood National Forest
Clackamas Ranger District

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Review Team:

Randy Whitehall, Review Team Leader
Deputy Fire Staff - Fuels
US Forest Service, Okanogan-Wenatchee NF

Eric Johnson, Team Member
Deputy Fire Staff
Bureau of Land Management, Northwest Oregon District
US Forest Service, Willamette NF & Siuslaw NF

Larae Guillory, Prescribed Fire Specialist (Burn Boss)
Battalion Chief (Fuels)
US Forest Service, Deschutes NF

Dana Skelly, LTAN / FBAN / SOPL(T)
Regional Fuels Specialist
US Forest Service, R6 Regional Office

Introduction

The Drum Wildfire was declared on 11/1/18 from a series of pile burns that were lit beginning on 10/22/18 on the West Side of the Mount Hood National Forest. As part of internal discussions regarding the declaration, the forest identified behaviors and actions that don't meet their standards of being a High Reliability Organization. There was an interest in having an outside team take stock of the program using this experience to provide feedback at all levels of the organization.

Forest Service Manual 5140 requires a review be conducted of all prescribed fires which result in a wildfire declaration. This review was conducted in accordance with the Interagency Prescribed Fire Planning and Implementation Procedures Guide, July 2017, page 38-39 and addresses the following key elements:

- An analysis of the seasonal severity, weather events, and on-site conditions leading up to the wildfire declaration.
- An analysis of the prescribed fire plan for consistency with agency policy and guidance related to prescribe fire planning and implementation.
- An analysis of prescribed fire implementation for consistency with the prescription, actions, and procedures in the prescribed fire plan.
- The approving agency administrator's qualifications, experience, and involvement.
- The qualifications and experience of key personnel involved.

In this document, the team addresses the elements above as required as well as systemic opportunities for improvement in line with a forest fuels program review.

Timber Lake/Drum Pile Burn Daily Summary

Ignitions on the Westside Piles burn project were initiated on October 22, 2018, beginning with the piles at the Timber Lake Job Corps Center. Ignition in this unit was completed the following morning.

Tuesday, October 23rd. Ignition started on the Drum units at approximately 1200 hours. The Burn Boss and trainee, started the test fire and took weather observations. Test fire successful, proceeded with ignitions until 1400, when weather was noticed to be moving into the area and completed ignitions ahead of weather at 1430.

Wednesday, October 24th. Timberlake units had a report of a tree across a powerline. Resources were sent to this report. The tree that fell was from the previous day's burn and the resources were assigned to continue mop-up of that burn, however this information was not relayed to the Forest Duty Officer. Report from the Drum units was that there was approximately ¼ of an acre burning outside the unit on Unit 84. Resources on scene began a saw-line and hose-lay around the area in question. Based on what had been found on Unit 84, the decision was made that the following day there would need to be additional resources assigned to Unit 84 to continue mop-up, and any additional resources available would continue mop-up on the Timberlake unit and recon on other Drum units. It was anticipated that everything down south (Drum) was not likely to be a problem.

Thursday, October 25th. Piles on the Drum unit continue to spread away from pile footprint on several units. Resources continue to work on identified priority areas designated by the Burn Boss.

Friday, October 26th. 1-3 acres outside of the unit boundary, weather was moderating, and plan was to monitor it throughout the weekend.

Saturday, October 27th. Active fire in 1 Drum unit, plan was to change tactics and come up with a plan on Sunday.

Sunday, October 28th. Fire still creeping and smoldering, large fuels still burning. Decision was to stop all forward progress in each of the Drum units, this would be accomplished through saw lines and hose-lays.

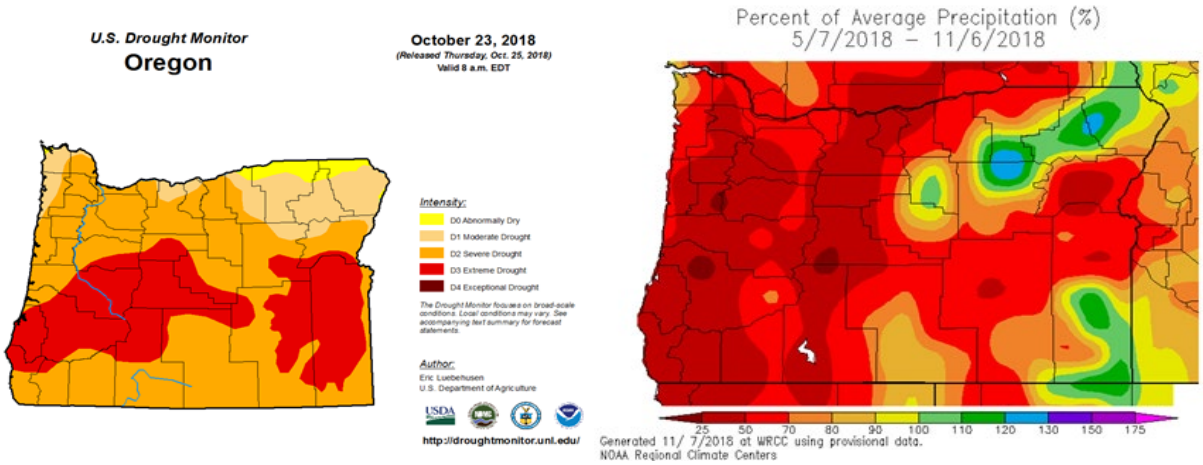
Monday, October 29th. Leadership met to review the burn plan and discussed the chain of events as well as conversion of the fire. A field trip was planned for Wednesday to finish discussing this.

Wednesday, 10/31: Forest staff, including the District Ranger, district fire personnel and forest fire staff took a field trip to the units. The burn was declared a wildfire on 11/1.

Bullet 1: Seasonal Severity, Weather, and On-Site Conditions Leading Up to the Wildfire Declaration

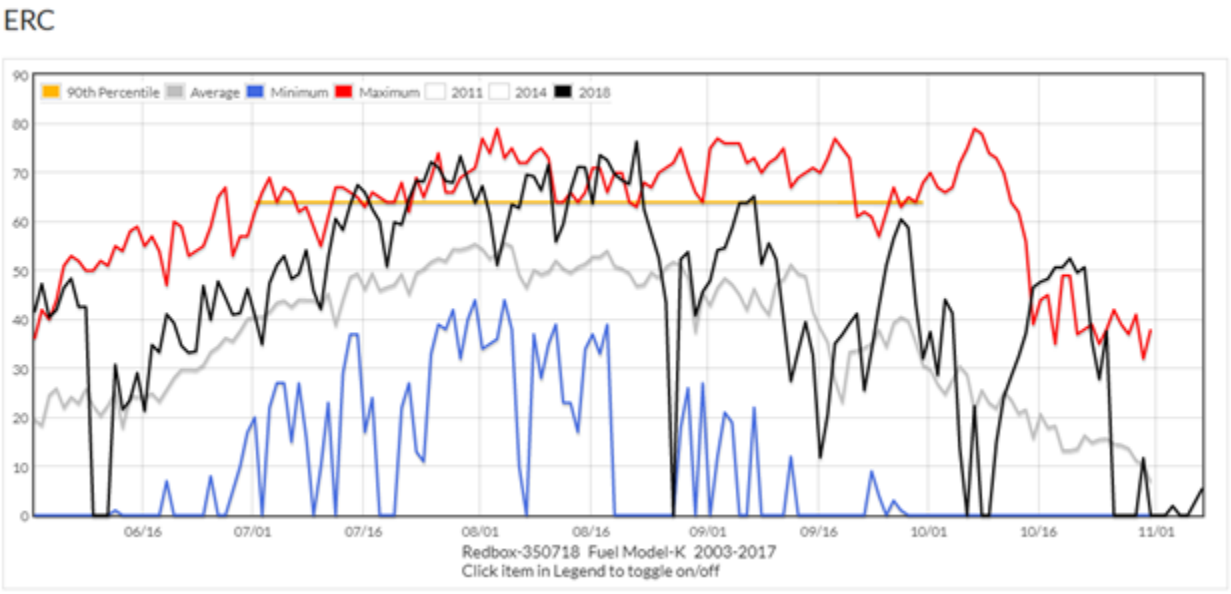
Weather and Fuels:

Climate – At the time of ignition for the Timber Lake and Drum pile burning units, the north Oregon Cascades were experiencing severe drought conditions. Precipitation for the previous 6 months in the area was less than 70% of normal.

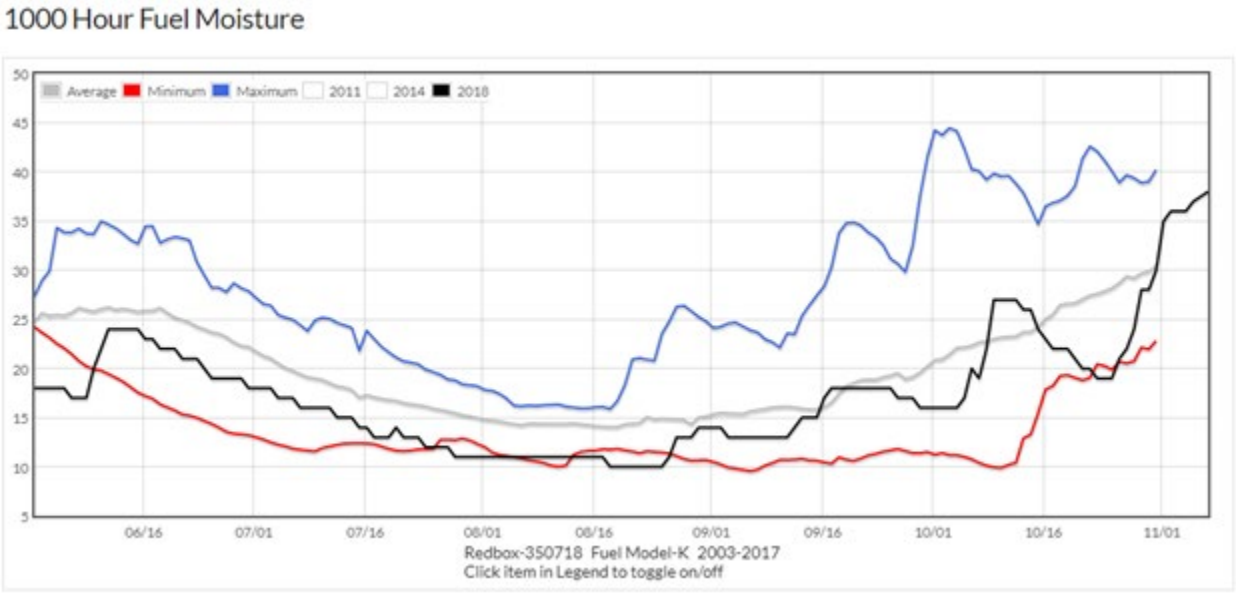


Left- US Drought Monitor for Oregon on 10/23/2018. Right- Percent of average precipitation for 5/7-11/6/2018

Seasonal – A somewhat dry spring ushered in a fairly dry summer for the project area. One thousand hour fuel moistures were below average for most of the summer. A period of record low fuels moisture was observed from late July to late August. With some relief arriving during the transition to fall. Energy Release Component (ERC) fuel model K shows a similar seasonal trend of periodic record setting high values during the months of July and August; with some relief during the transition to fall.

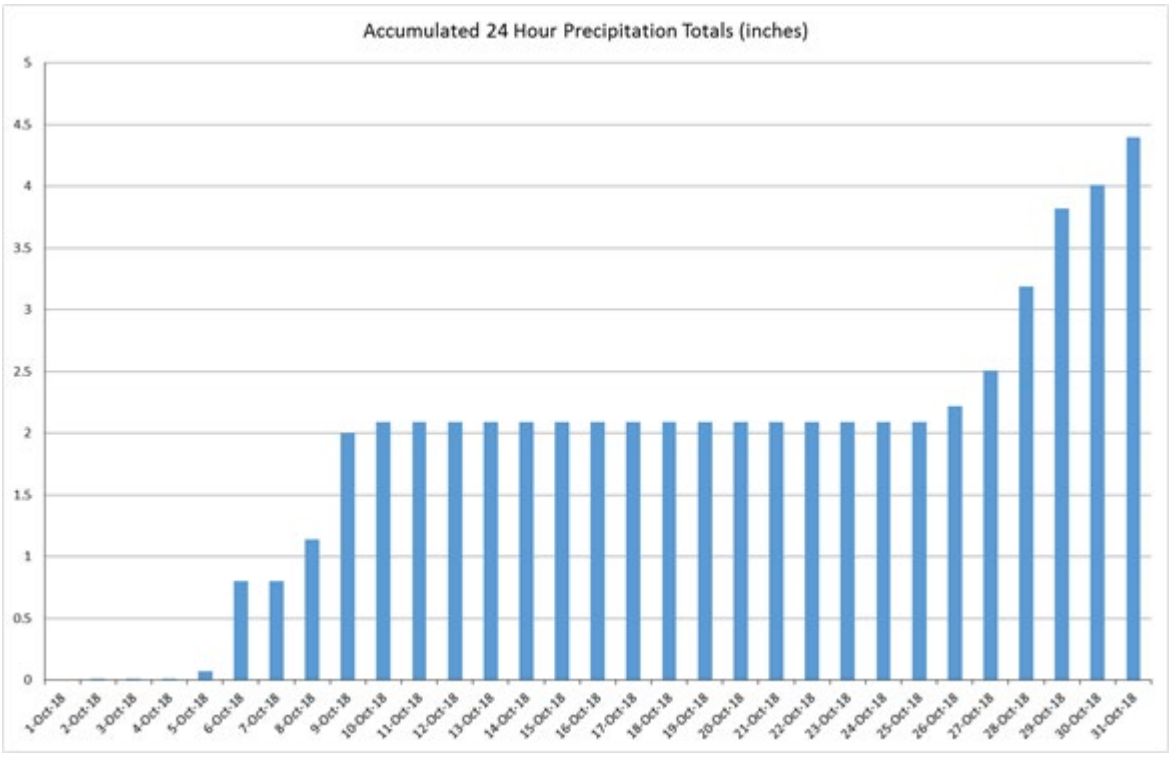


ERC for Redbox RAWS or the month of October 2018



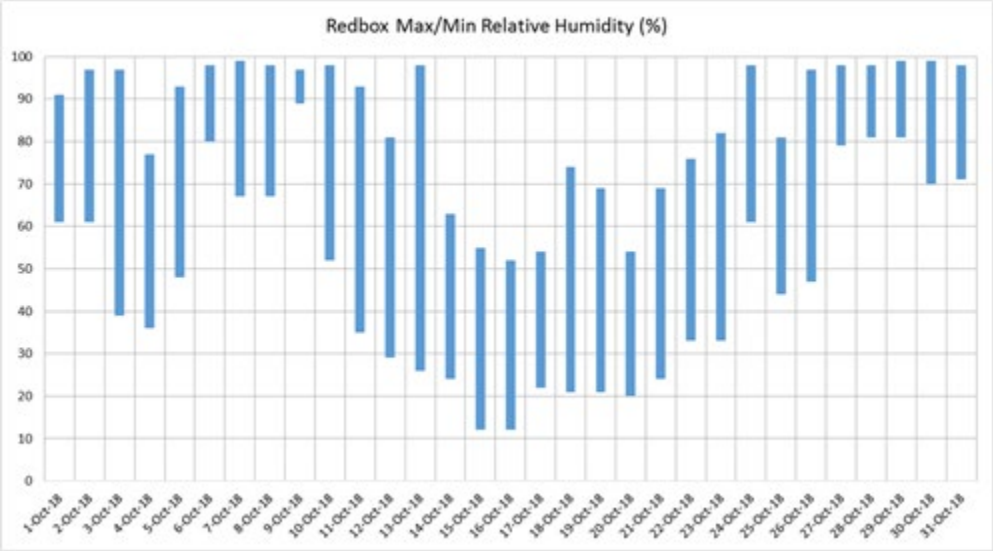
1000 Hour fuel moisture for Redbox RAWS or the month of October 2018

Weather- October saw a sharp increase in fuel moistures and drop in ERC as Redbox recorded just over 2 inches of precipitation between October 5th and 10th.



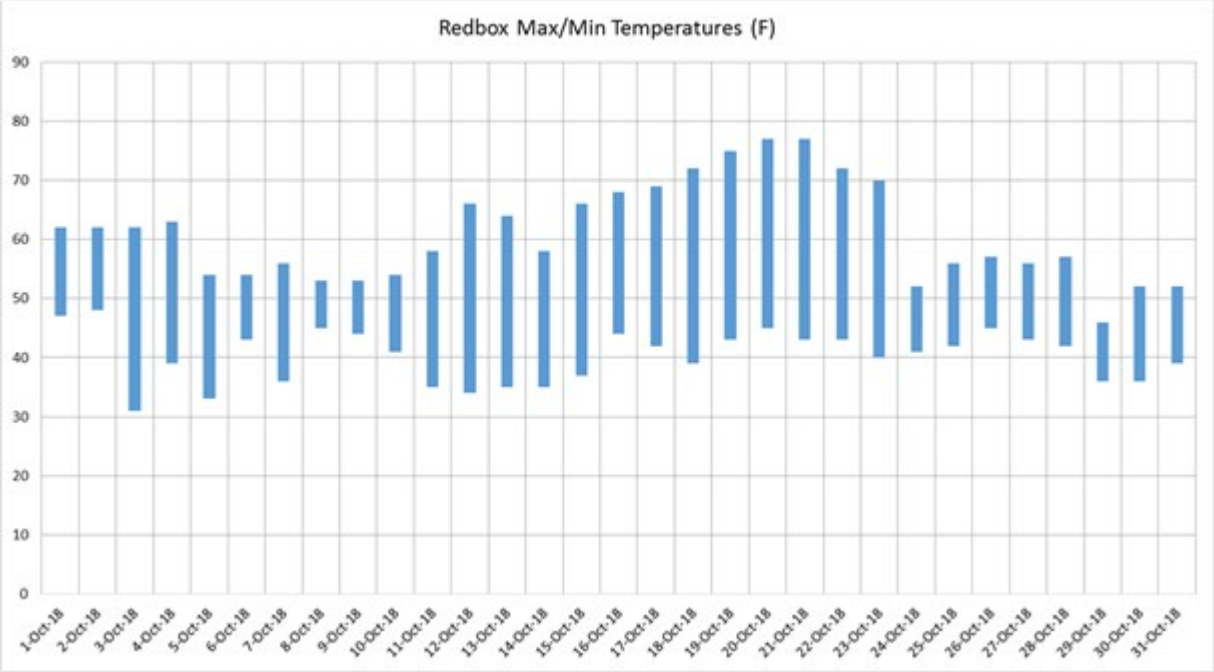
Accumulated 24 hour precipitation for Redbox RAWS for the month of October 2018

At the conclusion of this wet period an extended period of dry weather set into the area as off-shore flow dominated the area. For the 12 days prior to ignition on the Drum unit's minimum RH values were very low with limited recoveries.



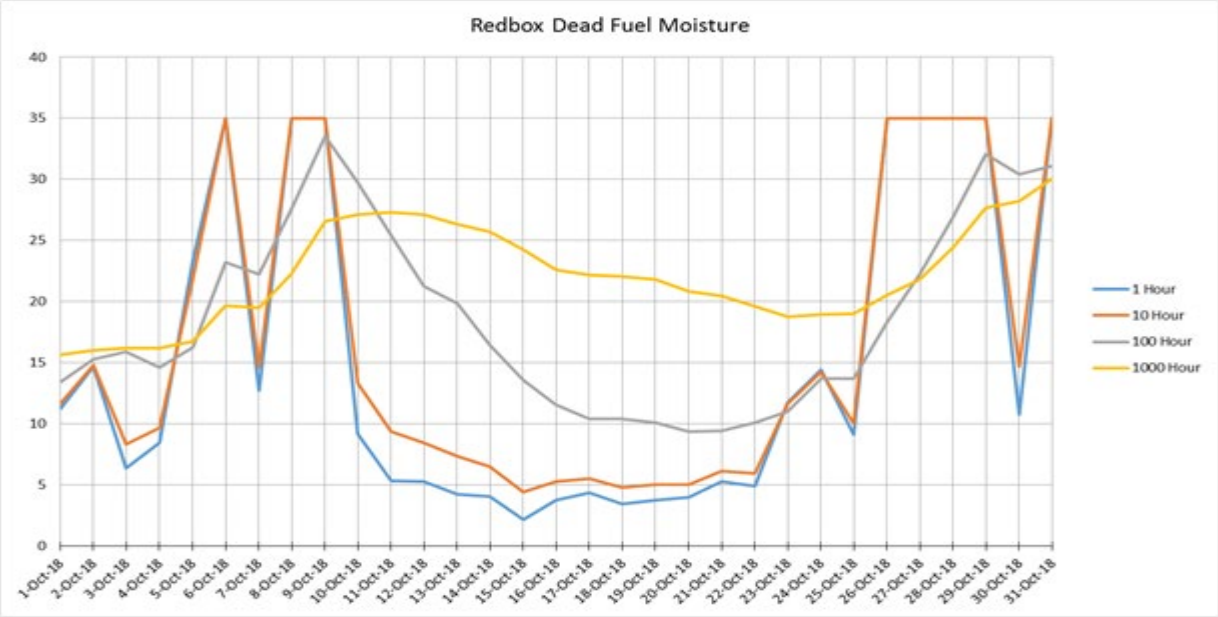
Maximum and minimum relative humidity for Redbox RAWS for the month of October 2018

Temperatures over the period were also reflective of an offshore event with highest temperatures reaching nearly 80 degrees.



Maximum and minimum temperatures for Redbox RAWS for the month of October 2018

Fuels – Fuel moistures leading up to the ignition date were consistent with an offshore event. In the days leading up to ignition 1, 10 and 100 hour fuel moistures all reached dryness levels of less than 10% with 1000 hour fuel moistures just below 20%. The sudden spike in 1 and 10 hour fuel moistures are a result of precipitation moving into the area and reflect the WIMS input of SOW 6 on the 26th. Fuel moistures likely varied widely across the burned area. Fuel moistures within thinned stands (within the units) would have increased more rapidly than those in the natural stands adjacent to the units. These natural areas likely continued to support spread longer than the fuels within the treatment units.



Fuel moistures for Redbox Raws for the month of October 2018

Fuel moistures at Redbox RAWS on the day of ignition for the Drum Units

Date	1 Hour	10 Hour	100 Hour	1000 Hour
23-Oct-18	11.73	11.59	11.01	18.73

Bullet 2: The Prescribed Fire Burn Plan and Consistency with Policy

A review of the Westside Piles Prescribed Fire Burn Plan was conducted and found that neither the Timberlake nor Drum burns were explicitly covered by the plan. In addition, not all elements were consistent with Agency Policy and Guidance as outlined in the Interagency Prescribed Fire Planning and Implementation Guide (PMS 484).

The Interagency Burn Plan Template (PMS 424) was used in every element of the development of the Westside Piles Prescribed Fire Burn Plan, however there was a common element of utilizing generic text that was not specific to the burns being planned, and conflicting information in the plan. All required elements required in PMS 484 were present.

The burn plan was reviewed and approved by the Zone District Fire Management Officer and Agency Administrator (Forest Supervisor). The plan was prepared by an appropriately qualified Type 2 Burn Boss (RXB2). The Agency Administrator Ignition Authorization was signed and provided the permissible dates to implement the prescribed fire project. A Go-No-Go Checklist was completed and signed for the Timber Lake Job Corps unit on 10/22 and for the Drum Units on 10/23. No Go-No-Go Checklist was found for the ignitions on Timber Lake on 10/23.

PRESCRIBED FIRE PLAN ELEMENTS	S, U, or N/A	COMMENTS
1. Signature Page	**S**	
2. GO-NO-GO Checklists	**S**	
3. Complexity Analysis Summary	**U**	No rationale.
4. Description of the Prescribed Fire Area	**S**	Refers to Appendix A, which includes description and maps for several timber sales. However, there is no description of either Timberlake or Drum. The Drum units are displayed on the vicinity map, but not a unit specific map. Timberlake pile unit is not mentioned anywhere.
5. Goals and Objectives	**S**	
6. Funding	**S**	Cost estimate worksheet in Appendix E is excellent, but it does not include either Timberlake or Drum.
7. Prescription	**U**	Conflicting prescription elements. Narrative describes saturated fuels that will prevent fire spread, but the acceptable fire behavior range includes 3.5-7.6 ch/hr rate of spread, 1.8-4' flame lengths. The parent EAs specifically say that slash outside of the piles would not be burned. In a pile burn plan it is not necessary to model fire behavior on the piles. What works best is to identify what will keep you within the NEPA authority. Here the question that needs to be answered is what parameter(s) will eliminate the potential for spread outside of the piles. Low/Desired/High is not necessary, only a minimum threshold to achieve those objectives. Ultimately, this reflects the confusion about burning only the piles or burning the entire treatment unit.
8. Scheduling	**S**	Project duration references Appendix A, but that information is not located there. Constraints refers to the prescription rather than scheduling constraints.
9. Pre-Burn Considerations	**S**	Missing key contacts for Timberlake burn, including PGE and Timberlake director. Missing pre-burn steps that are indicated elsewhere in the plan, for example the pre-burn notification to dispatch. Recommend making this element a checklist.
10. Briefing	**S**	
11. Organization and Equipment	**U**	Desired fire behavior 3.5-7.6 ch/hr cannot be contained by 6 ch/hr of fireline construction according to

		BehavePlus Contain module. This line construction rate is unrealistic for 2 firefighters in slash or heavy timber (FM 10/12). Utilizing line production for the Burn Boss is not recommended, as they would most likely be performing other duties in a holding scenario.
12. Communication	**S**	
13. Public and Personnel Safety and Medical	**U**	Medical plan is so minimal as to not be useful. Recommend that the plan has steps that should be taken if an injury occurs, and where to take the injured employee. Medical Incident Report in body of burn plan is not usable (small, fuzzy). Appendix K has some of the information that would have been useful in the medical plan, such as an medical locations and phone numbers. Appendix K did not utilize the standard ICS-206 WF Medical Incident Report. Appendix K is not referenced in Element 13. Element 9 says that signs should be posted on roads, but this is not identified as a safety mitigation here.
14. Test Fire	**S**	
15. Ignition Plan	**S**	The element is generic, with no specific relevant information. The intent was to utilize drip torches, but language spoke to very pistols, etc.
16. Holding Plan	**S**	No plan for how holding actions would occur. No critical holding points (such as Timberlake structures) identified. The only action identified to address critical holding points is to skip piles near the boundary.
17. Contingency Plan	**U**	Contingency plan does not adequately address the actions to be taken if unintended outcomes occur. Actions are limited to stopping spread outside of the piles, which is essentially the holding plan. The contingency plan should address if this action fails. Recommend including contingency plan for smoke becoming a problem, or unexpected drying occurs.
18. Wildfire Conversion	**U**	Unclear what would trigger wildfire conversion. Recommend that the Burn Boss has the authority to declare a wildfire.
19. Smoke Management and Air Quality	**S**	Element refers to Element A, which does not include information regarding the Smoke Sensitive Receptors or Potential Impacts. Contingency plans for smoke were not mentioned in Element 17. Element says that smoke management mitigations from NEPA have been incorporated into plan, but no such mitigations are present in the EAs. Similarly, many of the Best Smoke

		Management Practices listed were not included in the burn plan.
20. Monitoring	**S**	
21. Post-Burn Activities	**S**	
Appendix A: Maps	**S**	No information regarding the Drum units, although it was included on the BDBD FY19 map. No information regarding Timberlake units.
Appendix C: Complexity Analysis	**U**	No unit-specific information considered, for example Timberlake units have both on-site and off-site values (power lines and structures). Other than Values tab, not a single box was edited from the default form. No mitigations or post-plan ratings were completed.
Appendix D: Risk Assessment/JHA	**U**	JHA was not signed.
Appendix E: Cost Estimation Worksheet	**S**	Current for what as analyzed in plan, however would need to adjust as you add units into the plan.
Appendix F: Fire Behavior Modeling	**U**	Fire behavior modeling was insufficient range to determine what fuel moisture would result in no spread.
Appendix G: Dispatch Notification Sheet	**S**	While satisfactory, Dispatch was not aware that this notification sheet exists. This form is not identified in the pre-burn checklist.
Appendix H: Mop-up and Patrol Plan	**S**	
Appendix I: Monitoring	**S**	
Appendix J: Smoke Management Log	**S**	
Appendix K: CCCC Medical Plan	**U**	This is not a current plan in CCCC. It does not match the standard ICS-206 WF.

Bullet 3: The Actions Taken Leading Up to the Wildfire Declaration, to Determine Consistency with the Prescribed Burn Plan

Did the actions taken by the Burn Boss follow the plan as it was written and approved by the Line Officer?

1. <u>Prescription parameters not met.</u>
   The three parameters and ranges in the burn plan prescription are:
   a. Temperature: 0°-70°
   b. 1 Hr Fuel Moisture: 15-22
   c. 20’ Wind Speed: 0-20
   On 10/22 according to the test fire documentation, the Timber Lake Job Corps unit was in prescription for temperature (65°), wind speed (0), but not in prescription for 1 Hr fuel moisture (12). On 10/23, according to the test fire documentation from the Drum units, the unit was in prescription for temperature (59°), wind speed (0-1), but not in prescription for 1 Hr fuel moisture (11, calculated from observations).
2. <u>Go-No-Go Checklist not completed for each day of ignition on each unit and completed incorrectly.</u>
   Policy requires a separate Go-No-Go Checklist be completed for each day of active ignition on a prescribed fire. There was no checklist completed for the second day of ignitions at Timber Lake. In addition, the question “Are ALL prescription parameters met?” could not have been marked “YES” for either burn but was in both cases.

3. Agency Administrator Ignition Authorization direction was not followed.
   In the Agency Administrator Ignition Authorization for the Westside Pile plan, signed 10/15/2018, the additional instructions state:
   i. "I also authorize the use of a general weather forecast for the implementation of this Pile Burn Plan. The pile burning will occur during fall and winter weather conditions when the ground will be saturated, frozen or covered in snow preventing fire from spreading outside the burning piles."
4. Complexity Analysis was Low based on pile burning
   The fire behavior (prescribed and observed), as well as the overall organization needed to maintain control of multiple burn units which had transitioned from pile burns to landscape burns was not reflected in this complexity analysis.
5. There was a lack of clarity regarding amount of spread from piles that was acceptable.
   The NEPA document and burn plan reflected that creep outside the pile footprint was not acceptable, however discussions between fire management and the line officer were more centered on creep within the harvest unit vs. creep outside the perimeter of the unit. In the days following the declaration, the group appeared to remain mixed on whether or not to declare a wildfire when creep was confined to within the unit boundary.
6. Dispatch did not receive maps of burned units and did not receive updates of the Dispatch Notification Sheet (Appendix G).
   The burn plan received by dispatch on 10/22 may not have been the signed/final plan. It included maps of Jelly and other west side pile units but did not include maps of Drum or Timber Lake Job Corps Center. According to the burn plan, Appendix G (Dispatch Notification Sheet) must be emailed or faxed daily.
7. Smoke Management requirements partially met.
   Within the FASTRAX database, the Timber Lake piles were registered on 10/12 and burned 10/22-23 as required in the plan. Drum piles were registered 10/22/2018 and planned for ignition on 10/24/2018, though ignitions began on 10/23/2018.
8. Contingency Plan describes intent to stop spread outside of the footprint of the pile (Element 17).
   The contingency plan was triggered when additional resources were brought in to contain the fire. Actions were modified based on current/expected weather as well as weighing exposure risks to firefighters.

Bullet 4: Approving Line Officer's Qualifications, Experience, and Involvement

The approving Agency Administrator met all training, experience requirements and was fully qualified to approve prescribed fire plans at the High complexity level.

The Agency Administrator was involved from the initial approval of the burn plan, signing the Administrator Pre-Ignition Approval Checklist and Ignition Authorization, prescribed fire implementation on through the reporting of the Drum wildfire.

Bullet 5: Qualifications and Experience of Other Key Personnel

All key fire personnel were qualified at the appropriate level as determined by the project complexity analysis and USFS policy for the positions they were assigned according to current Incident Qualification and Certification System (IQCS) records. All other assigned personnel also have been found to be qualified in their respective positions.

DRUM RX BURN -- KEY BURN STAFF QUALS

ASSIGNED POSITION	QUALIFIED YES/NO
Agency Administrator (AADM)	Yes/Current
RXB3	Yes/Current
Technical Reviewer	Yes/Current
Burn Plan Preparer	Yes/Current
RXB3 (T)	Yes/Current

RECOMMENDATIONS

Recommendations listed below are meant to be used as mitigation factors listed in "Bullet 3: The Actions Taken Leading Up to the Wildfire Declaration, to Determine Consistency with the Prescribed Burn Plan".

Recommendation 1: Design land-management actions with fire in mind

Proximity of continuous slash was a contributing factor in this event. The assumption in the Environmental Assessments is that "snow pack and natural processes of decay cause the debris to break down and compress quickly to the point where fire hazard is not a concern." Based on the resistance to control experienced both on the 2017 Jazz fire and on these pile burns, this is not the case. For successful pile or broadcast burns to follow timber-harvest, it is imperative that the project be designed and implemented with that in mind. Design features to consider include whole-tree yarding, creating high-quality well-covered piles that will burn under moist conditions, and harvest / treatment units that extend to roads or ridgelines.

Harvest units with low-quality piles surrounded by continuous slash cannot be burned under any prescription that will result in consumption without spread. Quality piles are those that are compact, with little dirt/bark, taller than they are wide, covered with plastic, cured, and rescinded / available for burning while the needles are still red.

Recommendation 2: Thoughtful writing and review of the burn plan

Ensure that sufficient time and attention is invested into the writing of the burn plan to ensure that it is a useful tool for implementation. Ensure consistency throughout the burn plan and with the parent NEPA document. Consider potential outcomes, and ensure that the plan adequately addresses each of those. Routine off-unit reviews are recommended to ensure an outside perspective and fresh-eyes. Organize the appendices so that it is a useful tool for the Burn Boss, much of what was located in appendices could have been organized into the main body of the plan. Ensure that only forms and tasks that are realistically expected of the Burn Boss are included. It is suggested that a fresh burn plan be written from scratch to ensure that antiquated language and forms are not included.

Multi-unit or programmatic burn plans are an excellent tool for pooling a group of very similar burn units. However, care needs to be taken to ensure that burn plans are still relevant to each unit, and that each unit is identified in the plan.

The prescribed fire behavior must match the objectives found in the NEPA document and burn plan. The environmental elements should produce the desired fire behavior, and be supported by the fire behavior modeling. Ensure that each of those links in the chain remain connected.

Clearly define what the objectives are, and what is desirable fire behavior and effects. Consider where the line is between undesirable fire behavior and spread, and an escaped wildfire. Ensure that the intent is clear to all. Flexibility is key, but avoid undefined language such as "excessive spread" or "creep."

While the narrative in the prescription (Element 7) prescribes saturated fuels, this is a subjective description of the conditions of the fuels. In slash fuels, it is important to consider the fuel moisture of large-diameter material. Recommend including a minimum 1000-hour fuel moisture of 25% for the day of the burn and the following 5-7 days. This could be for the nearest RAWS as displayed on the CCCC webpage, the NDFD RAWS Point Forecast Tool, or onsite fuel sampling.

It is critical that the author, technical reviewer, agency administrator, and burn boss each have reviewed and understand the burn plan. Do not settle for "checking the box" or "getting the signature."

Recommendation 3: Following the Burn plan

The Burn Boss is responsible for reviewing the burn plan and ensuring all burn plan requirements are met. Burn Boss should ensure that all required forms and documents, including Go-No-Go Checklist, Appendix G (notification of dispatch), monitoring forms, etc. are completed for each day of ignitions. In addition, burn personnel, especially Burn Boss, must understand parameters within the burn plan which dictate timing of wildfire declaration.

Recommendation 4: Access to the burn plan and documentation

Throughout the review, it was stated that key personnel did not have access to elements such as the prescription or the burn plan in its entirety. Consider storing signed burn plans with all appendices in a central location, such as Pinyon, for implementation personnel to access and have onsite during implementation.

Recommendation 5: Weather forecasts & Localized Weather Situations

It is recommended that Burn Bosses should compare onsite weather with spot weather forecasts and contact the National Weather Service in the event that predicted forecasts do not reflect observed weather. In areas where it is suspected that nearby RAWS are not representative of unit conditions, consider using portable RAWS prior to burning to ensure prescription parameters are met.

Recommendation 6: Clarification of Roles, Expectations, and Communication protocols pre-burn and throughout the life of the burn

Clear, concise and frequent communications between the Burn Boss, Line Officer and Forest Duty are needed to ensure that the burn program on the Forest is successful. Each has a part to play in the communication loop, a shared responsibility is required by all parties, whether you are on the unit or at the Forest, everyone needs to be on the same page. With this in mind, the recommendation is for the district/zone to have a preseason meeting to go over the plan for the upcoming burn season. All possible burn bosses need to attend, line officers need to give clear intent on their expectations on what outcomes are acceptable and the forest needs to provide their expectations on how often and what type of communications are needed.

Recommendation 7: Utilization of RXB3

The unit has made conscious decisions to approach how the RXB3 will perform that are different from how an RXB2 or RXB1 will perform. While duties of a burn boss can be delegated, such as notifications, alleviating those duties from the RXB3 devalues the command status of the position. Did this contribute to the RXB3 implementing without having carefully reviewed the burn plan? If that individual was not responsible for

careful review prior to implementation, who was taking that role? This is not clear. Many of the items noted in Bullet 3 would not have occurred with better attention to the plan.

Confusion regarding the responsibilities and limitations of an RXB3 is not isolated to this incident or this unit. However, implementing Recommendation 6 will ensure consistent use of the position on this forest.

Full documentation for the RXB3 is not evident from the master record (PTB is missing). He is shown as qualified on his redcard and having met the competency requirements. No one disagrees that he can do the job, however it would be good to explore fixing the master record to clearly show certification.

Recommendation 8: High Reliability Organization (HRO)

The Review Team noticed some complacency in the implementation of the burn. This was demonstrated by a number of differing opinions on what was in the unit and outside the unit, what was considered still in prescription or not and were we still meeting objectives. Based on the burn plan anything that left the pile footprint should have been considered outside prescription and not meeting objectives.

The common themes of an HRO have been described in different ways:

Weick & Sutcliffe Principles	**Brief Explanation**
Preoccupation with failure	Embrace failures and weak signals
Reluctance to Simplify	Look across system boundaries to determine path of issue comprehensively and holistically
Sensitivity to Operations	Recognize that system failures are not the result of one error
Deference to Expertise	Encourages communication regardless of level

The interest demonstrated by district personnel, forest fire staff, and forest line officers in having an open discussion to improve the organization is a key component in an HRO. The principles described above were exhibited in many ways, such as by having this review. Though not necessarily correct, many units have had similar issues and would not have declared this an escaped fire.

All aspects of HRO principles were exhibited in different ways at different levels. The best illustration of how these were not exhibited is the discussion about conversion taking as long as it did. This reflects misunderstanding and inconsistent information relayed at all levels. Had perception been driven by the principles above, those communication issues would not have been present.

CONCLUSIONS

A variety of factors contributed to the series of events leading to the declaration of Drum as a wildfire. While the consequences of Drum burning beyond the planned area are relatively benign, the unit is to be commended in utilizing this opportunity to learn. A common thread of complacency was perceived reaching all the way from the Environmental Assessments through the implementation of the burns. This thread ended when the decision was made to declare Drum a wildfire.