Reference 007

Eon Energy

Section 4.2
"...The AUGE believe that the assumption that the RbD value is composed largely of Unidentified Gas (as was put forward in modifications 228 and 228A) is not valid...."

Given that the amount of UG is not currently known but the value of reconciled gas is known, can the AUGE explain the rationale for making the above assertion ?

Section 6.3 IGT CSEPs
"...Xoserve understands that it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant IGT system, and hence this area is ruled out as a source of Unidentified Gas..."

Given that it is known and accepted that unregistered sites exist on DN primary networks can the AUGE explain why it is assumed that unregistered sites cannot exist within a IGT system ? CSEPs may be 'nested' and therefore control of the registered supply points may prove problematic, can the AUGE query this with Xoserve please.

Section 6.5 Meter Errors
"...Metering errors (at both the LDZ entry points and the supply points) can have an effect on the calculated loads for each market sector if there is found to be a non-zero bias over time. Any such bias should be dealt with as a correction to RbD rather than UG,..."

We understand how meter errors at LDZ entry points affect the SSP market sector and how they are corrected via the RbD process. We do not understand how meter errors at supply points can be dealt with via this process. The RbD process adjusts for modelling versus actual usage. Supply point meter errors will affect the accuracy of actual usage only. Can the AUGE explain their rational for this assertion ?

"...The AUGE understands that LDZ meters and LSP meters are regularly checked and maintained and demonstrate no particular bias in metering error. The LSP meters are of different construction to SSP meters, in that they are typically of a rotary/turbine meter type and constructed of parts less likely to distort over time. When there have been incidents of large scale metering error these are corrected accordingly.
SSP meters contain a diaphragm which can warp over time and therefore can have a longer term drift effect. As this investigation is aimed at establishing UG particularly for the LSP market, and SSP metering will not be used in the formulation of the estimate of UG, any potential bias in the SSP meters will have no effect and therefore can be ignored..."

We do not believe that this is a correct statement. Diaphragm type meters are subject to a regular (20 year)replacemnt programme but not to any in service testing. Rotary Positive Dispacemnt meters are maintained from a mecahanical perspective (oil change) but as is also the case with Rotary Turbine meters, are not subject to any in service testing. LSP meters consist of Rotary meters described above and also larger diaphragm type. As far as we understand the only large scale errors identified are those involving LDZ input meters which are subject to an in service test regime.

However our concern is not that meters are inaccurate per se but that there is potential for gas at low flow rates through large rotary meters to be measured innacurately or without being registered at all. This due to the fact that these type of meters are designed to measure accurately within a defined flow rate band width. These meter installations are originally designed to cater for maximum flow rates.

Recent years have seen a down turn in industrial output with coresponding reduction in industrial gas usage. In addition industrial premeses that have ceased production or changed owneship are lilkey to be consuming considering less gas which will continue to be measured by the original metering equipment. As a consequence we believe that there is potential for widespread under measuremnt.

Mods 194/194A and 228/228A noted that a consensus had been reached that no such long-term bias exists and metering error does not contribute to Unidentified Gas or RbD error over time.

We are not aware that the above Mods reached any such concensus. In any event without a full investigation and analysis of the issues as described above we do see how any conclusions can be drawn. We would ask the AUGE to provide a response to these commnents.

GL Noble Denton Response 31/05/2001

AUGS Text (Section 4.2):
"…The AUGE believe that the assumption that the RbD value is composed largely of Unidentified Gas (as was put forward in modifications 228 and 228A) is not valid…."

Question/Issue:
Given that the amount of UG is not currently known but the value of reconciled gas is known, can the AUGE explain the rationale for making the above assertion?

Response:
This assertion comes from an analysis of worked examples of the Mod 228/228A methodology. Note that at this stage these examples are based on data from the TPA Solutions assessment of these Mods, due to the fact that full data has not yet been supplied to the AUGE. Once full data has been received, no reference to TPA figures will be made and all figures quoted will be from the AUGE's own analysis.

The allocation algorithms that produce the deemed load for both SSP and NDM LSP markets are statistical models. As such they are subject to error, because every naturally-occurring process contains random variation (known statistically as "common cause variation"), which is due to unknown causes and natural fluctuations in the process. Gas demand is such a process, and the AUGE has several decades of experience working with demand forecasting issues. This experience leads to the knowledge that such common-cause variation exists, and also to a general appreciation of its likely magnitude.

The presence of this common cause variation in the deeming algorithm process means that even if the input data used (e.g. AQ) is perfect, the output will not equal actual demand – there will always be an error component. RbD introduces "actual" LSP loads, which means that at this point model error is eliminated from the sector load estimates. RbD is the quantity that redresses the difference between deemed and metered LSP load, and hence in addition to containing Unidentified Gas, it must by definition also contain the model error. Hence the question is not whether RbD contains a model error component or not, because we know that it does. The question is how much of RbD corresponds to model error and how much is left representing Unidentified Gas.

Mods 288 and 228A contain no recognition of this model error element of the RbD quantity, which is one reason for questioning their validity.

The AUGE believes that the assumption that RbD is largely composed of Unidentified Gas is invalid due to the statistical behaviour of the data when such an assumption is made. The reasons are mostly connected with the calculation of theft as the "balancing factor" and the fact that no allowance is made for model error. Mods 228/228A make a small allowance for "genuine

reconciliation" based on AQ drift, but this once again carries an inherent assumption that if the correct AQs are supplied to the deeming algorithms, the output will be perfect, which is not the case. The remainder of RbD is split between a number of causes, with most calculated directly and theft calculated by subtraction at the end. The figures for theft that this process produces (taken from the worked examples) are unrealistic for a number of reasons:

- The calculated value of theft across four years (06/07 to 09/10) hits a peak of 1.4% of throughput. This is five times higher than the theft estimate contained in Section N of the UNC, and is 350 times higher than the level of shipper-responsible detected theft calculated by Xoserve. This suggests that the values of theft calculated using this methodology are too high and hence are likely to contain another factor, whose values are higher than the actual theft figures.

- It is reasonable to assume that theft varies with throughput, and that these two variables are positively correlated. The theft figures in the worked examples have a very high level of variation, however, in one case rising by 67% from one year to the next, and in another dropping by 48% from one year to the next whilst throughput remains relatively constant. In addition, the variation present appears to be random. This suggests that the additional factor identified above is model error, for two reasons:
  - model error must make up part of the catch-all balancing factor, because it is known to exist
    and it is not accounted for elsewhere in the calculation
  - model error, by definition, varies randomly, and this is how the balancing factor is behaving

  The size of the variation suggests that the randomly varying model error element is larger than the theft element.

- In the worked examples, the "balancing factor" accounts for an average of 56% of the RbD quantity. Hence if a large proportion of this is actually model error, it follows that a significant proportion of RbD in total is also accounted for by model error.

If certain assumptions are made about the likely level of true theft, an estimate of the proportion of RbD that is actually composed of model error can be made. If true shipper-responsible theft lies at the UNC level of 0.28% of throughput (i.e 0.3% minus the 0.02% that is assumed to be transporter-responsible theft), it can be calculated that, on average, 42% of RbD is composed of model error. The maximum for any individual year is 58%.

It should be noted that RbD values are positive on approximately 80% of occasions. If up to half of it is randomly-varying model error, this result indicates that the error in question is positive more often than it is negative, i.e. it is skewed towards the LSP market. This is accounted for by the fact that across the four formula years from 2005/06 to 2008/09, AQs for the SSP sector exceeded weather corrected demands by an average of 1.8%, whilst the for LSP sector, AQs exceeded weather corrected demands by an average of 8.9%. This skews the allocations (and hence model error) towards LSP and hence results in RbD being positive more often than negative.

Finally, given that RbD is positive on 80% of occasions, it is by definition negative on 20% of occasions. When this occurs, the Mod 228/228A methodology splits what is now a negative RbD value into Unidentified Gas sources, leading to negative figures for theft, shipperless consumption and unregistered CSEP consumption. The physical lower bound for these is zero, however, and so the production of such negative values indicates once more that a factor has been left out of the calculation. This factor is the randomly-varying model error that evidence suggests makes up a significant part of the balancing factor.

AUGS Text (Section 6.3):

"…Xoserve understands that it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant IGT system, and hence this area is ruled out as a source of Unidentified Gas…"

Question/Issue:
Given that it is known and accepted that unregistered sites exist on DN primary networks can the AUGE explain why it is assumed that unregistered sites cannot exist within a IGT system? CSEPs may be 'nested' and therefore control of the registered supply points may prove problematic, can the AUGE query this with Xoserve please.

Response:
The understanding that it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant IGT system was provided to the AUGE by Xoserve in good faith. Since the validity of this assumption was questioned at the UNCC meeting on 16th May, this area is being investigated further. The issue has been raised with Xoserve and a response is awaited. If it is found that unregistered LSP sites do exist and take gas from CSEPs, options will be investigated for including this element in the Unidentified Gas calculation. Unregistered SSP sites on CSEPs do not affect the calculation as RbD automatically assigns them to the SSP sector at present, which is the correct location for such demands. Therefore, if it is found that only SSP sites are affected, no action is required.

AUGS Text (Section 6.5):
"…Metering errors (at both the LDZ entry points and the supply points) can have an effect on the calculated loads for each market sector if there is found to be a non-zero bias over time. Any such bias should be dealt with as a correction to RbD rather than UG,…"

Question/Issue:
We understand how meter errors at LDZ entry points affect the SSP market sector and how they are corrected via the RbD process. We do not understand how meter errors at supply points can be dealt with via this process. The RbD process adjusts for modelling versus actual usage. Supply point meter errors will affect the accuracy of actual usage only. Can the AUGE explain their rationale for this assertion ?

Response:
Unidentified Gas is a physical quantity of gas that has been burned somewhere in an unrecorded manner. Hence theft, shipperless sites, unregistered CSEPs etc all clearly fall into this category. Meter error works in a different way, in that whilst negative errors (under-reads) do result in unrecorded gas being burnt, positive errors (over-reads) have the opposite effect. Therefore meter error is somewhat different to other components of Unidentified Gas.

In is agreed that the RbD process adjusts for the difference between deemed and actual consumption at NDM LSP sites. However, this means that by definition the accuracy of the metering at these sites directly affects the calculation. If, for example, LSP meters were known to over-read by an average of x%, the true consumption at LSP sites equals the metered consumption minus x%. It is this true consumption that should be taken forward into the remainder of the RbD calculation, and hence it is at this point (i.e. during the RbD process) that any such metering error adjustments should be made.

Both LDZ entry point meter errors and DM meter errors affect the RbD quantity in a similar manner, as they directly affect the calculation of total SSP plus NDM LSP load (i.e. total LDZ load minus shrinkage and DM load). Hence the optimal place to adjust for these errors is also during the RbD calculation.

AUGS Text (Section 6.5):

"…The AUGE understands that LDZ meters and LSP meters are regularly checked and maintained and demonstrate no particular bias in metering error. The LSP meters are of different construction to SSP meters, in that they are typically of a rotary/turbine meter type and constructed of parts less likely to distort over time. When there have been incidents of large scale metering error these are corrected accordingly. SSP meters contain a diaphragm which can warp over time and therefore can have a longer term drift effect. As this investigation is aimed at establishing UG particularly for the LSP market, and SSP metering will not be used in the formulation of the estimate of UG, any potential bias in the SSP meters will have no effect and therefore can be ignored…"

Question/Issue:
We do not believe that this is a correct statement. Diaphragm type meters are subject to a regular (20 year) replacement programme but not to any in service testing. Rotary Positive Displacement meters are maintained from a mechanical perspective (oil change) but as is also the case with Rotary Turbine meters, are not subject to any in service testing. LSP meters consist of Rotary meters described above and also larger diaphragm type. As far as we understand the only large scale errors identified are those involving LDZ input meters which are subject to an in service test regime.

However our concern is not that meters are inaccurate *per se* but that there is potential for gas at low flow rates through large rotary meters to be measured inaccurately or without being registered at all. This due to the fact that these types of meters are designed to measure accurately within a defined flow rate band width. These meter installations are originally designed to cater for maximum flow rates. Recent years have seen a downturn in industrial output with corresponding reduction in industrial gas usage. In addition industrial premises that have ceased production or changed ownership are likely to be consuming considerably less gas which will continue to be measured by the original metering equipment. As a consequence we believe that there is potential for widespread under measurement.

Response:
The AUGE recognises that this statement in the AUGS is a simplification of the actual situation, and that sites at the lower end of the LSP market do have diaphragm meters. It was never the AUGE's intention to suggest that such meters are subject to regular maintenance, as this was a reference to the simplified case presented as SSP = diaphragm, LSP = rotary. The wording of the AUGS will be changed to reflect the actual situation more closely.

The potential for flows to be recorded inaccurately or not at all due to changing on-site conditions resulting in the meter being inappropriate for flow conditions has not been considered up to this stage. Further investigation will take place with regard to this issue. It remains the case, however, that such errors are best dealt with during the RbD calculation for the reasons given in the response above. The particular situation described does always lead to meter under-read rather than over-read, however, and hence any such quantities, should they be shown to exist, could be included in the Unidentified Gas calculation as an alternative. Discussions will be held with Xoserve on this issue with regard to the availability of data, and a way forward will be established.

AUGS Text (Section 6.5):
Mods 194/194A and 228/228A noted that a consensus had been reached that no such long-term bias exists and metering error does not contribute to Unidentified Gas or RbD error over time.

Question/Issue:
We are not aware that the above Mods reached any such consensus. In any event without a full investigation and analysis of the issues as described above we do see how any conclusions can be drawn.

Response:
The text referred to in the AUGS relates to the following section of Mod 228:

- Supply point metering

Consensus was reached via discussions at the modification 194 development workgroup that there is **potential** for measurement errors to be caused by supply point metering.

However there was no evidence presented to demonstrate that supply point metering had an adverse impact on RbD. Nor was any evidence or rationale presented to demonstrate that any one market classification made a greater contribution to supply point metering and measurement errors than the other. Our assumption is that supply point metering does not contribute to NDM error.

- LDZ off take metering

Consensus was reached via discussions at the modification 194 development group that there is **potential** for measurement errors to be caused by LDZ offtake metering.

Any error in the measurement of gas entering the system would, so long as undiscovered, simply distort the true level of NDM error. The costs and benefits associated with any under-statement or over statement of gas entering the system should be borne by all sectors.

However our primary assumption is that overall there is not an over or under registration of gas entering the system.

This extract implies that consensus was reached with regard to the impact of both supply point and LDZ offtake metering on RbD/Unidentified Gas. Therefore, the statement in the AUGS was simply there to note that our conclusions were the same as those drawn by previous analyses. Having said this, the issue of inappropriate meter size will be investigated, and this may affect this conclusion. The wording of the AUGS will be updated dependent on the outcome of this investigation.