



west virginia department of environmental protection

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WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS

CASING AND CEMENTING STANDARDS AND BEST MANAGEMENT PRACTICES

The operator should prudently drill through fresh groundwater zones so as to minimize any disturbance of such zones. Further, the operator should construct the well and conduct casing and cementing activities of all horizontal wells in accordance with these standards and in a manner that will provide for control of the well at all times, prevent the migration of gas and other fluids into the fresh groundwater and coal seams, and prevent pollution of or diminution of fresh groundwater. At a minimum, the following standards should apply:

Casing Standards

1. All casing installed in the well should possess an internal pressure rating twenty percent (20%) greater than the anticipated maximum pressure to which the casing will be exposed. Prior to installation, used casing should pass a hydrostatic pressure test at a pressure twenty percent (20%) greater than the anticipated maximum pressure to which the casing will be exposed. All casing shall be made of steel and manufactured and tested consistent with standards established by the American Petroleum Institute (API), in API Specification 5CT or the American Society of Testing Materials (ASTM). Each casing connection, whether new or used, should be torqued in accordance with the manufacturers' specifications and API recommended practices RP5A3 and RP5C5 should be followed to preserve the design integrity of the casing.
2. The casing shall be of sufficient quality and condition to withstand the effects of tension and maintain its structural integrity during installation, cementing, and subsequent drilling and production operations.
3. Casing shall be centralized in each segment of the wellbore. Centralizers should provide sufficient casing standoff and facilitate effective circulation of cement to isolate critical zones. Centralizers should meet standards established by the American Petroleum Institute (API) in Specification 10D where bow spring centralizer use is applicable, or in API 10TR-5 for use of solid or rigid centralizers, where applicable.
4. Casing shall not be disturbed for a period of at least eight hours after the completion of cementing operations.
5. The operator should provide notice to the oil and gas inspector at least twenty-four (24) hours prior to the commencement of any casing installation.

Promoting a healthy environment.

Cement Standards

1. All cement placed in the well shall meet the ASTM C 150 Standard or API Specification 10A and secure the casing to the wellbore, isolate the wellbore from all fluids, contain all pressures during all phases of drilling and operation of the well, and protect the casing from corrosion and degradation.
2. Cement used in conjunction with surface and coal protection casing must prevent gas flow in the casing annulus.
3. Cement placed in the annular space around the casing should be allowed to set to a minimum compressive strength of five hundred pounds per square inch (500 psi) and achieve a compressive strength of one thousand two hundred pounds per square inch (1,200 psi) within seventy-two (72) hours, using approved engineering data for the type of cement used. The waiting time for cement used in compliance with this section should not be less than eight (8) hours
4. Subsequent to the installation and cementing of any casing, a casing pressure test may be required by the Chief to establish casing integrity.
5. The operator should report defective, insufficient or improperly cemented casing to the oil and gas inspector or the Chief within twenty-four (24) hours of discovery of the problem, and within seventy-two (72) hours, correct the defect or submit a plan to correct the defect to the Chief for approval.
6. The operator should provide notice to the oil and gas inspector at least twenty-four (24) hours prior to the commencement of any cementing operations and maintain a copy of the cementing records at the well site during the drilling and completion of the well.

Conductor Casing Standards

1. Conductor casing should be set where necessary to stabilize unconsolidated sediments and should be installed in a manner that prevents infiltration of surface fluids into the subsurface.
2. Conductor casing may be driven into place, unless it will penetrate fresh groundwater zones. If set in a drilled hole, the casing annulus must be cemented. Cementing of the conductor casing may be done by grouting from the surface, so long as any fresh groundwater zones are cemented across and isolated.
3. The section of the wellbore in which the conductor casing is installed, if drilled, should be drilled using only air, freshwater or freshwater-based drilling fluid. Any additives to the drilling fluid, such as soap, should be added in a manner that is protective of fresh groundwater.

Freshwater Casing Standards

1. The freshwater protective casing required should extend at least fifty feet (50') and no more than one hundred fifty feet (150') below the deepest freshwater horizon (that being the deepest horizon that will replenish itself and from which freshwater or usable water for household, domestic, industrial, agricultural or public use may be economically and feasibly recovered) and should have cement circulated in the annular space outside the casing. The freshwater protective casing may be installed to a depth greater than one hundred fifty feet (150') below the deepest freshwater horizon in order to cover workable coal seams, so long as all other requirements of this subsection are met.
2. A minimum of three hundred (300) feet of freshwater casing should be installed, except that less than three hundred (300) feet may be installed if necessary to avoid penetration of any salt water, oil or gas bearing zones.

3. Casing should be installed and cemented prior to drilling into any strata known or likely to contain oil, gas or saltwater.
4. No gas or oil production, or pressure may exist on the freshwater casing.
5. The section of the wellbore in which the freshwater casing is installed should be drilled using only air, freshwater or freshwater-based drilling fluid.
6. In the event cement does not return to the surface, the oil and gas inspector should be notified. If the top of the cement cannot be located using sound engineering practices approved by the Chief or the Chief's designee, then an electric log or similar technology approved by the Chief should be used. Sound engineering practices approved by the Chief or the Chief's designee should be used to fill the annular space back to the surface.

Coal Protection Casing Standards

1. No oil or gas production or pressure may exist on the coal protection casing annulus. Coal protection casing required should be in addition to production casing.
2. In the event cement does not return to the surface, the oil and gas inspector shall be notified. Sound engineering practices approved by the Chief or the Chief's designee should be used to fill the annular space back to the surface.
2. Either the freshwater casing or the intermediate casing may serve as the coal protection casing.

Intermediate Casing Standards

1. The operator should install intermediate casing to a depth that provides for well control, down-hole stability, safety, and separation of zones, and it should be cemented to the surface from that depth.
2. Subsequent to installation and cementing of the intermediate casing, a formation integrity (shoe) test may be required by the Chief to establish cement and formation integrity.

Production Casing Standards

1. The operator should install production casing in the well subsequent to drilling and logging operations.
2. Production casing may be cemented in place or set without cement to allow for packer completion. If cemented, the cement should be placed in the hole by the displacement method from the bottom of the hole to a point at least five hundred feet (500') above the shallowest producing zone. If no intermediate casing is installed, production casing should be cemented to a point at least five hundred feet (500') above the shallowest fluid bearing zone.

DATE

**JAMES A. MARTIN, CHIEF
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