

Discovery



RAILWAY WEATHERMAN

TRANSPORTATION

THE TWO-METRE-LONG RAILWAY track in Jim Bertrand's suburban front yard may be the shortest in the country, but it has been hauling pioneering weather data that may help make all railways safer.

Bertrand, a fourth-year University of Calgary civil-engineering student, is researching the relationship between weather, rail heating and the risk of derailment, knowledge of which has remained unchanged for decades. With 30 years in the railway business, mainly in building and maintaining tracks, the 47-year-old is uniquely positioned to bridge the information gap. "I have an opportunity to research something I thought I knew well," he says. "Now I realize there is so little that was really known."

Heat has always been a major factor in train safety, since rails become significantly hotter than ambient air temperature — up to 25°C hotter from Bertrand's preliminary data — increasing the risk of track buckling and derailments. But no one has studied the impact of other weather factors. Bertrand's study so far suggests that wind speeds and cloud cover are also important, since they absorb heat. "There is a direct correlation between the

intensity of the sun and clear skies on rail heating," he says.

The seed of Bertrand's research project was first planted on a hot day in 2003, while he was inspecting the railway in Kindersley, Sask. A railway employee there remarked in passing that his air-temperature recordings revealed that the hottest day did not result in the highest rail temperature. Bertrand wondered, How windy



Test rails in Jim Bertrand's front yard (BELOW) may help predict the weather's effects on tracks like these near Calmar, Alta. (ABOVE).

was it that day? Was it cloudy?

Last June, using a weather station and temperature probes drilled into the rails on the track he installed right in his front yard, Bertrand began to record, among other data, ambient temperature, humidity, wind speed and cloud cover. Measurements are sent wirelessly every 2.5 seconds to a computer console where the data are logged with high, low and average values for each parameter.

Bertrand hopes his study will enable railway workers to use expanded weather information to predict more accurately the risks of track buckling and, consequently, know when to slow down trains. The added scientific dimension to decision making when slowing trains could improve traffic flow and result in significant savings for railway companies. They have typically used weather service information, automatically reducing train speeds by 32 kilometres per hour when ambient air temperature reaches an arbitrary 30°C. "It is overly conservative," says Bertrand. "It was OK 30 years ago, when there was less traffic, but it is inadequate now. It is ironic, as a safety inspector, that I am saying, 'Maybe it is too safe.'"

Heather Kent