AQ Prescribed Fire - Chumyons Wildfire
Escaped Prescribed Fire Review

September 2017

Pacific Northwest Region (R6)
Okanogan-Wenatchee National Forest
Wenatchee River Ranger District

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NARRATIVE

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 prescribed 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.

AQ Burn Summary

Ignitions on the AQ prescribed fire project were initiated on September 27, 2017, in conjunction with the TREX program.

9/27/2017 - The Wenatchee River Ranger District received approval to conduct a prescribed burn for up to 118 acres (middle unit) on Unit AQ. Test Fire was successful and burn operations began at 1115 hours. Notifications were made, and the burn organization commenced with general ignitions. Burn progressed slower than anticipated but overall the assigned burn boss felt confident that they could have the burn tied in later on that evening. By the end of shift, one small slop over into (NE corner) AQ East still needed line around it. The next day's plan was to utilize WA State 300 ton rule, to contain the slop; while looking for other opportunities to go direct, within AQ east foot print.

9/28/2017 - Crews scouted and continued to contain the slop over to the North of AQ East, while looking for opportunities to go direct within the AQ East perimeter. Topographic features, steep incised drainages, and potential safety concerns with going direct, helped to make the decision to confine the burn perimeter to the original NEPA project boundary. Crews went direct along the upper most Northeastern edge, of the East boundary of AQ using cold black and tying in portions with hand line, while inserting a hose lay along a riparian feature along the southern edge of AQ East.

9/29/2017 - Crews continued to contain, control and confine the burn perimeter within the AQ Middle and East foot print. Little to no growth was observed.

9/30/2017 – A forecasted cold frontal passage brought high winds, which lofted an ember midway up the slope, and across the drainage to the south of AQ east (closed canopy conifer stand). This spot torched a tree, which lofted more embers to a south aspect, where it ignited flashy fuels. Crews remobilized for point protection. At this time fire was burning at a moderate rate of spread within the flashy fuels on the south slope. Additional Resources were ordered at this time. Notifications to the Duty Officer and Agency Administrator were made. Eventually the fire reached a small section of private land. Resource damage amounted to burned grass (20Acres). Notification to the land owner was made, and the Burn was declared a wildfire.

Project Map – AQ burn

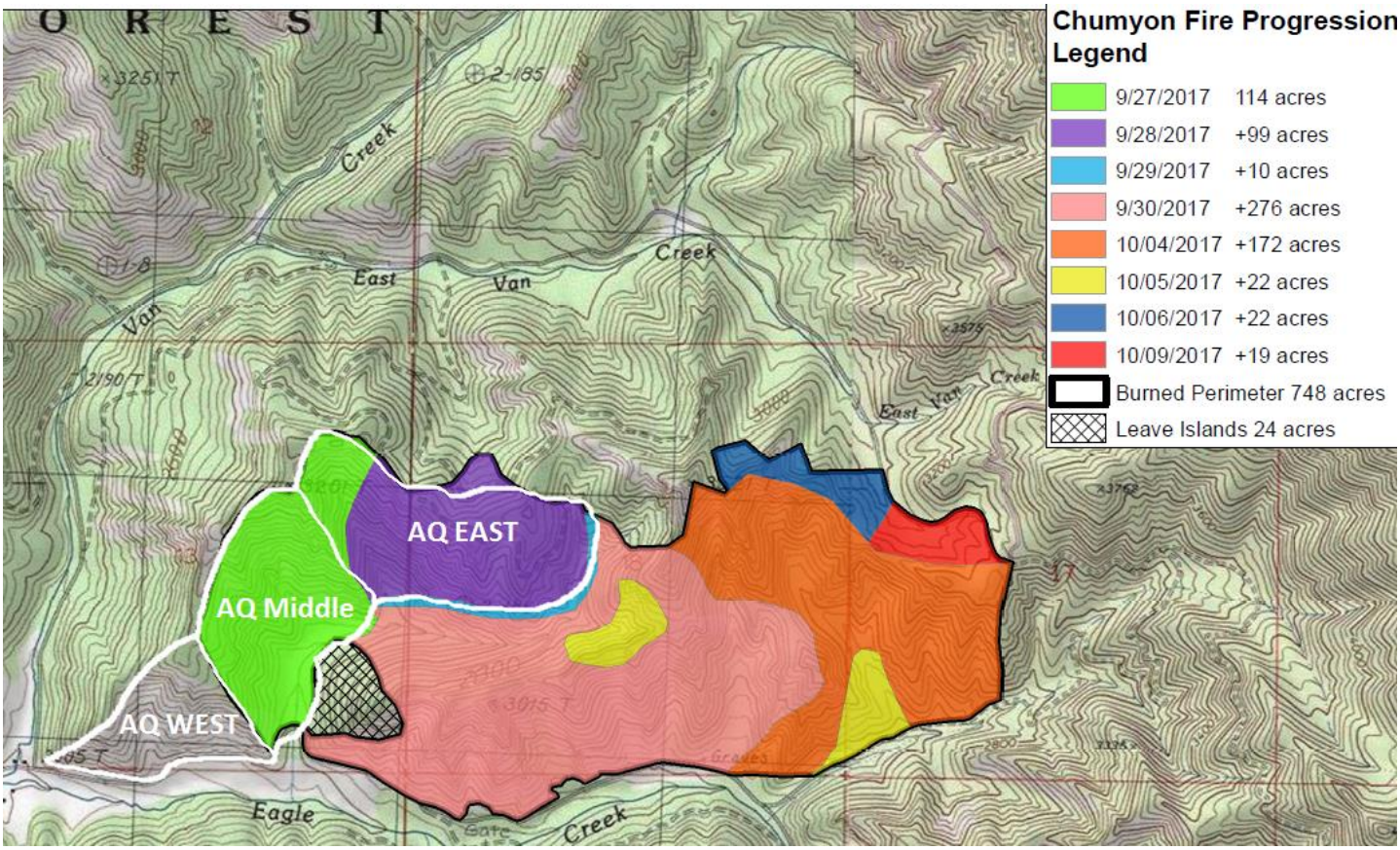
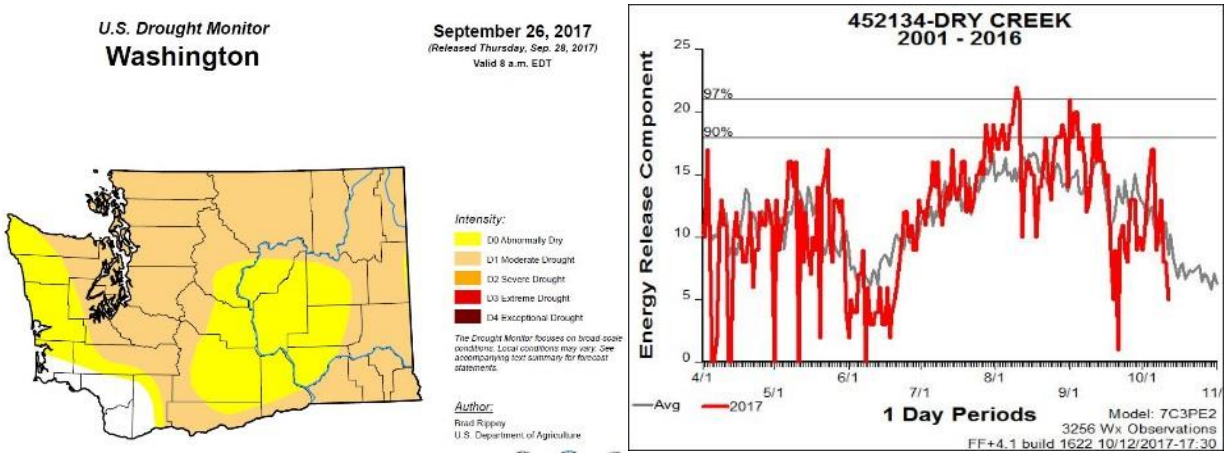


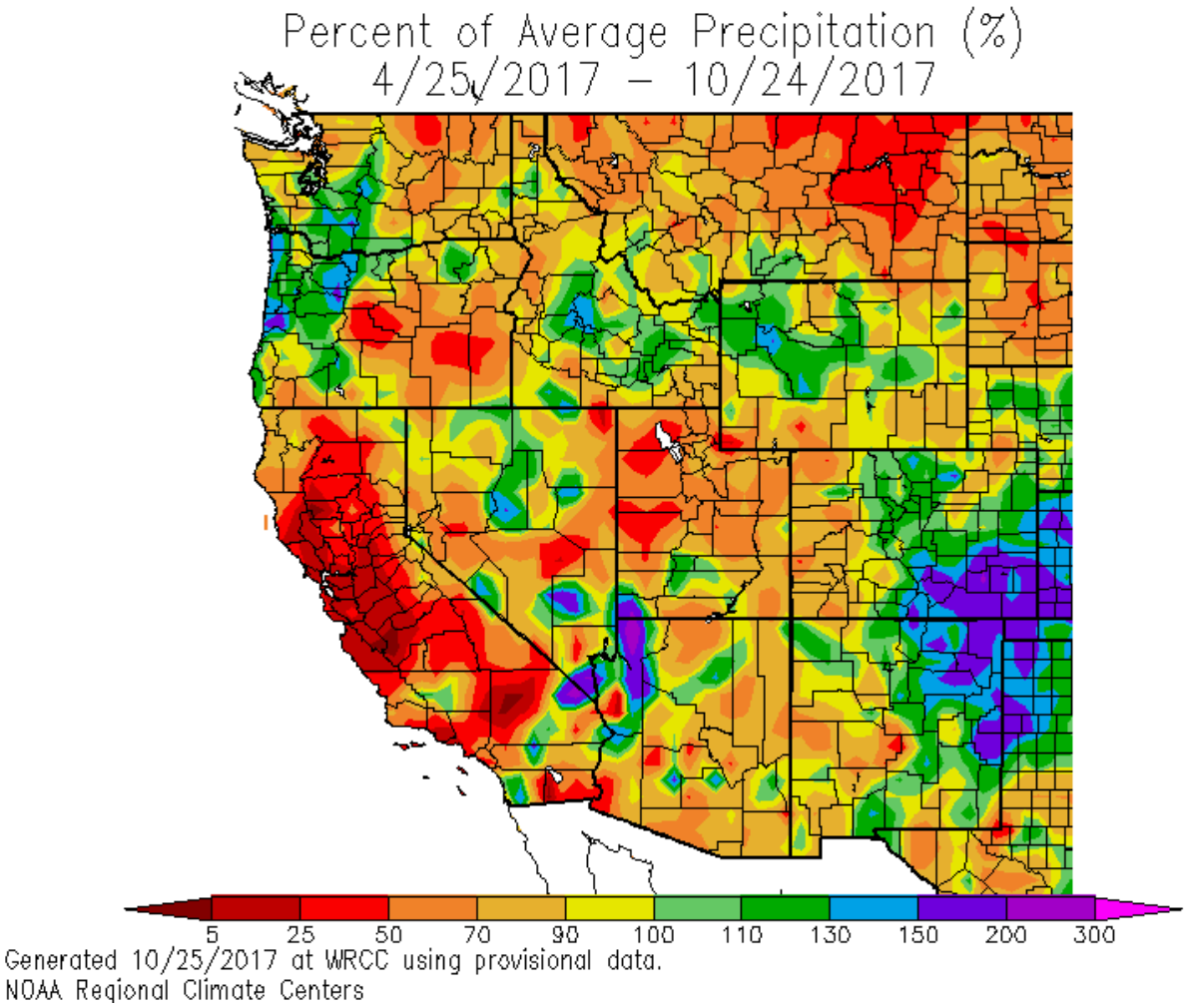
Figure 1: Burn Progression and AQ Perimeter

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

Weather and Fuels:

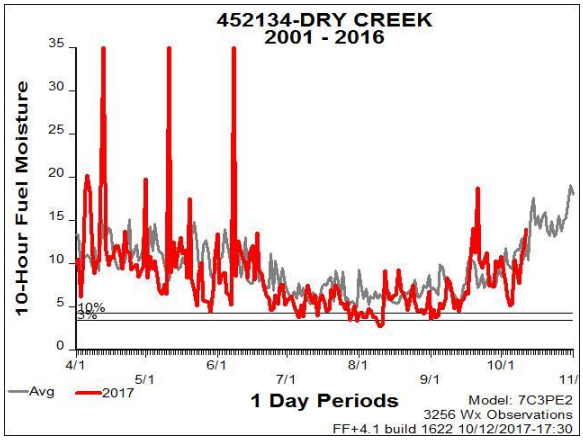
Climate – The Cascade Mountains of Washington State experienced above average precipitation for the previous 12 months starting in October 2016. Abnormally dry conditions developed over the project area during summer months of 2017. A normal wildfire season was predicted for the Pacific Northwest, however above normal fire activity occurred for the geographic area. Large fire activity decreased by late September due to lower temperatures and higher humidity.

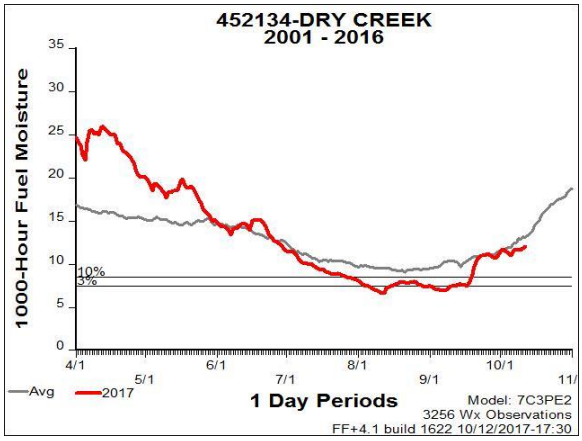




Seasonal – winter and spring experienced above average precipitation, however summer months quickly dried surface fuels as snow melt occurred. A wet spring generated above normal grass crops and the last recorded wetting rain occurred on June 16, 2017.

During July, August and September, fuel conditions were drier than average for most of the date range. Fuel moistures in the project area began to respond to cooler weather, higher humidity, shorter days and thus dropping to near average conditions by late September.





Fuels – Fuel moistures in the project area began drying in May with 1000-Hour Fuel Moistures below average in late June and ERC above average in late June. Daily temperatures were trending 5-7 degrees above average beginning in July and extending through much of September. This weather pattern pushed ERC values above 90th percentile and 1000-Hour fuel moistures below the 10th percentile. September 27, 2017 indices were as listed below per the Dry Creek RAWS Station located within the vicinity of the project area. Main species occupying the burn location included Ponderosa pine, Douglas-fir, grasses and brush. Project location received well below average precipitation during July-September.

ERC – 13

10 – Hour Fuel Moisture 7%

1000 – Hour Fuel Moisture 11%

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

A review of the AQ Prescribed Fire Burn Plan was conducted and found that all elements were consistent with Agency Policy and Guidance as outlined in the Interagency Prescribed Fire Planning and Implementation Guide (PMS-484 2014).

The most recent Interagency Burn Plan Template was not used in every element of the development of the AQ Prescribed Fire Burn Plan. All required elements were addressed and the information contained in the burn plan met interagency standards outlined in PMS-484.

The burn plan was reviewed and approved by the District Fire Management Officer and Agency Administrator. The plan was technically reviewed by an appropriately qualified Burn Boss Type 2 (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 every day ignitions occurred and was placed in the project file.

Technical Review Checklist – AQ Prescribed Fire Plan, OWF 2017

PRESCRIBED FIRE PLAN ELEMENTS	S, U, or N/A	COMMENTS
1. Signature Page	**S**	
2. GO-NO-GO Checklists	**S**	
3. Complexity Analysis Summary	**S**	Have recommendations to improve
4. Description of the Prescribed Fire Area	**S**	
5. Goals and Objectives	**S**	
6. Funding	**S**	
7. Prescription	**S**	Have recommendations to improve
8. Scheduling	**S**	
9. Pre-Burn Considerations	**S**	

10. Briefing	**S**	
11. Organization and Equipment	**S**	Have recommendations to improve
12. Communication	**S**	
13. Public and Personnel Safety and Medical	**S**	
14. Test Fire	**S**	
15. Ignition Plan	**S**	
16. Holding Plan	**S**	Have recommendations to improve
17. Contingency Plan	**S**	Have recommendations to improve
18. Wildfire Conversion	**S**	
19. Smoke Management and Air Quality	**S**	
20. Monitoring	**S**	
21. Post-Burn Activities	**S**	
Appendix A: Maps	**S**	Have recommendations to improve
Appendix C: Complexity Analysis	**S**	
Appendix D: Risk Assessment/JHA	**S**	
Appendix E: Fire Behavior Modeling	**S**	

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

It is assumed that the AQ unit is in a Fuel Model TL8. Based off of the TL8 the unit was:

- Temperature: According to the burn plan, the unit was in a Moderate prescription on the 26th and before 15:00 on the 27th. At the time of the test fire, the unit was at 66 degrees putting it in a moderate parameter. At 15:00, the unit moved into the High category until the last reading of 17:30 on the 27th per the burn plan. On the 28th and 29th, the unit was in the High prescription. On the 30th, they were either in the Low or Moderate prescription.
- Humidity: On the 26th (day prior to ignition) humidity was too high according to the prescription and the observed weather. Smoke approval was not approved for this day as well. On the 27th, the 11:15 test fire and 11:30 weather reading had a temperature of 66 degrees, the 47% humidity recorded was actually out of prescription (44% humidity is the top of the Moderate parameter prescription). Humidity was within prescription most times other than being too high in some observed weather in the mornings and evenings, especially on the 30th (50% +).
- Wind Speed: The unit was within prescription most of the time. There was one reading Saturday the 30th that was out of prescription (9 mph at 15:00). It should be noted that there were forecasted breezy winds on Friday into the following week

- Fuel Moisture: Fine dead (1 hour) fuel moisture started at 11 from the test fire putting the unit into the Moderate parameter and it stayed in Moderate the rest of the day. Fine dead fuel moisture bottomed out to 6 on the 28th and 29th putting the unit into the High prescription. On the 30th, Fine Dead fuel moisture was in the 11-15 range putting it into the Moderate, Low, or out of prescription. From the Dry Creek RAWS 10 hour fuel moisture observations, it appears that prior to the unit being burned, 10 hour fuel moisture got close to 20 (fairly wet), and then there was a drying trend bottoming out close to 6 (fairly dry) after October 1. The unit appears to be within prescription on 10 hour fuel moisture (based off of Dry Creek RAWS), however this was not recorded.
- Probability of Ignition was not accurately portrayed in the burn plan. Even though you can calculate a POI of 26 in Behave, it is impossible to calculate a POI of 26 in the field. Calculation factor of 10, (10, 20, 30, etc.) should be used. The way it is written currently gives the Burn Boss ambiguity of what is within and what is out of prescription.
- Some of the information was not provided/recorded such as Scorch Height, or Spotting Distance which are required items identified in this burn plan.
- Rate of Spread: From the test fire, Rate of Spread was not recorded and should have been recorded because it is a required element in this burn plan. 0-1 chains/hour were recorded on the 27th at some point in the day, and 1-2 chains/hour on the 28th. 15-20 chains recorded on 9-30 in a TL3 which is different from what the unit prescription parameters were based on for 9-27. The rate of spread for the 30th is out of prescription. This is also a required parameter required in this burn plan.
- Flame Length: During the test fire, it was observed to be 2-4 feet. The 4 foot observation would be out of prescription for the TL8, because the moderate category has a 3.3 foot length and the High has a 3.5 flame length. Further observations on flame length were not recorded until 9-30. 4-6 foot flame length was observed and recorded and is outside of the prescription whether inside the unit or outside. If Flame Length is a prescription parameter this should be recorded.
- Under the "Acceptable Fire Behavior Range" portion of the burn plan, it is stated, "Any combination of weather and fuels guidance parameters that results in an acceptable fire behavior range will be considered within prescription." This statement potentially puts the Burn Boss on a slippery slope if he or she is picking and choosing what fire behavior is "acceptable" for a given fuel model.
- Based off of the High prescription of TL8, the unit had the appropriate amount of people (more than what contingency called for) and resources per the Burn Plan and had contingency resources on site.

Actions and Procedures:

No smoke approval was given on Tuesday the 26th. Approval was given for Wednesday the 27th.

The plan was to implement the AQ unit west of the IHC handline. Anything east of that line had been determined to be un-implementable due to an intermittent stream bed that was not a place to hold prescribed fire, even though it was analyzed in NEPA.

There were 47 people on the burn (per the Organization Chart) as well as 3 Fire Engines (one Fire Engine used solely for transportation). Eighteen of the 47 were individuals from the TREX program. This was a new training opportunity to TREX and the Okanogan-Wenatchee National Forest. All contingency resources were on the burn, per the burn plan.

A test fire was conducted and said to be successful and the unit was fired down the west and east side from the top. Through the day the unit provided challenges to holding as there were embers getting across the line, but were picked up with holding actions. At 17:45, the prescribed fire spotted over the IHC handline, and a 1.5 acre slop was identified in the NE corner of the unit. Direct attack on this was said to not be appropriate, due to lack of successful containment opportunities.

The larger AQ unit was approved for burning under the project NEPA, but was dropped from consideration as part of the burn unit, due to concerns about safety. So on the day of ignition, this seemed to cause some ambiguity as to the boundary of the unit and when the burn should be declared an escape. It seems like the area east of the IHC handline could have been called a Contingency area and a raised level of urgency could have been taken on holding actions once the prescribed fire had gotten on the other side of the handline

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 completed the following formal training; Geographic Fire Management Leadership - GFML (2007), Agency Administrator Workshop (2011) and Advanced Fire Use Application S-580 (2008) and was delegated the responsibility from the Forest Supervisor via letter dated July 6, 2017.

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 Chumyons 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.

AQ RX BURN -- KEY BURN STAFF QUALS

ASSIGNED POSITION	QUALIFIED YES/NO
Agency Administrator (AADM)	Yes/Current
RXB2	Yes/Current
FIRB	Yes/Current
TFLD (Holding Boss)	Yes/Current

RECOMMENDATIONS

Recommendation: Notifications when declaring a wildfire

It was found that the notification process for declaring a wildfire was not fully understood or followed. The District did a good job communicating with the Forest Duty Officer, however the Forest did not communicate early with the Region. We need to communicate early and often within our agency, as well as, with our partners and cooperators, with whom we are working with to accomplish our management objectives. We are clearly telling our story when things are going well, however there may be a reluctance to admit when we are having issues. **Team recommends that District and Forest work together to clearly communicate when things are going well and communication is even more important when things are going poorly. Increased communication between the District staff, Forest PAO and Forest Fire staff, will provide the framework needed to meet the challenges of future prescribed burns.**

Recommendation: NEPA

The District identified that many of the older NEPA decisions had identified treatment polygons which did not adequately address how prescribed fire could be used or contained within those polygons. The older decisions also minimized the acreage that could be treated using prescribed fire to achieve stated ecosystem goals. District personnel were able to point to numerous proposed treatments in the Chumstick and Natapoc EAs that would be next to impossible to implement as currently analyzed. **The Review Team recommends using NEPA tools such as a Supplemental Information Report (SIR) or Categorical Exclusion (CE) to update these legacy decisions and increase the efficiency and safety of prescribed burning while expanding the restoration footprint across the Forest.**

Recommendation: Contingency

It was identified by the burn plan preparer that part of the AQ unit was inaccessible and that there was no good places that a control line could be established. With this in mind, the preparer reduced the actual AQ burn area to that portion that was considered accessible and had a good control point. This belief that the area outside of the reduced burn area was not a "good" place to put personnel and had no real contingency lines that could be located within it, did not change when the burn left the reduced unit and started burning into this inaccessible terrain. Control of the burn was delayed while efforts were put into locating containment lines in this already identified inaccessible area. In the future, if areas are believed to be not part of the burn plan, they need to be readily identified and actual contingency lines located, to facilitate a prompt response to a burn that has left the planned area. The lack of any kind of Contingency Line or the forward thinking of "what happens if this unit gets out" is the biggest thing that needs to be addressed moving forward. It seems there is too little of a margin for error here and for other burn units in the future. **Team recommends providing a map that clearly identifies where contingency lines can be placed that have a reasonable chance of holding or stopping the prescribed fire.**

Recommendation: Prescription

There seem to be too many requirements and/or elements and/or fuel models in the prescription. A thought would be to keep it simpler by using the relationship between fine dead fuel moisture, mid-flame wind speed and flame length and only making one desired condition for each fuel model and unit rather than a low, moderate, and high for different fuel models.

With the current prescription, the monitoring of these requirements through the day seem laborious. In this example, some of the requirements were not documented whether the burn met prescription or not. This was observed during the test fire documentation as well as during the rest of the burn. Weather observations showed the burn starting in a Moderate prescription, and moving to a High, however it was unclear to the Team whether the Burn Boss clearly knew this, that it was documented, or what the ramifications of moving from a Moderate to a High were.

There are great appendices contained in this burn plan including test fire, monitoring, fire weather, fire behavior, smoke, fire behavior observation summary, transfer of command, and patrol schedule. However, with all of these appendices, tracking prescription parameters through the day is easier said than done. These appendices should be consolidated to capture all the prescription parameters. This could be part of a Prescribed fire Incident Action Plan or a daily burn boss packet that captures all prescription parameters and other pertinent information. **The Team recommends a simplified prescription that is easy to track and document for the Burn Boss to determine if prescriptions are met or not.**

Recommendation: Smoke management issues

When the unit was ignited on Wednesday September 27th, smoke submittals are only permitted Monday-Thursday. After Thursday, up to 100 tons can be submitted without an approval. When more than 100 tons are anticipated (or burned with a larger fire behavior run) on a day such as Saturday September 30th, where there was an estimated 276 acre size increase and somewhere between 1,904-5,652 tons emitted (based off of a TL8 fuels data), the DNR smoke approval requirement was violated. Element 9, in the burn plan, states "Daily Burn Request submitted and approved", therefore the burn plan was violated, which was a factor in the wildfire declaration.

The inability to gain smoke approval for days outside of the Washington Smoke Management Plan (SMP), led to discussions on the need to convert to a wildfire, due to possible smoke impacts. As it turned out, no smoke impacts materialized in relation to the actual burn itself, but there were some elevated smoke reading during the wildfire episode. SMP does not allow burning between Friday and Sunday, during the summer months. Due to the TREX program being hosted, the District could have requested an exemption for this burn, however the exemption was not sought, per direction from the Forest, as the SMP really has no exemption for this. **The Team recommends following up with local smoke approval requirements and documentation supporting what led up to the escape. Make clear the need to meet the smoke requirements which may have led to an urgency to get the spot back into the burn unit and to continue to meet SMP requirements.**

Recommendation: TREX

The district hosted a Prescribed Fire Training Exchange (TREX) which began on 9/25 and continued until it was declared a wildfire. A TREX is an opportunity to give individuals from off-unit the chance to increase prescribed fire skills and work as trainees to gain qualification. The participant's positions ranged from FEMO (t) to RXB2 (t).

This was the first time a TREX was hosted in the State of Washington and by the Forest, in general these are new to the PNW. While the TREX itself did not contribute to the escape, it added complexity to the situation with lessons learned for the future. **Team recommends that when anyone is hosting a TREX, consider first, because these individuals are new to the unit and area, they should not be relied upon to meet required organizational numbers for implementation. Second, because this is a training opportunity, units should lower their expectation for production and accomplishments.**

Recommendation: Aerial Ignition

The Okanogan-Wenatchee NF (OWF) has a forest wide Aerial Ignition Project Aviation Safety Plan (PASP). The Tonasket, Methow, Chelan, Entiat and CleElum Ranger Districts all have units identified in the current PASP which is effective from January 1, 2017 through December 31, 2017. The PASP is updated annually. This PASP identifies units in which aerial ignition may be utilized to reduce natural and activity fuel accumulations. The OWF aerial ignition PASP also allows management the ability to utilize a helicopter to conduct reconnaissance flights, sling gear into designated sling sites and move passengers to designated helispots. In the event of significant slop over, bucket work may also be ordered to help crews control the spread of fire. Because prescribed fire is a planned event, the utilization of any aviation resource would require a PASP that addressed the use and assessed the risk associated with the specified resource. Any units not included in the PASP would be prohibited from utilizing any aviation resources until the prescribed fire was declared a wildland fire. **The Team recommends that all prescribed burn units be included into the Forest wide PASP.**

Recommendation: High Reliability Organization (HRO)

The Review Team noticed some complacency in the planning and implementation of the burn. This was demonstrated by a number of instances including; the absence of pre-firing work on identifying and improving contingency lines, a pre-occupation of spotting and slop-overs being "normal" and "nothing unusual or bad" instead of a potential indication of expected fire behavior, maintaining a firing pattern that was not creating a successful outcome, sending personnel to another prescribed burn when the AQ burn was still actively testing containment lines, and communication issues between fire managers and field personnel.

The Team recommends an increased concentration on two elements of becoming a High Reliability Organization, a preoccupation with failure and a reluctance to simplify, will assist the District in future burning operations. *(Weick K, Sutcliffe K. 2007. Managing the unexpected: Resilient performance in an age of uncertainty. San Francisco, CA: Jossey Boss.* http://high-reliability.org/Managing_the_Unexpected.pdf*)*

CONCLUSIONS

Looking beyond easy explanations and clichés can often provide heightened awareness. We don't have to wait for accidents or levels of failure to identify the issues in the system. It can take years to reach a NEPA decision, so once they are made, we often focus only on accomplishing target within the parameters of those decisions. In the AQ burn, the NEPA decision largely inhibited any burn plan from being completely successful, this was readily acknowledged by the District Fire Organization. As with NEPA, it takes years to get public and cooperator acceptance in using prescribed fire on the landscape, it may only take minutes or hours to lose this acceptance. We as an agency take great pride in being stewards of the land, however with this responsibility, we need to take great care that we do not lose the public's trust in our ability to accomplish our land management objectives.