

# Technical Publication

Title: Project Summary: Nitrate Monitoring Demonstration Project and  
NOM Monitoring Experiments

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**ChemScan® UV-6100 Process Analyzer**

**Project Summary  
Nitrate Monitoring Demonstration Project  
and  
NOM Monitoring Experiments**

**at**

**Boyle Engineering  
Bakersfield, CA**

**Published by:**

**BIOTRONICS TECHNOLOGIES, INC.  
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## Project Objectives

Boyle Engineering is a consulting engineering firm with offices throughout the U.S., including Bakersfield, CA. A demonstration was conducted in an area adjacent to the Bakersfield offices during August and September, 1994.

The demonstration was organized using a 55 gallon drum fed with tap water and periodically spiked with a known amount of sodium nitrate to produce changes in nitrate concentration in the drum. A ChemScan UV-6100 was calibrated for on-line nitrate analysis and periodically pumped a sample from the drum to the UV-6100 system for analysis.

Scientists at Boyle Engineering controlled chemical additions and dilutions in the drum, with actual nitrate concentration estimated from drum volume calculations. The primary objective was to verify the ability of the ChemScan system to track variations in nitrate concentration.

## On-Line Nitrate Results

An internal data log was used to record nitrate analysis values automatically detected by the system at 20 minute intervals. Results from the data log are shown in Figure 1. These results compare favorably to a log of drum concentration changes maintained by Boyle Engineering. This log shows the following:

August 15-24	Steady Concentration
August 25	Tap Water Recharge
August 31	Tap Water Recharge
September 1	Nitrate Spike Added
September 1-2	Slow Dilution with Tap Water
September 2-6	Steady Concentration
September 6	Tap Water Recharge

## Other Results

The Boyle Engineering location was also used to gather information in an attempt to construct an on-line calibration for Natural Organic Material (NOM). Samples with known concentrations of various organic acids plus nitrate were prepared and scanned by the UV-6100 system to record absorbance signatures from 200 nm to 450 nm. Organic standards included tannic acid, humic acid, acetic acid, methacrylic acid and combinations of these acids. Concentrations were based on their equivalent TOC values. Files of these sample spectra were collected and used to perform computer analysis of numerous potential calibrations for on-line organics analysis. These same files were used at Boyle to construct a nitrate calibration that was relatively independent of any changes in organic concentrations.

Figure 2 shows the absorbance spectra for equal concentrations of tannic acid and humic acid, based on their equivalent TOC values.

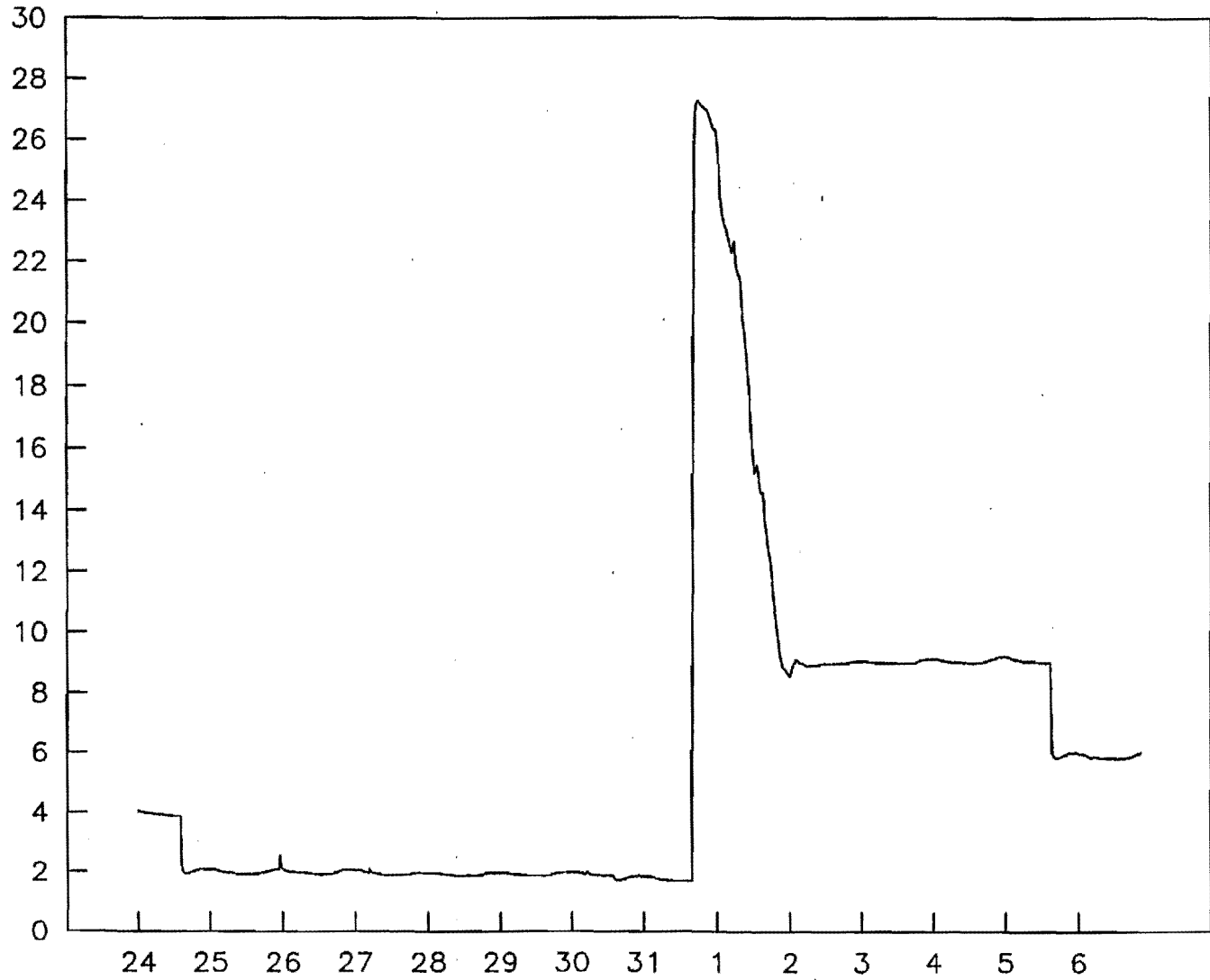
Data gathered at the Boyle Engineering site was instrumental in the eventual construction of a successful on-line NOM calibration demonstrated at another site.

# Boyle Engineering, Bakersfield CA

On-Line Demonstration, Aug-Sep 1994

N-NO<sub>3</sub>-N  
ppm, NO<sub>3</sub>-N  
Figure 1

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Nitrate in High Salt Irrigation Runoff

FILE 1: BE0STB.CST  
FILE 2: BE0SHB.CST  
FILE 3: BE0SMXB.CST  
FILE 4: LIDI03A.CST  
FILE 5: LIDI04A.CST

FILE 6:  
FILE 7:  
FILE 8:  
FILE 9:  
FILE 10:

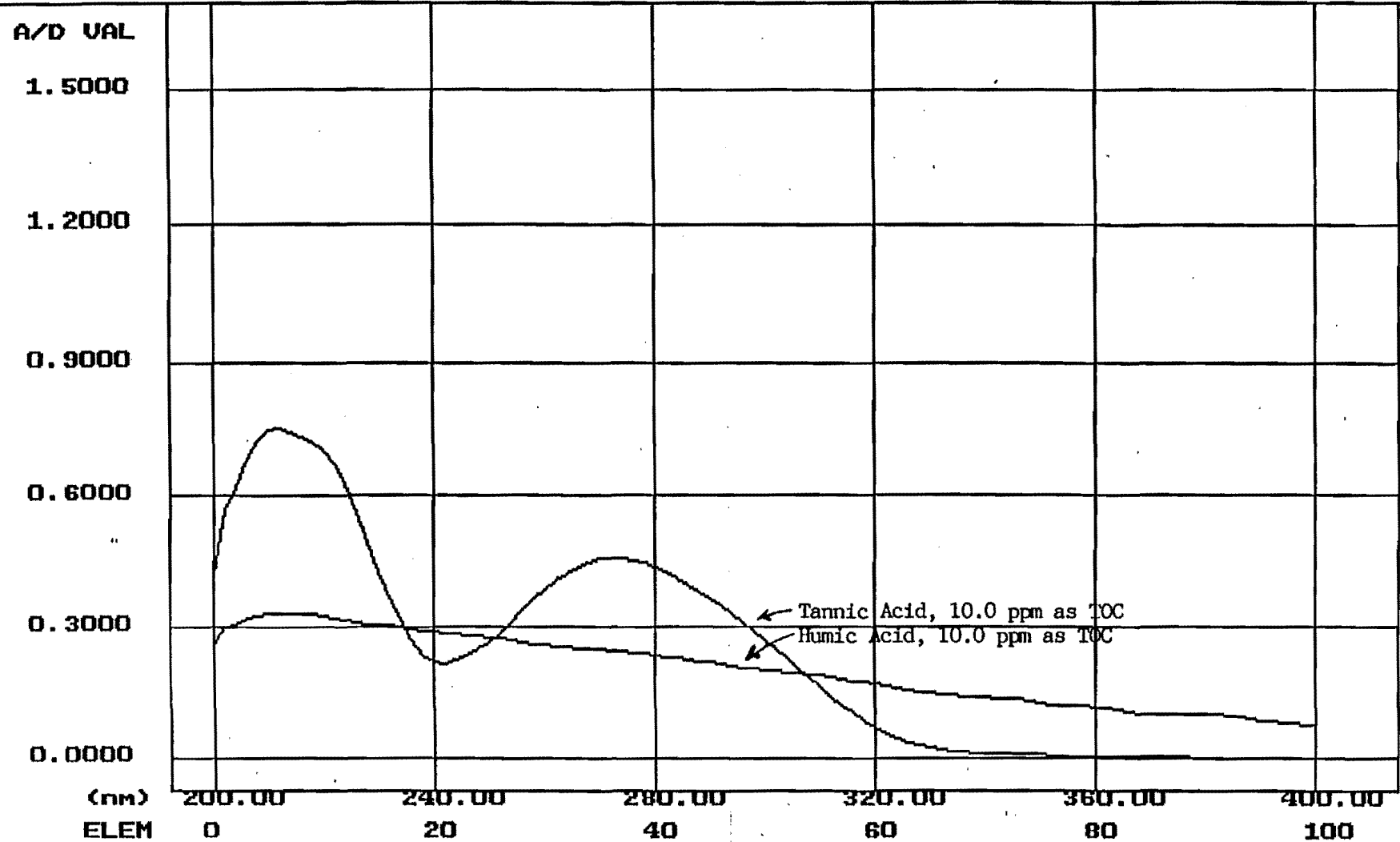


Figure 2