GL Noble Denton

Technical Note Number: 12395
Issue: 1.0
Date: 19th March 2012

Third Response to Technical Measurement Issue TMIN NT008 301111 Relating to Report 11827 Horndon SMER NT008

Previous questions and answers are shown in *italic*, new questions are in red.

Q9 and Q15

Q9a. Need to be careful here as there is a bias so how is this addressed?
A9a. This is the standard deviation of the bias which the author has used to give the reader an indication of the spread of the individual biases. The standard deviation by definition is normally distributed about the mean.
Q15a. These distributions are poor, e.g. a bias of +1.15 at Shorne with a deviation of +/- 0.99.
A15a. The levels of bias are as expected between sites with different pipe work sizes and configurations, in different locations. The author has used 'the most appropriate data and methodology to ensure to ensure that as accurate an error assessment of the "Measured Data" can be made in an economic and efficient manner reflecting the size of the error' in line with the published guidelines.
Q9b. The issue in this case is that the uncertainty around the value is so great that it can swamp the value itself which does not inspire confidence in the result. As the standard deviation is greater than the value, the true value of the different could be zero i.e. no error at all. So is there an error?
Q15b. This is linked to the question over the bias and uncertainty. The biases quoted are small compared to the standard deviations which indicate that there is little confidence in these biases. How can these biases be claimed to be "as expected" when dwarfed by the standard deviation. I would challenge "used the most appropriate data and methodology" when the standard deviation is so large is it really an appropriate method or would a guess be just as good?
A9/15b. The step changes in temperature at Horndon have been correlated to the network pressure data. This highlights the need for two bias correction values, a method which was shown to reduce the standard deviations. While these standard deviations indicate a level of uncertainty around the biases the distribution (see ***Error! Reference source not found.****) indicates that the mean is the most appropriate value to use.*
The author would prefer to separate the 'bias' from the 'error' to avoid confusion. There is the possibility that the bias is zero, but it is more likely to be the value that has been used (i.e. mean). Even if the bias were zero this would not result in zero error.

Further Question: Our comments still stand, having an error where the standard deviation almost matches the error in magnitude does not give confidence in the calculated error, in this case there is a probability that the error could be very close to zero as a result. This case is different from cases where the distribution affects the magnitude of the error but there is definitely an error.
In general terms we have concerns that the calculation must always return an error and correction, no matter how little confidence there is in the result. This also links to the fact that the expert always returns an error very close to that originally estimated by the network operator.
A. The standard deviation quoted here is that of the bias between sites during comparable periods. It is not the standard deviation of the temperature errors. The standard deviation of the temperature errors is 0.6 °C which is significantly less than the magnitude of the error.
The author's analysis has not been influenced by any previous calculations of the error.

Q25. *These assumptions have been changed to explain events maybe trying to derive errors where there are none and excluding others.*
A25a. The methodology had to be changed for this initial error period because of the transient nature of the error and the lack of flowing data. An error is definitely present as the temperature is in excess of 30 °C during the nights. The author has used 'the most appropriate data and methodology to ensure to ensure that as accurate an error assessment of the "Measured Data" can be made in an economic and efficient manner reflecting the size of the error' in line with the published guidelines.
Q25b. Use of the standard response phrase does not answer the question. Therefore we would be grateful for some further explanation.
A25b. The methodology had to be changed for this initial error period because of the transient nature of the error and the lack of flowing data. An error is definitely present as the temperature is in excess of 30 °C during the nights. Section 3.2 explains the necessity of using a different methodology for this period:
'On 15th and 22nd September 2008 Horndon was flowing for a short period of time when none of the nearby sites were. This meant the proposed methodology did not produce a temperature difference for these days and so a default temperature error would have been used. The transient nature of the error at this point would have led to an inaccurate assignment of default temperature error therefore a detailed analysis was undertaken for both of these days to establish a more robust temperature error. As there was no flow at any of the sites at this time the measured temperatures reflected that of ambient and all the sites roughly followed each other. Comparing all sites illustrated the change in the magnitude of the error over this period.'

Further Question: Using ambient temperature is a very weak approach as this introduces even more uncertainty. The report states that "the sites roughly followed each other", this is not an acceptable response as there must be a point when the uncertainty of the approach for a small error deems the outcome unviable due to the high uncertainty in determining the error. Therefore we are concerned that the approach used in this case is a 'rough' guess, at this rate - potentially no more than a 'finger in the air' estimate of the error. There must be a point where the estimate of the error is not possible due to the high level of uncertainty.
A. The author agrees that "the sites roughly followed each other" was a poor choice of words and not objective. The standard deviation of the temperatures from the sites was 0.62 °C for the period on 15th September 2008 and 0.97 °C for the period on 22nd September 2008. These are both significantly less than the magnitude of the errors. The author believes that the level of uncertainty does not undermine the analysis. The two days in question account for 0.18% of the overall error.

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Q29. *If data is missing then would it be prudent not to estimate the data.*
A29a. The data is not estimated. The daily volumes are present and are corrected using the mean of the correction factors in the surrounding period. The author has used 'the most appropriate data and methodology to ensure to ensure that as accurate an error assessment of the "Measured Data" can be made in an economic and efficient manner reflecting the size of the error' in line with the published guidelines.
Q29b. The response does not answer question, would it not be prudent to omit the days if no data is missing, that introduces no additional error unlike an estimate of the missing data.
A29b. Where data is missing the evidence (data from previous period and subsequent 'As Found' validation) suggests that the error was present and was of a similar magnitude to the surrounding period. When choosing between a) the methodology used and b) not correcting for the error on these days, the more accurate calculation of the real energy flowing through the meter comes from the methodology used.

Further Question: The principle remains, as with the historic Farningham meter error, that if there is no data available then the prudent approach is not to assume there is no error, the other approach is to demonstrate there was flow and data or show why the data was not recorded for each case. If there is no data and there is no evidence of a reading, an error should not be applied by interpolation, a correction should only be applied to a reading.
A. The author cannot categorically say why the RBD data is missing as it could be for any number of issues (e.g. the program that collects the RBD data was not running). The flow readings were still live on the day and recorded via telemetry. It is only the detailed differential pressure, pressure and temperature (RBD) data that is missing. The error doesn't vary significantly throughout the period in question and so the mean correction has been applied to the recorded energy reading for the day.

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