EGLE and AFCEC Split Sample Results

Former Wurtsmith Air Force Base

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Why Collect Split Samples

1. Precision

- Measures agreement between duplicate analyses of the same sample
- Identifies variability in analytical procedures

2. Reproducibility

- Confirms consistency across different labs
- Critical for inter-laboratory validation

3. Bias Detection

- Identifies differences between labs

4. Data Quality Objectives (DQOs) Compliance

- Demonstrates data integrity

How do we evaluate Split Sample Data?

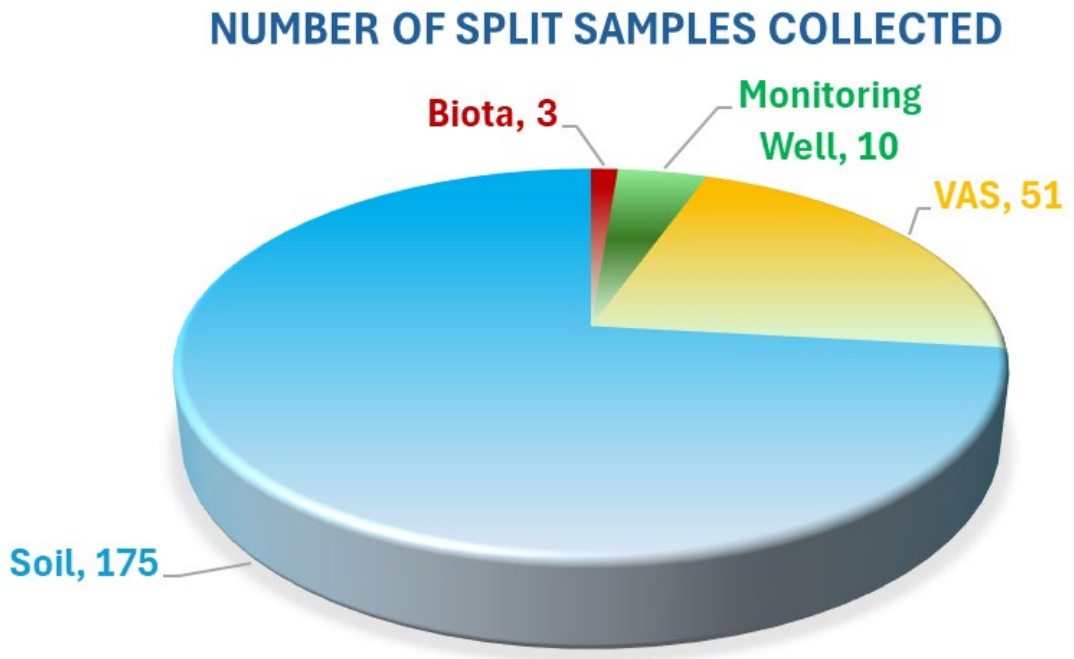
- **Compare Analytical Results**
  - Evaluate concentrations from each lab side-by-side
- **Calculate the Relative Percent Difference (RPD)**
  - RPD = (|Lab1 - Lab2| / Average) × 100
- **Assess Against Acceptance Criteria**
  - UFP-QAPP acceptance criteria between the analytical results of the parent and split sample
- **Identify Outliers and/or Bias**
  - Look for consistent over- or under-reporting
- **Document Results and Explain Deviations**

Relative Percent Difference

- **Acceptance criteria outlined in the UFP-QAPP**
  - **For Aqueous Samples < 20%**
    - If both lab results are greater than 5 times the LOQ:→ results should be within 20% of each other
    - If the result is near the LOQ:→ The results are acceptable if the two values are within 3 times the LOQ
  - **For Solid Samples (soil or tissue) < 50%**
    - If both results are greater than 5 times the LOQ:→ They should be within 50% of each other
    - If the result is near the LOQ:→ The results are acceptable if the two values are within 3 times the LOQ

Media Sampled

- **Split samples were collected from:**
  1. Soil
  2. Monitoring Wells
  3. Vertical aquifer samples (VAS)
  4. Biota



Media	EGLE Lab	AFCEC Lab
Tissue	Eurofins (ELLE)	Battelle
Soil	Enthalpy/Vista	SGS
Groundwater	Enthalpy/Vista	SGS

Tissue Split Samples

- **Initial Discrepancy Identified:**
  - ELLE initially reported higher PFAS concentrations than Battelle due to dry weight reporting, which is not recommended for tissue. Dry weight reporting is not recommended for tissue using USEPA Method 1633. ELLE reissued results on a wet weight basis, which aligned better with Battelle.
- **Highest tissue concentration:** 1,100 ug/kg (SUP302F001) RPD: |7.6%| is within acceptance criteria, indicating good precision.

VAS Split Samples

- **2022-2023 Dataset for VAS**
  - **21 pairs**
    - Of the 21 pairs evaluated, the overall average RPDs for 19 pairs are within the acceptance criteria
    - Overall average RPD < 2%, indicating no lab bias.
    - 2 sample pairs showed an average RPD > 20%, likely due to higher sample turbidity from the grab samples.
- **2021 Dataset for VAS**
  - **30 Pairs**
    - Of the 30 pairs evaluated, 24 pairs are within the acceptance criteria.
    - Overall average RPD < 16%, indicating no lab bias.
    - 6 sample pairs showed an average RPD > 20%, likely due to higher sample turbidity from grab samples

Monitoring Well Split Samples

- **10 sample pairs for MWs**
  - All sample pairs were within the acceptance criteria
  - Overall average RPD was 3.5%, indicating no lab bias

Soil Split Samples

- **2023 Dataset**
  - **7 Sample Pairs**
    - Average RPDs for all pairs are within the acceptance criteria
    - Overall average 1.48%, indicating no lab bias
- **2021 Dataset**
  - **168 Sample Pairs**
    - Average RPDs < 50% for 151 pairs and > 50% for 17 pairs, indicating a slight bias between labs.
      - Bias likely from lab prep/extraction differences, and soil heterogeneity.
      - Concentrations at or near LOQ and compounds without screening criteria account for the majority of RPDs exceeding 50%.

Split Sample Summary

1. Precision

- Generally, RPDs are within acceptance criteria per media, indicating analytical precision is observed.
- Lower precision is primarily observed when sample results are near the LOQ.

2. Reproducibility

- Average RPDs are reproducible between labs approximately 90% of the time for sample pairs evaluated.
- Lower reproducibility is observed most often for compounds without screening criteria.

Split Sample Summary

3. Bias Summary

- No bias is observed between labs for VAS, monitoring well, and tissue data.
- Soil (2023) results show no bias between labs, with all average RPDs being less than 50%.
- Soil (2021) results show little bias between labs, with average RPDs being less than 50%, approximately 90% of the time. In general, bias is more frequently observed for compounds with no screening criteria.
  - Attributed to degradation due to varied extraction methods per DoD QSM B-15 (e.g., unconstrained: variations in temperature, pressure, solvent choice, time, agitation, and/or matrix effects)

Split Sample Conclusion

- **Data review supports that PFAS data generated by both labs are suitable for decision-making.**

Your Success is Our Mission!