

Sulphur may be valuable in roadway construction

Alberta's vast sulphur resources could be put to valuable use in the road-construction industry, according to findings from a research study conducted last winter by a University of Calgary civil engineering student.

A lightweight sulphur concrete base, designed by Peter Gifford, proved far more successful than conventional road-building materials in preventing frost penetration beneath a 30-foot test strip of pavement on the university campus.

Mr. Gifford, under the supervision of Dr. Jack Gillott of the civil engineering department, conducted the experiment as part of his thesis for a master's degree. The investigation was part of ongoing studies at U of C to discover new ways of using Canada's more than 19 million tons of sulphur, most of which is in Alberta.

"Climatic, soil and moisture conditions in Canada are such that frost action causes a major problem in the maintenance of highways and airfields throughout the country," Mr. Gifford notes.

Strengthens surface

His research indicates that the sulphur-concrete base could provide an effective and economically feasible solution to the problem. Its insulating layers positively modify the temperature beneath the roadway while at the same time increasing the roadway's

structure, something conventional insulating materials do not do.

"My experiments confirmed expectations that at the proper thickness, the sulphur-concrete base effectively impedes frost penetration into the sub-grade soils, thereby reducing one of the major causes of pavement deterioration," he explains.

The added advantage of the sulphur-concrete base is that it improves the strength of the pavement systems.

"For example, roadways using the base would have a greater load capacity which would allow larger, heavier trucks to use them. Also, road bans usually enforced on many secondary highways each spring because of thawing could be reduced."

Adding further to the economic attractiveness, the thickness of costly asphalt topping could be substantially reduced in most cases without a loss in structural integrity.

He says the base consists of a pre-placed lightweight aggregate which is bonded by the sulphur poured over the aggregate in the form of hot liquid. A few hours is necessary for the liquid sulphur-aggregate mix to cool and solidify, rapidly gaining strength as it does so.

Although no definite plans have been proposed, U of C is expected to continue lab studies and field trials using sulphur as a bonding agent in producing materials similar to concrete and soil cement.

- total employment increased by almost 4 per cent;
- the general rate of inflation did not appreciably change although retail automobile prices declined by 12 per cent;
- while large increases in corporate profits (8.8 per cent) and in total wages, salaries and supplements (6.5 per cent) occurred, real wages per employee only moderately increased (2.6 per cent);
- real gross capital stock in the Canadian economy marginally increased (1.3 per cent); and
- there was a strong favourable effect on the current account of the balance of payments.

The author bases his findings on the assumption that the Government had no alternative policy available. He also warns of inherent errors in research of this type. The study compares, through simulation, the impact of the automotive agreement with an alternative industrial policy designed to stimulate investment in the manufacturing sector to the same level of output and employment obtained by the agreement. The most substantive differences in these two policy simulations rests in the impact on foreign trade flows and the balance of payments.

The 1971 simulated current balance deficit under the investment incentives program widens to an amount in excess of \$2 billion, in direct contrast to the small simulated surplus achieved under the automotive agreement simulation for the same year. The author believes that the tremendous surge in automotive exports generated by the agreement more than offsets the increased flow of imports that typically accompany a higher rate of economic activity.

Possible reversal

The situation could change, however. "The fact that the automotive trade surpluses of 1970-71 have dissipated into substantial deficits in 1974-75 may signal a reversal of some of the positive effects of the earlier years," he says.

The study, *An Econometric Analysis of the Canada/United States Automotive Agreement: The First Seven Years*, available from the Economic Council of Canada, Ottawa, for \$3.60, reflects the views of the author and not necessarily those of the Council.

Canada/U.S. auto pact - Economic Council study

"The Canada-United States Automotive Agreement was one of the most successful economic decisions undertaken by the Canadian Government in the postwar era," concludes David E. Wilton, professor at the University of Guelph, Ontario, in a study released September 9 under the auspices of the Economic Council of Canada.

If the Government had not negotiated the automotive pact, and in the absence of all other policies, then the 1971 level of real output in the Canadian economy would have been over \$3 billion lower, he states. This would have also meant almost 300,000 fewer jobs.

The author shows that the pact caused a 100 percent increase in the level of real output in the motor-vehicle manufacturing industry. The automotive parts and accessories industry alone added an additional 26,000 employees and tripled its level of real output.

Effects on economy

The automotive agreement had the following effects on the Canadian economy for the year 1971:

- real gross national expenditure (GNE) was over 5 percent higher;