

## Pump Station Monitor Keeps Village of Kohler on Top of Collection System

Kohler, Wisconsin, a charming village of 1900 people near the shore of Lake Michigan north of Milwaukee, is perhaps best known as the home of the Kohler Company, a leading manufacturer of bathroom fixtures. The collection system in the Village of Kohler includes 25 miles of sewers ranging from 8 to 42 inches, with over 400 manholes and 3 lift stations.

The Sunset lift station uses two 7.5 hp pumps to serve a development with 21 homes that used to have septic systems, while the Sports Core station has two 10 hp pumps to serve a combination of residential and commercial development, including a shopping center, a fitness center, and convenience stores. The Fenwood location is the main lift station, with three 50 hp pumps that convey sewage to the 18 MGD treatment plant in nearby Sheboygan, Wisconsin.

Bruce Neerhof, Public Works Superintendent for the Village of Kohler, uses Isco 4501 Pump Station Monitors to stay on top of his collection system.



*Bruce Neerhof at Kohler's Pump Station Monitor.*

### Principle of Operation

The Isco 4501 Pump Station Monitor monitors the operation of the pumps at the pump station as the wet well fills and is emptied. Combining this information with the known volume between the levels in the wet well, the 4501 uses patented algorithms to calculate the flow into and out of the pump station, and the pumping rate of each pump. By using drawdown calculations rather than manufacturers' pump curves, influent flow and pump capacity at most pump stations can be measured within 1%.

Neerhof has Isco 4501s installed on each of his 3 lift stations. According to Neerhof, *"In the past, we would*

*record the numbers on the hour meters on the pumps on a regular basis, but they were never read at exactly the same time each day, so the data wasn't that useful. We also did manual drawdown tests, but it was so time consuming that we could only do it every once in a while. But the 4501 is like having someone at each pump station conducting drawdown tests 24 hours a day. And, with all of the data reported on a 24 hour basis, midnight to midnight, if the flow at the main station is high, we can quickly see where it is coming from. It keeps you totally on top of what's going on."*

The 4501 also eliminated the need to do a major engineering study. The Sports Core lift station, constructed in 1982, was originally intended to be a temporary station with a life of 5 to 10 years. Eventually, it was to be replaced by an interceptor sewer, or the lift station was to be enlarged. It has now been operating for 15 years, and the Isco 4501 demonstrated that it has enough excess capacity to last another 10 to 15 years.

The Isco 4501 also helped the Village of Kohler discover an illegal sewer connection. Neerhof said, *"The 4501 at the Sunset station occasionally measured a 500 gallon spike. That information helped us locate a residential sump pump that was connected to the sanitary sewer instead of the storm sewer."*

### Detection of Abnormal Pump Activity

In addition to flow measurement, the Isco 4501 Pump Station Monitor detects abnormal pump activity so that preventive maintenance can be conducted before serious, expensive problems occur.

The 4501 uncovered a bad alternator at the Sports Core station. This problem might have eventually been seen from the hour meters but, with the 4501 installed, the problem was immediately obvious.

The Isco 4501 also reveals when a pump's capacity drops, for instance, due to ragging or a piece of lumber jammed in the impeller. *"The pumping rate may only drop by 20 GPM, so we wouldn't see it without the 4501. But if we didn't discover such problems, we would be wasting energy, and the plugging could become much more serious."*

Neerhof also likes the fact that the 4501 logs power failures at his lift stations. *“The 4501 even verified that one of our pumps gained 15 GPM capacity after we rebuilt it,”* said Neerhof.

## Easy to Install

The Isco 4501 can be installed in a matter of minutes. Its pump monitor inputs connect to anything from 12 to 120 volts AC or DC that turns on when the pumps are activated, such as indicator lights, pump timers, or pump motor starters. There is no need to shut down the operation of the pump station, and confined space entry is eliminated. In addition, the 4501 never needs calibration, and there are no level sensors to install.

Its compact design and ease of installation make the Isco 4501 Pump Station Monitor ideal for portable use, or it can be quickly installed in the pump station control panel for permanent monitoring.

## Expanded Monitoring Capabilities

In addition to measuring flow and monitoring pump performance, the Isco 4501 Pump Station Monitor also has the versatility to log other data and control external devices. For example, the pump station monitor can be easily set up to:

- store rainfall data for inflow and infiltration (I&I) studies
- log data from water quality and pressure sensors
- record alarms such as high levels and intrusion
- pace a sampler to collect a flow proportioned sample
- record data on a strip chart or a circular chart recorder
- activate a dialer when an alarm condition occurs
- signal a process control system

The Village of Kohler has Isco 674 Rain Gauges connected to the 4501s at the Sunset and Sports Core lift stations. Little I&I was found in the collection system served by the Sport Core station. However, flooding was previously a problem at the Sunset station. By correlating rainfall and flow, the Isco 4501 made it obvious that I&I was the problem, and subsequent television inspections revealed a number of bad laterals. Once repairs have been completed, the 4501 will show the effectiveness of the repairs. This will be much less expensive than additional television inspections.

The Fenwood station also has a magmeter, and the 4 to 20 mA output from the magmeter is connected to one of the 4501's analog inputs. This allows the flow measured by the magmeter to be compared to the flow that the 4501 measured using its volumetric technique. Another 4501 logs the 4 to 20 mA signal from the magmeter on the effluent from the Kohler Company's manufacturing plant. According to Neerhof, *“This allows all of our data to be presented in a consistent manner.”*

## Informative Data Analysis

Results can be viewed using the 4501's keypad and display. In addition, the 4501 stores data on pump activity and other inputs in internal memory. Stored data can be retrieved on-site with a laptop compute, or via an optional telephone modem. Isco Pumplink Software is then used to analyze stored data and generate informative graphs and reports on pump station flows and pump performance.

*“We have modems installed in all of our 4501s, and we call them every weekday and retrieve the data,”* Neerhof said. *“I also have Pumplink Software installed on my PC at home, so I can call them up during rainstorms in the middle of the night and on the weekend, and determine whether or not I need to respond immediately.”*

## Future Plans

Neerhof may also have the need for another Isco 4501 Pump Station Monitor on his drinking water pumping station. Four pumps draw water out of Sheboygan's reservoir, and the 4501 would help ensure that the pumps are alternating correctly. The 4 to 20 mA output from the magmeter at the station would also be connected to one of the 4501's analog inputs, allowing the 4501 to log the flow data from the magmeter. *“The daily flow reports from Pumplink Software would be much easier to read than the charts from the circular chart recorder we currently have connected to the magmeter,”* said Neerhof.

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