Tracerco

Providing Insight Onsite

Exchanger Leak Testing - Radiotracers

An online approach to identifying a leaking exchanger uses a short lived radiotracer that is injected into the feed line and effluent exit lines are monitored from each exchanger for it's presence.

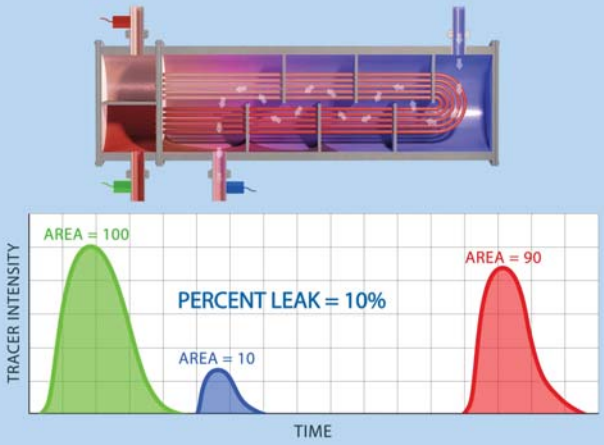
The tracer material passes through all the feed sides of all the exchangers. If one or more exchangers are leaking, then a proportional amount of radiotracer will leak into the effluent side of the exchanger(s). Radiation detectors mounted on the effluent exits of each exchanger will respond to the radiotracer that leaks into the effluent stream.

Project Field Test

A refinery engineer believed there was a leak in one of the two feed/effluent exchangers in a hydrotreating unit. He wanted to confirm this suspicion and determine which exchanger was leaking so the unit could reduce maintenance costs and lost production associated with searching for the leak. Tracerco was contacted to perform an online Tracerco Diagnostics™ Leak study.

Figure 1 shows the positioning of the detectors for the leak test. Detectors mounted on the outside of the pipes will detect the radiotracer as it passes through. If radiotracer leaks into the effluent side, the detectors mounted on the effluent lines will respond to the radiotracer. However, the leak detectors on the effluent line can produce false responses from the radiotracer in the feed side of the exchangers due to radiation "shine".

To differentiate the responses, a second leak detector is mounted next to the primary leak detector. A dense material is positioned between the secondary detector and the effluent pipe. If radiotracer passes through the effluent line, the primary detector will respond, but the response of the secondary detector will be smaller or non-existent, due to the dense material blocking the radiation. If both the primary and the secondary leak detectors produce similar responses, the signal is from "shine" of the main body of radiotracer in the feed side.



Tracerco Diagnostics™ Leak studies detect the presence of a heat exchanger leak online no matter how small. Not only can the leak be narrowed down to a specific heat exchanger bank but the study can be performed without the need for a shutdown.

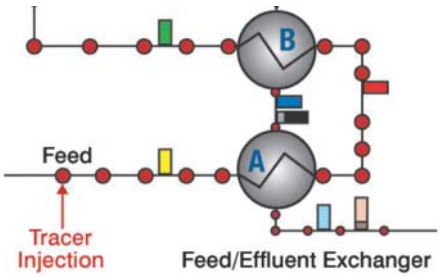


Figure 1 - Detector placement used for a leak test performed on feed/effluent exchangers.

Process Diagnostics

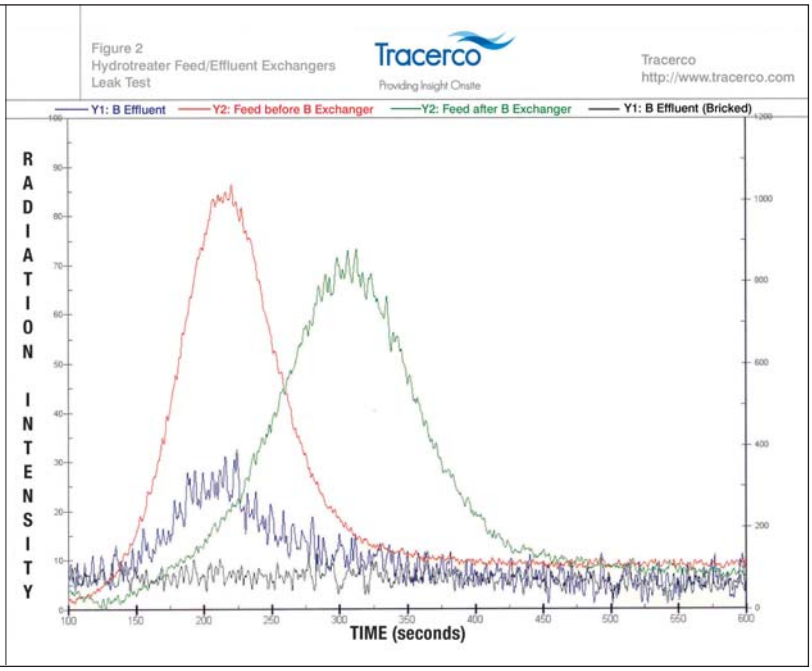
Project Analysis

In Figure 2, the passage of the main body of radiotracer through the feed side of the B exchanger is shown by the responses of the red and green detectors. The primary leak detector (blue) also showed a response. Yet, the secondary leak detector (black) did not show a response. This indicates that the response of the blue detector was due to radiotracer in the effluent line caused by a leak in the B exchanger. The area under the response of the blue detector was compared to the area under the responses of the red and green detectors. The leak response was determined to be approximately 2.5%.

Customer Conclusion

The refinery personnel were pleased to hear that the source of the high sulfur level was a leaking exchanger and to know which exchanger to repair. They took a short outage to repair the leak. When they restarted the plant, the sulfur levels returned to normal.

Figure 2 - A leak was indicated from the "blue" detector response found in exchanger B. The main body of radiotracer through the feed side of the B exchanger is shown by the red and green detector response curves. A comparison of areas under the red, green and blue plot results indicated that a 2.5% leak was detected.



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