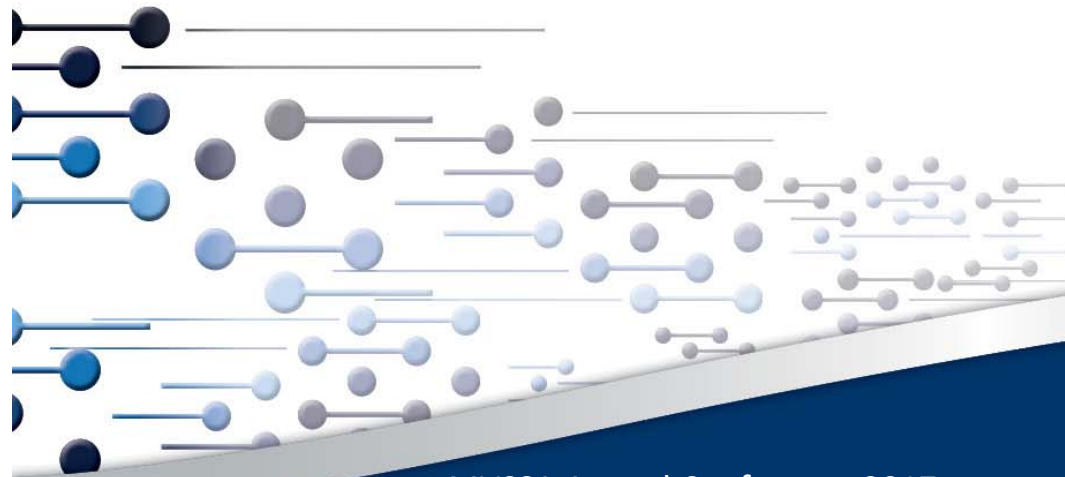


Emergency analytical testing: things to consider

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INTRODUCTION

- **Emergency situation: grab sample from area or source**
- **Incident, investigation or project**
- **Non-standard sampling and unknown analytical requirements**
- **Results required fast as it enforces decisions**

BACKGROUND

- **Past experience with unconventional sampling and non-routine analysis**
- **Need for guidance on how to take the sample and what to test for**
- **Important: maintain sample integrity**

OBJECTIVE

Things to consider on sampling and analysis of samples that were taken under unconventional circumstances

APPROACH

Different types of grab samples:

- Solids (soil, rocks, burnt residue)
- Liquids (water, oil, unknown suspensions)
- Fine to ultrafine particulates (dust, fumes, vapours)
- Gases (unknown, potentially complex)

APPROACH

Consideration #1: Planning the sampling

- Sufficient background information from different sources
- Guides the sampling strategy
- Useful resources: NIOSH Method Finder and US-EPA Field Sampling Guides

APPROACH

Consideration #2: Take a sample safely

- Environment is unsafe and hazardous until proven otherwise
- The sample is **toxic** until proven otherwise
- **Do not touch** with bare hands
- **Do not smell or taste it**
- Refrain from making direct contact

APPROACH

Consideration #3: Representative sample

- Sample should be representative of the original source
- Take sample **as soon as possible**
- Gases dissipate, liquid change composition and solids or particles may change form/composition

APPROACH

Consideration #4: Suitable container

- **Protect the integrity of the sample**
- **Prevent contamination; maintain composition**
- **Inert material such as glass, Teflon, polypropylene or PPE**
- **Suppliers of laboratory consumables**

APPROACH: Liquids



- **Dark – protects from UV rays**
- **Glass – limits adhesion of organic compounds**
- **Used container: wash and dry; Smell before use.**
- **Rinse bottle a few times with the sample first**

APPROACH: Liquids



- Fill to the top and seal tightly
- Bag and seal entire bottle
- Ensure no leakages
- 2 – 5 L should be sufficient
- Keep $< 5^{\circ}\text{C}$ and test ASAP
- Test micro-organisms within 24 hrs

APPROACH: Solids



- Plastic bag or glass container with airtight seal
- Bag and seal sample
- Quantity of two or three handfuls



APPROACH: Gases



- **Tedlar bags or stainless steel canisters**
- **Gases dissipate through normal plastic bags**
- **Sample biggest quantity**
- **Test ASAP**

APPROACH

Consideration #4: Suitable container

- Dust & airborne particulates: gravimetric
 - Human tissue, blood or urine: medical professionals
 - Tape or cable tie the container: prevent tampering
- **Protect sample integrity**

APPROACH

Consideration #5: Contextual information

- Observations and notes
- Use your senses: hear, smell, feel, see and taste
- 5W: who, what, where, when, why?
- How was the sample taken?
- Chain of custody: ownership and responsibility
- Information useful in investigation and for the analytical laboratory

APPROACH

Consideration #6: Testing facility

- **Send the sample to laboratory ASAP**
- **Keep a list of laboratories and their capabilities:
MRS, Micro- and Path-Labs, CSIR, Mintek,
NNR/NECSA, Universities, NIOH etc.**

APPROACH

Consideration #7: Information to testing laboratory

- **Appropriate and sufficient information**
- **Information gathered and contextual information**
- **Take care not to ask for specific tests before providing information**
- **Refrain from reaching a conclusion until the investigation is completed**

APPROACH

Consideration #8: Request the right analysis

- Qualitative screening methods
 - Organic: GC-MS, FTIR or HPLC/UPLC
 - Inorganic elements: AAS, ICP or XRF
 - Inorganic compounds: XRD
 - Micro-organism: E.coli, faecal coliform etc.
- Analysis time and sample quantities required
- Direct further and more focused testing

APPROACH

Consideration #9: Interpreting the results

- **Results relate to samples analysed; refrain from extrapolating**
- **Ensure that you have a good understanding of the results**

CONCLUSION & RECOMMENDATIONS

- Representative sample
- Protect the integrity of the sample
- Keep cool and test ASAP
- Contextual information
- Screening methods first and then focused testing
- **Be prepared: establish an emergency SOP**

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Thank you

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