Noble Energy, Inc.

Land Application of Water-Based Bentonitic Drilling Fluids & Associated Drill Cuttings

This document outlines the operational requirements to be used when applying water-based bentonitic drilling fluids and associated drill cuttings to spread fields to maintain compliance with the Colorado Oil and Gas Conservation Commission (COGCC) Rule 907.d.(3). These materials are applied as a beneficial soil amendment.

The spread fields covered under this Waste Management Plan are detailed in Table 1. Only water-based bentonitic drilling fluids generated by Noble Energy, Inc. (Noble) will be applied at these sites. No other E&P waste shall be deposited at these sites. Changes to Table 1 will be provided to the COGCC in an electronic communication.

Spread Fields

1. Noble shall obtain written authorization from the surface owner (if non-Noble land) prior to land application of water-based bentonitic drilling fluids and associated drill cuttings. The signed agreement shall state that incorporation of the material into the native soil will occur within 10 days of application.

2. A 3-inch maximum lift, per application, of water-based bentonitic drilling fluids and associated drill cuttings will be applied.

3. Daily tracking tickets will be used and will include the following information:
    - Name of each well where material was generated;
    - Date of transfer of the material from each well to the spread field;
    - Volume of material taken to the spread field;
    - Name of transporter; and
    - Area where drilling fluid and associated drill cuttings were applied.

4. The volume of material transported to the spread field will be tracked using a spreadsheet to help ensure the 3-inch maximum lift per application is not exceeded.

5. Conditions permitting, Noble personnel will ensure the material will be incorporated into the native soil within 10 days of application.

6. Soil sampling will be conducted, following incorporation, on a semi-annual basis, and prior to use if available.

- Prior to use, surface soil samples will be collected from an interval of 0-8 inches below ground surface (bgs), from every area where material will be applied, to document the baseline conditions of the spread field. Baseline samples will be analyzed for the full COGCC Table 9-10 suite.
- During operations and closeout, soil samples will be collected on a semi-annual basis from a depth of 0-8 inches bgs. All soil samples will be analyzed for total petroleum hydrocarbons (TPH), including gasoline range organics (GRO) and diesel range organics (DRO). Soil samples will also be analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), electrical conductivity (EC), sodium adsorption ratio (SAR), pH, and arsenic.
- Noble will utilize the attached PDF figure of the United States Geological Survey arsenic soil study in Colorado, overlaid with the National Resource Conservation Service (NRCS) soil classifications. Noble Energy will utilize this data to compare arsenic values collected at each spread field within the NRCS soil classification of each spread field.
- One composite soil sample per spread field will be taken during each sampling event. The sample will be analyzed for petroleum aromatic hydrocarbons (PAHs).

7. Spread fields will not be utilized for more than three years. Spread fields may be identified as geographic locations that are contiguous, but any specific field will not be utilized for more than three years continuously.

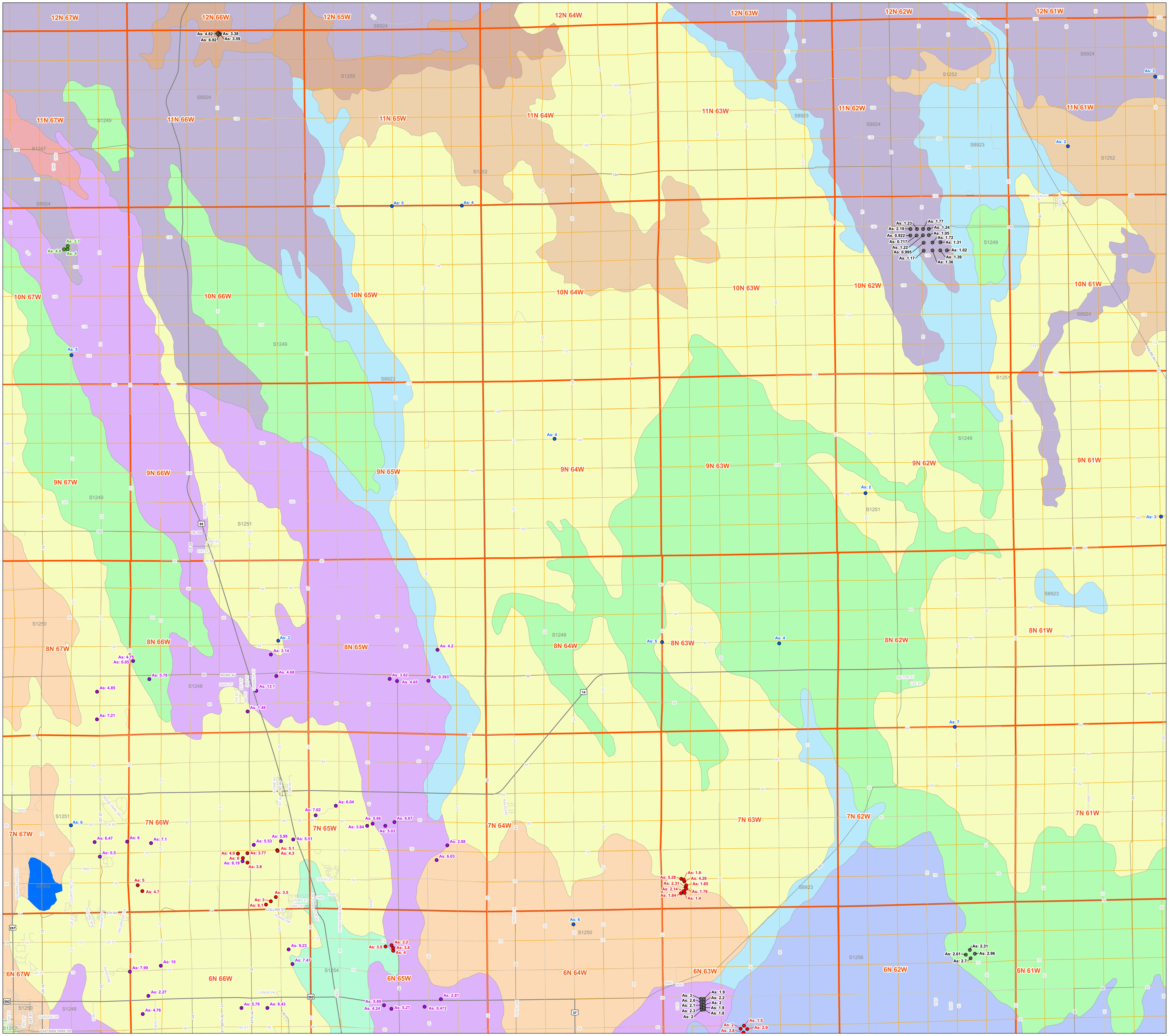
8. All records will be available to the COGCC or landowner upon request, within five business days.

9. The resulting concentrations of the spread fields' soil will be in compliance with COGCC Table 910-1 concentration levels.

Attachment
Table 1 – Active Spread Field Locations
Figures-USGS Arsenic Data overlaid with the NRCS Classification

Table 1
Active Spread Field Locations
Noble Energy, Inc.

Site Name	Legal Description	Latitude/ Longitude	Driving Directions
Sandau # 1	Sec. 24, T4N, R66W	40.278634, -104.729513	NE of CR35 and CR 40
Moser III	Sec 28 T3N R65W	40.199951, -104.664102	SW of the corner of WCR 30 and WCR 43
Grover/Konig	Sec 10 T10N R62W	40.850461, -104.312578	1 mile South of WCR 120 and WCR 79
Miller I North	Sec 11 T6N R62W	40.497715, -104.293745	NE WCR 70 and WCR 81



LEGEND

- ANADARKO ARSENIC SAMPLE (PPM)
- NOBLE ARSENIC SAMPLE (PPM)
- PDC ARSENIC SAMPLE (PPM)
- USGS As BACKGROUND (PPM)
- USGS As GEOCHEMICAL SOIL DATA (PPM)

USGS: UNITED STATES GEOLOGIC SURVEY

As: ARSENIC

PPM: PARTS PER MILLION

- HIGHWAY
- INTERSTATE
- TOWNSHIP
- SECTION

ASSOCIATION SOIL TYPE

- FLUVAQUENTS-BANKARD-ALDA (S1262)
- NUNN-HAVERSON-DACONO-ALTVAN (S1248)
- OTERO-HAVERSON-BAYARD-BANKARD-AVAR (S8923)
- PEETZ-BUSHMAN-ASCALON-ALTVAN (S8924)
- RAZOR-MIDWAY-MANZANOLA-HELDT (S1267)
- SIXMILE-PURNER-KIRTLEY-CONNERTON-BARNUM-BALLER (S1245)
- SIXMILE-ROCK OUTCROP-RENOHILL-MIDWAY-CARNERO-BALLER (S1246)
- STONEHAM-NUCLA-MITCHELL-KIM-EPPING-BAYARD (S1252)
- TERRY-TASSEL-SHINGLE-RENOHILL-ASCALON (S1249)
- THEDALUND-TERRY-OTERO-OLNEY-KIM-HAVERSON (S1250)
- THEDALUND-STONEHAM-LARIMER-ALTVAN (S1247)
- TREON-TERRY-ROCK OUTCROP-MITCHELL-ALTVAN-ABERONE (S1255)
- ULM-NUNN-ENGLEWOOD (S1253)
- UPSON-ROCK OUTCROP-NEWCOMB-MACFARLANE-LEIGHCAN (S1174)
- VALENT-JULESBURG (S1256)
- VALMONT-NUNN-NEDERLAND-LEYDEN-KUTCH-DENVER (S1271)
- VONA-MANTER-JULESBURG-HAXTUN (S1259)
- WELD-STONEHAM-PLATNER-OLNEY-NUNN-ASCALON (S1251)
- WETMORE-ROCK OUTCROP-RATAKE-MOEN-BOYLE (S1244)
- WETMORE-TRAG-ROCK OUTCROP-LININGER-BREECE-BOYLE-BONJEA-ALLENS PARK (S9004)
- WILEY-WELD-NORKA-COLBY-ADENA (S1254)
- WATER (S8369)

0 1 2 Miles

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FIGURE 1
BACKGROUND ARSENIC LEVELS
NORTH DJ BASIN
WELD COUNTY, COLORADO

LT ENVIRONMENTAL, INC.

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LEGEND

- ANADARKO ARSENIC SAMPLE (PPM)
- NOBLE ARSENIC SAMPLE (PPM)
- PDC ARSENIC SAMPLE (PPM)
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USGS: UNITED STATES GEOLOGIC SURVEY

As: ARSENIC

PPM: PARTS PER MILLION

0 1 2 Miles

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FIGURE 2
BACKGROUND ARSENIC LEVELS
SOUTH DJ BASIN
WELD COUNTY, COLORADO

LT ENVIRONMENTAL, INC.

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