

Road Salt: Friend or Foe

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ABSTRACT

The negative environmental aspects of road salt are well known and receive widespread publicity at the start of each winter season.

Municipalities and other road agencies conduct an annual search for a product that will provide the same benefit at about the same cost without negative side effects. Each year the result is the same and the annual supply of road salt is procured.

Beyond sweeping statements such as "our citizens need safe

roads" or "chaos will result," there has been little effort to sell the positive monetary and safety returns of wintertime bare streets to the citizens.

What is needed is more research and surveys on the improvement in productivity and safety that arises from wintertime bare pavement along with the selling of existing information, basically the P. Claffey work.

I will not make any friends among you with my first statement. We wish we did not have to use your product in our winter control programme.

Before you start marching up to the podium, my second statement is that the safety and productivity of our citizens in the winter time depends to a large part on using your product.

This opinion will give you an idea of how it feels to be in municipal government. We don't feel universally loved but we know we are providing services the citizens need and are helping to provide a safer and more productive environment for all. As each year brings winter, it also brings a request to municipal road officials to look for a substitute for rock salt that has no detrimental effects on the environment. Such requests have occurred in my experience in four municipalities and two federal governments. Without fail, the answer has been that there is no substitute for salt that can provide the same service as economically or even at anywhere near the cost of using salt.

However, one major change that has taken place over the years is better management of the use of road salt. This has been spurred on by both the aversion to road salt by a segment of the public and the need to reduce maintenance costs. Careful monitoring of the optimum quantities of salt that is spread and the development of sensitive electro-mechanical spreaders that carefully measure how much is spread has helped to reduce the amount of road salt used per mile. We estimated that in 1982 we used about 40 percent less salt than in 1975 while achieving the same level of snow and ice control service. Your industry has wisely assisted in this trend with your "Sensible Salting" programme.

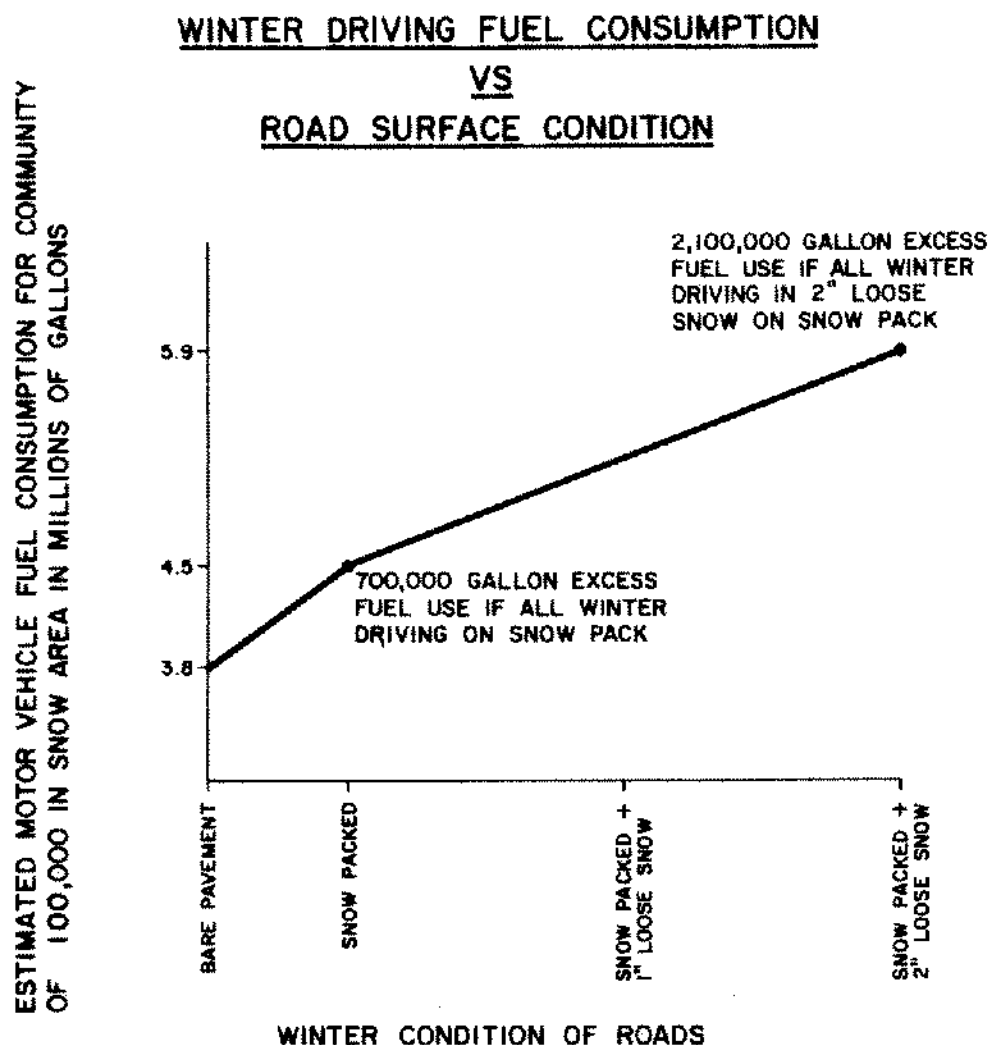
The economic data on the value of bare pavement has been researched by Paul Claffey for the Transportation Research Board and in a report, "Benefits and Costs in the Use of Salt to De-Ice Highways," by The Institute for Safety Analysis, in Washington, D.C. The City of Milwaukee has devised a scenario to show what the economic effect would be without a winter control programme.

We concentrate on the benefits of *bare pavement*, not on the use of salt. Salt is the means, but any product that can achieve this result could be used. However, as stated earlier, no other product, to date, can compete with rock salt in all of these—effectiveness, safety of use and cost.

What are the pitfalls of not having a bare pavement policy in winter? They are as follows:

- It costs as Claffey pointed out
- Failure to remove snow windrows can cause a constriction in the roadway, reducing the amount of traffic that can be moved and increasing congestion
- Slippery, narrowed roads cause accidents.

The economic benefits can be estimated based on research by Paul Claffey & Associates and others. The reduction of accidents has a wide-ranging effect. It reduces traffic tieups, police work, medical costs, deaths and injuries. Transportation Research Board Report 58, "Consequences of Deferred Maintenance," provides tables of fuel use under various snow conditions. This is an expansion on the earlier NCHRP Report III. This table shows the excess fuel use caused by driving on snow-packed and snow-covered roads (Figure 1). Fuel use increases to a point where with two inches of loose snow on snow pack, 54 percent more fuel is required to drive the same distance than



NOTE: CONSUMPTION 0.048 GALLONS/MILE ON BARE PAVEMENT
 BASED ON 80 MILLION MILES DRIVEN
 AVERAGE 2,400 MILES PER VEHICLE IN WINTER CONDITIONS

Figure 1. Winter Driving Fuel Consumption vs Road Surface Condition.

without the snow. In Ottawa-Carleton we estimate that one third, or about 650 million kilometres, of travel occurs during winter. During an average winter, if our citizens drove on snow pack, in addition to loose snow after each snowfall, there would be approximately 22,500,000 extra litres of fuel used by motorists at a cost of \$10,000,000.

It has been shown that even without the cost of time lost due to congestion, providing bare pavement is very cost effective. The Institute for Safety Analysis in its study stated that \$18 is returned in benefits for each dollar spent in achieving bare pavement by removing snow and ice from roads. To the credit of the researchers, they included data from those who would challenge this benefit, and the low

side return was stated as \$6 for each \$1 invested—a return any business person would relish. Even though data from the TISA study was available we felt we had to have at least a crude research project for our own area. Our bus company, OC Transpo, the best surface bus company, which has 170 rides per capita, operates a fixed schedule each three-month period. The company kept data for two days during a snowfall and the same two days of the week within the same schedule after the roads were bare and dry. The two-day snow period cost \$25,000 more (1980) in fuel and driver costs. The buses constitute 2 to 2½ percent of total traffic. During December 1979 and January 1980, we had a very mild winter. This was compared with the following

year when we had an average winter. The extra days of dry pavement resulted in a saving of \$80,000 in operating costs to OC Transpo.

Now, when we think of winter driving we think of accidents. In a municipality we could never arrange to carry out experiments on traffic safety by varying our winter control level. Fortunately, we can find comparative figures, because our weather is extremely variable. During the light winter year, bus accidents dropped to 75 from an average of 155; passenger accidents dropped from 22 to 13. This 50 to 75 percent drop in accidents coincided with published reports, including Michalski in 1965 to The American Public Works Association and Brenner in a U.S. Department of Transportation report in 1976.

Officials in the City of Milwaukee became concerned that the media always reported winter control efforts as a costly operation and never seemed to mention the benefits.

To emphasize the important part winter maintenance played in the City's productivity, a study, "Snowstorm—Economic Impact Which 'Shuts Down' the Milwaukee Economy (1980)" was made. It determined that the loss in wages and business revenues in one 5-day work week affected by a major snowstorm would be a staggering \$39,000,000. However, it would be extremely unlikely that this type of situation would be allowed to happen because of their good snow and ice control operations. Nevertheless, without such service there could be just under \$8,000,000 a day loss in Milwaukee. A few years ago Chicago got caught by a big snowstorm. We don't believe all the costs from that storm and its aftermath have ever been calculated.

In summary, a high level of winter snow and ice control is necessary in today's highly mobile society, particularly in urban areas. The level of service has a direct effect on fuel consumption, accident rates and the productivity of a com-

munity in winter time. And rock salt is an essential part of a high level snow and ice control programme.

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