

## CASE STUDY

# Methane Recovery at Non-coal Mines

## Background

Existing methane recovery projects at non-coal mines reduce greenhouse gas (GHG) emissions by up to 3 million tons of carbon dioxide equivalent (CO<sub>2</sub>e). Although methane emissions are generally associated with coal mines, methane is also found in salt, potash, trona, diamond, gold, base metals, and lead mines throughout the world. Many of these deposits are located adjacent to hydrocarbon (e.g., coal and oil) deposits where methane originates. Consequently, during the process of mining non-coal deposits, methane may be released.

## Overview of Methane Recovery Projects

### Beatrix Gold Mine, South Africa

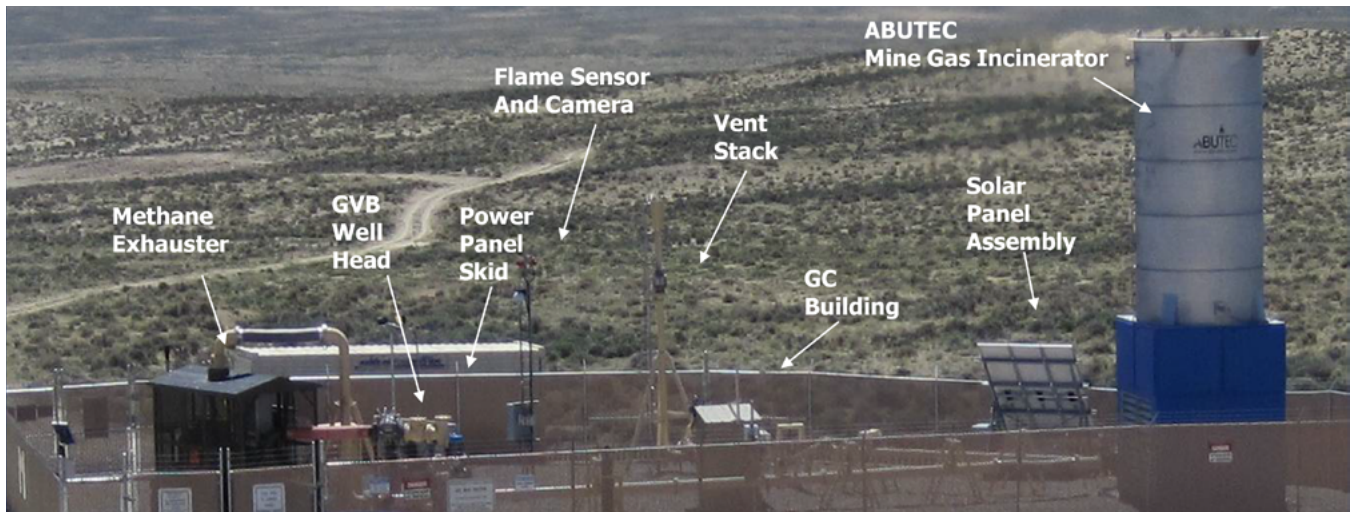
Promethium Carbon, a carbon and climate change advisory firm, has developed a project to capture and use methane from the Beatrix Gold Mine in Free State, South Africa (see box).

#### Project Specifications: Beatrix Gold Mine

Name	Capture and Utilization of Methane at the Gold Fields–owned Beatrix Mine in South Africa
Site	Free State Province, South Africa
Owner	Gold Fields Ltd., Exxaro On-site Pty Ltd.
Dates of Operation	May 2011–present
Equipment Phase 1	<ul style="list-style-type: none"> <li>• GE Roots Blowers</li> <li>• Trolex gas monitoring systems</li> <li>• Flame arrestor</li> <li>• 23 burner flare</li> </ul>
Equipment Phase 2	Addition of internal combustion engines
End-use Phase 1	Destruction through flaring
End-use Phase 2	4 MW power generation
Emission Reductions	1.7 million tons CO <sub>2</sub> e expected over CDM project lifetime (through 2016)



**Commissioning of Flare at Beatrix Gold Mine**  
(Photo courtesy of Gold Fields Ltd.)



**ABUTEC Mine Gas Incinerator at Green River Trona Mine** (Photo courtesy of Solvay Chemicals, Inc.)

## Green River Trona Mine, United States

Trona is an evaporite mineral mined in the United States as the primary source of sodium carbonate, or soda ash. Soda ash is made by processing trona and nahcolite, an associated mineral often found within trona deposits. The world's largest deposit of trona is in the Green River Basin of Wyoming. Trona also occurs in California, the Nile Delta of Egypt, Kenya, Namibia, and Turkey. Trona is mined by room and pillar, longwall, and in-situ solution mining.

In Wyoming, the methane associated with trona mines originates in interbedded layers of methane-bearing oil shales. Although methane emissions from non-coal mines are sometimes significant, trona emissions represent only 3 percent or less of mine methane emissions in the U.S. (0.87 to 2.01 million metric tons CO<sub>2e</sub> annually).

The only successful methane recovery project at a non-coal mine in the U.S. is the Green River Trona Mine in Wyoming. Operated by Solvay Chemicals, Inc., this mine produces 4.3 million tons of trona annually. In order to optimize mine safety, Solvay uses gas extraction pumps to drain methane released from strata surrounding the mined-out trona seam. This prevents the migration of methane from the mined-out areas of the deposit into the working areas of the mine. In 2010, Solvay developed and installed a system that collects and combusts methane drained from gob vent boreholes; this reduces GHG emissions from the

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Project Specifications: Green River Trona Mine	
Name	Green River Trona Mine Methane Destruction and Utilization Project
Site	Sweetwater County, Wyoming, United States
Owner	Solvay Chemicals, Inc.
Dates of Operation	August 2010–present
Equipment	<ul style="list-style-type: none"> <li>• ABUTEC Mine Gas Incinerator</li> <li>• KSD Methane Buster Exhausters</li> <li>• Dehydrator</li> <li>• 400 HP Compressor</li> </ul>
End-use	<ul style="list-style-type: none"> <li>• Destruction through incineration</li> <li>• Fuel supply for trona ore calciner and soda ash dryer</li> </ul>
Emission Reductions	<ul style="list-style-type: none"> <li>• 168 thousand tons CO<sub>2e</sub> (August 2010–March 2012)</li> <li>• 1.3 million tons CO<sub>2e</sub> expected over project lifetime</li> </ul>

mining operations since the methane would otherwise be emitted by the ventilation system into the atmosphere. More recently, Solvay modified two existing natural gas burners in order to combust recovered mine methane. The extracted methane is delivered to a compressor site, which moves it through a 3.9 mile pipeline to the calcining and drying facility. The mine's on-site trona ore calciner and soda ash dryer are operated with a mixture of mine methane and natural gas.

Based on mining operations and economic conditions, Solvay can switch between utilizing and incinerating methane in order to ensure consistent methane destruction. Solvay registered the project with the Climate Action Reserve's (CAR) Coal Mine Methane Project Protocol 1.0 in August 2010.