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Procedure Objective

This procedure is to provide a detailed response plan for a control room operator when a subsea leak alarm is sounded. The **Detect Section** defines the different types of subsea leak alarms. The **Diagnose Section** defines reporting lines and timeline for escalation. This section also contains tools to validate or invalidate a given alarm. The **Leak Test Procedure** details the process for performing a below hydrostatic pressure leak test. The **Respond Section** defines the specific actions required for valid or invalid alarms.

NOTICE	THINK LEAK FIRST: If the control room operator is in doubt, exercise stop work authority to shut-in affected wells/flowlines.
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NOTICE	When a subsea leak alarm is sounded, the control room operator has full authority to shut-in the affected wells/flowlines/drill center.
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Referenced Documents

[Sec. 11100, Production - Individual Well Startup](#)

[Sec. 11200, Production - Flowline Startup](#)

[Sec. 12100, Production - Individual Well Planned Shutdown](#)

Prerequisite

None

Detect: Summary of Subsea Leak Alarms

This section is to define the alarms currently active in the Tahiti control system to alert a control room operator of a potential subsea leak. This section also details alternate means of detecting a suspected subsea leak:

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NOTICE	The control room operator requires Operations Installation Manager approval prior to clearing a subsea leak alarm.
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NOTICE	All subsea leak alarms require immediate control room operator action.
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1. **Conditional Rate of Change Alarm (CROC)**– Alarm is active during STEADY STATE and TRANSIENT operations, ABOVE and BELOW hydrostatic conditions. CROC alarms are generated from the rate of change of the moving average of the pressure transmitters on the wellhead, manifold, and topsides for each flowline.
2. **FMT Alarms:** Alarm generated from the Flow Management Tool that indicates likelihood and expected location of subsea leak; active during TRANSIENT and STEADY STATE conditions. Flow Management Tool is maintained by Flow Assurance Engineer.
 - a. If Watchdog or Model Reliability error, consider whether alarm is reliable.
3. **Alternate indications of potential subsea leak:**
 - a. Flowline manifold pressure reaches within 200 psi of hydrostatic during shut-in.
 - b. Significant pressure change of tree or manifold pressure towards hydrostatic during steady state operations.
 - c. Unexplained LACT rate decrease
 - d. Unexplained Sales Gas rate decrease
 - e. Unexplained water cut increase topsides (for operating conditions below hydrostatic)

If any one or more of the above indications cannot be immediately resolved, continue to the **Diagnose** Section of the procedure.

Diagnose- Validate or Invalidate the Alarm

The purpose of this section is to validate or invalidate the subsea leak alarm.

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1. Immediately alert Operations Installation Manager once any subsea leak alarm is sounded.
2. Immediately consult **Flow Assurance Flow Chart for a Suspected Subsea Leak**. FUTURE: Flow Assurance Flow Chart for a Suspected Subsea Leak using Exapilot
3. Pull permits to prevent accidental shut-in or other events topsides and to limit Simultaneous operations during subsea leak investigation activities. Use Operations Installation Manager discretion.
4. Within **30 minutes**, operator must walk the deck to look for a sheen. If alarm occurs at night, walk the deck at first light. If sheen is visible, alarm is valid. Immediately move to **Respond: Valid Alarm** section for valid alarm.
 - a. If possible, use other resources available in the field to survey for possible sheen. This may include Remote Operated Vehicles or Helicopter with Human Observers.

NOTICE	Most subsea leaks do not result in a sheen visible from platform. Alternative methods of confirming a leak are usually required.
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NOTICE	The maximum allowable time to safely shut-in wells and flowlines is not to exceed 4-hours.
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Leak Test: Below Hydrostatic Pressure

The following section is to be utilized if a leak test is required to validate or invalidate a potential subsea leak.

NOTICE	Because flowlines may be left untreated, procedure should be progressed without delay. Flow Assurance Engineer should be notified that leak test is occurring.
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1. Remove personnel from area around affected BSDV(s) to limit HES exposure during leak testing.

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2. Line up affected flowline to test separator. Route all other flowlines out of test separator. Using the Test Separator Flare Valve PV_130036, bleed down affected flowline, flowline jumper, and well jumper. Bleed down until Test Separator pressure is at 10 psig.
 - a. If Test Separator is unavailable, blow down to the closed drain. This will add additional time to blowdown portion of procedure.
3. Confirm flowline manifold pressure is at least 200 psig below hydrostatic pressure (possible for flowlines with WC up to 80%). If unable to achieve pressure below hydrostatic pressure, flowline fails leak test.
 - a. NDC: 4020 ft. Depth, Hydrostatic pressure at the manifold is 1790 psig.
 - b. SDC: 4294 ft. Depth, Hydrostatic pressure at the manifold is 1915 psig.
4. Monitor and trend manifold and topsides pressures and temperatures for 2 hours to confirm no ingress. If the pressure rise at the manifold during the leak test is greater than 20 psi, flowline passes. If the pressure drop at the manifold is less than 20 psi, contact Flow Assurance Engineer for further evaluation.
5. Take screen shot of each trend showing starting and ending values for documentation.
6. If the flowline fails the leak test, follow **Respond: Valid Alarm** in the next section.
7. If flowline passes leak test, subsea leak alarm is invalid, follow **Respond: Invalid Alarm**.

Respond: Action Required

The purpose of the **Respond** Section is to detail the next steps once a subsea leak alarm has been validated or invalidated.

Valid Alarm

If a subsea leak alarm is **valid**, immediately follow the next steps:

1. Notify Operations Installation Manager.
2. Hard shut in and treat all affected wells. Shut in all affected flowlines.
3. Initiate **Surveillance Action Plan** detailed below **to visibly confirm spill**. Operations leadership to consider courtesy Internal and External

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notifications as appropriate. However, this is not required until leak is **confirmed**.

- i. Determine if sheen is visible from facility.
- ii. Consult additional Surveillance Alternatives:
 1. Helicopter with Human Observer
 2. Fixed Wing Aircraft with Hi-Tech Cameras
 3. Remove Operated Vehicles (ROV)
 - a. There is an established “Open Door” policy with other Gulf of Mexico Operators to share ROV’s. Contact all surrounding facilities, both internal and external to Chevron, to determine accessibility to ROV.
 4. Vessels with Hi-Tech Cameras
 5. Satellite Imagery from Coast Guard or other
4. If spill is confirmed, initiate **Emergency Response Plan** and alert **Emergency Response Team**. A confirmed spill concludes this procedure. Follow steps in **Emergency Response Plan** for further guidance.
5. Continue **Surveillance Action Plan** until leak has been confirmed, or it has been determined that no spill occurred. If it has been determined that there was no spill, subsea leak alarm is invalid, follow **Respond: Invalid Alarm**.

Invalid Alarm

If a subsea leak alarm is **invalid**, follow the next steps:

1. Immediately alert Operations Installation Manager of invalid/false alarm. OIM approval is required to clear all subsea leak alarms.
2. Clear invalid alarm.

NOTICE

If shut-in has extended past cooldown time, consult Flow Assurance Engineer prior to start-up.

3. Alert flow assurance and process controls engineer of false alarm within 48 hours. Email is acceptable.
 - i. RCA may be recommended following false alarms.

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4. If production has been curtailed, DW Operations Manager approval required to restart production. Follow [Sec. 11100, Production- Individual Well Startup](#) and [Sec 11200, Production- Flowline Startup](#) to ramp back to normal production.