A Note Regarding the Potential Value of Pulverized Glass as an Environmentally Friendly Abrasive for Winter Roads

M. F. Albright*, J. Homburger*, and D. Rosen°

In response to a marked increase in the chloride content of Otsego Lake water between 1950 and 1980 (Peters, 1987), the Village of Cooperstown adopted a policy to limit road salt-to-sand ratios as deicing agents in the late 1980's. However, maintaining safe road conditions throughout the winter requires additional sand applications (Russell, 1996). While serving as an appropriate road abrasive, the finer fractions of this material is susceptible to transport via storm runoff. Most of Cooperstown is in the Willow Brook drainage basin, which flows into Otsego Lake; extremely high export rates of suspended sediment and, more importantly, the associated phosphorus, have been well documented by this laboratory (Albright, In prep.).

Pulverized glass may offer an environmentally sound alternative to sand as a road abrasive. To test this premise, a sample of sand, used by Otsego County and the Village of Cooperstown as an abrasive on area roads during winter conditions, was collected on 4 January, 1994. The intent of this sampling was to examine the fine particulate portion of the sand, as well as the amount of potentially available total phosphorus associated with these fines. Concurrently, these same attributes were examined on a sample of glass, provided by Andela Tool and Machine Inc. in Monticello, N.Y. This material has the same physical characteristics as natural beach sand. It is obtained from recycled sources.

METHODS

One kilogram of each sample was placed in a 2 liter sample bottle. Five hundred milliliters of distilled water was added to each container. The samples were shaken for 30 seconds, allowed to stand for 60 seconds to allow the coarser fraction to settle out, and the supernatant was drawn off for analyses. Dilutions of 1:400 were made for total phosphorus determinations (perchloric acid digestion followed by ascorbic acid colorimetric determination). Similarly, the samples were shaken for 30 seconds, allowed to stand for 60 seconds, and 10 ml of supernatant was drawn off for measurement of suspendable fines. This portion was passed through a pre-weighed glass fiber filter. The filters were then dried at 105°C for 24 hours and re-weighed.

As the methodologies followed in this study have not been established and tested, caution should be used in placing a great deal of confidence upon the absolute derived values. However, as both samples were treated identically, the relative values for the two samples should be meaningful.

*BSF Graduate research assistant
+1994 BSF environmental administrator. Present address: NYSDEC offices, Utica, NY.
°BSF volunteer. Springfield Center, N.Y.
RESULTS

Results were as follows:

Sand pile supernatant
  fines = 32.84 grams/kilogram
  T-PO4 = 34.20 mg/kilogram

Ground glass supernatant
  fines = 13.68 grams/kilogram
  T-PO4 = 4.60 mg/l

CONCLUSIONS

These results indicate that ground glass, having substantially less associated phosphorus, may offer an environmentally sound alternative to sand as a road abrasive. However, many other attributes would have to be considered, such as other possible contaminants associated with residual labels and glues and the actual effectiveness of this product as an abrasive.

REFERENCES

