Case **Study**

ADNOC Onshore
United Arab Emirates

MSA
The Safety Company

Client	**ADNOC Onshore, Abu Dhabi, UAE**
Requirement	**Evaluation of New H_2S Point Gas Detector**
Trial Detector	**General Monitors S5000 H_2S Electrochemical Gas Monitor**

WE KNOW WHAT'S AT STAKE.

The Client and background:

ADNOC Onshore, Bab site, Abu Dhabi, United Arab Emirates.

ADNOC Onshore, an affiliate of **Abu Dhabi National Oil Company (ADNOC),** is responsible for the onshore oil operations in the Abu Dhabi Emirate of the UAE. The Bab site is located in the UAE desert, approximately 150 km from the UAE capital Abu Dhabi. The desert environment is extremely challenging with temperatures regularly exceeding +50˚C and all products are tested to their limits. For more than 20 years the preferred sensor technology for H_2S detection has been the Metal Oxide Semiconductor (MOS) sensor. At the time, the MOS sensor was chosen over electrochemical sensors for a number of reasons, but one of the main advantages was its high operating temperature, which was +70˚C and this meant it had a longer operating life.

The Challenge:

Due to the extremely sour nature of these gas fields, where the H_2S concentration is typically more than 15%, a large number of H_2S detectors are required to protect the personnel working in the hazardous areas. The MOS H_2S sensors that were traditionally used in the field were unable to alert the operator when it had reached the end of its life and was unable to detect gas. Therefore, the MOS sensors required frequent calibrations, usually every 3 months. However, for some high-risk areas, calibrations would be more frequent to ensure any sensors that were not capable of detecting gas would be quickly identified and replaced. ADNOC engineers commented that in the past, they have tried to calibrate MOS sensors, which appeared healthy and functioning correctly (represented by a 4mA signal), only to find the sensor had died and needed replacing. With so many H_2S gas detectors installed, all requiring regular checks to ensure functionality, a significant amount of labour, time (preparation time, travelling time to the site, time to service the detector) and calibration gas was required.

The Objective / Requirement:

ADNOC wanted to evaluate the latest H_2S sensor technology from MSA – the General Monitors S5000 gas detector with the H_2S XCell® sensor. MSA's revolutionary design makes it an excellent sensor for use in extreme environments. The new technology now also offers fail-safe operation, as it performs a sensor self-check every 6 hours to verify sensor operation. This self-test also alerts the user if the sensor requires a manual calibration, is approaching end of life and if the sensor is no longer able to detect gas, by initiating a fault signal.

The suitability of the S5000 detector and XCell® electrochemical sensor in the hot desert environment, was a key requirement for ADNOC. To evaluate the performance in these extreme conditions, the trial of the S5000 Gas Detectors was to run for a minimum of 12 months. MSA's Channel Partner Trizac Abu Dhabi, supplied 10 detectors and each of them was equipped with two XCell H_2S sensors. The primary sensor would be tested with H_2S test gas every 3-months and its T-50 response time recorded. As the XCell sensor does not need calibrating for up to 2 years[1], the secondary sensor would not have any gas applied for the full duration of the 12-month trial. This was to evaluate the sensor's ability to perform a self-test and if necessary, an automatic self-calibration, which is part of the new TruCal® technology and its overall performance when not exposed to H_2S for an extended period of time.

The Trial :

ADNOC replaced 10 General Monitors S4000TH MOS detectors with the new S5000. As the S5000 has the identical mounting footprint and cable entries as their existing General Monitors S4000TH MOS detector, ADNOC engineers said that they found the installation was both quick and easy. Configuring the detector was also easy and convenient, as no special tools were required, and the menu was accessed via the touch screen display. ADNOC engineers were aware of the Bluetooth capability of the detector and the MSA Connect App, but this was not used during the trial.

ADNOC engineers commented that they wanted to ensure the sensors were thoroughly tested and exposed to all the weather conditions throughout the year. In the Abu Dhabi desert, as well as having temperatures exceeding +50˚C during the summer, the winter months can be cold, with heavy rain and humid, foggy conditions.

Results of the trial:

During the trial, the primary sensors' T-50 response time to the H_2S test gas was recorded. The response times throughout the year, including the last test on day 387, were all between 5 and 11 seconds. The sensors were tested with a cylinder of H_2S test gas at a flow rate of 1.0 LPM.

The 10 sensors which had not been exposed to any H_2S test gas for more than 12 months were also tested on the final day of the trial. The T-50 response times for these sensors were between 8 and 14 seconds, confirming that although they had not been exposed to any H_2S gas for more than a year, their average response time was still very good.

The ADNOC engineers said that they did not experience any false alarms during the trial or have any warnings/fault signals from the H_2S detector and found the zero measurement was stable. They commented that the detectors worked well throughout the trial, and they were impressed with the performance of the XCell electrochemical sensor. They also commented that as the sensors were fail-safe and therefore did not need calibrating as often as the MOS sensors, they estimated the new Electrochemical sensors would reduce their maintenance costs by more than 50%[2].

Conclusion:

The trial demonstrated the suitability of the General Monitors S5000 for the extreme conditions experienced in the UAE desert, as the S5000 and XCell electrochemical sensors performed as expected and without any issues at all. The advanced features of the new technology, with the smart self-calibrating sensors showed that the measurement and response times of the sensor were not affected when the sensor was not regularly exposed to H_2S gas. The estimated cost saving by the ADNOC engineer was only based on calibration cost and did not consider the operating life of the sensors. ADNOC's engineer commented that on average the General Monitors' MOS sensor life was 3 years. The new XCell Electrochemical life expectancy is 5 years, which would further help to reduce the cost of ownership for the company.

Following the successful trial, the General Monitors S5000 was approved by ADNOC and is in use on several sites. Some sites have also installed the latest and more advanced XCell H_2S sensor, which now includes Diffusion Supervision[3]. This enables the sensor to monitor its inlet for blockages, which would prevent gas reaching the sensor and being detected. Diffusion Supervision adds another layer of protection for the people working in the hazardous areas where H_2S exists and provides added reassurance that the sensor can detect gas, as well as providing accurate measurement.

[1] At the time of the trial, MSA recommended the calibration frequency for XCell H_2S sensors could be extended up to 18 months. Due to MSA's own successful long-term testing of the H_2S sensors and the field proven data, the calibration period has now been extended up to 24 months.

[2] The estimated 50% cost saving was based on changing from a calibration every 3 months to every 6 months and only accounted for the cost of calibration gas and labour. Users who extend calibrations up to 24 months reduce the calibration cost by more than 85%.

[3] TruCal and the Diffusion Supervision technology is also available in the Carbon Monoxide (CO) Electrochemical sensors.

Are you using MOS sensors or the traditional type of Electrochemical sensors and would like to learn more about the General Monitors S5000 and how it can increase the level of safety and also reduce your cost of ownership? Then click here to learn more and to arrange a demonstration or a trial.

MOS users may also like to read our White Paper on the benefits of upgrading from MOS to the new Electrochemical sensor for H_2S. Click here for your free download.

To learn more about the MSA's wide range of gas and flame detectors, please click here.

MSA — **The Safety Company**

Our business is safety. We've been the world's leading manufacturer of high-quality safety products since 1914. MSA products may be simple to use and maintain, but they're also highly-sophisticated devices and protective gear—the result of countless R&D hours, relentless testing and an unwavering commitment to quality that saves lives and protects millions of hard working men and women each and every day. Many of our most popular products integrate multiple combinations of electronics, mechanical systems and advanced materials to help ensure that users around the world remain protected in even the most hazardous of situations.

Our Mission

MSA's mission is to see to it that men and women may work in safety and that they, their families and their communities may live in health throughout the world.

MSA: WE KNOW WHAT'S AT STAKE.

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