



Kerr-McGee Oil & Gas Onshore LP

FERN

Fluid Leak Detection Plan

**SW/4 SE/4 Section 31, T3N R66W, 6th P.M.
Weld County, Colorado**

October 2024

Table of Contents

I.	Introduction and Site Description	2
II.	Drilling Operations Best Management Practices (BMPs)	2
III.	Completion Operations Best Management Practices	2
IV.	Production Operations Best Management Practices	4
V.	Recording Keeping	4
VI.	Summary of Best Management Practices	5
A.	Material Handling and Spill Prevention	5
B.	Drilling Operations	5
C.	Completion Operations	5
D.	Production Operations	6

I. Introduction and Site Description

Oil and Gas Location Name: Fern

Type of Surface: Fee

Total Area of Disturbance During Operations: 15.75 acres

Total Area of Disturbance After Interim Reclamation: 4.06 acres

Site Elevation (Well Pad): 4,840'

II. Drilling Operations Best Management Practices (BMPs)

- a. Two drilling crew members required and dedicated for all fluid transfers (no exceptions) from start to finish of the operation. Their sole focus is on the transfer. No fluid transfer will occur during crew change. Crew members conducting the fluid transfer will not leave the area until transfer operations completed.
- b. Tanks (along with auxiliary equipment installed in tanks) will be inspected prior to use and replaced/repaired if damaged.
- c. During rig up, hoses and lines will be properly assembled, all bolts properly made up and gaskets installed (when applicable).
- d. Appropriate secondary containment will be utilized when equipment maintenance is conducted on location.
- e. Contractors will maintain an updated copy of their Spill Prevention and Control and Countermeasures (SPCC) plan on location and its personnel will be trained accordingly.
- f. Tanks will be labeled (signs, magnets, etc.) indicating the contents of the tank.
- g. Verify tank capacity is capable of handling estimated volumes prior to operations start.
- h. Tanks will have hatches, valves and bull plugs secured prior to transfers.
- i. Shut down transfer pump and close supply valve when transfer or circulation is completed. Ensure fluids cannot enter holding tank through gravity feedback.
- j. Pre-job inspection will be conducted prior to start up which include the visual inspection of hoses, lines, and valves to ensure proper connection and alignment.
- k. During operations, all fluid containing equipment is inspected daily.
- l. Walk all lines and confirm valve alignment before starting the transfer.
- m. Walk the lines as soon as the transfer starts to confirm no leaks.
- n. All personnel on location on behalf of Kerr-McGee Oil & Gas Onshore LP (KMOG) are trained in Auditory, Visual, Olfactory monitoring (AVO) techniques. All personnel are empowered with 'Stop Work Authority' and to report any leaks immediately.

III. Completion Operations Best Management Practices

- a. Two completion crew members required and dedicated for all fluid transfers (no exceptions) from start to finish of the operation. Their sole focus is on the transfer. No fluid transfer will occur during crew change. Crew members conducting the fluid transfer will not leave the area until transfer operations completed.

- b. Tanks (along with auxiliary equipment installed in tanks) will be inspected prior to use and replaced/repaired if damaged.
- c. Appropriate secondary containment will be utilized when equipment maintenance is conducted on location.
- d. Contractors will maintain an updated copy of their SPCC plan on location and its personnel will be trained accordingly.
- e. Tanks will be labeled (signs, magnets, etc.) indicating the contents of the tank.
- f. Verify tank capacity is capable of handling estimated volumes prior to operations start.
- g. Tanks will have hatches, valves and bull plugs secured prior to transfers.
- h. Shut down transfer pump and close supply valve when transfer or circulation is completed. Ensure fluids cannot enter holding tank through gravity feedback.
- i. Pre-job inspection will be conducted prior to start up which include the visual inspection of hoses, lines, and valves to ensure proper connection and alignment.
- j. During operations, all fluid containing equipment is inspected daily.
- k. Walk all lines and confirm valve alignment before starting the transfer.
- l. Walk the lines as soon as the transfer starts to confirm no leaks.
- m. Temporary produced water storage tanks will be designed, constructed, and maintained in accordance with the following portions of the National Fire Protection Association (NFPA) Code 30 (2008 version):
 - o Tanks are built to engineering standards using noncombustible materials, with relief device sizing based on API 2000 standards.
 - o Tanks are inspected and maintained while in use.
 - o The only pipes within the containment are related to the temporary tanks (i.e., no external piping is co-located within the containment), and firefighting equipment is, likewise, not stored within the containment area.
- n. The temporary produced water storage tanks will be staged on a geosynthetic liner and surrounded by an earthen berm. The berms will enclose an area sufficient to provide secondary containment for 150% of the volume of the largest single tank and will be sufficiently impervious to contain spilled or released material. Berms and the liner and all secondary containment devices will be inspected at the same time as stormwater inspections, with personnel on location, daily inspections will occur. During non-active, but while under construction, site inspections will occur every 14 days. When construction is completed and the location is on production, site inspections will occur every 28 days at a minimum.
- o. Monitor pressure responses and containment to identify potential leaks. Lines will be walked continuously throughout operations (between stages) to identify potential leaks.
- p. There is a slam valve and control valve with Emergency Shut Down system in line to the external temp tanks to prevent overflowing tanks during the green flowback duration.
- q. Hourly walk-throughs and pressure measurements recorded during flowback operations for leak detection.
- r. During operations, all fluid containing equipment is inspected daily.

- s. All personnel on location on behalf of KMOG are trained in AVO techniques. All personnel are empowered with ‘Stop Work Authority’ and to report any leaks immediately.

IV. Production Operations Best Management Practices

- a. Berm Construction: A geosynthetic liner will be laid under the permanent tanks on this location and a metal containment will be constructed. Secondary containment devices will be constructed around crude oil, condensate, and produced water storage tanks and will enclose an area sufficient to contain and provide secondary containment for 150% of the largest single tank. Secondary containment devices will be inspected at the same time as stormwater inspections, with personnel on location, daily inspections will occur. During non-active, but while under construction, site inspections will occur every 14 days. When construction is completed and the Location is on production, site inspections will occur every 28 days.
- b. Automation technology will be utilized at this facility. This technology includes the use of fluid level monitoring for the tanks and produced water sumps, high-level shut offs, and electronic sensors to monitor the interstitial space of double-walled produced water sumps. All automation is monitored by KMOG’s Integrated Operations Center (IOC), which is manned 24 hours per day, seven days per week.
- c. Field Inspections include the following: Field-Constructed Above Ground Containers; Secondary Containment Structures; Shop-Built Containers; Generators / Fuel Tanks and associated secondary containment; Pressure Vessels (separators, heater treaters, pigging stations); Portable Containers and all Manifolder Piping; Onsite and Offsite Pipelines (flowlines, production piping, gathering lines) Field Drainage Systems (oil traps, sumps, or skimmers); and Additional equipment used during separation, storage, containment, or transferring of produced fluids.
- d. All personnel on location on behalf of KMOG are trained in AVO techniques. All personnel are empowered with ‘Stop Work Authority’ and to report any leaks immediately.
- e. KMOG complies with Colorado Energy & Carbon Management Commission (ECMC) Rule 609.
- f. For pressure vessels, KMOG will adhere to API standard 510. With an additional pre-installation inspection of all vessels.
- g. For tanks, KMOG will adhere to API standard 653 & 12R1. With an additional pre-installation inspection of all tanks.
- h. After the first year, KMOG will pressure test flowlines annually.

V. Recording Keeping

- a. Inspections resulting in findings are reported to the IOC. These are entered into an internal management system. Corrective actions are automatically assigned when necessary. SPCC required inspection records are kept in accordance with US EPA requirements.
- b. Maintenance or repair records are managed through an internal management system. These are tracked from assignment through completion of the tasks.
- c. Leak records: All leaks are reported immediately to the IOC and logged in internal management systems. Leak reports are reviewed daily. Any additional investigation is conducted by trained personnel and records in the system. All leaks are tracked until final resolution. Records are retained per federal, state, and local guidelines.

- d. Training Records: KMOG retains AVO training records for all personnel with access to the location in an internal management system. Records are retained per federal, state, and local guidelines.

VI. Summary of Best Management Practices

a. Material Handling and Spill Prevention

The following site-specific BMPs will be used on location:

- The temporary produced water storage tanks will be staged on a geosynthetic liner and surrounded by an earthen berm. The berms will enclose an area sufficient to provide secondary containment for 150% of the volume of the largest single tank and will be sufficiently impervious to contain spilled or released material. Berms and the liner and all secondary containment devices will be inspected at the same time as stormwater inspections, with personnel on location, daily inspections will occur. During non-active, but while under construction, site inspections will occur every 14 days. During the production phase, a geosynthetic liner will be laid under the permanent tanks on this location and a metal containment will be constructed.
- Secondary containment devices will be constructed around crude oil, condensate, and produced water storage tanks and will enclose an area sufficient to contain and provide secondary containment for 150% of the largest single tank. Secondary containment devices will be inspected at the same time as stormwater inspections, with personnel on location, daily inspections will occur. During non-active, but while under construction, site inspections will occur every 14 days. When construction is completed and the Location is on production, site inspections will occur every 28 days.

b. Drilling Operations

During drilling operations, the following site-specific BMPs will be used:

- Appropriate secondary containment will be utilized when equipment maintenance is conducted on location. KMOG will shut down transfer pump and close supply valve when transfer or circulation is completed. KMOG will ensure fluids cannot enter holding tank through gravity feedback. Pre-job inspection will be conducted prior to start up which include the visual inspection of hoses, lines, and valves to ensure proper connection and alignment.
- During operations, all fluid containing equipment is inspected daily.

c. Completion Operations and Water Recycling Operations

During completion and recycling operations, the following site-specific BMPs will be used:

- KMOG will monitor pressure responses and containment to identify potential leaks. Lines will also be walked continuously throughout operations (between stages) to identify potential leaks. In addition, there is a slam valve and control valve with Emergency Shut Down system in line to the external temp tanks to prevent overflowing tanks during the green flowback duration.
- Water recycle operations will use pneumatic valves that auto shut to stop the treatment process.

d. Production Operations

During production operations, the following site-specific BMPs will be used:

- Automation technology will be utilized at this facility. This technology includes the use of fluid level monitoring for the tanks and produced water sumps, high-level shut offs, and electronic sensors to monitor the interstitial space of double-walled produced water sumps.
- All automation is monitored by KMOG IOC, which is manned 24 hours per day, seven days per week.
- All personnel on location on behalf of KMOG are trained in AVO techniques.
- All personnel are empowered with 'Stop Work Authority' and to report any leaks immediately.