# Built-In-Place Refuge Alternatives – (BIP-RA)

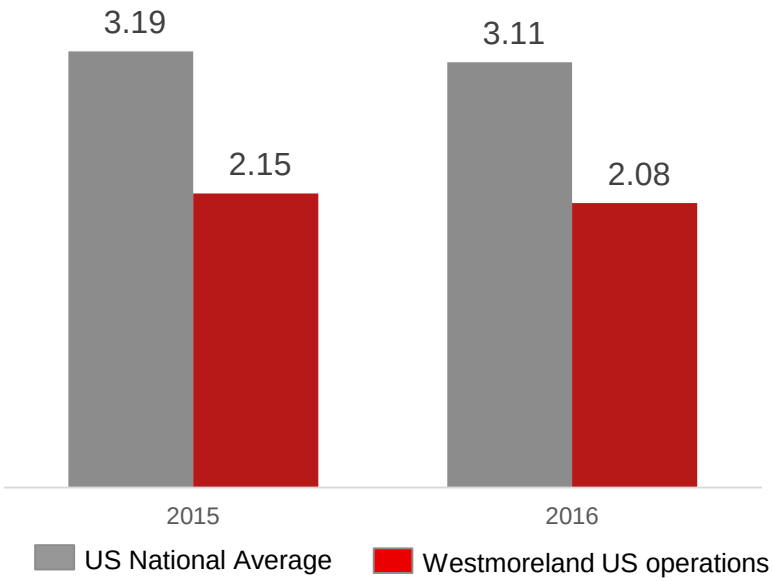
October 19, 2016

WESTMORELAND COAL COMPANY

# Safety Moment

# Westmoreland at a Glance:
# It all Starts With Industry Leading Safety

## Total Reportable Incident Rate US Operations




- Uncompromised safety is a core value
- Comprehensive safety programs, systems and training
- Total vigilance in adhering to and exceeding all standards

Sentinels of Safety Award
NMA THE AMERICAN RESOURCE
**Colstrip Mine**
**2011**

John T. Ryan Safety Award
CIM ICM
**Paintearth Mine**
**2012**

John T. Ryan Safety Award
CIM ICM
**Genesee Mine**
**2013**

Sentinels of Safety Award
NMA THE AMERICAN RESOURCE
**Jewett Mine**
**2014**



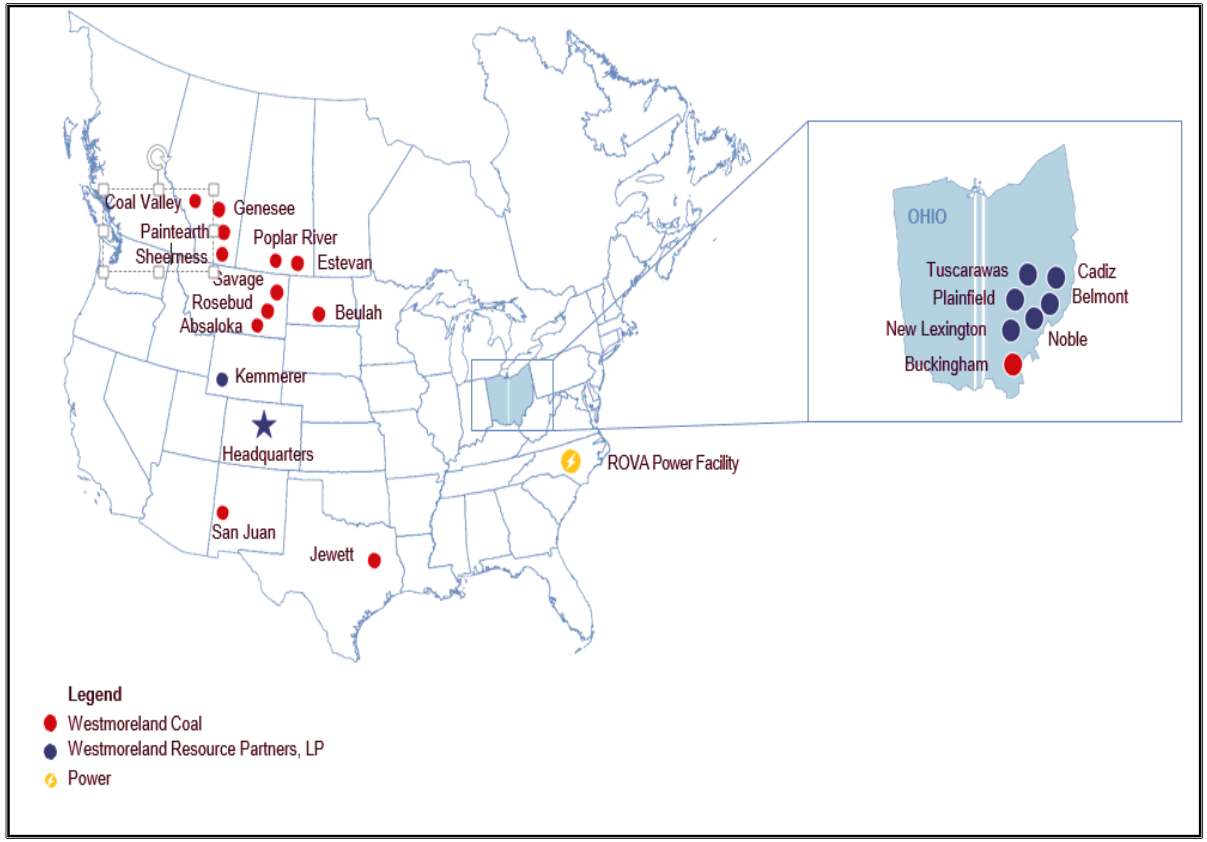
WESTMORELAND COAL COMPANY

Note: Total Reportable Incident Rate represents number of incidents per 100 full-time employees working a year or number of incidents per 200,000 annual hours

# Westmoreland at a Glance:
# Diversified North American Coal Leader

## Successfully mining coal since 1854

- Operations include:
  - 18 surface mine operations in U.S. and Canada
  - A long-wall mine in New Mexico
  - An underground mine in Ohio
  - Char and activated carbon production facilities
  - Two-unit ROVA coal-fired power plant
- Owns general partner and majority interest in WMLP
- Award-winning safety and environmental performance






WESTMORELAND COAL COMPANY

Looking back:

# BIP RA History at San Juan Mine

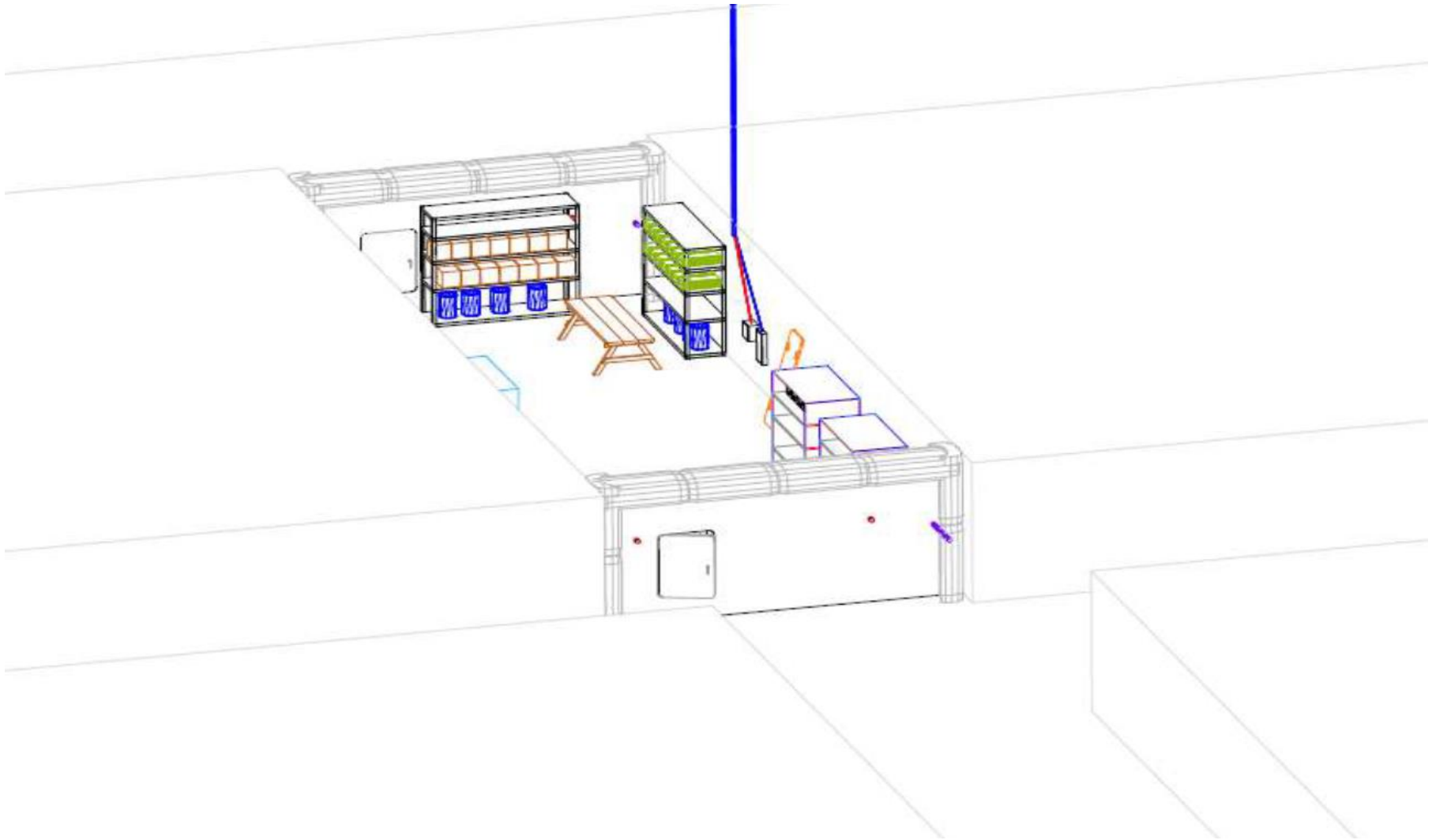
- First installation, March 2006
- Incorporated into the MSHA Approved Emergency Response Plan, April 2007
- Original structure design loosely based on a previous 20 psi alternative seal design.
- Structure was certified as exceeding the 15 psi strength requirements in 2009.
- Structure and Door were certified as exceeding the 15 psi strength requirements in 2010.
- Part 7 Approval was acquired in 2014.
- Continue to install at a maximum of 6000 foot intervals.



*"Therefore, the concept design meets the 15-psi design loading requirements for the assumed load, minimum material properties, and construction methods considered in this report."*

(Quoted from 2010 Analysis Report)

# Typical BIP-RA Layout



# Maintenance of Atmosphere

- Main mine fan provides continuous airflow into the BIP-RA during normal operations.
  - Air flows down the borehole and out of the BIP-RA into the mine.
- Large vent pipe is open during normal operations, closed during actual use.
- Equipped with a check valve to prevent air reversing through the pipe.
- Dual sampling ports for sampling the mine atmosphere outside the RA.
- A second vent pipe is equipped with a pressure relief valve.
- Portable blower fans are added to each borehole during emergency use.

**Check Valve to prevent airflow from the mine into the BIP-RA.**

# Interior View of An Early Version

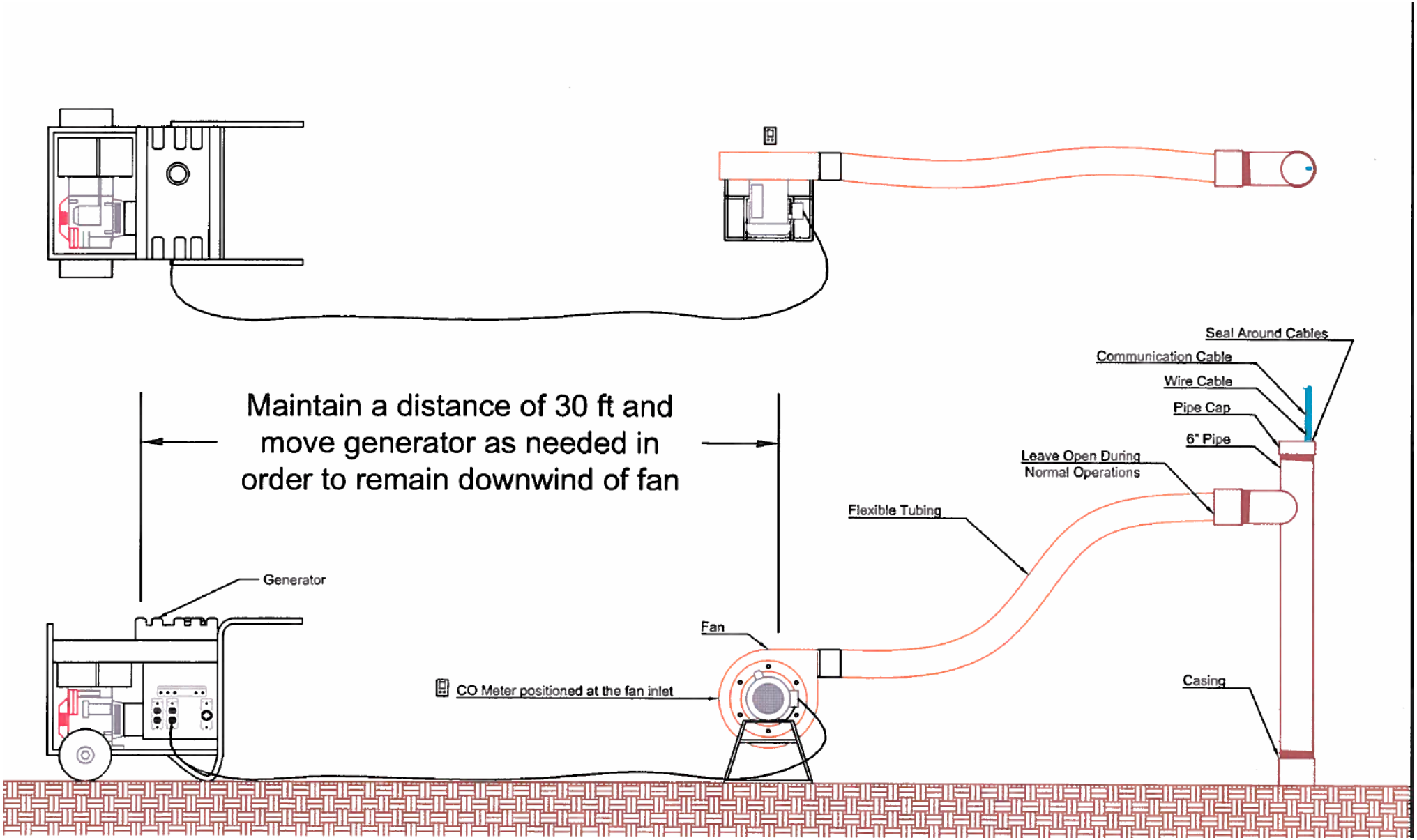
**Borehole location for this BIP-RA**

# Interior Photo of Current Installation

- Supply containers with tamper-evident seals.
- Shelving for supply storage and inspection.

## Typical Surface Borehole Site
# During Normal Operations


## Surface Components Typical Layout
# During Emergency Use



# Borehole Support Trailers


- Borehole Support Trailers
- Stored at a central & secure location
- Equipment examined and tested on a regular basis.
- Must maintain capability of deploying this equipment in less than 1-hr.

| Trailer Materials | Quantity | |
|---|---|---|
| | Gateroad | East Mains |
| Generator | 1/borehole | 1/borehole |
| Carbon Monoxide Detector set to alarm at 10 PPM | 1/borehole | 1/borehole |
| Fans | 1/borehole | 1/borehole |
| Ventilation hose/tubing | 1/borehole | 1/borehole |
| Lighting | 1/borehole | 1/borehole |

# Borehole Support Equipment

# Ventilation Survey Data – Part 7 Application

| BIP RA Location | Wall to Wall Length (ft) | Floor to Roof Height (ft) | Rib to Rib Width (ft) | Ambient Noise Level (db) | Ambient Noise Level with Fan (db) | Ambient Inside Temperature (F) | Ambient Surface Temperature (F) | CFM W/O Aux Fan (Adjusted) | CFM W/ Aux Fan (Adjusted) |
|---|---|---|---|---|---|---|---|---|---|
| EM XC 35 | 44.5 | 10 | 18.75 | 52.2 | 62 | 64 | 99 | 78 | 270 |
| EM XC 72 | 31.5 | 10 | 18.05 | 55 | 61 | 64 | 79.7 | 191 | 468 |
| EM XC 107 | 53 | 10 | 19 | 48 | 54 | 71 | 99 | 78 | 397 |
| WSM XC 1 | 68.1 | 8 | 18 | 61 | 63 | 65 | 86.6 | 174 | 374 |
| GR-400 XC 24 | 35.5 | 11.3 | 21 | 40.2 | 47.8 | 66 | 96.3 | 110 | 321 |
| GR-401 XC 22 | 66.5 | 9.5 | 18.3 | 48 | 50 | 67 | 95.4 | 110 | 302 |
| GR-401 XC 48 | 78.5 | 9.4 | 22.3 | 38.2 | 48.1 | 72 | 93.1 | 302 | 480 |
| GR-402 XC 16 | 66.5 | 10 | 18 | 45 | 50.3 | 66 | 93.2 | 220 | 480 |
| GR-402 XC 42 | 61.8 | 9.5 | 19.8 | 34 | 58 | 66 | 89.5 | 302 | 499 |

# Uses During Normal Operations

- *Exhausting ventilation fan maintains fresh air flow continuously into the BIP-RA.*
- *Crews sometimes utilize the BIP-RA if the intake roadway needs to be rockdusted during their shift.*
  - Borehole provides clean fresh air until rockdust clears in the intake roadway.
  - Entered once during every 8-hour period as part of the normal preshift.
  - Check for hazards.
  - Verify airflow direction is correct.
- *Locating and entering them is included in evacuation drills.*
- BIP-RA structures have been used as underground classrooms for various training scenarios.

# Key Learnings from our Experience

- *Initial installations were installed as part of the Escape System.*
  - Still referred to as Escape Shelters at San Juan Mine.
- *Borehole fans enhance that ventilation volume and assure positive pressure inside the RA.*
- *Major ventilation changes must consider impact on RA ventilation.*
  - They can impact RA ventilation and its performance.
- *Regular inspections of ventilation, supplies and RA conditions are necessary.*
  - Including verification of airflows provided by blowers.
- *Site selection is critical, surface and underground.*
  - Surface waterflows, especially during storm events.
  - All-weather access to surface sites.
  - Underground water or gas make can have a negative impact on performance.


WESTMORELAND COAL COMPANY




**For more information visit our website at www.westmoreland.com**
**Investor Relations Contact: Gary Kohn**
**Phone 720.354.4467**
**Email: gkohn@westmoreland.com**