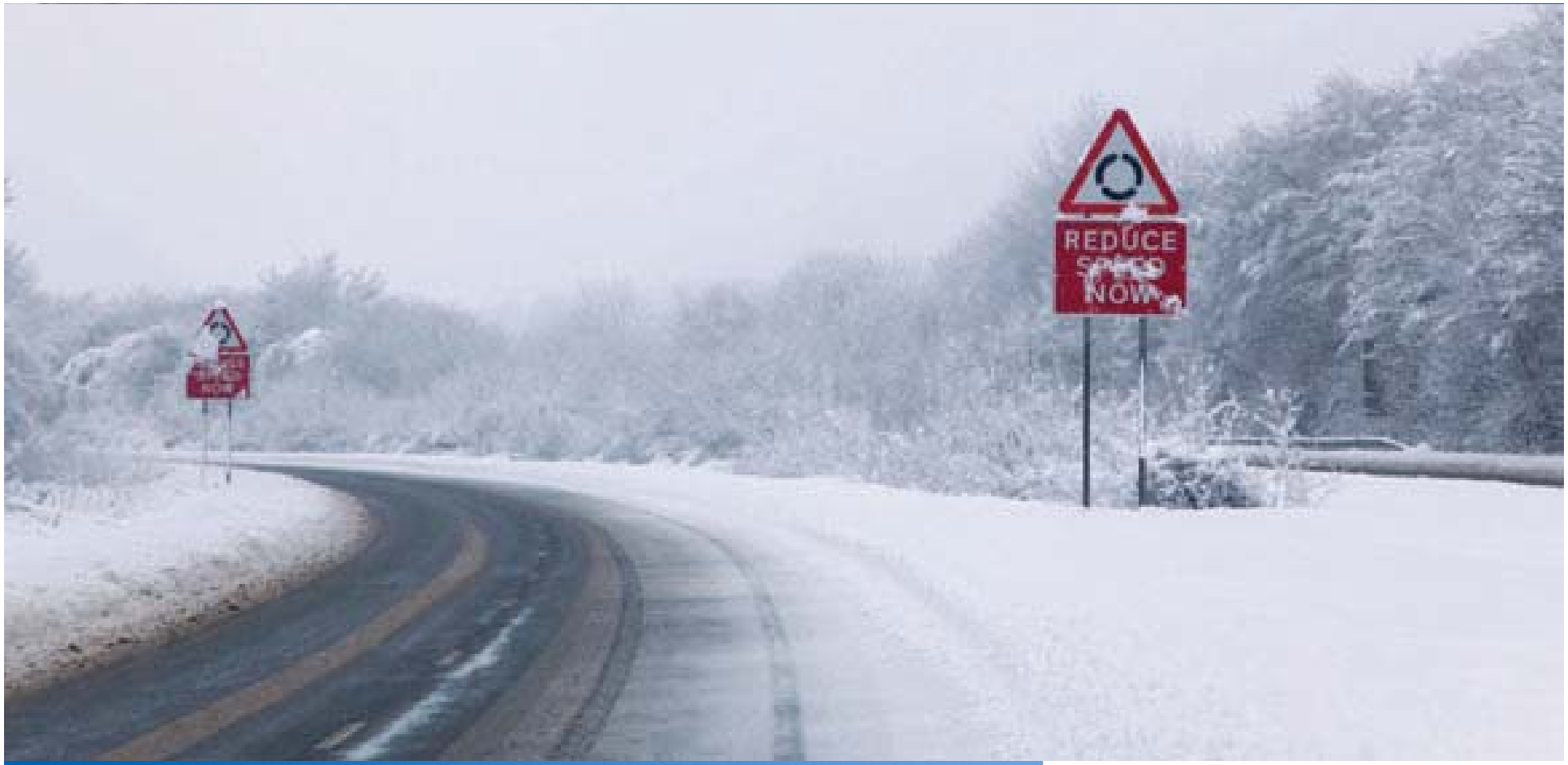

WMH Appendix H & other stories

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Appendix H – New Revision

- **Published on 18 September 2013**
- Appendix H contains the most essential information distilled from the NWSRG “Practical Guide”

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Appendix H – New Revision

Sections of Appendix H cover:

- General winter service plans and service resilience
- De-icing materials and technologies
- Salt storage and management
- Spreader calibration and monitoring
- Decision Making
- Spread rates for precautionary treatments
- Treatments for snow, ice and freezing rain
- Treatments for extreme cold

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Appendix H – New Revision

Delivering a better service

- Many authorities can achieve significant savings, increased resilience and improved service levels by following the recommendations and detail in Chapter 13 and Appendix H
- Changes to plans, equipment, technology, etc. should be based on a business case relating to the particular service and treated network
- However, some recommendations and practices are likely to take a number of years to fully implement

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Effectiveness of salt

- De-icers are not effective until they have dissolved to form a brine solution
- The rate of dissolution and ice melting slows at lower temperatures
- The practical effective temperature for salt as a road de-icer, when **spreading**
  - At or above -7˚C in normal UK winter humidity conditions
  - At or above -5˚C in low humidity conditions
    - below 80% relative humidity

Effectiveness of salt

- In theory, a close to saturated salt solution can prevent freezing down to -21˚C
- However, this is not achievable in practice on the highway network
  - The minimum practical freezing point is no lower than -15˚C
  - And even this is only achievable when sufficient time is available for a solution to form

Salt Use

- Salt distribution by the spreader depends on:
  - Size
  - Grading
  - Moisture content
- Spreaders should always be calibrated for the salt grade being used and the moisture content
- Grading and moisture content should be checked regularly - particularly when salt is obtained from a new source or supplier.
- All salt must comply with agreed quality standards.

Salt storage options

- Different storage options
  - Salt barn/dome
  - Fabric covered structure
  - Outside under cover
  - Outside unprotected

- Consider
  - Relative cost of construction
  - Maintenance requirements
  - Control of salt condition
  - Effect on spread rates
  - Environmental requirements

Monitoring salt condition

- Regularly check salt condition from new deliveries and existing stockpiles
- Develop test regime in consultation with the salt supplier
- Samples can be sent to UKAS accredited laboratories
- Additional simple checks on moisture content

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Monitoring salt condition

- Suggested frequencies of testing
- Actions to take when moisture content is outside of the optimum range

Loading spreaders

- Do not load thatch or large aggregations (‘lumps’)
- Avoid contamination of the salt with detritus
- Salt spreaders should be sheeted during spreading
  - Protect the salt from snow and rain
  - Prevent losses from the hopper during spreading

Spreader Calibration

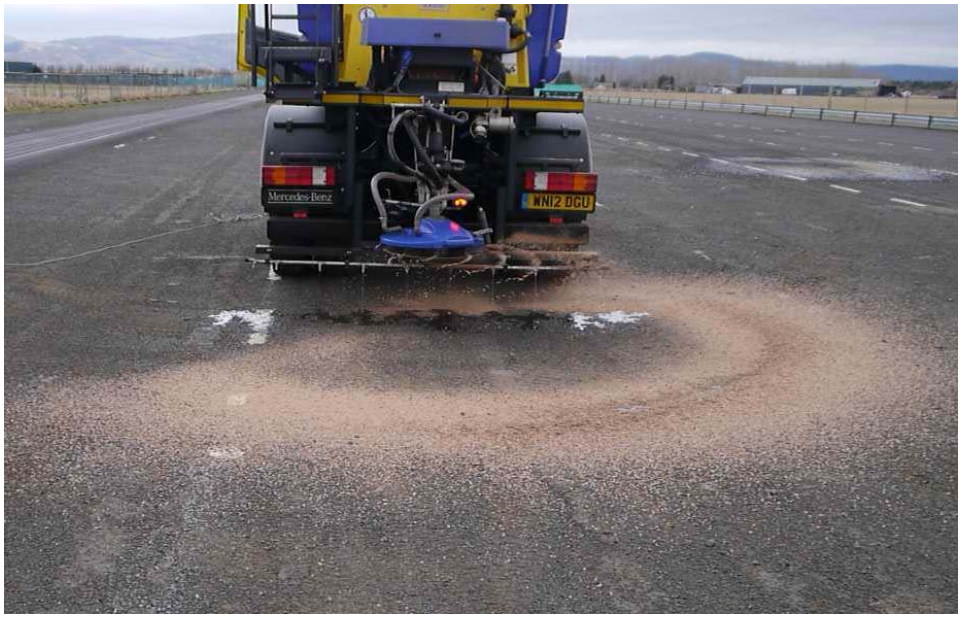
Information and guidance on:

- Spreader calibration procedures
- How to assess and monitor spreader performance

Calibration procedure

Calibration should always involve:

- Direct measurement of the salt being discharged
- Where it is being spread to



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Calibration timing

Spreaders should be calibrated:

- Just before the start of the season
- Mid-season
- Whenever significant changes are made to the spreader (maintenance, repair, etc.)
- When salt type or condition changes
- Performance monitoring indicates a problem
- A concern is raised by driver
- Vehicle collisions along a route attributed to icy conditions.

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Monitoring spreader discharge performance

- Once calibrated, spreader performance may change as a result of many factors
- Spreaders should be routinely monitored throughout the season
- Carry out re-calibration of spreaders where performance changes
- Incorporated as routine procedure, provides a quick and easy method of checking the spreader performance in terms of discharge rate

Considerations for precautionary treatments

- Spreading capability and performance
- Forecast weather conditions
- Road surface wetness
- Traffic levels during and after spreading

Target Spread Rates:

- Target spread rates for precautionary treatments
- Treatments for snow, ice and freezing rain
- Treatments for extreme cold

Target spread rates for precautionary treatments

- The majority of winter service treatments in the UK are precautionary
- Sufficient salt should be spread to:
  - Prevent frost and ice formation
  - Prevent ice or snow bonding to the carriageway
- Spread rates should be kept as low as practicable for the forecast conditions and road surfaces considered
  - Cost savings
  - Increased resilience
  - Environment

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New spread rate matrices

- New spread rate matrices provide
  - Minimum recommended rates
  - A reference point for review of current rates
- Based on assessment of spreading capability and network conditions:
  - Can provide an opportunity for salt savings from reduced rates
  - Can provide a warning for conditions where recommended rates are higher than current rates
- Spread rates greater than 20g/m² in some conditions

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New spread rate matrices

TREATMENT MATRIX A DRY SALTING (De-icer spread rates in g/m^2)													
Frost or forecast frost Road Surface Temperature (RST) and Road Surface Wetness	**Column Cvrg Traffic Loss**	**A PC HT NL**	**B PC HT HL**	**C PC MT NL**	**D PC MT HL**	**E FC HT NL**	**F FC HT HL**	**G FC MT NL**	**H FC MT HL**	**I GC HT NL**	**J GC HT HL**	**K GC MT NL**	**L GC MT HL**
RST at or above -2˚C and dry or damp road conditions		8	8	8	8	8	8	8	8	8	8	8	8
RST at or above -2˚C and wet road conditions		10	13	13	16	8	11	11	13	8	8	8	10
RST below -2˚C and above -5˚C and dry or damp road conditions		15	20	17	20	13	17	14	17	10	13	11	13
RST below -2˚C and above -5˚C and wet road conditions		25	2 x 17	2 x 17	2 x 20	21	28	28	2 x 17	16	21	21	25
RST at or below -5˚C and above -10˚C [*1] and dry or damp road conditions		29	2 x 19	2 x 16	2 x 19	24	32	27	2 x 16	18	24	20	24
RST at or below -5˚C and above -10˚C [*1] and wet road conditions˚		2 x 24	2 x 32	2 x 32	2 x 39	2 x 20	2 x 27	2 x 27	2 x 32	30	2 x 20	2 x 20	2 x 24
Please see Table H13 for variations to the rates given above													

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New spread rate matrices

MATRIX COLUMN G (De-icer spread rates in g / m²) Fair coverage, medium level of traffic, normal loss after spreading			
Frost or forecast frost Road Surface Temperature (RST) and Road Surface Wetness	**Dry salting**	**Pre-wetted salting**	**Treated salting**
RST at or above -2˚C and dry or damp road conditions	8	8	7
RST at or above -2˚C and wet road conditions	11	10	8
RST below -2˚C and above -5˚C and dry or damp road conditions	14	14	11
RST below -2˚C and above -5˚C and wet road conditions	28	27	21
RST at or below -5˚C and above -10˚C and dry or damp road conditions	27	27	20
RST at or below -5˚C and above -10˚C and wet road conditions˚	2 x 27	2 x 27	2 x 20

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Treatments for snow, ice and freezing rain

- Impractical to spread sufficient salt to melt more than very thin layers of snow and ice
- It requires 40g/m^2 on the carriageway to melt 1mm of ice or 10mm of un-compacted snow at -2°C
  - Requires spreading at least 50 to 60g/m^2
- Ploughing is the only economical, effective and environmentally acceptable way to deal with all but very light snow

Ploughing

- Appendix H provides guidance on the types of plough and good ploughing practices
- Ploughing is most effective when down to the road surface (importance of suitable ploughs and blades)

Treatments for Extreme Cold

- Treatments used when:
  - The combination of temperature and humidity result in salt dissolving too slowly to be effective
  - The temperatures are so low that salt is no longer effective in melting or preventing ice forming
- **Spreading** salt when temperature less than:
  - -7°C in normal humidity
  - -5°C in lower humidity (<80%)
- When temperatures -15ºC or lower are forecast

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Use of alternative de-icers for Extreme Cold

- Types of de-icer considered:
  - Magnesium chloride
  - Calcium chloride
  - ABP type de-icers blended with a chloride brine
- Alternative de-icers can be used as liquids on their own or in combination with salt
- For precautionary treatments in Extreme Cold, the liquid de-icers are best spread as the wetting agent in pre-wetted salt

Use of alternative de-icers

- Guidance includes
  - Storage
  - Spreading equipment
  - Spread rates
  - Treatment strategies
  - Environmental and corrosion considerations
- Consideration may be given to mutual aid and resource sharing within the winter plans of service providers

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A Couple Of Interesting Recent Legal Cases

- Coles -v- Plymouth City Council
  - Woman slipped on icy footway at 09:20hrs
  - Busy town centre footway
  - Not on pre-salting network
  - Claimant alleged it should have been pre-treated
  - Claimant also alleged that the Council took too long to respond to reports of ice that morning

Coles -v- Plymouth City Council

- Judge found that the Council should have carried out pre-salting of the footway at the accident location so as to avoid the formation of the patch of ice which caused the Claimant's fall:

" *... city centre footways, such as this spot, should have been identified as being a high risk ice accident spots* [sic], *as this part of the footway network was a relatively busy and well used part of a new, busy shopping precinct, with staff and shoppers using this spot from early in the morning. Those using it at the earliest times, around the time of the Claimant and all the others slipped there on the ice, needed the protection of pre-salting and gritting as the ice might only relatively recently have formed, depending on the type of formation of that ice ...* "

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Coles -v- Plymouth City Council

- Judge also found that the Council should have reacted more rapidly than they did to reports of ice:
- *"In my view, in just under half an hour from 08.52 to 09.18 on 10 December 2008, there had been sufficient warning to the Defendant that some people were falling at the spot where the Claimant fell at 09.20 … Had there been a faster reaction to the events of 08.52, with the roads at that time pre-salted and more easily passable by the gritting/salting vehicles, on the balance of probabilities, I find that the pavement area upon which the Claimant slipped and fell would have been gritted/salted and the Claimant would not have slipped, fallen and injured herself."*

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Ryder -v- Highland Council

- Single vehicle fatality on ice on the A99 (non-trunk)
- Collision occurred at approximately 05:35hrs to 06:00hrs on 10 December 2008; no witnesses
- The road was salted the previous day but showers affected the area up to around 01:00hrs and these likely removed the residual salt
- The showers were forecast
- A pre-planned morning salting operation was commenced shortly after the collision occurred

Ryder -v- Highland Council

- It was accepted that, if treatment had taken place during the early morning hours, after the showers had passed through the area, it is likely (on the balance of probabilities) that ice would not have been present at the collision site and that the collision would not have occurred

Ryder -v- Highland Council

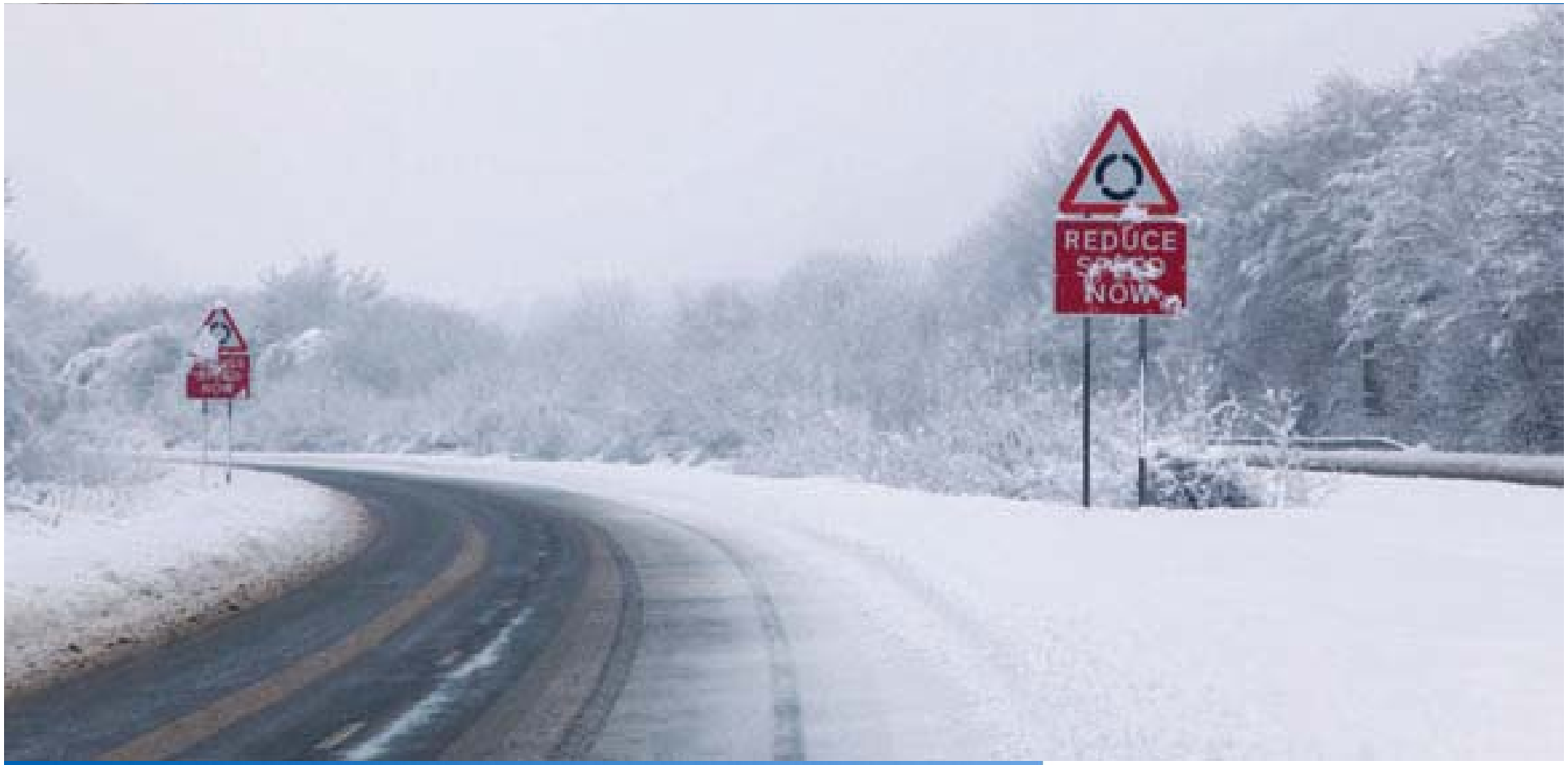
- Highland Council policy is that treatment on priority routes *"will be provided between 6am and 9pm"*
- The Council provided good evidence regarding the development of their policies and their winter service decision making process during the period of concern

Ryder -v- Highland Council

- Regarding the policy, the Judge noted that it was long standing and had been approved and ratified by elected Council Members
- The Council also demonstrated that they had considered risks when developing their policy, supporting it with evidence regarding the size of their network and the costs of treatment, compared to relatively low overnight traffic flow
- In addition, the Court was made aware that there are two other Scottish Roads Authorities that also operate policies which include a period overnight when no service is provided (Western Isles Council and Perth & Kinross Council)

Ryder -v- Highland Council

- The Judge found in favour of the Defendant Roads Authority.



Thank you and enjoy the rest of the conference

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- The NWSRG is a Member organisation comprising UK Highway and Roads Authorities, as well as Contractors and Consultants engaged in delivering the Winter Service.
- In addition, we have a wide range of (non-voting) Industry Associates who assist us with their expertise and resources - many of whom have a great deal of both UK and International experience.
- Our aims are to undertake scientifically valid trials and practical research, and to produce guidance to assist authorities in delivering the Winter Service.

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- We are a Technical Sub-Group of the UKRLG Roads Board, advising them regarding Winter Service issues.
- And we are now responsible for producing, reviewing and updating national Roads Board guidance relating to the Winter Service, such as Appendix H and Section 13 of 'Well Maintained Highways' (WMH).
- **In order to do this we need your help !**

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- We need **authorities**, and **consultants**, and **contractors**, and **suppliers** to help us with our research, and to take part and engage with our Working Groups, so that we can ensure the guidance is appropriate and that it **fully recognises and takes account of the current diversity of nationwide practices**
- As well as benefiting from all of the **expertise** and **knowledge** that already exists across the country.....

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In return, benefits to NWSRG Members include:

- **Full access to the latest and most detailed best practice guidance as soon as it is produced;**
- **Full access to numerous test results, research findings and trial reports (which will not generally be published);**
- **The opportunity to help design and take part in trials and applied research projects that may well improve service delivery in your area and will further the overall understanding of Winter Service issues;**

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- **The opportunity to assist in shaping future best practice guidance and to help ensure that it fully accounts for and reflects your needs and aims;**
- **Involvement in a pro-active working forum which actively encourages engagement and support, as well as the exchange of ideas and experiences between Winter Service practitioners and industry specialists across the country (and wider)**
- **And it looks good in Court !**

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NWSRG Annual Membership Fees

- In order to be as fair as we can be, and to attract smaller authorities as well as large, our annual subscriptions are calculated on the basis of the length of treated network.
- **Up to 250km: £500**
- **251km to 1,250km: £1,000**
- **Greater than £1,250km: £1,500**
- Also, Consortium / Group Membership is possible

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