Rapid Lesson Sharing

Event Type: Type 6 Engine Damage from Heat on a Prescribed Fire

Date: March 17, 2019

Location: West Canal Prescribed Fire
Malheur National Wildlife Refuge
near Frenchglen, Oregon

Heat damage to Engine-616 occurred to its top compartment fiberglass box, the front door passenger gear box, and the passenger side mirror. All of these components will need to be replaced. In addition, the Engine's entire rear package will need to be repainted and restriped.

Narrative – Background

On March 16, Burns Interagency Fire Zone personnel and assisting resources from John Day, Vale, Lakeview, and Prineville (Bureau of Land Management, U.S. Forest Service, and U.S. Fish and Wildlife Service employees) initiated the West Canal Prescribed Fire.

The purpose of this 4,800 acre prescribed fire was to open up dense stands of vegetation along waterways and reset decadent riparian vegetation. The implementation plan was to accomplish this burn over 2-4 days, with the first 2 days targeting establishment of perimeter lines. The following days would focus on holding and cleaning up any internal pockets of heavy fuels that weren't consumed during the prior days.

After discussions with those involved on this incident, there have been many ideas/thoughts on what could have been done to prevent this incident. Although hindsight is 20/20, perhaps addressing the majority of these ideas will provide a thought-prompting list for the next time crews are working in a similar situation.

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The Rx Organization consisted of dual ignition and holding crews that started on the unit's southeast corner and coordinated progression around the unit's east and west flanks, moving to the north. The east and west flanks consisted of waterways (Blitzen River and West Canal) that utilized levy/dike systems to control water flow. Prep work had focused on mowing off the tops of these dikes to remove heavy vegetation along control lines. Vegetation left after the mowing was either bailed or scraped off lines and pushed into the unit by a small Skid-Steer Loader with bucket.

Morning briefings discussed how the fuels (tule patches and heavy meadow grasses) were flashy in nature but also had the ability to exhibit high-intensity heat for short durations. Other unique hazards pointed out for this prescribed burn were the narrow and degraded levy/dike tops utilized for control lines. During the initial briefing, all personal on the prescribed fire went over and then signed the burn plan Risk Assessment.

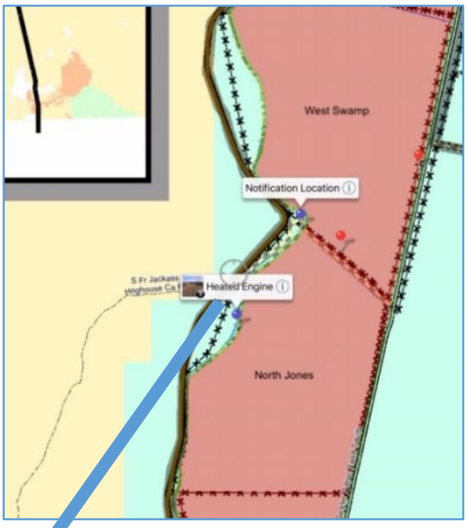
The crewmember running the hose stated that—due to the heat in both directions—they weren't able to go forward or back up.

The Incident

The following day, March 17, at approximately 1245 hours, the Engine Boss of E-616 (a Burns District BLM Light Engine staffed with two Forest Service personal) reported to the Holding Boss Trainee that their Engine had sustained some heat damage.

E-616 was holding behind ignitions along the west flank (which utilized the West Canal as the primary control line). Other holding resources were 2 UTVs with small slip-in tanks along the dike. In addition, a heavy (Type 4 Engine) as well as a super heavy (Type 3 Engine) were following ignitions from the contingency line (Highway 205).

The Holding Boss and Trainee tied-in with the E-616 crew to make sure they were OK and check the damage to the Engine. At 1300, the Prescribed Fire Burn Boss (RXB2) and Trainee were notified about this incident. They also headed over to tie-in with the crew.



Heat Damage Occurred When They Moved into Heavier Fuels

An accident form was filled out by the crew in which the Engine Boss and crewmember explained what had happened. From the crew's discussion with the Holding Boss, the damage had likely occurred around 1240 when ignitions moved into the heavier fuels that were more dominated by tules. (For specific location, see the "Heated Engine" pin on the map on right and the photo on right.)

When ignitions became established in this area with the heavier fuels, the flame lengths quickly increased from approximately 2 feet to 10 feet. This is when the Engine heat damage incident occurred.

The crewmember running the hose stated that—due to the heat in both directions—they weren't able to go forward or back up.

Once the heat dissipated, the crew progressed on with their holding duties. Initially, they were unaware of the heat damage to their Engine. (Reference the "Notification Location" pin on map above to see where this damage was first identified.) At this time, at this location, they notified the Holding Boss Trainee of the damage.

After tying-in with the crew, the Holding Boss went back with them to establish the presumed location where the heat damage had occurred.

The Damages

Local personnel have assessed the damage and foresee the need to replace: the top compartment fiberglass box; the door of the front passenger gear box (this door was warped); and the passenger side mirror of truck. In addition, the repainting of the entire rear package of the Engine (both sides to avoid a two-tone look) is required—followed by reapplying the striping to the Engine.

Furthermore, it's also possible that the Engine's long rectangular box door will need to be replaced. The Engine was taken to a local body shop that will make the final determination regarding what parts will need to be replaced versus those that will just need to be repainted.

Lessons and Possible Mitigation Measures

After discussions with those involved on this incident, there have been many ideas/thoughts on what could have been done to prevent this incident. Although hindsight is 20/20, perhaps addressing the majority of these ideas will provide a thought-prompting list for the next time crews are working in a similar situation.

1. Coordination between Holding and Ignitions is key.

- Better communication between the Ignition and Holding crews may have avoided this incident by: Easing into the heavier fuels area; Bringing the second burner in closer to the dike top; Allowing fire to back more before moving on or, possibly, by putting the engine ahead of burners and utilizing a wet line for burners to light off of rather than following ignitions closely to put out the fire creep across the dike.

2. Ensure a better blending of outside and local resources.

- The majority of the local resources on this prescribed fire had familiarity in burning in these fuel types. Therefore, by blending the crew on this engine with an experienced local person might have helped to mitigate this incident and done a better job of educating outside resources.

3. More prep work could have been accomplished.

- Clean off vegetation from dike tops to prevent fire creeping across.
  - Had fire creep across the dike top not been an issue on this prescribed fire, they may not have needed E-616 on the dike top, or at least not following burners so closely.
- Put in more "mash lines" through the tules with the Marsh Master (tracked swamp vehicle the Refuge uses) to put fuel loads on the ground—which would reduce the effective flame lengths.

4. Improve infrastructure with holding lines.

- Prior to Rx implementation, drive dike tops with heavy-wheeled vehicles to identify and fix infrastructure issues (such as beaver holes under dikes). A concern surrounding such potential issues is the primary reason why only one Type 6 Engine was located on the dike top control line.
- Blade and pack dike top prior to burning.
  - A majority of traditional holding resources on the prescribed fire's western flank held back on the contingency line (a highway) due to the uncertainties of the structural soundness of the dike top. Wheels breaking through dike tops into beaver holes is a common occurrence.
- Clean out canals.

- The canal was overgrown with tules (solid fuel across top of water in many locations). Therefore, the dike top was the only effective fuel break—requiring Holding crews to follow ignitions closely. If there was an open waterway adjacent to the dike top, holding would have been much easier and resources could have followed farther behind—allowing heat from tule patches to die down more before advancing on the holding line.

5. Ensure and promote information sharing.

- Products such as this RLS report may resonate with those people who are unfamiliar with these fuel types and better prepare them for understanding and realizing the potential that these fuels have of moving fast, coupled with periods of high-intensity heat.

6. Explore multiple entries on units with these fuel types to reduce heavy fuel patches along control lines.

- Explore the possibility of developing a programmatic burn plan geared toward targeting heavy fuel pockets (tule and willow patches) when conditions inhibit spread in fine grass fuels. Reducing these pockets along control lines prior to the main ignitions would drastically reduce the potential for incidents such as this one that occurred on Oregon's Malheur National Wildlife Refuge.

This RLS was written and submitted by the Burn Boss (RXB2) on this prescribed fire in consultation with the people who were present and involved with this incident.

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