



Winter Road Maintenance Practices Strategies to reduce their impact on the Environment

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RÉGION WALLONNE

Winter Road Maintenance Practices Strategies to reduce their impact on the Environment

PLAN

PART I - XIIth International Winter Road Congress

- Effects on Vegetation
- Effects on Water
- Products
- Other Environmental Considerations

PART II - Summary on the main titles, issues, and future perspectives

PART III - Quotations

Torino-Sestrière – march 2006

Topic IV : Environment

Chairman : SCHLUP Ulrich

Vice chairmen : CERNE Svit

OLANDER Jan

PREVOT Arnold

19 presentations from 10 different countries



PART I - XIIth International Winter Road Congress EFFECTS ON VEGETATION

JAPAN :

- Research on environmental impact of de-icing salts
- Study on the impact of de-icing chemicals on plants


FINLAND :

- Biodegradation of potassium formate in soil and groundwater

SWEDEN :

- Corrosion of archaeological artifacts exposed to de-icing salt

GERMANY :

- Analyses of the environmental impacts of municipal winter maintenance (two exemples)
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PART I - XIIth International Winter Road Congress EFFECTS ON WATER

FINLAND :

- Experiences of reducing the sodium chloride consumption on groundwater areas

NORWAY :

- The effects of road salt and other highway pollution on the water quality and circulation conditions in a lake
- A distribution simulation of traffic pollutants in a river caused by snow dumping

FRANCE :

- Effect of road winter maintenance on surface water

SWEDEN :

- Automated monitoring of groundwater contamination along salted roads

PART I - XIIth International Winter Road Congress PRODUCTS

UK :

- The use of salt with the addition of agricultural co-products

NORWAY :

- Experience with use of magnesium chloride

SWEDEN :

- Anti-freeze treatment using glucose/ fructose
- Effects by mixing tenside into salt solution

ITALY :

- How climate conditions challenge low emission trucks



PART I - XIIth International Winter Road Congress OTHER ENVIRONMENTAL CONSIDERATIONS

SWEDEN :

- Studies of wear particles using the Road Simulator/Particle Generator

GERMANY :

- Feasibility study for the formulation of requirements for a new eco-label for de-icing agents for roads

CANADA :

- The highway 175 road salt management plan

BELGIUM :

- Influence of de-icing salts on the choice of the site for setting up a road storm water basin



PART II – Summary on the main titles, issues and future perspectives

➔ European Union has directed that any significant and sustained upward trend in the concentration of any pollutant in groundwater should be identified and reversed by the year 2015 !

PART II – Summary on the main titles, issues and future perspectives

FINLAND

reacted with a research program on

« Migration of alternative de-icing chemicals in aquifers »

- **Aim** : to identify alternative de-icers which have least harmful impact on vegetation, soil and groundwater
- Potassium formate was found to be the most promising alternative
- In the middle of the third consecutive winter of potassium formate application at the site, formate concentrations have remained below detection limit in the groundwater

PART II – Summary on the main titles, issues and future perspectives

In GERMANY

1. In the process of defining requirements for a new eco-label, an ecological comparison was undertaken for different products :

sodium, calcium and magnesium chloride, sodium and potassium formate, urea and gritting material

→ **Result** : undifferentiated use of formate can not be recommended, despite its very low aquatic toxicity and the fact that it is easily bio-degradable.

The **reason** lies in the very energy-intensive production.

PART II – Summary on the main titles, issues and future perspectives

2. Life cycle assessment of the environmental impacts of spreading materials in cities (salt and abrasives)

- **MUNICH :**

- **one half** was generated by the spreading itself, including energy and vehicle emission
- **one third** was made up by the production and the transport of the gritting materials
- **the rest**, recovery, disposal and recycling, was of lesser impact

PART II – Summary on the main titles, issues and future perspectives

- NUREMBERG

- an **energy intense** gritting agent (extended clay) was used
- **two thirds** originated from the production process

These studies demonstrate that a final judgement on a product can only be made after looking at the live cycle process !

PART II – Summary on the main titles, issues and future perspectives

In JAPAN,
a survey showed that :

- 70 % of the salt spread flowed into the drainage ditches
- 20 % was scattered outside the roadway
(most of which remained within a 3 m. distance)
- the 5 % reaching finally the cultivated areas caused salinity in the ground

PART II – Summary on the main titles, issues and future perspectives

- the tolerance threshold for the cucumber (one of the most salinity allergic plants) was only exceeded at one point)
- a table giving the salinity tolerance of most of the plants in the vicinity of roads can be found in the proceedings of Torino
- plants are more susceptible to anti-icing chemicals when they enter their active phase, end of winter

PART II – Summary on the main titles, issues and future perspectives

In **FRANCE** and **BELGIUM** :

storm water basin

1. Comparison between two potential sites in three aspects :

- interaction of collected water with the concrete of the structure
- water-mineral reactions
- seepages of water into the local aquifer

→ **Recommandations** were made for the choice of the concrete and for the management

PART II – Summary on the main titles, issues and future perspectives

2. Installation of settling tanks :

- to reduce peak flow
- to decantate solid materials
- to contain floating waste and hydrocarbons
- to settle accidental pollution, and
- to supervise the discharge quality

→ **Adopted policy** consists in real-time follow-up of road weather forecasts and optimal dosage

PART II – Summary on the main titles, issues and future perspectives

In **NORWAY**, **SWEDEN** and **FINLAND** :

river, lake and groundwater

1. large quantities of polluted snow are dumped in rivers: simulations with a mathematical model to estimate the impact of pollution distribution in the water and in the river sediment

→ **Conclusion** :

probability is low that the present magnitude of snow dumping will polluate the water to an extent as to exceed the concentration classification « insignificantly polluted »

PART II – Summary on the main titles, issues and future perspectives

2. development of an automated system for monitoring groundwater salinity: Electronic Tongue (frost depth)
3. populations of zooplankton and fish seemed to be little affected by pollution. Biologists fear that if more salt comes, water stability will increase
4. salt reduction experiment of 50 % showed stabilization or a decrease in chloride concentration in the wells

PART II – Summary on the main titles, issues and future perspectives

In **UK**, **SWEDEN** and **NORWAY** :

new trials on products

1. agricultural by product to rock salt

→ significantly lower level of apparent corrosion by the end of the season

2. sugar product to salt solution

→ to find out whether a certain amount of salt could be replaced by this additive

PART II – Summary on the main titles, issues and future perspectives

3. tenside to salt brine

→ surfaces dries faster, fluid creeps easier down into the pores of the asphalt, no effect on friction

4. comparison brine of sodium chloride and of magnesium chloride

→ tendency towards less salt consumption with magnesium brine without reducing of friction

PART III - QUOTATIONS

- The activities must start at the design of the road and comprise drainage and rainwater management, depots, equipment, salt management, training and communication
- Think winter maintenance at every stage of planning a road
- A project has to take into account the exposition of the road. Plentiful sunshine on its surface allows a marked reduction of salt use.



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THANK YOU
FOR YOUR ATTENTION