

Case study: North America

# LEAKTRAP hydrocarbon leak detection system helps refinery improve bottom-line profitability

A refinery in the USA had a leak of process fluid into the evaporative cooling water. The leak proved extremely difficult to find for both the refinery personnel and Baker Hughes onsite staff.

Several factors made this leak hard to find:

- The leak symptoms were intermittent as well as small in volume
- Biological activity induced foaming was possible because the cooling water system did not have reliable bleach feed
- Abnormal concentration of contaminants was likely because the tower blowdown was not consistent
- The make-up water system within the refinery was periodically contaminated with ammonia bearing compounds even though the source was provided by the city and was not contaminated
- The multi month investigation identified possible causes that were fixed over time but the leak persisted

The Baker Hughes area manager contacted technical support, and formed a team of both Baker Hughes and refinery personnel to tackle the problem. The Baker Hughes team had over 60 years of experience in process and water applications and a substantial background in refinery leak detection.

There were repeated examinations of every accessible heat exchanger, pump, sample cooler, make-up stream, oil cooler, and significant laboratory work. As always, some

system components were not accessible for sampling which added to the complexity of this problem. A key learning point was that persistence, attention to detail, experience, and good methodology pays off.

The team employed good investigative methods:

- All of the available information was gathered and reviewed
- Refinery personnel were interviewed and a formal meeting was held to share and plan
- Gas chromatograph information was reviewed and the focus narrowed to primary or likely areas to examine closely
- An investigation sequence was created and agreed upon
- Considerable time was spent in the refinery surveying, measuring, testing, and tracing lines
- Everything available avenue was checked and cross checked

The LEAKTRAP™ hydrocarbon leak detection system was used as the diagnostic leak detection tool. It captures samples of any gas or process fluid lighter than the cooling water. Investigation showed the sample stream passing through the LEAKTRAP detection system was not a composite stream. Approximately one-half of the return water flow went to an adjacent cooling tower. The two small towers share a common basin and recirculation pumps.

## Challenges

- Leak of process fluid into the evaporative cooling water
- Extremely difficult to locate
- A caustic leak into the cooling water system could scale the entire system and shut down the unit

## Results

- LEAKTRAP hydrocarbon leak detection system was used as the diagnostic leak detection tool
- Identified leak and repaired two leaking exchangers
- Identified and repaired malfunctioning check valve that could allow caustic to enter the cooling tower make-up water

By utilizing the LEAKTRAP detection system, several problems were identified and addressed:

- Baker Hughes was able to identify and repair two leaking exchangers. One leak was found in naphtha service, while the other was in amine service
- The refinery was alerted to a contamination of the non-process water system
- A malfunctioning check valve that could allow caustic to enter the cooling tower make-up water was identified and corrected
- A minor hydrocarbon contamination of the fire water system was identified
- The load on waste treatment processing was reduced
- Microbe induced fouling of the system was stopped
- Heat transfer surfaces are cleaner and corrosion is lower

This case history is presented for illustration purposes only as the results may vary between applications.

However, the customer in this case did benefit from this exchange.

- Prior to bringing in technical support the refinery invested over 80 hours of effort
- An estimated leak volume of 150 milliliters per minute equates to 40 barrels of product per month
- A caustic leak into the cooling water system could scale the entire system and shut down the unit
- Process contamination of supposedly “clean” water streams is critical information
- Unloading the waste processing system did not impact this facility
- Better heat transfer can be worth a considerable sum