SESSION III

Paper (c)

SCIENTIFIC INPUT INTO THE CODE

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This paper discusses the use of scientific tests and results to aid in the formation of a code of practice. In particular, reference is made to the code which most affects the logging industry - the Safety Code for Bush Undertakings. Recent work in updating the section of this code dealing with log transport has highlighted the important role of scientific tests in code formation.

The Bush Code is a collection of regulations and recommended practices covering tree harvesting and log transport. In this country as it applies to log transport this code is the sole source of effective regulations. The Code only applies to off-highway (or "in the bush") log transport, however, log cartage vehicles commonly traverse both off- and on-highway roads during a single trip. The regulations contained in the bush code overrule the less stringent rules in present Ministry of Transport laws. (The MOT regulations state that the load must be "secured" with no further provision or recommendation of how such securing be carried out). So, in effect, the regulations contained in the transportation section of the bush code have quite a wide scope of application. The scope of equipment covered in the code includes not only trucks specifically built for log cartage but any heavy truck even temporarily modified and used to carry logs.

In the past, code formation and revision has involved canvassing the appropriate sectors of the industry to draw on the collective experience of the personnel involved. While this is one good means of forming a code it must not be the only one used. Other sources of information, including the results of scientific tests, must be used, together with experience.

During the latest revision of the code the area of log transportation got a very necessary and thorough treatment. Scientific testing was used as one of the means for updating and revising the regulations.

The main concerns with the regulations which were being revised were in the area of log load securing devices. Unfortunately, the cause for concern was brought about only after an accident involving a log truck which caused the loss of two lives on other road users.

Scientific input into the transportation section of the code came about through the following chain of events during the latest revision exercise.

Late in 1982 a number of investigations began simultaneously. The N.Z. Logging Industry Research Association (LIRA) began work to survey and examine the various types of log load securing devices being used to determine those which best satisfied the criteria of having sufficient strength for safety and practical sizes and weights for installation and removal. Coinciding with this work the N.Z. Institute of Road Transport Engineers (IRTE), which is concerned with the manufacture of truck-trailer equipment, began work to investigate the forces applied to these types of vehicles during their work. The IRTE contracted the Department of Scientific and Industrial Research (DSIR) to undertake a series of tests on a logging truck and trailer unit to demonstrate the techniques of dynamic force measurement. In doing so, there was hope to gain a better understanding of the forces involved, as well as the function and behaviour of log load securing devices. In the midst of this the Department of Labour announced the revision of the bush code.

When it was discovered that all of these organisations were working along similar lines, a move was made to co-ordinate the efforts and to concentrate tests on updating and improving the regulations in the code.

The investigations which followed marked the first time in this country that scientific and engineering tests have been carried out to formulate improved regulations to govern the devices and methods used for securing log loads on road transport vehicles.

An example of the tests completed was one done to determine the forces which are normally put into the throw-over or stanchion chains/strops on a typical long log truck (see figure 1 below for definition).

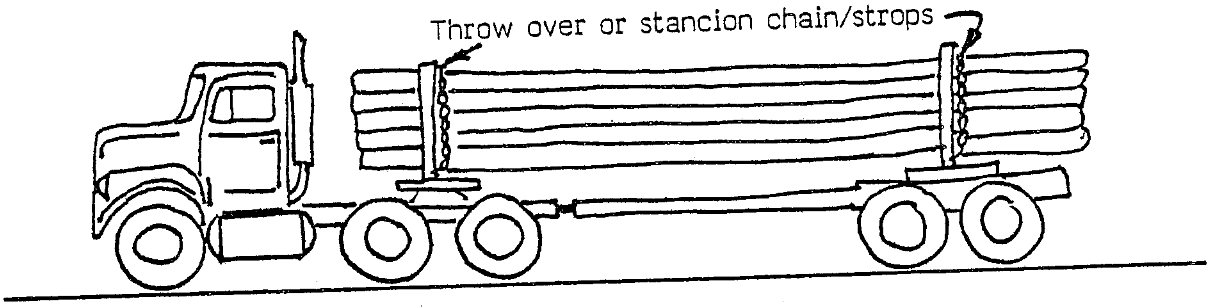

Fig. 1

Force measuring devices were installed on a loaded truck and it was run thru a normal work cycle of: travel empty, load, travel loaded and unload. During this the forces being applied to various truck and trailer components and load securing devices were recorded.

The principles of applying scientific tests to gain information for the use described here can be applied in other areas of code coverage and in other codes. The type of tests required must be determined. In the case of load securing devices, the forces being applied to them while installed on a heavy transport vehicle were not known. Information on this had to be gained from either fitting force measurement equipment to vehicles in the field or by designing an adequate simulation exercise to reproduce conditions which load securing devices endure.

In doing this the test team from the DSIR proved initially that measurements could be taken on load securing devices in the field under actual working conditions.

Prior to carrying out the tests a committee met to discuss the conditions during the transportation cycle which were most likely to be causing the most damage to the equipment used for load securing. A number of activities were identified but the worst condition for stressing load securing devices was not found until a number of tests had been carried out. Test results showed that under normal conditions no one event was likely to overload chains or strops on a log truck but that fatigue (or repeated loading and unloading of forces) was a most likely mode of failure. Further to this, a condition outside of normal occurrences was identified as being the most important for determining load securing device effectiveness. This condition was hard braking or vehicle deceleration in excess of 0.7g.

Taken in isolation the results of scientific or engineering tests are not enough to effect changes to a code or even some specific regulations.

Test results with log transport conditions pointed up the fact that load securing devices could only assist in retaining log loads. Ideally, much more rigid and heavy frame members would have to be fitted to give 100% protection from log movement during transport.

The value of scientific input, however, must be measured in the other inputs or considerations in forming or revising a code. There are moral, social and economic aspects which are also contributing factors to a safe workable code of regulations. Not only must the safety of the driver of a logging truck be considered, but that of passers-by or other people likely to be in contact or in the vicinity of a truck during its operation. A most elaborate and 100% safe load securing system could be designed but, chances are the cost of such device(s) would most likely be prohibitive and possibly unworkable in operation.

In conclusion the exercises here which were carried out to try to improve log transport conditions and equipment proved very fruitful. Test results were combined with the experience of people in the industry and used to improvise changes to the Bush Code which reflect the magnitude of today's transport vehicle power and the conditions in which they operate.

APPENDIX 1

Principles :

- can the conditions in question be measured accurately?
- can the measurements be made on actual equipment in the field?
- what factors affect the conditions which are being measured?

Using qualified and experienced research staff, tests can then be carried out. With test results in hand, changes to regulations in a code can be suggested considering the following :

- how can present work conditions and/or procedures be modified to reduce risks or increase safety?
- can any international standards be applied to specify sizes of equipment required to carry out a job safely and effectively?
- what means can be used to ensure that equipment of adequate size, shape and condition is used?