Gas USM Calibration Comparison

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TECHNICA MEASUREMENT

Introduction

- Marc Baynham- Technical Director, Technica Measurement
- 16 Years as Metering Engineer, Consultant, Auditor and occasional Tech
- 2010-2021- Emerson/METCO
- 2021- to now- Technica group

- Technica Measurement formed in August 2024

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Accuracy | Excellence | Integrity

Langeled Receiving Facility

- GASSCO is Norwegian government owned.
- LRF located in Easington, East Yorkshire
- Langeled pipeline-
  - 42” pipeline, 725 miles long,
  - 2nd longest subsea pipeline in the world behind Nordstream
- LRF provides 20-25% of daily UK gas demand.
  - 75MSm^3/d continuous.
  - 82MSm^3/d peak.
- 4x 24” Metering lines, n+1.
- 46D upstream straight lengths per stream.
- Full analyser system to ensure gas meets UK NTS entry specification.
- Redundancy & reliability is a high focus- for security of UK supply.

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USM Replacement Project Background

- Project initiated in 2023 to replace USM's.
- Original USM's calibrated in 2005, operational in 2006.
- Full public tender process to select vendor based on technical and commercial criteria.

- Endress + Hauser FlowSic600-XT Quattro (8 path) selected in Q3 2024.

- FAT Carried out at SICK, Dresden in June 2025
- 5x meters calibrated at DNV, Bishop Auckland in August 2025
- 1x Meter calibrated at FORCE in December 2025

- Purpose of this presentation is to present the calibration results.

DNV Calibrations

- All 5x meters calibrated within 8 days (Monday to Thursday, then following Monday).
- Calibration pressure as close to operating pressure as possible ~62.5Barg
- GASSCO Supplied 24D Upstream calibration spool. Remaining upstream straight lengths made up of spools at DNV of suitable bore. 46D total upstream straight lengths.
- Pressure & Temperature of meter fixed at start of calibration
- Transducer fail test- failed one pair of transducers and repeated a flowrate point.
- Linearisation curve implemented at end of calibration- 2 flow rate points repeated to check correction.

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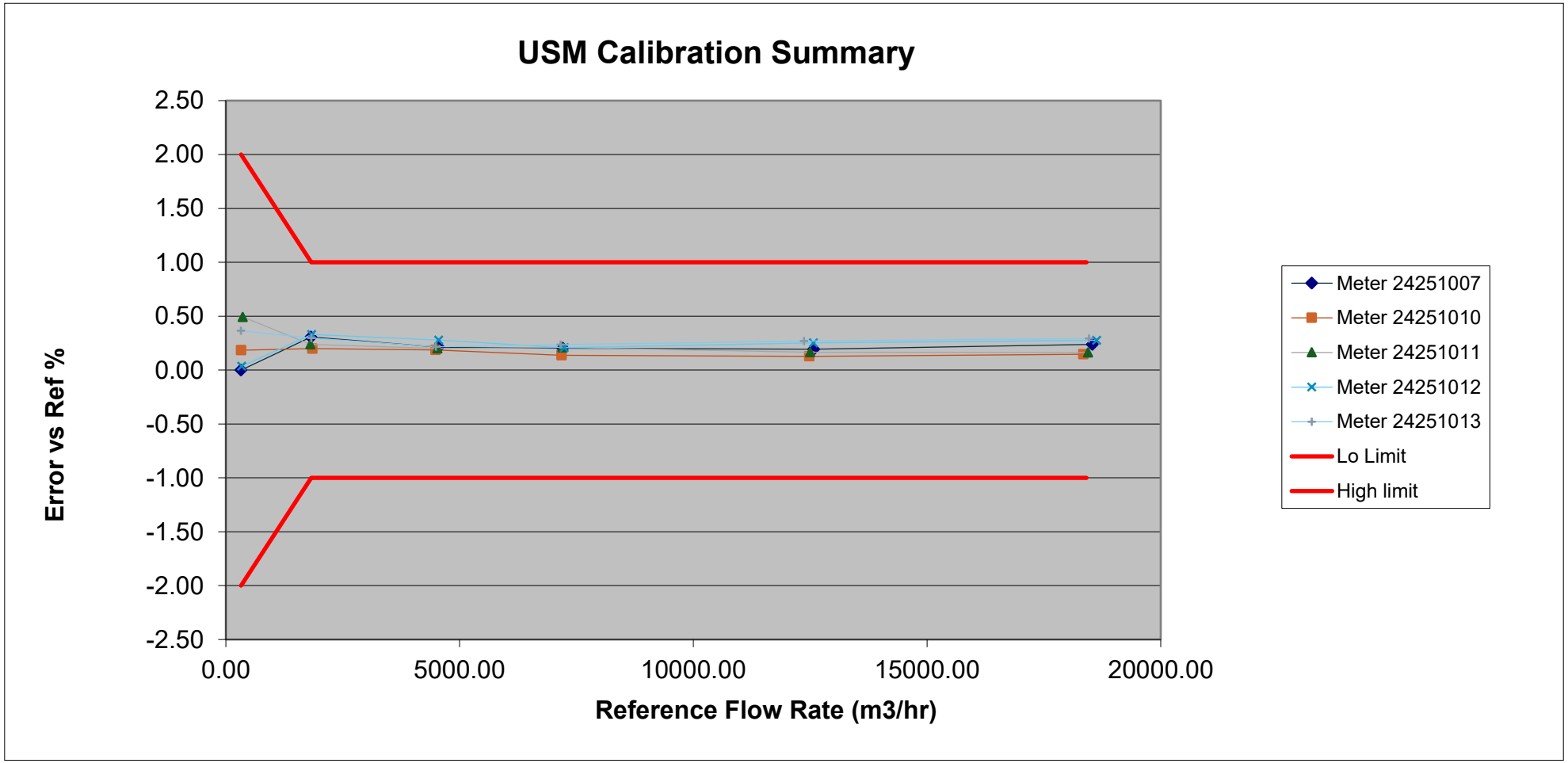
DNV Calibration Results



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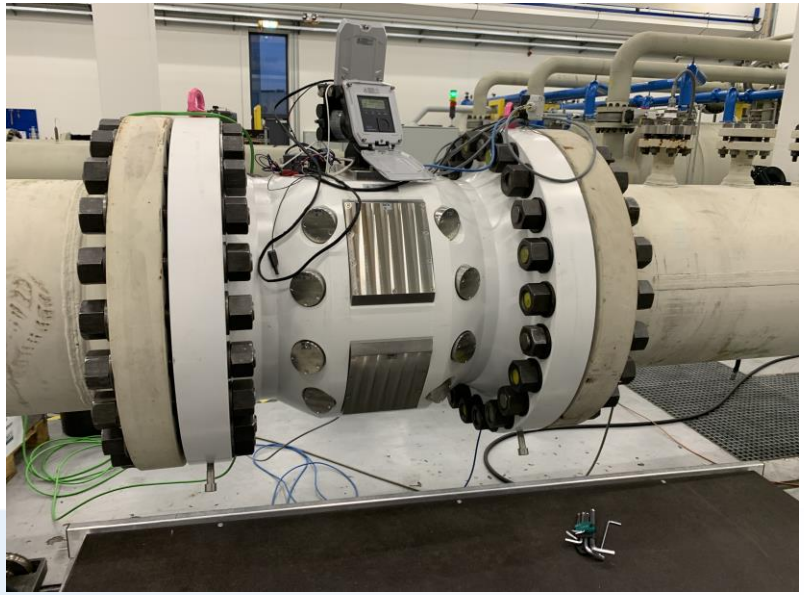
FORCE Calibration

- Meter XXXXX07 taken directly from DNV to FORCE.
- Same setup as closely as possible as DNV Calibration
- Slightly lower pressure- ~50Bar
- Approx 37D upstream straight lengths- due to constraints in the MEGAloop

- Same flow rates, transducer fail tests performed.
- Piecewise correction implemented (mistake due to miscommunication)



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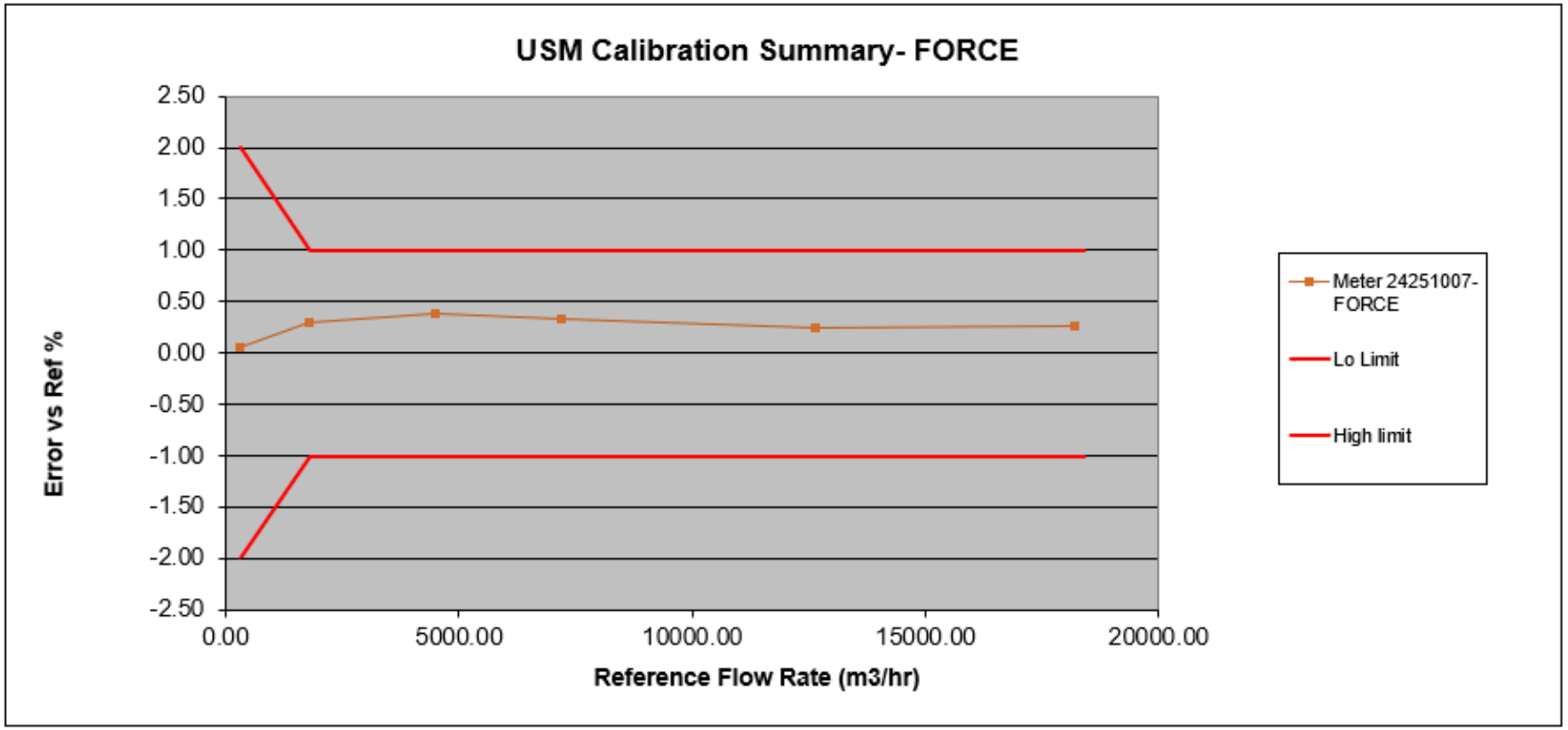
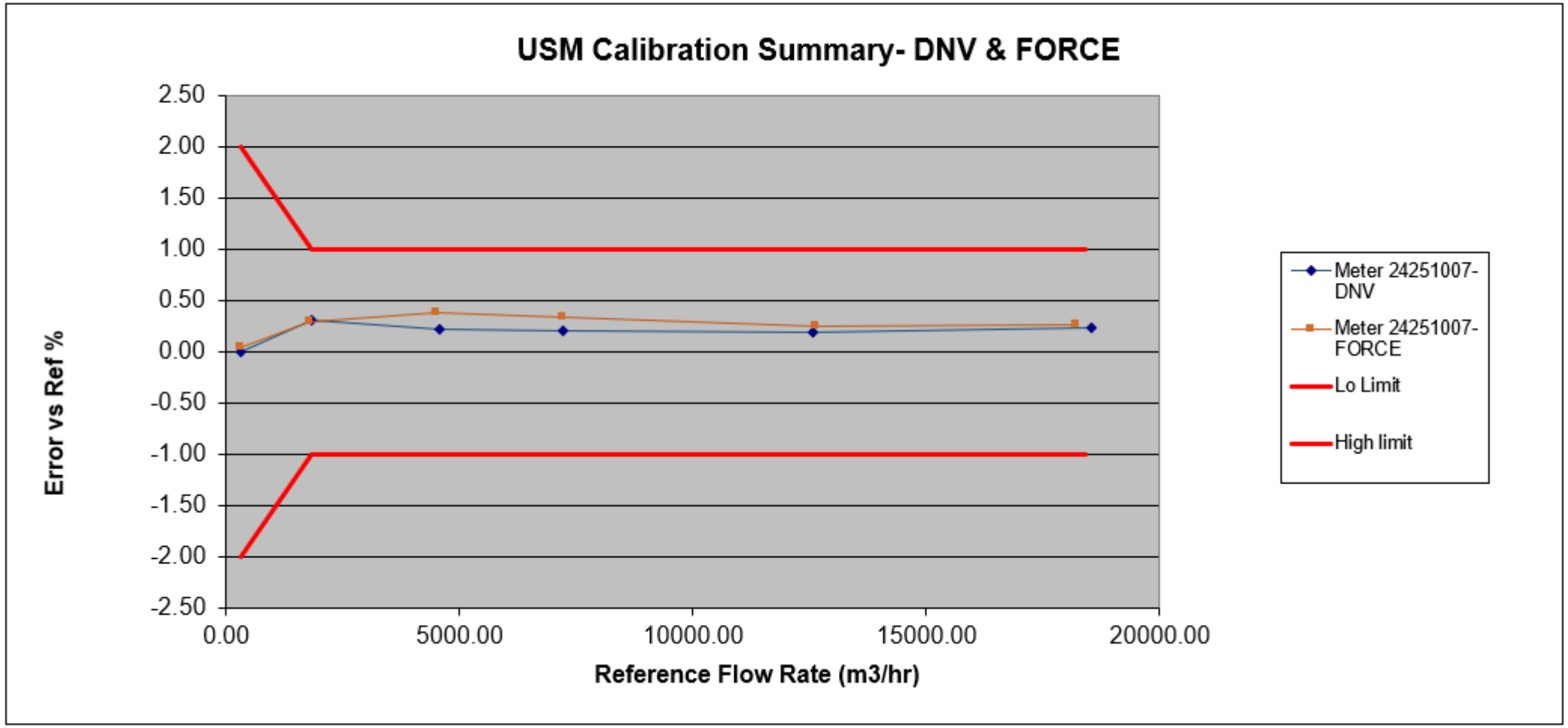
FORCE Calibration Results



Calibration Comparison



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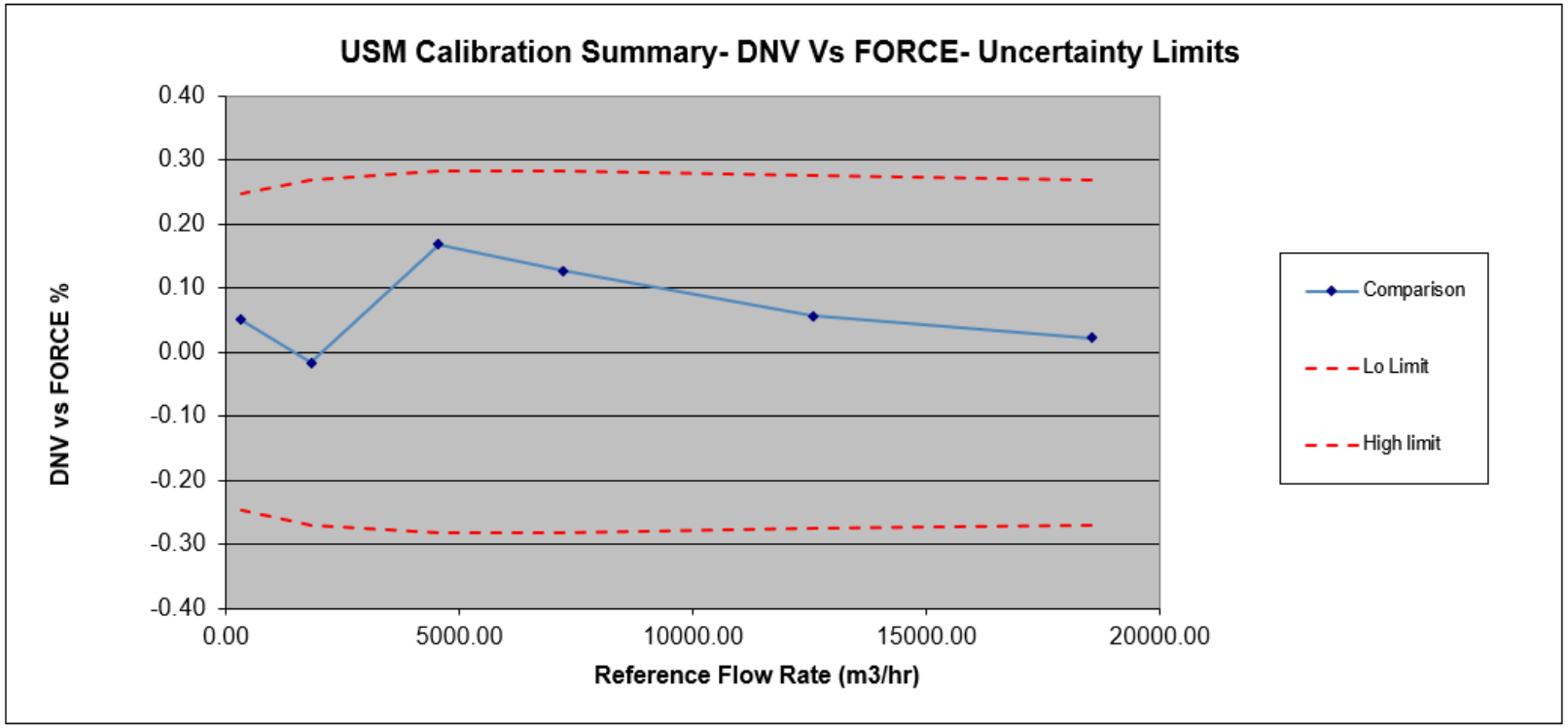
Calibration Comparison



Meter 24251007- DNV			Meter 24251007- FORCE				
usm m3/h	error %	Lab Uncertainty	usm m3/h	error %	Lab Uncertainty	Comparison FORCE vs DNV	R.S.S Unc
18538.03	0.24	0.23	18213.00	0.26	0.14	0.02	0.269
12578.45	0.19	0.23	12624.00	0.25	0.15	0.06	0.275
7208.79	0.20	0.24	7214.00	0.33	0.15	0.13	0.283
4555.18	0.21	0.24	4506.00	0.38	0.15	0.17	0.283
1820.55	0.31	0.23	1794.00	0.29	0.14	-0.02	0.269
326.50	0.00	0.21	320.00	0.05	0.13	0.05	0.247

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Conclusions

- Good repeatable results at DNV for all 5 meters
- Good comparable result at FORCE
- Good confidence in both facilities
- Good confidence in the E+H USM’s.

Questions