

# MONITORING ACTIVITY TO ENSURE WELL INTEGRITY

## WELL CONSTRUCTION ASSURANCES

### WELL DRILLING

- Pressures constantly monitored to assure well control
- Drilling fluids routinely checked for bacteria that may cause corrosion/toxic gas and treated preemptively

### WELL CASING

- Designed for drilling, hydraulic fracturing and production scenarios
- Casing strings are tested to meet the highest demands of each scenario

### CASING CEMENT

- Designed for drilling, hydraulic fracturing and production scenarios
- Cement is tested before pumping and after placement

### WELLHEAD

- Designed for drilling, hydraulic fracturing and production scenarios
- Tested upon installation and maintained throughout production life

## COMPLETION ASSURANCES

### PRE-HYDRAULIC FRACTURING

- New technologies and techniques routinely used to enhance safety and performance
- Pressure tests performed to ensure the stimulation impacts only the targeted reservoir

### HYDRAULIC FRACTURING

- Monitor annular pressures to detect potential leaks during pressure pumping
- Treat freshwater and recycled produced water base fluids for formation compatibility

### POST-HYDRAULIC FRACTURING

- Utilize chemical inhibitors to prevent scale deposits during flowback and production
- Employ steel tanks and lined storage pits for storage and trucks or pipelines for transportation to prevent produced water spills during flowback

## PRODUCTION ASSURANCES

- Routinely conduct water analysis for scaling and corrosion tendencies and toxic gas potential, then place identified wells on a chemical treatment program
- Use solar panels to provide power for chemical treating pumps and “SCADA” to communicate real-time data

