

# ***MNA Guideline Development in Alberta***

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# ***Introduction***

- **Upstream Oil & Gas Sites**
- **Guideline developed to support risk management framework**
- **MNA suggested as remediation option**
- **Interest and research from other sectors**



## ***Regulatory Context***

- **Alberta Environmental Protection and Enhancement Act**
- **Activities Designation Regulation**
- **GARPHA**
- **AENV/AEUB MOU for Upstream Site Reclamation**
- **Petroleum Storage Tank Guidelines**
- **Groundwater Quality Objectives Guideline**



# *Process*

- **Review of existing Legislation**
  - *M.Sc. Thesis (Epp, 2000)*
    - Canada*
    - United States*
    - Europe*
- **Ongoing Research (CORONA)**
- **Guideline Development (committee)**



# ***Existing Legislation***

## **■ Many Similarities:**

- *Site characterisation*
- *Supporting lines of evidence*
- *Source removal/control*
- *Modelling*
- *Ongoing monitoring*
- *Performance evaluation*
- *Contingency planning*

## **■ Differences**

- *Scoring vs. conceptual model*
- *Timeframes for completion*



# **Research**

## ■ Consortium for Research on Natural Attenuation (CORONA, 1999):

### **Phase 1**

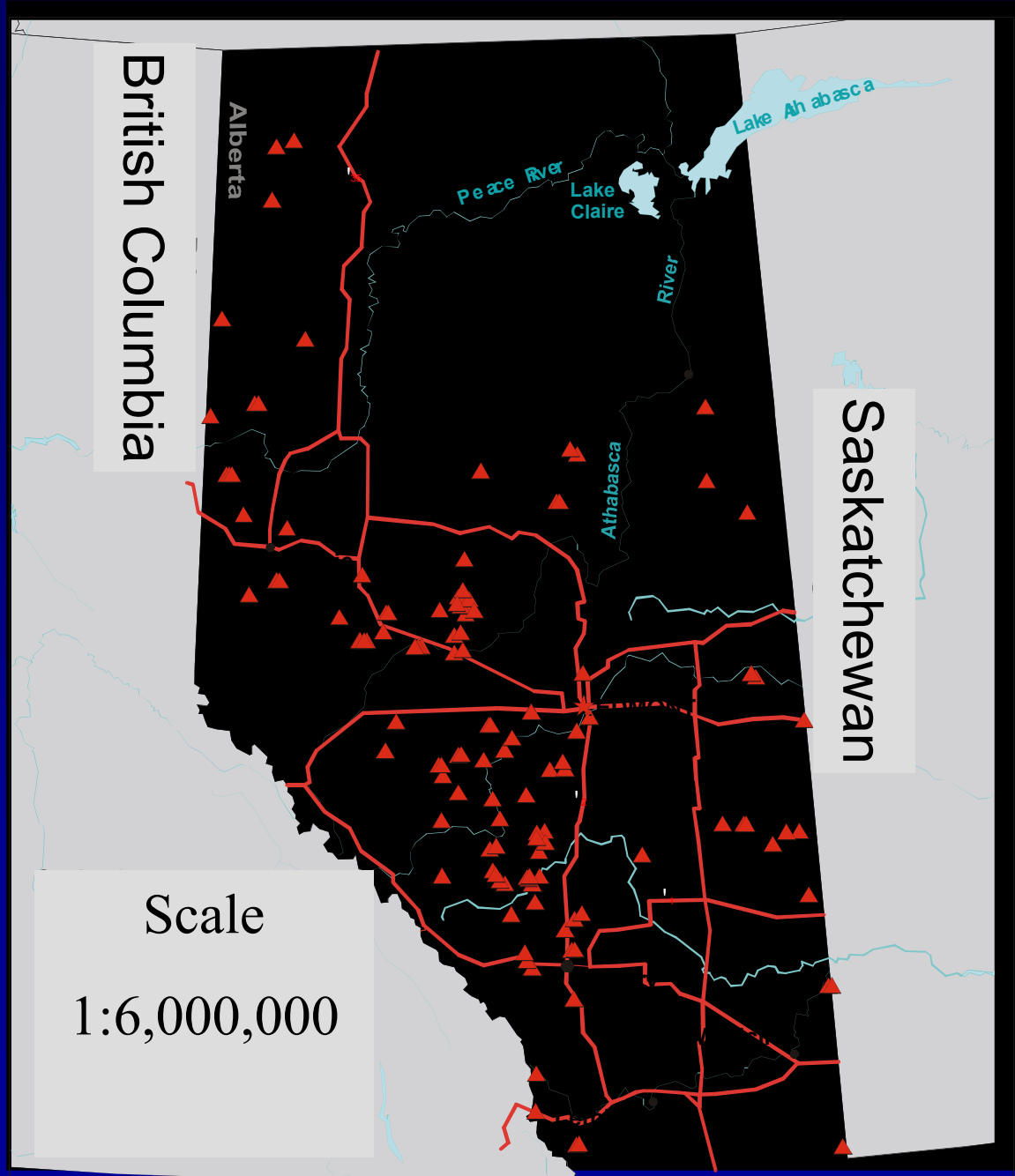
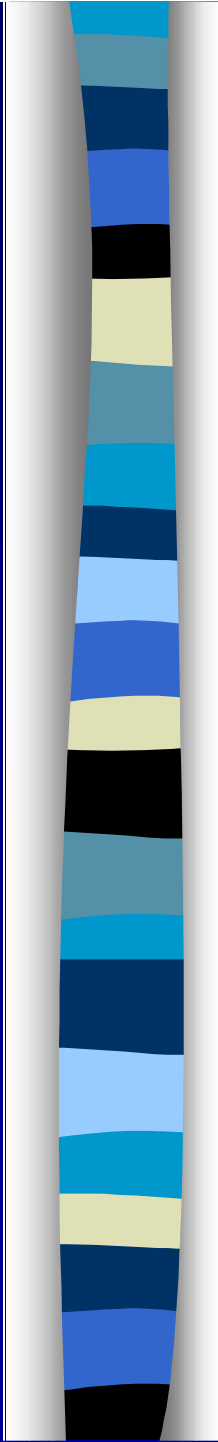
- *Review existing data for Alberta sites*
  - Evidence of natural attenuation
- *Microbiological test assessment*
  - Quick indicator of biological activity
- *Sampling and characterization study*
  - Literature review and fieldwork



# **Research Results – Phase I**

## **■ Alberta Site Review (CORONA 2002):**

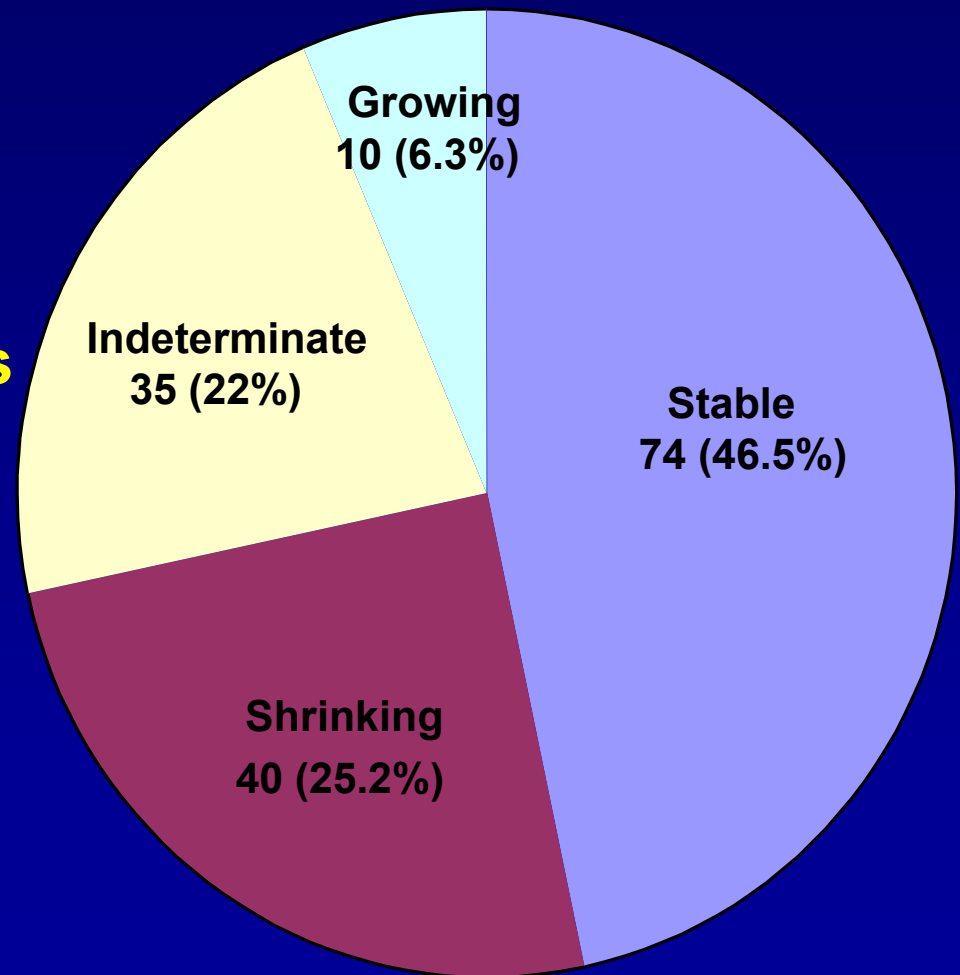
- *Plumes: petroleum hydrocarbons (PHC), process chemicals (non PHC), inorganics (mainly chloride)*
- *Majority interpreted as stable or shrinking*
- *PHC plume length shorter than other types*
- *Sulphate reduction most important biodegradation reaction*





# ***PHC Plume Trends***

- **71% of PHC plumes are shrinking or stable**
- **Growing plumes associated with increases in co-contaminants**
- **Other studies had higher numbers of shrinking plumes**





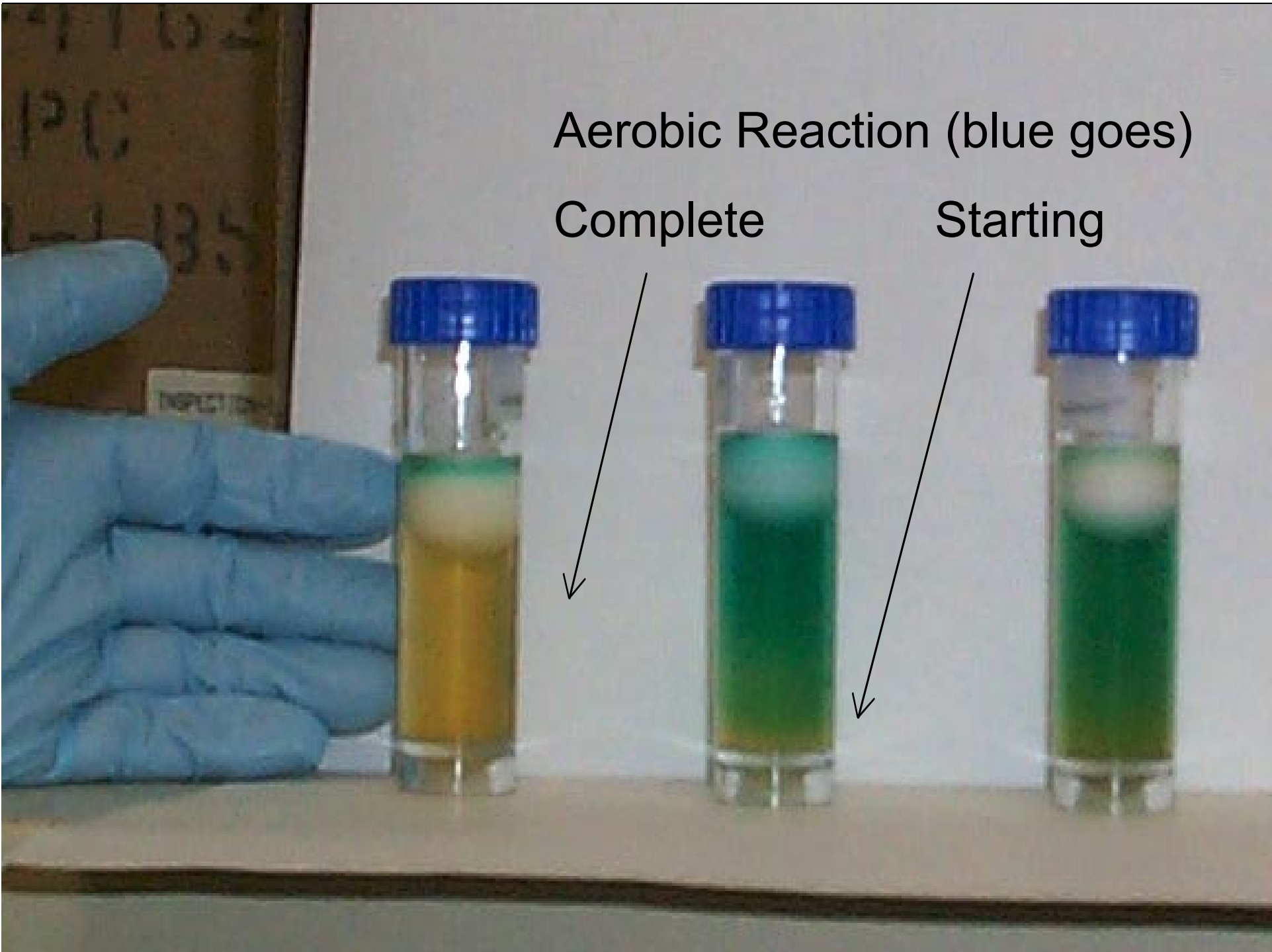
## ***Research Results (cont.)***

- **Biological Activity Reaction Test (BART™)**
  - *Cooler temperature increased lag time, but gave similar results*
  - *Sulphate reduction test results correlated well with other lines of evidence*
  - *Other test types (aerobic, denitrifying, iron-related bacteria) gave non-specific results*

Aerobic Reaction (blue goes)

Complete

Starting



# Iron and Sulphate Reactions

Colour and/or growths





## ***Research Results (cont.)***

- **Sampling at Slow Recovery Well Sites**
  - *Minimal purging gave most consistent results*
  - *Uncertainty due to:*
    - well construction
    - hydrogeology influence
    - purging protocol
    - sampling method











## ***MNA Guidelines***

- **Set up Steering Committee in 2002**
  - *Government, industry, consultant, academic, and public representatives*
- **Committee set Guideline Content**
  - *Issues/concerns*
  - *Specific items to include/address*
- **Committee set Guideline Format**
  - *Outline*
  - *Content*



## *Issues*

- **Regulatory review process**
- **Stakeholder notification**
- **Offsite/off lease contamination**
- **Timeframe for completion**
- **Contingency plans**
- **Others?**





# ***Applying MNA in Alberta***

## **■ Staged Approach**

- *Screening*
- *Process documentation via lines of evidence*
- *Implementation/Monitoring*
- *Closure if successful*
- *Contingency plan (if not successful)*

## **■ Site Conceptual Model**

- *Risk evaluation*
- *Receptor identification*
- *Modelling*
- *Refine as data collected*



# **Guideline Writing**

- **July 2002**
  - *Outline finalized*
- **September 30, 2002**
  - *Deadline for draft guideline*
- **October 24, 2002**
  - *Steering committee review and comments*
- **November, 2002**
  - *Internal and stakeholder review*



# ***Closure***

- **Work in progress**
- **Looking for stakeholder input**