Induced Seismicity Monitoring

Manage your oil and gas operations to control the risks of induced seismicity

Seismic events near oil & gas wells and water injection sites can lead to costly operational suspensions or shut downs, wellbore integrity losses, and serious public and regulatory concerns.

Real-time monitoring of local seismicity provides operators with hard data to assess these risks and manage their operations to minimize potential disruptions from seismic events induced by well completions, production and wastewater injection.

Spectraseis, (an ESG-managed company) provides turnkey solutions for short-term and life-of-field seismic monitoring using low-profile wireless sensor networks. We track earth motion at your sites 24/7 and alert you of changes, enabling a fast operational response to abnormal seismicity.

By building a high-resolution record of both natural and induced seismic activity, we can quickly evaluate when felt events are within your areas of operation, helping you to control risks and stay ahead of the regulatory curve.
Identify your risk factors for induced seismicity

Are your operations near a population center?
Are there known faults in the local geology?
Is maintaining wellbore integrity important to you?

Five steps to mitigate risk:

1. Establish a baseline of local seismic activity. A seismic array of appropriate size and geometry to properly measure and locate seismic events can be accomplished with a permanent, life-of-field system, or with a temporary network.

2. Map and characterize local geological faults as thoroughly as possible. Fault information is used in conjunction with all planned drilling, hydraulic fracturing, field stimulation and waste water injection operations to help assess the overall risks of induced seismic activity.

3. Establish permanent seismic monitoring. An effective real-time monitoring system identifies changes in seismic activity and quickly alerts the asset team if there are significant seismic events.

4. Implement a “Traffic Light” system to self-regulate injection activities. This enables operations to quickly and safely reduce or alter operations to ensure compliance with seismic limits.

5. Choose to make your induced seismic data transparent. Establish a plan to keep regulators and the public informed, preferably through an easy-to-access online application.

Spectraseis can help address these steps by providing in-depth knowledge and experience in passive seismic monitoring, processing and analysis.

Spectraseis combines a fit-for-purpose seismometer field installation and web-based software to allow seamless monitoring and control for your at-risk operations.

Why monitor completions and injection operations?

“The USGS has documented that M3 and larger earthquakes have significantly increased in the U.S. mid-continent since 2000, from a long-term average of 21 such earthquakes per year between 1970 and 2000, to 31 per year during 2000-2008, to 151 per year since 2008. Most of this increase in seismicity has occurred in areas of enhanced hydrocarbon production and, hence, increased disposal of production-related fluids.”— Testimony before Congress by Dr. William Leith, the senior science advisor for earthquake and geologic hazards for USGS, in connection with the NAS report “Induced Seismicity Potential in Energy Technologies”, June 2012.
Remotely monitor operations with Spectraseis’ ISV-Pro™

Spectraseis’ web-based software for real-time monitoring, notification and data management

Manage and safeguard your at-risk salt water disposal injection or large scale hydraulic fracturing operations. Spectraseis’ ISV-Pro provides web-based interactive monitoring and display. ISV-Pro delivers seismic event notification based on magnitude and location, while handling long-term data archiving to preserve seismic monitoring records far into the future.

Key Features

- Web-based software for remote desktop access
- Interactive microseismic event viewer
- GIS and subsurface feature overlay
- Comprehensive equipment state-of-health monitoring
- Configurable strong event email notification
- Customized data management service

Events viewer

- Fully customizable table view
- Event download
- 3D event view

Gather viewer

- Station trace history
- Station trace download
- Auto-event selector

State of health monitoring

- Digitizer: power, temperature, GPS
- Sensor: seismometer mass positions, power
- Charging System: supply voltage, charging voltage
Maintaining wellbore integrity

Wellbore damage may be a common side effect of induced seismicity, leading to:

- Contamination of shallow aquifers
- Production loss along damaged wellbores
- Loss of reservoir isolation

Monitoring and controlling induced seismicity in operations can help mitigate this risk.

ISM Risk Management

Proactively avoid costly shutdowns by implementing an induced seismic monitoring system for your at-risk operations. Whether salt water disposal, hydraulic fracturing or carbon sequestration, Spectraseis’ ISM system ensures you are operating within recommended protocols.

Adopting the sequence illustrated to the right will allow for continuous monitoring, remote display, automatic notification and transparency.

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