

Assess

Design

Implement



Remediation Technologies Symposium 2009

Guaranteed Site Remediation Solutions



Remediation Technologies Symposium 2009

Biotreatment of Oily Sludges

Presented by: Jeff Dirks

Guaranteed Site Remediation Solutions



Site History

- Petrochemical plant near Montreal, Quebec, in an industrial area
- Sedimentation pond in use since the 1960s
- Oily sludge was characterized between 1998 and 2001
- TPH content averaged 170,000 mg/kg (17%)
- Pond had to be partially rebuilt



Mandate and Objectives

- Meet client's and Biogenie's expectations related to health and safety and environment
- Removal of oily sludge and impacted clay at the bottom of the pond
- Change the property of the impacted material in order for it to be received at a non-hazardous landfill
- Redesign of the pond to meet current provincial regulations

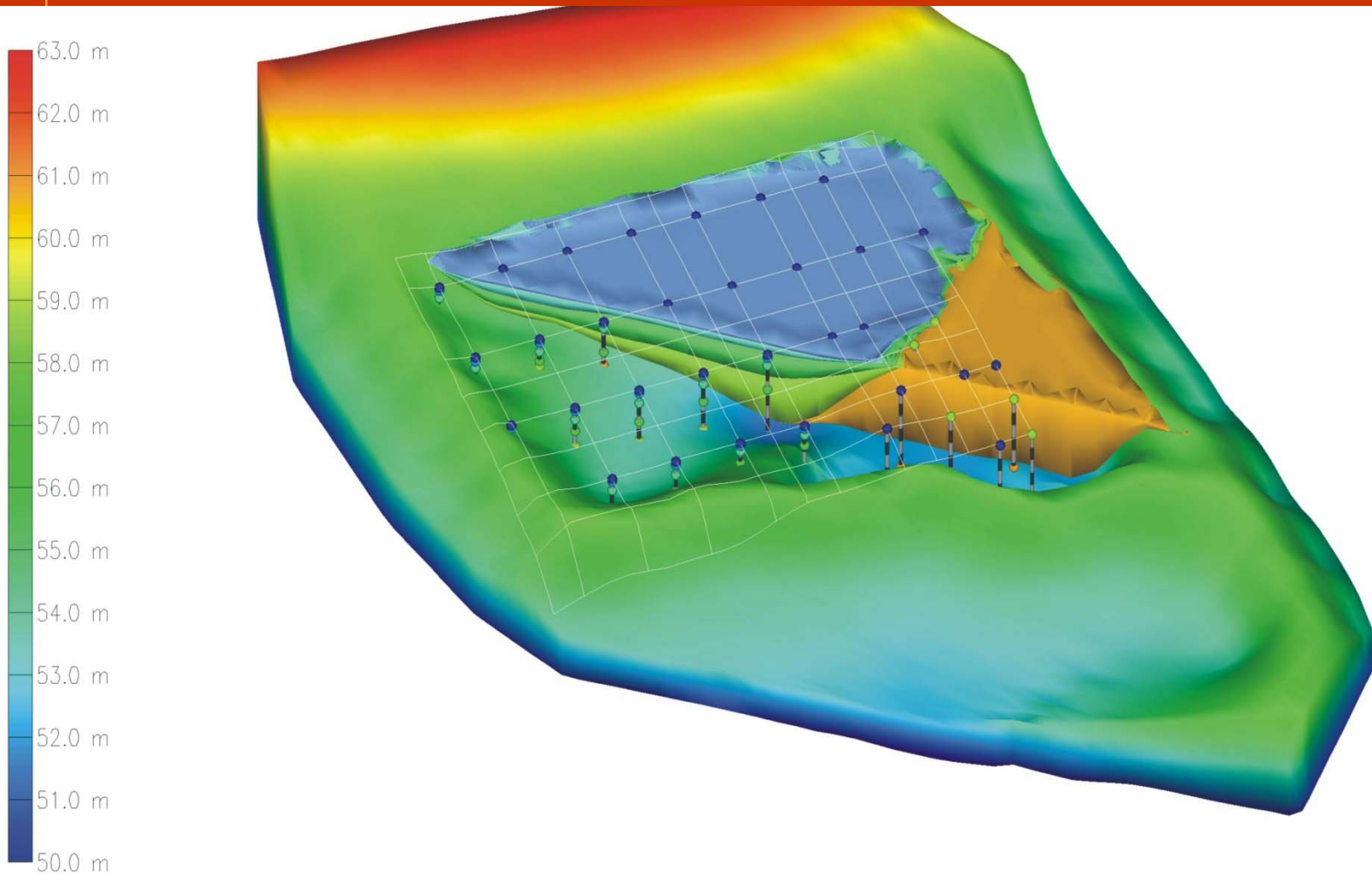


Treatability Study

- Determine the best bulking agent
- Sludge amended with organic and inorganic nutrients
- Estimate performance and duration of treatment
- Determine the presence of a inhibitors (e.g. metals)

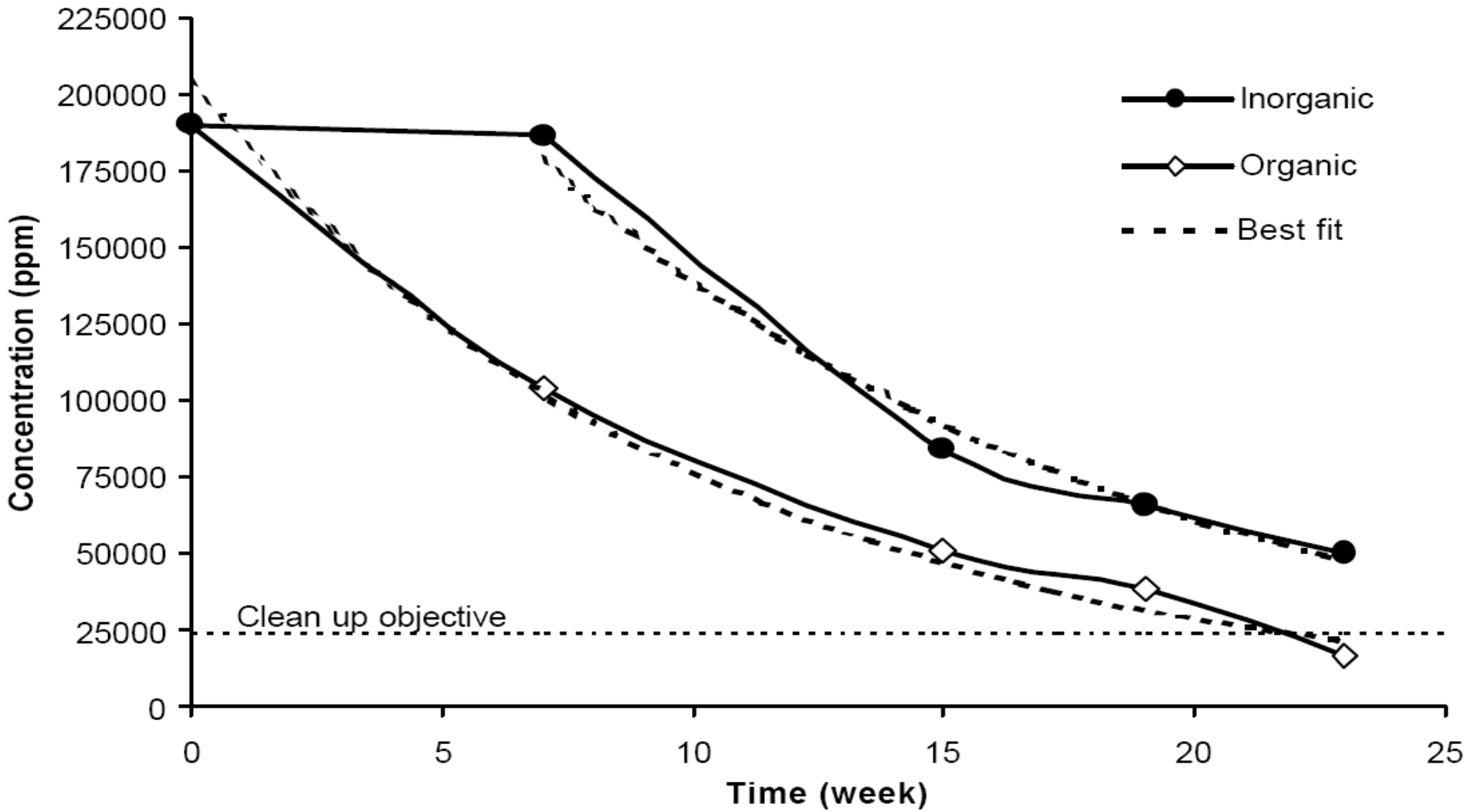


Sludge Characteristics



Treatability Study Results

Biodegradation Kinetics (treatability study)

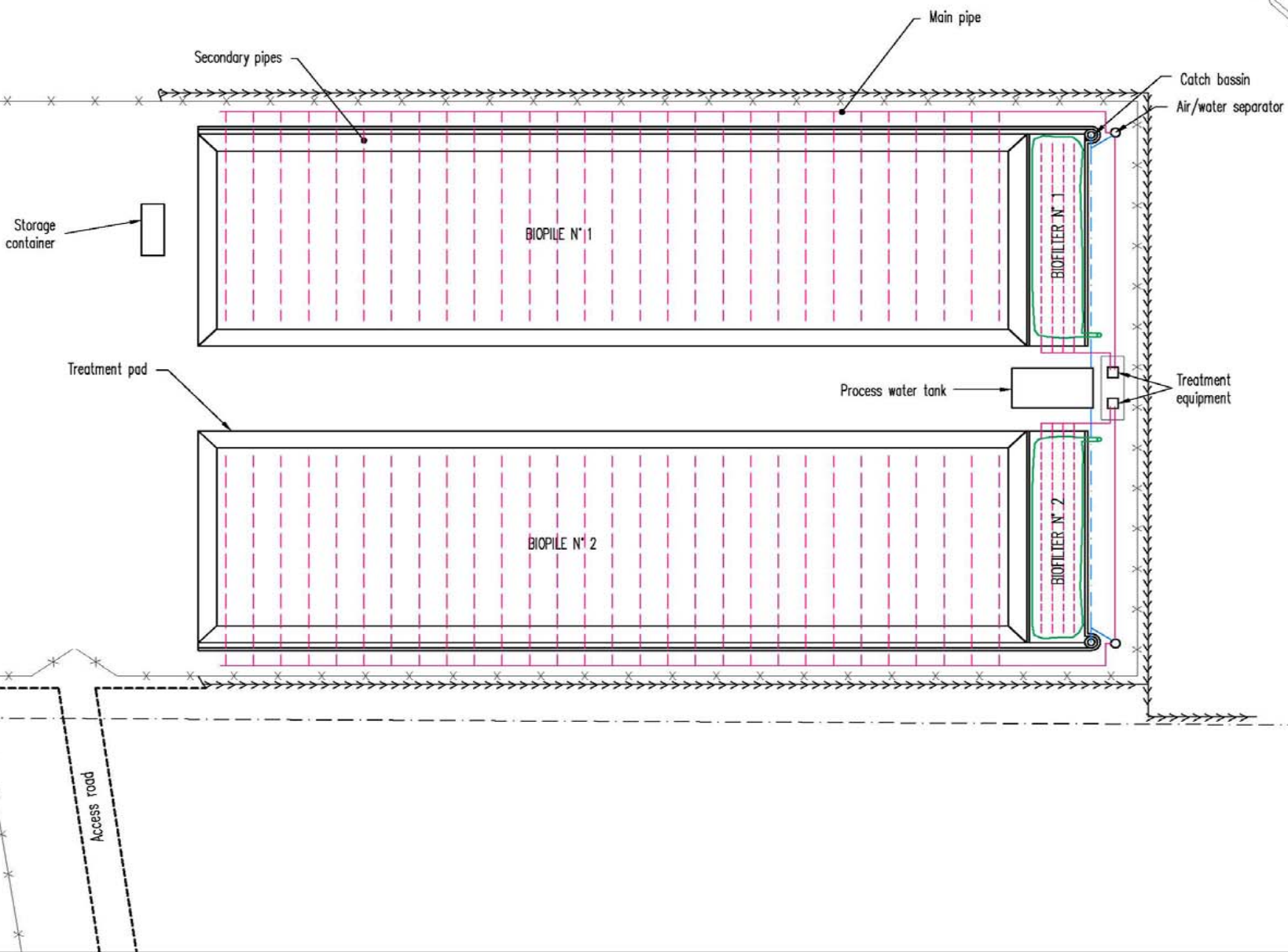
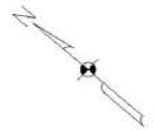


Remediation Strategy

Biotreatment of impacted waste using the *ex situ* Biopile

- Construction of two treatment pads (capacity of 5,000 m³ each)
- Soil amendment with bulking agent and nutrients
- Soil transport
- Periodic soil tilling
- Monitoring of equipment and soil condition
- Disposal at an authorized landfill





Secondary pipes

Main pipe

Catch basin
Air/water separator

Storage container

BIOPILE N°1

BIOFILTER N°1

Treatment pad

Process water tank

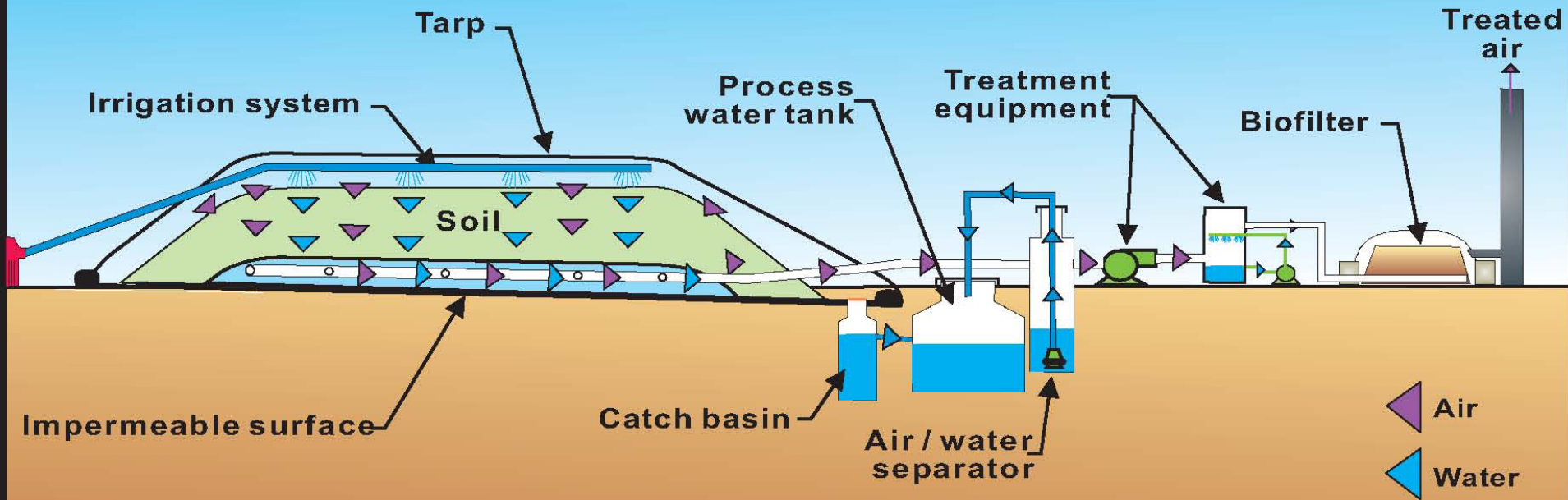
Treatment equipment

BIOPILE N°2

BIOFILTER N°2

Access road

BIOPILE - Schematic View



Treatment Pad Construction



Sludge - Initial State



Access Ramp



Sludge Loading



Stockpiling of the Sludge



Truck Cleaning



View of Treatment Pad #1



Sludge Watering



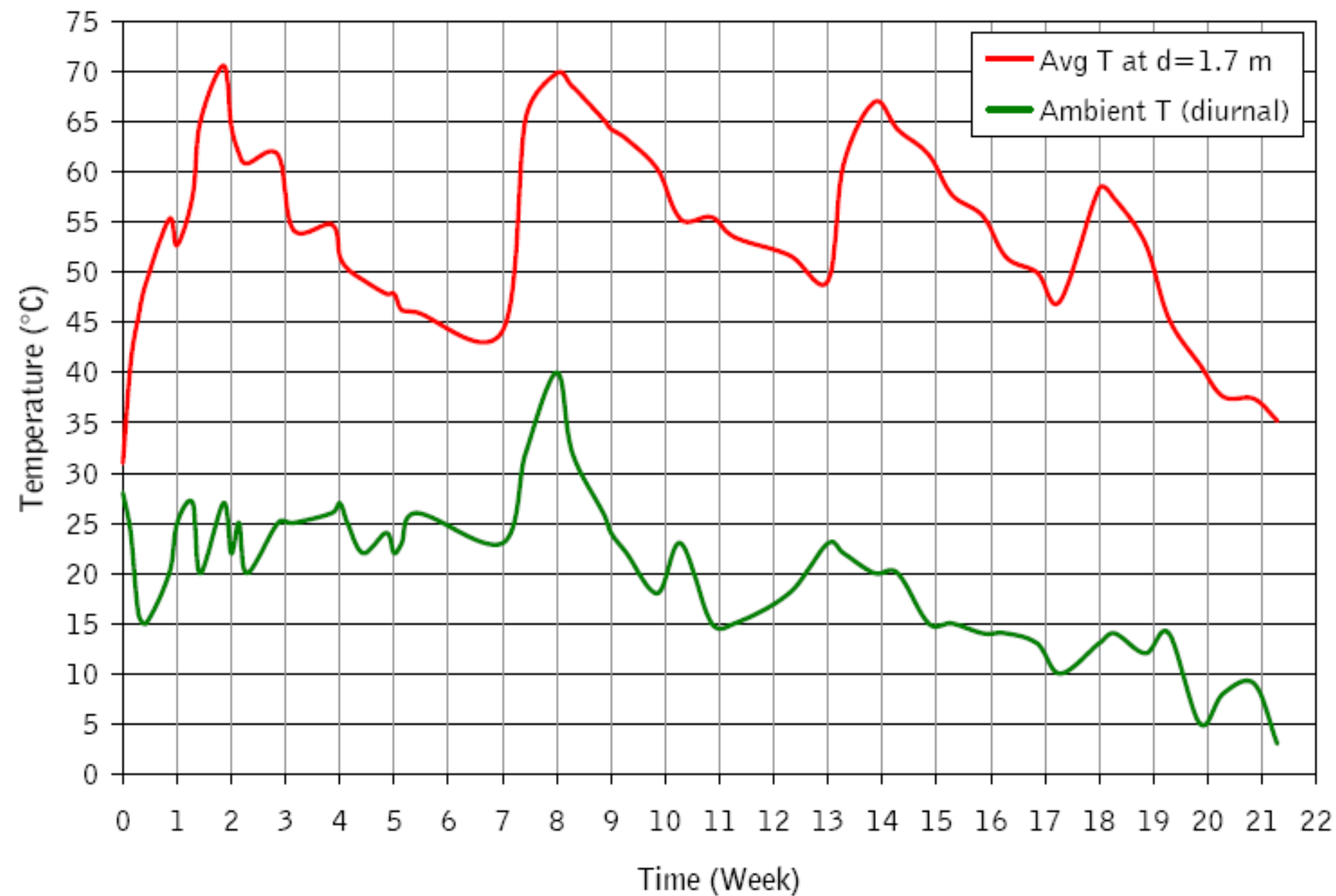
Project Results

- Hydrocarbons had a final average concentration of 10,000 mg/kg
- All others control parameters were below the applicable criteria (BTEX, PCBs, PAHs, metal leachate)
- Air treatment results showed concentrations below the applicable criteria⁽¹⁾
- Total treatment time: 5 months

⁽¹⁾: Montreal Urban Community (CUM) and Provincial Guidelines

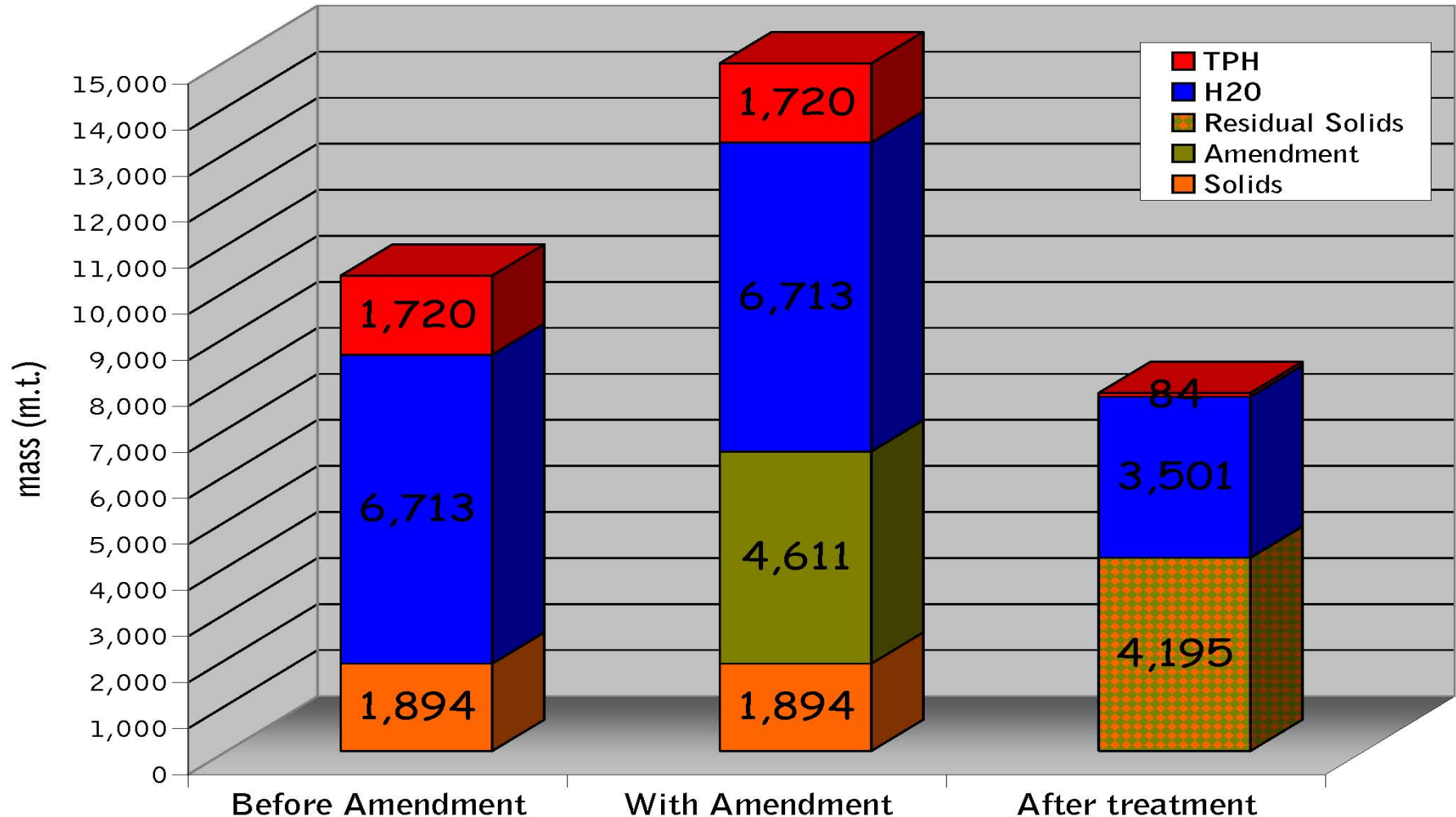


Temperature Evolution in Biopiles



Mass Balance

(Sludge Mass Breakdown in m.t. before and after treatment)



Pond Reconstruction

- Reshape the berms and preparation of the bottom
- Installation of a drainage system and membrane
- Reconstruction of the dam



Berms Reshaped



Drainage System



Membrane Installation



Membrane Installation (continued)



Dam Prior to Reconstruction



Dam Following Reconstruction



Impermeable Liner Pipe Junction



Impermeable Liner Dam Junction



Health and Safety

- Approval of our Program by the client
- Job Safety Analysis process applied
- External audits were completed during the project
- Ambient air quality tests were performed by an industrial hygienist
- Training given by the Quebec Petrochemical Institute to all employees
- Blood screening prior to and after the project for field personnel



Questions?

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