High-Level Shutdown System Risk Assessment Checklist

The following checklist is intended to establish best practices around types and frequency of inspections of high-level shutdown systems (HLSs) to prevent related failures that can lead to releases. While use of this checklist is not mandatory, its use is strongly recommended because it is a simple tool developed from the shared knowledge and experience of other operators in the province, and checklists like these have proven to be effective tools for reducing failures. Answering "Yes" to either of the first two questions in the checklist means that your site may pose a significant risk to the environment were a failure to occur and would benefit most from the use of this checklist.

Answer each of the following yes/no questions and then count the number of answers in shaded boxes.

- If you answered 12 or more questions in a shaded box, you should inspect at least monthly.
- If you answered 8 to 11 questions in a shaded box, you should inspect at least quarterly.
- If you answered 5 to 7 questions in a shaded box, you should inspect at least every six months.
- If you answered 4 or fewer questions in a shaded box, you should inspect at least annually.

If no detrimental conditions are detected after six iterations of inspections at whatever frequency the assessment results suggest, it may be reasonable to reduce the frequency to the next lower level. However inspections should always be conducted at least annually.

Operators that use this checklist are expected to retain completed copies for inspection by the AER on request. Also, in the event of a failure, the AER may request copies of completed checklists to assist in determining the adequacy and extent of the operator's efforts to prevent the incident.

Risk Factors	Yes	No	Inspection and Action Best Practice (if shaded box is checked)
Is there a flare stack on site?			• Ensure that flare knockout drums have functioning level indicators. • Ensure that flare knockout drums have functioning alarm systems. • If a flare knockout drum is underground, ensure that the inspection data is up to date and available. • Test flare knockout HLS.
Is there a water body within 100 metres of the well or facility?			• Ensure integrity of all required containment methods (i.e., berms, ponds). • Ensure that all alarm systems that would indicate a loss of containment are operational.
Could the composition of the stored fluids cause HLS issues (e.g., foaming, wax, asphaltenes, solids)?			• Monitor the composition of fluids periodically to ensure that you understand and know if the composition is constant or changing.

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Are the switches appropriate for the fluids they will be in contact with?			• Test HLSs and components to ensure that they can detect stored fluid (e.g., does float detect foaming) and make adjustments to equipment or process treatment to ensure that HLS equipment is matched to stored product. Float must have been physically tested at some point to ensure it can detect the fluid it will come in contact with.
Could switch be susceptible to buildup of product (e.g., wax) on the switch itself or the tank due to the fluids being stored?			• Use solvent-based solution to clear high-level floats. • Take measures to ensure that floats will not lodge in sediments at the bottom of tanks. • Consider heating or revised inspection schedule for winter.
Are HLS systems powered by natural gas (e.g., fuel, casing, produced, lease)?			• Natural gas composition should be known.
If so, do the conditions exist where the gas could be wet (susceptible to freezing), contain particulate (susceptible to plugging), or have an inconsistent composition?			• Ensure that water has been bled out, desiccant is fresh, or solvents are used to control wax buildup as appropriate.
Has the facility experienced HLS failures due to gas issues in the past?			• If particulates in the gas stream cannot be reliably managed, consider an alternate power source for the HLS system.
Are you relying on inventory control to ensure that the production tank does not overflow?			• Consider adding an HLS (if not present), more storage capacity, or increasing the HLS or lease inspection frequency if there is a possibility of transportation delays (e.g., poor road conditions, winter access).
If so, is daily production greater than 20% of storage capacity?			
Have there been any process changes since the original design that could affect the produced fluid, such as increased liquids production or a change in composition?			• Ensure that the HLS system is still appropriate for the current process. • Ensure that tank sizes are still appropriate for potential pressure releases or for maximum transport delay.

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Is the site designed to automatically shut itself in upon HLS power failure or gas supply heat trace failure, and is there a redundant switch on a different power source?			• Monitor HLS systems closely during changing environmental conditions and consider redesigning the system.
Has it been more than a year since the HLS was last tested?			• HLS systems should be tested at least annually.
Does the site have an HLS inspection or maintenance program?			• Consider following this checklist at a minimum, but you should also develop a standard maintenance program.
If so, does the maintenance program include a seasonal component (e.g., winterization)?			• If asphaltenes are present, consider adding heating or increasing inspection frequency in the winter.
Has the facility been acquired from another operator within the last year?			• Review transferred HLS inspection, maintenance, and testing records.
If so, is the maintenance history known?			• Inspect all HLSs in the facility.
Has this same type/make/model of HLS failed in this type of operation before?			• Document this and consider replacing or changing the inspection program of similar HLSs.