Shared Learning

Electricity | Failure of SCE – Final Element| Te Huka Binary

What happened?

Turbine Stop Valve on Te Huka Binary Plant.

On Friday evening 10 March 2023, Te Huka Binary plant was tripped (both Units 1 and 2) due to loss of signal from the four flame detectors covering the feed pumps on Unit 2.

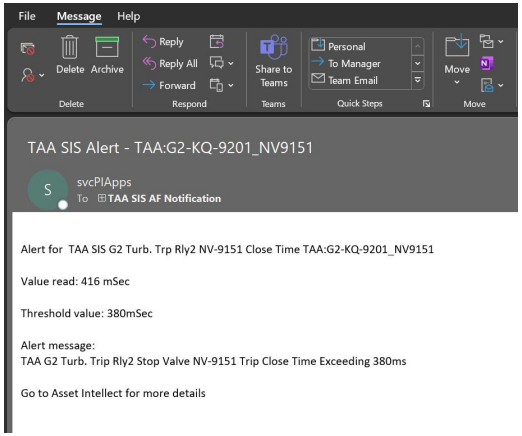
The trip was traced to a faulty input card on the safety controller, which was replaced and the unit was returned to service. The failure of the card trigger the correct response from the safety system in this case.

HOWEVER…….

The automated valve performance monitoring system which tracks ESV stop valve closure performance noted that one of the ESVs just fell outside the alarm setpoint and this automatically flagged to the Technical Team. Review of the valve trace data (opposite). Showed the valve performance had slowed from commissioning and while currently meeting the safety performance had degraded.

The unit was returned to service as the valve still meet the safety requirements, and a trial of performance of all ESVs was programmed.

Note: These valves are quick closing, fail save spring actuated and move from open to close in approx. 300ms.



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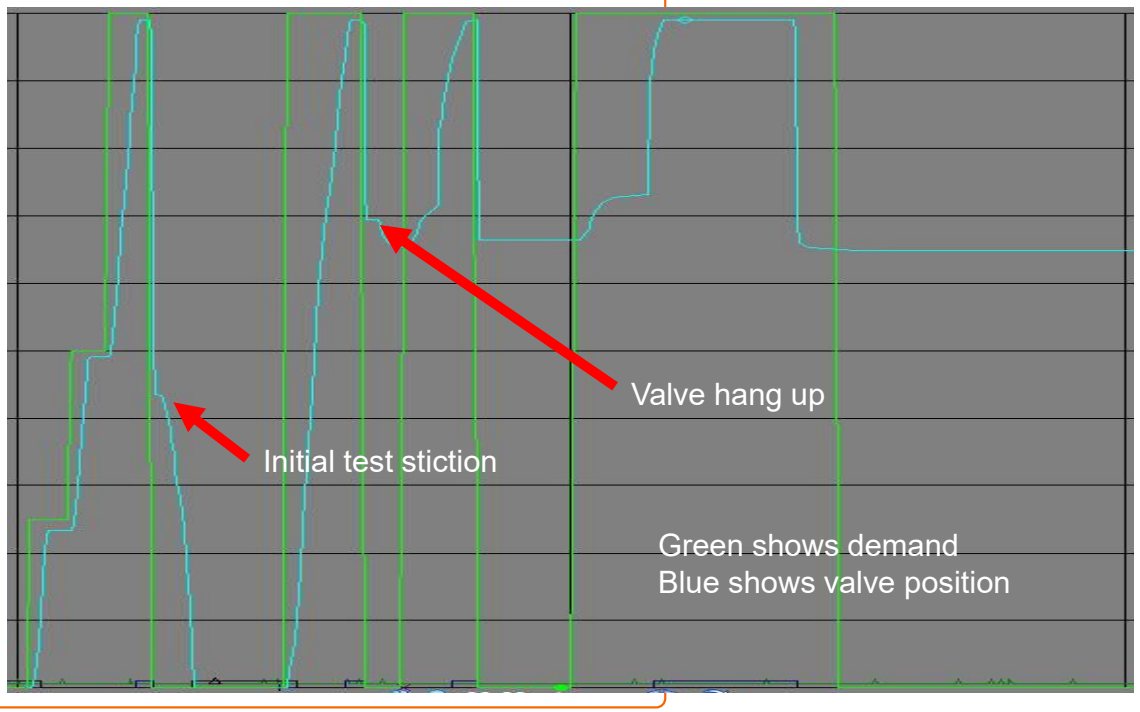
What happened?

The trial of all ESVs was undertaken and the trace for the suspect stop valve is shown opposite. It can be seen that on first operation the valve was slow to close with speed dropping significantly from what was expected from 50% to closed.

On the following tests the valve hung up between 60-70% closed. The test was stopped and the unit remained shutdown.

The valve subsequently closed under spring actuator force once the unit had cooled.



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What happened?

Ongoing investigation of the valve showed that the pneumatic actuator once decoupled operated as designed, which suggests that the problem is internal to the valve. This will require the binary plant to be decanted and purged to enable the valve to be removed for inspections. This activity is currently being programmed.

We will also remove at least one valve for a comparative cross-check. At this point It is too early to make an assessment of root cause, whether is a systemic fault or unique to this valve. Investigations are ongoing.

What did we learn?

This is good news story for the processes used to specify, and monitor and assess the performance of a Safety Function.

- The design included the required performance data for the valve.
- The automated monitoring system picked up the initial degradation and flagged it to the technical team.
- A good decision was made to undertaken testing which uncovered the failure of the valve before it impacted the required SF performance.