Methane to Markets Partnership
Monterrey, Mexico
January 28th, 2009

VAMOX™
Ventilation Air Methane Abatement System
Project Developer Since 1987

- Air Pollution Control
- Clean Energy
- Landfill Gas
Biothermica’s Expertise

Build

Own

Operate (Transfer)

Biothermica
The VAMOX™ System

Highly efficient regenerative thermal oxidizer (RTO)

Inspired by BIOTOX® air pollution control technology
BIOTOX® Experience

- 15 years expertise
- Industrial air pollution control
- Leader of non-traditional applications
- Award winner from...

- Processes condensable gases (pitch & tar fumes)
VAM Is Simple For Biothermica

**Pitch & Tar**
(problematic)

**Methane**
(simple)
Principle Of Operation
VAMOX™ Highlights

- Large unit capacity minimizes capex (up to 100,000 ft³/min)
- Custom design for each application (Increased efficiency & profitability)
- Proven reliability & availability
- Accepts wide range of methane level (From 0.2% to 1.2%)
VAMOX™ Highlights

- **Automated operation**
- **Remote monitoring & troubleshooting**
  (low opex, high availability)
- **Minimum maintenance**
  (2 days per year down time)
- **Up to 98% destruction efficiency**
- **20 years service life**
Safety Considerations
Not connected to mine ventilation system.

Ventilation Shaft Evasé

VAMOX™

Inlet

Biothermica
No Flammable Gas Mixture Can Enter The VAMOX™
Current VAMOX™ Project

- Partnership with
  
  Jim Walter Resources, Inc.
  
  Blue Creek Coal - Brookwood, Alabama

- 1st & only VAM project in America
- Approved by U.S. Mine Safety & Health Administration
- **Mid-size** demonstration project
- Methane *destruction only*  
  (No heat recovery)
- Will generate $\approx 40\,000\,t\text{CO}_2\text{e}$ every year
- (Voluntary Carbon Standard (VCS))
- 50 000 m³/hr capacity (30,000 ft³/min)
- 0,8% CH₄ average
- 96% destruction efficiency
- 55 kW fan power (nominal)
- Propane gas burner (start-up only)
Project Schedule

2008
April
MSHA approval
May – June
Detailed design
July – Oct.
Fabrication & acquisition
Nov. – Dec.
Installation & dry run

2009
January
Start-up & commissioning
February
Operation by JWR
Installation Completed
Oxidized Mine Air On Jan. 26th
Developer’s Considerations
Methane Level Matters Most

Installed Capacity = Capex
Methane Level = Revenues

0.3% CH₄  0.5% CH₄  0.7% CH₄
No Direct Connection Implies Partial Air Capture
Shaft Service Life

Consider it, moving is expensive
You Need Room

Largest VAMOX™ installation takes up to a basketball court
Use CMM If Available

Feed start-up burner & regularize mine air methane level
Local Need For Thermal Energy?

Beyond 0,3% CH$_4$ the VAMOX™ can produce **hot water** or low press. **steam**
Typical Case Study

One shaft can generate $3,75 million/year*

(300 000 ft³/min @ 0,5% methane)

*15 $/tCO₂e
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