

CASE STUDY: EVENT MONITORING

A Proactive Approach to NPDES

NPDES PERMITTING FOR OIL & GAS

A unique portable Stormwater Monitoring System was recently built by YSI for a refinery in North Texas. A contractor had been hired by the refinery to help them monitor stormwater discharges into tributaries that feed a large and heavily used river system, so that they would stay in compliance with their NPDES permit.

The National Pollutant Discharge Elimination System (NPDES) was designed to regulate point source pollution in waters of the United States. It is administered by the Environmental Protection Agency (EPA) in accordance with the 1972 Clean Water Act (CWA). The EPA authorizes individual states to issue NPDES permits on its behalf. Permits are required for pollutant discharges into U.S. waters, and place limits on an organization's discharges. Industries throughout the U.S. navigate policy and the NPDES very carefully because while most violations have manageable consequences and corrective actions, serious or recurring violations can disrupt business operations and cost millions of dollars.

"Discharges" include stormwater runoff. There is a specific **NPDES Stormwater Program** that regulates stormwater discharges from municipal separate storm sewer systems (MS4s), construction activities, and industrial activities. Large industrial sites can function like cities: they are filled with impervious surfaces so that heavy rainfall leads to runoff that can carry industrial chemicals and wastes into nearby waterways. One of the most heavily regulated industries under the NPDES Stormwater Program is the **Oil and Gas Industry, to which Section 401(l)(2) of the CWA is entirely devoted.**



For more on NPDES:
[EPA.gov/NPDES](https://www.epa.gov/npdes)

A CHALLENGING SCENARIO

The refinery in Texas wanted to take a proactive stance on their NPDES stormwater permit, both to stay in compliance with EPA regulations, and to protect the beautiful natural resource that everyone in the region, including the refinery's own employees, enjoyed.

The system that was designed by YSI was based on an Event Monitoring blueprint, though the actual monitoring plan might be described as semi-continuous. Event Monitoring solutions are portable—they can be rapidly deployed only as needed, and easily relocated to adapt to changing circumstances. The refinery client anticipated that the systems would be deployed during seasons when the most rainfall might be expected, and possibly recovered during the dry, intensely hot parts of the year in Texas. The actual sites themselves might change, as well.

In fact the deployment sites required a portable solution design. Members of the project described the monitoring sites

A PORTABLE SOLUTION

The client's requirements were met with a system that leveraged one of YSI's most widely used stormwater sensors: the **SonTek IQ**. This all-in-one flow, total volume, level, and velocity sensor is precisely made for ease of use. This IQ comes equipped with custom flow algorithms, carefully designed and tested to ensure the data being delivered. The IQ has 4 independent velocity beams for accurately mapping the cross-sectional velocity profile throughout the water column. This allows for very high-accuracy flow data which is instantly obtainable without velocity indexing in natural channels. In keeping with the need for ease-of-use, the SonTek IQ is also self-calibrating.

The IQ was connected to a **Storm 3 datalogger** that would store and transmit data to YSI's HydroSphere, enabling refinery personnel to access their data on desktops and mobile devices, anytime, anywhere. The Storm 3 was ideal because it is so easy to use—it doesn't require complex programming and it seamlessly transmits data into HydroSphere. The datalogger can communicate through many types of telemetry, including cellular, satellite, and spread spectrum radio modems. A nearby cell tower made cellular communication the best option for these sites.

HydroSphere was also an important choice from the perspective of simplicity, and in this case the contractor would set up and manage the HydroSphere account, and give the team at the refinery full visibility of the data. Importantly it enabled the contractor to set up alerts and notifications. The sites were remote—weather events there might not even be experienced by the team that lived in an urban center about an hour away. In the case of a heavy rainfall event and rising water levels, alerts would be sent to any team member, either from the contractor's roster or at the refinery, via text or email. Sites in a state of alert would also be visible online in HydroSphere. If an action was to be taken, notifications, and escalation of notifications to other



For more on Portable Data
Collection platforms:
[YSI.com/PortableDCP](https://www.ysi.com/PortableDCP)

as "the middle of nowhere" and it was not feasible to construct any infrastructure that would characterize a typical continuous monitoring solution. The system would be hand-carried to remote locations, so equipment needed to be compact and lightweight. The system needed to be installed in less than half a day by two people. The location would also limit site visits so the system needed to be highly durable in the Texas heat, and data telemetry was a must-have. Finally, ease of use was critical because the equipment operators were experts in oil refining, but not necessarily in water monitoring technologies. They would work with a private contractor to handle their data and reporting requirements.

That contractor recommended a YSI solution because of their previous experience with YSI, and the three parties (the refinery, the contractor, and YSI's Integrated Systems and Services) worked together to adapt an Event Monitoring System for this project.

team members, could be set up. They could even alert on features like system battery voltage—this would help the team to schedule visits to repair or maintain the system in the event of a power issue or unexpected change in performance. This 24/7 visibility on not just the data but also system health will help the contractor and the client to minimize site visits.

This system is also scalable—it is easy to add sensors or monitoring sites in the future. If one of the portable systems was transmitted to a new site that would be very easy to set up in HydroSphere, without losing information about the original site where the system had been placed.

The system electronics, including the Storm 3, power system with a solar regulator, and a cellular modem, were housed in a **portable data collection platform (DCP)**. This rugged chest is a custom designed welded powder coated aluminum NEMA 4X enclosure able to withstand the harshest environments, yet easily handled by two people. YSI engineers have designed an uninterrupted integrated solar power system with this enclosure which ensures long term autonomy, and even battery voltage is reported to HydroSphere to keep tabs on system operability.

All of the system components were delivered fully assembled to make installation on site as easy as possible, and YSI could readily replicate the system for the addition of more sites in the future. In this manner, the client will always stay abreast of their stormwater discharges.

