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AquAeTer
optimizing resources | water, air, earth

The AquAeTerian

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Hot Topics

Dr. Wes Eckenfelder was honored at the Water Environment Federation (WEF) Industrial Waste Conference in Providence, Rhode Island with the first "Dr. Wesley Eckenfelder Industrial Water Quality Lifetime Achievement Award." This award will continue to be given to professionals in the industrial wastewater field who have made a minimum of 25 years of significant technical contributions and impact to the industrial waste treatment or disposal industry. Congratulations to Wes on this distinguished and well-deserved award.

The President's Corner

Surgēns Arbor Incipit Cum Firmīs Radicēs
"A Growing Tree Starts With Strong Roots"

AquAeTer is forging ahead into our 16th year of operations with a diverse team of professionals who are providing our clients with a wide range of assistance. We have recently expanded our staff in the Brentwood office with the additions of Kristine Pordesimo, chemical engineer; Miriam Borosund, geologist; and our new accounting assistant, Hallie Finney.

Steve Wampler and Chris Bolin are completing an engineering design for a new Subtitle C RCRA landfill cell in Nevada. Sean Muller and Marc Melker are continuing their resource evaluations for new and existing mining operations in Central America, China and Kazakhstan, as well as for mining companies here in the U.S. They have also expanded their team to include Patrick Hollenbeck, Senior Geologist, formerly with Cripple Creek Gold and Maptec. Patrick will be providing expertise in resource modeling, geostatistics and data acquisition/interpretation.

Wes Eckenfelder and Paul Marotta are working with Bill Hansard in developing a treatment strategy to meet very stringent water-quality based BOD_5 permit limits for a discharge to a tidal stream. The treatability studies being conducted in our laboratories have indicated that BOD_5 limits of less than 5 mg/L are achievable for this pulp and paper mill discharge. Darci Scherbak is working with Terranext and BE&K engineers on a flood analysis for a new greenfield steel mill site in Alabama.

Amanda Wilding and Amanda Klink have successfully completed several wetland evaluations for real estate transactions being managed by Chris Green. Their work is one of our featured articles in this newsletter. Paul Marotta and John Michael Corn are also featured in this issue of the newsletter for their work with Horner and Shifrin on an analysis of hazardous air pollutants (HAPs) emissions for one of the largest municipal wastewater treatment plants in the country.

L to R: Michael Curtis and Wes Eckenfelder

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Modeling Air Emissions Estimates From a Wastewater Treatment Facility

The Metropolitan St. Louis District (MSD) operates the Bissell Point Wastewater Treatment Plant. The Bissell Point plant discharges to the Mississippi River and is sized to handle a peak wet weather flow of 350 million gallons per day (mgd) through the primary settling units and 250 mgd through secondary treatment. The National Pollutant Discharge Elimination System (NPDES) permitted design flow is 150 mgd. During normal operating conditions, the flow is generally a total of 110 mgd including both domestic and industrial wastewaters. The plant utilizes bar screens, grit separators, diffused air, and primary clarifiers for primary treatment. For secondary treatment, the plant employs trickling filters, as shown in Figure 1, and final clarifiers.

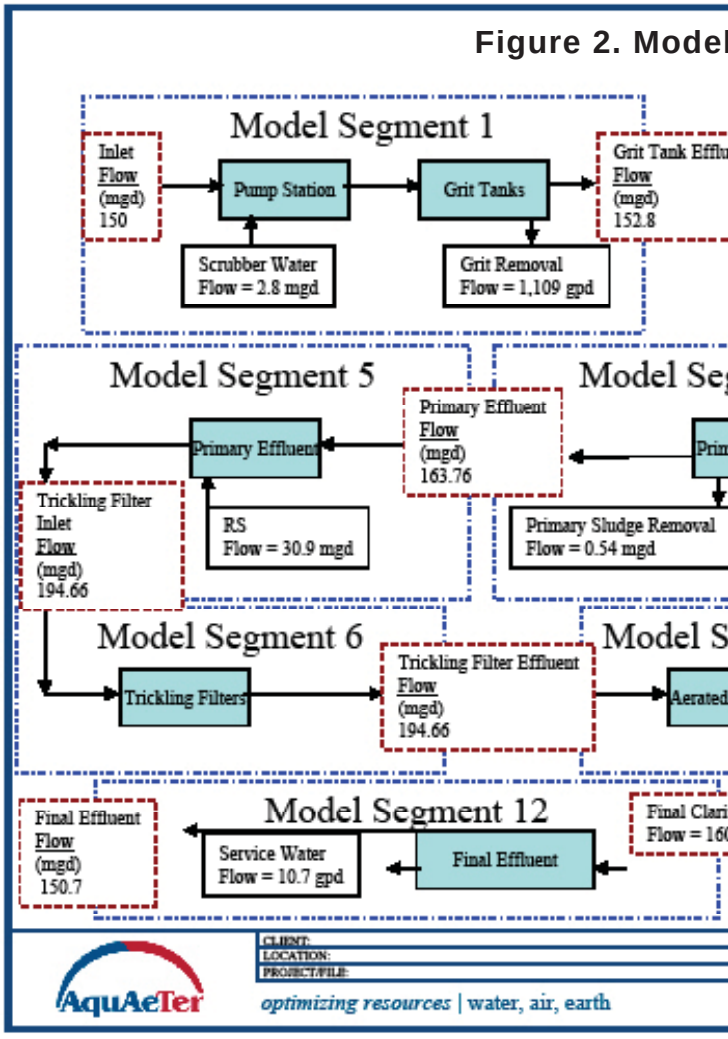
Figure 1. Trickling Filters

BACKGROUND

The past air emissions estimates were based on the United States Environmental Protection Agency (USEPA) AP-42 emission factors for methanol developed for wastewater treatment plants. Using the AP-42 emission factor, 4% of the methanol input to the wastewater treatment system would be released into the air. Using this estimate, the plant may have been classified as a major source during some years due to methanol loadings from local industries. Discussions with the three largest methanol dischargers indicated that the plant with the largest loading of methanol would be discontinuing operations and therefore the methanol loading from that facility would cease.

MSD hired the firm, Horner & Shifrin, Inc., to lead the development of a model to estimate emissions using an USEPA approved model. Horner & Shifrin retained **AquAeTer** to complete the detailed modeling work. Mr. John Michael Corn, P.E. constructed the detailed air emissions model with technical direction from Mr. Paul Marotta, P.E. The objective of the analysis was to produce air emissions estimates of hazardous air pollutants (HAPs) from existing wastewater treatment process units, excluding the solids handling unit, located at the Bissell Point Treatment Plant. For the purposes of this scope of work, the wastewater treatment process units did not include the units associated with the solids handling building, such as the incinerator, belt filter press, or ash ponds, as emissions from these units had already been estimated by MSD.

Figure 2. Model



DATA GATHERING

A three-step approach was used for developing the emission estimates which included: 1) obtaining current available operating and analytical data from MSD, which were provided by Horner & Shifrin; 2) constructing a mathematical model using the USEPA Water9 platform; and 3) running a model scenario at specified operating conditions to conservatively estimate an annual potential to emit (PTE) HAPs emissions. The design basis flow of the plant used for the PTE condition was 150 mgd. The Bissell plant took monthly samples of untreated influent wastewater over a six-month period and analyzed the samples for 118 constituents of concern. These data were used to determine an average loading to the facility.

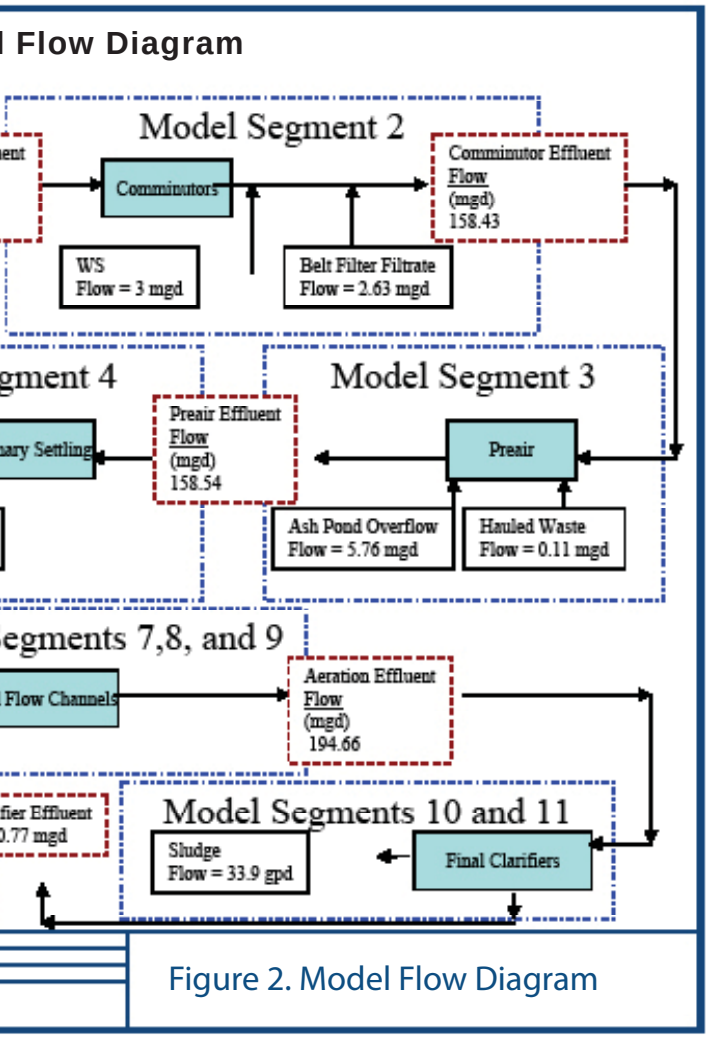


Figure 2. Model Flow Diagram

Due to treatment plant changes and upgrades over the years, a full plant schematic of the current treatment was not available. Horner & Shifrin gathered the necessary data about each process unit and developed a comprehensive plant schematic that identified all current process information, including flow directions and sizes of the units. This updated schematic, along with the constituent concentration data, was used as the basis for the Water9 model.

MODEL DESCRIPTION

Due to the size and complexity of the treatment system, **AquAeTer** engineers subdivided the process into smaller sub-processes. Water9 was used to construct an air emission model of each sub-process, as illustrated in the simplified flow diagram in Figure 2. Detailed process data and engineering judgment (including technical support from Dr. Wes Eckenfelder) were used to determine model inputs.

The model was separated into twelve different segments, and the outputs of each file were used to calculate the inputs of the next unit. This method allowed the model segments to calculate in less than one hour and minimized the amount of time spent debugging model segments caused by model convergence issues. One of the challenges with Water9 is if it fails to converge to a solution, the calculation is halted and data are not saved, resulting in time-consuming model re-runs.

RESULTS

With the completion of the modeling, **AquAeTer** provided emission factors for each HAP constituent. The emission factors were provided for the plant as a whole and for individual treatment sections, so that the emissions could be estimated, even if certain units were not in use during various times of the year.

Based upon the wastewater treatment modeling and the emissions calculations provided by MSD, the total HAP emissions estimated by **AquAeTer** and MSD are 16.14 tons per year. The largest single HAP emitted from the wastewater treatment modeling was methanol at 5.66 tons per year. The modeling for this facility allowed the Bissell Point facility to be considered a minor source for HAPs.

Paul J. Marotta, P.E.

Mr. Marotta has been with **AquAeTer** for over six years as operations manager for the Brentwood, TN office. He has B.S. in Applied Mathematics from Siena College; a BSME in Mechanical Engineering from Manhattan College; and a M.S. in Engineering from Union College. His prior professional experience includes work in the nuclear power industry for Knolls Atomic Laboratory and 14 years experience in the pulp and paper industry with International Paper. Paul now provides technical direction for projects involving air quality, wastewater, and soil and groundwater remediation.

John Michael Corn, P.E.

Mr. Corn has been with **AquAeTer** for over four years. He graduated from University of Tennesse with a B.S. in Chemical Engineering. His work at **AquAeTer** has included air and water quality, wastewater, soil and groundwater remediation, litigation support, and risk analyses.

For more information, please contact Paul or John Michael by phone at 615.373.8532 or by e-mail at pmarotta@aquaeter.com or jcorn@aquaeter.com.

Amanda R. Wilding

Ms. Wilding graduated from Austin Peay State University in 2002 with a M.S. in Biology. Her graduate research work and previous experience included non-point source pollution monitoring and research on Federal changes to the Clean Water Act on protected wetlands. Ms. Wilding has five years of biological and environmental project experience, which includes water quality field and laboratory studies, environmental media sampling, Phase I and II Environmental Site Assessments, and NEPA screenings. Ms. Wilding has completed a 36-hour wetlands delineation training course and has managed several projects involving wetlands delineations, evaluations, and permitting for real estate developers.

Amanda J. Klink

Ms. Klink graduated from San Diego State University in 2004 with a B.S. in Biology. Since joining **AquAeTer** in September of 2006, Ms. Klink has assisted with a variety of projects including NPDES permits, Phase I and II Environmental Site Assessments, NEPA assessments, ground penetrating radar (GPR) surveys, aquatic toxicity testing, water quality studies, and wetlands delineations. Ms. Klink has recently completed an intensive, field training class taught by one of the few individuals in the U.S. who has completed the United States Army Corps of Engineers (USACE) wetlands delineation training program. Ms. Klink is managing projects in the real estate development and telecommunications markets.

Wetlands Delineations and Permitting

AquAeTer's staff of biologists in the Brentwood, Tennessee office are assisting in expanding the company's profile to include wetlands delineation. Two of our biologists, Amanda Wilding and Amanda Klink, have performed several wetlands delineations in various areas throughout the Southeast and have assisted high-profile clients through the permitting process. In addition, Ms. Wilding and Ms. Klink are versed on the new wetlands regulations created under the Clean Water Act (CWA) Section 404, based on the recent rulemaking in light of the Rapanos Supreme Court decision.

If a parcel of property is suspected of containing a wetland, it is critical to conduct a wetlands investigation or full delineation prior to development of the property. Some wetlands indicators include hydric soils, wetland plants, and connections to navigable water bodies. Another indicator may be that the property is mapped as a wetland on the National Wetland Inventory (NWI) maps. The delineation process involves several steps and requires experience in a multitude of scientific areas. Prior to field visits, historical maps, photographs, and precipitation data are analyzed. During the field investigation, vegetative communities are assessed and dominant plant species are identified. Additionally, hydrologic and soil indicators are examined. Each property is unique, and all the components must be evaluated simultaneously to correctly determine the wetlands status. Once the delineation is complete, the United States Army Corps of Engineers (USACE) District personnel verify the determination. If wetlands are found, permits and mitigation may be required. The permitting process varies between states and USACE district offices and can potentially take up to 18 months.

AquAeTer recently completed a General Section 404 Permit for a commercial real estate developer in Covington, Louisiana. The wetlands delineation was performed in accordance with the USACE 1987 Wetlands Delineation Manual. During the site investigation, the 2.4-acre parcel was evaluated and wetland areas were identified. After the site visit, routine wetland determination data forms for each plant community type and maps indicating the wetlands locations were submitted to the USACE New Orleans District office. Small wetland inclusions were observed within the non-wetland live oak tree community. Additionally, soil cores were examined throughout the property, including wetland areas where oxidized root channels were observed in the top six inches of soil, which is a hydrologic indicator of wetlands.

In conclusion, portions of the subject property were delineated as wetlands. **AquAeTer** worked in close coordination with the New Orleans District office and the Louisiana Department of Environmental Quality to provide the necessary information to expedite the final Jurisdictional Determination and wetlands permit. **AquAeTer's** coordination with these departments allowed the process to be completed within 10 months and construction is currently underway for development of the client's property.

Amanda Wilding conducting a soil analysis

To find out more about the wetlands permitting process, contact Amanda Wilding or Amanda Klink by phone at 615.373.8532 or by e-mail at awilding@aquaeter.com or aklink@aquaeter.com.