Practical Experiences of WID Process Installations to Meet EN-14181

Effective Procedure for EN-14181

- A 3 Step approach
  - QAL1; Ensure appropriate approval including certification range (include sufficient pre order analysis)
  - QAL3; Use of AST Audit Units and self check results
  - QAL2; Functionality checks prior to 13284-1. Also discussions with plant and Iso team to see what measures can be done re raising/reducing emissions

Effective Procedure for EN-14181

- Examples of typical installations
  - 2 DT991 applications (Electrodynamic Probe)
  - 2 LMS181 applications (Proscatter)

  Including some QAL2 reporting

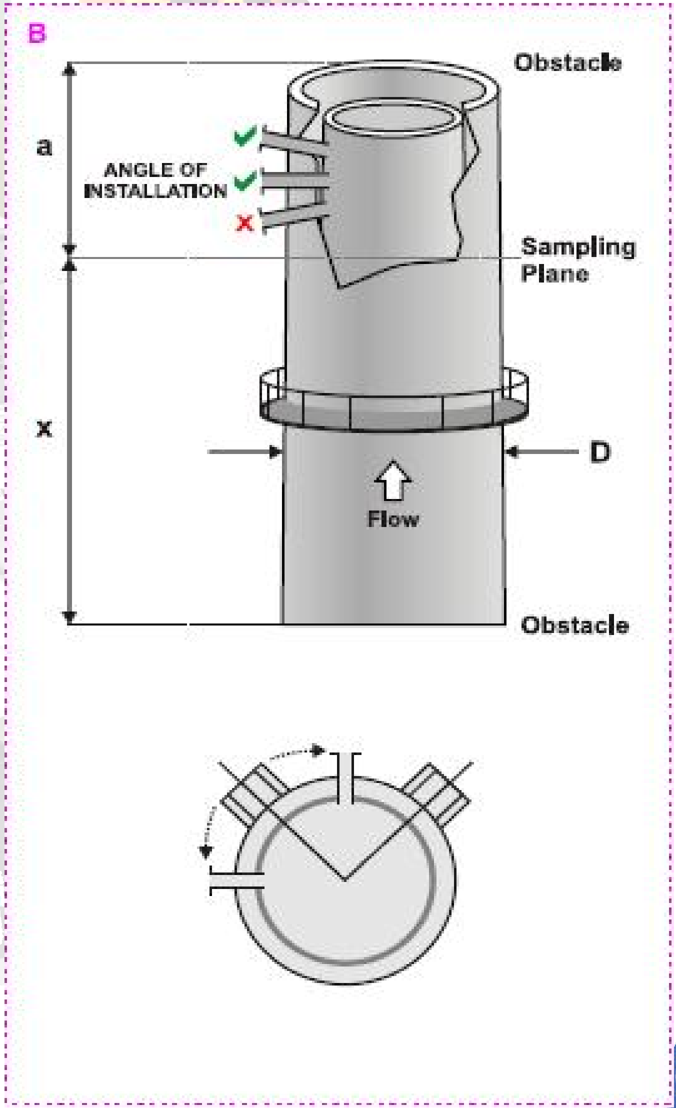
Installation Considerations

•Give priority to locating the Isokinetic sampling ports

•There are specific guidelines as to where the Iso ports should be located

•The sensor should be located >2 duct diameters downstream of Iso ports – This is a guide. It must be clarified by means of additional tests

•Care on orientation when installing instrument 'mounting' to minimise interference



Installation Considerations

2.1.3 Criteria for locating the sampling plane (Extracted from M1, with view to draft prEN15259)

The general approach for periodic sampling of particulates and aerosols can be summarised as:

Sampling must be carried out at a suitable location on the stack. Bends, branches, obstructions, fans and leaks can all cause undesirable variations in the velocity profiles, which may make the location unsuitable for sampling.

For new installations, the sampling plane should be located according to the requirements contained in Table 2.1. By adhering to these requirements, there is a very good chance that the flow-stability criteria defined in Table 2.2 will be met. The flow-stability criteria of a gas encompass velocity and direction. Flow criteria is used in this TGN as a term to cover all these parameters. It should be emphasised that it is the flow criteria that are important, not the adherence to the positional requirements *per se.* **Therefore on plants where the sampling plane location does not meet the recommendations in Table 2.1, it is possible to locate the sampling plane at another location as long as the flow criteria are met.**

Identify a potentially suitable sampling location (covered in this section) Access the stack and check that the gas-flow criteria are met by carrying out an exploratory survey (see Sections 2.1.4 and 2.1.5) Decide the number and position of the sampling points (see Sections 2.1.7 and 2.1.8), and install ports and access to the sampling location (see Section 4.1).

Carry out preliminary velocity traverse (Section 2.1.5) to confirm satisfactory and proceed with sampling.

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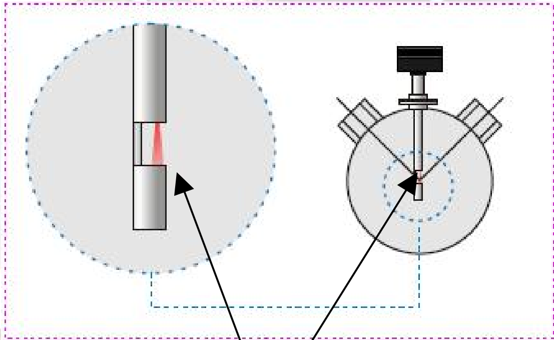
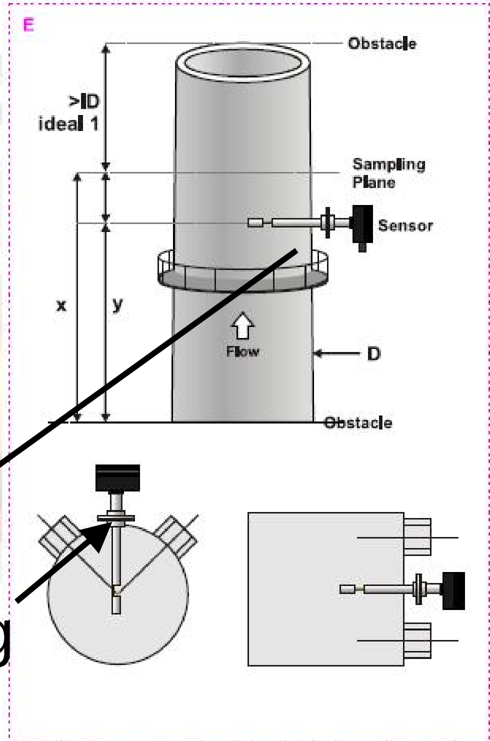
Installation Considerations

- If it is not possible to mount in ideal location, then install Dust monitor in best location in relation to the Iso ports, bearing in mind the need to understand implications of ‘obstacles’

- Ensure a Pitot traverse is carried out to confirm flow profile – including possible affects of Iso equipment

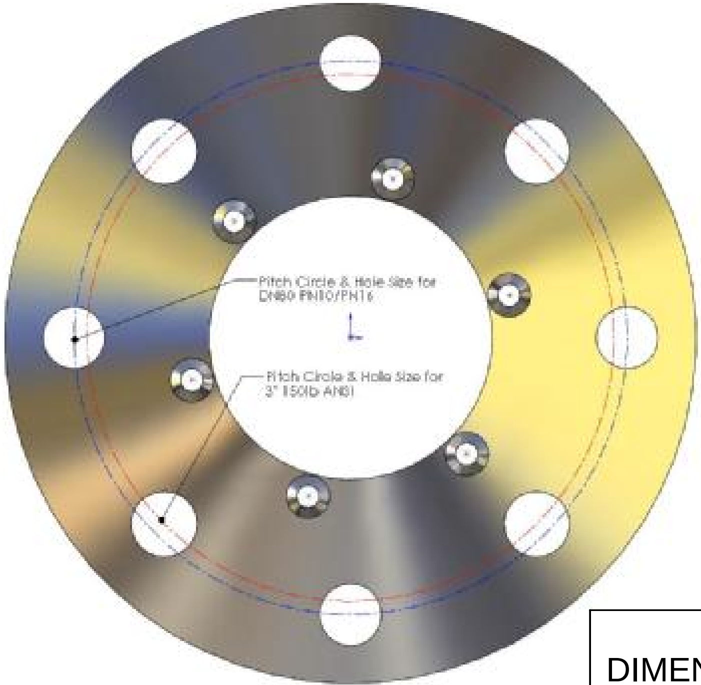


Check orientation and distance from stack wall



Ensure sufficient clearance in ducting
NB Same stack mounting for DT991 and LMS181

Flange Information



Dual Flange arrangement

DIMENSION	3" 150lb ANSI	DN80 PN10 DN80 PN 16
OD	**190mm**	**200mm**
PCD	**152.4mm**	**160mm**
HOLE SIZE	**19mm**	**18mm**

DIMENSION	3" 150lb ANSI	DN80 PN 6	DN80 PN10 DN80 PN 16
OD	**190mm**	190mm	**200mm**
PCD	**152.4mm**	150mm	**160mm**
HOLE SIZE	**19mm**	18mm	**18mm**

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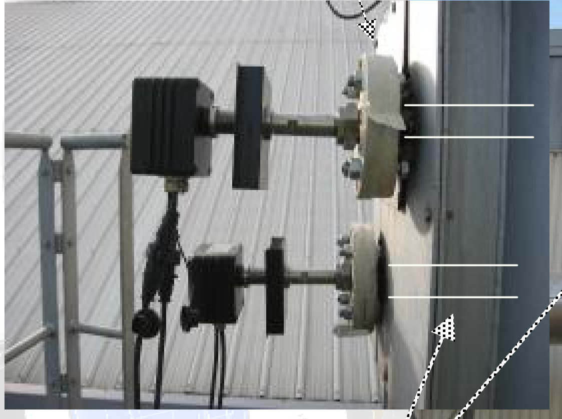
Application 1, DT991 MWI

Stack Split in to two parts by means of dividing plate running the length of the stack

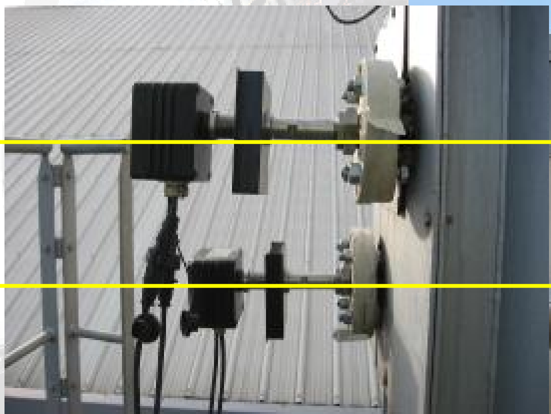
Application 1, DT991 MWI

Flange Face

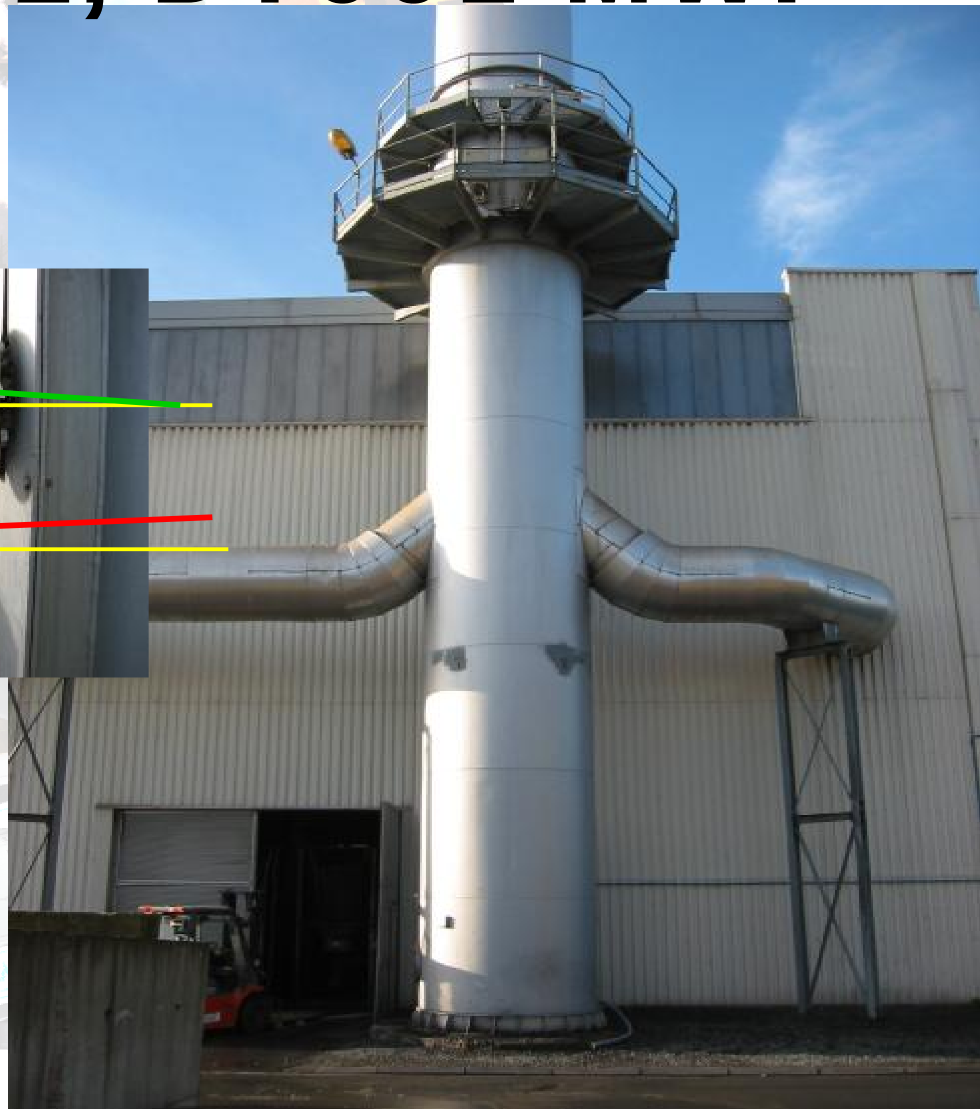


Insulation thickness. Mounting ‘tube’ through into the duct from Flange

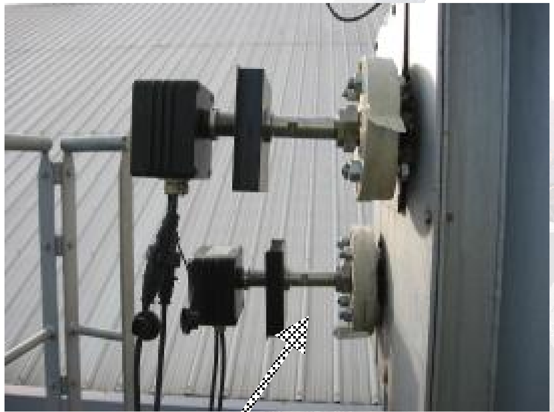
Application 1, DT991 MWI



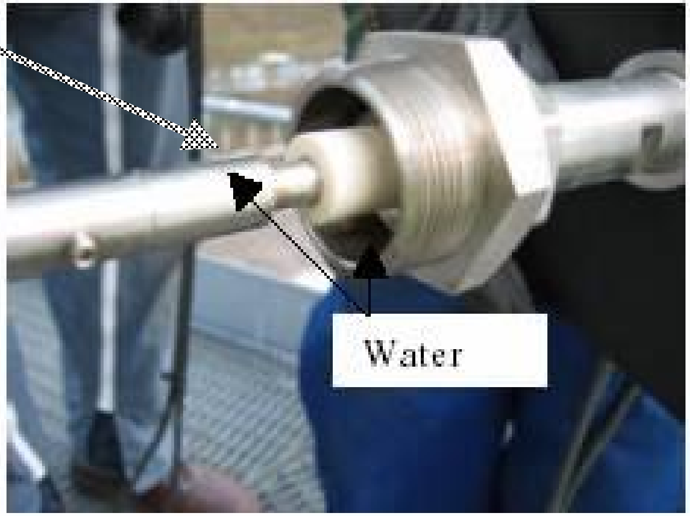
Application 1, DT991 MWI



Application 1, DT991 MWI



Water Build up on Upward Pointing Mounting



Carbon Build up all points

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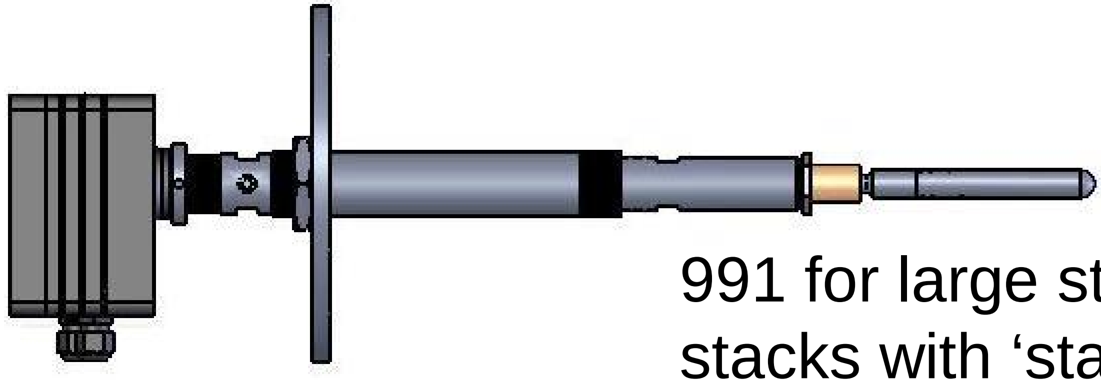
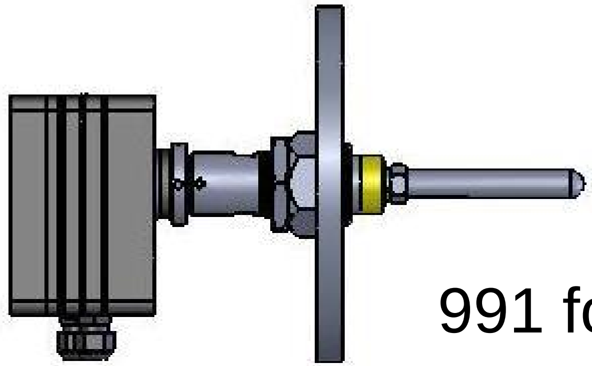
The DT991 Sensors

Standard



991 for large stacks and stacks with ‘stand offs’ – typical if replacing existing optical system

Option

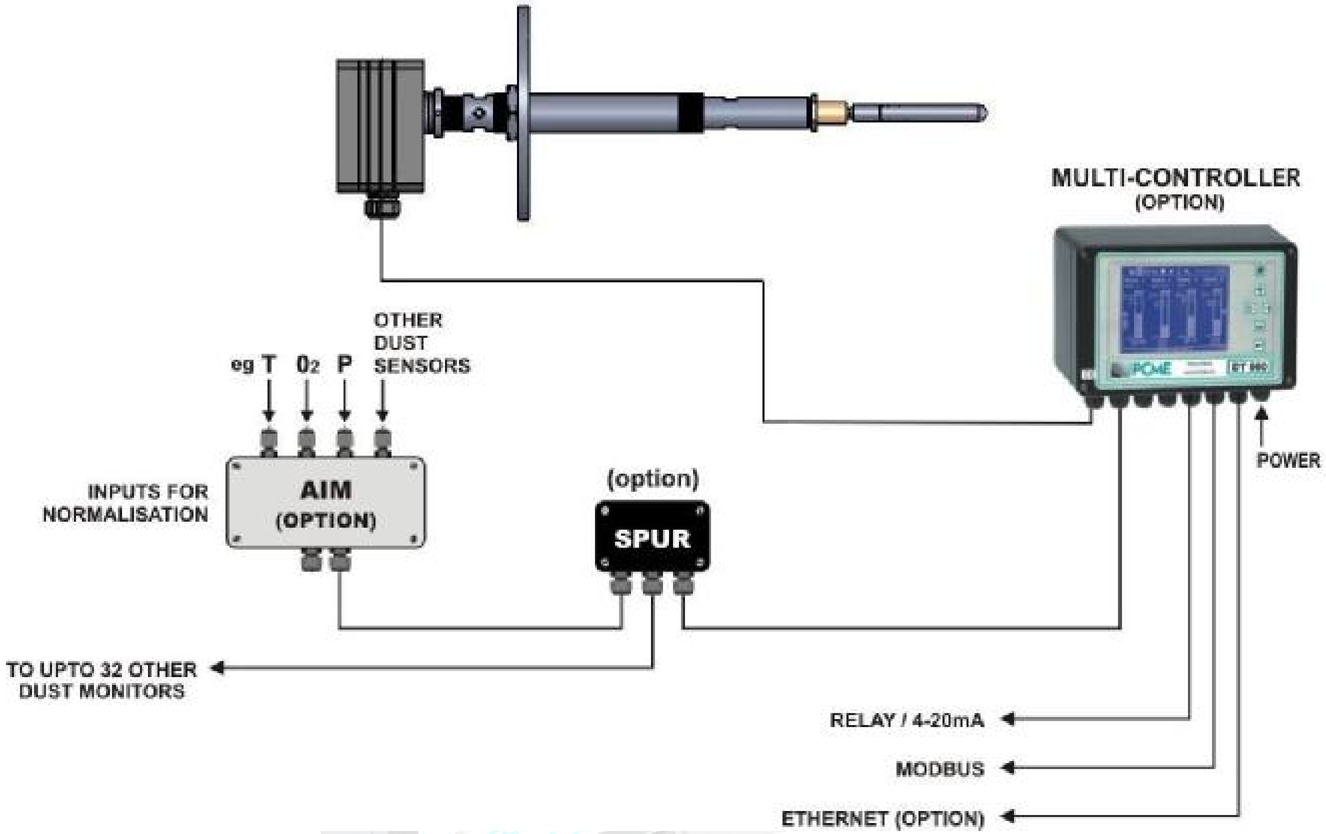


991 for small ducts

Both have option for higher temperature of 400°C

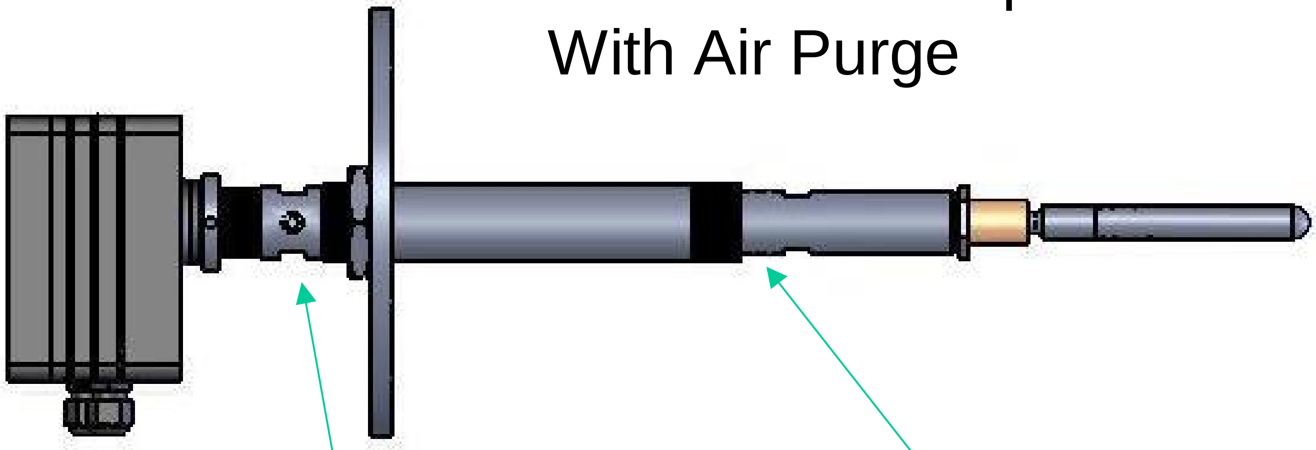
DT991 System

System Overview



DT991 Mechanical Arrangements

Standard Passive Active Option – With Air Purge

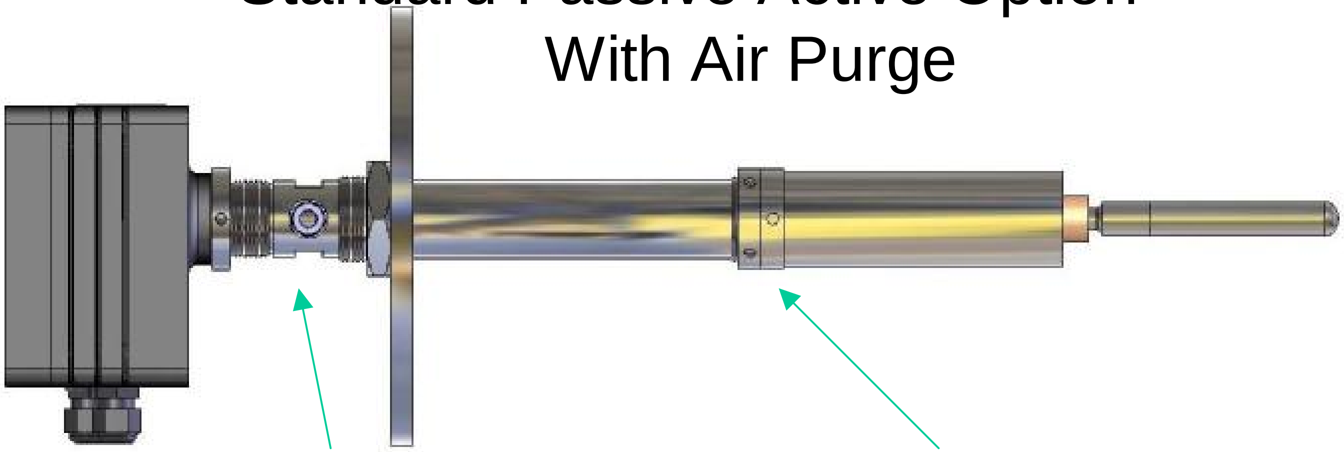


Blanking Plug removed and Air Coupling added

Blanking Plugs removed and Air Purge Body Added

DT991 Mechanical Arrangements

Standard Passive Active Option –
With Air Purge



Blanking Plug removed and Air Coupling added

Blanking Plugs removed and Air Purge Body Added

Why DT991 has Passive Active as standard

Flue gas Temperature above dew point

Condensation around base as temperature drops below dew point

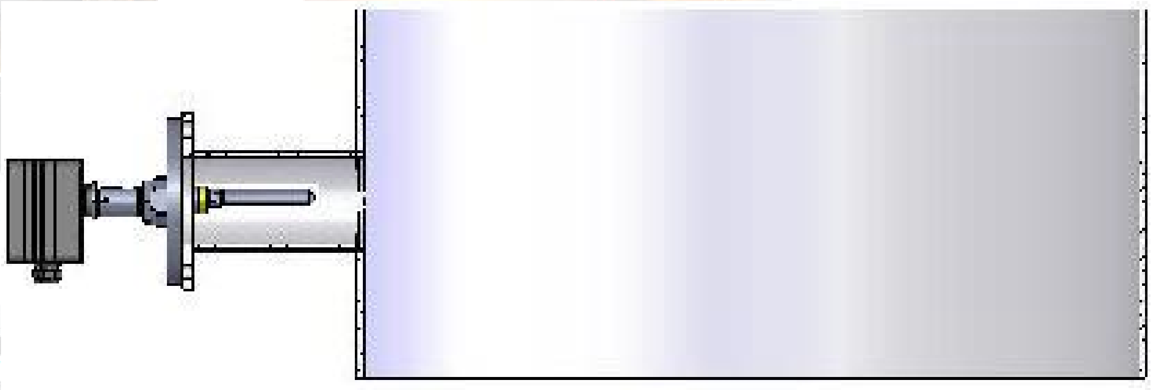
OPTIONS –

Air Purge

Passive Active

Why DT991 has Passive Active as standard

If long ‘Stand Off’ 150mm+ eg through insulation, then water can collect in the ‘tube’ which can cause interference signal –



Solution is to use Passive / Active Style

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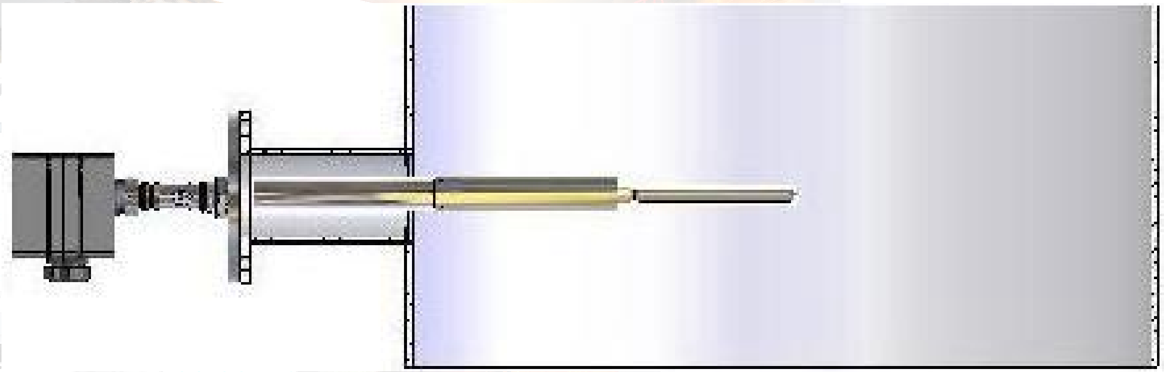


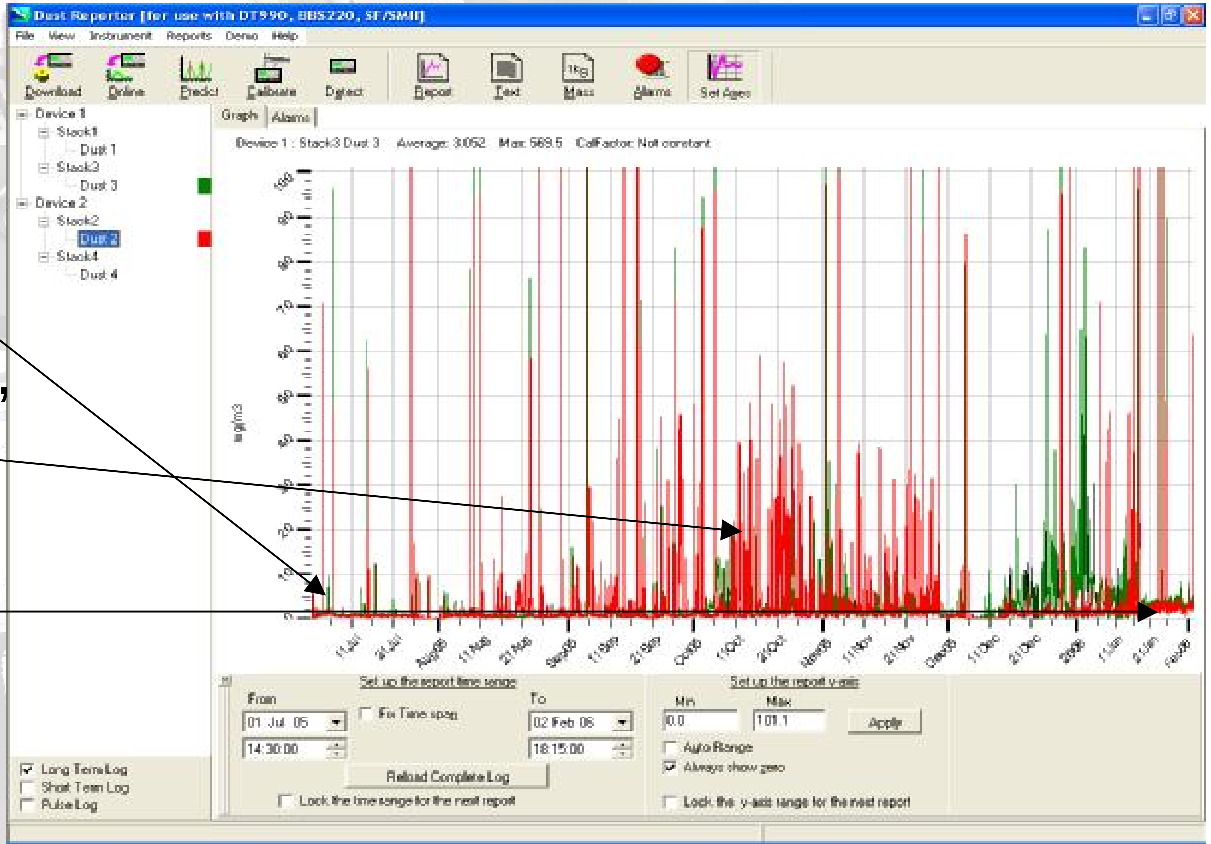
Solution is to use Passive / Active Style

Installation Considerations

Examples of how not to do it

Application 1, DT991 MWI

- Long term log showing good tracking when originally fitted, problems encountered and finally corrected

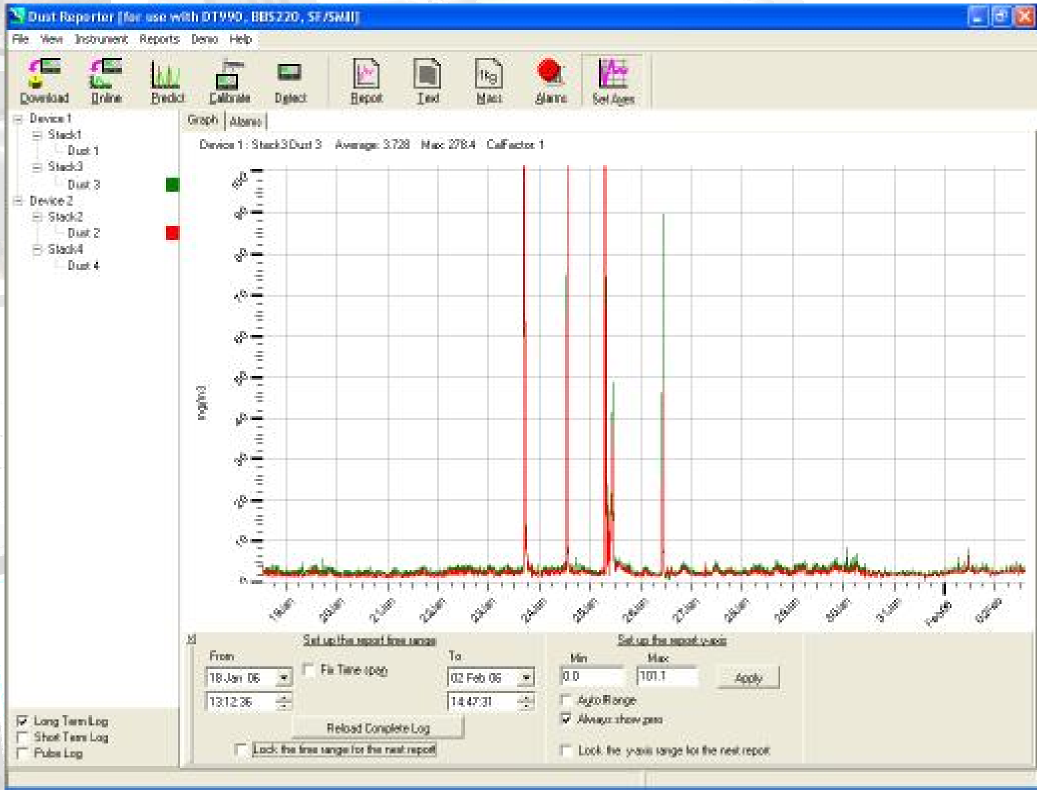


Application 1, DT991 MWI

- Both DT991 sensors tracking well – In this case

CU1, CH2 (Green)

CU2, CH1 (Red)



Application 1, DT991 MWI

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CU1, CH1 (Green)

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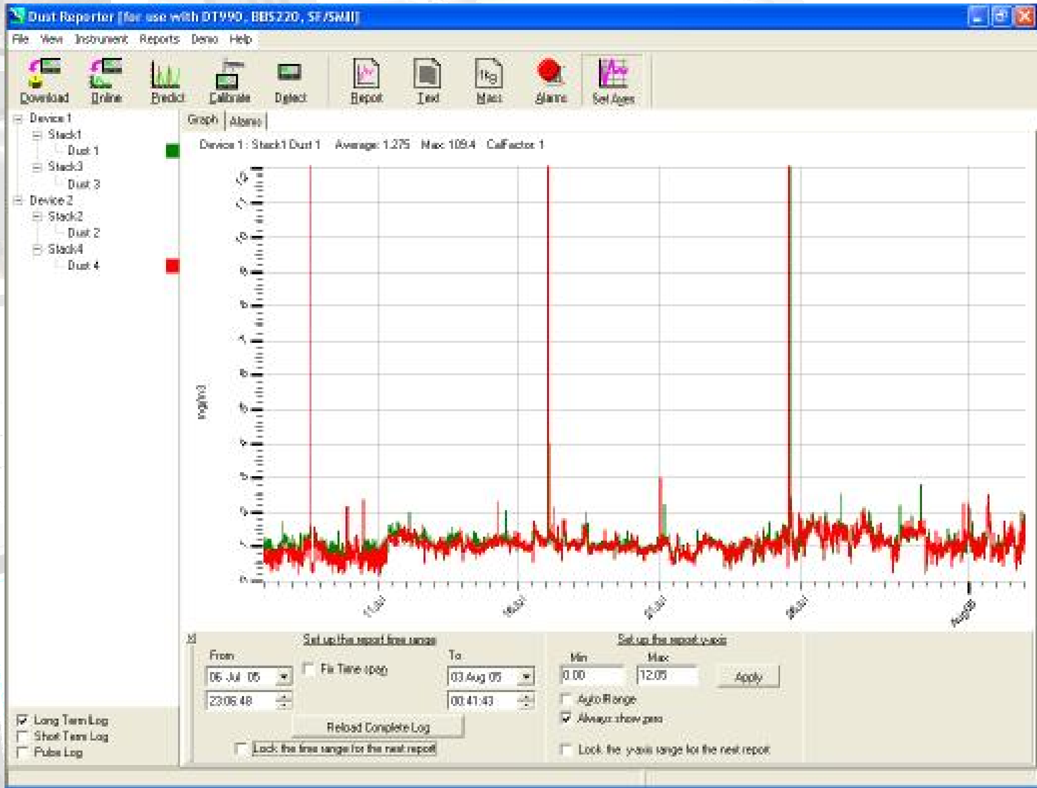

Application 2, DT991 Electrodynamic

Application 2, DT991

- AST Unit used prior to installation

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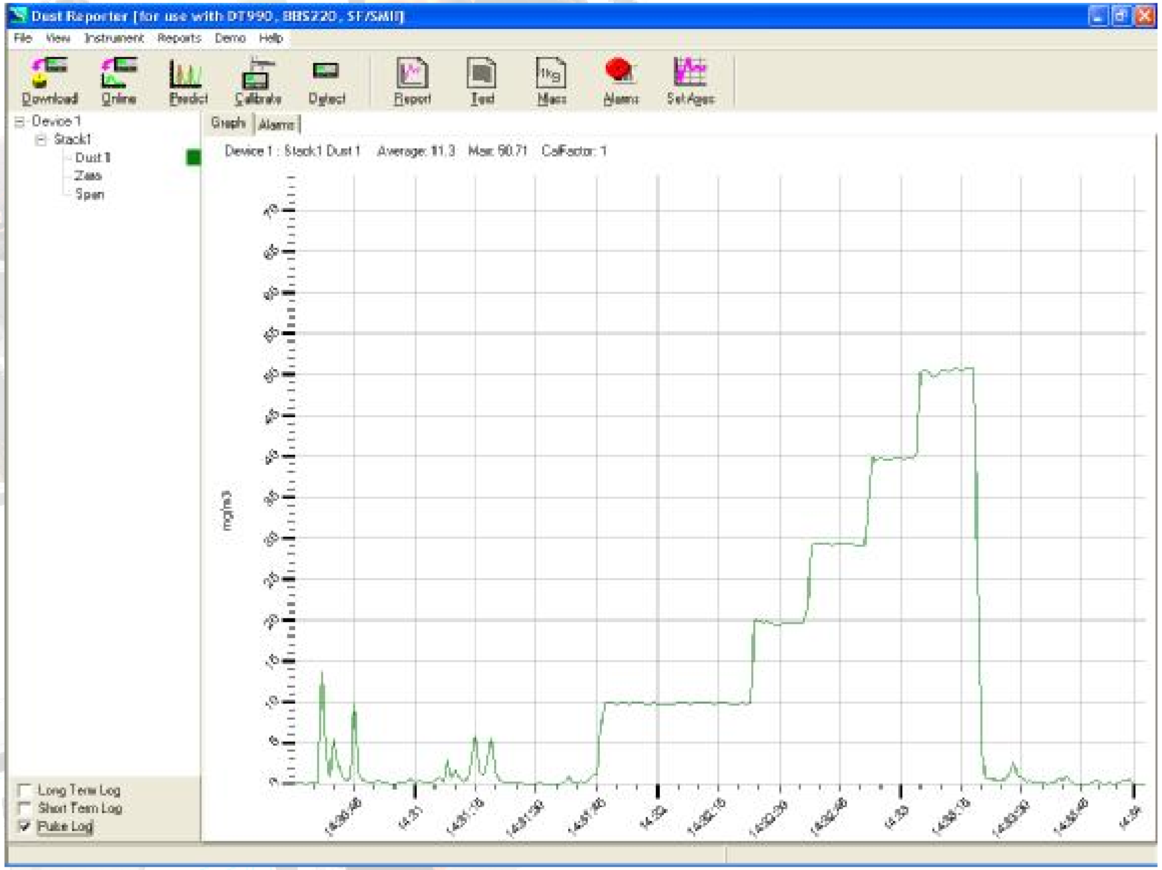
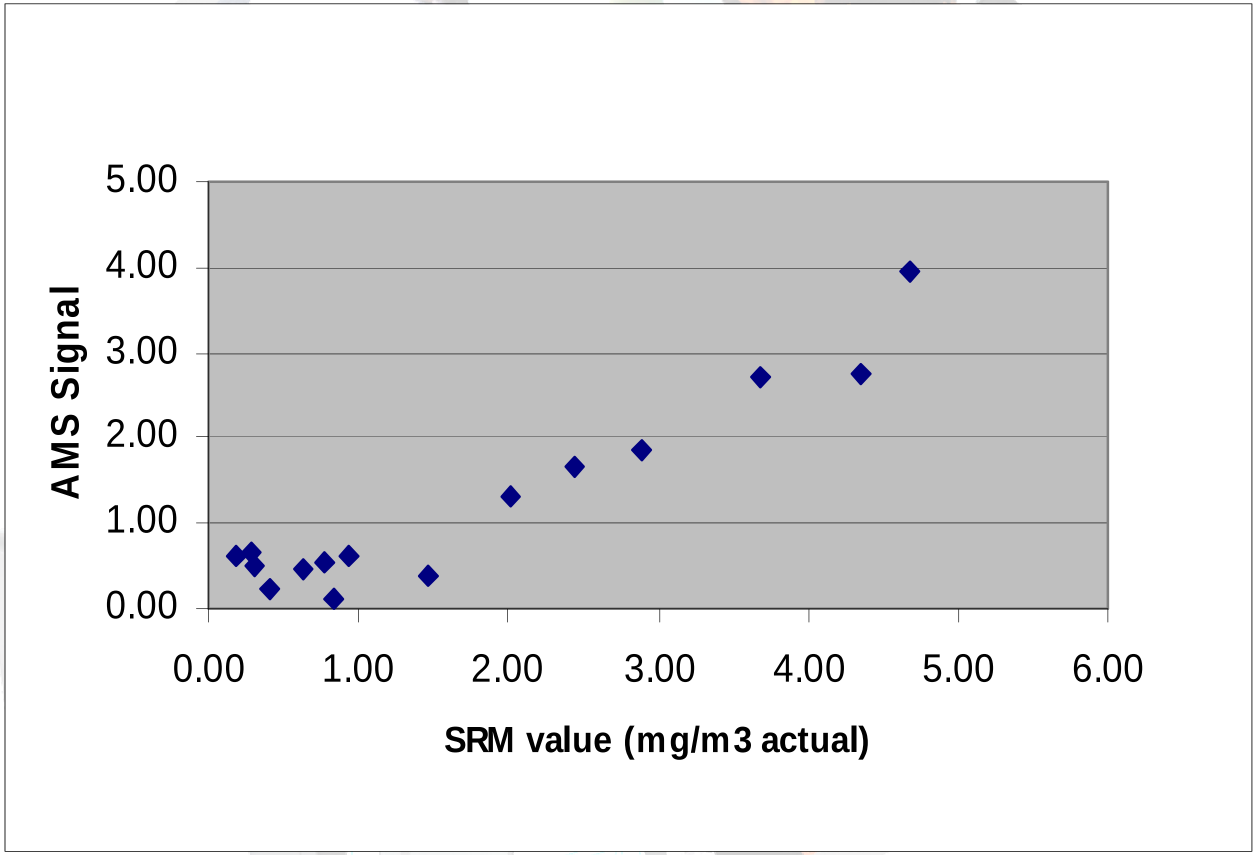
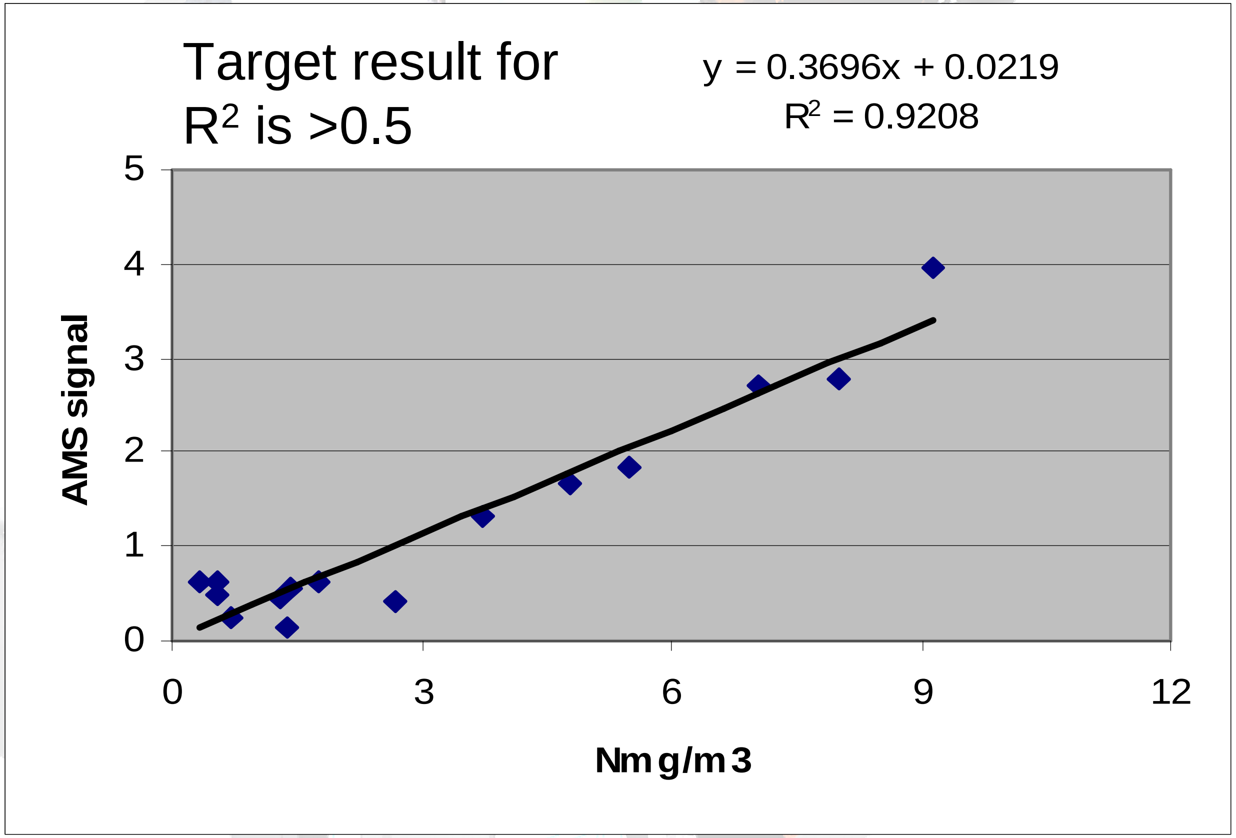
- AST Unit used prior to installation



Application 2, DT991

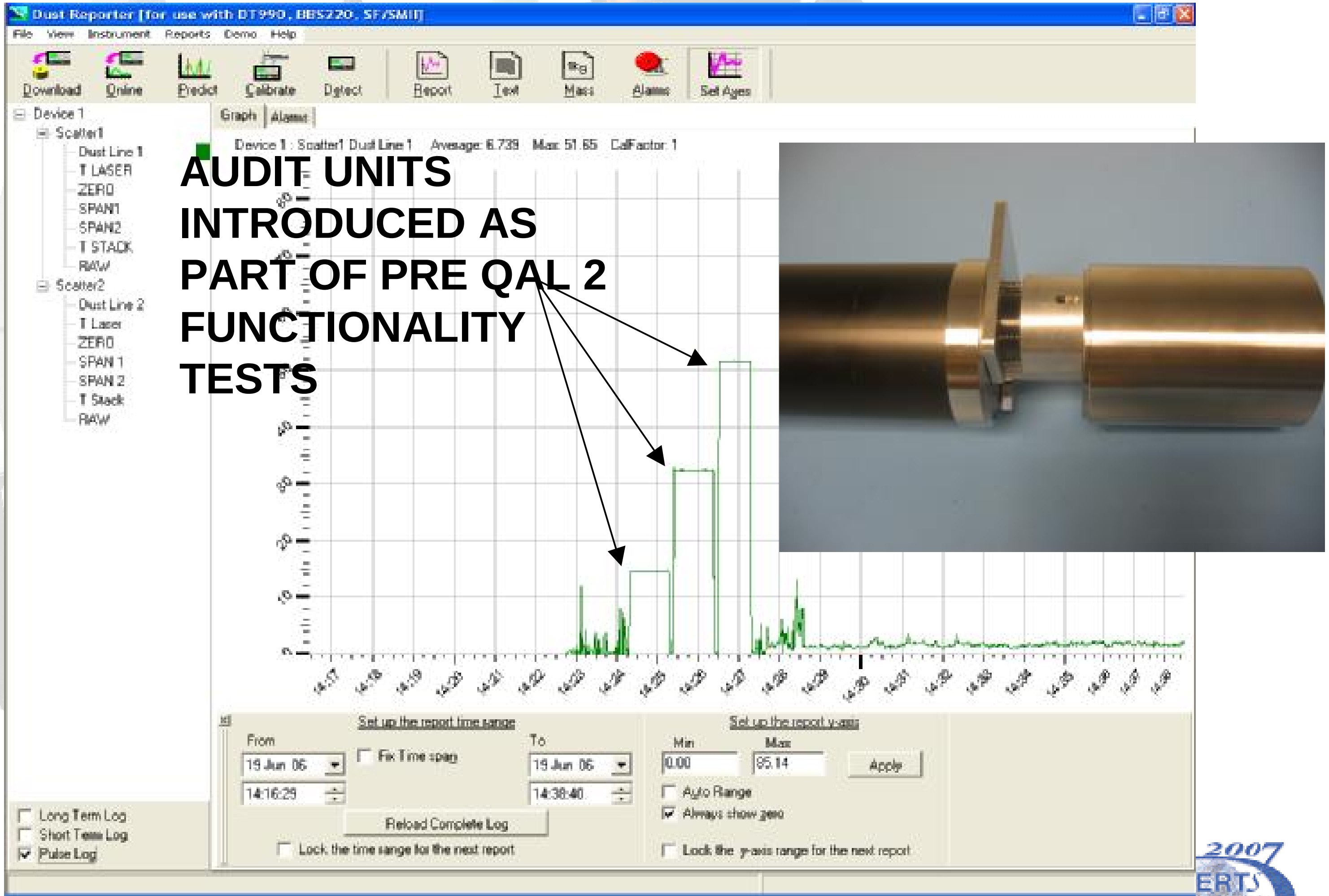


Application 2, DT991



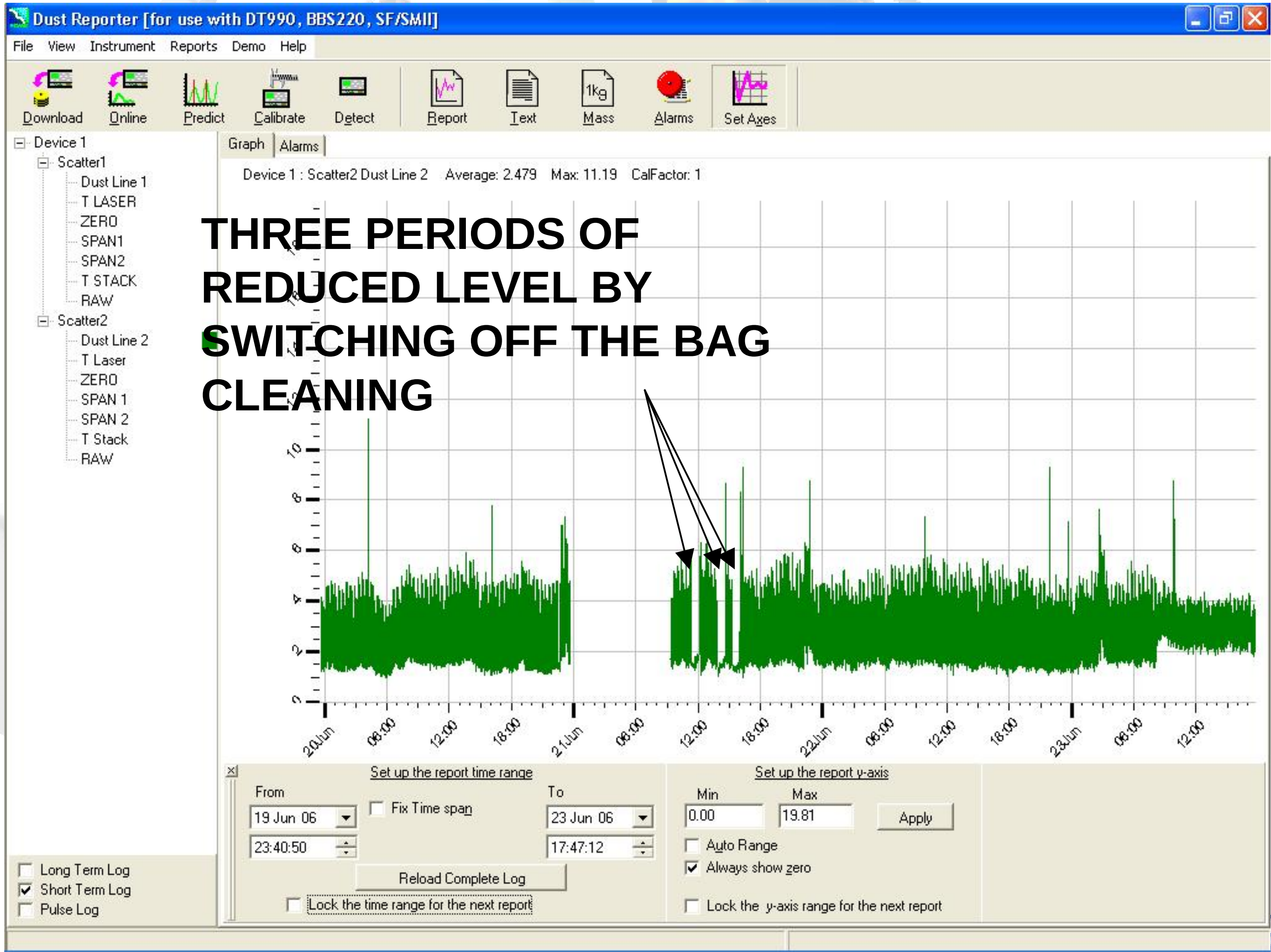
Application 3, LMS181 Proscatter

Application 3, LMS181



AUDIT UNITS INTRODUCED AS PART OF PRE QAL 2 FUNCTIONALITY TESTS

Application 3, LMS181



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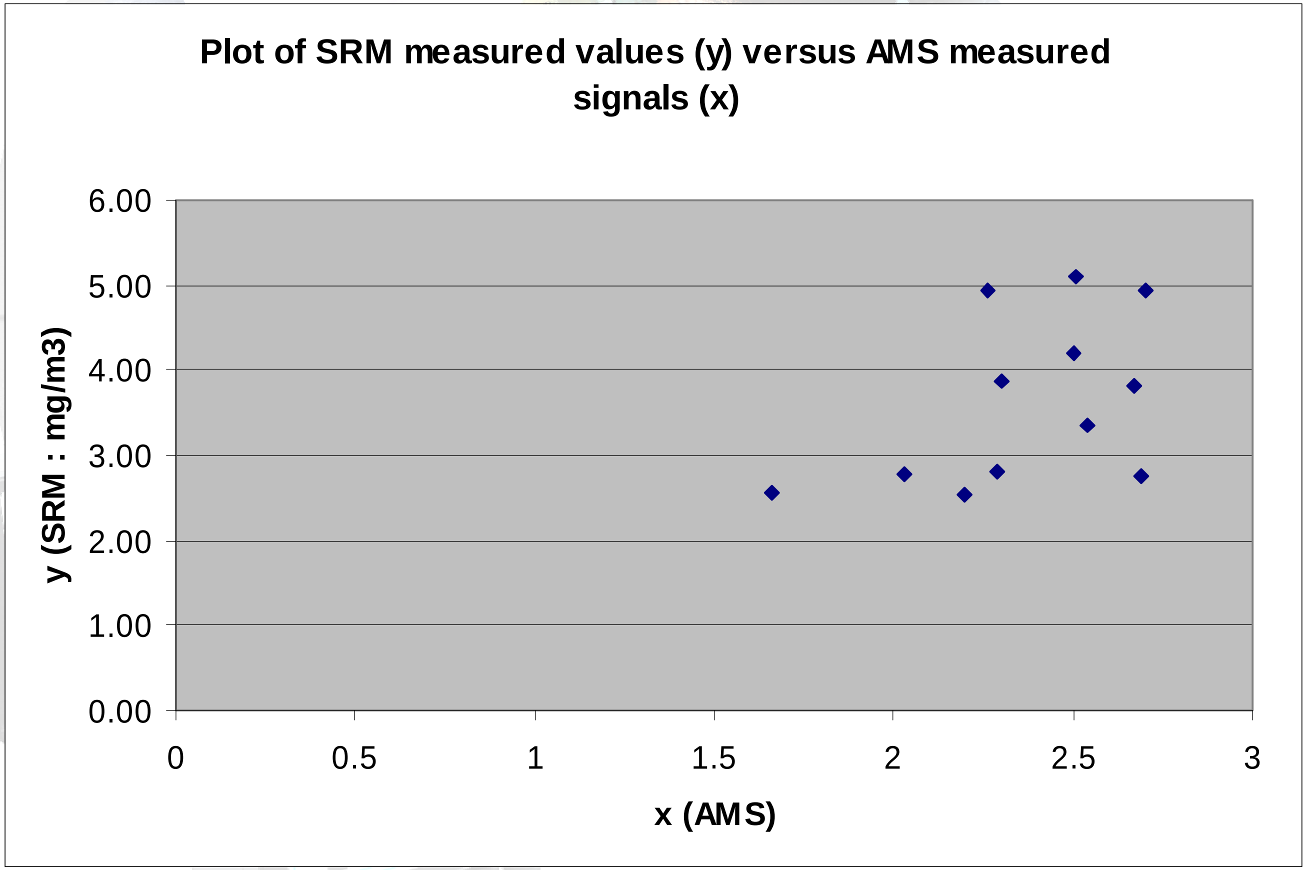
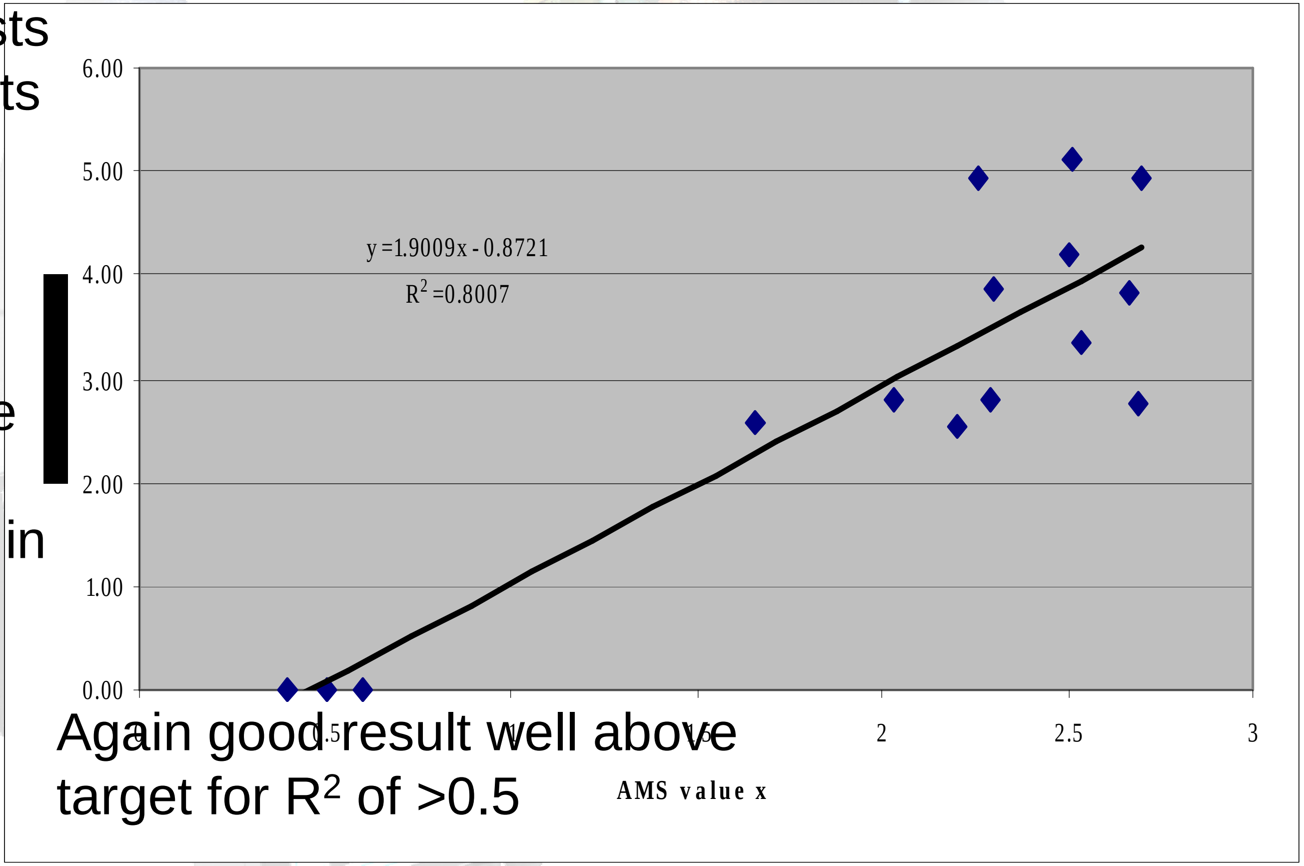
Application 3, LMS181



Application 3, LMS181

Additional tests for instruments zero – Achieved by removing sensor from stack and use of ‘surrogate’ (as indicated in M20)



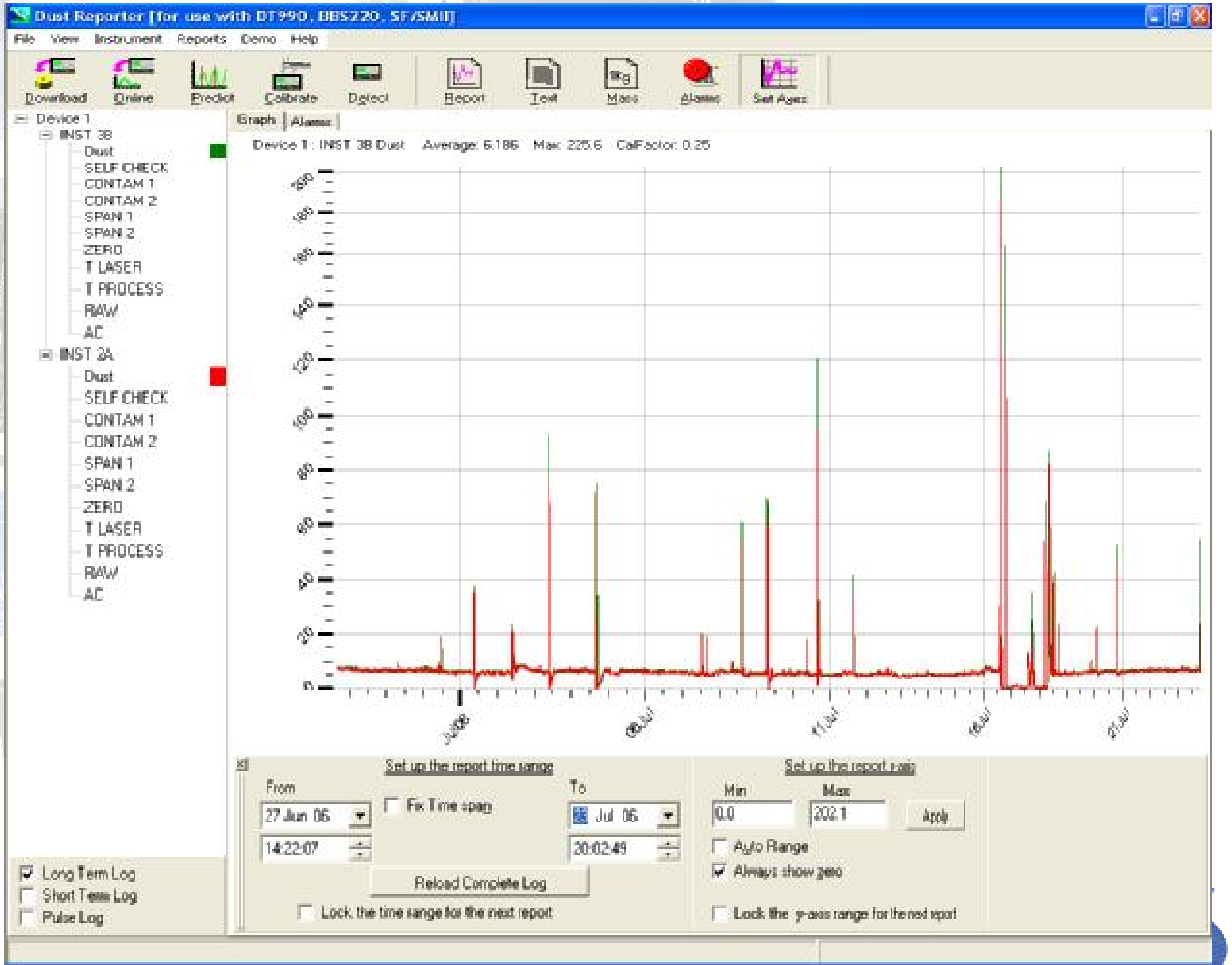
Again good result well above target for R^2 of >0.5

Application 4, LMS181 Co-Incinerator

Application 4, LMS181 Co-Incinerator

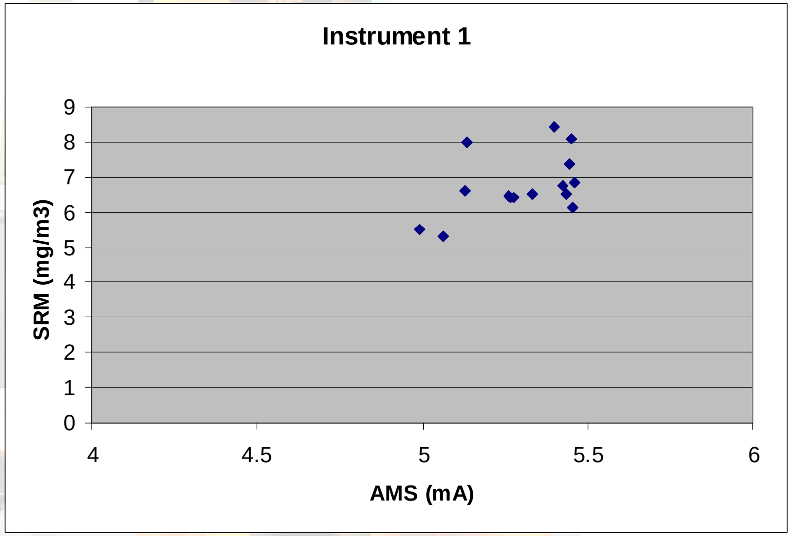
Application 4, LMS181 Co-Incinerator

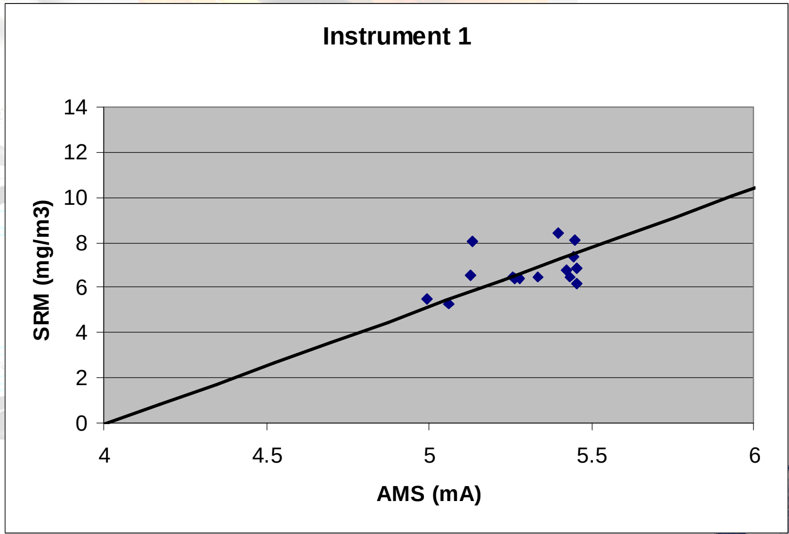
- CH 1 (Green) & CH2 (Red) Combined to show how well they tracked each other



Application 4, LMS181 Co-Incinerator

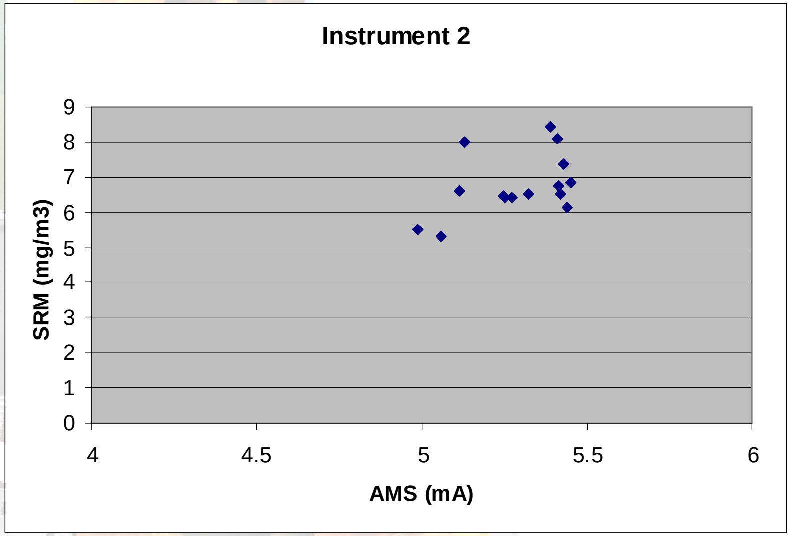
This shows a nice cluster. In this case, follow the guidelines in M20 – average the 15 points, then draw a line through zero and extend upward (by 100%).

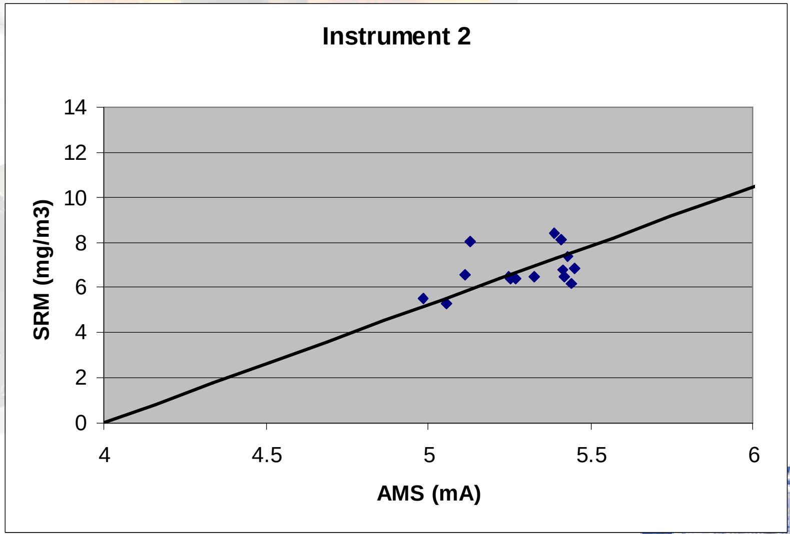




Application 4, LMS181 Co-Incinerator

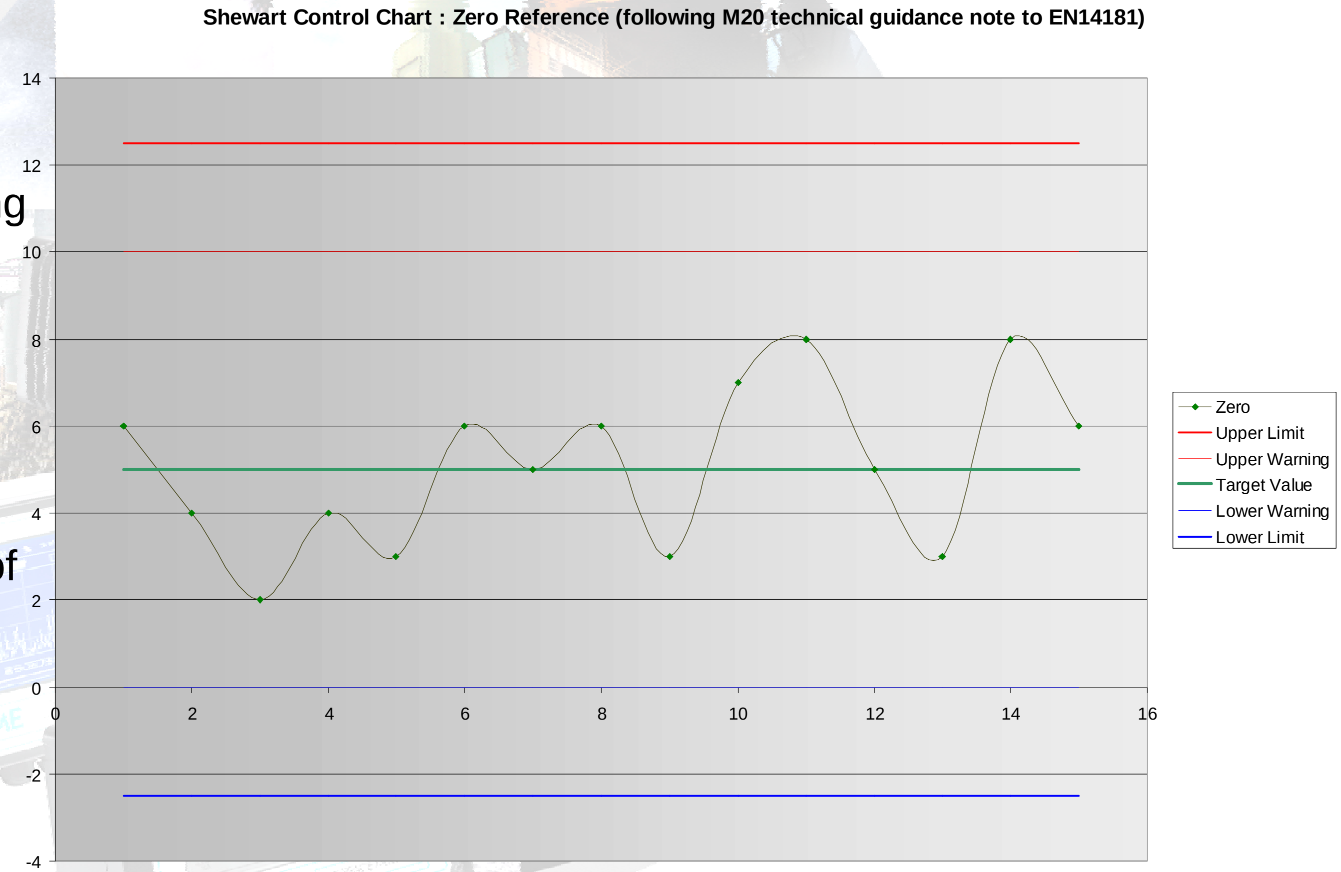
Again, a nice cluster with appropriate implementation of M20 guidelines.





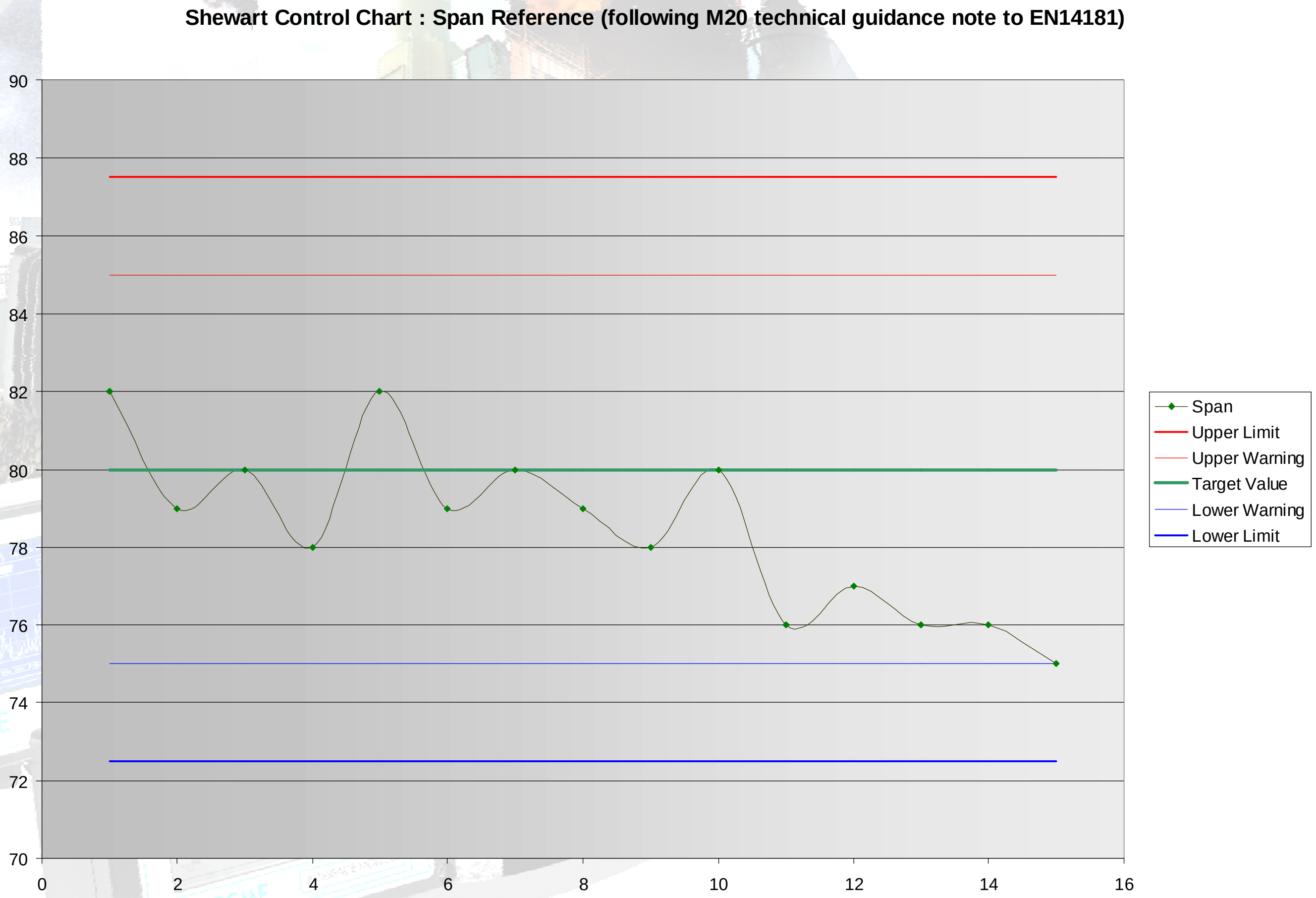
Example of QAL3 data - Zero

- There are the two methods of displaying QAL3 data:
  - 1. Manual using spread sheet template.
  - 2. Automatic download to Dust Reporter
- This is an example of how the data stored can be presented using Shewhart formula in an Excel Spreadsheet



Example of QAL3 data - Span

- This is an example of how the data stored can be presented using Shewhart formula in an Excel Spreadsheet



Example of QAL3 data - Span

- This is an example of how the QAL3 data stored is presented using QAL3 Software
- Our guide for where to set the ‘limits’ are;
  - First (warning) limit set after reviewing ‘instrument drift’ over minimum of 7 day period
  - Second is limit as directed by directive (30%)

Summary

- Take care with location and installation
- Take time to analyse ‘Typical Emissions’ prior to arranging QAL2
- Remember QAL2 has 2 parts namely, FUNCTIONALITY ***and*** SRM 13284-1
- It will cost you, in more ways than one, if you do not take time to understand your full requirements