

St. Croix Operating, Inc.
Revenant #1
NWNE Section 7, T3S R51W
Washington County, Colorado

FLUID LEAK DETECTION PLAN

St. Croix Operating, Inc. (St. Croix), is drafting this plan in accordance with Rules 304.c.(13), 608, 609, 1102, 1103, and 1104.

1. Introduction and Site Description

St. Croix is proposing to construct the Revenant #1 well pad. This is a new proposed location that will have one vertical well. This well is anticipated to produce oil and produced water. The location is located on fee surface and will produce fee minerals.

This location will also have a new proposed access road as well as a new off-location flowline that will connect the wellhead to offsite production equipment.

The total location disturbance will be 7.59 acres. The working pad surface is 3.67 acres. The production pad size (post-interim reclamation) will be 0.002 acres. The proposed constructed site elevation is 4699'.

Drilling for the proposed well is anticipated to take approximately 7 days. Completions for the well is anticipated to be approximately 7 days. St. Croix plans to drill and complete the proposed vertical well before turning it over to production and evaluating the production rate. The well is anticipated to produce for 30 years.

2. Monitoring and Inspection Procedures and Schedules

Category	Site-Specific Equipment	Procedures	Schedule
Drilling	Tanks and Steel Pits	All fluid containers will be installed by third-parties familiar with the OEM recommended installation procedures.	Daily – visual inspections of all fluid containers for integrity
Drilling	Connecting temporary flowlines	Prior to beginning drilling operations, flowlines will be pressure tested to identify any potential leaks. Once integrity has been confirmed, flowlines will be utilized for drilling operations.	Daily – visual inspections of flowlines
Field-Constructed Above Ground Containers	No field-constructed, above-ground containers are proposed for this location.	N/A	N/A
Secondary Containment Structures	The proposed Revenant #1 location will not have any production equipment located onsite. All fluids will be piped to the proposed Revenant Production Facility. For all new facilities that are installed on location, steel secondary containment will be placed around produced fluid tanks. The tanks will be set on an	<p>Prior to installation, secondary containment will be calculated to insure sufficient volume.</p> <p>Field personnel will be familiarized with the equipment on location and where leaks may occur.</p>	<p>Weekly - visual inspections of berm and liner integrity</p> <p>Monthly – a written inspection will occur in accordance with the Spill Prevention, Containment, and Countermeasure Plan.</p>

	impervious liner within the containment.		
Shop-Built Containers	Up to 2 oil tanks and 2 water tanks are proposed to be installed on the proposed Revenant Production Facility location. These tanks will be fabricated offsite and hauled into location for installation.	All new produced fluid tanks will be installed within the steel secondary containment on an impervious liner.	Weekly – visual inspections of tanks, valves, and piping. Monthly – a written inspection will occur, documenting visual inspections of tanks, valves, and berm integrity.
Generators / Fuel Tanks and associated secondary containment	No generators are proposed for this location.	N/A	N/A
Pressure Vessels (separators, heater treaters, pigging stations)	1 Heater Treater is proposed to be added to the proposed Revenant Production Facility location. No Separators or pigging stations are proposed.	St. Croix will follow OEM guidelines for onsite installation and maintenance	Weekly – visual inspections of the heater treater, associated valves, and on-location piping.
Produced Water Pits or Ponds;	No pits or ponds are being proposed for this location.	N/A	N/A
Portable Containers and all Manifolded Piping	No portable containers are proposed for this location. Tanks will be manifolded together at the Revenant Production Facility location.	Prior to being placed into production, manifold connections will be tested with freshwater to identify potential leaks. Once integrity is confirmed, the tanks will be turned over to production operations.	Weekly – visual inspections of the manifolded piping
Onsite and Offsite Pipelines (flowlines,	One off-location flowline is proposed for this project to connect the proposed wellhead	Field personnel will be familiarized with Audio-	Audio-Visual-Olfactory inspections will be conducted monthly.

production piping, gathering lines)	to the production equipment that will be installed at the Revenant Production Facility location.	Visual-Olfactory inspections and Rule 1104.	
Additional equipment used during separation, storage, containment, or transferring of produced fluids	No additional equipment is anticipated for this location.	N/A	N/A

3. Testing and Maintenance Procedures and Schedules

Category	Site-Specific Equipment	Testing Procedures & Schedule	Maintenance Procedures & Schedule
Pressure Vessels (separators, heater treaters, pigging stations);	<p>No pressure vessels are proposed for this location.</p> <p>A Heater-Treater is proposed for the Revenant Production Facility location.</p> <p>No pigging stations are proposed for the location.</p>	<p>Separators and the heater-treater will undergo initial testing as per manufacturer's specifications.</p> <p>Periodic integrity testing after initial start-up will occur as per standard industry practices and manufacturer's recommendations.</p>	<p>Audio-Visual-Olfactory inspections will be conducted monthly</p> <p>Issues identified during monthly inspections or during regular operations will be addressed as soon as possible.</p>
Onsite Pipeline Testing and Maintenance	There will be no onsite flowlines.	N/A	N/A
Offsite Pipeline Testing and Maintenance	One off-location flowline is proposed to connect the well to its production equipment.	<p>Off-Location flowlines will be tested in accordance with the Rule 1104.</p> <p>Below-ground Off-Location Flowlines: a pressure test to maximum anticipated operating pressure will be conducted annually. The pressure test will be to maximum anticipated operating pressure and run for at least 30 minutes once the fluid has stabilized. A successful test will demonstrate the line does not leak, pressure loss does not</p>	<p>Audio-Visual-Olfactory inspections will be conducted monthly</p> <p>Issues identified during monthly inspections or during regular operations will be addressed as soon as possible.</p>

		exceed 10%, and the fluid pressure is stable for the last five minutes of the pressure test.	
Storage Tanks and Containers	<p>Above-ground storage tanks are not proposed for this location.</p> <p>Above-ground storage tanks to support this well will be installed at the proposed Revenant Production Facility location.</p>	<p>All tanks will undergo initial testing as per manufacturer's specifications prior to being connected to production.</p> <p>Periodic integrity testing after initial start-up will occur as per standard industry practices and manufacturer's recommendations.</p>	<p>Weekly visual inspections will occur.</p> <p>Monthly written inspections will occur.</p> <p>Issues identified during any inspection or during regular operations will be addressed as soon as possible.</p>

4. Produced Fluids (oil, condensate, produced water) Procedures

Site Activity	Discharge Prevention Measures
Loading and Unloading Racks	Racks, if required, will be used within lined, secondary containment
Loading and Unloading Procedures	Loading and unloading will occur within lined, secondary containment.
Intra-Facility Transfer Procedures	During intra-facility transfers, field staff will regularly check all connections as fluids are being moved to insure no leaks. If a leak is detected or suspected, operations will cease until the leak has been repaired.
Drained Control Procedures	During drained control procedures, field staff will regularly check all connections as fluids are drained to insure no leaks. If a leak is detected or suspected, operations will cease until the leak has been repaired.
Well Drilling and Workover Operations	Location will have an earthen berm around location to prevent fluids from leaving location.
Storage Tank and Container Testing and Maintenance	Permanent storage tanks will be located within lined, secondary containment.

5. Record Keeping Requirements

All written inspections will be kept with the location file.

All written inspections will contain a signature of the St. Croix employee or company representative that performed the inspection.

All equipment will be tested and maintained as per industry standard practices and manufacturer's recommendations.

This plan will be updated with manufacturer specific information as equipment is installed on location.

Visual inspections will involve:

- Looking for tank/piping damage or leakage, stained or discolored soils, or excessive accumulation of water in diked and bermed areas;
- Observing the exterior of aboveground storage tanks, pipes, and other equipment for signs of deterioration, leaks, corrosion, and thinning.
- Observing tank foundations and supports for signs of instability or excessive settlement.
- Observing the tank fill and discharge pipes for signs of poor connection that could cause a discharge, and tank vent for obstructions and proper operation.

6. Site-Specific Fluid Leak Detection BMPs

- AVO (Audio, Visual, Olfactory) inspections of pipe and connections will be performed during Lease Operator's routine visits to location (at a minimum once every 72 hours but most sites are inspected every 24 hours) on all production equipment to detect leaks which will be immediately corrected, repaired, and reported to COGCC as required.
- St. Croix will use Approved Instrument Monitoring Method (AIMM) Inspections as per CDPHE's Regulation 7.
- Spill Prevention training will be provided to all field employees on an annual basis.
- Written inspections of all equipment on location will occur monthly.
- Any leaks or spills detected during monitoring will be reported within 24 hours in accordance with Rule 912.b if:
 - The spill impacts or threatens any Waters of the State, Public Water System, residence or occupied structure, livestock, wildlife, or publicly maintained road;

- A Spill or Release in which 1 Barrel or more of E&P Waste or produced Fluids is spilled or released outside of berms or other secondary containment;
- A Spill or Release of 5 Barrels or more of E&P Waste or produced Fluids regardless of whether the Spill or Release is completely contained within berms or other secondary containment.
- The discovery of 10 cubic yards or more of impacted material resulting from a current or historic Spill or Release. Discovery and reporting will not be contingent upon confirmation samples demonstrating exceedance of Table 915-1 standards.
- A suspected or actual Spill or Release of any volume where the volume cannot be immediately determined, including a Spill or Release of any volume that daylights from the subsurface.
- A Spill or Release resulting in vaporized hydrocarbon mists that leave the Oil and Gas Location or Off-Location Flowline right of way from an Oil and Gas Location and impacts or threatens to impact off-location property.
- The presence of free product or hydrocarbon sheen on Groundwater or surface water is observed.
- Annual flowline testing will also occur according to COGCC rules 1101 and 1102. Inspection and record retention of flowline testing will be in accordance per COGCC regulation. All records will be made available to the COGCC upon request.
- All loadlines shall be bullplugged or capped.
- All on-location flowlines will be inspected and tested as per Rule 1104.
- All equipment deficiencies will be corrected immediately or as soon as practical (all identified problems and corrections/repairs will be documented and records will be maintained in the operator's office).
- Spill response includes notifications, reporting, response actions, remediation and corrective actions. The spill criteria in St. Croix's plan requires that waste be properly classified as E&P or non-E&P wastes. For E&P waste, all spills greater than 1 barrel (outside containment) or greater than 5 barrels (inside containment) will be reported to the COGCC using a Form 19. Should spill clean-up need longer than 90 days, a Form 27 will be submitted as well. Spills related to non-E&P waste will be managed in accordance with CDPHE and EPA regulations depending on the volume spilled.
- St. Croix will track and clean up all spills, including those that are not reportable.
- St. Croix will temporarily shut in the production well on the pad in the event of any upset condition.
- If a leak is discovered or suspected, the well will be shut in and the line will be hydrotested. If a leak is determined, the well remains shut in while the leak is located and repaired. Not until the line has passed hydrotesting, will the well be brought back online.