

APPENDIX P

**BLM UTAH OIL AND GAS DEVELOPMENT
GROUND WATER PROTECTION MEASURES**

This page intentionally blank.

BLM Utah Oil and Gas Development

Ground Water Protection Measures

The BLM's protection of ground water resources begins during the resource management planning process with the development of stipulations or lease notices to be applied to oil and gas leases. Stipulations and notices are attached to leases at the leasing stage when appropriate for resource protection as determined by BLM interdisciplinary specialists. The application and implementation of stipulations, lease notices, BLM regulations and Onshore Oil and Gas Orders protects ground water resources. A site-specific analysis of ground water and its protection will be conducted during BLM's review of an application for permit to drill (APD). Onshore Oil and Gas Order No. 1, Approval of Operations, is authorized by 43 CFR 3160 and contains the requirements for a complete APD package. The requirements are: a completed Form 3160-3 APD; well plat certified by a registered surveyor; drilling plan; surface use plan of operations; evidence of bonding; operator certification; and completion of an onsite inspection.

The proposed action described in Chapter 2.0 of this EIS/EA is based on the drilling plan submitted by the operator, which includes a description of the drilling program; projected completion zone locations; pertinent geologic data; estimated depths at which the top and bottom of anticipated water, oil, gas or other mineral-bearing formations are expected to be encountered and plans for protecting such resources; expected hazards and proposed mitigation measures to address such hazards. The surface use plan of operations must include maps showing existing roads to be used for access, new access to be constructed, location of existing wells (including water wells), location of existing and/or proposed facilities, location and type of water supply and well site layout. Information must be supplied regarding the source of construction materials for the road and pad, location of auxiliary facilities, methods of handling waste disposal, name of the surface owner, and plans for reclamation of the surface.

In accordance with 43 CFR 3162.3-1, Drilling Applications and Plans, the well is approved only after appropriate environmental and technical reviews by the authorized officer (AO) of the BLM. Permitting is a site-specific process. A thorough review of submitted materials for each individual well by BLM resource specialists is completed. The geologist performs independent review utilizing Utah Geological Survey (UGS) and U.S. Geological Survey (USGS) geologic and hydrologic data and maps to generate a geologic report. The geologist identifies usable ground water and mineral-bearing zones that require protection. The petroleum engineer reviews the casing and cementing portions of the drilling plan to ensure the protection of those zones identified by the geologic report. The natural resource specialist (NRS) reviews the surface use plan and determines the adequacy of reserve pit design. Conditions of approval (COAs) are attached to the APD as necessary. An on-site inspection involving company representatives, the BLM interdisciplinary team, Utah Division of Oil, Gas and Mining (UDOGM) personnel and the

surface owner or management agency is required to be conducted prior to approval. BLM and UDOGM specialists also inspect the constructed pad site before drilling begins.

Usable ground water resources are protected during drilling in accordance with BLM Onshore Oil and Gas Order No. 2, Drilling Operations, and Utah UDOGM Administrative Rules. Onshore Order No. 2 requires that all formations containing usable quality water ($\leq 10,000$ mg/L total dissolved solids) be isolated and protected utilizing cement. A COA will be attached to the APD that states, "If encountered while drilling, usable quality water requires protection by bringing the cement at least +/- 100' above the usable water quality zone". The COA would specify the anticipated formation and depth usable quality water might be encountered. BLM petroleum engineers (PEs) and petroleum engineering technicians (PETs) conduct inspections to ensure that the operator's plans have successfully avoided environmental impacts. PETs inspect well sites during drilling, completion and production for technical and safety compliance.

In accordance with 43 CFR 3162.4-2, Samples, Tests and Surveys, "during the completion of a well, the operator shall, when required by the authorized officer (AO), conduct, test, run logs and make other surveys reasonably necessary to determine the presence, quantity, and quality of oil, gas, other minerals, or the presence or quality of water." These tests and logs are reviewed and correlated with geologic and hydrologic data. "When needed, the operator shall conduct reasonable tests which will demonstrate the mechanical integrity of the down-hole equipment" (43 CFR 3162.4-2(b)). In order to protect fresh water and other minerals, "tests and surveys of the effectiveness of such measures (to isolate and protect usable water) shall be conducted by the operator using such procedures and practices approved or prescribed by the AO". The BLM has the authority to require companies to do reasonable testing if deemed necessary. The BLM AO may require an operator to conduct cement bond log surveys to verify cement adequacy.

The Gold Book, Fourth Edition - Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development incorporates the 43 CFR 3160 regulations and presents them in a field-oriented manner. To prevent contamination of ground water and soils, or to conserve water, the BLM suggests that operators use a closed-loop drilling system or line reserve pits with an impermeable liner if pits are constructed in areas of shallow ground water or porous soils over fractured bedrock. If the AO determines it is necessary, as verified during the onsite or permit review, the BLM would make this a requirement by attaching a COA at the time of APD approval.

The purpose of Onshore Oil and Gas Order No. 7, Disposal of Produced Water (43 CFR 3162.5 – Environment and Safety) is to specify informational and procedural requirements for submission of an application for the disposal of produced water and the design, construction and maintenance requirements for disposal pits. All produced water from Federal leases must be disposed of by (1) injection into the subsurface which is regulated by the Environmental Protection Agency (EPA) or UDOGM within the underground injection control (UIC) programs; (2) into pits which is regulated by BLM or UDOGM; or (3) other acceptable methods approved

by the AO, including surface discharge under the National Pollutant Discharge Elimination System (NPDES) as regulated by UDEQ. Injection of produced water on federal lands in Utah is regulated by Utah Administrative Rule R649-5: Underground Injection Control of Recovery Operations and Class II Injection Wells. Injection of produced water on Indian lands in Utah is administered by the EPA under 40 CFR Part 17.2253.

Produced water disposed of in a pit or evaporation pond, i.e. disposal facility, must conform to approved construction requirements in accordance with Onshore Order No. 7, BLM Manual 9172, and UDOGM or EPA requirements. After construction, the facility must be determined to be acceptable by the AO prior to discharge of fluids. The BLM AO may impose additional conditions or revoke a previously-approved disposal permit.

Operators are encouraged to substitute less toxic (chromate, lead, etc.), yet equally effective chemicals, for conventional drilling products such as mud and pipe dope. Containment structures are to be constructed around all tank batteries consistent with EPA's spill prevention, control and countermeasure (SPCC) regulations. All spills or leakages must be reported immediately by the operator to the BLM in accordance with Notice to Lessees NTL-3A.

Application of stipulations and lease notices and the above guidance, regulations, Onshore Oil and Gas Orders and COA's should effectively reduce or mitigate potential impacts to usable ground water sources.