

Weak Signals – Facilitators guide

Topic: Acting on weak signals

Cautionary statement: This LFI video/webcast script has been developed for learning purposes. Although elements of the scenario are intended to depict what could have happened in real life, the scenario is purely theoretical and do not pertain directly to any real incidents. Names are selected arbitrarily. Any similarities to real events are purely coincidental.

Intent:

This podcast/video is intended to be used during a rig-based safety meeting for personnel involved in managing Wells Process Safety. It is intended used to facilitate discussions, relevant to both the individuals in the discussion, the team and the rig.

Practical information

The video/podcast has 6 different scenes and includes voices of key individuals involved with controlling process safety. After each scene there are some questions to be discussed by the audience, so the facilitator needs to stop after each scene. It is suggested that drilling contractors, service providers and operator personnel participate. Group size expected around 10-12, but you may want to break into smaller groups for the discussion. This is flexible.

In total, the video last some 17 minutes without discussion. Total time including discussion is 1 hour.

Learning Outcomes:

Whilst the technical explanation is given below, three Learning Outcomes are relevant:

- 1) Each weak signal may be a broken barrier in a bow tie context.
- 2) Each barrier has an owner. Examples from the scenario includes: who owns the calibration of the mud balance on your rig and who verifies? Who owns the Drill Pipe tally and who verifies?
- 3) Bow tier barrier and weak signals are many times interdependent.
- 4) We rely on individuals to STOP when noticing weak signals.

The three main technical elements/mistakes in this theoretical scenario are:

- 1) Mud weight was too low due to a wrongly calibrated mud balance. The mud that arrived from town actually had the right weight, but the rig mud balance showed it as too heavy. Instead of correcting the mud balance, the rig assumed logistics had made a mistake with the mud. This meant that the previous hole section had unintentionally been drilled with too low a mud weight causing hole instabilities. Below the casing shoe, the mud weight does not provide overbalance on the reservoir pressures.
- 2) Hole depth was wrong. There had been a mistake in the tally when drilling the previous hole section and a stand was left out. Lack of logs meant it was not discovered. Hence the well depth

was shallower than thought. The casing, when run, stood up at the total hole depth of the well and the crew thought it was related to hole instabilities. When now drilling out the shoe track, the tally error had been corrected also without noticing the previous error, hence the cement was tagged one stand early. In other words, the end of the scenario has the team drilling new formation below the casing shoe without knowing it.

- 3) The broken-down crane was an additional concern which should have triggered a formal deviation or paperwork to ensure volume control was not compromised.

Some compromised “bow tie” barriers:

- 1) Geological control failed through lack of data, inexperience, tally failure and failure to act on weak signals. Underlying technical issue is wrong mud weight causing hole instability.
- 2) Mud volume control failed through PTW not fully covering risks related to the crane being permanently stuck over the side.
- 3) Mud weight control failed due to mud balance not calibrated and lack of ownership. Mud weight control also contributing factor in failure of geological control.
- 4) Cement barrier control failed due to downhole problems and losses due to hole instability, (mud balance not calibrated, geological control)
- 5) Depth barrier control failed. We drilled too far due to mistake in DP tally from previous hole section. (ref unable to get casing to depth)
- 6) Failure in assessing all relevant risks. (drilled new formation without planning to do so).
- 7) Reference is made to lack of experience from the geologist. No additional controls put in place.
- 8) Underlying it all, seems the rig has very good/friendly working relationships which leads to acceptance of weak signals. (“must be OK, then” syndrome). Them/us approach between rig/office and rig/logistics.

Simplified bow tie model for the scenario

