Online wall thickness measurement

e.g. Permasense

Introduction

- The asset management of a refinery is critical.
- Integrity management of a refinery is associated with the measurement of critical pipework and vessel thickness to determine life limits of these pieces of equipment.
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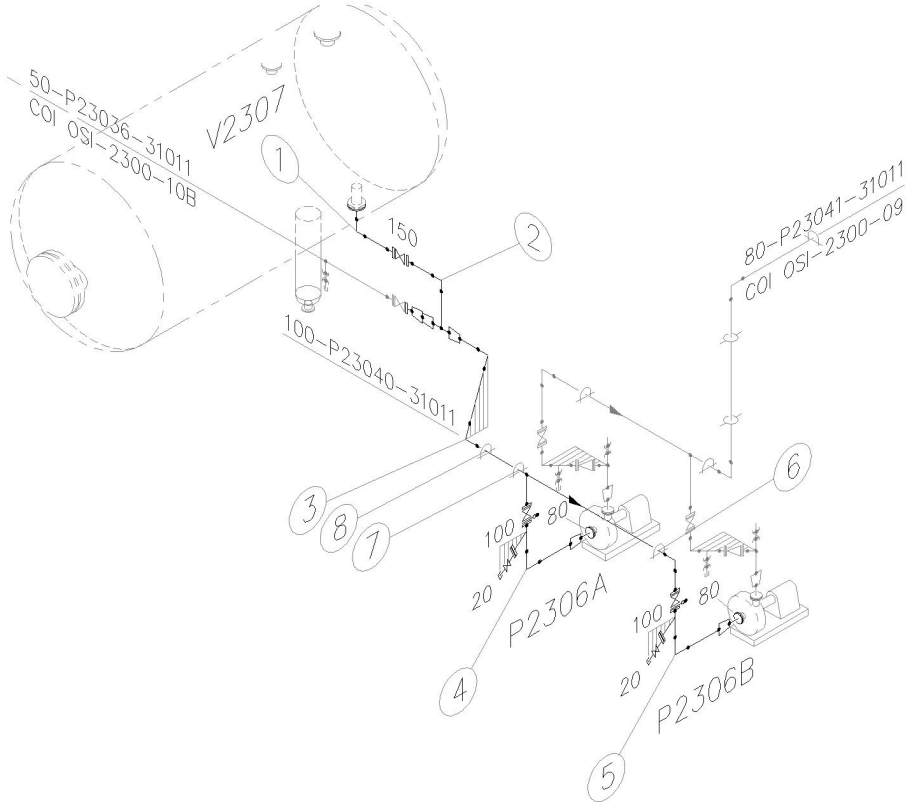
Current state – UT/RT
discrete points discrete time – usually years

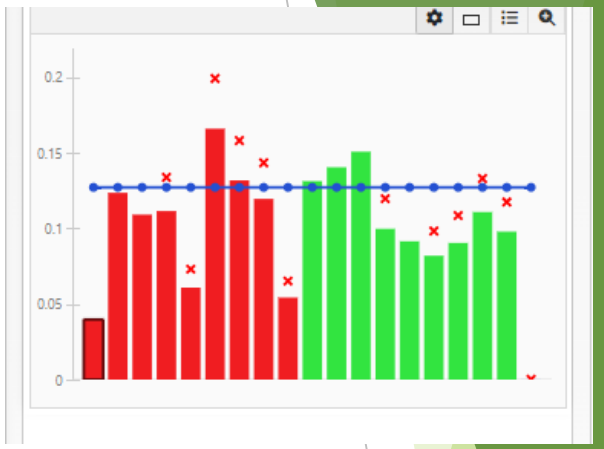


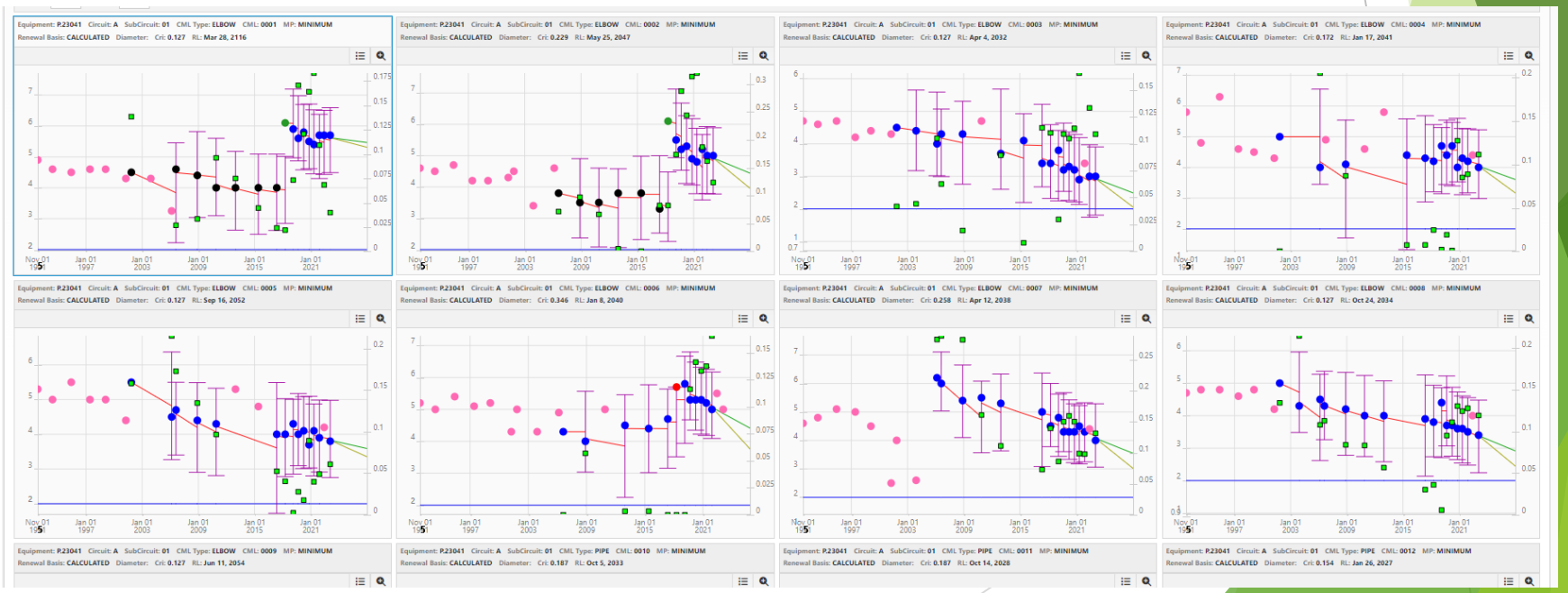
Traditionally this is handling by manually checking points of interest (CML's, Corrosion Measurement Locations) at designated timings and locations, the rate at which the asset degrades/corrodes is then used to determine the remaining life on that asset (years to decades).

Traditional Technique's

- Location ?
- Scaffolding ?
- Time ?
- Temperature ?

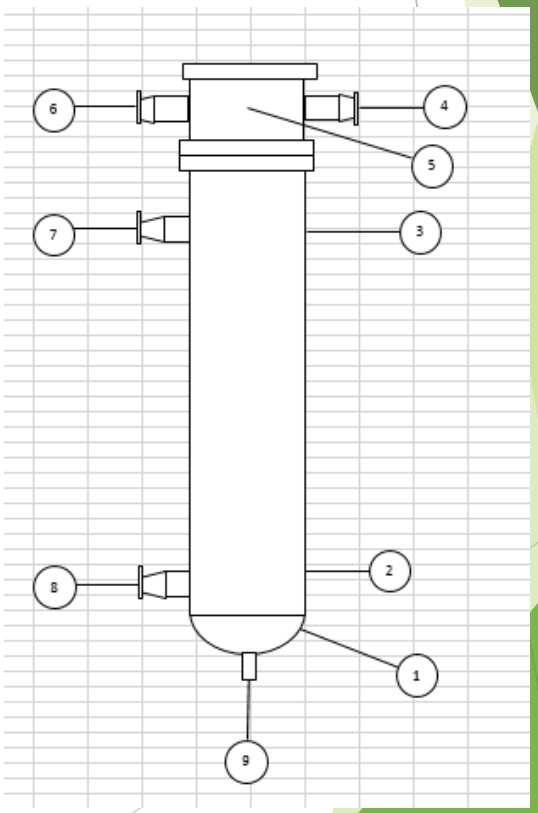
P.23041 – Unit piping over time – Database





For Vessels - Current state – UT/RT discrete points discrete time – usually years

These CML points are traditionally measured by ultrasonic measurement (UT) or Radiography (RT), these measurements are manual and require planning and have a significant cost. Given the time frame of time between measurements (typically years), subtle changes in rate due to processing and diet changes can be missed.



So we measure locations in discrete intervals - What happens over time and conditions ??

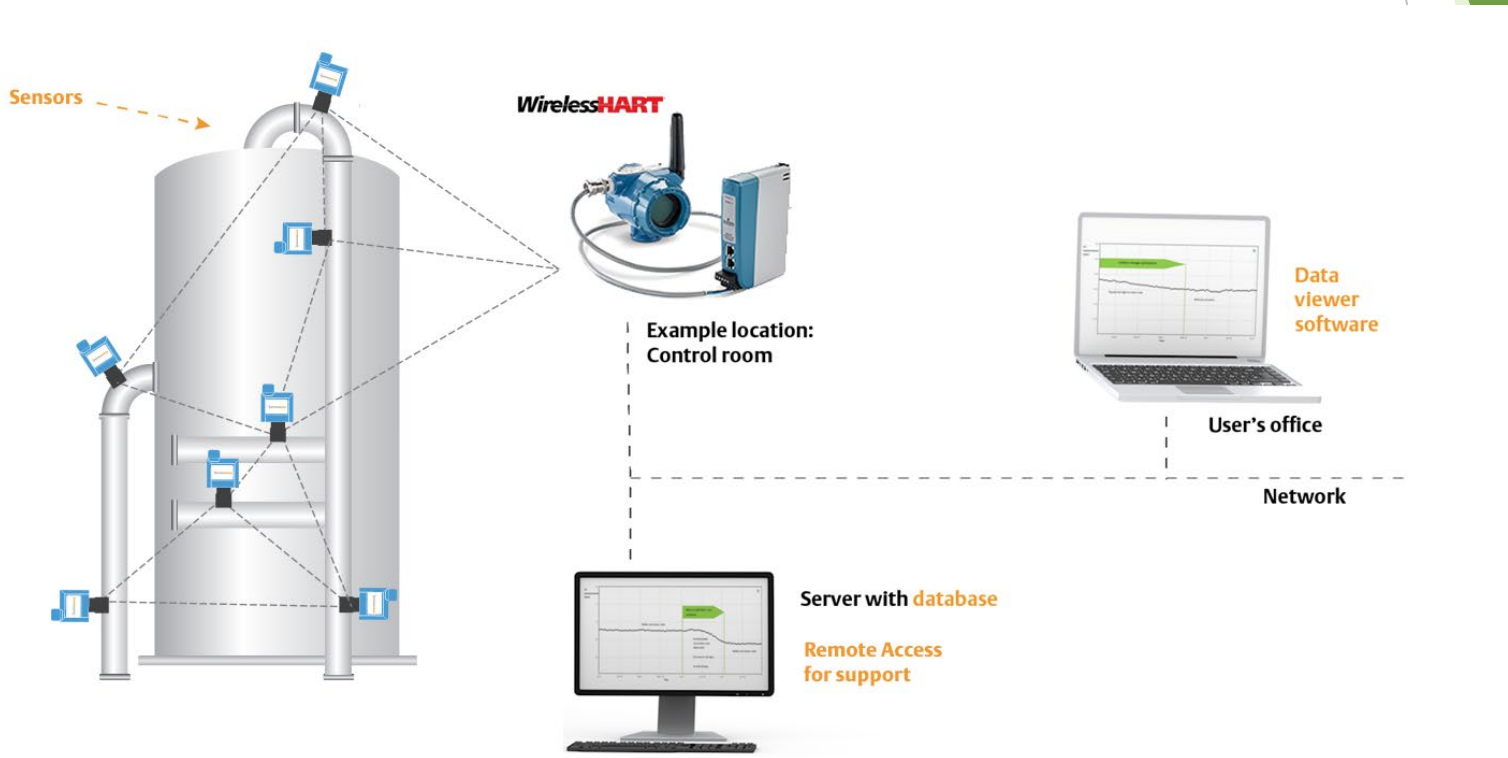
Ideally if we had continuous measurements we could establish changes immediately either due to deliberate process changes time/temperature/chemistry or process drift. e.g. temperature/pressure/crude chemistries/material issues

Permasense – On the run measurements Note: Sensors blue or orange

Newer technologies such as Permasense (Owned by Emerson) can measure these points at discrete intervals, nominally every 12 hours for effectively monitoring the rate of change of a particular asset. Whilst these devices only measure a discrete location, they may offset the need for manual checking of the CML by the more traditional approach.

Sensor and Network

Virtual server next step



Future enhancement(s)

The other distinct advantages these devices have is that they can measure effectively continuously at higher temperatures (up to 600 deg C), this is particularly important in high temperature service and again may offset the need for a specific measurement campaign.

These devices require installation but communicate this information using Wireless technology (Wi-HART) and battery technology

3 BASIC TYPES

All are: Intrinsically safe, WiFi (WiHART), Battery operated

ET210

Pro's – Easy installation, movable.

Con's – Low temperature <120 Deg C, 6mm minimum thickness, 4" minimum pipe (specialized to 2")

ET410

Pro's – Straight forward installation, movable, Higher temperature (270DegC)

Con's – 6mm minimum, 4" minimum pipe.

WT 210

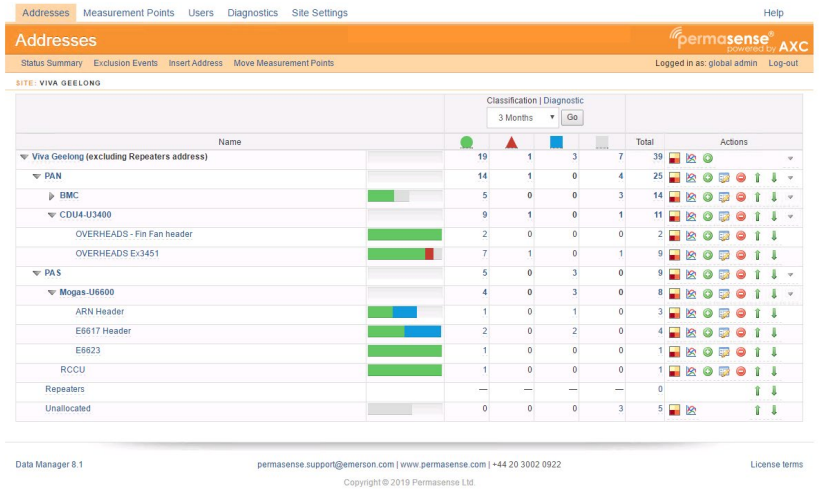
Pro's – High temperature capable (600 DegC), 3 mm minimum, robust attachment, 2" minimum pipe diameter.

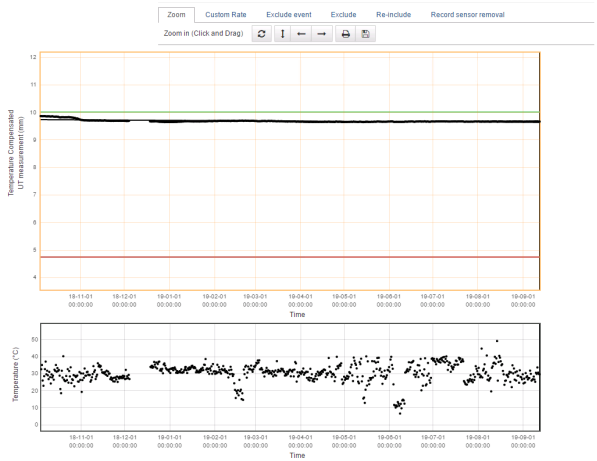
Con's – Hot work installation (studs), not movable

Note – Clamp installation possible

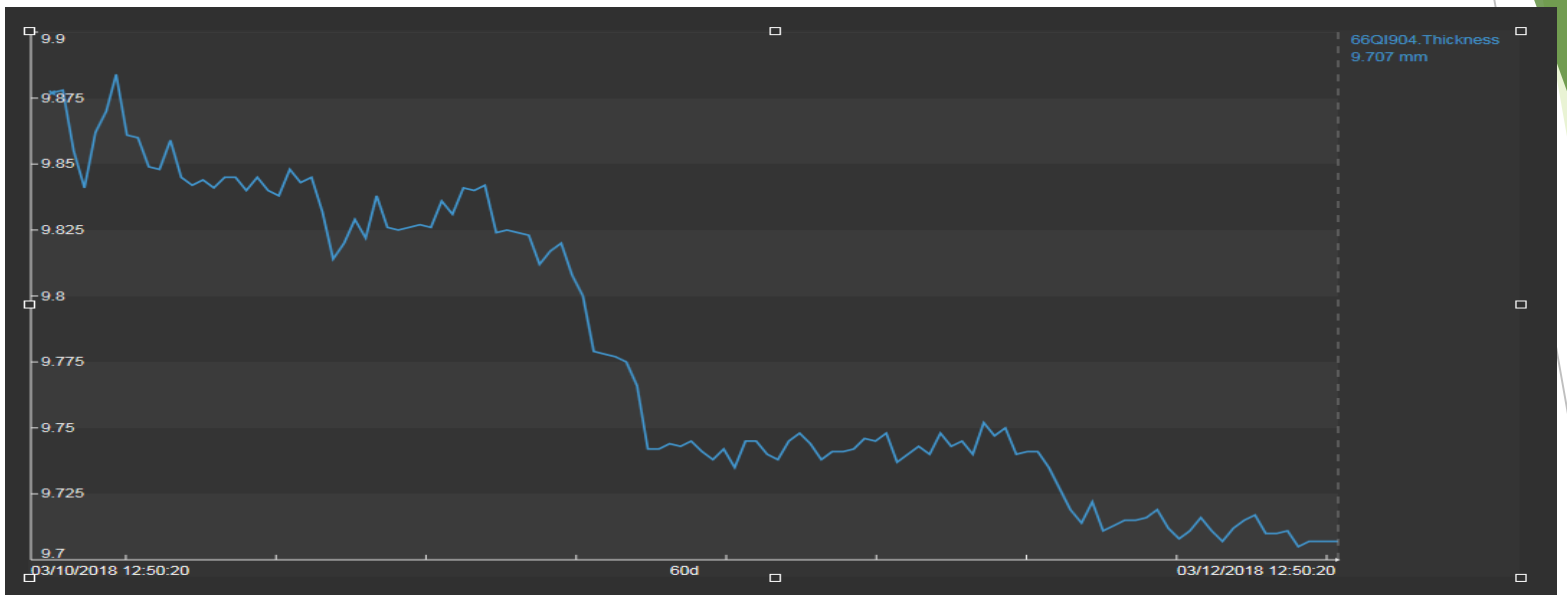
Permasense Software – e.g. Butane Rundown Exchanger

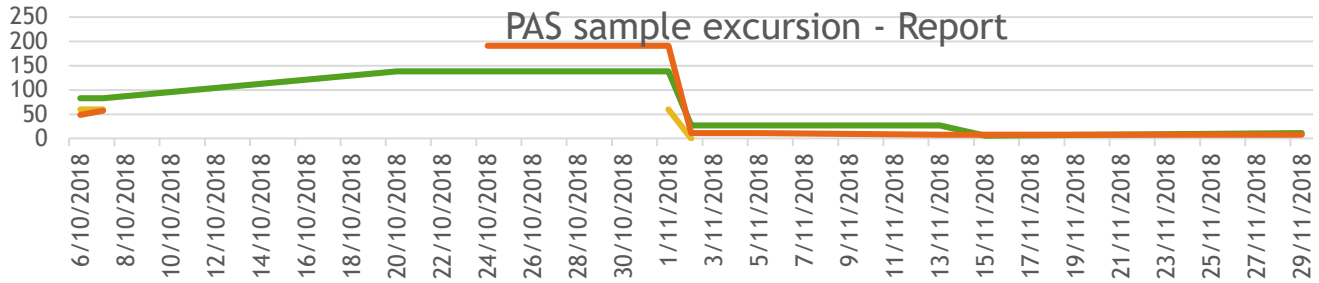
Overall Dashboard



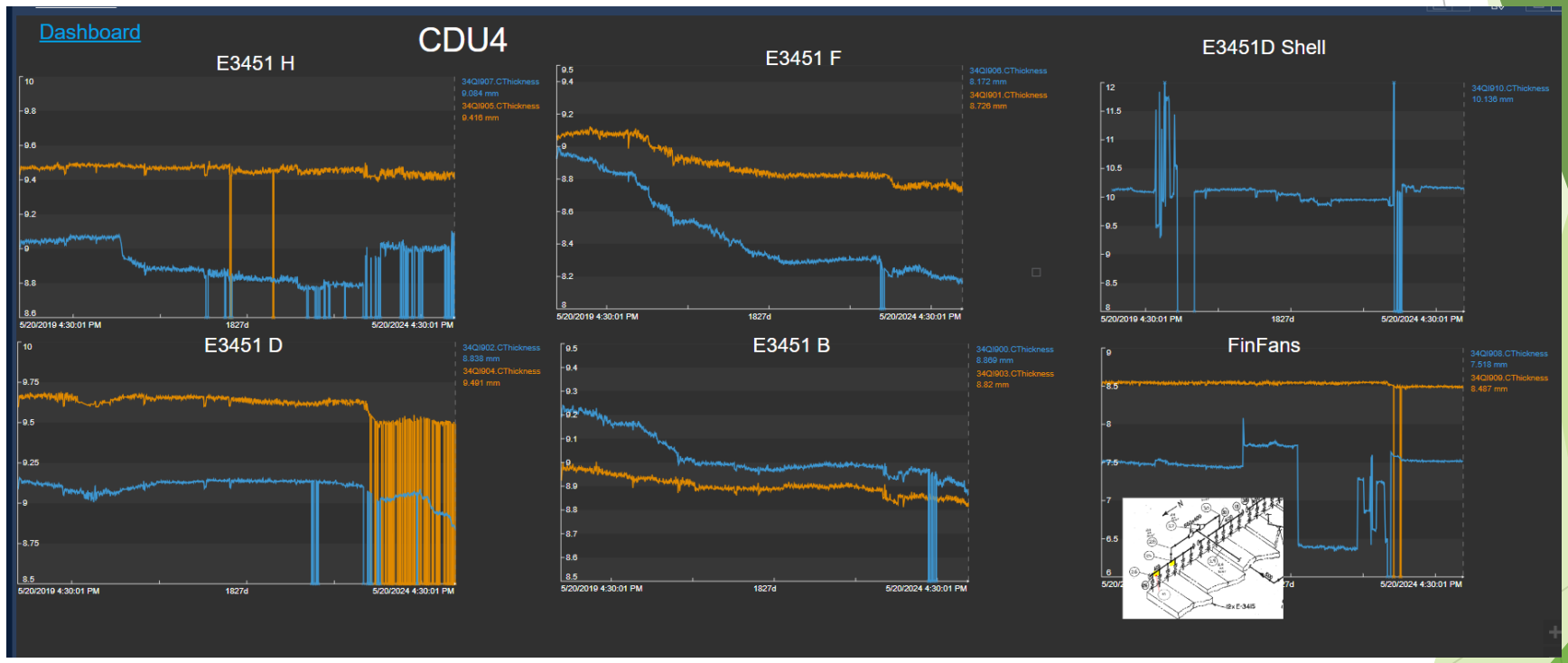


Permasense via PI loss with Lab result



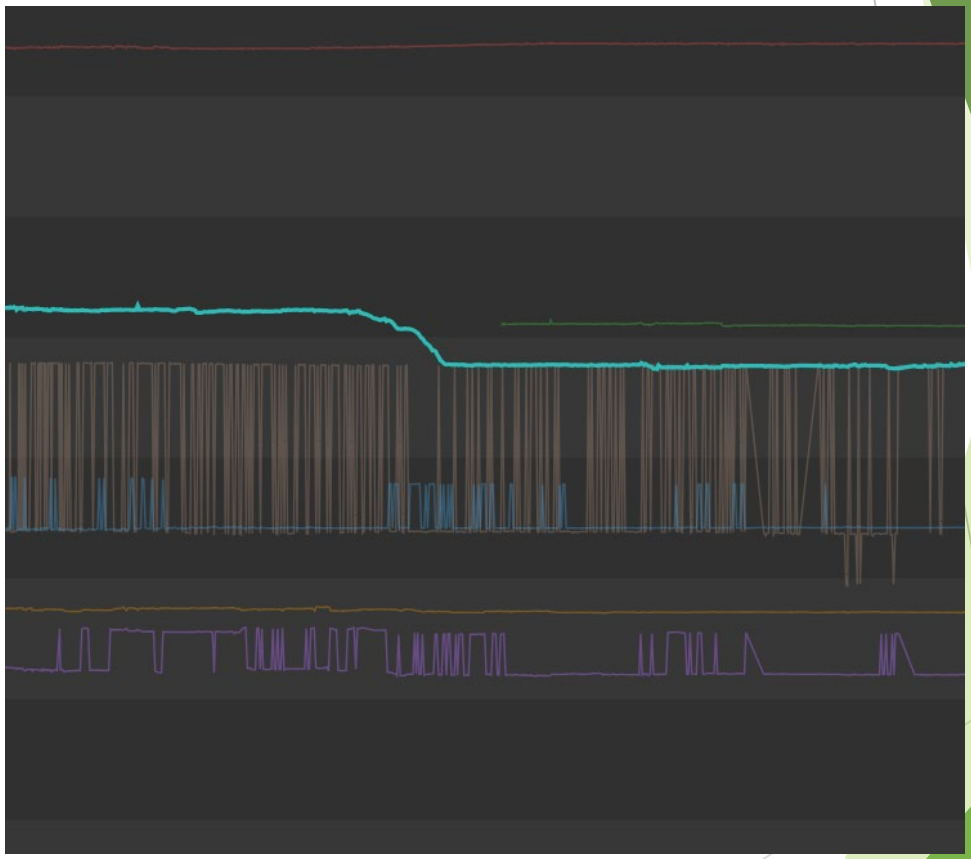


Crude overheads - Some corrosion is a way of life - Not controlling is the issue !



T- Section in Acid service - What happened ?

- High acid event
- Successful Mitigation
- $400k material
- $ millions if leaked



Summary of Online sensors – e.g Permasense

Pro's	Con's
Immediate feedback	Effort to set up
Data available to all – i.e. Process techs	Cost/Probe ($10,000)
Variable effect (s)	Network Management
High Temperature use	Instrument reliability
Data flexibility	Problematic UT
Network cell	Data management
Proof of mitigation	Battery
Relatively easy install	Effort in managing

Questions?