



Application of Site-specific Samples as On-site Reference Material

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History of the Dow contract lab program

- Spiked pooled serum for PCDD, PCDF, PCB ¹
- Blended waste water submitted camouflaged representing typical matrices in processes of Vinyl Chloride producers ²
- Qualifying program for Dow preferred labs based on blended real world matrices ³
- Expansion of the component list, tighter criteria and implementing on-going measures to insure on-going quality ⁴

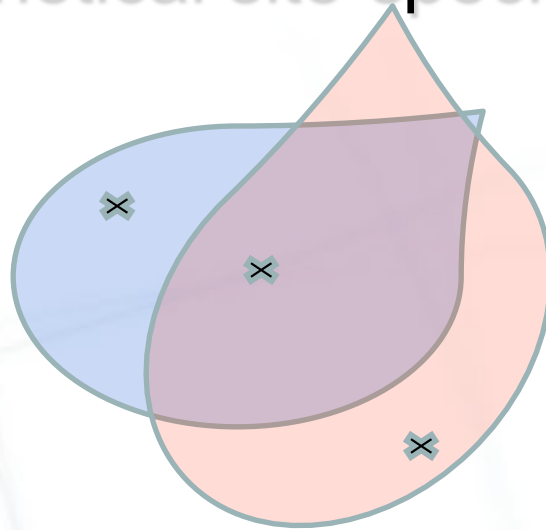


How can we control the quality of our preferred contract labs on an on-going basis?

Problems with common reference or proficiency test samples:

- Labs “**smell**” them as such even if camouflaged
- Might be treated differently – “get an extra set of eyes”
- Normal reference material has none of the matrix and associated interferences

Hypothetical site-specific project

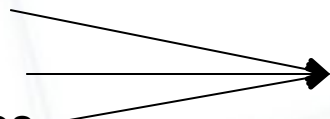


Each point has a different pattern. Take a sample from:

Red plume

Blue plume

Mixture of both plumes



Blend

→ Each pattern is in the blend. The ratio of blue/red and the concentration might differ.



Conventional approach versus site-specific approach

Conventional Approach:

- 1) Spiked water:
 - a) Commercial PT samples (but neither red nor blue have HPLC water quality)

- 2) Spiked sample from Project:
 - b) MS/MSD is **ALWAYS** spiked **ON** the matrix – may lead to misinterpretation (e.g. good recoveries)
 - a) Can be red or blue or red/blue or (if not specified) from any other sample in the batch (MS/MSD). May not give the information for all matrices



Conventional Approach versus site-specific approach (cont.)

Site Specific Approach:

- 1) Take 3-5 groundwater samples from various wells at the site.
- 2) Blend, homogenize, camouflage and submit to lab as, for instance, sample "7"
- 3) Submit a duplicate of this sample as , for instance, sample "2"
- 4) Dilute this sample 1:x (x can vary to accommodate project needs) and submit as, for instance, sample "14"
- 5) Send these samples to two or three of our preferred labs as reference labs. The project lab can even serve as a reference lab by receiving the samples independently and labeled differently.



Conventional Approach versus site-specific approach (cont.)

Site Specific Approach Outcome:

- 1) The dilution versus the neat sample in the site specific approach, is comparable to the sample versus a MS in the conventional approach, **BUT**, it has the “backbone” which is part of the sample and not added to the sample. This demonstrates, as well, the capability to analyze over a wider concentration range.
- 2) The site specific duplicate can be used to determine the precision (RPD).
- 3) Using the data from the reference labs, we can determine the project laboratory’s on-going quality in the specified project.
- 4) In the case that the project laboratory also got the samples as a reference laboratory, the data points for the QAQC samples from the project lab are doubled.

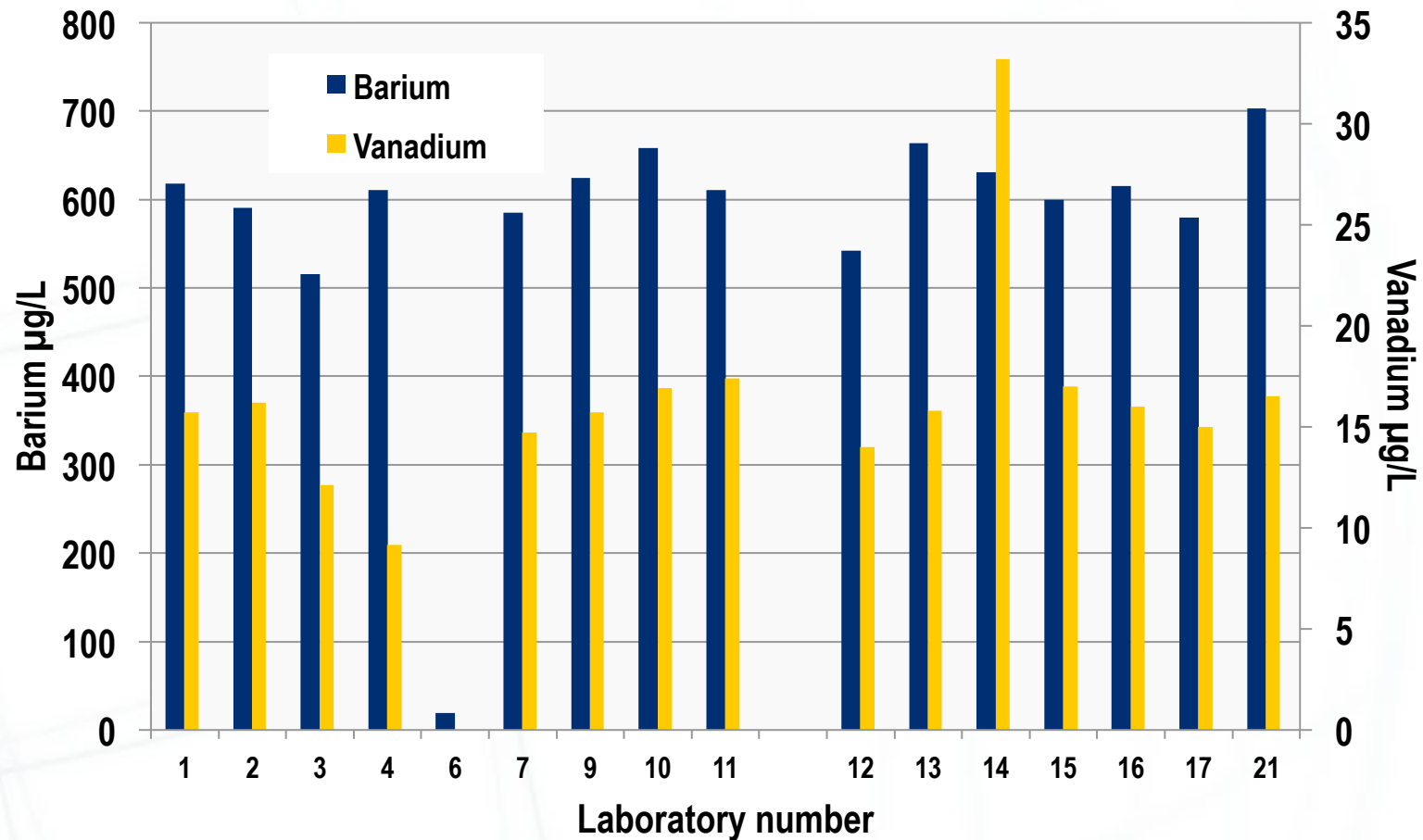


Future Plans

- Quality Assurance Criteria needs to be established based on pooled reference data such as:
 - RPD range
 - data variability range
 - dilution variability range
- Started to implement this concept in our projects in PARALLEL to the “traditional” way but, some principles can be derived from current annual Dow proficiency test study

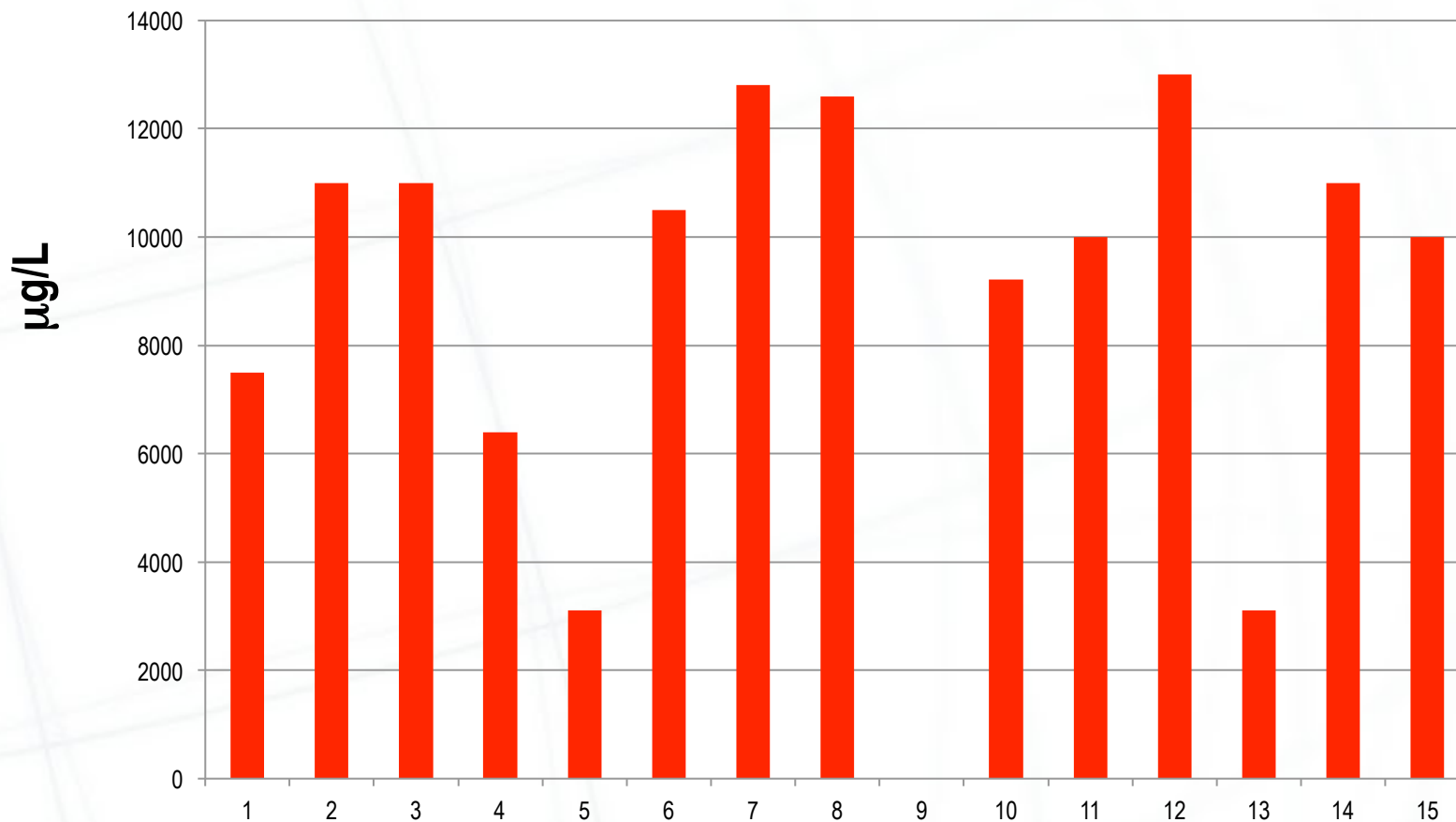


Metals data from 2015 proficiency test samples





TOC data from 2015 proficiency test samples





References

1. "Quality Assurance and Quality Control for Serum Dioxin Evaluations of Trichlorophenol Workers in New Plymouth" - Michael Wilken - International Dioxin conference - New Zealand -2008
2. "Vinyl Chloride Producers Voluntary Monitoring Program - Analytical QA/QC Program" - Michael Wilken - International Dioxin Conference - San Antonio, Texas - 2010
3. "Matrix and Site Specific QA/QC Samples - A Tool For Ongoing Quality Control" - Michael Wilken & Jennifer Richardson - International Dioxin Conference - Carnes, Australia - 2012)
4. "The Dow Laboratory Qualification Program" - Jennifer Richardson & Michael Wilken – National Environmental Monitoring Conference - Washington D.C. - 2014



Questions?