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Challenges Facing Stack Samplers

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What Will I Talk About?

- 1) Planning Challenges
- 2) Technical Challenges
- 3) Safety Challenges



Background

Peter Pakalnis

- Sampling since the late 1980's
- Started at ORTECH as a Co-Op Student (never thought I'd stack sample again after 1 term)
- Started at LEHDER in 1995
- Experience includes getting work, preparing for testing, conducting testing, reporting, building equipment and managing programs



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Planning Challenges

- Purchase Order – Do you have a PO for work?
- Contractor Safety Qualification – Does your company have the appropriate qualification (i.e. ISNetworld, CanQual, PICS, etc.)?
- Safety Training – Do you have your certificates (i.e. IEC, MOL Worker and Supervisor, NORCAT, Fall Arrest, WHIMS, TDG, CSAO Supervisor, Site Specific, Zoom Boom, etc.)?



Planning Challenges

- Schedules Change - Brad Bergeron is supposed to be here, but he's testing. I'm here because a job's postponed. "Hour at a time."
- Human Resources – Is the crew available (i.e. other jobs or personal commitments)?
- Equipment Resources – Do you have the right equipment or enough equipment / calibration gases?



Planning Challenges

- Plant Operation – Is the plant going to be running when you arrive?
- Plant Contact – Is there good communication with the plant contact?
- Test Methodology – Do you have experience with the methods required? Right method?
- Pre Test Plan / Test Protocol – Is it accepted by the MOECC?
- Logistics – What is the plan for getting there and back?



Planning Challenges

- Hotels – Are any available where you are going?
- Time of Year – Hot weather and cold weather sampling require different approaches!
- Sample Locations – Site visits are not always possible, can be big surprises! Photos help.
- Sample Access – Is there scaffolding, ladders, stairs or do you use a zoom boom? Who gets scaffolding / zoom boom?



Planning Challenges

- Sample Analysis – Is the lab certified to do the method you require and what are detection limits?
- Sample Storage - Will you have the means to store samples at appropriate conditions?
- Sample Shipping – How do I get samples to the lab (i.e. drive, ship, fly or do they pick up)?
- Paperwork – What paperwork is required for driving, on site or when shipping sample?



Planning Challenges

Time Constraints

- When does the plant commence operation?
- When does the Test Protocol go in?
- When does the Test Protocol get accepted?
- When can we test?
- When is the report due?
- **IS THE TEST SCHEDULE REALISTIC?!?!**



Planning Challenges

THE BIGGEST CHALLENGE!

- So what do you do when your plan fails?
- This happens a lot due to plant outages – you roll with it!
- Option 1 - Wait on site and finish.
- Option 2 – Leave, come back and finish.



TECHNICAL SUPPORT



**"HAVE YOU TRIED
POUNDING IT
WITH YOUR FIST?"**



Technical Challenges

- Probe and Nozzle Material – Pyrex, Quartz, Teflon, Stainless, Inconel, etc.
- Impingers – Glass / Teflon plus how many needed (i.e. SVOC proving / cleaned for metals).
- Calibrations – HUGE!! Are all the proper calibration complete and meet specification?



Technical Challenges

- High Temperature Sources – Melting entire probes, melting liners, melting heated lines or burning port stuffing / platform fires.
- High Pressure Sources – Positive pressure from port blowing out. Very dangerous – particulate, steam, hazardous gas!



Technical Challenges

- High SO_2 General – Not only dangerous to workers, but equipment. Exhaust must be vented, use peroxide in impingers to scrub it out as protection to dry gas meter and pump.
- High SO_2 in Method 29 Train – Add more peroxide or add more acidified permanganate as SO_2 will oxidize permanganate.



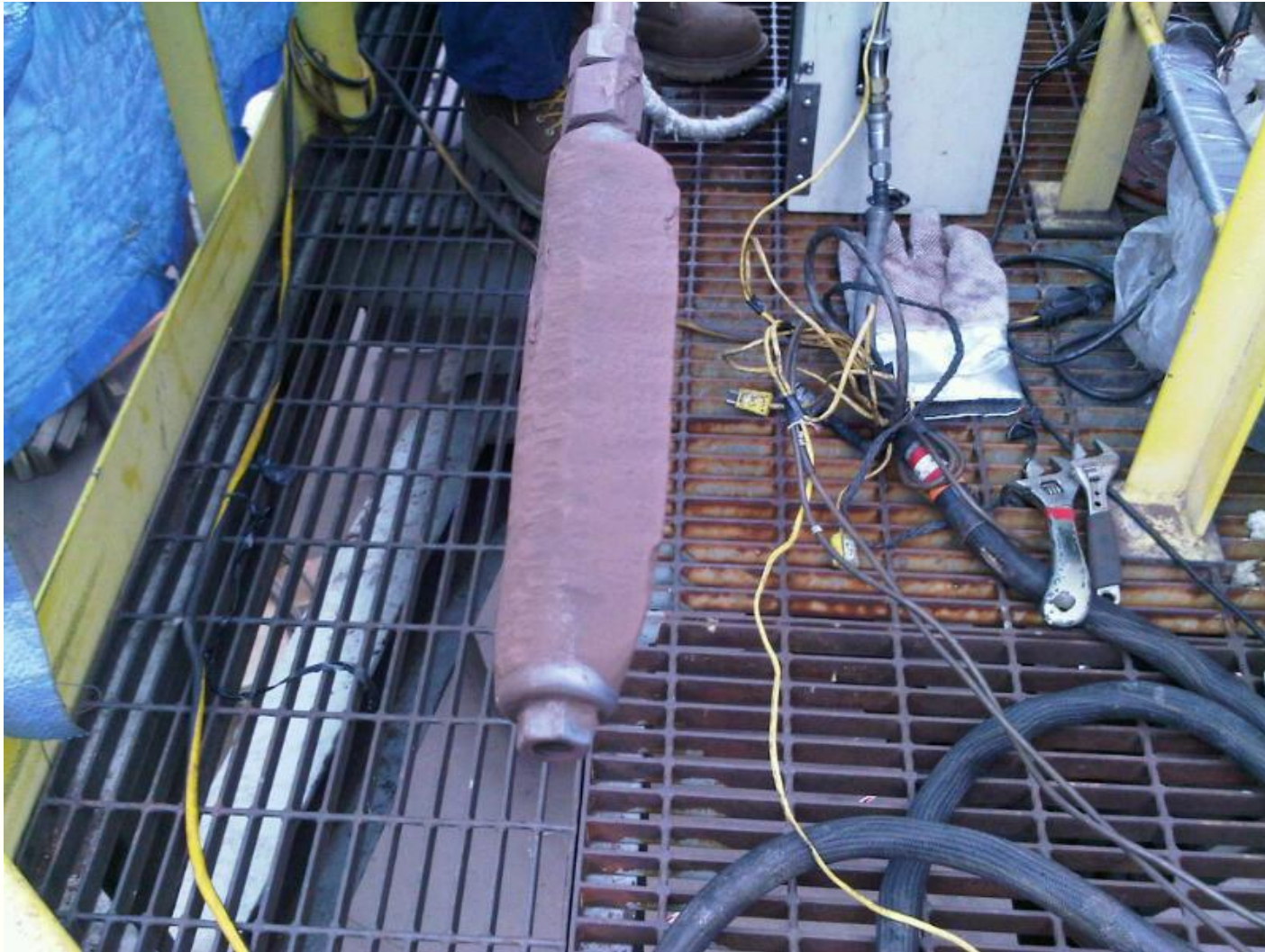
Technical Challenges

- Ammonia – Will bias NO_x concentrations high in a chemiluminescent analyser. Use a molybdenum converter or an ammonia scrubber or both!
- Hydrogen – Very dangerous to sample as there can be explosions. Also interferes with electrochemical cell operation.



Technical Challenges

- High CO – We all know what happens if CO is high. Requires special high range analysers / gases and a lot of caution. Vent everything!!! Wear SCBA if required.
- High Particulate – Makes sampling an absolute nightmare and can make analysis painful too! Sample time is shortened or sample rate is reduced drastically.





Technical Challenges

- High Vacuum Sources - Negative pressure sucking air into port. Usually at port before a fan (suction side). Port stuffing or wrench in to a fan is bad. Turn sample pump on first or lose all solutions.
- High Moisture Sources – Need extra impingers or a knock out impinger and a lot of ice!



Technical Challenges

- Detection Limits – Can the lab do what you want? What are in stack detection limits for contaminants?
- Long Test Times – To reach the detection limits the tests may have to be very long – like 8 to 24 hours!



Technical Challenges

- Method 0061 Hexavalent Chromium – Designed in warmer climate so using when cold painful. Have to heat potassium hydroxide recirculation lines, pumps and probe at times.
- Method 202 Dry Impinger Condensible Particulate – Keeping the CPM filter between 65 and 85 °F is very difficult when cold or windy or if really hot.



Technical Challenges

- Sample Probes – Again designed for southern climates, thus may have issues with heating. Probes are covered in cold or windy conditions.
- Cold in General – Test equipment freezes, solutions freeze and people freeze. Use heaters, blankets to insulate trains, use ethylene glycol in impingers for moistures.



Technical Challenges

- Equipment Malfunction – It'll work in the shop, but on site its always a big surprise! You'll be in a remote area when it fails.
- Fixing Equipment – You want to be able to fix equipment on the fly. Best techs are hands on people. Typically if they own a motorbike or have farming experience you are good to go!





Safety Challenges

Driving to and from the Job

- Commercial Vehicles – Driver log books, inspections by OPP or MTO, weigh scales, hours of service in a day (13 hrs) and week (70 hrs)
- Carrying Dangerous Goods – Bill of Lading and TDG training when driving



Safety Challenges

Driving To and From Job

- Weather – Ice, snow, wind, rain and closed roads.
- Vehicles – Are they prepared for the winter?
- Remote Areas – Gas / diesel, flat tires, etc.
- Our biggest concern is travelling!





Safety Challenges

- Other Dangerous Sources – While testing one stack, you may be fumigated by another source. Need to know surroundings well.
- Safety Training – Ensuring all the right training is valid prior to a job (I have 31 valid certificates)



Safety Challenges

- Paperwork – Are all permits, job safety analysis, TASK cards, work slips, work plans and daily inspections complete / signed off?
- PPE – What PPE is needed for the task and what is the plant requirement? Special gloves / coveralls / boots / spoggles? Has it been inspected?



Safety Challenges

- SCBA – Harsh atmosphere's require supplied air. Not fun to wear in summer / winter or when air runs low.
- Rules - Contractor rules may be more stringent than the facility rules – easier to enforce on a contractor.

Safety Challenges

- Weather – You can get really cold or really hot. Sampling at $-30\text{ }^{\circ}\text{C}$ is not fun for anyone.





Safety Challenges

- High Angle Rescue Plans – Some facilities require highly trained personnel in case of injury on the stack.
- Working at Heights – The risk of personal injury and property damage due to falling or dropping items from a platform is enormous.



Safety Challenges

Electrical Hook Up

- The risk of shock during powering up equipment. Usually completed by plant. Trailer is ESA inspected annually in Sarnia area.
- Working in wet areas with electrical equipment (GFIs)



Safety Challenges

Hours of Work

- You must have a MOL Approval for Weekly Excess Hours. When working at a plant hours are not normal or if working at a start up. Easy to exceed hours.
- Easy to exceed driving or MOL hours if travelling long distances before and after a job. Has to be planned before job if possible!



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That's It!!!

Thanks!