

**Report Prepared for:
TRANSPORT SCOTLAND**

**Fatal Incident on 21 January 2009
West of Junction 29 of the M8 Motorway |
On the Eastbound Carriageway**

Preliminary Investigation Report

2 February 2009

**TRL Limited
Craighouse Campus, Craighouse Road, Edinburgh, EH10 5LG**

Document Ref: TRL051/11105320/M8/R4

CONTENTS

1.	BACKGROUND AND SCOPE	1
2.	BASIS AND ASSUMPTIONS	2
3.	INCIDENT LOCATION	5
4.	WEATHER FORECAST ISSUED ON 20 JANUARY 2009	6
5.	DECISION REGARDING PLANNED OPERATIONS 20/21 JANUARY 2009	9
6.	INFORMATION AVAILABLE OVERNIGHT 20/21 JANUARY 2009	16
7.	SUMMARY OF CONCLUSIONS	23

1. BACKGROUND AND SCOPE

- 1.1 It appears from the Strathclyde Police internet website that, at approximately 05:25hrs on Wednesday 21 January 2009 [REDACTED] was involved in a road traffic collision that occurred on the eastbound carriageway of the M8 Motorway approximately 3 miles west of St James Interchange (Junction 29).
- 1.2 [REDACTED] was tragically killed as a result of the collision, in which it appears that her vehicle left the carriageway and struck a tree.
- 1.3 The Police have indicated that [REDACTED] was driving a [REDACTED] motor car at the time of the collision and that she was the sole occupant of the vehicle. It appears that no other vehicles were involved.
- 1.4 The incident is still the subject of ongoing Police investigations. However, there have been a number of media reports indicating that the pertinent section of motorway carriageway was adversely affected by ice at the material time, with the implication being that this was the primary cause of the incident.
- 1.5 This Preliminary Investigation Report has been prepared by TRL as sub-consultants to Halcrow Group Ltd under the Performance Audit Group commission for Transport Scotland. Transport Scotland requested that TRL specialists prepare this report.
- 1.6 This report considers the technical aspects of the Winter Service decision-making process and does not include analysis of the wider contractual aspects, particularly in relation to indemnity etc.
- 1.7 It should be noted that the authors have only seen very limited information concerning the nature of the incident itself. For example, the précis of the incident provided above has mainly been gleaned from the Strathclyde Police internet website. No Police Accident Report into the incident has been seen, the site of the incident has not been inspected, and neither has the vehicle involved.
- 1.8 The documents relating to winter service provision on the motorway that have been considered in the preparation of this report are discussed in the following section.
- 1.9 The information seen is consistent with the pertinent section of motorway being adversely affected by ice at the material time.

2. BASIS AND ASSUMPTIONS

2.1 TRL has been provided with the following documents in the preparation of this report:

- Schedule 7 Part 2 'Winter Service' of the 3rd Generation Term Contract for Management and Maintenance of the Scottish Trunk Road Network South West Unit';
- Schedule 9 Part 1 'Specification for Maintenance Operations' of the 3rd Generation Term Contract for Management and Maintenance of the Scottish Trunk Road Network';
- Term Contract for Management and Maintenance of the Scottish Trunk Road Network – South West Unit Winter Service Plan, 1 October 2008 to 15 May 2009 (referred to as the 'Winter Service Plan' in the remainder of this report);
- South West Unit Winter Service Plan 'Proposed Action' Form completed on 20 January 2009. This document includes the weather forecast received by Amey Highways which was apparently the main basis for their decision regarding planned winter service operations during the period of concern to my investigations, as well as details of those planned operations;
- South West Unit 'Form 6 – Response Times Achieved' for 20 and 21 January 2009;
- Extract from 'Form 2 – Communications Log' which relates to the pertinent period and was apparently completed by the Amey Highways Winter Service Duty Officer for the South West Unit;
- Pertinent 24 hour site specific graphs of predicted road surface temperature, air temperature and dew-point temperature at the sites of the ice detection stations located on the A8 at Port Glasgow and on the M8 at Riddrie;
- Data of actual conditions recorded during the pertinent period from ice detection stations located at:
 - A8 Port Glasgow
 - A82 Alexandria Bypass
 - A898 Erskine Bridge

- M8 Bishopton
- M8 Kinning Park
- M8 Riddrie

2.2 In addition, data from the Glasgow Airport weather station has been obtained for 20th and 21st January 2009.

2.3 The above information has provided the basis for this report and is considered sufficient to inform the preliminary findings expressed herein. However, because this does not constitute all of the information that would normally be considered when undertaking a full investigation of an incident such as this, it is important to recognise that this report has required certain assumptions to be made.

2.4 The main assumptions predicated the preliminary findings expressed in this report are as follows:

- The weather forecast information (including the 24 hour site specific graphs) provided was available to the South West Trunk Road Unit Winter Service Duty Officer around lunchtime on Tuesday 20 January 2009 and, other than the single reference in the 'Communication Log' provided, this information was not updated at any point during the pertinent period;
- Other than the references contained within the Communications Log provided, the South West Trunk Road Unit Winter Service Duty Officer was not contacted regarding road and/or weather conditions by any staff member, the weather forecasting organisation, the Police, or any other third party during the pertinent period.
- The ice detection station data provided is either from the only sensors attached to those stations, or those sensors that were recording the most adverse conditions.

2.5 Importantly, and with regard to this investigation, without knowledge of the findings of the Police investigation and/or without undertaking an investigation of incident reconstruction issues, this report cannot provide comment on incident causation.

2.6 In addition, some parts of the UK experienced unusually severe weather conditions during the morning of Wednesday 21 January 2009. For example, there are media reports that a 40 mile section of the A30 Trunk Road in Devon and Cornwall was closed and that over 100 incidents occurred in that area during that period as a result

of freezing rain causing ice to form on carriageway surfaces. In conditions such as these, highway and road authorities can be powerless to prevent ice from forming on road surfaces, as any salt or other de-icing material spread onto the surface is likely to be rapidly washed away and therefore prove ineffective.

- 2.7 Having stated the above, on the basis of the information considered in the preparation of this report (which includes meteorological data from the weather station at Glasgow Airport), it currently appears unlikely that the area of the fatal incident on the M8 Motorway was adversely affected by freezing rain during the morning of 21 January 2009.
- 2.8 The remainder of this report is predicated on the above understanding. However, without further investigations into the weather conditions prevailing around that time, this cannot be ascertained with certainty.

3. INCIDENT LOCATION

- 3.1 The Strathclyde Police internet website indicates that the incident occurred on the eastbound carriageway of the M8 Motorway, approximately 3 miles west of the St. James interchange (Junction 29).
- 3.2 This would appear to place the incident site fairly close to, and southeast of, Junction 30 of the motorway, i.e. the junction between the M8 and the M898 which leads northeast towards the A898 and Erskine Bridge.
- 3.3 It would appear from this, and the South West Trunk Road Unit Winter Service Plan, that the incident site is within Weather Domain 2, is treated as part of Precautionary Treatment Route Number K1 (or K20/1 as it is sometimes referred in the documentation) and that the nearest ice detection station to the site is that on the M8 at Bishopton.

4. WEATHER FORECAST ISSUED ON 20 JANUARY 2009

- 4.1 The South West Trunk Road Unit Winter Service 'Proposed Action' Form provided to the authors of this report includes a copy of the 24 hour weather forecast apparently issued to the South West Trunk Road Unit by the Met Office around lunchtime on Tuesday 20 January 2009 and which apparently constituted the main meteorological information utilised when the decision was made regarding planned winter service operations within that Unit during the following 24 hour period.
- 4.2 This weather forecast included reference to Weather Domains 1 through to 8.
- 4.3 With regard to the weather domain that includes the site of the incident, (Weather Domain 2, which is referred to as 'Clyde East' in the forecast), the weather forecast stated that the minimum predicted road surface temperature was +1°C and that the minimum predicted air temperature was +2°C.
- 4.4 It went on to state that ice, hoar frost and/or snow were not expected to pose hazards in that weather domain (with low confidence being expressed on the part of the weather forecaster). Fog was not expected (with high confidence) but strong winds and rainfall were expected (with low confidence).
- 4.5 The forecast for other weather domains, notably domains; 1 'Glasgow'; 3 'Renfrew'; 5 'A75 West'; 7 'A76/A701'; and 8 'Lanark', predicted lower road surface temperatures than those in Weather Domain 2, with ice and hoar frost being predicted to pose hazards (with low confidence) in Domains 5, 6 and 7, and snow being predicted to pose a hazard (with low confidence) in Domains 3, 7 and 8.
- 4.6 With regard to ice and/or hoar frost, the forecast stated:
- "Risk of ice and hoar frost in colder areas, risk period 2200-1000.
Mainly routes 5, 6 and the south of route 7".*
- 4.7 It is unclear as to whether the reference by the weather forecaster to 'routes' here is accurate, or whether this is a reference to Weather Domains. However, in either case, it is apparent that this does not refer to an expected ice or hoar frost hazard in Weather Domain 2 or on Precautionary Salting Route K1, which is the route that includes the site of the fatal incident on the M8 Motorway.
- 4.8 With regard to snow, the forecast stated:

"Band of rain (1200-1700) crossing northwest to southeast may fall as sleet or snow, mainly above 150m. Risk of localised accumulations of 1-3cm. Thereafter, isolated light showers, mainly on western coasts are not expected to cause any accumulations."

4.9 The area of the incident site is relatively low lying and is significantly lower than 150 metres above mean sea level.

4.10 The '24 Hour Weather Summary' of the forecast for Weather Domain 1 'Glasgow' stated:

"A band of precipitation will cross the area from the northwest during the afternoon, clearing southeastwards by 1700hrs, to leave a risk of isolated light showers through the remainder of the night. The precipitation may fall as snow or sleet at times (see snow box for details). Otherwise, clear spells will develop at times overnight, particularly towards the end of the night. Although there remains a risk of one or two light showers, the remainder of Wednesday morning will be dry with some clear spells."

4.11 And that for Weather Domain 2 was stated "As 1 Glasgow".

4.12 The overall 'Readiness Colour' given on the forecast for all weather domains was 'Amber'.

4.13 The 'Readiness Colour' follows a 'traffic light' colour coding sequence, whereby 'Green' indicates that no winter weather hazards are expected, 'Amber' indicates that there is a potential risk of some winter weather hazards, and 'Red' indicates that winter weather hazards are expected.

4.14 It appears that, at around the same time as the forecast discussed above was issued, the Met Office also issued certain site specific 24 hour graphs of predicted road surface temperature.

4.15 The prediction graphs (which also include predictions of road surface state, air temperature and dew-point temperature) issued at that time for the ice detection station sites on the A8 at Port Glasgow and the M8 at Riddrie have been provided and considered in the preparation of this report.

- 4.16 The closest of these two stations to the site of the fatal incident on the M8 Motorway is that on the A8 at Port Glasgow, which is within Weather Domain 2 (the M8 Riddrie station being within Weather Domain 1).
- 4.17 The site specific prediction graph for A8 Port Glasgow is consistent with the text forecast for Weather Domain 2, indicating that road surface temperature at that site would reach a minimum of approximately +1.0°C at around 05:00hrs on 21 January 2009.
- 4.18 This graph also indicated that road surface temperature at that site would be colder than the dew-point temperature between approximately 19:50hrs on 20 January to approximately 07:20hrs on 21 January 2009.
- 4.19 The horizontal bar at the bottom of this graph which relates to the predicted road surface state indicates that the road surface was expected to be subject to light dew formation for much of the night but would become mainly dry from around 05:00hrs onwards.

5. DECISION REGARDING PLANNED OPERATIONS 20/21 JANUARY 2009

- 5.1 The South West Trunk Road Unit's Winter Service Plan includes two tables that appear to constitute copies of tables contained within the Specification of the Contract to which the South West Unit Operating Company was operating on 20 January 2009 (Tables 1 and 2 in Appendix 28/1 of Part 1 of Schedule 9). These tables are stated in the Contract Specification as constituting "*The minimum requirements for de-icing material spread rates for precautionary treatment*".
- 5.2 The Contract Specification also makes reference to precautionary treatment being required on Trunk Roads when road surface temperatures are predicted to fall to +1°C or below.
- 5.3 As discussed in the previous section of this report, the weather forecast indicated that in Weather Domain 2, the lowest expected road surface temperature overnight 20/21 January 2009 was +1°C and that a band of rain would affect the area during the afternoon of 20 January 2009.
- 5.4 It is considered that these predicted conditions most appropriately qualify as Category 'E3' in Table 1 of the South West Unit's Winter Service Plan (copied from the Contract Specification), which corresponds to conditions of a predicted road surface temperature of between +1°C and -2°C following rain.
- 5.5 Table 2 of the Winter Service Plan indicates that the minimum appropriate action in response to Category E3 conditions is a precautionary treatment of 30 g/m², which is a relatively heavy application.
- 5.6 It therefore appears from the above that the most appropriate interpretation of the South West Unit's Winter Service Plan (and the Contract Specification) would have led to a precautionary salting operation being planned to take place on the Trunk Roads in Weather Domain 2, including Precautionary Treatment Route Number K1 and the site of the fatal incident on the M8 Motorway, during the evening of 20 January 2009.
- 5.7 The South West Trunk Road Unit Winter Service 'Proposed Action' Form seen in the preparation of this report indicates that, on the basis of the weather forecast and the other information available to the Unit's Winter Service Duty Officer around lunchtime on 20 January 2009, "*No Action*" was planned for any of the Trunk Road precautionary salting routes covered by that Unit in Weather Domains 1, 2, 3, 4 and

8. It also indicates that precautionary treatments were planned to taken place commencing at 19:00hrs that evening in Weather Domains 5, 6 and 7.
- 5.8 With regard to the incident site on the M8 Motorway in Weather Domain 2, and on Precautionary Treatment Route Number K1, the form therefore indicates that no winter service operations were planned to take place during the 24 hour period from noon on 20 January 2009.
- 5.9 The Proposed Action Form includes a column entitled "*Template Category*", which is assumed to be a reference to the categories contained within Table 1 of the Winter Service Plan.
- 5.10 With regard to Weather Domain 2, the Duty Officer has indicated that the relevant "*Template Category*" was 'A3' which, from Table 1 of the Winter Service Plan, which corresponds to a predicted road surface temperature of $+1^{\circ}\text{C}$ or lower and wet road surfaces.
- 5.11 Table 2 of the Winter Service Plan indicates that the minimum appropriate action in response to Category A3 conditions is a treatment of 0 g/m^2 , which is interpreted as indicating that no precautionary action would be required.
- 5.12 It can be seen that the predicted conditions for Weather Domain 2 overnight 20/21 January 2009 qualified for the conditions described by Category A3. Therefore, with regard to this weather domain and the site of the fatal incident on the M8 Motorway, it would appear that the Duty Officer may potentially have complied with the minimum requirements of the Winter Service Plan when deciding, at lunchtime on 20 January 2009, that no precautionary treatment was required during the following 24 hour period.
- 5.13 However, as indicated above, it is not considered that Category A3 is the most appropriate or specific category that applied to the conditions predicted to occur in Weather Domain 2, which is due to the reference in the forecast to rainfall during the afternoon of 20 January 2009. The description for Category A3 conditions does not include reference to any precipitation, whereas the description for Category E3 explicitly refers to conditions "*following rain*".
- 5.14 Experienced Winter Service Duty Officers are well aware of the importance of precipitation to the success, or otherwise, of winter service operations in preventing the formation of ice on road carriageways. Therefore, it is considered that the

majority of experienced Winter Service Duty Officers would have categorised the conditions predicted for Weather Domain 2 overnight 20/21 January 2009 as Category E3, rather than Category A3, when using Table 1 of the Winter Service Plan.

5.15 The Proposed Action Form for 20 January 2009 indicates that the South West Trunk Road Unit Winter Service Duty Officer categorised the predicted conditions in weather domains outwith Weather Domain 2 as:

- Weather Domain 4 : Category 'A3', i.e. the same as those in Weather Domain 2;
- Weather Domains 1, 3, 7 and 8 : Category 'B1', i.e. road surface temperature between +1°C and -2°C, and a dry road surface;
- Weather Domains 5 and 6 : Category 'B3', i.e. road surface temperature between +1°C and -2°C, and a wet road surface.

5.16 It is clear from this that, when making his Winter Service decision around lunchtime on 20 January 2009, the Duty Officer did not consider that Category A conditions applied to all situations where the road surface temperature was predicted to be equal to or below +1°C.

5.17 It also appears that the Duty Officer may not have accounted for the reference in the weather forecast to the band of rain crossing the region during the afternoon of 20 January 2009 when he was determining the appropriate action to take in all of the weather domains in the South West Unit.

5.18 As a result of the reference in the weather forecast to rainfall during the afternoon of 20 January 2009, in combination with the predicted minimum road surface temperatures, it is considered that the conditions predicted to occur in all of the weather domains in the South West Unit overnight 20/21 January 2009 most appropriately qualify as Category 'E3' in Table 1 of the South West Unit's Winter Service Plan (copied from the Contract Specification).

5.19 Although not specifically referred to in the South West Unit's Winter Service Plan, which is the document that is likely to have been most familiar to the Duty Officer, the Contract between Transport Scotland and the Operating Company of the South West Trunk Road Unit included a number of general references to ensuring the safety of road users etc (e.g. Paragraph 1.1 (l) (b) of Part 1 of Schedule 3,

Paragraph 5 (iii) of Annex 3.9/A of Part 9 of Schedule 3 and Paragraph 1.1.1 of Part 2 of Schedule 7) and, with regard to the undertaking of precautionary treatment of road carriageways, it stated:

"Precautionary treatment for carriageways in the Unit shall be provided by the Operating Company when road surface temperatures fall to or are forecast to fall to less than or equal to plus 1° C or when snow conditions shall be forecast."

[Clause 2803AR of Schedule 9 Part 1]

5.20 Therefore, it can be seen that the Contract in effect between Transport Scotland and the Operating Company of the South West Trunk Road Unit at the time of the fatal incident on the M8 Motorway specifically refers to a requirement for precautionary treatment to take place when road surface temperatures were predicted to fall to less than or equal to +1°C.

5.21 The Contract also specifically refers to 'low confidence' weather forecasts, stating:

"The Operating Company shall provide details in the Winter Service Plan for specific arrangements to ensure precautionary treatments shall be provided for Trunk Roads within the Unit when low confidence level weather forecasts shall be issued by the expert weather forecasting service provider for variable road and weather conditions.

When such conditions shall be forecast appropriate actions shall be taken to maintain the said Trunk Roads in safe conditions based on the Operating Company's Winter Service Plan."

[Paragraph 2.4.2 of Part 2 of Schedule 7]

5.22 As discussed earlier in this report, the weather forecast received by the South West Trunk Road Unit Winter Service Duty Officer at lunchtime on 20 January 2009 indicated that the predictions relating to ice, frost and snow in the weather domain that included the site of the fatal incident on the M8 Motorway (Weather Domain 2) were made with low confidence on the part of the forecaster.

5.23 Therefore, regardless of the content of the decision matrix table in the Contract Specification and the content of the South West Unit's Winter Service Plan in effect on 20 January 2009, it is considered that a prudent Winter Service decision would

have included the planning of precautionary salting operations to be undertaken on Trunk Roads within Weather Domain 2 during the evening of 20 January 2009.

5.24 The above opinion is supported by the facts that:

- Rainfall during the afternoon of 20 January 2009 would have removed almost all salt remaining from earlier winter maintenance operations and left roads wet overnight;
- The Contract Specification includes a number of references to precautionary treatment being required when road surface temperatures are predicted to fall to +1°C or below;
- The predicted minimum temperature of +1°C is so close to freezing that it is considered that experienced winter maintenance personnel should have been aware that, at certain locations on the network, there would have been a distinct possibility that ice would form during the pre-dawn hours;
- The references in the weather forecast to 'Amber' conditions and 'Low Confidence' should have alerted the Duty Officer that the predicted conditions may well have been subject to change for the worse.

5.25 It is considered that, on the basis of the forecast discussed above, the majority of UK winter service decision makers would have decided to undertake a precautionary salting operation during the evening of 20 January 2009. Winter maintenance decision makers are generally relatively cautious in their approach and it is considered that most would tend to 'play it safe' in these circumstances.

5.26 Based on the information seen in the preparation of this report, which indicates that road surface temperatures did not fall very far below 0°C overnight and that, following the completion of the salting operations that were planned and undertaken by the South West Trunk Road Unit during the evening of 20 January 2009, little precipitation occurred overnight in the area of the incident site (as indicated by the data obtained from the weather station at Glasgow Airport), it is considered that a precautionary salting operation utilising a salt spread rate of 30 g/m² undertaken on Treatment Route K1 in Weather Domain 2 during the evening of 20 January 2009 may have prevented ice from forming during the early morning of 21 January 2009 at the site of the fatal incident on the M8 Motorway.

5.27 Given that the Duty Officer apparently decided not to undertake any precautionary salting operations within Weather Domain 2 during that period, and on the basis of the weather forecast he had apparently received and considered when he took that decision, it is considered that he should have been particularly aware of the need to carefully monitor conditions overnight and during the early morning of 20/21 January 2009, with a view to reviewing that decision and instructing salting operations should conditions be seen to deteriorate, even relatively marginally, from those that were predicted.

6. INFORMATION AVAILABLE OVERNIGHT 20/21 JANUARY 2009

- 6.1 The authors of this report have been provided with a copy of the 'Communications Log' that was apparently completed by the South West Unit Winter Service Duty Officer during the period 20/21 January 2009, as well as certain data that was recorded at a number of ice detection stations located on the South West Unit Trunk Road Network during the early morning hours of 21 January 2009.
- 6.2 The 'Communications Log' indicates that, at 20:58hrs on 20 January 2009, the Duty Officer was contacted by the Met. Office. With regard to this telephone call, the Log records that:
- "Domain 7 getting colder but forecast to stay the same. Dipping below +0 in far south east towards the end of the night. Showers continually pushing in from the west keeping temps above +0"*
- 6.3 The above appears to indicate that, although the weather forecaster had identified that temperatures were falling below those predicted for that time in Weather Domain 7, the overall predictions for minimum temperatures overnight/during the early hours of 21 January 2009 were still expected to remain valid. Part of the reason for this may have been that showers, with their associated cloud cover, were expected to continue to affect the area.
- 6.4 The earlier made decision regarding salting operations in the South West Trunk Road Unit had included evening precautionary treatments in Weather Domains 6 and 7, which are in the southeast area of the Unit. Therefore, it is not considered that this telephone call should or would have caused any immediate concern to the Duty Officer regarding the appropriateness of this earlier made decision.
- 6.5 Having stated the above, it is considered that this conversation could potentially have served to further remind the Duty Officer that conditions were expected to be marginal on Trunk Roads in that Unit and that they could well be subject to change at short notice.
- 6.6 The Log indicates that, shortly after 01:00hrs on 21 January 2009, the Duty Officer received a telephone call from 'Ayr 1' and was informed that air temperatures at "Carrutherston" and "Glen Loose" were +4°C and +3°C respectively, and that it was raining lightly at "Carrutherston" but dry at "Glen Loose".

- 6.7 It is understood that these locations are outwith Weather Domain 2 and it is considered that this information should or would not have caused any concern to the Duty Officer.
- 6.8 The South West Trunk Road Unit Winter Service Plan refers to the monitoring of conditions throughout the winter period and also refers to the use of the network of ice detection stations for this purpose.
- 6.9 Under the heading *"Proposals for precautionary and additional de-icing treatments when low confidence forecasts shall be issued for variable road and weather conditions"*, the Winter Service Plan states:
- "Monitoring of the actual road surface temperatures in relation to the forecast road surface temperatures will determine the accuracy of the weather forecast, providing additional information for the Winter Service Duty Officer to amend the treatment requirements."*
- 6.10 It can be seen from the above that the South West Trunk Road Unit Winter Service Plan emphasises the importance of monitoring actual road surface temperatures against those predicted, when low confidence forecasts are received (such as occurred on 20 January 2009).
- 6.11 The data seen in the preparation of this report from the ice detection stations, which would have been available to the Duty Officer in 'real time' during the period, indicates:
- At 02:00hrs the A82 Alexandria Bypass ice detection station, which is in Weather Domain 2, was recording a surface temperature of +0.5°C, and it continued to fall to -0.3°C by 03:00hrs. It then stabilised a little until around 05:00hrs, when it started to fall once more until reaching a minimum temperature of -1.9°C at 09:20hrs that morning. This station was recording the presence of ice on the road surface at that location between 07:40hrs and 09:00hrs inclusive.
 - At 02:20hrs the A898 Erskine Bridge ice detection station, which is in Weather Domain 2, was recording a surface temperature of +0.6°C, and it continued to fall to reach -1.0°C by 04:40hrs. It reached a minimum temperature of -1.4°C at 06:40hrs but did not record the presence of ice during that morning.

- At 02:25hrs the M8 Riddrie ice detection station, which is in Weather Domain 1, was recording a surface temperature of +0.8°C and a wet road surface. It continued to fall and reached a minimum of 0.0°C at 04:25hrs. It then stabilised until starting to rise at around 05:38hrs. This station did not record the presence of ice during that morning.
- At 02:56hrs the M8 Bishopton ice detection station, which is in Weather Domain 2 and appears to be the closest station to the site of the incident, was recording a surface temperature of +0.8°C and a wet road surface. It continued to fall to +0.6°C by 03:23hrs but then stabilised until around 05:37hrs, when it started to fall once more until reaching a minimum temperature of -0.4°C at 06:56hrs. This station did not record the presence of ice during that morning.
- At 02:57hrs the A8 Port Glasgow ice detection station, which is in Weather Domain 2, started to record a surface temperature of +0.8°C, which is marginally below the minimum temperature of +1°C that had been predicted for that station and Weather Domain overnight, and it continued to fall to +0.6°C. The road surface was wet at this time and no residual salt was recorded. This station did not record the presence of ice during that morning.
- At 03:00hrs the M8 Kinning Park ice detection station, which is in Weather Domain 1, was recording a surface temperature of +0.7°C and a wet road surface. It continued to fall and reached a minimum of +0.3°C at 04:30hrs. This station does not appear to have recorded the presence of ice during that morning.

6.12 It can be seen that four of the above weather stations are in Weather Domain 2 and that, at 02:00hrs, 02:20hrs, 02:56hrs and 02:57hrs, these four ice detection stations progressively started to record road surface temperatures lower than the minimum temperature predicted to occur in that weather domain overnight.

6.13 In accordance with good practice, the Contract Specification requires the South West Trunk Road Unit to monitor conditions throughout the winter period and it specifically refers to monitoring the information available from the network of ice detection stations.

6.14 It is therefore considered that the Duty Officer should have identified that the ice detection stations in Weather Domain 2 were recording road surface temperatures

colder than the minimum temperature predicted overnight in that domain relatively quickly after this situation started to arise.

- 6.15 Given the fact that the A82 Alexandria Bypass ice detection station was recording a road surface temperature of +0.5°C by 02:00hrs that morning, and that this general situation was also reflected (although not to such a great degree) at other ice detection stations at around that time, it is considered that the Duty Officer should have identified this situation by approximately 02:30hrs that morning.
- 6.16 It is considered that the appropriate initial response to the information being recorded by the ice detection stations at that time would have been for the Duty Officer to have contacted the weather forecaster in order to discuss the developing situation. This is considered to constitute the action that the great majority of Winter Service Duty Officers in the UK would have taken in such circumstances and appears to be supported by the South West Trunk Road Unit's Winter Service Plan which states in regard to communicating with the weather forecasters:
- "Regular communication is vital when managing changes in weather conditions, enabling us to continually review our planned actions and react promptly when necessary."*
- 6.17 Given the temperatures being recorded at the ice detection stations at that time, the general weather conditions, and the fact that there was a considerable period of time before sunrise, it is considered that appropriate consideration of all of these issues would, on the balance of probabilities, likely have led to a salting operation being instructed to take place as soon as possible on all Trunk Roads in Weather Domain 2 (at least).
- 6.18 Given the required target Response and Treatment Times for such operations (which require Trunk Road treatment routes to be able to be completed within three hours of a decision being made to undertake treatment), and the fact that the site of the fatal incident on the M8 Motorway is treated part way around Precautionary Treatment Route K1, rather than at its end, it is considered likely that, had an instruction to undertake an immediate salting operation been issued prior to around 03:00hrs or thereabouts, then the site of the fatal incident on the M8 Motorway could have been treated before the incident occurred at approximately 05:25hrs that morning.

- 6.19 It is considered likely that such an operation would have prevented ice from being present on the carriageway surface at the time and location of the incident.
- 6.20 An alternative and potentially valid response to the ice detection station data being recorded at around 02:30hrs on 21 January 2009 could have been for the Duty Officer to have instructed a salting operation to take place as soon as practicable on the Trunk Roads in Weather Domain 2 without contacting the weather forecaster first. However, it is generally recognised by experienced Winter Service personnel that, although the data recorded at ice detection stations is extremely important, it only constitutes one part of the information normally utilised to determine whether or not salting operations are warranted.
- 6.21 In the event, it appears that the situation with regard to the ice detection station data at that time was either not identified by the Duty Officer or that it was not considered to be of concern. In either case, this is not considered to constitute an appropriate situation or response.
- 6.22 The 'Communications Log' indicates that, at 03:35hrs on 21 January 2009, the Duty Officer was contacted by 'AA' and the associated log entry records that:
- "The hard shoulder at Jct. 25 has water on it. In car thermometer showing +3 and closest sensor at Kinning Park showing RSTs at +1.1 with air temps at +3.6. Forecasts for Riddrie and Port Glasgow showing RSTs rising. NADICS carrying out gantry inspections in area. GH advises AA not to salt due to temps already above +0 and rising."*
- 6.23 At this time the M8 Kinning Park ice detection station was recording +0.7°C, which is inconsistent with the Log entry of "+1.1". The authors of this report have seen no explanation for this apparent discrepancy..
- 6.24 The forecast graphs for the A8 Port Glasgow and M8 Riddrie stations were indicating that road surface temperatures were falling at that time and that these temperatures were not expected to rise significantly until well after 07:00hrs that morning. This appears to be inconsistent with this Log entry, and the authors of this report have seen no explanation for this apparent discrepancy.
- 6.25 The Log indicates that, at 03:57hrs, the Duty Officer was informed that a maintenance crew on a section of Trunk Road (appears to be at "Jct 25" of the M8)

that had been closed to traffic for maintenance was treating the road by applying salt from a 'bucket'. This would therefore appear to indicate that patches of ice had been identified on that section of road.

- 6.26 The Log records that, at 04:22hrs, the Duty Officer was informed of an accident that had occurred between Junctions 9 and 10 of the M74 Motorway and that the driver involved had reported that the carriageway surface was affected by ice at that time.
- 6.27 The Duty Officer's response to this information appears to have been to undertake an inspection of the road.
- 6.28 It is considered that a more appropriate response would have been for the Duty Officer to have reviewed the data from the network of ice detection stations, at least three of which were recording road surface temperatures at or below 0°C by that time (A82 Alexandria Bypass, A898 Erskine Bridge and M8 Riddrie), and for him to have contacted the weather forecaster to discuss the situation.
- 6.29 It is also considered that the appropriate response to the overall situation at that time was to instigate an immediate salting operation on the Trunk Roads across the Unit.
- 6.30 It should be noted however that, had such an operation been instigated at this time (04.22hrs), it is unlikely that this would have resulted in the site of the fatal incident on the M8 Motorway being treated before the incident occurred.
- 6.31 It appears from the Communication Log that the Duty Officer was informed of the fatal incident on the M8 Motorway at 05:30hrs that morning, which appears to be approximately five minutes after the incident had occurred (although, at this time, it was not known that the incident had resulted in a fatality).
- 6.32 At this time the Duty Officer was informed of two incidents on the M8 Motorway and was aware that two other incidents had occurred on the M74 Motorway.
- 6.33 From 05:30hrs onwards, the Duty Officer issued a series of instructions to undertake certain treatments on Trunk Roads in that Unit and it appears from the records seen in the preparation of this report that Route K1, i.e. the route including the site of the fatal incident on the M8 Motorway, was commenced at 06:15hrs that morning, which is well within the one hour target Response Time specified in the Contract for such operations.

7. SUMMARY OF CONCLUSIONS

- 7.1 The precise circumstances of the fatal incident on the M8 Motorway and its causes are currently unknown to the authors of this report. However, the information seen in the preparation of this Preliminary Report is consistent with the pertinent section of road being adversely affected by ice at the material time.
- 7.2 Around lunchtime on 20 January 2009, the South West Trunk Road Unit Winter Service Duty Officer received a weather forecast from the Met. Office which predicted that, overnight 20/21 January 2009, the minimum road surface temperature in the weather domain that includes the incident site was expected to be +1°C. This forecast also indicated that a band of rain would cross the area during that afternoon, and predicted that hoar frost, ice and/or snow would not affect that weather domain overnight. However, the weather forecaster placed a 'low confidence' on those predictions.
- 7.3 It is considered that, when utilising the tables contained within the South West Trunk Road Unit Winter Service Plan (which have been copied from the Contract Specification), the predicted weather conditions would, most appropriately, be categorised such that this warranted the planning of a precautionary treatment to take place during the evening of 20 January 2009 utilising a relatively heavy spread rate of salt.
- 7.4 However, it is apparent that the South West Trunk Road Unit Winter Service Duty Officer who received the weather forecast categorised the predicted conditions such that these did not warrant a precautionary salting operation.
- 7.5 It appears that this decision may potentially have met the minimum requirements of the South West Trunk Road Unit's Winter Service Plan in this regard. However, it is considered that this decision may not have constituted the most appropriate interpretation of the requirements of Transport Scotland.
- 7.6 Regardless of the content of the tables in the Contract Specification and the South West Trunk Road Unit Winter Service Plan, it is considered that a prudent Winter Service decision would have included the planning of a precautionary salting operation to be undertaken within the pertinent weather domain during the evening of 20 January 2009. It is considered that the majority of UK winter service decision makers would have followed this course of action. Winter maintenance decision

makers are generally relatively cautious in their approach and it is considered that most would tend to 'play it safe' in these circumstances.

- 7.7 Had such an operation been undertaken, it appears that this may have prevented ice from forming during the early morning of 21 January 2009 at the site of the fatal incident on the M8 Motorway.
- 7.8 Given that the South West Trunk Road Unit Winter Service Duty Officer had decided that no action was warranted on the Trunk Roads in the pertinent weather domain, it is considered that he should have been particularly aware of the need to carefully monitor conditions throughout the night and early morning of 20/21 January 2009, with a view to reviewing the decision and instructing salting operations, should conditions be seen to deteriorate, even relatively marginally, from those that were predicted to occur.
- 7.9 Before 02:30hrs on 21 January 2009, there appears to have been information available to the Duty Officer from the network of ice detection stations indicating that road surface temperatures in the area of the fatal incident on the M8 Motorway were falling below those previously predicted.
- 7.10 It is considered that the above situation should have been identified by the Duty Officer in a timely fashion, and by approximately 02:30hrs on 21 January 2009.
- 7.11 It is considered that the appropriate initial response to the information being recorded at the ice detection stations at that time would have been for the Duty Officer to contact the weather forecaster in order to discuss the developing situation. This is considered to constitute the action that the great majority of Winter Service Duty Officers in the UK would have taken in such circumstances.
- 7.12 Given the temperatures being recorded at the ice detection stations at that time, the general weather conditions, and the fact that there was a considerable period of time before sunrise, it is considered that appropriate consideration of all of these issues would, on the balance of probabilities, likely have led to a salting operation being instructed to take place as soon as possible on all Trunk Roads in the weather domain that includes the site of the fatal collision on the M8 Motorway (at least).
- 7.13 It appears likely that, had an instruction to undertake an immediate salting operation been issued prior to around 03:00hrs or thereabouts, then the site of the fatal

incident on the M8 Motorway could have been treated before the incident occurred at approximately 05:25hrs that morning.

- 7.14 It is considered likely that such an operation would have prevented ice from being present on the carriageway surface at the time and location of the incident.
- 7.15 In the event, it appears that the situation with regard to the ice detection station data was either not identified by the Duty Officer or that it was not considered to be of concern at that time. In either case, this is not considered to constitute an appropriate situation or response.
- 7.16 It appears that the Duty Officer did not identify the developing situation until significantly later in the morning, when it was too late to undertake a salting operation prior to the fatal incident occurring.
- 7.17 Indeed, it appears that an operation was only instructed to take place on the pertinent section of the M8 Motorway after the Duty Officer had been informed that the incident had occurred.
- 7.18 Once it was instructed, the salting operation appears to have been carried out in a timely fashion.