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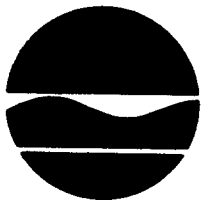

Thomas C. Jorling
Commissioner

January 26, 1989

MEMORANDUM

TO: Regional Water Engineers, Bureau Directors, Section Chiefs

FROM: Daniel Barolo

SUBJECT: Division of Water Technical and Operational Guidance Series (5.1.7)
Storage and Use of Highway Salt and Salt/Sand Mixtures
(Originator: Philip DeGaetano)

PURPOSE

To provide guidance for preventing water quality problems resulting from highway salting and storage of salt and salt/sand mixtures.

DISCUSSION

The policy of maintaining "bare pavement" for public safety during the winter is now considered standard practice in most areas. As in other northern areas with severe winter climates, this is accomplished through the use of deicing salts (NaCl, $CaCl_2$) and salt/sand mixtures.

The surface water and groundwater quality standard (drinking water classes) for chloride is 250 ppm (mg/l), based primarily on taste. No standard has been set for either sodium or calcium. Other constituents sometimes added to road salt (as anti-caking agents or to lower the temperature at which deicing salt continues to act effectively) may also be of concern. For example, the groundwater quality standard for cyanide of 0.2 mg/l is known to have been exceeded in at least one instance in wells adjacent to a road salt pile, apparently from compounds (e.g. ferric ferrocyanide, sodium ferrocyanide) used to minimize caking. In carrying out field investigations of specific problems it is important to identify and consider any additives typically contained in the salt stored or used at that particular location.

The principal focus of this memo is prevention of contamination of groundwater. Groundwater quality problems stemming from road salt storage and use are not known to be widespread, but they do occur. Currently, problems

resulting from salt storage occur more often than those resulting from roadway application.

Surface water impacts may also be important in specific local situations. In general, however, chloride levels in surface waters are well below the standard and are not known to cause problems, although inhibition of seasonal lake turnover has been cited as a potential worry. Additives could ultimately be of greater concern than the salt itself in relation to surface waters. At this time, there are no waters on the Priority Water Problem list because of salt storage or application impacts. Ultimately, however, the Division encourages research into alternative compounds which would achieve the same level of public safety at the same time minimizing any environmental impact.

It is important to distinguish storage of salt (e.g. salt piles) from distribution of salt (i.e., spreading). At present, DEC has limited authority to establish preventive regulatory controls for either. However, there are significant differences in the degree of threat each poses to water quality and the types of management which may be appropriate.

GUIDANCE

Salt and Salt/Sand Mixture Storage

The identifiable threat to water quality posed by improper storage is considered more significant than the threat from spreading. Storage typically involves stockpiling large amounts of the material at one defined location where, if it is not properly protected from precipitation and surface runoff, high concentrations of dissolved material leaching from the storage pile can subsequently be transported to underlying groundwater or nearby surface waters.

In the absence of legislation to regulate salt storage (including development of a salt storage code), it is the Division's policy to strongly encourage proper storage wherever practical. It is particularly important to promote proper storage when the storage facility in question may threaten an aquifer or a nearby stream, or where drinking water wells are located in the immediate vicinity.

The elements of proper storage and storage facility construction are well known and readily implementable. An outline of these basic elements, plus a bibliography of several available reference documents which describe and illustrate appropriate management practices, is appended.

Salt Spreading

The water quality problems associated with salt spreading are believed less significant than those associated with storage. However, it is known that high chloride concentrations have occurred in some private wells adjacent to highways. In many of these instances, poor well siting and construction practices may be a contributing factor. Regardless, well contamination due to salt spreading can be an issue in some locations.

Reduction of salt application rates to levels below those required to properly melt snow and ice involves a difficult trade-off with highway safety. As a matter of general philosophy, the Division supports and promotes (a) limiting the application of salt to only that needed to do the intended job, and (b) using special care in the vicinity of sensitive ground or surface water resources, particularly where wells are known to be located near the roadway. In practice, the accomplishment of these aims is not amenable to regulation by DEC. DOT and local highway department staff in each locality are in the best position to make the necessary judgements on whether salting can safely be reduced where specific locations involving sensitive water resources are identified. Regional DOW staff should bring such locations to the attention of the appropriate state or local highway agencies. However, the decision on whether salt spreading can be safely reduced rests with the responsible public works agency.

Daniel M. Barolo
Director, Division of Water

APPENDIX 1

BASIC ELEMENTS OF SALT & SALT/SAND MIXTURE STORAGE

I. Facility Siting

a) Avoid locating the facility above aquifers or highly permeable soils.

b) Maintain a reasonable separation (e.g. several hundred feet or more) from streams, lakes, or ponds.

c) Do not locate storage facilities within wellhead protection areas for community water supplies or close to existing private water supply wells. Full consideration should be given to relocating existing storage facilities which are located in those areas or using the highest level of storage management (roof, enclosures, pavement and catchment basin).

II. Site Considerations

a) The storage area should be large enough to hold the maximum amount of chemicals required without overflowing and to permit easy movement of vehicles for loading and unloading.

b) The storage area (including areas used in loading and unloading) should be paved, or underlain by an in place material having a maximum permeability of no more than 1×10^{-6} cm/sec after installation, and be constructed of material which is not adversely affected by the salt. Materials such as asphalt are much too permeable to be used.

c) The elevation of the storage area should be sufficiently above the exterior yard area to prevent inflow of rainwater. The site drainage should be designed to prevent runoff from entering the pile.

d) The stored material should be kept dry and out of the weather, ideally through use of a storage structure (shelter). Temporary covers of a waterproof material are adequate to cover non-working piles however because of problems such as freezing in an open position, tearing or blowing away, they should not be considered as a permanent solution for covering a working pile. Where storage shelters are used, they should be oriented to minimize contact of the material with wind-driven precipitation. Truck loading operations should also be shielded from prevailing winds.

e) Drain pipes, curbing, and catchment basins to collect brine runoff from the pile should be considered. Disposal of the brine must be accomplished in an acceptable manner such as pickup by a licensed industrial waste transporter or discharge into a municipal sewer system (with approval by the municipality).

f) Priority attention should be assigned to management of storage facilities in wellhead protection areas first, followed by aquifer areas outside of wellhead areas. Such facilities warrant paved underlayments and roofed enclosures, possibly supplemented by catchment basins.

ATTACHMENT 2

ANNOTATED BIBLIOGRAPHY
ROAD SALT

DOCUMENTS USEFUL FOR PROGRAM STAFF

1. "Manual for Deicing Chemicals: Storage and Handling," USEPA, July 1974. Presents practical guidelines for good practice in the storage and handline of deicing chemicals. Covered storage, preferably using permanent structures, is strongly recommended. Provides guidelines for site selection and design. Presents examples of existing facilities representing a range of designs, costs, and storage capabilities. Also provide suggested good housekeeping practices for handling of deicing chemicals at the site.

2. "Highway Salt Management Handbook for Local Government Officials," Cornell Cooperative Extension, 1985. A relatively short (approximately 30 pages) document which focuses primarily on storage site selection and design. Probably most useful for local governments in rural areas.

ADDITIONAL DOCUMENTS

3. "Manual for Deicing Chemicals: Application Practices," USEPA, December 1974.
Reviews a variety of aspects of highway operations relating to application of deicing chemicals, but does not appear to provide much in the way of straightforward guidance which is readily usable in the field.

4. "Environmental Impact of Highway Deicing," USEPA, July 1971. A broad scale review of the use of deicing chemicals and the available information their environmental impacts. May be extremely useful as a background document for researching specific issues related to deicing, but does not contain practical guidelines for management practices.

5. "An Economic Analysis of the Environmental Impact of Highway Deicing, " USEPA, May 1976. Strictly an analysis of the impacts of deicing chemicals and the associated costs to society. Does not contain material on management practices.

6. "A Search: New Technology for Pavement Snow and Ice Control," USEPA, December 1972. Brief review of some possible alternative methods. Does not offer anything useful for immediate field application.

7. "Highway Deicing: Storage and Application Methods," Westchester County Best Management Practices Manual, 1981. A very useful review and discussion of management techniques and practices covering both storage and application. Although siting and design of storage areas is stressed, the document also contains a good discussion of application aspects including techniques which can be considered to reduce application rates in environmentally sensitive areas.

8. "Road Salt and Water Supplies: Best Management Practices," State of Massachusetts, DEQE, 1981. Comparatively brief (10 page) document which provides an overview of management practices for both storage and application. Little detail on the practices is provided.

9. "Sensible Salting," informational package published by the Salt Institute. Includes the "Salt Storage Handbook," an 18-page booklet devoted primarily to guidelines on storage and handling; and the "Snowfighters Handbook," an 18-page booklet devoted mainly to salting operations including application. Although neither of these is devoted exclusively to the environmental aspects, they do pay considerable attention to the environment including water quality. The information is packaged attractively in a format which should be comprehensible by local officials and appears less biased than might be expected.