Presentation

- Brief introduction about myself
- Background information on the UK
- In the beginning
- Raw materials and storage
- Developments
- NSSRG
- Overview of Europe

Introduction

Mark Dutton, Managing Director of Safecote
20 Years in winter maintenance
15 Years working for Salt Union Limited, Part of Compass Minerals
2 years for Peacock Salt
Started with Safecote – July 2004

United Kingdom

UK Statistics

- UK is 153,000 sq miles
- Population of over 61,000,000
- Over 242,300 miles of road
- Motorways less than 1% (19% of traffic)
- 1980 to 2005, traffic increased by 81%
- Congestion charging in London has reduced traffic by 18% since 2003
**UK Climate**

- Climate is strongly influenced by the sea
- Summers are cool and damp. Winters mild
- Gulf stream from Mexico keeps waters warm
- West coast is far wetter than the East due to Atlantic air flows

**UK Average Temperatures**

**Days of Ground Frost in UK**

**Days of Lying Snow in the UK**

**England’s Motorways & Trunk Roads**

**Scotland’s Motorways & Trunk Roads**
Wales’ Motorways & Trunk Roads

Road Safety
- In 2006, over 24,000 people killed or seriously injured on UK’s roads
- Even so, UK’s roads are still second safest country in Europe behind Sweden
- The cost of one fatality is over £1 million to the UK economy
- Estimated cost to the UK each year is £16 billion

In the beginning
- UK’s first motorway was opened in 1955, M1 linking London with Birmingham
- DOT needed to ensure it was free flowing in winter
- Salt was chosen as the de-icing chemical
- Cheap, effective and readily available
- Only UK dedicated salt mine invested heavily in plant and machinery upgrades
1960’s to 2000

- Developments in spreader technologies based on agricultural equipment
- Introduction of snow ploughs
- Pro-active winter pans in place at all UK council’s

1960’s to 2000 (cont)

- Salt demand increased
- Two further salt mines were opened in the UK to accommodate usage
- Site based forecasting techniques introduced
- RWIS (salt sensors) installed to assist decision making
- All priority 1 routes to be treated before the formation of ice or fall of snow

1960’s to 2000 (cont)

- Salt grading began to switch from 10mm to 6mm salt – windscreen damage
- New techniques involving pre-wetted salt were trialled
- Higher spec spreaders from the continent
1960’s to 2000 (cont)
• Environmental pressure to store salt under cover (still less than 50% in 2007!!)
• Growth of salt barns and timber dome’s
• Introduction of ‘just-in-time’ deliveries from salt suppliers
• Axle weigher’s installed to automatically record usage – linked in to salt suppliers to trigger automatic replenishment

Need to Learn
• More demand to understand performance
• Desire to increase service delivery and improve winter maintenance
• Formation of NSSRG in 2000
• User’s and suppliers getting together to carry out research
• Trials in laboratory, TRL test track and live field tests

NSSRG Aims
• Little robust empirical knowledge about salt spreading
• Limited salting trials based on robust methodologies
• Local Authorities and national government had limited winter research budgets and expertise to carry out rigorous and extensive scientific testing
• Requirement to develop a sustainable approach to winter service in terms of:
  □ Safety
  □ Environmental impact
  □ Economics
• Desire to develop a Best Value winter service approach

How the NSSRG Works
• Steering Group
• Working Group
• General Membership
• All participation through website, AGM and regional workshops
• Secures pooled funding to leverage independent research
• Develops research programmes based on practitioners priorities
• Publishes research findings to contributors and industry members
Key Research Issues for Service Providers and Suppliers

- Spreader design and calibration
- Spreading speeds, rates, width and pattern
- Salt – size grading purity and moisture content
- Benefits of differing spreading regimes: dry, pre-wet, brine only and treated salt
- Residual salt levels and interface with Road Weather Information Systems (RWIS)

Key Research Issues for Service Providers and Suppliers (cont)

- Optimum treatment under differing climatic conditions
- Optimum treatment for different road surface types
- Effects of trafficking
- Impact on the environment, infrastructure and vehicles
- Cost benefit analysis of different treatment options

Methodologies to understand the science of salting

- Robust salt recovery methodology (based on wet vacuum method) developed by TRL

Utilising Best Practice in Europe

- Working Group suppliers and manufacturers share best practice and innovation:
  - Development of spreader calibration standards
  - Salt and brine recovery unit
  - Access to COST Action 353 – Winter Service Management Systems

Research findings from Phase 1

- 10mm & 6.3mm salt delivered into the target area below target level
- Poor distribution of 10mm across 2 lanes
- High degree of salt wastage with 10mm (i.e. outside target area)
- Low throw equipment spreading 10mm does not give significant distribution improvement
- 3mm pre wet spreading gave mixed results when spread over 3 lanes
- In summary, majority of spreaders delivering significantly less salt into the target area than calibrated for (typically 50% of desired rate)

Factors affecting salt distribution

- Wind speed and direction
- Turbulence created by the spreader
- Turbulence has a particular effect on smaller salt grains in the area immediately behind the spreader
- Moisture content of around 4% will improve salt distribution profile
- Excessive moisture (>4%) leads to larger grains travelling further and fine grains concentrating at rear of spreader
- Trafficking – up to 30% of salt delivered can be lost in first hour
Role of ABP additives in salt distribution and retention

- Increases flow of salt from the hopper
- Discharge rates for treated salt are generally higher than dry salt under the same control settings
- Additives bind the salt fines leading to increased control and ability to spread wider carriageways
- Significantly less treated salt is lost after 1 hour of trafficking compared to dry salting (2% vs 30%)
- Additives aid salt retention during initial stages of trafficking, and may have increased effect on salt retention after 18 hours of trafficking

Key lessons learnt from the Phase 1 trials

- Undertake both static and dynamic calibration
- Salt stocks should be stored in a covered barn
- Select a de-icer product type and grade that enters solution within an hour
- Changing de-icer product, spreader settings, moisture content or grading requires dynamic calibration
- Grading and moisture content should be capable of producing optimum and consistent distribution
- Calibrate spreader to achieve target level spread and minimise waste outside of target width

Key lessons learnt from the Phase 1 trials (cont)

- Salt additives can be advantageous at temperatures below -7°C
- Pre-wetted salt is 20% more corrosive than dry salting, reducing vehicle life
- Higher spread rates should be used on newly laid thin surfaces
- Reduce spread rates on thin surfaces as surface ages
- Be aware of the implications of different surface types and their impact on the performance of different de-icers

Phase 2 Research Programme – 2006-07

- Dissolution rates of dry, pre-wet and treated salt under controlled conditions
- Spreading performance and residual salt levels for dry, pre-wet and treated salt
- Uni-body, modified and untested spreader performance trials
- Effect of salt, brine and additives on skidding resistance both lab and field based
- Residual salt measurement and prediction
- Footway and cycle track treatment and policy

Anything else??

Just a few words on our European colleagues ............
Facts & Figures

• 50 countries in Europe (a growing continent)
• Population estimated at 700 million
• The climate of Europe varies from subtropical to polar
• All but one European country has a defined winter maintenance strategy

Winter Maintenance in Europe

• Individual countries have individual standards
• Much more adoption of pre-wetted salt
• Higher purity salts than UK – much more costly
• Small amount of direct liquid de-icing
• Trialling additives in brine for longevity & corrosion inhibition

The Future

• Liquid, solid or a combination?
• How to measure residual salt?
• Litigation?
• Reduce environmental impact
• Reduce corrosive impact
• Assess the impact of global warming!!