

AN OPERATIONAL TRIAL OF THE SKIDDER-MOUNTED FOAM GENERATOR UNIT

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AN OPERATIONAL TRIAL OF A SKIDDER-MOUNTED FOAM GENERATOR UNIT

During the past two years field tests had shown the possibility of forming a foam fire-break across logging slash with a skidder-mounted water tank and foam generator. These field tests also demonstrated that a foam line could be constructed at 1.5 mph and with an efficiency of water use of .3 gallons of water per foot of foam line. The question remaining now was, "just how does a foam line behave as a fire-break and as a back-fire line?" From the research point of view the question was also, "On the basis of this preliminary test of effectiveness, how should future research proceed?"

Fortunately, a prescribed burn conducted by the Canadian International Paper Company near Maniwaki, provided an excellent opportunity to conduct this preliminary test.

THE DEVELOPMENT OF THE SKIDDER-MOUNTED FOAM GENERATOR

The fire-fighting capacity on woodlands operations needs to be increased; on one hand there are high values of wood inventories and installations in the vicinity of hazardous slash fuels, and on the other, there is the increasing mechanization of woodlands operations with consequent reduction of manpower available for the shovel method of fire-line construction.

Water tankers, based either on the logging operation or at a more central location, are one solution to increasing fire fighting capacity, and are particularly useful in areas of water scarcity and good accessibility. The limited amount of water carried by one of these tankers must be used as effectively as possible since refills can be time consuming and costly.

Both wetting agents and retardants have been intensively tested by the United States Forest Service as a possible means of increasing the effectiveness of water (see selected references). The first date that foam was tested as a forest-fire fighting tool was in 1936. (David P. Godwin, 1936). Foam, produced chemically by a reaction between aluminum sulphate and sodium bicarbonate, and stabilized with a licorice extract, was found to increase the effectiveness of the conventional back-pack pump. Credit for operational trials of the skidder-mounted foam generator unit is due to both the Woodlands Research

Department of the Canadian International Paper Company, and to the Gatineau Forest Protection Association. Logging skidders of the tree farmer type were recognized as a feasible method of applying the high expansion foams that can now be produced mechanically by commercially available generators.

THE OPERATIONAL TRIALS

From the very beginning of the testing plans we realized that each test of foam line effectiveness would be conducted in unique sets of slash and weather variables that would complicate any comparison to future trials. Every effort was made, therefore, to define these variables as closely as possible.

Slash condition is determined both by arrangement and by moisture content of its component parts. Slash arrangement is demonstrated with photographs in Appendix I.

The moisture content variation between burning plots and between class of fuel components is summarized in Figure I. These moisture content values require interpretation. Experimental work has shown that slash fires will spread in fuels of 25 per cent moisture content or less, since only the moisture content of exposed needles and twigs fell below this critical level, it is not surprising that the sheltered fuels did not burn.

The daily course of the weather preceding the burn is shown in Table I. On the day of the burn, wind speed was extremely variable, gusting from 1 to 10 mph.

Because of the unique set of wind and slash conditions on each plot, fire behaviour was also variable. The rate of spread, for example, was 15 ft./minute on plot 1, and 12 ft./minute on plot 2. (Appendix IV).

OBSERVATIONS ON FOAM EFFECTIVENESS

A Bliss-Rockwood foam generator and Jet-X foaming agent was mounted on a 425-gallon skidder tank for this trial. The following observations can be made on the basis of this preliminary test:

1. Since the foam's effectiveness stems primarily from its insulating capacity, slash protruding from the mass of the foam line will carry fire.
2. The present effectiveness of a foam line is limited by its duration and by its wetting ability. Fires burning in the litter layer adjacent to the foam line will eventually break through the foam line. This trial indicated that present foam lines, at an expansion of about 400 to 500 will remain an effective break for up to 30 minutes in a slash fuel type.
3. Wind speeds in excess of 5 mph tend to break up the foam as it flows from the generator, and the resulting foam line is less effective.

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK

Although research is advancing rapidly in the direction of developing and discovering superior foaming agents, field tests are useful for the following reasons: they help the laboratory scientist to define the most critical characteristics of a foam, they help operational personnel to evaluate the probable strategic use and effectiveness of the system, and they help to stimulate a more effective equipment design.

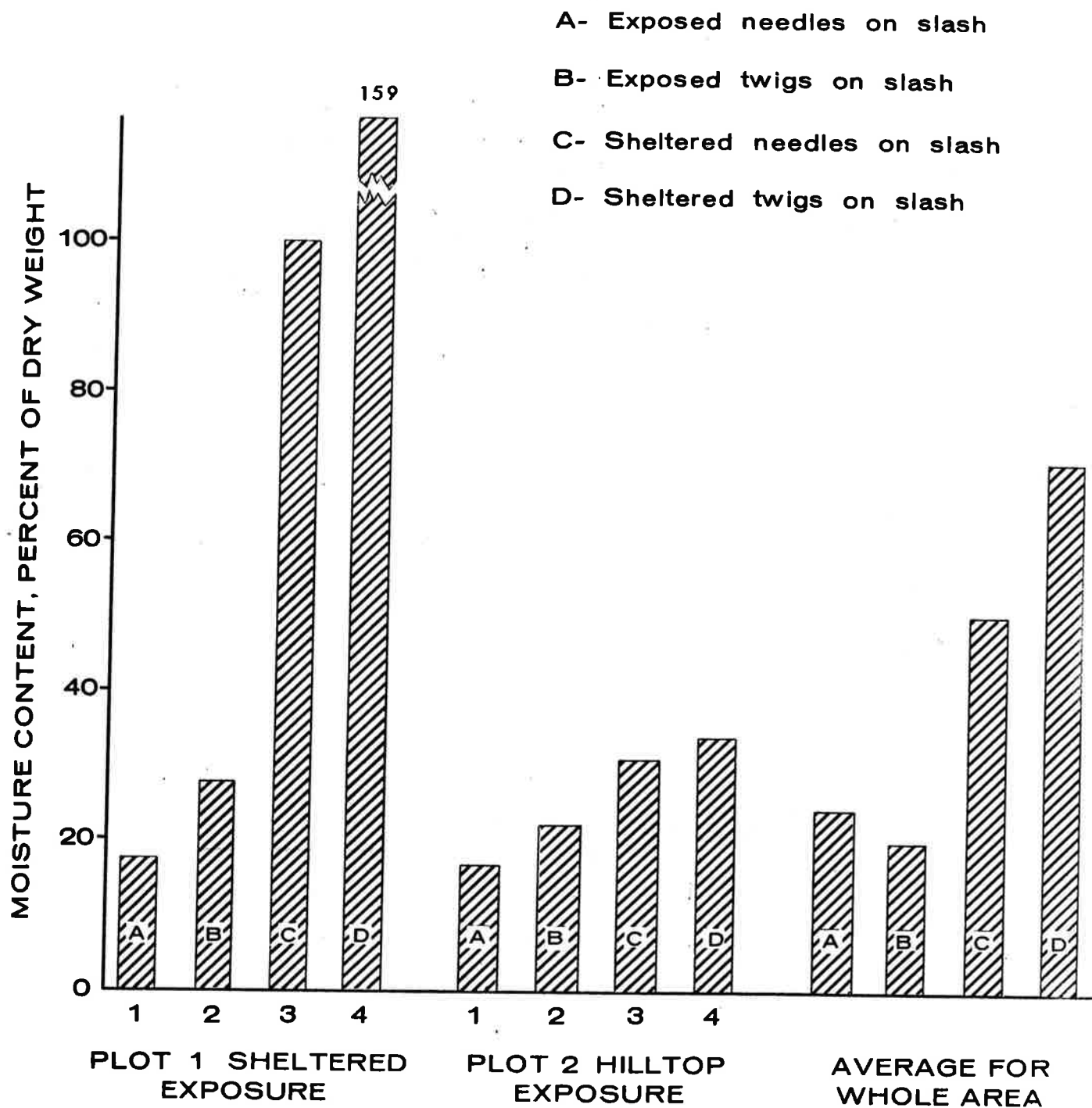
Since foams are competitive with both viscous water and wet-water in the construction of lines from which backfires can be set, a testing procedure is needed to rate their relative effectiveness. Comparisons of fire retarding effectiveness are difficult on large prescribed burns because fuel arrangement and weather (especially wind speed) is different in each test. Since these comparisons could be made on carefully conducted laboratory and field-test fires, a major effort will be made in their design.

TABLE I

Weather observations April 17-26, 1967, for
Barrier Weather Station, (Southern Gate of
La Verendrye Park, courtesy of Ministere des
Rechesses Naturelles, Quebec).

Date	Temperature				Rel.Hum.	Precip.	Wind
	Max.	Min.	2 P.M. Wet-B. Dry-B.				
17	46	28	43	44	93	.12	E-2
18	39	35	38	38	100	.53	NW-2
19	43	36	39	43	63	.10	N-8
20	45	25	33	45	24	-	N-10
21	44	26	38	43	63	-	E-4
22	49	33	45	46	93	.72	N-1
23	42	34	39	40	76	.11	W-6
24	42	24	31	41	26	-	NW-12
25	47	21	35	46	28	-	NW-6
26	53	18	38	51	24	-	NW-8

MOISTURE CONTENT FOR SLASH COMPONENTS ON DATE OF THE PRESCRIBED BURN



Appendix I



Photograph 1
A panoramic view of slash arrangement



Photograph 2
Close-up of maximum slash depth and the approximate position of the dividing line between sheltered and exposed fuels. The plastic bag contains a fuel sample.

Appendix II



Photograph 3

Foam generator assembly in the lowered position. The equipment mounted on the 425-gallon water tank is, from left to right, a gas container and a 'jerry-can' of foaming agent, a fire pump, and a foam generator.

Foam generator
assembly in the
mounted position



Photograph 4

Appendix III

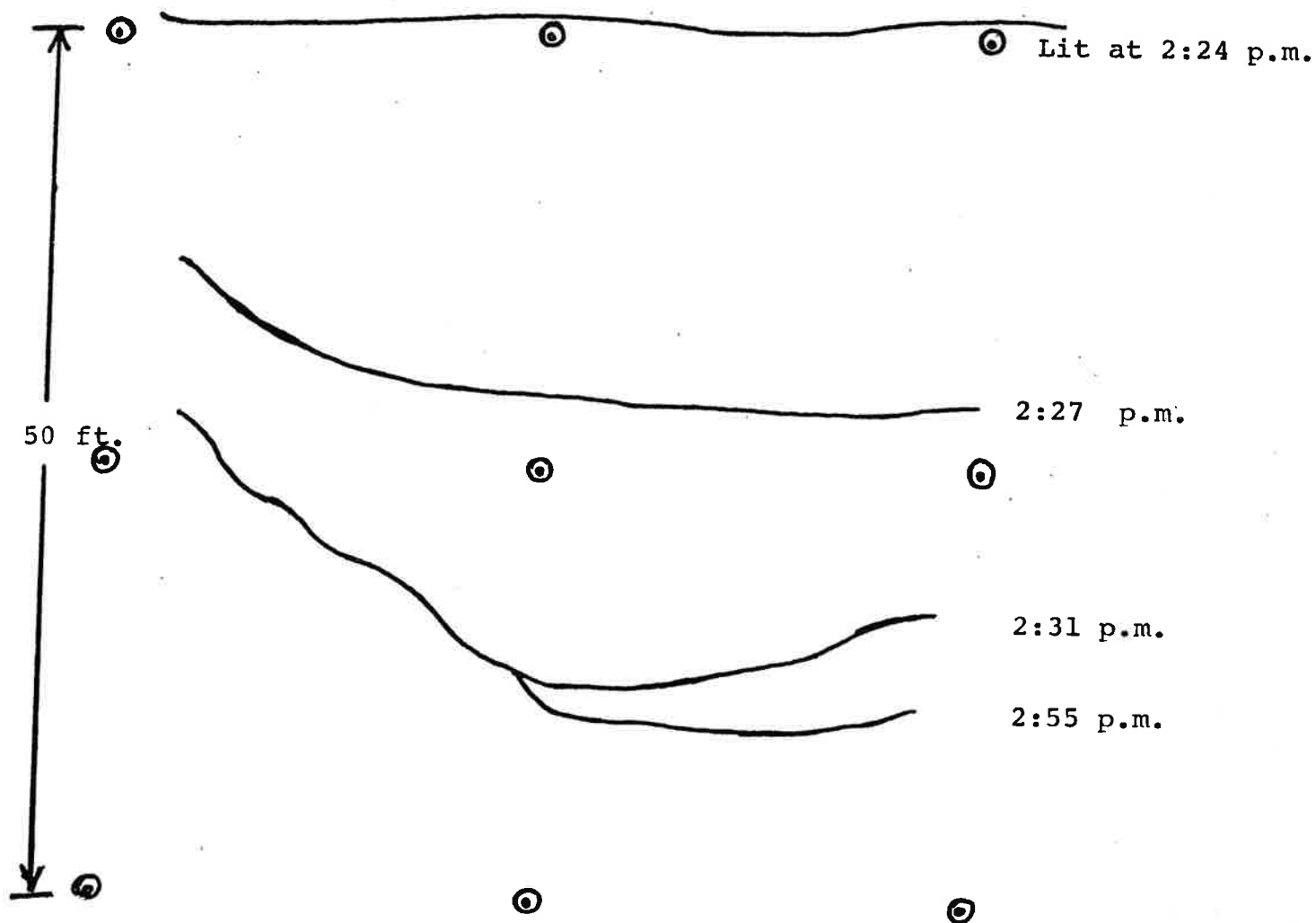


Photograph 5
Burning out from a foam barrier

Appendix IV

TOMASINA PRESCRIBED BURN: PLOT 1

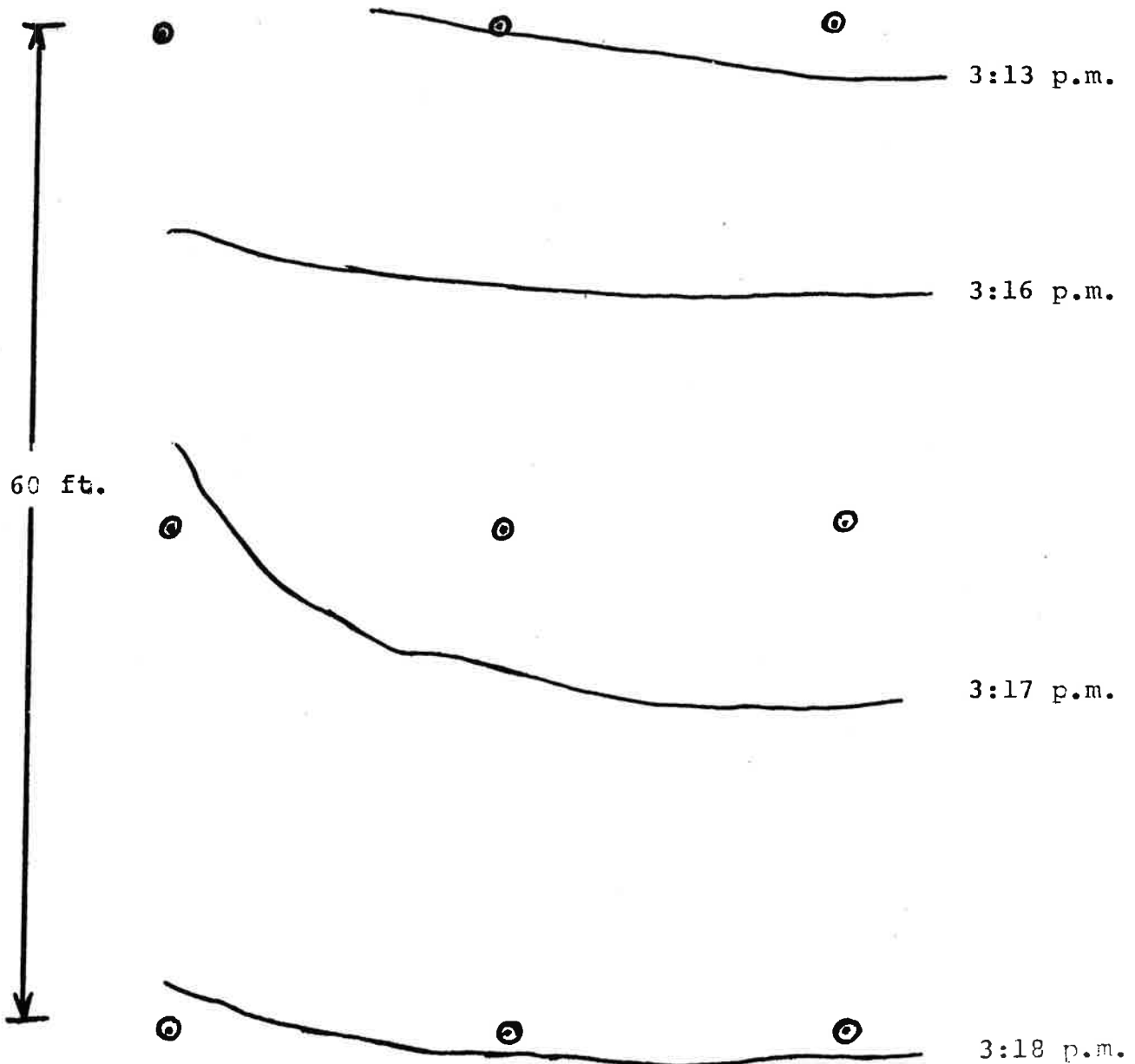
Scale: 1" = 10'
Date: April 26, 1967
Time of Ignition: 2:13 p.m.
Wind: 0-3 mph
Rate of Spread: Approx. 1.5 ft/min.



Appendix IV

TOMASINA PRESCRIBED BURN: PLOT 2

Scale: 1" = 10'
Date: April 26, 1967
Time of Ignition: 2:13 p.m.
Wind: 6-12 mph
Rate of Spread: Approx. 12 ft/min.



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