AquaSentinel: A Real-Time Reagentless Biosensor System for Standoff Detection and Classification of Toxins in Source Water

Elias Greenbaum and Miguel Rodriguez, Jr.
Chemical Sciences Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee

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AQUASENTINEL™

Genatek LLC, is pleased to present our flagship system, "AquaSentinel". It is the first product to automatically and continuously test for chemical toxins that have been introduced into water supplies. It is a fully automated system that continuously tests the health of water borne algae. Within minutes, the system can detect the presence of a chemical contaminant and provide an immediate alert to a remotely located control station.

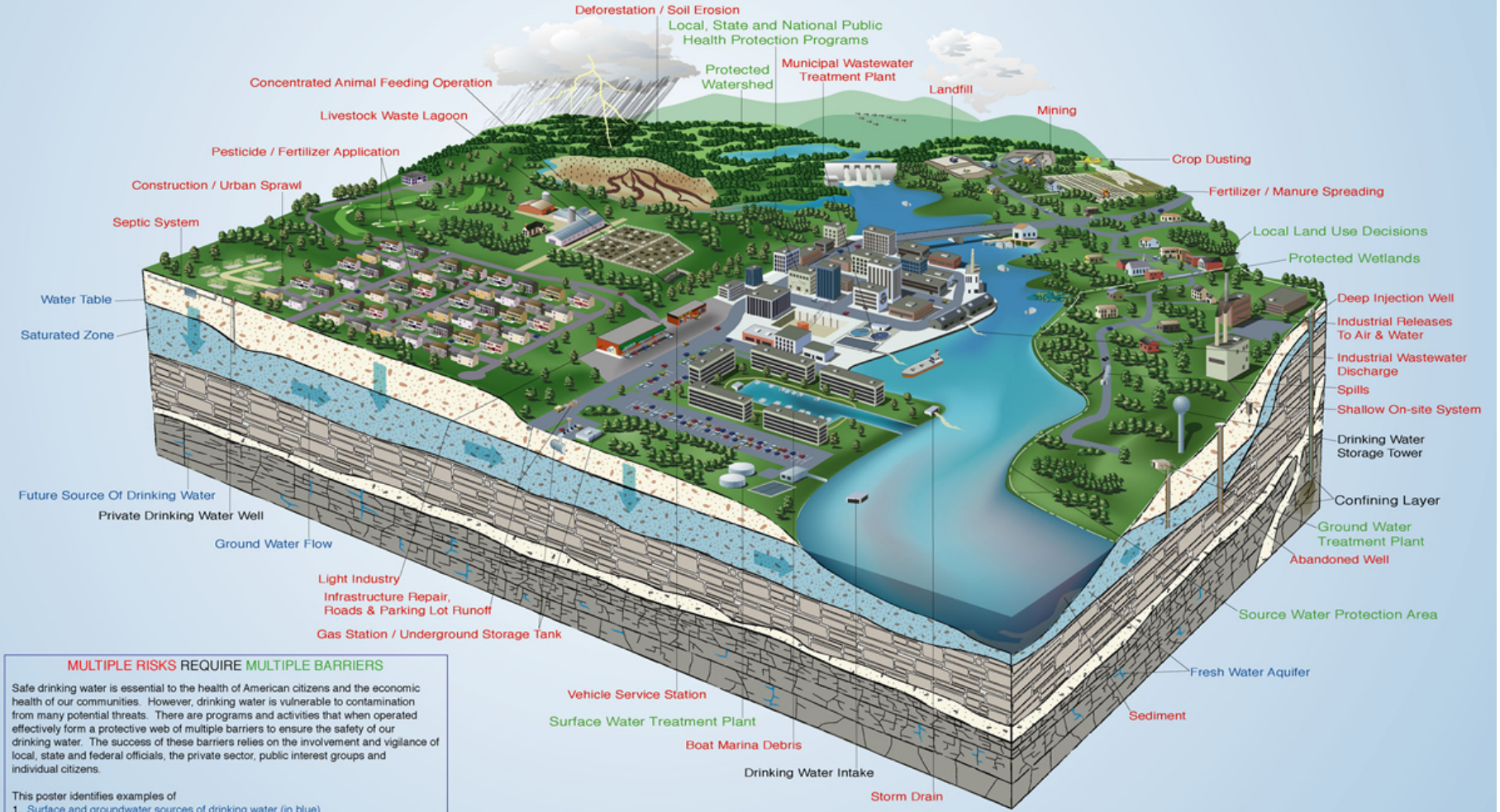
AquaSentinelTM is a new approach to quickly detect toxic chemicals in large-scale, source drinking water supplies for homeland security and regulatory compliance for industrial use.

It is fully automated, easily maintained, and reduces the need for on-site personnel to manually test water. AquaSentinel provides a new and invaluable level of source water security for military and civilian drinking water supplies, allowing cities, first response, and homeland security agencies the opportunity to take early countermeasures against potential terrorist threats.

Installation of AquaSentinelTM will help secure the source of drinking water for millions of households. AquaSentinel is always

Done

Safe Drinking Water Act - Protecting America's Public Health



MULTIPLE RISKS REQUIRE MULTIPLE BARRIERS

Safe drinking water is essential to the health of American citizens and the economic health of our communities. However, drinking water is vulnerable to contamination from many potential threats. There are programs and activities that when operated effectively form a protective web of multiple barriers to ensure the safety of our drinking water. The success of these barriers relies on the involvement and vigilance of local, state and federal officials, the private sector, public interest groups and individual citizens.

This poster identifies examples of

1. Surface and groundwater sources of drinking water (in blue),
2. Potential threats to those drinking water sources (in red), and
3. The multiple barriers that together protect our nation's public health (in green).
   - Risk Prevention Barrier
   - Risk Management Barrier
   - Risk Monitoring and Compliance Barrier
   - Individual Action Barrier

Safe Drinking Water Hotline – (800) 426-4791 Safewater Web Site – www.epa.gov/safewater

EPA
United States Environmental Protection Agency
EPA 816-H-02-003
January 2002

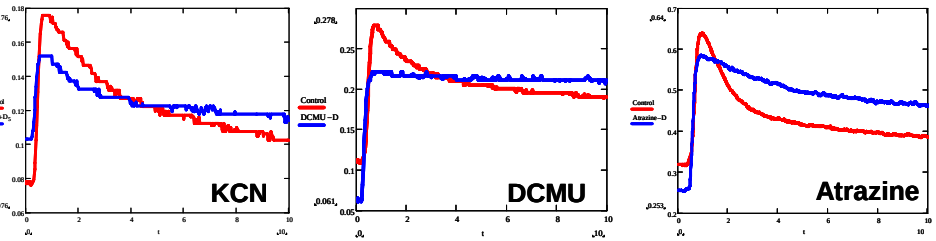
Features of AquaSentinel

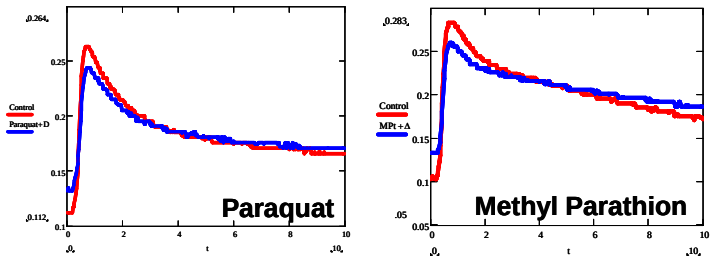
- Extracts information from minute changes in a natural aqueous environment
- No sample preparation
- Sediment, debris okay
- Sentinel + Chemical Identification
- Standoff-hands off detection
- No consumable reagents
- Electromagnetically silent until an event has occurred
- Mobile; Direct line of sight is not required
- Wireless encrypted bidirectional telecommunication
- Broad spectrum of aqueous toxins
- Small size; Lab-on-a-chip capable

CLEAN WATER ALGAE

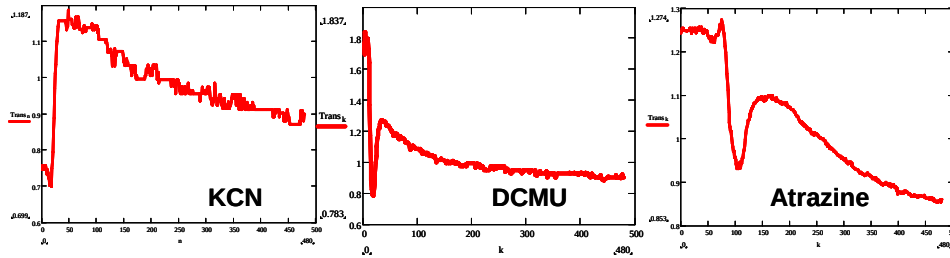
Basic Idea of AquaSentinel

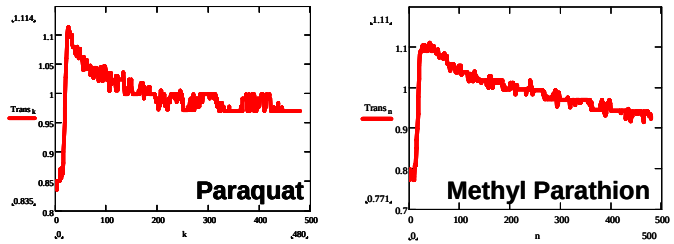
Effect on Fluorescence



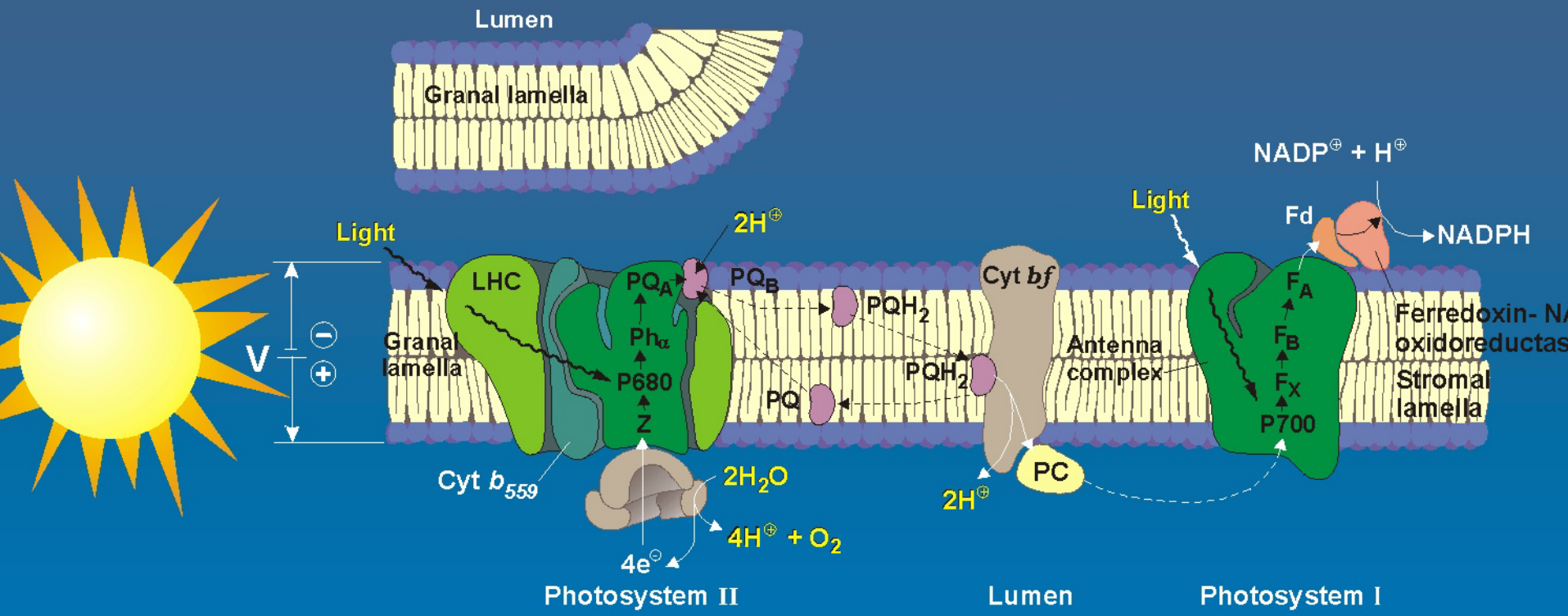


Digital Signature – “Fingerprint”

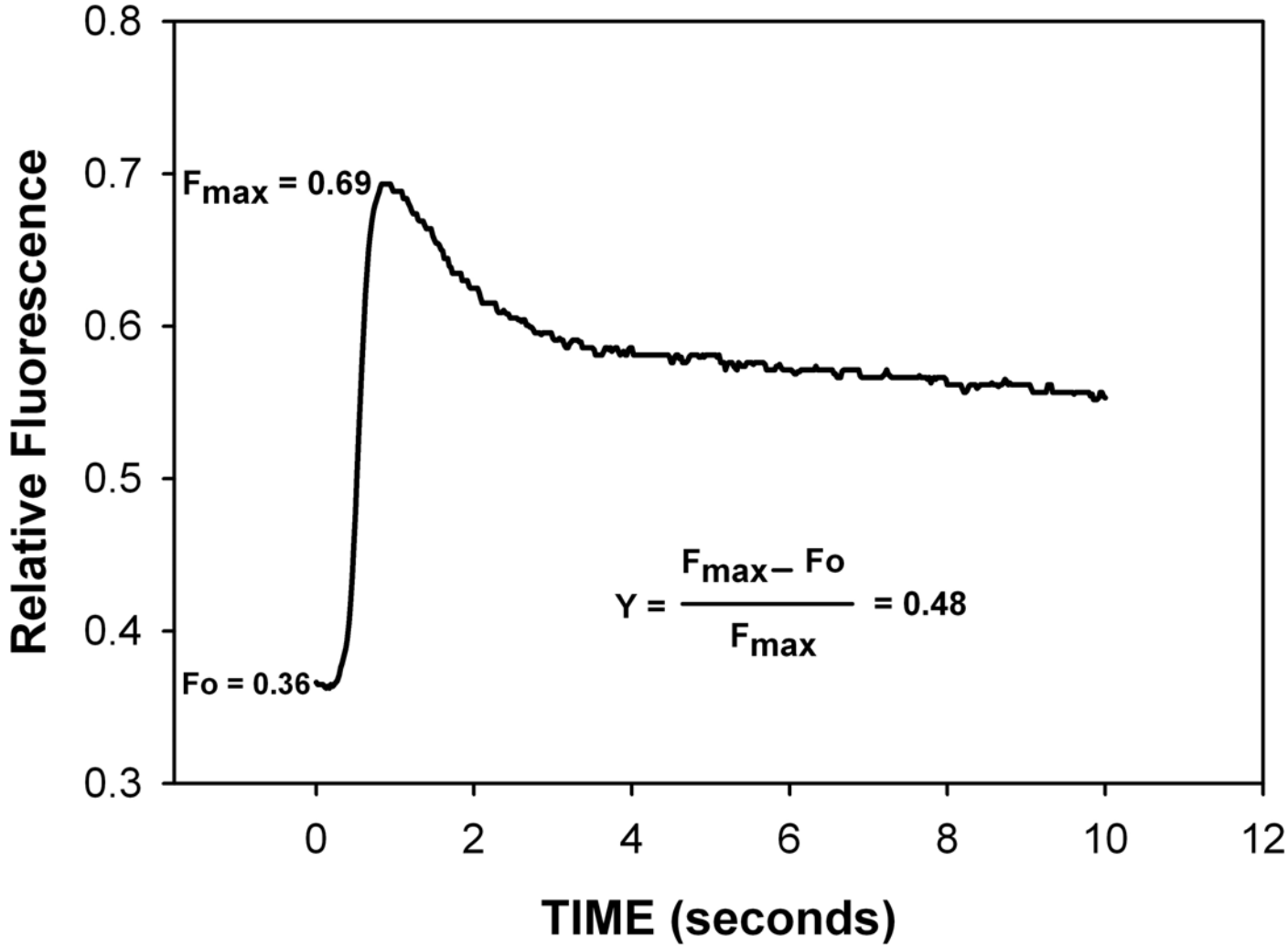




The Photosynthetic Membrane



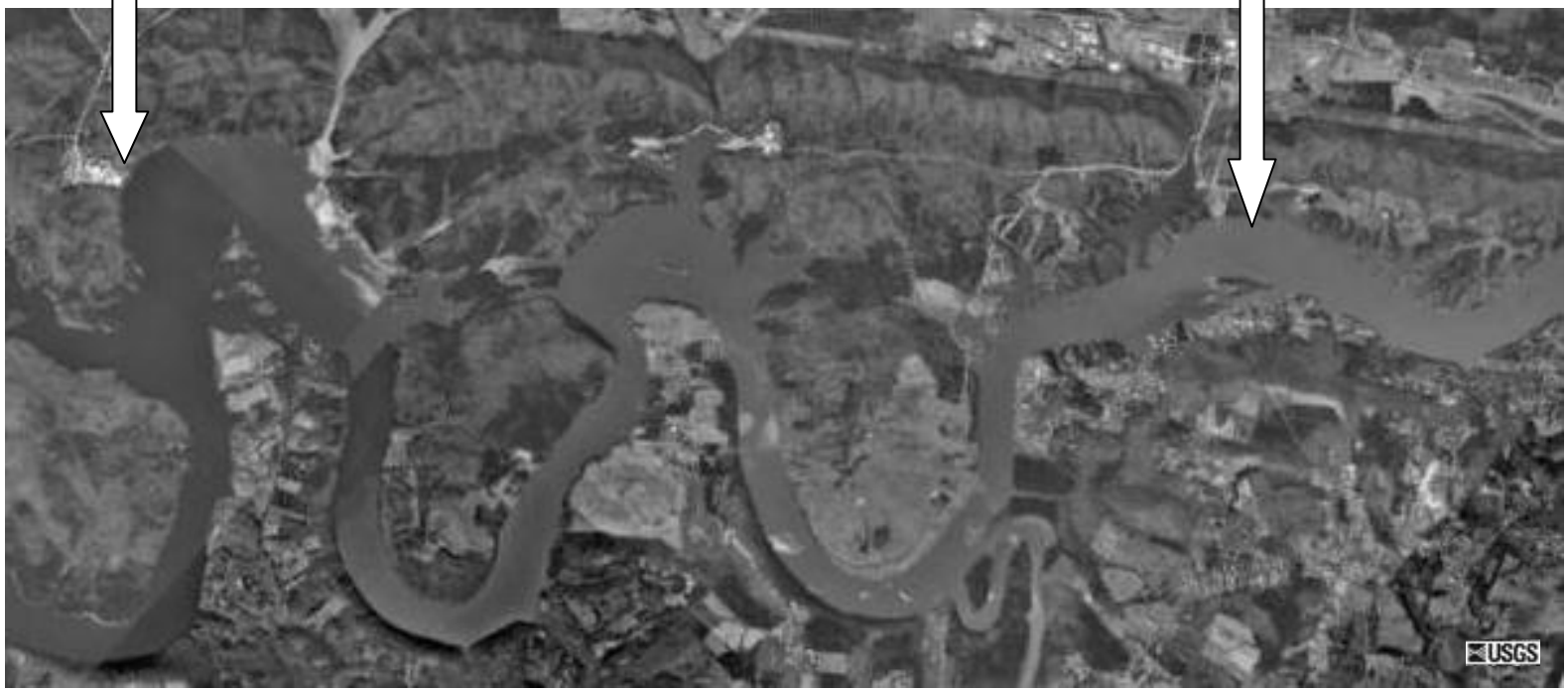
Typical Fluorescence Induction Curve from Naturally-Occurring Algae in Untreated Clinch River Water



Real-World Conditions

AquaSentinel Monitoring Station

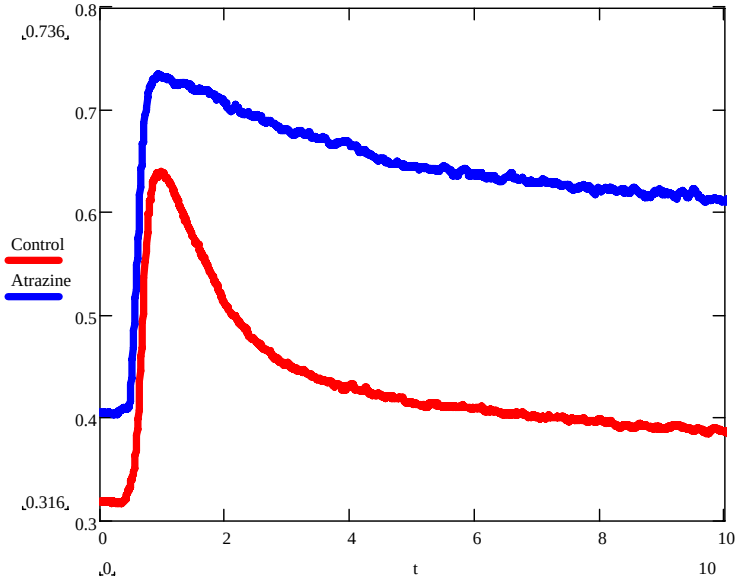
Drinking Water Supply for Oak Ridge, TN

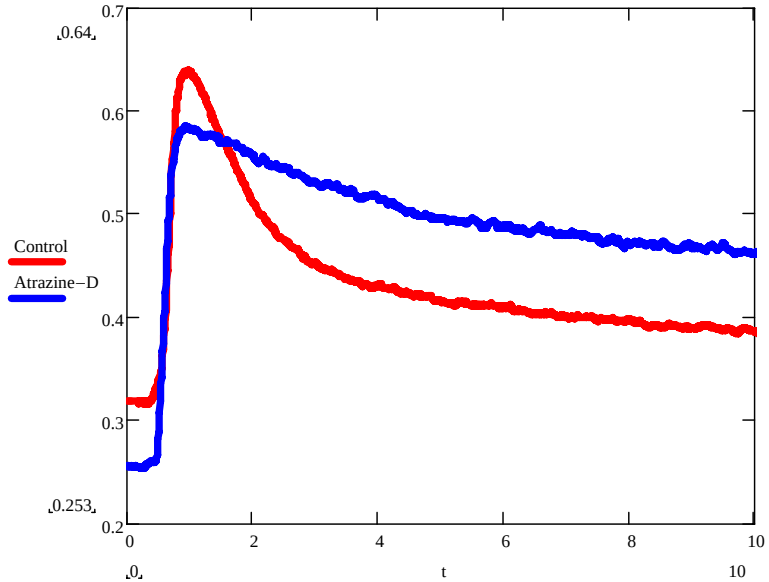


CLINCH RIVER/MELTON HILL LAKE, OAK RIDGE, TN

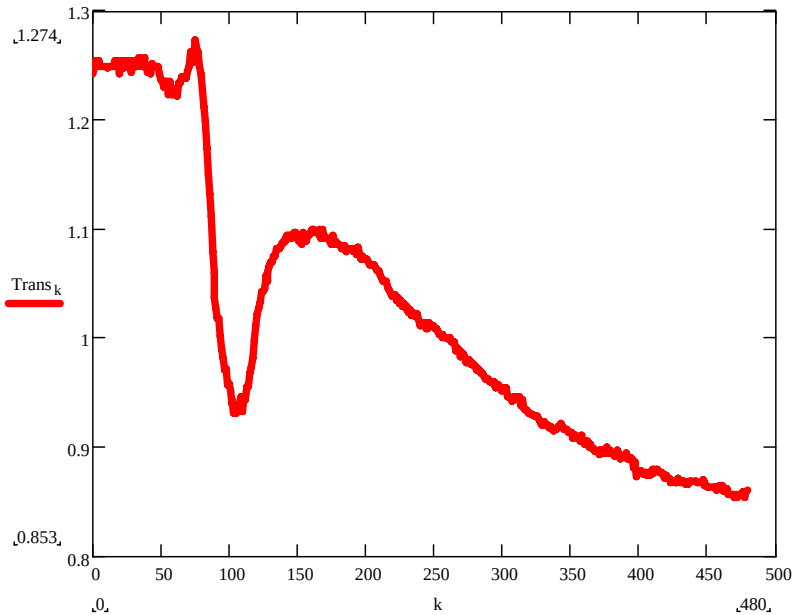
Clinch River Monitoring Station - ORNL

Atrazine Data Analysis – 0.3 ppm





Transformation Data Set for Atrazine



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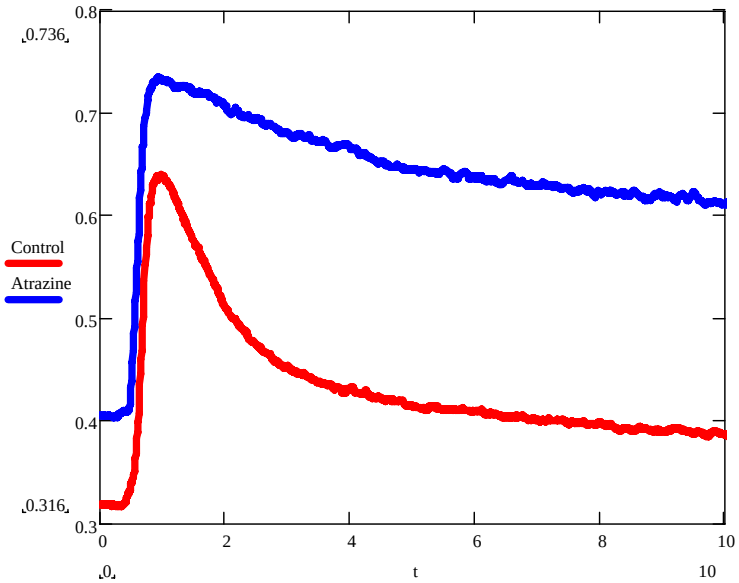

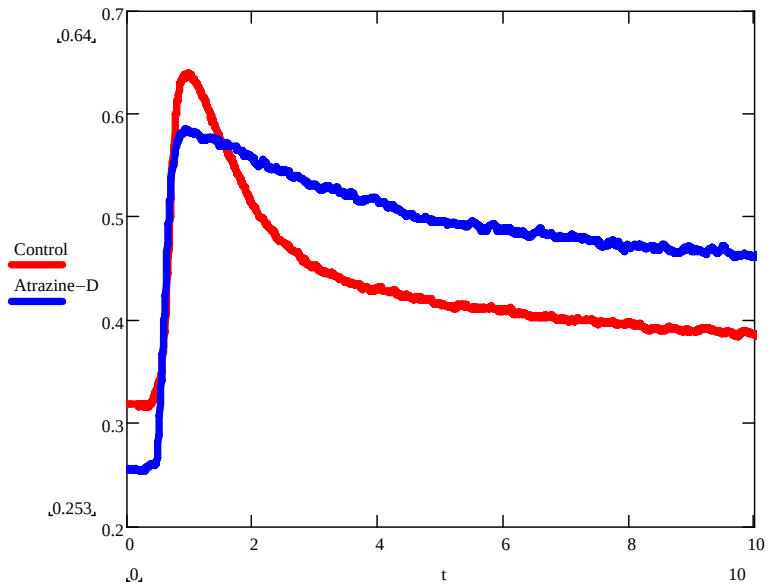

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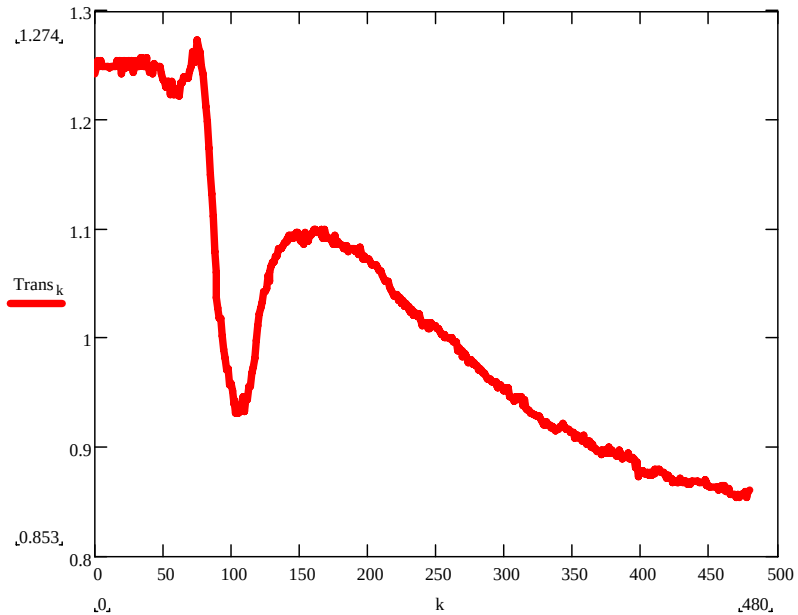

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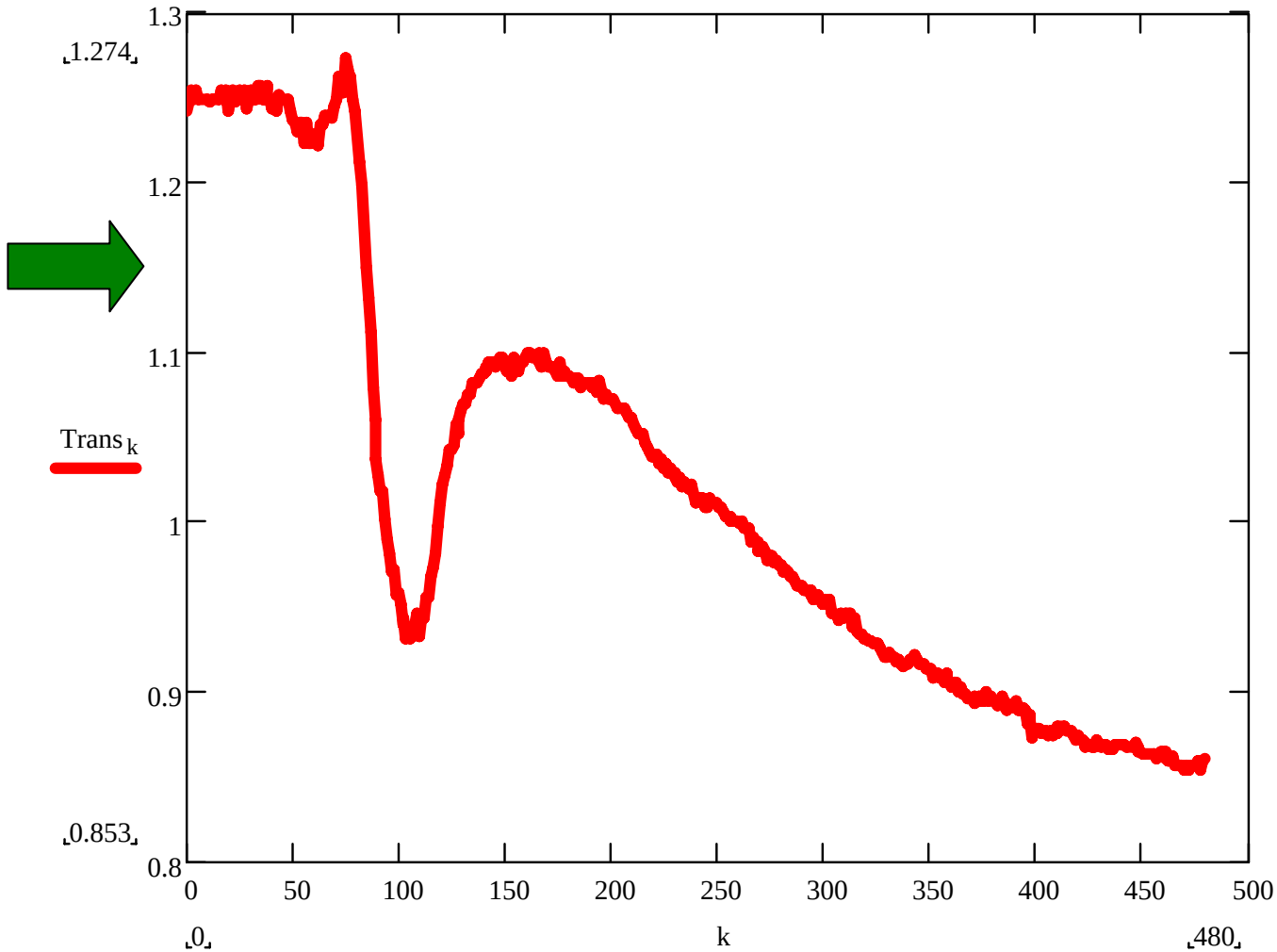
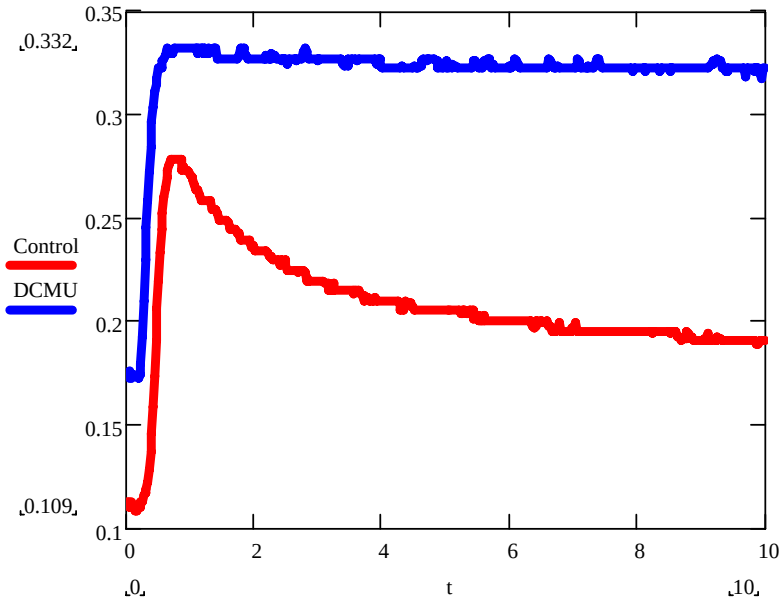
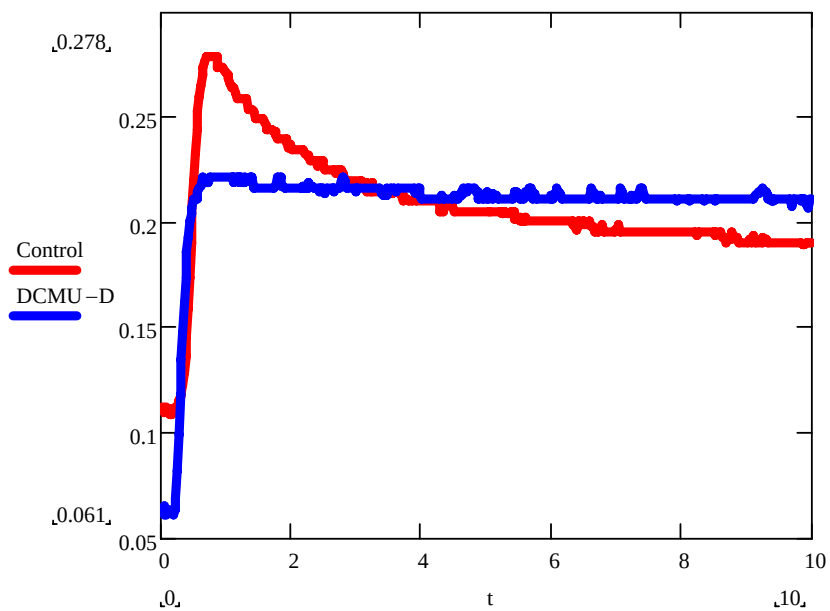


DCMU Data Analysis – 2 ppm





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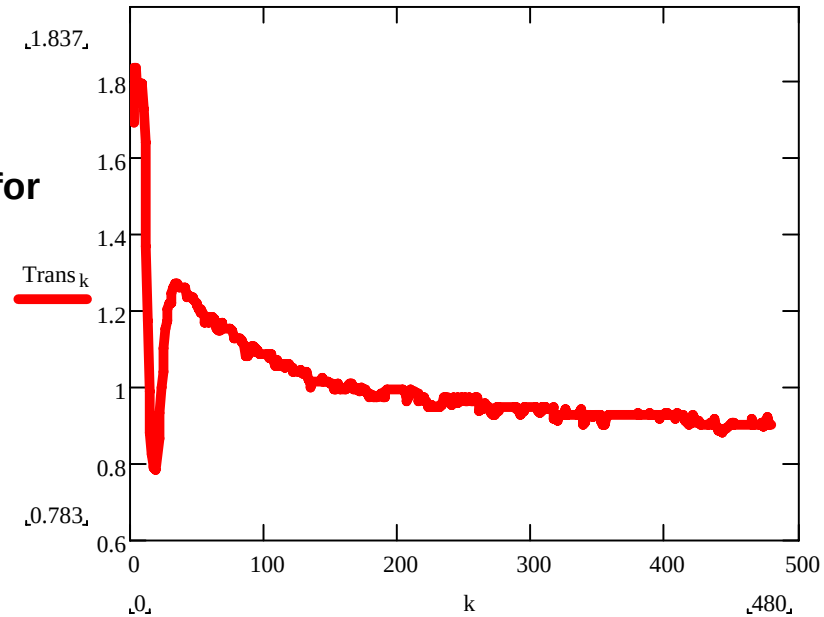

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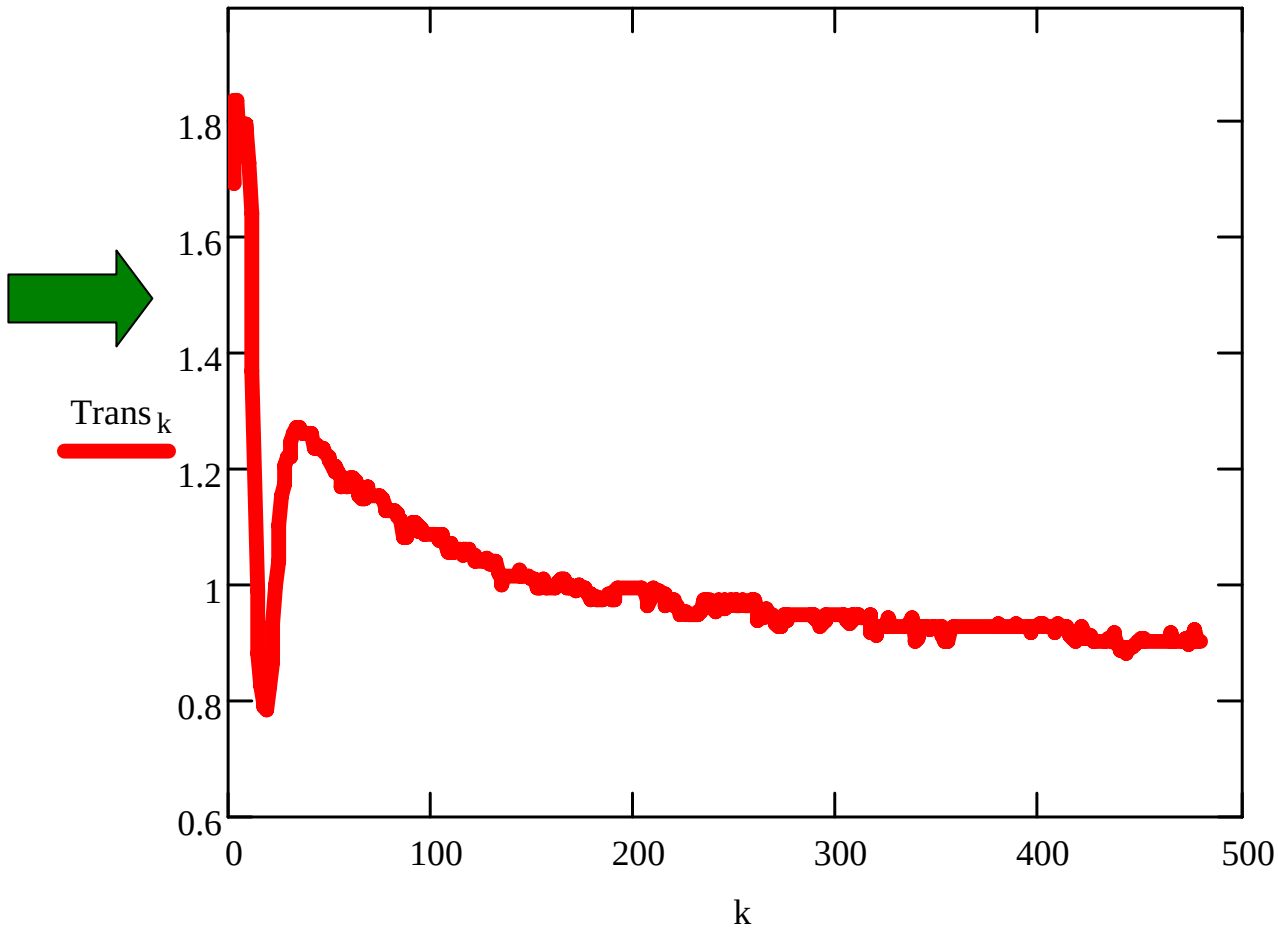
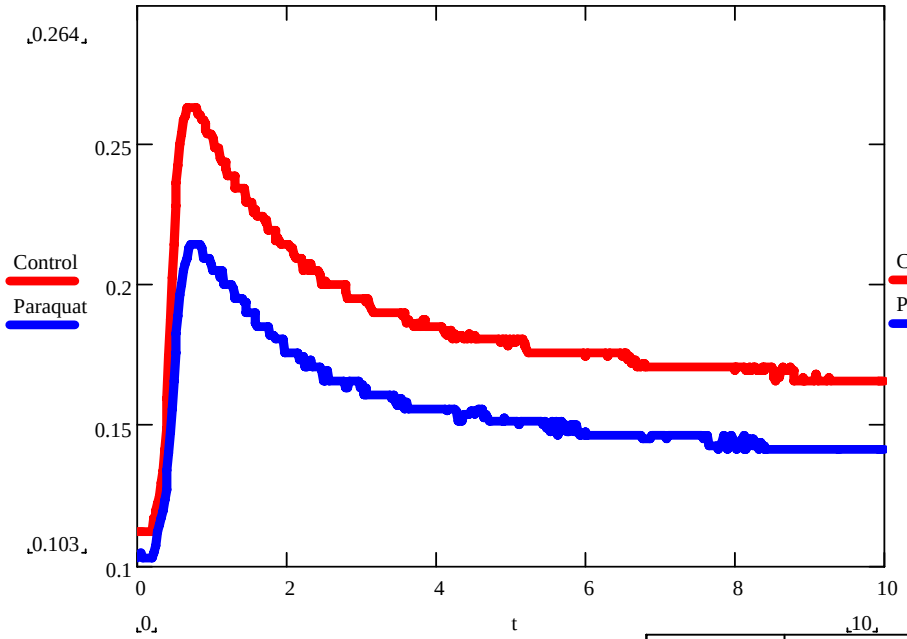
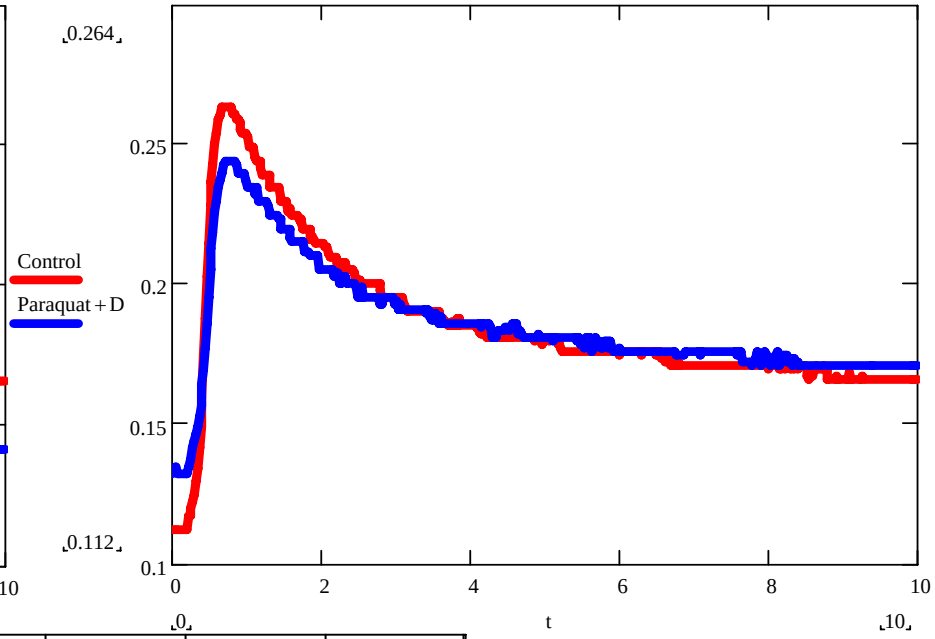


Paraquat Data Analysis – 6 ppm





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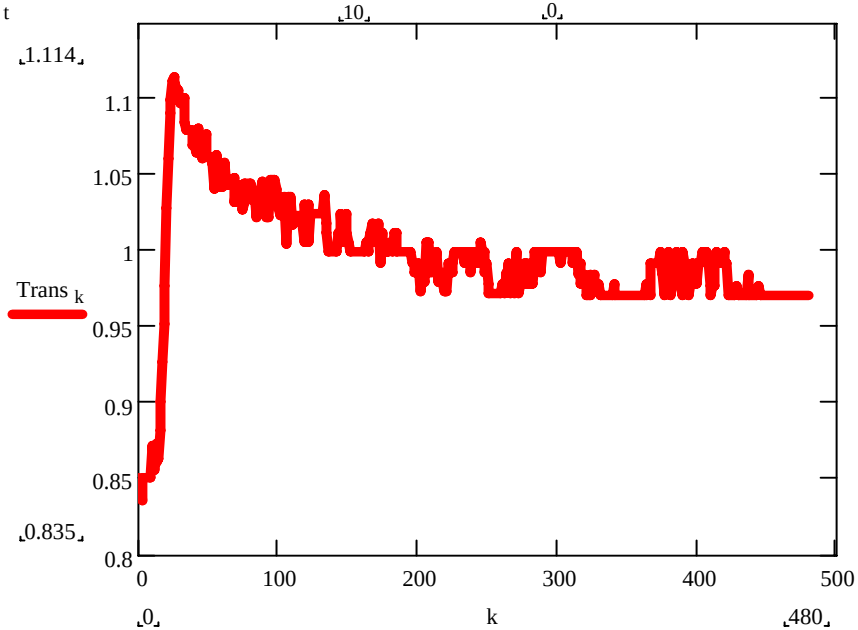

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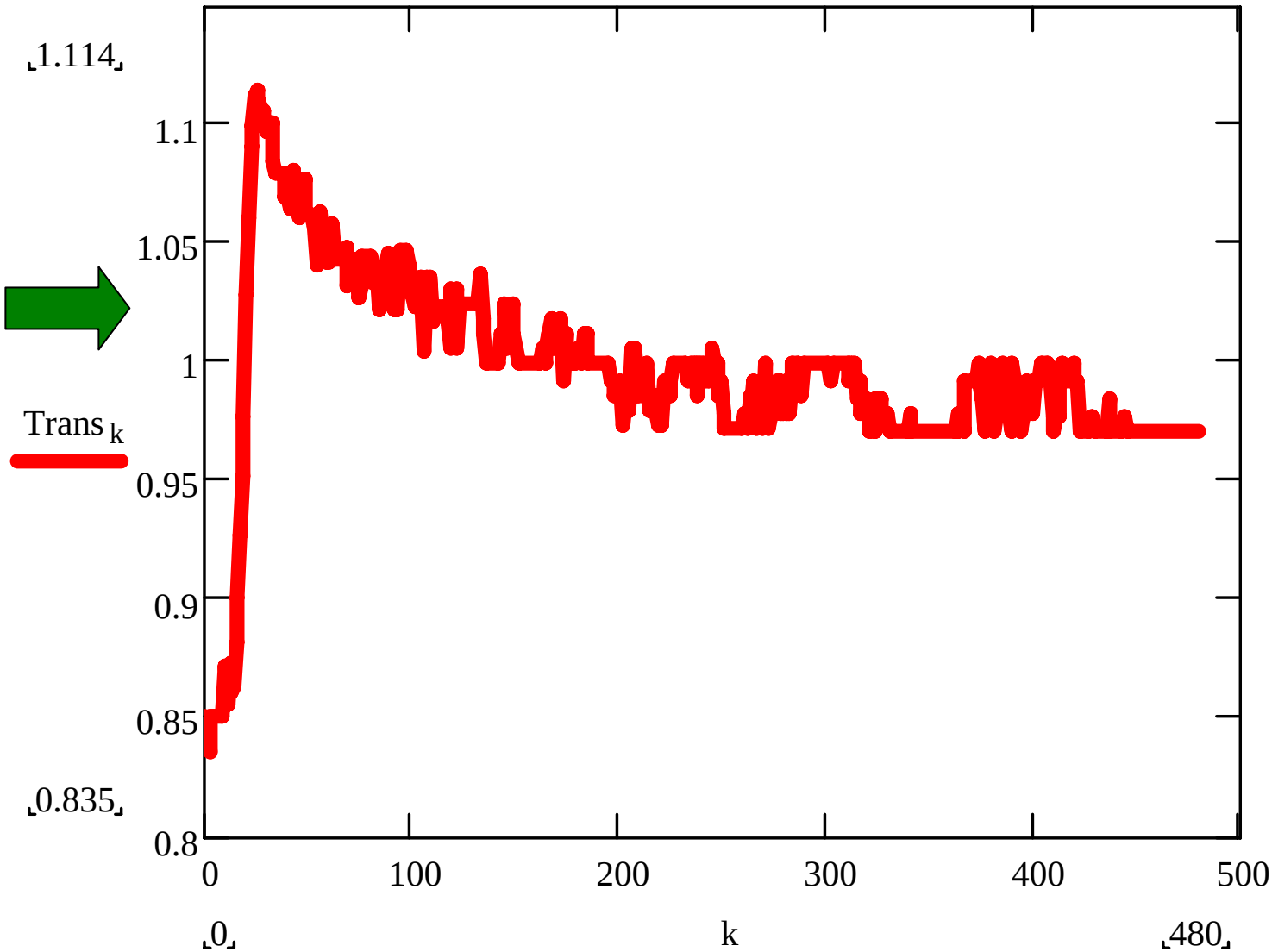
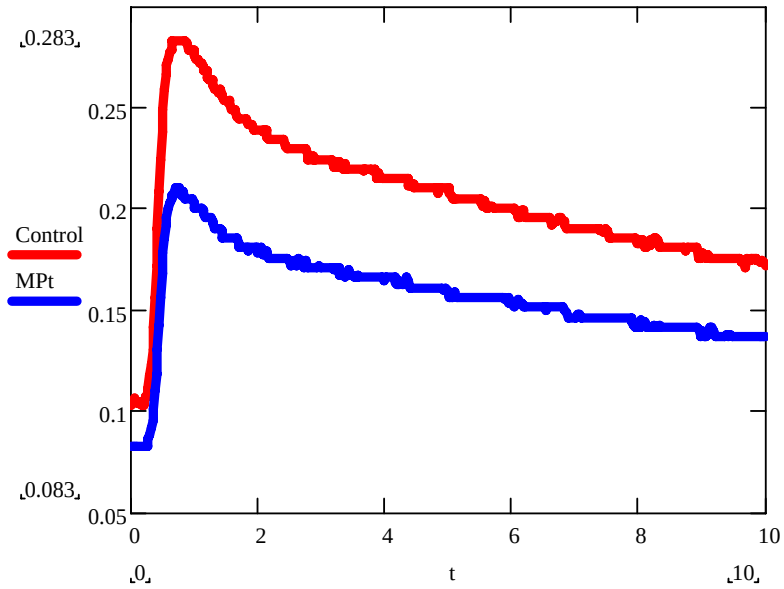
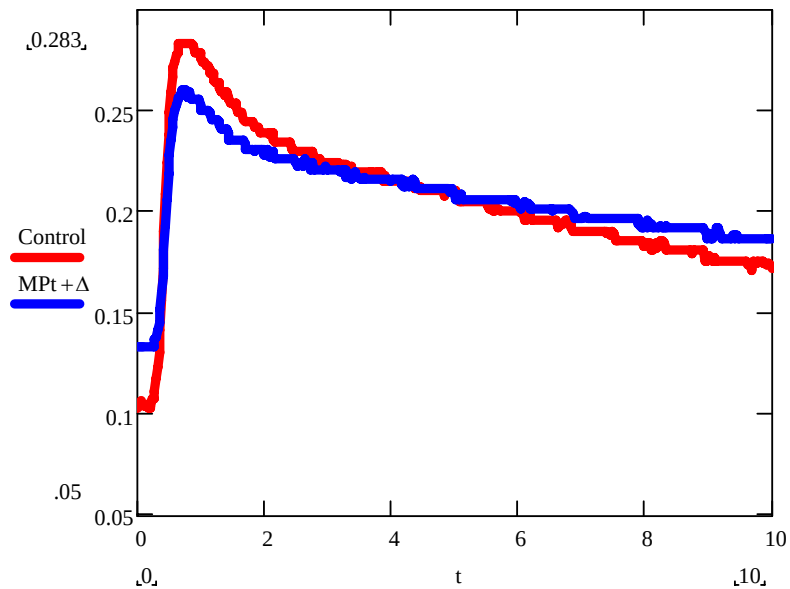


Methyl Parathion Data Analysis – 5 ppm





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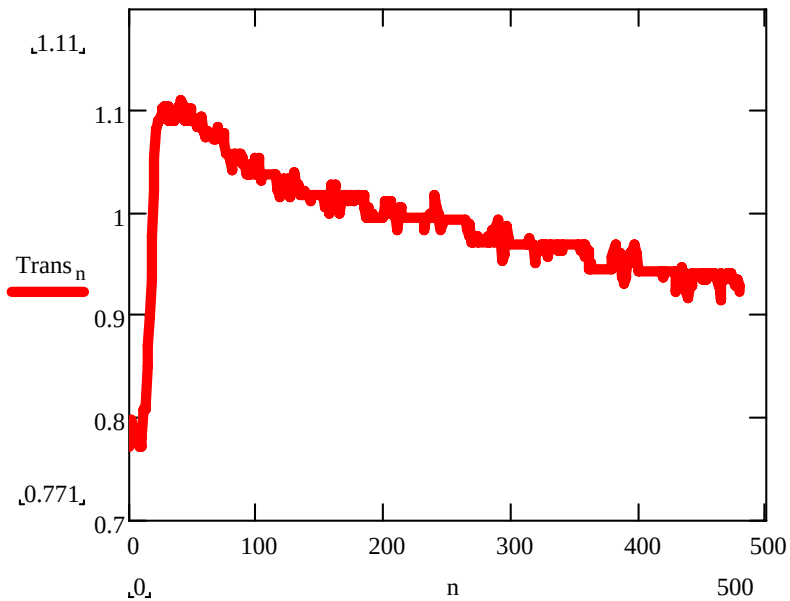

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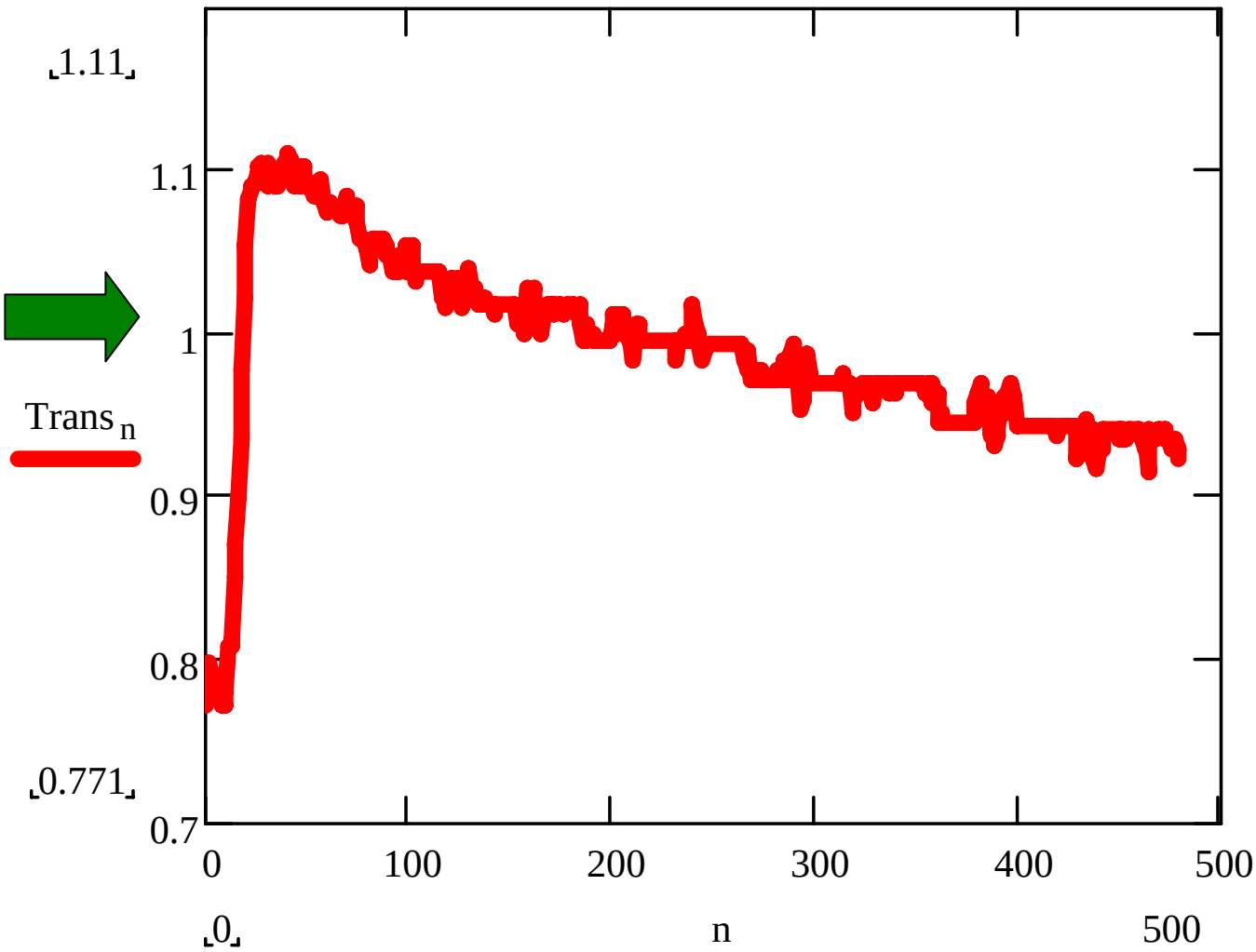
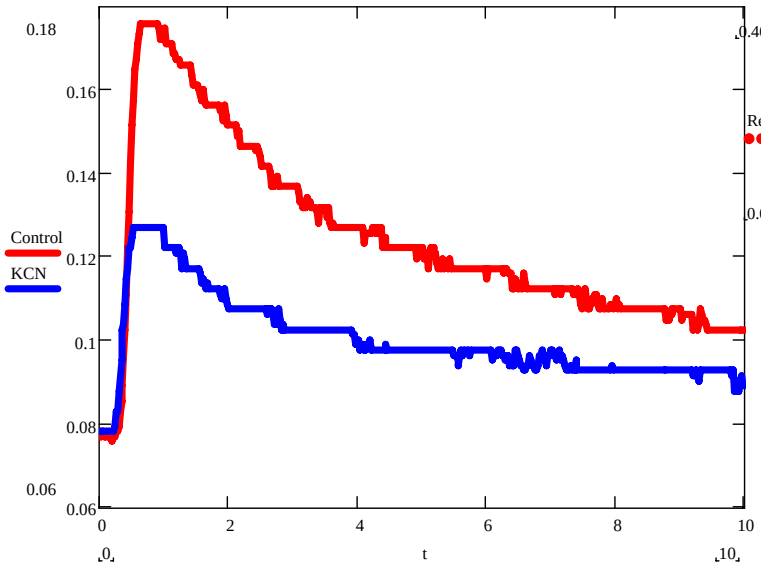
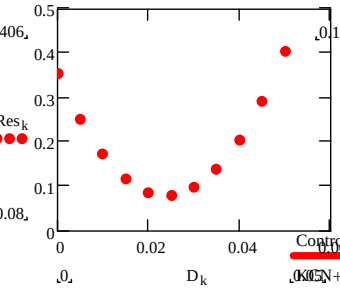
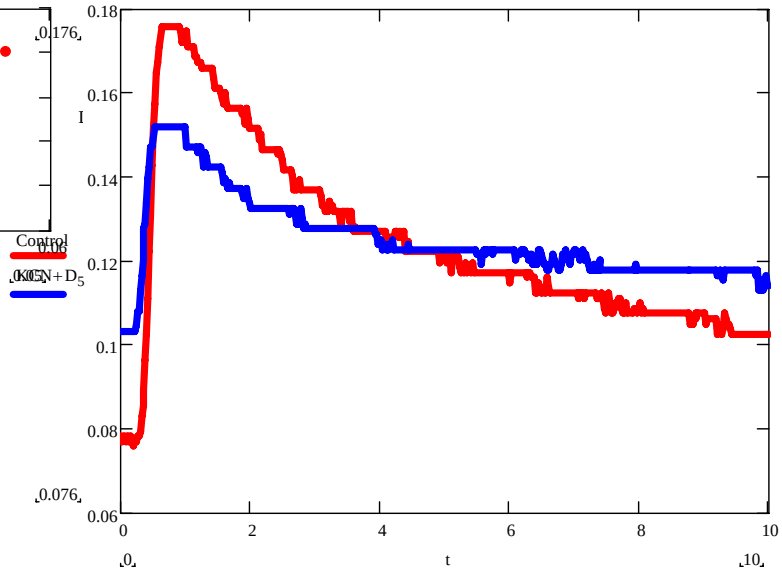


KCN Data Analysis – 130 ppm







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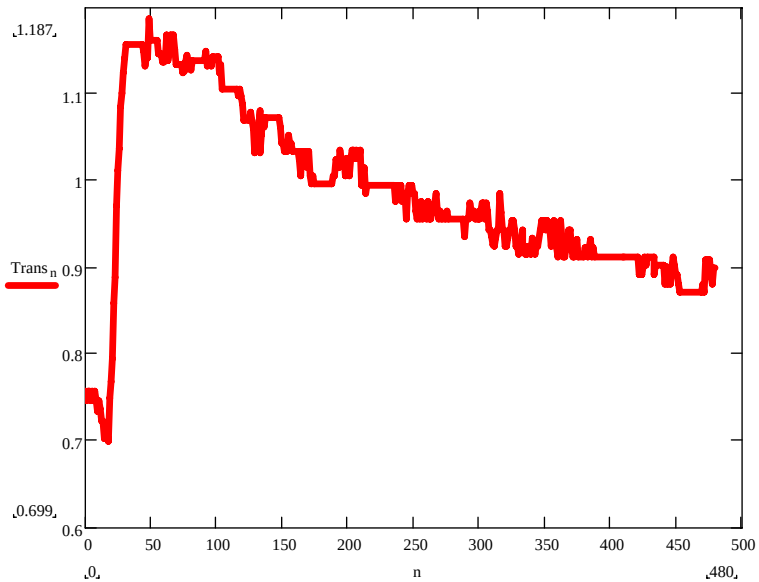

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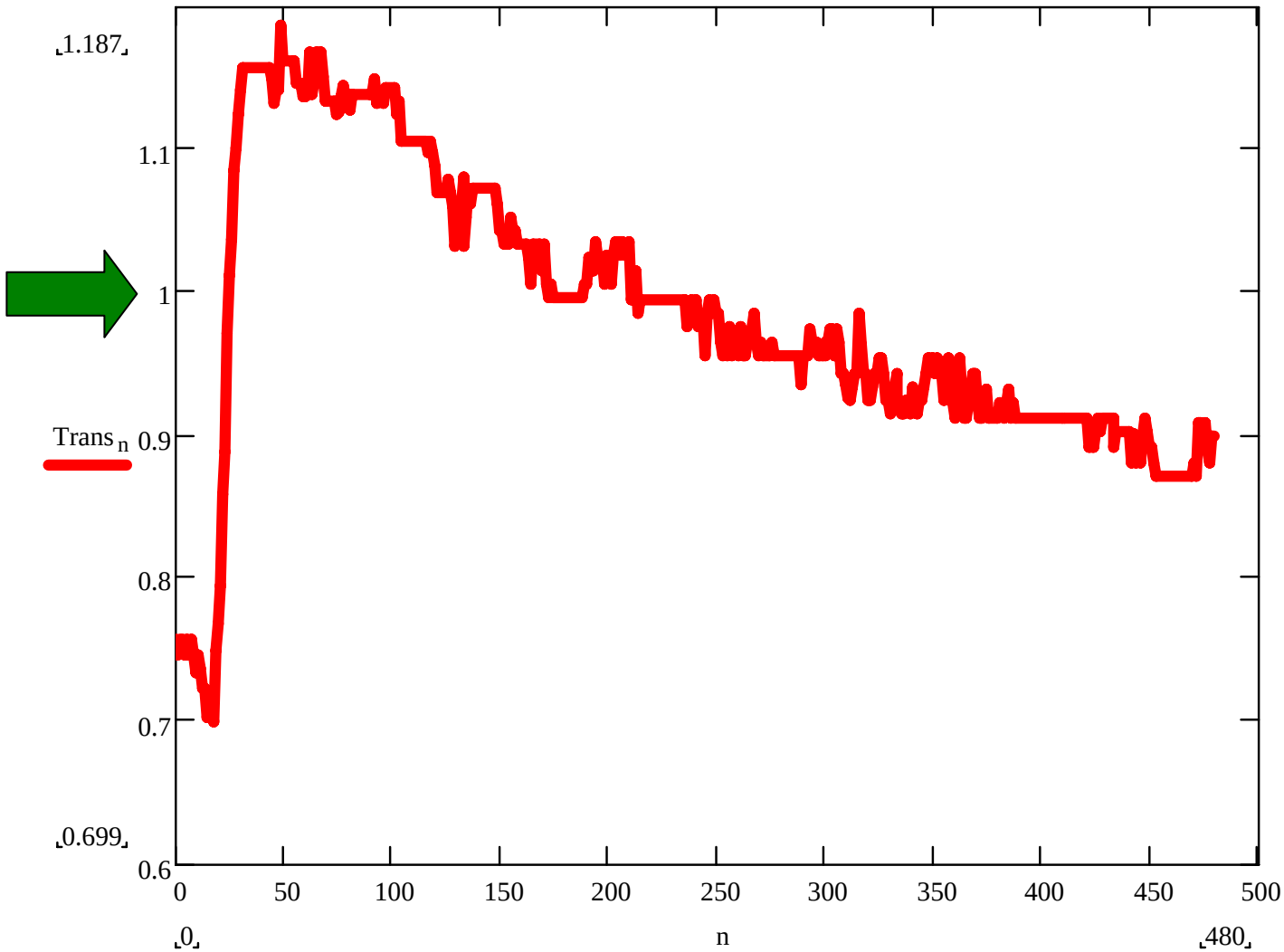
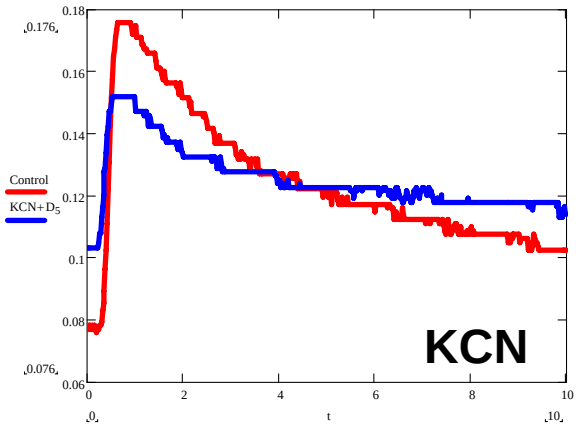
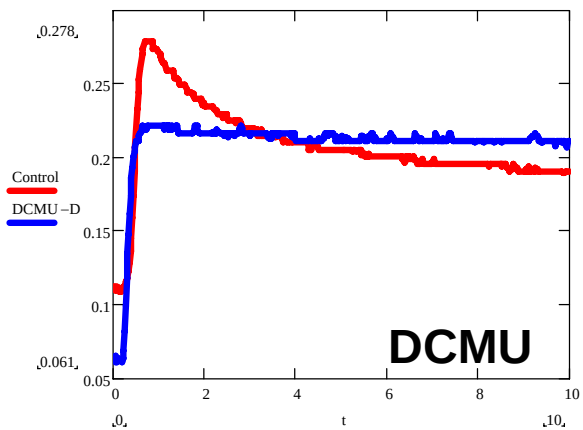
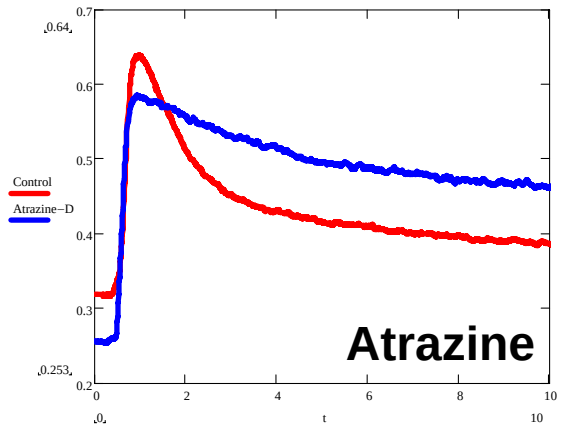
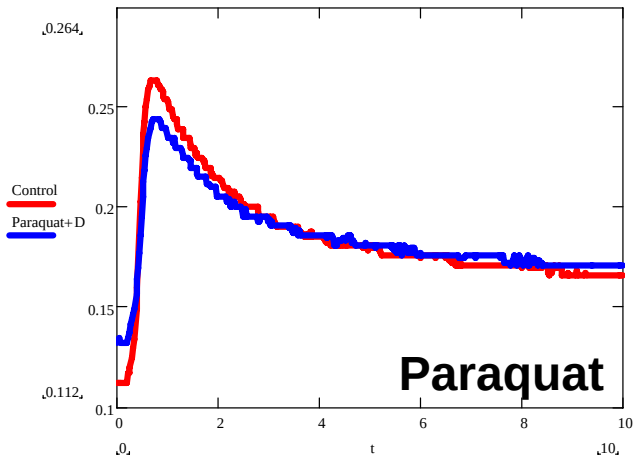


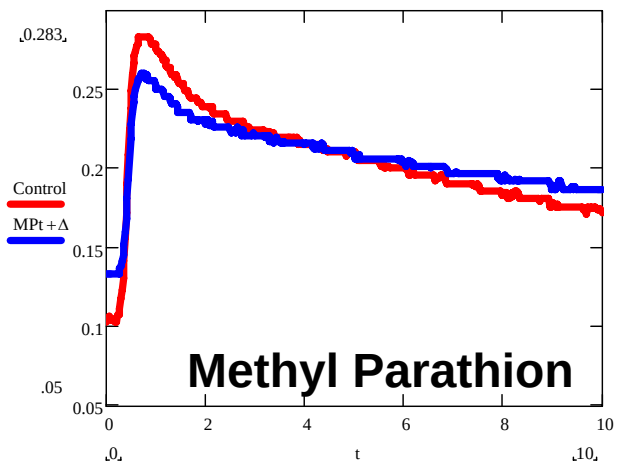
Summary of Toxin Data + Differential Offset Analysis



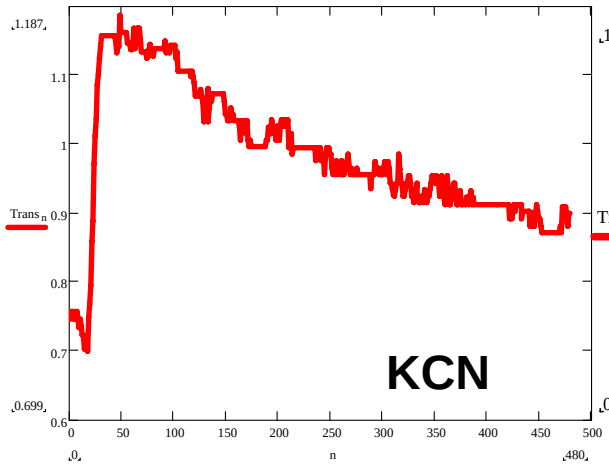


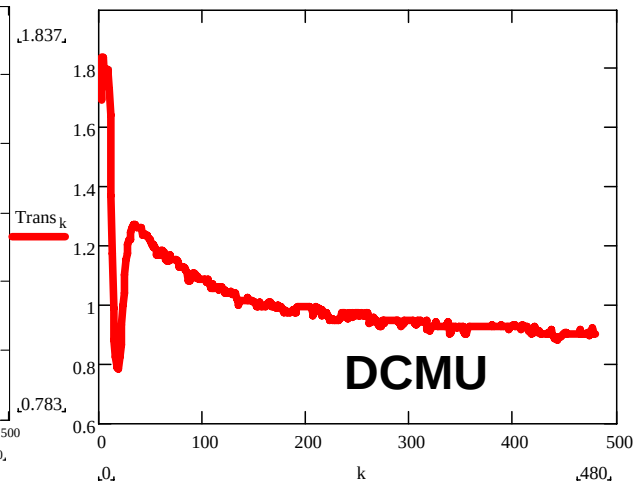


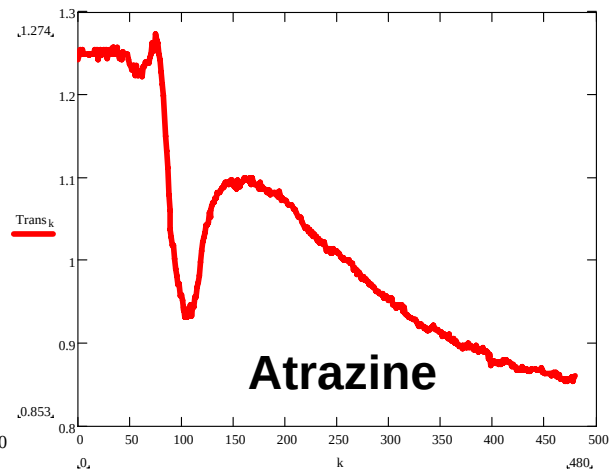


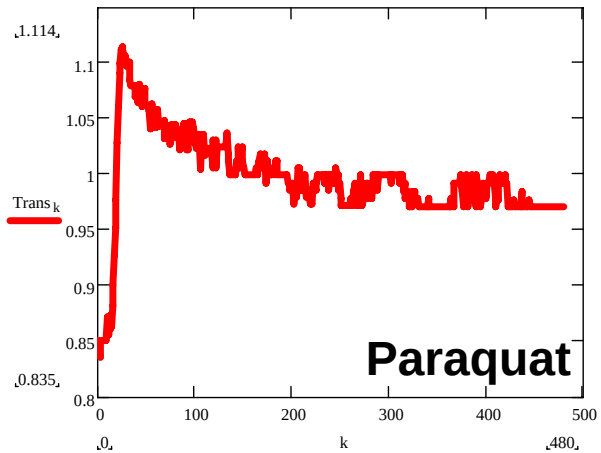


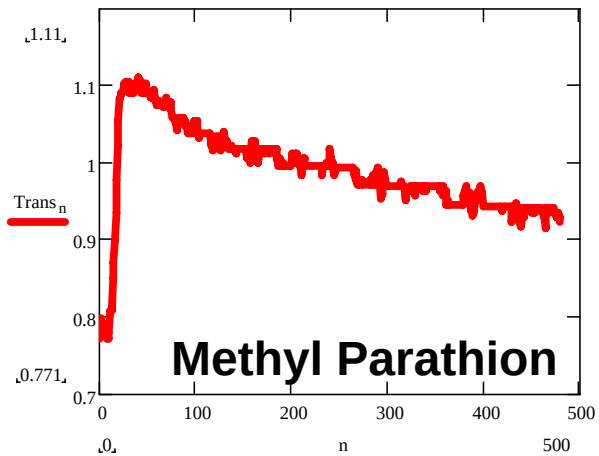
Summary of Toxin-Specific Transformation Data Sets





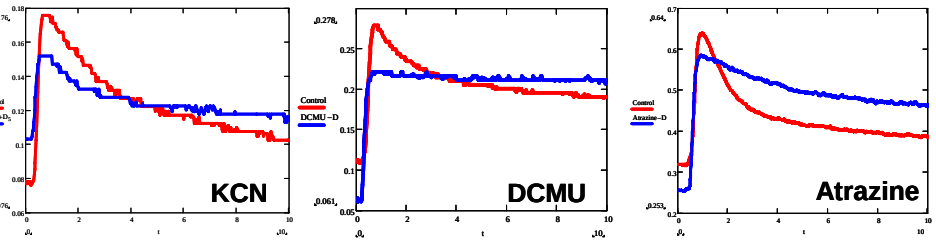


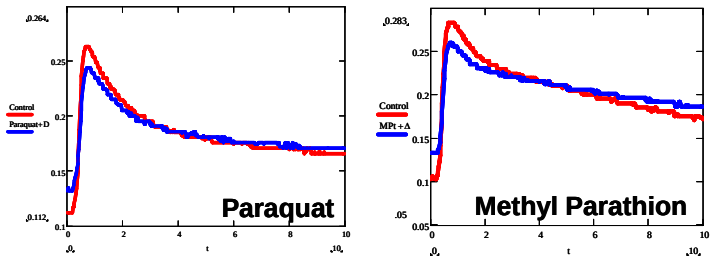




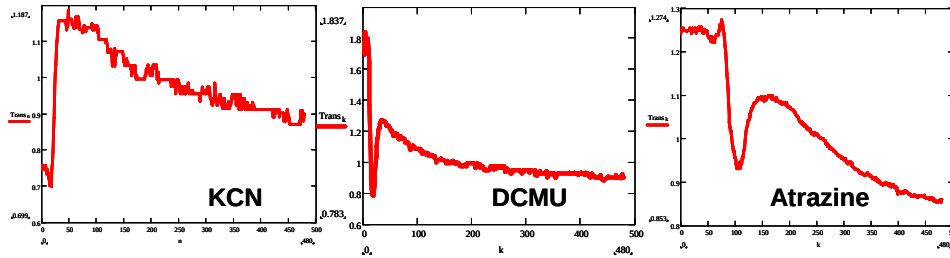
Basic Idea of AquaSentinel

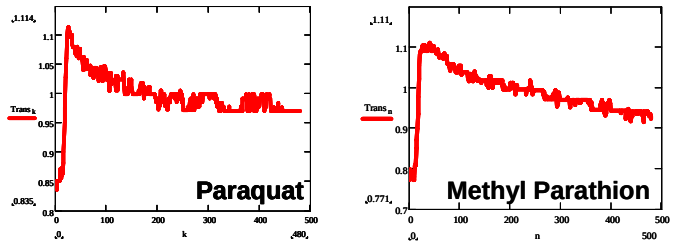
Effect on Fluorescence





Digital Signature – “Fingerprint”





Acknowledgements

Charlene A. Sanders
Miguel Rodriguez, Jr.

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