<u>Final Report</u>

RBDMS for Water Online: Providing Coal Operators and Their Laboratories Data Review and Reporting Capabilities via Web-enabled Water Quality Database/GIS and Providing On-demand Water Quality Data to the Public

Summary

The Ohio Department of Natural Resources Division of Mineral Resources Management (ODNR-DMRM) manages hydrologic data associated with its Coal Regulatory, Oil & Gas, and Industrial Minerals and Abandoned Mine Land (AML) programs. The hydrologic data comes from sources such as data submitted by regulated mining companies and sampled submitted to the ODNR laboratory by ODNR staff and partnering organizations. The ODNR laboratory processes over 25,000 individual parameter tests annually. Mining operators submit over 76,000 water parameter tests annually as required by Title V SMCRA permits and Ohio EPA NPDES permits for mining permit applications. An effective centralized water data management system is needed for storage, retrieval, and evaluation of data.

ODNR-DMRM embarked on a process of developing a comprehensive, web-enabled water information system that will meet the needs of ODNR-DMRM, Ohio's regulated industry and AML Program watershed partners. Current water data management utilized the existing Risk Based Data Management System for Water (RBDMSW) database framework that was developed with the Groundwater Protection Council (GWPC) in 2005 – 2007. This version is a .NET WinForm interface with an online GIS paired with a SQL server database. The purpose of the OSMRE Applied Science project (Phase II) was to develop the RBDMWS as a centralized and all-inclusive data management system capturing ODNR Laboratory analyzed data, coal operator supplied data and AML collected data that is entered on the watersheddata.com site. The main tasks for the project were:

- Develop the Laboratory Information Management System (LIMS) exchange so data entered at the lab would go directly into RBDMSW
- Build the water quality, sources water assessment, and GIS spatial querying components of the database, including data entry forms, reporting, and user querying functions for internal ODNR use
- Develop or adapt an XML schema for data exchange with laboratories and other state and federal agencies

- Web-enable the database with an ASP.NET interface, and establish a XML Web service to receive data from other laboratories.

Project Tasks

The project scope of work required multiple tasks to be performed with contributions from ODNR and GWPC and their contractor (Virtual Engineering Solutions Inc.). One of the first steps involved the GWPC team creating an open source code website for ODNR using ASP.NET and hosted on rbdmsonline.org development server. The application was linked to a RBDMSW SQL server on the back end. The RBDMS.NET Administration Application, a WinForm smart client application, was developed to allow ODNR administrative control for users, groups, rights, reporting, error and exception handling, personalization, filtering and reporting and configuration. In addition to the website, a new GIS configuration file was developed using the base map created during RBMDSW development (phase I). Upload forms were developed for users for station and sample information and analysis information. An XML parser and data dictionary were developed to ensure properly formatted data, according to XML schema, during upload. An XML web service that allows for data transfer to the ODNR SQL Server database, checking for invalid sample ID's and data anomalies and for data exchange between ODNR Web server and private laboratories the coal industry is utilizing and EPA laboratory was also created. Reporting functions were built into the system that allows users to view and analyze data. These reports included specialized reports for different programs such as Permitting and Applications – CHIA, Complaint Investigations, AML, Oil & Gas and Oil Field Brine. Additional user reports were developed such as Summary by Program, Site and Site Detail, Chain of Custody, etc. that allows for analyzing data collection and sites or areas of interest. Additional capabilities were built into the RBDMSW system such as alerts to staff for missing data. Self-designed red flags were incorporated for exceedances of effluent standards, minimum or maximum contaminant levels and percent deviation from baseline figures.

Project Results

The web application with GIS was built and tested and was working upon completion. However, changes to the ODNR network later that involved GIS and flex viewer modifications prevented the system from working properly. Without the GIS component the Web application was not as powerful and was not implemented widely by users at ODNR. The goal of the project was to get data in electronic format for all required monitoring for Title V permits and AML/watershed monitoring. This proved to be difficult with the upload tools developed for private users (i.e. private and other state laboratories) analyzing data on coal permits. Data is retrieved by the Ohio EPA laboratory but only in batches and has to be uploaded on a schedule. Private laboratories analyzing data for operators are not uploaded to the system electronically. Data exchange between the ODNR laboratory and RBMDSW is working and any data collected and submitted to the ODNR lab is now directly transferred to the database.

Barriers to implementing the system full scale includes rapid changes in technology, working within an agency and state government that controls information technology and application that can be utilized and the complexity of managing large volumes of water quality data from various sources, internal and external. With lessons learned from this project ODNR has developed a data management strategy to

implement the goals of this project to completion. This will result in using a different web based data management system that is currently being used by the AML Program at this time.   Data and web applications will be housed at a partnering state university (Ohio University) and supported via contract. This structure should avoid issues encountered during this project and hosting the data and support outside of ODNR information technology platforms and will allow for more control and edits as needed and to keep up to date with changes in technology as they occur. The new system is anticipated to fully functional by the spring of 2017.