Cost-Effective Air Quality Management for Remediation Projects

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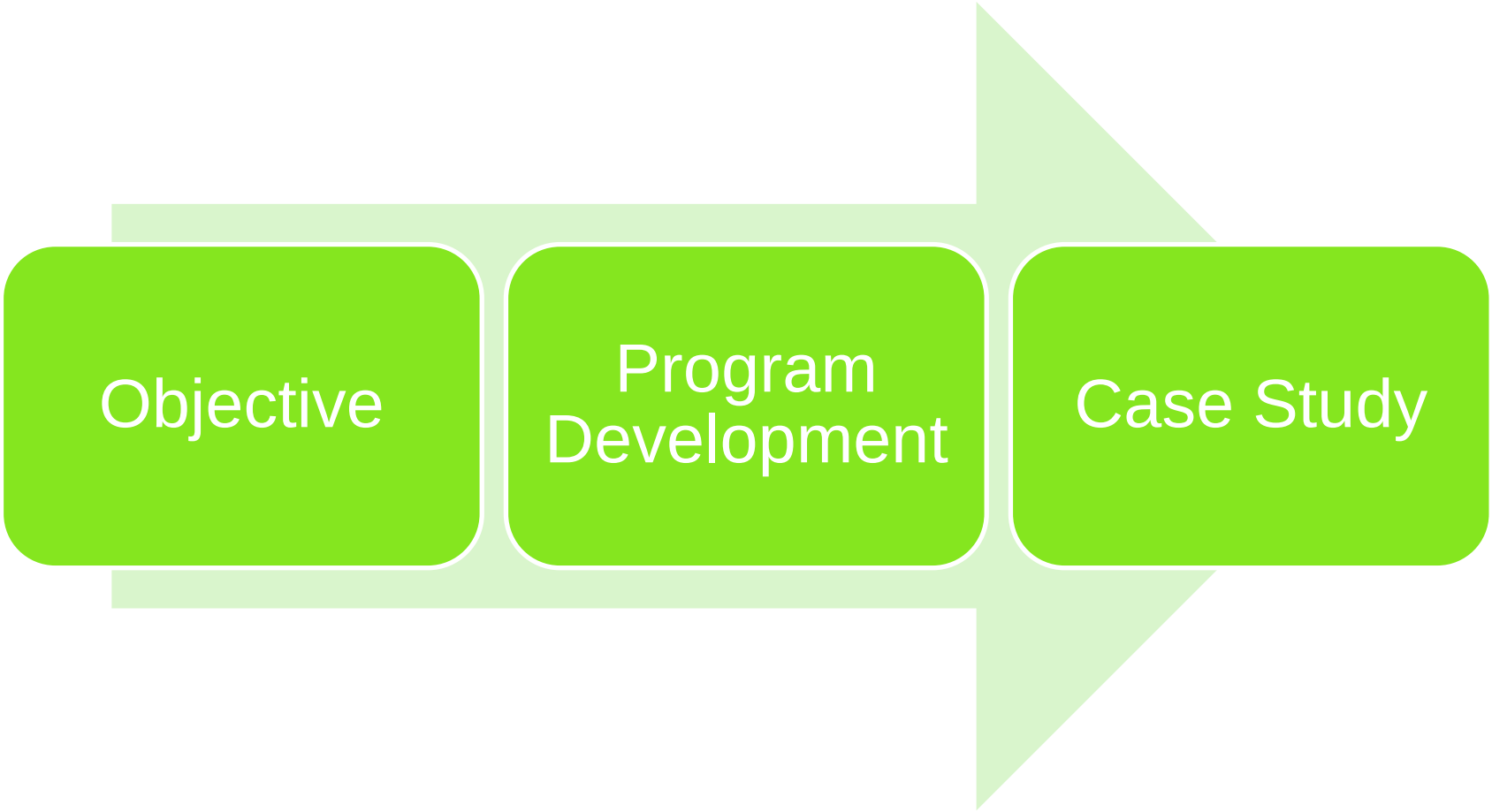
Overview



Introduction

Goal - To design a case by case technically defensible and cost-effective air monitoring program for remediation projects

Criteria - Outline the design and implementation of a perimeter air monitoring program that

- Is protective of public health
- Reduces owner's liability during remediation
- Is technically defensible with a cost-effective approach

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Perimeter Monitoring Objectives

- Protect public health and the environment
- Evaluate the need for dust suppression measures
- Document perimeter air quality during remediation activities
- Provide risk management and public confidence
- Reduce owner’s potential for liability

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Program Design Options

- Determine target parameters to be monitored via site investigation reports

Determine action levels	Equipment
• Based on a health/risk-based analysis • Based on regulatory acceptance levels	• Continuous: direct or via surrogate • Portable or Fixed Locations • Manual (walk around)

- Frequency of monitoring and reporting period
- Number of monitoring locations
- Sophistication of data telemetry/alarm systems

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Air Monitoring Action Levels

- An integral component of the program design

Purpose:

Site-specific Action Levels will indicate when to initiate dust suppression activities and/or limit or cease intrusive work for the protection of the general public and environment

- Risk-based action levels consistent with Federal and/or Provincial guidelines
- Action Levels based on protecting human health and the environment
- Parameter-specific action levels will assist in the ultimate design of types and sensitivity of monitoring equipment

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Developing Parameter-Specific Action Levels

Determine the constituents of interest (COI) at each site through a site survey, soil information, and planned remediation activities

Evaluate potential for exposure

- Human receptors in the vicinity
- Ecological receptors

Determine exposure pathways

Determine distance of receptors to site

Meteorological /climatological data

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Instrumentation

- Instrumentation must comply with accuracy needs dictated by parameter-specific risk-based action levels

Sampling equipment typically used at sites:

Particulates/Metals: **Continuous-fixed or portable particulate monitors (TSP/ PM_{10}/ $PM_{2.5}$)**	**Integrated Particulate Samplers (Hi-Volume or Lo-Volume samplers)**	**Volatile Organic Compounds (VOCs)**
• Used to detect fugitive dust levels as a surrogate for metals and, if applicable, PAHs	• On site analysis using XRF (i.e. lead) • Off site laboratory analysis (i.e. metals: Pb, As, Cr)	• Portable PIDs – for total VOCs • GCs – speciate (BTEX compounds) • Integrated Sampling - TO15

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Instrumentation (contd.)

Instrumentation (contd.)

- Meteorological data:
  - Continuous: wind speed, wind direction, temperature, dew point, rainfall
  - Need for real-time data:

    On-site tower vs. airport data

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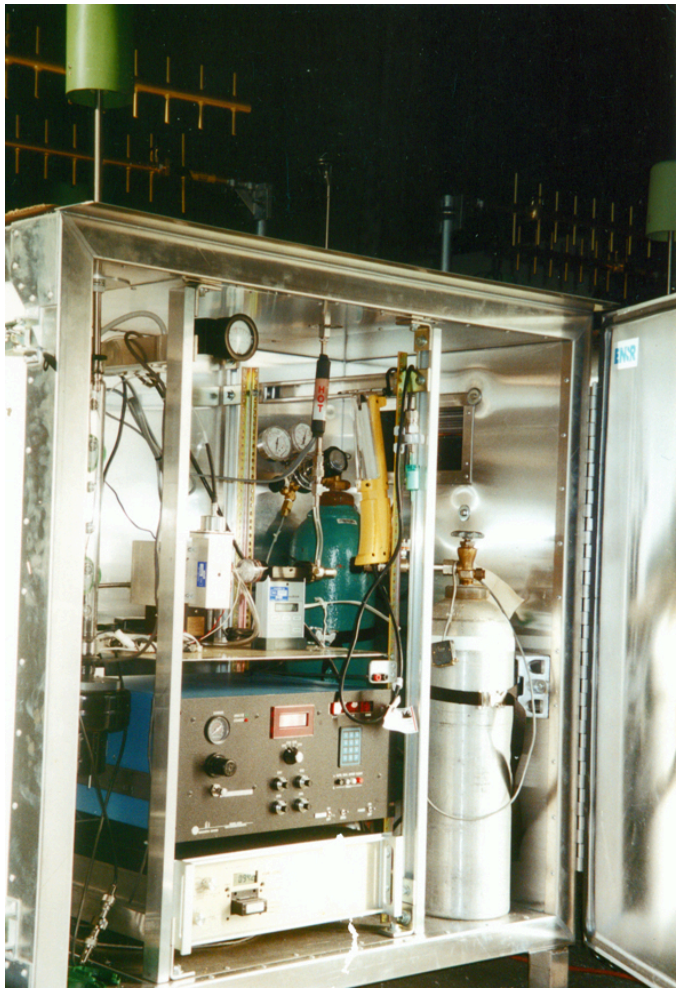
Number and Placement of Monitoring Locations

- Location and number of sites on a case-by-case basis
- Each site should be evaluated for the following:
  - Availability of electrical services
  - Security of site perimeter
  - Extent and length of perimeter boundaries
  - Proximity of remedial activities to local residents and other sensitive receptors (e.g., day care centers, schools, hospitals, housing, businesses, etc.)
  - Predominant wind directions, based on climatological analyses
  - Remedial activity plan (e.g., one location at a time vs. multiple locations at one time)
  - Budgetary considerations

Frequency of Air Sampling



More Intensive Program with Fixed Air Monitoring (FAM) Units

Advantages

- Continuous stream of data/information to base corrective actions on (if needed).
- Large, accurate database to help minimize owner liability associated with remedial activities

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Frequency of Air Sampling

More Intensive Program with Fixed Stations

Disadvantages

- May require electric power installation at each fenceline site
- May require environmentally controlled enclosures for instrumentation (speciated VOC parameters)
- Reduces mobility of monitoring sites and may require more sites than other monitoring protocols
- Requires extensive calibration and maintenance
- Higher costs and longer installation period

Frequency of Air Sampling (contd.)

Less Intense Program Approach Using Portable Air Monitoring (PAM) Units

Advantages

- Provides flexibility and ease of mobility to “hot” spots
- Battery operated – no electrical service needed
- Allows periodic survey of entire fenceline
- Generally lower cost than fixed units
- Easy and quick installation
- Provides real-time data telemetry to central location

Disadvantages

- In general, not as complete a data base as with continuous samplers
- No GC for VOC speciation
- 24/7 monitoring becomes more difficult

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Frequency of Air Sampling (contd.)

Integrated Sample Collection (8-72 hours)

Advantages	Disadvantages
• Ability to collect a sample at multiple locations during the work day • Reliability, some use conventional electrical power, others uses batteries, potential to use generators • Ease of moving sample location • Analytical results provide accurate, specific concentration of target parameter averaged over sample period	• One sample per sampling period per site • Data not available for up to 2-4 weeks after sample collection • Analytical costs vary depending on parameter ($25-250/sample)

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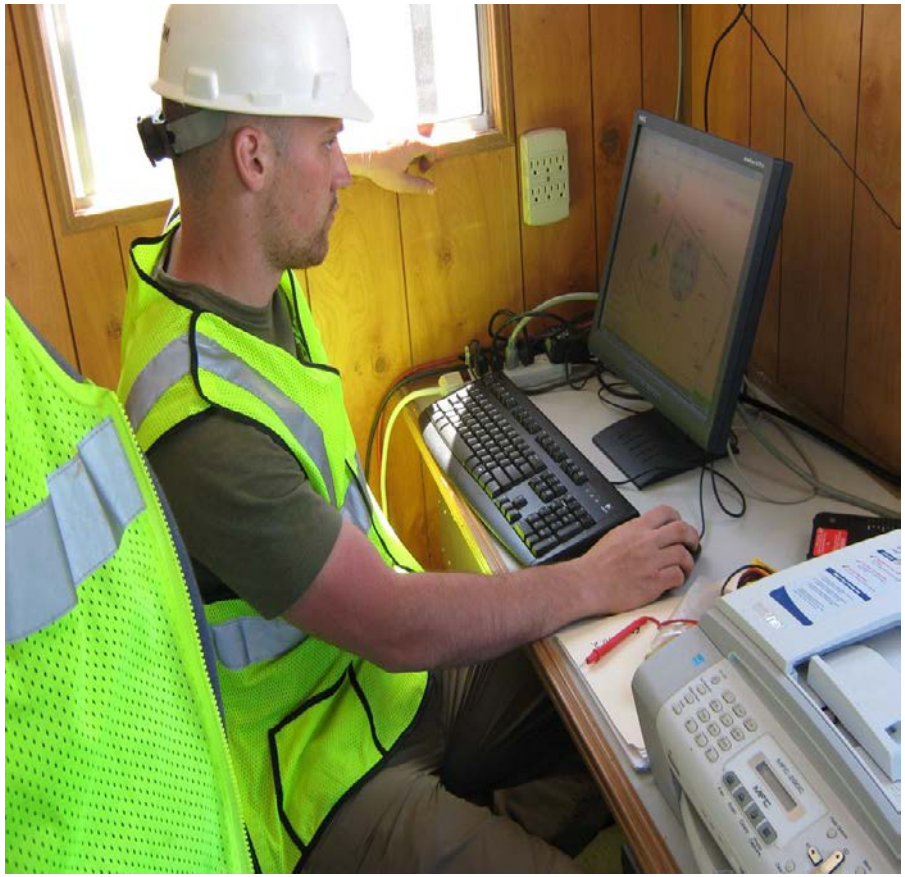
Reporting

- Appropriate reporting guidelines are laid out to meet requirements of the program.
- Data should be properly archived and reported in a systematic manner on a central database system
- Proper Quality Assurance (QA) procedures are defined and followed.



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Conceptual Design and Regulatory Review

- Prepare and discuss DRAFT design with site owner.
- Allow regulatory body (e.g., Federal, Provincial, Territorial, etc.) to review conceptual design of fenceline monitoring program.
  - Helps gain understanding of regulatory position on fenceline monitoring results.
- Obtaining up-front agreements with site owner and regulator(s) will save on potential valuable design time and save money

Monitoring Plan Generation

- Generate a formal monitoring plan based on project objectives, stakeholder needs, regulatory review and response to comments:
  - Monitoring objectives
  - Perimeter monitoring site locations
  - Monitoring protocols
  - Frequency of sampling
  - Instrumentation
  - Action limits for various parameters
  - Routine operations
  - Data telemetry
  - Data reporting
  - Instrument calibration protocols.
- Obtain regulatory approval of monitoring plan prior to commencing monitoring program

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Summary

- Many issues must be addressed in the design of a fenceline monitoring program for a remediation site.
- Must clearly define program objectives (internal and external).
- Goal is to design a technically defensible and cost-effective program.
- Neglecting some key issues can result in liabilities for site owner/remediation party or more elaborate and costly air monitoring programs than may be necessary.

Case Study – Air Quality Monitoring Plan: Giant Mine Remediation Project

Site Description

- 2,300-acre remediation site in Yellowknife, NT;
- Arsenic trioxide dust is the primary contaminant of concern (in soil and inside buildings)
- Sensitive receptors to the south
- Local and national public scrutiny.

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Case Study – Air Quality Monitoring Plan: Giant Mine Remediation Project

Program

- Represents a complex and conservative approach to air monitoring.
  - Used a tiered approach (fenceline and in-community monitors).
- Fenceline monitoring of targeted COIs will be a project management tool for operations and local air quality.
- This will be supplemented by the fixed-station in-community air monitoring to track environmental trends beyond the fenceline.

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Program Overview – Fenceline Monitoring

- Targeted parameters:
  - Particulate Matter - the surrogate
  - Arsenic - COI
  - Meteorology – Supporting data
- Frequency/Duration:
  - Continuous measurements during remedial activities
- Action Levels:
  - Risk based development
- Measurement Locations
  - Based on real-time wind data and remedial activity location.

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Program Overview – Community Monitoring

- Targeted parameters:
  - Trace metals (including arsenic), asbestos, PM_{10}
- Frequency/Duration:
  - Continuous and every three days
- Criteria:
  - Jurisdictional based
- Locations
  - Fixed at key residential communities

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Questions?

Thank You

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