

# Fluid Leak Detection Plan

North Cheyenne  
Oil and Gas Development

## Travis 1-10 Pfaffly 1-12

This Fluid Leak Detection Plan has been prepared by Navex Resources, LLC (Navex) for its North Cheyenne oil and gas development in Kit Carson County, Colorado. The Plan addresses the Colorado Oil & Gas Conservation Commission (COGCC) requirement at Rule 304.c.(13) to prepare a Fluid Leak Detection Plan and the fluid leak detection requirements in Rules 608-609 and 1102-1104.

### 1.0 Introduction and Site Description

Navex is proposing to develop two exploratory oil and gas wells for production of oil and condensate, natural gas, natural gas liquids, and inert gases, including helium. The wells will be developed as conventional vertical wells, approximately 6,000 feet deep. They will be in the following locations:

Travis 1-10: SE  $\frac{1}{4}$  NE  $\frac{1}{4}$  Section 10, Township 11 South, Range 45 West  
Pfaffly 1-12: NW  $\frac{1}{4}$  SW  $\frac{1}{4}$  Section 12, Township 11 South, Range 46 West

Each well will be on fee surface for production of fee minerals. The surface is used for dryland farming and is leased from private landowners. Each Oil and Gas Location will be approximately 3.0 acres during development with a Working Pad Surface of approximately 2.7 acres. After interim reclamation, each production pad will be downsized to an estimated 2.0 acres.

The wells will be developed using a water-based drilling fluid and a closed-loop drilling system. If the exploratory wells are developed for production, oil and condensate will be trucked off site for commercial sale. Natural gas will be piped underground to tie into the existing Ladder Creek Gathering System operated by Tumbleweed Midstream. Tumbleweed will pipe natural gas underground from its Ladder Creek Helium Plant in Cheyenne Wells, Colorado, to the Colorado Interstate Gas Company's midstream pipeline. Tumbleweed will process the natural gas liquids, inert gases, and helium for end users. The estimated durations for each phase of development are listed in Table 1. Site elevations are listed in Table 2.

**Table 1. Phases of Development**

Phase	Duration (days)
Construction	2
Well Drilling	7 to 14
Completion	6
Interim Reclamation	2
Production	20 years, est.

**Table 2. Site Elevations**

Location	Elevation (feet)
Travis 1-10	4365
Pfaffly 1-12	4467

## 2.0 Drilling and Completions Fluid Leak Detection Measures

### Drilling Operations

Drilling will be conducted using a closed loop drilling system, a water-based drilling fluid, and an estimated 3,500 bbl of water per well. A pre-drilling inspection of the equipment will be conducted by the rig and third-party operators trained in integrity management of the system. Inspection will include visual, function, and pressure testing of valves, hoses, and transfer lines to ensure that connections are secure. The rig operator will shut down the transfer pump and will close the supply valve when transfer or circulation are complete. The system and fluid containers will be inspected daily during use for signs of drips, leaks, or spills.

### Completion Operations

The completions operator will monitor pressure and containment for potential leaks. Visual inspections will be conducted throughout operations to look for signs of leakage. A shutoff valve and a control valve with an emergency shut down system will be in place to prevent overflowing tanks during flowback operations. Table 3 lists specific monitoring, inspection, testing, and maintenance procedures.

**Table 3. Monitoring, Inspection, Testing, Maintenance Procedures and Schedule**

Equipment	Monitoring, Inspection, Testing, Maintenance Procedures	Schedule
Drill Rig and Generator	Operators will function and pressure test and monitor the drill rig for signs of overheating, drips or leaks onto the ground, and at connection points to fuel or water. Any deficiencies will be corrected promptly. A spill or leak will be treated with the spill response material maintained on site and disposed of appropriately as oily waste at a disposal facility authorized to accept the waste.	Continuous while operating
Fuel Tank	The fuel tank will be integrated with the drill rig. It will have a liner underneath the fuel tank that will be monitored for signs of drips, leaks, or staining. Valves will be kept tightened to avoid leakage.	Daily
Above-ground Containment	Completion fluids are contained in steel tanks set on polyethylene liners for leak detection. Liners will be monitored for signs of damage and will be repaired promptly.	Daily
Transfer Lines	Transfer lines and valves on equipment to support drilling and completion will be monitored visually at the connection points for stains, drips, or other signs of leakage requiring correction.	Continuous while operating

## 3.0 Produced Fluid Leak Detection Measures

### Production

During production, tanks will be located inside of steel secondary containment, consistent with Rule 603.o. The containment will be sized to contain 150 percent of the volume of the largest tank. Fluid containing equipment will be visually inspected daily by the operator for signs of drips, leaks, or spills. Fluid level sensors will be installed on

tanks to provide continuous tank level monitoring. A valve or fitting found to be ineffective will be repaired promptly. Table 4 lists specific monitoring, inspection, testing, and maintenance procedures.

**Table 4. Monitoring, Inspection, Testing, Maintenance Procedures and Schedule**

<b>Equipment</b>	<b>Monitoring, Inspection, Testing, Maintenance Procedures</b>	<b>Schedule</b>
Tanks	Tanks will undergo testing per manufacturer's specifications prior to being put into service for production. Periodic integrity testing after initial startup will occur per API or STI standards and manufacturer's recommendations.	Pre-start up
Secondary Containment	Tanks and the heated separator will be located inside of secondary containment sized to contain 150 percent of the volume of the largest tank. Secondary containment will be visually inspected for evidence of damage, deterioration, or loss of integrity. Repairs will be made promptly to prevent the risk of migration from a leak or spill.	Daily
Pump Jack Motor	The motor will be powered using source gas. There will be no fuel tank on the location.	Daily
Chemical Container	The chemical container used for well treatment at the wellhead will be in polyethylene containment and monitored for signs of damage, deterioration, or leakage. Deficiencies will be corrected promptly.	Daily
Loading and Unloading	Loading and unloading will occur inside of steel secondary containment. Catch basins will be installed on loadout piping. Loadout piping will contain bull plugs when not in use.	Daily
Intra-facility Transfer Lines	Transfer lines will be monitored visually at the connection points for stains, drips, or other signs of leakage requiring correction and will be repaired promptly.	Daily
Isolation Valves	The operator will maintain isolation valves by performing function tests or maintaining the valve in accordance with its manufacturer's specifications per Rule 1103.a.	Annual
Production Flowline	The 2-inch-diameter buried fiberglass off-location flowline will contain the gas stream. The flowline will be installed per Rule 1102. Before the flowline is buried, it will be pressure tested to maximum operating pressure, according to manufacturer specifications. The operator will verify the integrity of the flowline by performing a monthly audio, visual, olfactory (AVO) survey of the line and annual static-head test, in accordance with Rule 1104.	Pre-start up Monthly Annual

## 4.0 Reporting and Recordkeeping

Inspections and testing will be documented. Documentation will list the activity, date, time, finding, personnel, and signature. Associated testing results will be included. Written records and a copy of this plan will be maintained in Navex's Dallas, Texas office. The Fluid Leak Detection Plan will be provided to the site operator.

The potential for a spill response will address rule requirements for notification, reporting, response actions, corrective action, and remediation. Waste will be properly classified as exploration and production (E&P) or non-E&P waste. A spill will be reported to COGCC in accordance with Rule 912.b and using a Form 19. If remediation is required, a Form 27 will also be submitted.

## 5.0 Site-specific Best Management Practices

**Table 5. Site-specific Best Management Practices**

Best Management Practices
<ul style="list-style-type: none"> <li>Site personnel will be trained in spill prevention, response, and response equipment on at least an annual basis. Training will include how spills or releases will be investigated, controlled, and contained in accordance with Rule 912.a.</li> </ul>
<ul style="list-style-type: none"> <li>If a spill or release meets criteria in Rule 912.b, it will be reported as specified in the rule.</li> </ul>
<ul style="list-style-type: none"> <li>A catastrophic loss of fluid will be temporarily bermed using the backhoe available on site until third-party support provides additional response and remediation.</li> </ul>
<ul style="list-style-type: none"> <li>Site personnel will be trained to conduct inspections using AVO procedures.</li> </ul>
<ul style="list-style-type: none"> <li>Equipment and transfer lines will be monitored daily during well drilling and completion for signs of drips, leaks, or spills, which will be corrected promptly.</li> </ul>
<ul style="list-style-type: none"> <li>Flowlines will be installed consistent with Rule 1102. In accordance with Rule 1104, before a flowline is put into service, it will be pressure tested to maximum pressure and AVO leak detection.</li> </ul>
<ul style="list-style-type: none"> <li>The operator will maintain shutoff valves on flowlines in accordance with Rule 1103.</li> </ul>
<ul style="list-style-type: none"> <li>Per Rule 1104, the operator will conduct a monthly AVO survey to detect failures or signs of leaks from the wellhead and flowlines.</li> </ul>
<ul style="list-style-type: none"> <li>The operator will conduct annual flowline integrity testing in accordance with Rule 1104.</li> </ul>
<ul style="list-style-type: none"> <li>Site personnel will be instructed on procedures for documenting and recordkeeping inspections and testing.</li> </ul>