

## Can Fire Suppressant Gels Protect Log Decks? Part II - A case study to test gel effectiveness against ignition from burning embers

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### Introduction

A case study to test the effectiveness of fire suppressant gel against fire spread in log decks was done in 2005 at the Community Protection Trials site (formerly International Crown Fire Modeling Experiment) near Fort Providence, NWT.<sup>1</sup> The results suggested that gel could be useful to slow fire spread. FERIC and the Government of the Northwest Territories returned to the Community Protection Trials site in 2006 in order to conduct additional tests. In the test reported here, FERIC explored the capacity of suppressant gels to protect log decks from fires started by airborne burning embers. In a second study two tests were done to observe the effectiveness of gels against radiant and convective heat transfer.<sup>2</sup>

### Objectives

- Observe/record cases of ignition when burning embers are applied to log decks with different gel treatments
- Observe the ability of suppressant gel to extinguish embers as they contact log deck surfaces

### Methodology

Four decks of similar size were built using jack pine logs removed from an adjacent research site. The logs had been felled at least three years prior to the test.

- Deck 1 was sprayed with water using a Mark 3 pump equipped with 1.5-inch (3.8 cm) hose until all the exposed wood was saturated.
- Decks 2 and 3 were treated with gel concentrate applied with a nozzle attached to 1.5-inch hose and a pump, with Deck 2 treated three hours before the start of the trial and Deck 3 ten minutes before application of burning embers. The gel was applied at a 2% mix ratio.
- Deck 4 was left as untreated control.

A small fire was started, and jack pine cones, collected from near-by material, were placed in the coals and allowed to smoulder. Once the cones were openly flaming, one shovelful (approximately 12 cones) was placed randomly-positioned on a deck (Figure 1). Ignitions were considered successful after the burning cones ignited the surrounding material and burned for at least 2 minutes (Figure 2). Successful ignitions were then extinguished. The experiment was repeated every fifteen minutes for a total of five tests on each deck.

<sup>1</sup> Schroeder, D. 2005. "Can Fire Suppressant Gels Protect Log Decks? A case study to test the concept." Online report <http://fire.feric.ca>

<sup>2</sup> Schroeder, D. 2006. "Can Fire Suppressant Gels Protect Log Decks? Part III – two case studies to test gel effectiveness against radiant and convective heat transfer." Online report <http://fire.feric.ca>



Figure 1. Application of flaming cones to log deck.



Figure 2. Recording video during application of flaming cones.

## Results and discussion

Weather conditions during the tests were 24 Celcius and 29% Rh. The Canadian Forest Fire Danger Rating System index for fine fuel moisture (FFMC) was 91. The site received 2mm of rain 2 days prior to the test.

The control deck ignited with the first application of flaming cones as was expected. Deck 2, treated with water, ignited from cone application twenty five minutes after the water was applied. The moisture on the logs had already evaporated from the heat of the day. The piles were rewetted using back pack pumps and flaming cones were applied again. The first application showed some smouldering but no ignition. The following application fifteen minutes later did result in ignition.

The gel treatments were successful in preventing cones from igniting the deck when the cones landed on gel-covered surfaces. For the first two applications, the cones smouldered for eight to ten minutes and then extinguished. On the second applications, some of the flaming cones dropped into the center of the piles where the gel had not reached during application. The deck then to ignited (Figure 3).



Figure 3. Ignition of a gel covered deck where a cone has fallen between the logs and into the unprotected interior of the deck – smoke is showing in the center of the photo.

## Conclusions

The results show that water, or gel will not eliminate all potential ignitions in log decks as a result of airborne embers. FERIC did observe that gel is superior to water because of its longevity. Log decks have very irregular surfaces (compared to a house or other structure) and it is very difficult to get gel into all of the gaps. No ignitions happened when the embers landed on gel. The effectiveness of gel applications will be enhanced by a) piling decks to minimize gaps and irregularities; or b) minimizing fine fuels that are difficult to coat with gel and easily ignited if exposed (including fuels around a deck's perimeter).

## Next step

A FERIC Advantage report will be prepared, summarizing best practices, including gel application, for log deck protection.

If you want more information about this study, please call Dave Schroeder at 780 865 6980.

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