Antero Resources' Mitigation Strategies and Best Management Practices: Wolf Springs, Mesa County

Air Quality and Odor Control

- All production tank venting emissions are routed to a VOC combustor
    - Purpose is to reduce odors by controlling VOC emissions from condensate flashing and working and breathing losses
- VOC combustors operate with auto-igniters
    - Purpose is to keep VOC combustors lit
- Flowback gas and well flow testing gas routed to temporary flare
- Well Pad Location Telemetry/Remote Monitoring
    - Reduces well pad location truck/pumper visits
    - Low profile antenna equipment
- Frac/Flowback Storage Tank Hatches
    - Tank hatches are closed and latched until the tanks are being prepared to receive flowback water
    - Hatches closed but unlatched when receiving flowback fluids
    - Operate with odor absorbing blanket or other similar odor control device when full
- Diesel Powered Drilling Rig Generators
    - Drill rig engines are regulated as non-road engines under the Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (40CFR 60, 85)
    - Diesel engines powering the drilling rigs are certified to at least the Tier 2/3 standards
    - Ensure that engine fuel meets regulated sulfur content requirements.
- Separators and Wellheads – Fugitive VOC emissions from valves and flanges
    - Operate with low-bleed pneumatic devices

Fugitive Dust

- Well pad location and access roads graveled to reduce dust impacts
- Soiltac and/or liquid dust suppressants are used to mitigate fugitive dust emissions on access roads and well pad location
- Buried water lines to minimize fugitive dust emissions from truck traffic
- Limiting vehicle speeds during well pad location site access
- Road sweeping to reduce fugitive dust and mud tracking onto roadways where practicable

Groundwater and Surface Water Resources

- Closed loop (pitless) drilling systems; no reserve, drill cuttings or frac/flowback pits will be constructed
- Water used for well completions will be recycled as practicable
- Frac/Flowback tank area lined and/or tanks equipped with portable spill berm containment structures
- Production tank containment area bermed and lined with plastic
- Well pad location perimeter berms to contain unintended fluid releases
- Voluntary Water Well Testing Program
    - Pre - all water wells/springs within ½ mile radius of the surface-hole location for each well on a well pad location
    - Post – within one year a follow-up test on the pretest wells/springs or when all wells drilled and completed on a well pad location
    - Where practical water quality testing as requested by landowner for water wells, springs, potable water and agriculture water
    - Comply with provisions of water well testing in surface use agreements
- Wetland/drainage survey and mapping conducted prior to site disturbance
- Containment for well pad location within 500 feet of surface water is 110 percent secondary containment for any volume of fluids contained at a well pad location during drilling and completion operations

Planning Infrastructure and Development Activities which Minimize Impact

- Antero setbacks of 500 feet from dwelling units – COGCC setbacks are 150-200 feet
- Well pad location construction not to exceed 3.5 acres
- Bury all gas and water pipelines adjacent to roads whenever possible
- Water used for well completions will be recycled as practicable
- Above-ground facilities located to minimize visual effects (e.g. production tanks will be low profile tanks and painted to mitigate visual impacts)

Spill Prevention, Control and Countermeasure (SPCC Program)

- Annual SPCC Training
- SPCC inspections conducted quarterly
- Well pad location perimeter berms will be constructed
    - Purpose is to provide tertiary spill containment for production tanks and separators
    - Provides secondary spill containment for all material activities on site not just oil storage.
    - Provides a barrier between well pad location activities and surrounding areas
- Frac/Flowback tank area will be located in an area with down gradient well pad location perimeter berm

- Frac/Flowback tank area lined to mitigate seepage losses from the unintended spillage of well completion fluids, or frac/flowback tanks will be placed in portable spill berms
- Standard Operating Procedures (SOPs) training performed for handling and transfer of frac/flowback and produced fluids
- High level overflow alarms installed on production tanks
- Covered drip buckets for condensate and produced water tanks and loadout lines
    - Purpose is to minimize spillage and drips that occur during normal loading activities
    - Designed to catch residual liquids that remain in lines after the tank valves and truck valves have been closed
    - Covers minimize VOC emissions and exposure to storm water

Stormwater Management

- Facilities operated with a Water Quality Control Division (WQCD) stormwater construction permit
- Stormwater BMPs in accordance with the Stormwater Management Plan will be implemented in a manner that minimizes erosion, transport of sediment offsite, and site degradation
- Inspections will be conducted every two weeks/monthly and after a precipitation or runoff event in accordance with WQCD General Permit to confirm that applicable BMPs are in place, maintained and functioning properly
- Straw wattles and erosion blankets or other suitable erosion control devices are used to prevent sediment from leaving the site
- Site Preparation conducted to establish stable slopes, water courses and drainage features to minimize erosion and sedimentation

Invasive Non-Native Vegetation Control

- Weed management plan will be developed and implemented to monitor and control noxious and invasive weeds
- Noxious weed control includes three treatments per year
- Existing weed infestations will be mapped prior to the development of each pad, access road and pipeline when practicable
- Reclamation/revegetation will be used as a weed management tool