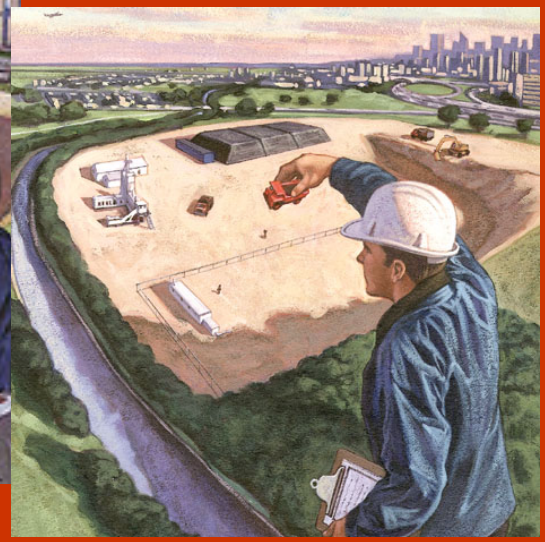
Assess Design Implement



Remediation Technologies Symposium 2010

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Guaranteed Site Remediation Solutions

Remediation Technologies Symposium 2010

3D Modelization and Remediation of Hydrocarbon Impacted Soil at a Former Mine Site in Northern Quebec

Presented by: Philippe Gingras

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Guaranteed Site Remediation Solutions

Site History and Environmental Issues

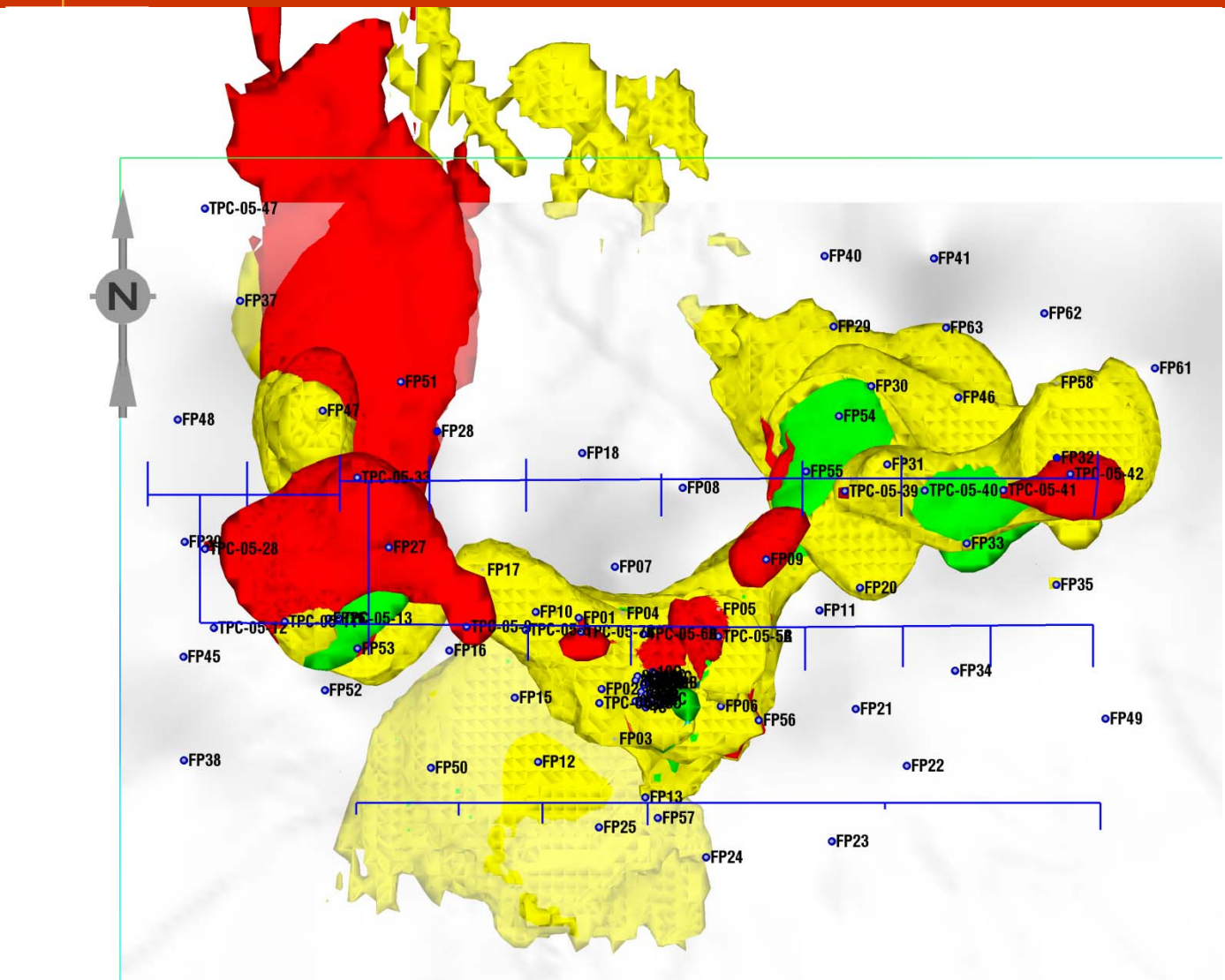
- Open-pit and underground mine producing copper zinc, silver and gold ore
- In operation from the early 1980's to early 2000's.
- Mine closure and reclamation initiated in 2004
- Hydrocarbon impacts associated to tank farm and underground piping carrying fuel oil

Open Pit

Camp

Site Characterization

3D Modelization



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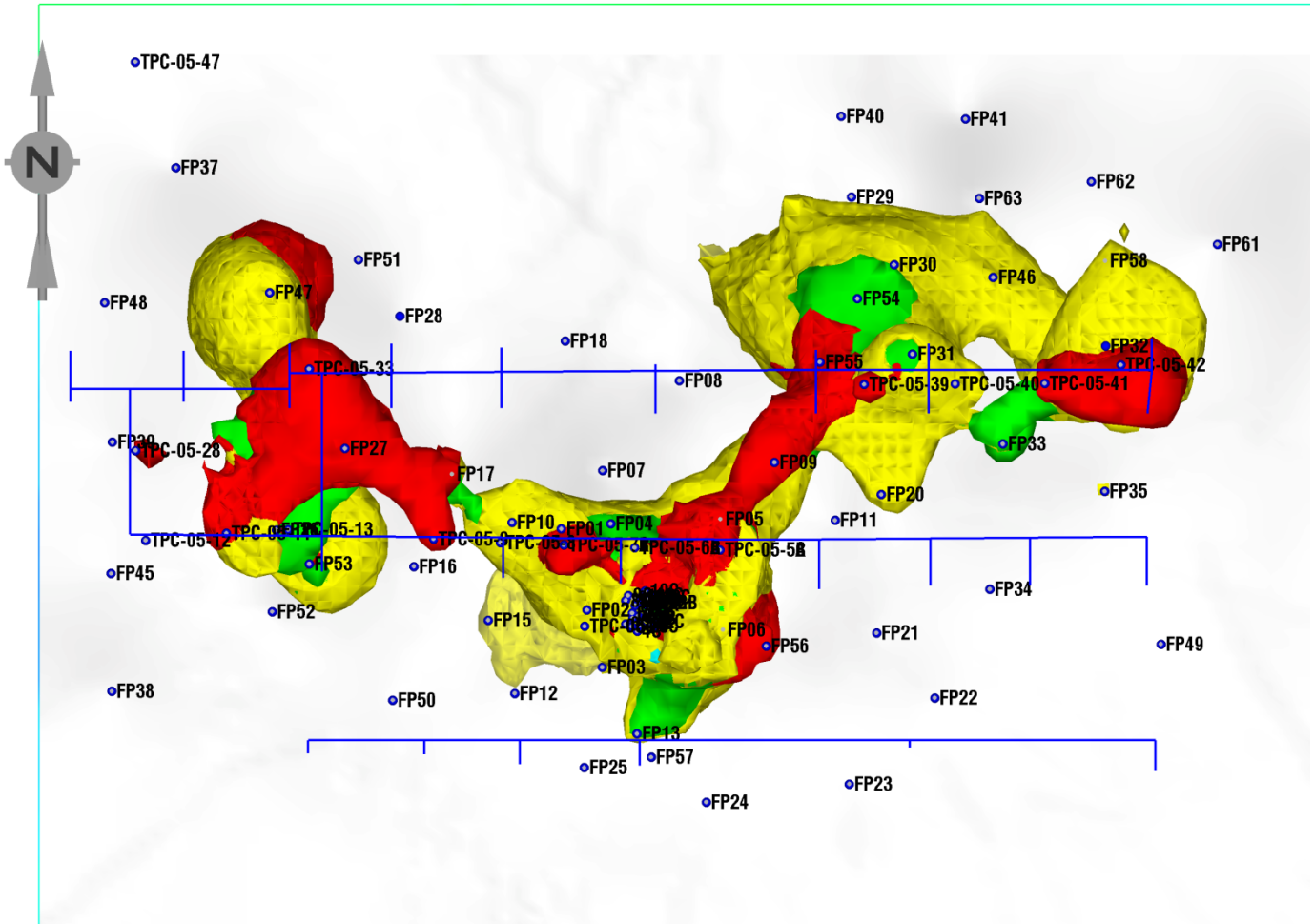
3D Modelization



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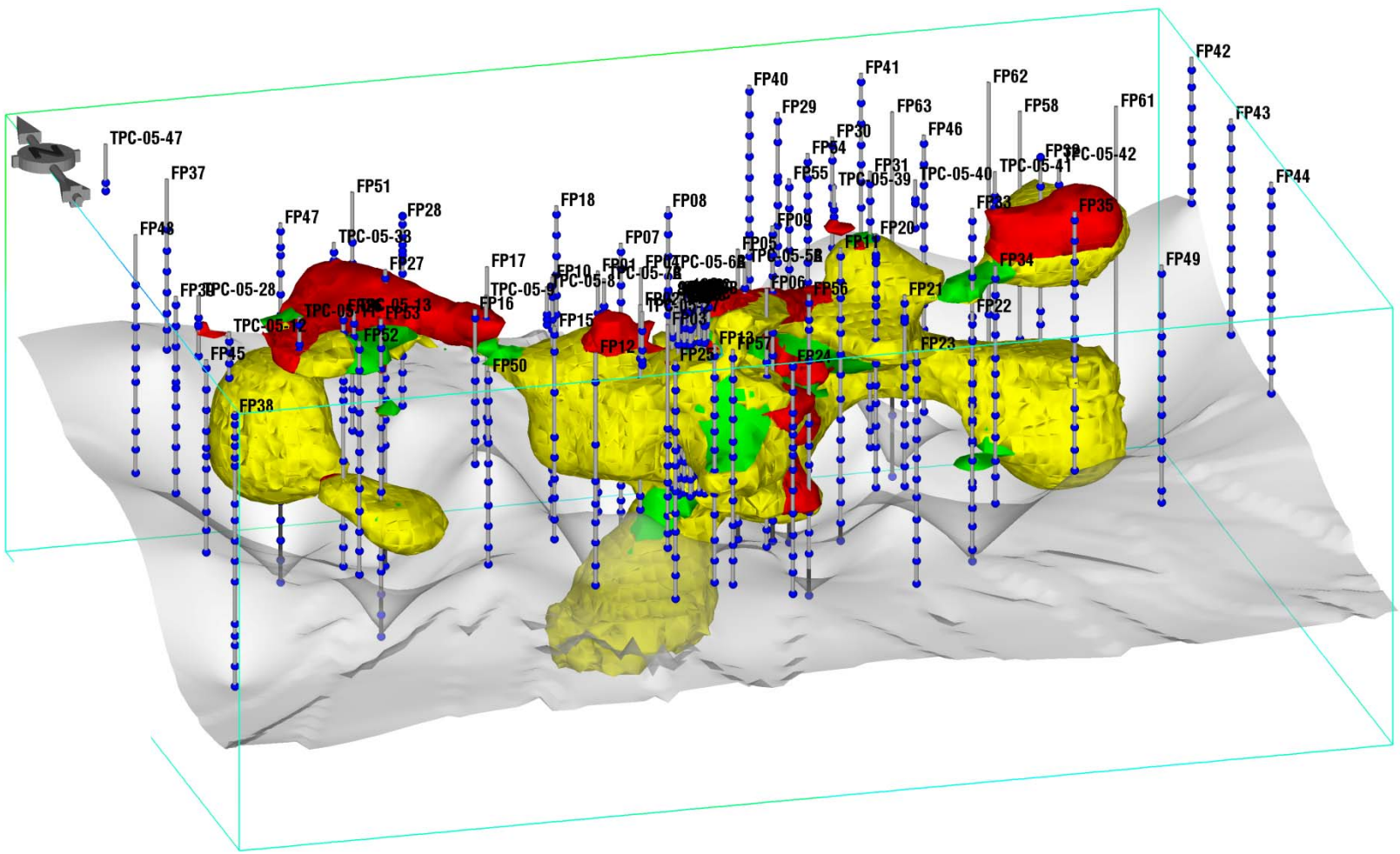
3D Modelization



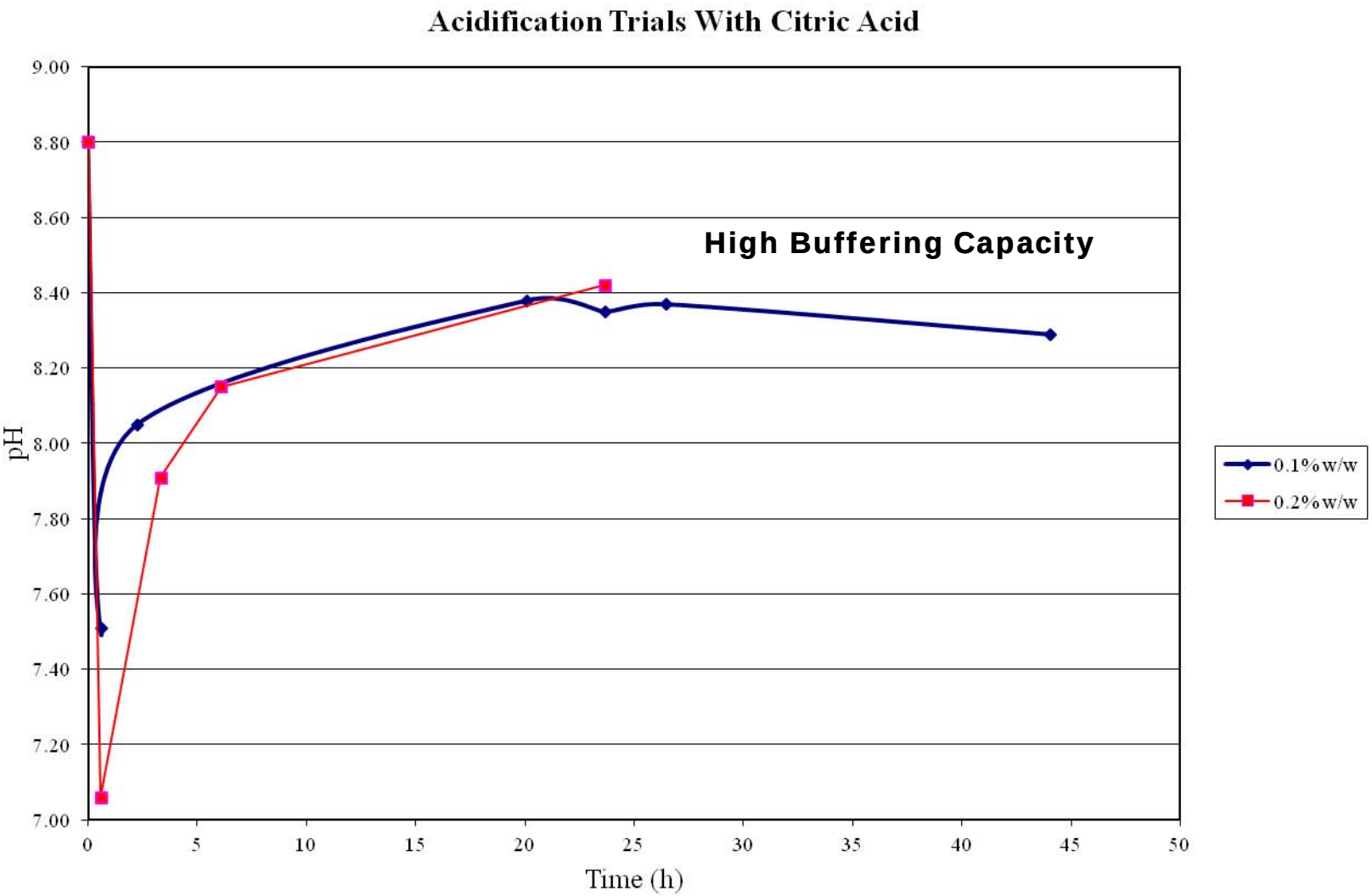
Volume Estimates

- 30,000 m^3 of Impacted Soil
- 90% Confidence Interval
- 220,000 m^3 of Common Excavation
- Slopes of 2:1
- Timeline of 2 Months for excavation
- Timeline of 4 Months for treatment

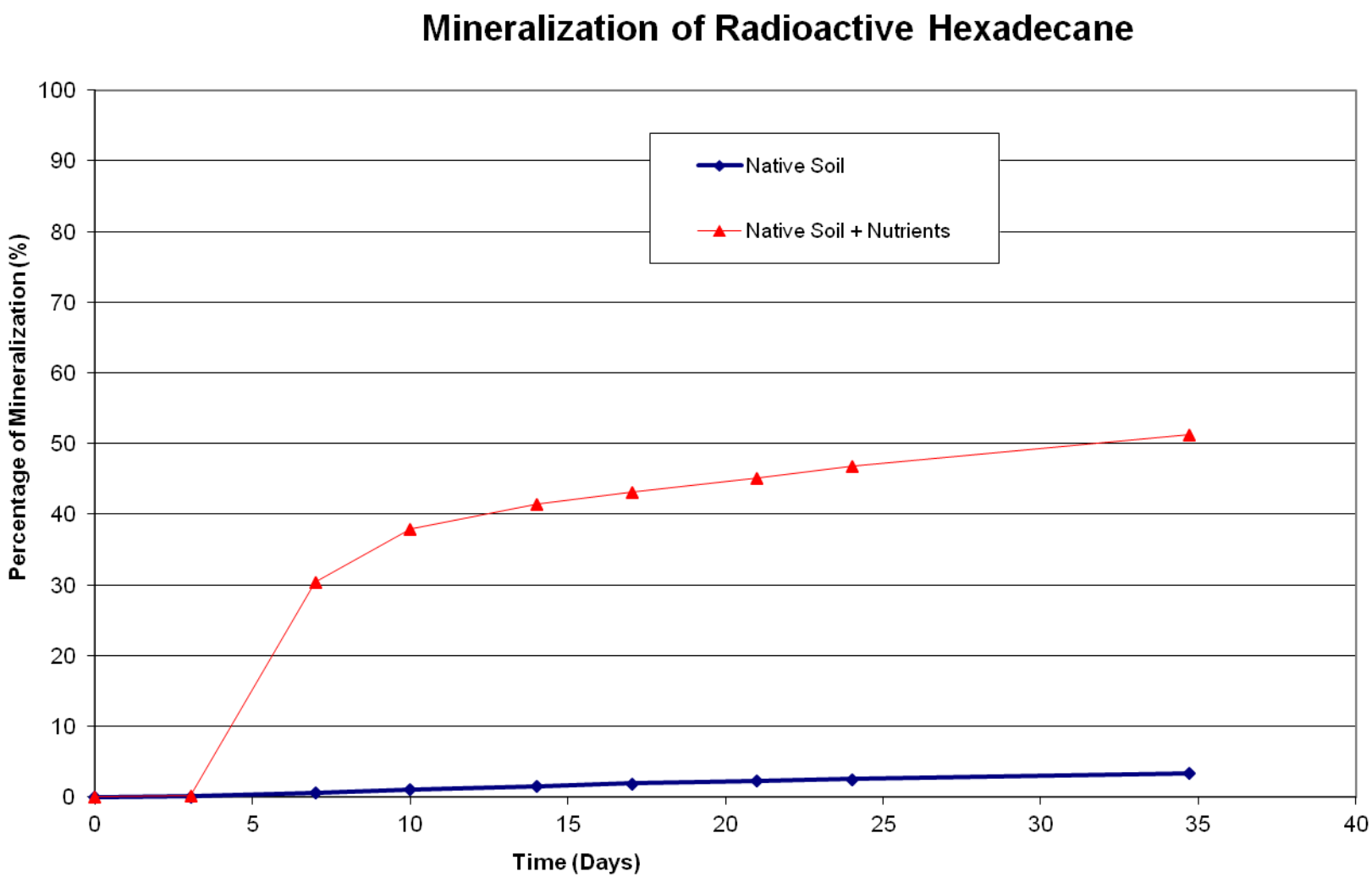
Initial Conditions

- Soil pH between 8.5 and 9.5
- Total Organic Carbon Values < 1%
- Low microbial counts in soil
- Available N and P concentrations inexistent
- Moisture Level < 5%
- High Porosity

Bench Scale Testing



Bench Scale Testing



Excavation

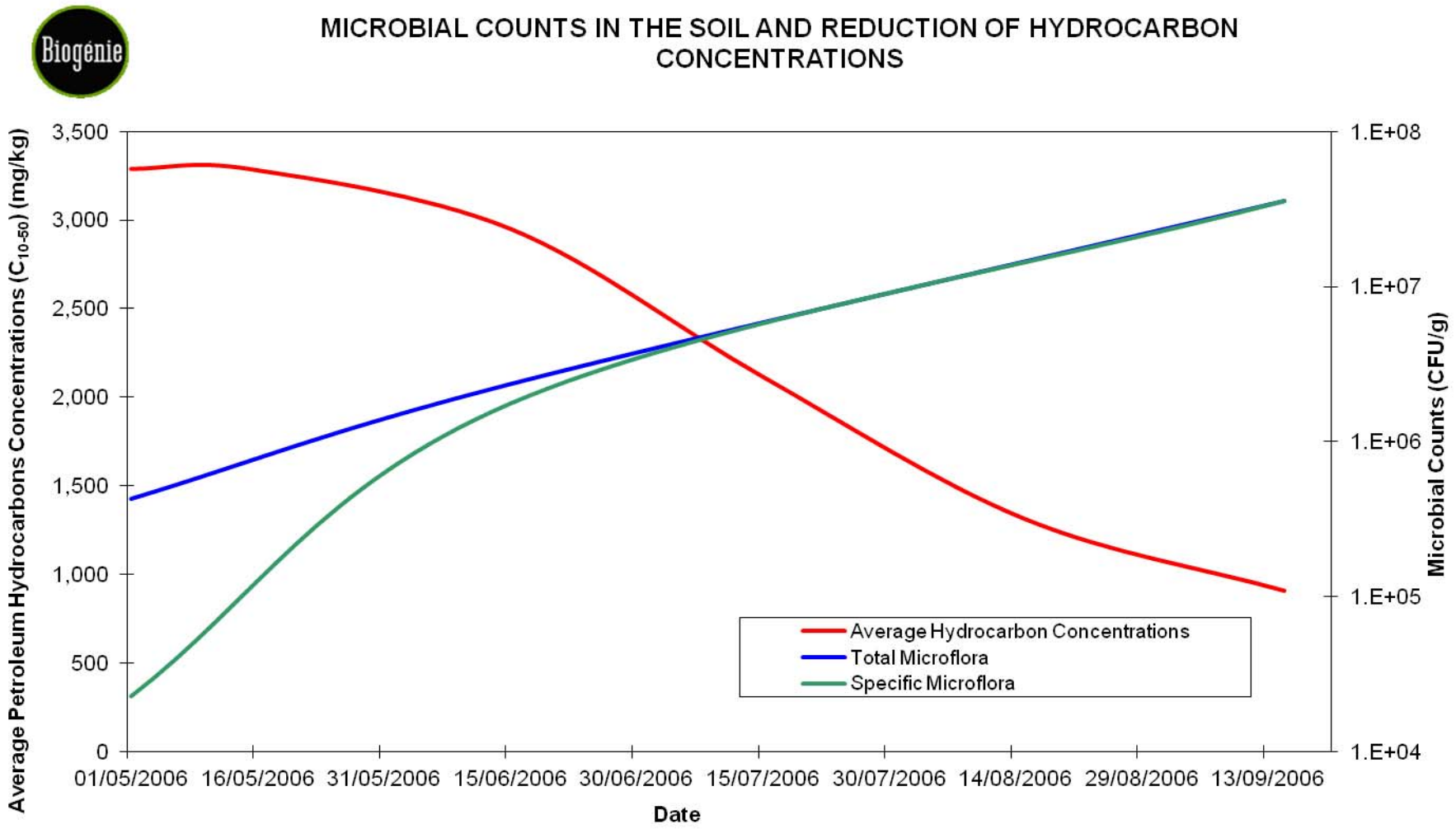
Removal of Fuel Lines

225,000 m^3 of Excavation

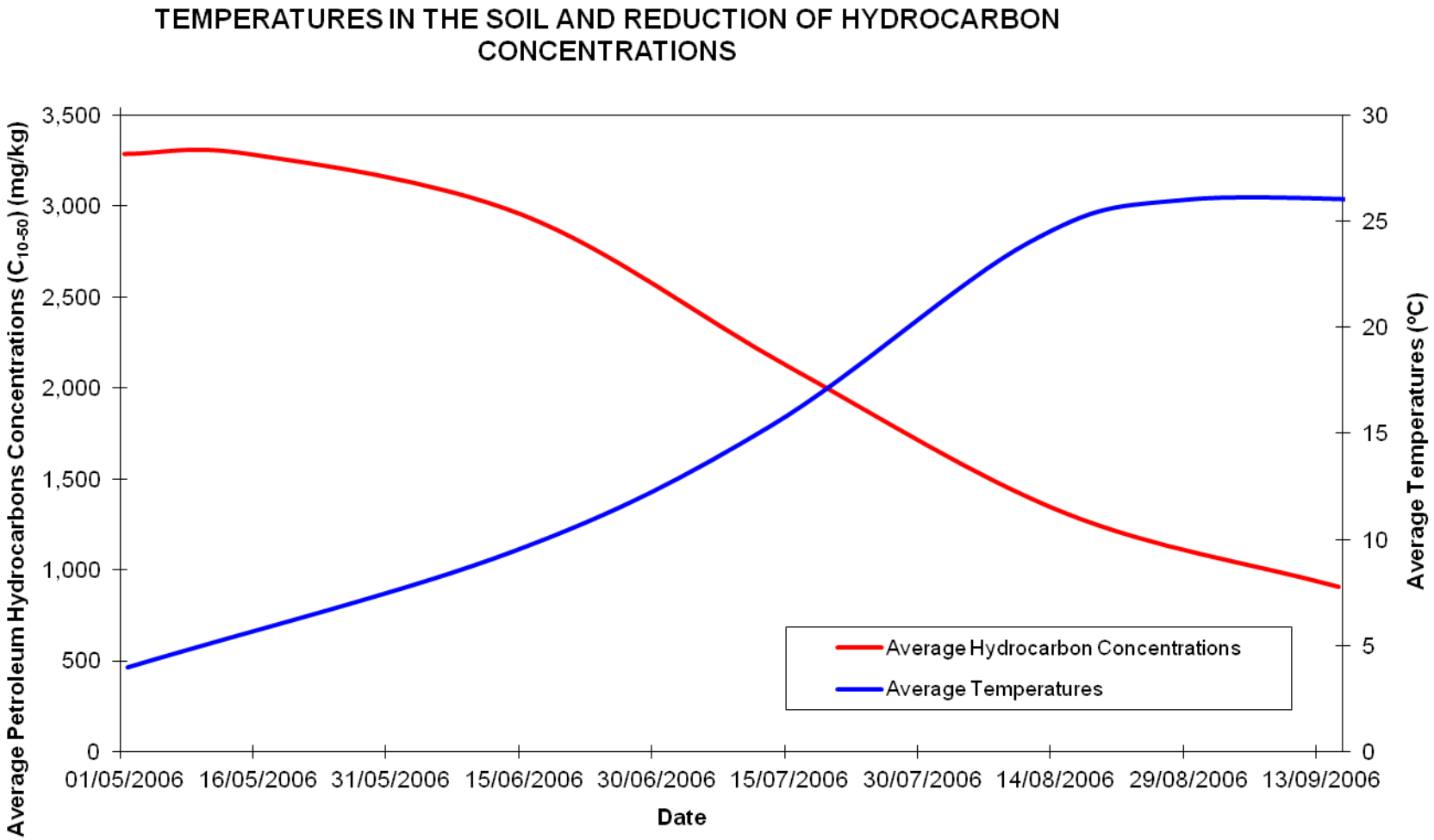
Treatment Pad Construction

Soil Treatment Equipment

Project Results



Project Results



Conclusions

- Volume estimate was within 10% of accuracy
- 35,000 m^3 vs. estimate of 33,000 m^3
- Alcalinity was not a limiting factor to biodegradation
- Available N and P were the limiting factor
- Good planning and good control of key factors resulted in project success

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Project Success

Questions?

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