

Alrewas MER Internal Investigation

Terms of Reference

- Identify the root causes for the incorrect orientation of the orifice plate on the Alrewas EM offtake.
- What controls should be in place to provide assurance of correct orientation
- What measures need to be put in place to prevent a future reoccurrence

Timeline

Issue found – 23rd February

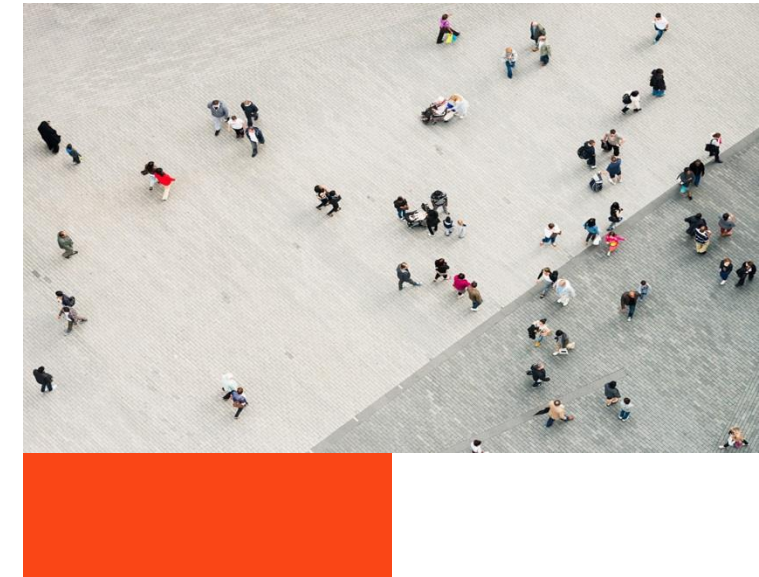
Reported to JO – 26th February

Investigation started – 25th February, formally completed – 7th May

As the investigation progressed, key actions were being progressed in parallel and closed out.

Root Causes

- Training
- Documentation
- Labelling



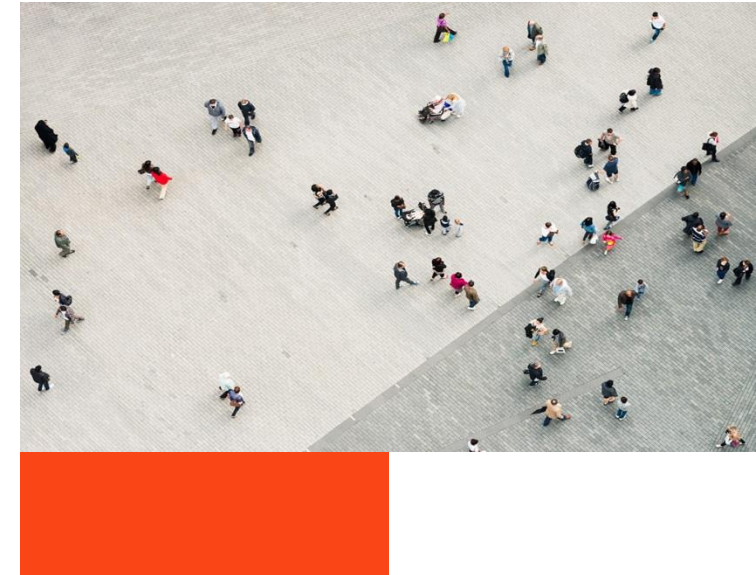
Controls and Assurance

Controls

- Markings etched into the Orifice plate denoting downstream face – all unmarked plates to be etched.
- Markings on the Orifice Plate carrier denoting direction of flow – All carriers to be marked.
- More specific photographic evidence of Orifice plate condition and Orientation.
- 2 person task; One technician undertaking the work, one technician cross checking and certifying works undertaken.
- Additional role created for an approver to check and sign off all works post event.
- Review of current pre and post footprint flow check process and enhancements made to capture errors of smaller magnitude.

Further mitigation measures identified

- Procedural documentation has been created outlining exact requirements of Orifice Plate exchange, incorporating:
 - All ME/2s to be completed under an authorised NRO (Non Routine work Order).
 - Areas that must be included in the NRO
 - Clarity on specific Orifice plate orientation checks
 - Determination of direction of gas flow
 - Requirement to review photographs prior to re-commissioning of metering stream.
 - Updated photograph clapperboards evidencing orientation requiring sign off from key personnel
 - Clarification of roles – Competent person, Certifying Technician, Approver and Authorising engineer.
- Training - All Instrumentation and mechanical teams to be re-trained on flow metering systems
- Audit – Audit process to be updated to incorporate findings and be undertaken on Fiscal metering sites and personnel undertaking ME/2's.



Independent Technical Expert

Michael Reader-Harris (MRH) TUV-NEL employed as ITE

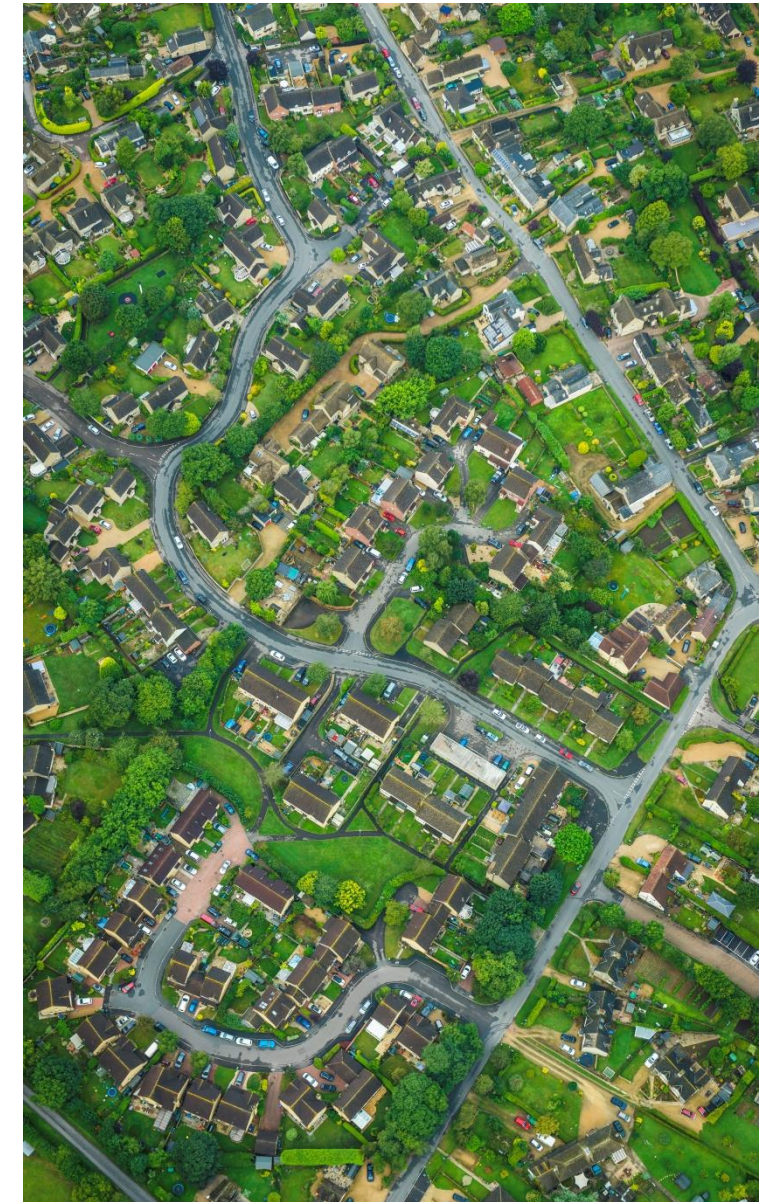
- MRH determined Computational Fluid Dynamics (CFD) would be the best methodology for determining the error
 - Benchmarking of the performance of the CFD simulations (3 simulations per orifice plate - 6 in total) will be modelled for each of the orifice plates installed in the correct orientation.
 - In order to determine the mis-measurement due to incorrect installation, 3 simulations per Orifice plate (6 in total) will be modelled to determine the error when in the incorrect orientation.

Work Undertaken

- TUV were engaged and scoping began on 16th March.
- Terms of Reference (Joint Office references) agreed
- Site visit undertaken by TUV (May 25th) to 3D scan the Orifice plates and associated metering pipework.

Proposed Timeline for reporting

- CFD Analysis results due end of June to be sent to MRH for data analysis and quantification.
- MRH to confirm dates for finalisation of Meter Error Report on receipt of the CFD analysis results. (Early indications suggests this to be early September).



PAC Questions relating to error EM009

1. Why does it take so long for the ITE to begin its work? Please can you confirm when the arrangements were made and when the work began?	The ITE began scoping on 16 th March. The site visit to undertake 3D scanning for CFD analysis, was undertaken on the 25 th May.
2. Will the ITE visit the site or has the ITE visited the site in question? If so, when?	TUV's representatives visited site on the 25 th May to undertake 3D scanning.
3. When will the ITE finish their investigation and submit their report? When will we know the amount of the error?	To be confirmed by the ITE, estimated to be 3 months (Early Sep 2021).
4. How will this final report be disseminated?	Via the UNC Offtake Arrangements Workgroup.
5. Is there a margin of error on the calculation?	To be confirmed by the ITE.
6. Is daily temperature taken into account?	As this is a physical orientation issue and no other issues are associated with the metering system, all coefficients will be used for the period of error and an overall error provided with that compared to a plate in the correct orientation.
7. Is there a Covid related aspect to the calculation of the error?	No
8. Can you confirm whether or not this meter error will affect Unidentified Gas (UIG)?	Yes, this will affect UIG: As the meter has been under reporting the amount of gas flow, the amount of UIG has also been under reported. To be determined by Correla.
9. Could this error have been spotted from flow figures?	No, not with the technology currently utilised, work is being done with providers to ascertain whether future mitigation can utilise pertinent datasets.
10. Was there a non-compliance with the prescribed process? Who is liable for this error?	The ME/2 Part 3 procedure was followed. The error identified an under-recovery of gas which has been used during the period in question. Any under-recovery of gas will be calculated by Xoserve and reconciled accordingly.

PAC Questions on general process

<p>1. Why is it still possible to install such a meter plate back to front? Can this be made impossible, if so when and how will this be implemented?</p>	<p>A significant redesign of the meter would be required and come at a significant cost and time. It is still possible to install a meter plate back-to-front, however the additional controls and measures outlined on slide 2 outline the controls and measure to mitigate likelihood.</p>
<p>2. How many jobs of this type are undertaken across the market each year? How many errors are spotted each year? (What is the likelihood of errors?)</p>	<p>Cadent figures only: 480 changes in the last 10 years, resulting in 1 issue. (0.2%) error due to orientation.</p>
<p>3. How is the process determined and by whom? Does each Transporter have its own separate process?</p>	<p>The process is outlined in the ME/2 Part 3 document, which is an Offtake Subsidiary Document, approved by the UNCC, and accessed via: link</p>
<p>4. How is the process controlled ? Does each Transporter have its own separate process?</p>	<p>Unable to comment on behalf of all GTs. On behalf of Cadent, the ME/2 Part 3 procedure was followed. Findings of internal investigation found some areas which are to be improved, please see slide 2.</p>
<p>5. We understand Cadent is conducting a review of the requirement for all ME2 processes (being undertaken by NRO internally to Cadent). When will the work be completed and how will this report be disseminated externally?</p>	<p>Internal Investigations outlined a number of actions, including ME/2 works to be undertaken under an NRO (see slide 2). Works will be completed under NRO from 1st July. Subsequent reports will be disseminated through the UNC Offtake Arrangements Workgroup</p>
<p>6. What are the plans if any to replace all Orifice Plate meters? (data by DN if possible?) Do we do this in a meeting prior or send a request out?</p>	<p>Cadent was granted funding to replace orifice plate meters on 10 streams (out of 39), with modern ultrasonic units, at a cost of around £17m. These new installations will be designed to meet the 1% metering uncertainty level, as set out in the UNC Offtake Arrangements Document (OAD). They will also have a lower likelihood of failure and better resilience if a failure does occur. Any further replacement of meters is subject to funding being agreed in future price controls.</p>
<p>7. Is there scope for additional/more frequent checks to 'catch' the errors quicker?</p>	<p>Work underway to identify errors through pre and post maintenance flow check processes with external metering specialists. Work is ongoing, any process improvements to be reported to the Offtakes Arrangement Workgroup.</p>