NEXINITE

Making Wastewater Pretreatment Software More Efficient and Helpful

A Case Study By Nexinite

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Introduction

Over 16,000 publicly owned treatment works (POTW) are operating in the United States currently. That means around 63 billion gallons of wastewater is treated every day.[1]

Pretreatment is a key component to the wastewater systems in the U.S. It's a safeguard. This step keeps pollutants from ever entering the sewer systems and the water treatment plants, which helps maintain the facilities longer and protect workers.

Pretreatment involves the sampling of water from industry in the area to determine compliance with guidelines established by local entities and the Environmental Protection Agency (EPA).

Every wastewater authority uses pretreatment software to sample, report and track industry compliance, plus to alert for noncompliance.

This whitepaper examines the inefficiencies of many pretreatment software (i.e., the man hours required for entering data, the difficulty to track different samples from the same business, the lack of reporting capabilities, etc.).

This paper also outlines ways to address these shortcomings – specifically, how business logic and its trusty counterparts (Microsoft Power BI, Power Query, etc.) give users easier and more efficient access to the information stored in pretreatment software.

Inefficiencies in Pretreatment Software

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Inefficiencies in Pretreatment Software

Data Entry. Wastewater agencies, as well as labs that test water samples, use a laboratory information management system (LIMS) to keep track of water samples and the results.

A big issue arises because all of the LIMS on the market today do not "talk with" pretreatment software.

Agency workers get lab results from a LIMS, often in a PDF, and then tediously enter those results into the pretreatment software. Each sample includes numerous data points, which leaves room for entry errors and means long hours (and, of course, tired eyes). The pretreatment software then alerts workers to any industry with a noncompliance in its sample.

Tracking Samples. From there, a business with a violation is informed and told to resolve the issue within a certain time frame.

The business works to comply and then resamples its wastewater. The process begins again – sample sent to lab, sample and results entered into a LIMS, wastewater agency receives results in a PDF from a LIMS and then agency enters results into its pretreatment software.

Sounds pretty simple, right?

Wrong.

Most pretreatment software does NOT offer tracking capabilities. Agency workers must manually search (i.e., read comments about samples, look at dates, study addresses, etc.) to link a business's newest results to its original sample that was not in compliance.

Without digital tracking of the results, workers spend valuable time doing manual data entry, leaving less time for high level, innovative work. And tracking is crucial because it shows an industry's progress, its attempts at being compliant.

Results Formatting. An obvious fix to the tracking issue is to digitally input results from a LIMS to an industry's data in the pretreatment software. However, it's not that simple.

Each lab, whether it's the lab of a wastewater agency or an independent lab, uses its own format for reporting results. A simple analogy of this problem – civilian time compared to military time. Three hours after noon can be written in two ways – 3:00 pm or 1600. Same time, written differently.

Labs report the same information about a water sample but do not use a consistent format across all labs.

Because of this format inconsistency, results from a LIMS cannot be digitally imported to a pretreatment software.

Naming Samples. Another problem comes with naming the water samples. Because it's common for wastewater agencies to use independent labs for water testing, the independent lab sees the agency as its client. Thus, it labels the sample with the agency's name, not the business where the sample was taken from.

For example, Red Factory takes a sample of its wastewater and sends to its wastewater authority, Big City Water Authority. Big City Water Authority decides to use an independent lab called Awesome Lab to test the results of this water. Awesome Lab names the sample, "Big City Water Authority," because the request for testing came from there.

This is problematic because it prohibits sample tracking. Red Factory's sample now appears as Big City's sample when results are reported in the LIMS. This is fixed manually, of course, but it's another example of why agencies are unable to import data from a LIMS directly to a pretreatment software.

Reporting. Because of the inefficiencies already described, reporting results to industries, board of directors, the EPA and other local entities is a time-consuming process.

Often, individual results are pulled manually from the pretreatment software and then entered into a final report. Or, a letter to an industry in violation is crafted outside the pretreatment software; there is no way to automate violation notices.

How to Solve these Issues

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Nexinite's Solution

Our Two Goals for This Project:
1. Automate Data Input
2. Improve Reporting

1. Automate Data Input

The large amount of manual data entry required to use a pretreatment software is apparent. (It seems almost archaic in today's times.)

So, an immediate goal was to automate as much of data inputting as possible

To do this, our (brilliant) engineers tackled this goal from two angles – a.) transform all of the result formats from varying labs into one consistent format and b.) create a naming system for water samples.

Consistent formatting for lab results. This step was a tough one, but it was necessary. Formatting was one of the biggest reasons why sample results from the different LIMS's couldn't be imported directly to the pretreatment software.

By utilizing Power Query and some custom coding, our engineers designed, in their own words, "an Uber spreadsheet."

This spreadsheet allows for sample results to be added at various times (whenever a LIMS reports results) while being batched with samples taken at the same time. Plus, this file translates the results into a format able to be digitally imported to the pretreatment software. (The file and the pretreatment software now speak the same language!)

A naming system for all situations. As discussed earlier, naming water samples is problematic because various labs are used, often as a subcontractor of the agency's own lab (and sometimes as a subcontractor of a subcontractor).

Our engineers recognized how important a naming convention was in order to automate data entry and to allow for industry tracking.

Through in-depth conversations with the agency employees, our engineers developed a nomenclature of sorts to systemize how water samples are named by the agency. Thus, samples were easily linked to the business of origin, as well as batched with samples from the same time period.

This naming system, plus the consistent formatting of results, helped automate data input. No more scanning and rescanning lines and lines of data to match samples with their counterparts. It's done digitally now.

2. Improve Reporting

Another clear goal for our engineers was to help the client agency report results quicker and easier. As with any government-regulated industry, reporting for accountability is imperative to all wastewater agencies.

And as mentioned earlier, most reports were being created manually from the pretreatment software.

Using Microsoft Power BI, our engineers created a dashboard of information, allowing the client agency to view a variety information, like compliance status of each industry, violation follow ups and number of permits served. All on one screen.

From this dashboard, reports can be quickly created and shared with decision makers and interested parties.

Next Steps

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Next Steps

Because of government regulations, pretreatment software is a must for every wastewater agency. It alerts them of compliance violations in an industry, and, thus, the software is important.

But, the inefficiencies are glaring. Lack of data automation and data management make tracking water samples and reporting from the software almost impossible.

We were tasked by the client agency to make the pretreatment software more user friendly. By identifying its shortcomings, our engineers were able to create a solution for importing data digitally and making reports in just a few clicks.

Of course, a great solution reveals the possibilities. It leads to hope and dreams of even greater things. The client agency is already talking about other ways to make work easier, allowing them more time for innovation and greater support for their customers.

Reach out to us to see a demo of our work on this project or to ask more questions. We welcome the conversation.

Case Study Resources

1. https://infrastructurereportcard.org/cat-item/wastewater/