Appendix G

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Subj: JFO comments on FS EA for O&G Leasing on MS Forests

Oil and gas wells may have the potential to affect Usable Safe Drinking Water (USDW) quality and quantity through withdrawal, injection, or unintentional leakage and spills. Since Oil and Gas development is faced with many complexities, adherence to 43 Code of Federal Regulations (CFR) 3162 and Onshore Oil and Gas Orders Nos. 1-7, BMP's, proper well sanitation, and drilling and completion methods would reduce these impacts, but would not entirely eliminate them. Due to the unique nature of lithology, every horizon, play, well, and pay zone may require a unique drilling and completion treatment.

There is a misconception that hydraulic fracturing is a drilling technique when it is actually a Production Enhancement technique. The environmental impacts associated with horizontal drilling are minimal. The reason is that numerous wells can be drilled from a single pad and sensitive areas can be developed with no surface disturbance. This allows the BLM and the FS to ensure the Federal Mineral Estate is not drained and maximum development and recovery of the hydrocarbon resource.

While conventional horizontal and directional drilling technologies have been used to drill shale gas wells, in almost every case, the rock around the wellbore must be hydraulically fractured before the well can produce paying quantities of gas. Hydraulic fracturing is not new technology, but is technology that has been evolving for greater than 30 years. Hydraulic fracturing is used to enhance recovery of new and old oil and gas resources by enlarging fractures through which oil and gas can be drawn to a well and recovered at the surface. Water-based fluids have become the predominant type of fracturing fluids. Depending on the pay zone, approximately 120,000 barrels of water may be utilized to facilitate the recovery in the newly completed gas reservoir. Current technologies allow for the recovered frac fluids to be utilized again in similar pay zone fracturing treatments. Recovery of water used in fracturing operations is less than 50% in some horizons, but more than 50% in other horizons. Therefore, the impact to the freshwater resource is minimized. After fluids and proppants are injected at high pressures to expand fractures, in some reservoirs, large quantities of reservoir formation water and some of the injected fracturing fluids are recovered from the well to facilitate the production of oil and gas from the well.

Although the injection of hydraulic fracturing fluids has not been determined to threaten underground sources of drinking water (EPA 2004), disposing of produced water withdrawn from oil and gas wells has the potential to affect surface water and groundwater sources. The preferred method of disposal of produced water is underground injection. Injection of produced water would prevent impacts to surface water quality; however, a critical aspect of underground injection is finding a permanent formation with a concentration of total dissolved solids (TDS) that is equal to or greater than the produced water. In order to inject produced water, an oil and gas operator must obtain a permit as

required by the 43 CFR 3162 and Onshore Oil and Gas Orders No. 1,2, and 7. The underground injection regulations address the siting, construction, operation, monitoring, abandonment of an injection well, and the protection of USDW. These requirements are designed to prevent contamination of surface and underground drinking water sources. At the present time, there are no known cases of groundwater contamination from Oil and Gas Operations in the state of MS. This includes horizontal, directional, vertical, and hydraulically fractured oil, gas, and water injection wells. The proper well drilling and completion techniques, lithology of MS, and the location of pay zones below the USDW have contributed to the success of the protection of the USDW Resource.

Surface discharge is another common method of disposing produced water from oil and gas production. Oil and gas operators must obtain a National Pollutant Discharge Elimination System (NPDES) permit to discharge produced water on the surface. The type of permit currently offered is a Tier II permit. This permit requires the monitoring of water quality in streams and limits instream TDS concentrations to 230 mg/L (GSA 2005). The surface discharge of produced water into existing stream channels could potentially increase the salinity of surface waters and increase flow rates, resulting in water quality degradation, increased soil erosion, and channel downcutting and widening.

In order to minimize the introduction of drill fluids, hazardous waste spills, or leakage from reserve pits into groundwater sources, adherence to the requirements of 43 CFR 3162 and Onshore Oil and Gas Orders No. 1,2, and 7 is required. Although potential impacts to groundwater would be reduced through the implementation of federal, state, and local regulations that require site characterization and corrective action for hazardous waste and spills, such impacts would not be eliminated.

While Oil and Gas production may contribute to the effects of climate change, proper storage facilities, adherence to flaring and venting regulations would limit the amount of emissions released. In addition, Oil and Gas Production emissions remain below other industries emissions.

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