

MSA Fixed Gas Detection **Solutions**

for the Natural Gas Shale Industry



*Because every life has a **purpose...***



MSA Fixed Gas Detection Solutions for the Natural Gas Shale Industry

The recent discovery of several significant shale deposits in North America, combined with technological advances in hydraulic fracturing and horizontal drilling, have led to a huge expansion of natural gas production. Thousands of jobs have been created to support the four distinct operational phases of new gas well development: construction, drilling, production, and workover.

Shale Reserve Operational Phases

Construction Operations

Construction support for a natural gas well involves road construction to access the well site, well pad assembly to support the drilling rig and pit excavation for wastewater containment.

Drilling Operations

Shale drilling workers are potentially exposed to several gas hazards including pockets of hydrogen sulfide (H₂S) created by decomposing organic material and carbon monoxide (CO) from raw natural gas and the rig's diesel engines. Permanent gas monitoring devices such as **Ultima® X Monitors and GasGuard® XL Controllers** offer continuous monitoring and detection of combustible and toxic gases and provide essential early-warning alerts.

Production Operations

Once the gas well is drilled and production of the raw natural gas begins, **Ultima X Monitors** can be used to perform the combustible gas monitoring that is necessary during normal operation or maintenance. The **UltraSonic™ EX-5 Gas Leak Detector** can be used to monitor pressurized gas leaks.

Workovers

Every few years, a rig may undergo partial re-drilling, re-fracturing and maintenance activities to keep it fully operational and safe. Such workover operations present many of the same potential safety hazards as drilling and production operations and thus require the same safety equipment. Monitoring of combustible gas levels using devices such as the **Ultima X Monitor** is especially vital during repair operations involving welding or other spark-producing work.

What is Hydraulic Fracturing?

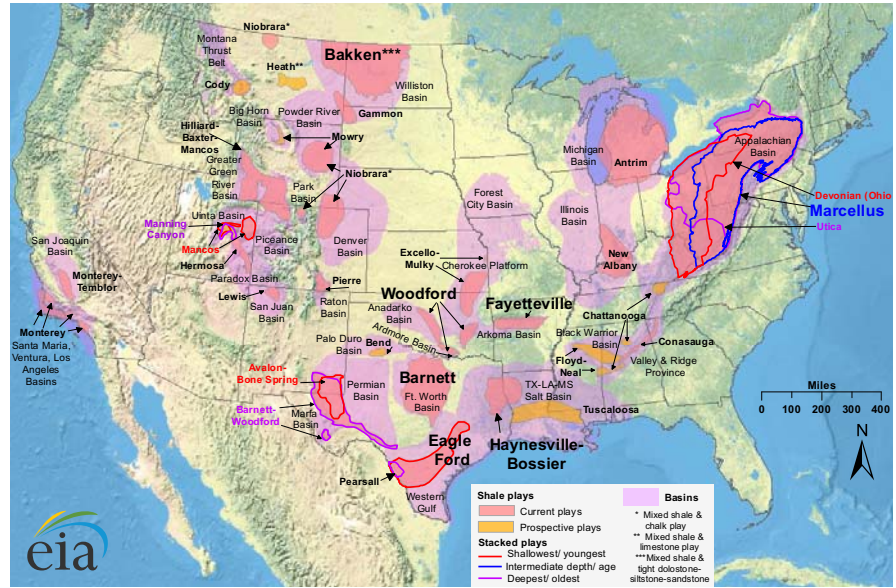
Hydraulic fracturing differs considerably from other natural gas extraction processes. Millions of gallons of water are mixed with chemicals, sand, and other materials to form fracking fluid. This mixture is pumped to deep underground shale formations. Applied high pressure causes the water mixture to fracture shale, allowing natural gas to flow from the well within. After fracturing completes, used fracking fluid is collected and treated to eliminate chemical and mineral contents before disposal, or reused at other well sites.

Where is the Marcellus Shale?

The Marcellus Shale rock formation lies 5,000 - 8,000 feet underneath much of Pennsylvania, areas of New York, and West Virginia. Natural gas reserves within the Marcellus Shale are believed to be extensive, especially in north central and northeastern regions of Pennsylvania.

Where are the other Shale formations in the US?

The shale formations in the lower 48 states are located on the map at right.¹



MSA Fixed Gas Detection Product Descriptions

Product	Description
FLAMEGARD 5 SERIES FLAME DETECTORS	The FlameGard® 5 Multi-Spectral Infrared (MSIR) Flame Detector provides superior false alarm immunity with the widest field of view utilizing neural network technology (NNT). Options include relays, ModBus and HART. FlameGard 5 Series UV/IR and UV/IR-H2 and MSIR Flame Detectors offer continuous optical path monitoring (COPM).
ULTIMA OPIR-5 OPEN PATH DETECTOR FOR HYDROCARBON GAS DETECTION	The Ultima OPIR-5 Detector is an open-path infrared gas detector that provides continuous monitoring of combustible hydrocarbon gas concentrations, including methane in both the 0 to 5,000 ppm/meter and 0 to 5 LEL/meter range.
ULTIMA MOS-5 H₂S GAS SENSOR	The Ultima MOS-5 Sensor features a highly intelligent microprocessor-based design for use with thin film metal oxide semiconductor (TFMOS) sensors. Options include relays, ModBus and HART.
ULTIMA X SERIES GAS MONITORS	Ultima X Series Gas Monitors offer continuous hazardous gas monitoring using catalytic, electrochemical, and infrared technologies, with HART Protocol and DuraSource™ Technology. Suitable for indoor and outdoor applications in virtually any industry including offshore rigs, refineries, chemical and petrochemical facilities, steel mills, water and wastewater plants, mining, and general industry.
ULTRASONIC EX-5 GAS LEAK DETECTORS	UltraSonic EX-5 Gas Leak Detectors offer fast detection of high pressure gas leaks without requiring the gas to come into contact with the detector. They are ideally suited for outdoor installations.
GASGARD XL CONTROLLER	The GasGard XL Controller multi-channel, wall-mounted controller monitors for toxic and combustible gases, and oxygen deficiency in a variety of industrial, chemical, municipal, and wastewater applications. Multi-language LCD display provides real-time target gas readings and events, full system diagnosis, and individual LEDs per channel with common relays and internal buzzer. The GasGard XL Controller is easily configured to accept up to 10 remote gas sensors.
MODEL 10K FIRE AND GAS DETECTION SYSTEM	The next generation in highly intelligent monitoring solutions is designed to help customers reduce hazard vulnerability while meeting the world's most demanding safety standards. The MODEL 10K™ is an innovative, highly scalable system offering intelligence, flexibility and reliability. The system's controller hardware configuration and software have been tested by Factory Mutual to verify NFPA 72 compliance.



FlameGard 5 Series Flame Detector



Ultima OPIR-5 Open Path Infrared Detector



Ultima MOS-5 H₂S Gas Sensor



Ultima X Gas Monitor



UltraSonic EX-5 Gas Leak Detector



Gasgard XL Controller



MODEL 10K Fire and Gas Detection System

¹Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States," June 13, 2013, US Energy Information Administration, www.eia.gov/oil_gas/rpd/shale_gas.pdf.

MSA Fixed Gas Detection Product Application Guide

Product	Purpose
DRILLING	
ULTIMA X COMBUSTIBLE GAS DETECTOR	Monitor near drilling site for combustible levels of methane escaping during drilling process. Leaks can occur in drilling process, possibly forming explosive levels of combustible gas.
ULTIMA X OR ULTIMA MOS H₂S SENSORS	Monitor near drilling site for worker exposure to toxic levels of H ₂ S gas escaping from underground gas pockets.
GASGARD XL CONTROLLER	Control device which can interface with any of the gas sensors and provide a visual indication of gas readings. Relays can be used to activate other safety/signalling devices.
PRODUCTION	
ULTIMA X COMBUSTIBLE GAS DETECTOR	During normal operation or maintenance, combustible gas monitoring is necessary for safe operation.
ULTIMA OPIR-5 OPEN PATH INFRARED DETECTOR	During normal operation open path detection can monitor for small leaks (ppm level) across long distances or at the boundary of a facility.
ULTRASONIC EX-5 LEAK DETECTOR	Detection of ultrasonic sound released by a pressurized gas leak. Provides early detection and signalling of leaks to shut down the production process and initiate safety measures.
DELIVERY	
ULTIMA X COMBUSTIBLE GAS DETECTOR	Monitor for combustible gas build-up from leaks in compressor stations.
ULTIMA OPIR-5 OPEN PATH INFRARED DETECTOR	Quick detection of leaks over long distances at rail or truck loading facilities.
ULTRASONIC EX-5 LEAK DETECTOR	Detects leaks from failed seals or flanges in compressors or piping in compressor rooms. Can be located inside or outside of room to provide sensitive detection of pressurized leaks.
FLAMEGARD 5 FLAME DETECTORS	Quick detection of flames in the compressor room that can lead to property damage and loss of life.
GASGARD XL CONTROLLER	Control device which can interface with any of the gas sensors and provide a visual indication of gas readings. Relays can be used to activate other safety/signalling devices.
MODEL 10K SYSTEM	Integrates gas and flame detection products into an NFPA 72-approved controller system.

Note: This Bulletin contains only a general description of the products shown. While uses and performance capabilities are described, under no circumstances shall the products be used by untrained or unqualified individuals and not until the product instructions including any warnings or cautions provided have been thoroughly read and understood. Only they contain the complete and detailed information concerning proper use and care of these products.



ID 07-8310-MC / October 2013
© MSA 2013 Printed in U.S.A.

MSA Corporate Center
1000 Cranberry Woods Drive
Cranberry Township, PA 16066 USA
Phone 724-776-8600
www.MSAafety.com

U.S. Customer Service Center
Phone 1-800-MSA-INST
Fax 1-800-967-0398

MSA Canada
Phone 1-800-672-2222
Fax 1-800-967-0398

MSA Mexico
Phone 01 800 672 7222
Fax 52 - 44 2227 3943

MSA International
Phone 724-776-8626
Toll Free 1-800-672-7777
Fax 724-741-1559
Email msa.international@msasafety.com

Offices and representatives worldwide
For further information: