Melting Snow on a Mountain Pass Highway By Using Coal Dust

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For many years, it has been observed on Washington's Chinook Pass in the Yakima area (District 5) that the snow melt was much greater around outcroppings of dark colored rock when the snow removal crews started to work each spring in the opening of the Pass for traffic. (It should be noted that Chinook Pass is closed each winter from approximately November 15 to May 30 because of the rock cliff formations that cause continual avalanche conditions on both sides of the summit during winter months.)

After much thought, it was decided to experiment with coal dust in the spring of 1967 to accelerate the melting of the 20 to 30-foot depths of snow that covered the highway from near Cayuse Pass to about five to six miles east of the summit of Chinook Pass. By speeding up the snow melt, it was felt the clearing operations would be expedited so that traffic could use the highway a week or two earlier each year. Maintenance work funds would also be conserved. These were the two objectives of the experiment.

While snow removal work on the west side starts as soon as work on Cayuse Pass tapers off, it is hazardous to attempt to open the east side section until the overhanging snow and ice on the cliffs above the highways have broken off and avalanched to the bottom of the mountain side. The starting date of snow clearing work at Morse Creek Bridge is timed so that the crew will arrive at the hazardous area just after the major danger of slides is past.

From progress reports kept each year, this timing can be estimated quite accurately, taking into consideration whether or not there are ice layers in the snow and how densely it is compacted. These factors vary each year. The probability of snow slides is determined by looking at the cliff areas with binoculars.

While it is possible to start snow removal work at Morse Creek much earlier each year, it would be uneconomical to organize a crew for approximately one week and then disband it until the upper section is safe. Also, the melting of the snow on the roadway from warmth of the sun instead of by mechanical means saves the Department much work and expense.

It was decided during the first part of April 1967 to experiment with one ton of coal dust placed on approximately 1,000 feet of roadway in the slide area. The width of spread on the untouched snow surface was 30 feet. The rate of application of coal dust was estimated to be about 0.60 pound per square yard of surface. The aim was to blacken the snow surface so that the absorbed heat would do the work of rotary snow plows.

Because fine coal dust was not available for purchase in the Yakima area, one ton of stoker grade coal was purchased and spread out on a pavement in the District 5 yard. It was then crushed as finely as possible by rolling it with a steel-tired roller. The coal was then sacked and transported to Lodgepole Maintenance Station.

On May 2, 1967, a G-2 helicopter was rented for spreading the coal dust. With highway personnel directing the course of the pilot over the location of the highway, the dry coal dust was spread on the surface of the snow. This spreading work was accomplished in one-half day's use of the helicopter, including travel time from Yakima and return. The sacked coal dust was emptied into the dust container of the helicopter and ejected the same as any chemical dusting compound.

After examining the test section later it was found that instead of a coverage of the snow with coal dust, as reported by the persons in the helicopter, the snow was gray color instead of black and only the coarser ¼-inch to 20-mesh size pieces were within the 30-foot width. From indications of the side areas along the test section, it was concluded the downdraft of the helicopter propellers plus natural windage had scattered the finer particles in the dry dust 100 feet or more on both sides of the intended target area.

While the experiment was only partially successful, it was believed the thin layer of coal dust melted approximately 4 feet of snow in a 3-week period. It was also noted that numerous avalanches had run off the slopes during the four days of clear and warm weather following May 2. These avalanches destroyed the thin layer of coal dust. It was concluded the application process should have been delayed until the avalanches had run their course. It was estimated for this method of melting snow to be practical, a minimum melt of 6 inches per day would have to be accomplished.

As a result of publicity given by newspaper, television and radio media, numerous personal visits, telephone calls and letters were received by the Yakima District 5 office from persons complimenting the Department on this experiment, making a pitch to sell things, mostly 200-mesh coal dust and/or giving advice as to how the coal dust should be applied. The contacts made in this manner regarding 200-mesh coal dust and methods of application were considered to be of much value for future experimental sections.

Checking into some of these contacts, we learned that coal dust had been used for several years for hastening the melting of late winter snow on golf courses in Wenatchee and on wheat fields in Douglas County wheat farming area. As a result, the courses were played from two to three weeks earlier each spring and the emerging winter wheat was protected from snow mold. The method used for both applications is as follows:

1. Sacked 200-mesh minus coal dust, a by-product of coal washing and processing plants, is mixed with water at the rate of 1 pound of coal dust to 2 pounds of water. The coal dust and water are agitated to thoroughly mix.
2. The mixture is placed in the tanks of either a crop spraying helicopter or plane and applied with regular equipment at the rate of 150 pounds per acre of ground or 0.033 pound per square yard. The District was advised that although this was a relatively thin application, heavier spreads had no beneficial effects and that at the 150 pounds per acre rate, the snow surface was black in color.

Next spring, we plan to place a second experimental section of coal dust on the east side of Chinook Pass using the above noted methods and application rates.