

## Kerr-McGee Oil & Gas Onshore LP (KMOG)

### Odor Mitigation Plan

#### Standard Odor Mitigation Procedure in the DJ Basin:

*In reference to Colorado Oil and Gas Conservation Commission (COGCC) Rule 304. c. (4) and Rule 426. a-c*

1. List of potential sources of odors (prior to mitigation measures):
  - a. Oil based drilling fluid is a potential source of odor. The following areas of the rig can be affected by oil-based drilling fluid odor if un-mitigated:
    - i. Shaker area and cuttings transfer tank
    - ii. Active and reserve oil-based mud tanks
    - iii. Three- sided cuttings collection/storage tanks
    - iv. Drilling tubulars racked in derrick
    - v. Cuttings while in transport to landfill
  
2. Identification of drilling fluid planned:
  - a. Hydrocarbon based drilling fluid at an approximate ratio of 70% hydrocarbon to 30% water.
  - b. The 70% hydrocarbon portion of the drilling fluid will be comprised of a blend of diesel and a proprietary product called DrO (Approximately 70% diesel and 30% DrO).
  - c. The DRO product is a less volatile hydrocarbon which lowers total volatile organic compounds (VOC).
  
3. Oil based drilling fluid International Petroleum Industry Environmental Conservation Association/International Association of Oil & Gas Producers (IPIECA/OGP) classification (Group)
  - a. Group 1 drilling fluid
  - b. Aromatic content (volume percentage) of hydrocarbon base fluid:

| Component    | 30%DrO / 70% Diesel Blend |
|--------------|---------------------------|
| Benzene      | 0.0000 (trace)            |
| Toluene      | 0.0020                    |
| Ethylbenzene | 0.0064                    |
| Xylene       | 0.0673                    |
| TOTAL BTEX   | 0.0757                    |

4. List of odor reducing or suppressive additives planned for use as part of normal operations:
  - a. Water-soluble odor neutralizer with essential oils, using KMOG designed concentrations specifics.
  
5. Description of equipment and processes used to control odors for each source/activity:
  - a. During the drilling phase all odor sources are attributed to the hydrocarbon-based drilling fluid when left untreated. To eliminate and/or reduce these odors the KMOG Drilling Department has partnered with a commercial vendor to design and optimize a treatment plan using essential oils mixed in all drilling fluids on location to encapsulate and neutralize odor at the source. The odor neutralizer product is added to the active drilling fluid system at a concentration rate of five gallons per 24-hours, metered, and continuously added throughout the 24-hour period. The concentration volumes and essential oil type were carefully selected through testing with a Nasal

Ranger olfactometer by the unaffiliated third-party company to ensure odors are neutralized to the maximum extent possible.

- b. The odor neutralizer treated drilling fluid eliminates odors in the following areas:
    - i. Shaker area and cuttings transfer tank
    - ii. Active and reserve oil-based mud tanks
    - iii. Three-sided cuttings collection/storage tanks
    - iv. Drilling tubulars racked in derrick
    - v. Cuttings loads in transport to landfill
  - c. In addition to using odor neutralizer the following techniques are used to further ensure the elimination and/or reduction of odor:
    - i. All cuttings on location are dried using centrifugal dryers to ensure only trace amounts of drilling fluid remain on the dry cuttings. This ensures odor is eliminated while waiting on transport and during transport to local landfills.
    - ii. Drill pipe and any other tubular pulled out of the hole are wiped down before being racked in the derrick or laid down on location.
    - iii. Base oil used to build new drilling fluid is transferred through a line outlet run to the bottom of the mix tank to minimize agitation (splashing) and reduce potential to create odor (odor neutralizer is continuously added to the system to immediately treat new drilling fluid).
    - iv. During flowback and well completions, utilize closed-loop green completion techniques to the maximum extent practicable to minimize emissions and the flaring of natural gas.
6. Description of how cuttings will be managed at location to include how odors will be managed during transport:
- a. All residual drilling fluid on cutting will have odor neutralizer additive applied which neutralizes the source of the odor from drill cuttings.
  - b. After passing over the shale shakers, cuttings are transported through a closed loop piping system to a centrifugal dryer which removes the majority of drilling fluid, leaving dry cuttings and the drilling fluid is then returned to the active pit system for reuse and re-treatment with odor neutralizer.
  - c. Cuttings are transported to local landfills at a rapid pace, generally, remaining on location less than 24 hours. The dried cuttings with only trace drilling fluid has been treated with odor neutralizer and continues to counteract odor during transport.
7. List of odor control Best Management Practices:
- a. Odor neutralizer will be added to oil-based drilling fluid system for all production drilling operations.
  - b. Odor neutralizer with essential oils are added to closed loop drilling fluid system continuously to neutralize odor at the shakers, transfer tank, active/reserve tanks, and cuttings in collection tanks and during transport.
  - c. All drill cuttings are processed through centrifugal dryers to remove residual oil-based drilling fluid not removed by shale shakers.
  - d. All tubulars pulled out of the hole will be wiped prior to being racked in the derrick or laid down.
  - e. Cuttings storage time on location will be minimized prior to transport to local landfills.
  - f. New drilling fluid will be built using transfer line outlets located below tank fluid level to minimize splashing/agitation. New fluid will immediately be treated with odor neutralizer.
  - g. Hydrocarbon base oil used in drilling fluid will include a mixture of the proprietary DrO product to reduce aromatics.

8. A description of any Best Management Practices used to manage odor from the location during production:
  - a. KMOG uses pipelines to transport hydrocarbons (oil & gas) from the production facility eliminating odors that could occur during truck loading.
  - b. Production facilities are inspected regularly by KMOG to make sure the equipment is working properly and necessary maintenance is performed, to reduce potential odors. KMOG incorporates Audio, Visual, Olfactory (AVO) observations at production facility inspections.
  - c. KMOG will use Best Management Practices to reduce unloading events and to reduce potential odor causing emissions when liquids unloading is necessary (i.e., maintenance activities to remove liquids from existing wells that are inhibiting production).
  - d. KMOG remotely monitors production facilities, this reduces traffic onto production facilities which may create odors from truck traffic.