



Case Study

Obtaining groundwater information from an industrial site

CHALLENGE

Safely, securely, and regularly obtain valuable groundwater information from a heavily industrialized production site.

SOLUTION

Equip part of an existing groundwater monitoring network with Diver-NETZ wireless groundwater monitoring system, replacing regular field rounds of manual measurements. The Diver-HUB web portal allows for continuous access to groundwater data and equipment status.

RESULTS

Safe data collection system and accurate groundwater data. Future planning include implementation of Diver-NETZ to more wells.



Silicon carbide production site from ESD-SiC in Farmsum, The Netherlands

Production of silicon carbide

ESD-SiC has been producing silicon carbide, also known as carborundum, in the north of the Netherlands since the 1970's and is one of the world's largest producers of silicon carbide. Silicon carbide is a well-known semiconductor containing silicon and carbon and can only rarely be found in nature as a natural resource. Synthetic silicon carbide has been mass-produced since the end of the 19th century, due to high demand for this product. Silicon carbide is mainly used as an abrasive in applications such as car brakes, car clutches and ceramic plates, and as a semiconductor in many electronic devices.

ESD-SiC manufactures silicon carbide (SiC) from raw materials; sand and petroleum coke. Sand and coke are mixed in correct proportions to create a reactive material. From this mix a material pile, a furnace, is built. In the center of this furnace is a core of graphite, which serves as an electric conductor. The furnace is covered with a plastic film to capture the gases that are formed during the production process. The gases are desulfurized and reused for energy production.

The graphite core is connected to a transformer and an electric voltage is applied. Due to the electric resistance, the core of the furnace reaches a temperature of about 2500 °C. At this temperature, the sand and coke decompose, and crystalline SiC is formed. This intense heating of the furnace requires large amounts of electricity and the process is very energy-intensive.

The importance of groundwater monitoring

The ESD-SiC site is in a low-lying, coastal area with generally high phreatic groundwater levels. A groundwater monitoring network consisting of 25 locations has been in operation since 2012 to monitor groundwater levels and flows. Until 2017, teams conducted weekly site visits to take groundwater level samples using a water level tape.

Groundwater level and flow data is important to quantify and understand the potential risks that groundwater might have on the production process. Groundwater may have an impact on production quality, energy consumption and process safety; for example, high groundwater levels can lead to steam formation under the furnace and cause steam to enter the furnace. This leads to deteriorated product quality, increased energy use and a safety risk due to increased gas production.



Near real-time water levels on Diver-HUB (source: ESD-SIC)

ESD-SIC selects Diver-NETZ

In 2017, ESD-SIC awarded Van Essen Instruments a contract to automate five existing monitoring points with Diver-NETZ remote monitoring technology. Van Essen Instruments supported equipment installation and deployed TD-Diver groundwater dataloggers in each well.

The TD-Divers sample and store groundwater levels and temperatures every hour. A DXT communication cable connected to each datalogger transfers data to a Diver-DXT radio device affixed on a 3 m pole placed next to the well.



Diver-Gate(S) modem installed on a lighting post at a height of 25 m overlooking the production site (source: ESD-SIC)

These radio devices transmit data wirelessly to a nearby Diver-Gate(S) gateway device mounted on a lighting pole at a height of 25 m. A clear line-of-sight between the Diver-DXTs and the Diver-Gate(S) optimizes communication between devices and limits potentially negative effects on communication caused by the existing buildings and the

furnaces on the site. The Diver-Gate(S) transfers the field data daily to an online database via the GPRS cellular network.

As data is received, it's automatically converted to water levels and made available to the ESD-SIC employees via the Diver-HUB web portal. Near real-time data collection allows ESD-SIC to quickly identify and mitigate monitoring issues, improve data quality, and evaluate the performance of the overall production process.

Expansion of Diver-NETZ usage

Automating the groundwater monitoring network with the Diver-NETZ wireless monitoring system has resulted in efficiency gains, cost savings, improved data quality, and a better understanding of overall groundwater conditions around the ESD-SIC site. Safety has significantly increased as it is no longer necessary to visit the wells frequently to collect data manually. The information derived from the groundwater data has created a link between groundwater levels and process performance, allowing for appropriate measures to control groundwater levels.

ESD-SIC decided to automate three more wells with Diver-NETZ at the beginning of 2018. In the future ESD-SIC aims to automate more wells with Divers and the Diver-NETZ telemetry system.



Monitoring well with Diver-DXT radio module placed on a 3-meter high pole next to the well (source: ESD-SIC)