

ChemScan® UV-6100 Process Analyzer

PROJECT REPORT AND DATA SUMMARY MULTIPLE PARAMETER PROCESS SAMPLE MONITORING DEMONSTRATION REPORT

City of Orlando, FL
Water Conserv II
Water Reclamation Facility

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ChemScan Continuous On-Line Process Chemistry Analyzer Demonstration Project, City of Orlando, Florida, Water Conserv II, Water Reclamation Facility

Applied Spectrometry Associates, (ASA) is demonstrating its ChemScan 6100 on-line continuous process chemistry analyzer and ultrafilter suspended solids removal system at the City of Orlando's Water Conserv II, Water Reclamation Facility, from January 15 through approximately February 28, 1997. The ChemScan analyzer is monitoring nitrate, nitrite and ammonia at a single sample point directly in the activated sludge, immediately prior to discharge to the secondary clarifier. Sample mixed liquor is being provided to the ChemScan analyzer system by a 4 inch Penn Valley Double Disc pump. The purpose is to prove the benefits of using ChemScan to provide real-time process chemistry data for optimizing biological nutrient removal processes.

The City of Orlando's Water Conserv II, Water Reclamation Facility treats a mix of domestic and industrial wastewater with approximately 10% of the volume, 70% of the loading being industrial and 90% of the volume and 30% of the loading being domestic. It has a design flow of 25 MGD and an operational flow of approximately 15 MGD. Designed to operate as a conventional activated sludge facility, it is now being operated in a biological nutrient removal mode utilizing two stages.

The first stage is an anoxic zone where the return activated sludge (RAS) is contacted with the influent wastewater. The anoxic conditions serve to cause denitrification of nitrate in the RAS utilizing the influent wastewater as the carbon source. The anoxic environment also results in the development of a fermentation condition where phosphorus is released from the first stage mixed liquor suspended solids.

The second stage is aerobic and it provides additional carbonaceous biological oxygen demand removal, nitrification, nitrate uptake by the biomass resulting in partial denitrification and luxury phosphorus uptake. The Conserv II process can result in significant reductions in influent ammonia, nitrate and phosphorus when controlled properly. Typical influent levels are: ammonia 18 - 22 ppm, total phosphorus 8 - 10 ppm and undetectable nitrate. Typical effluent levels are: ammonia 0.1 - 0.5 ppm, nitrate 6 - 8 ppm and phosphate 0.4 - 1.0 ppm.

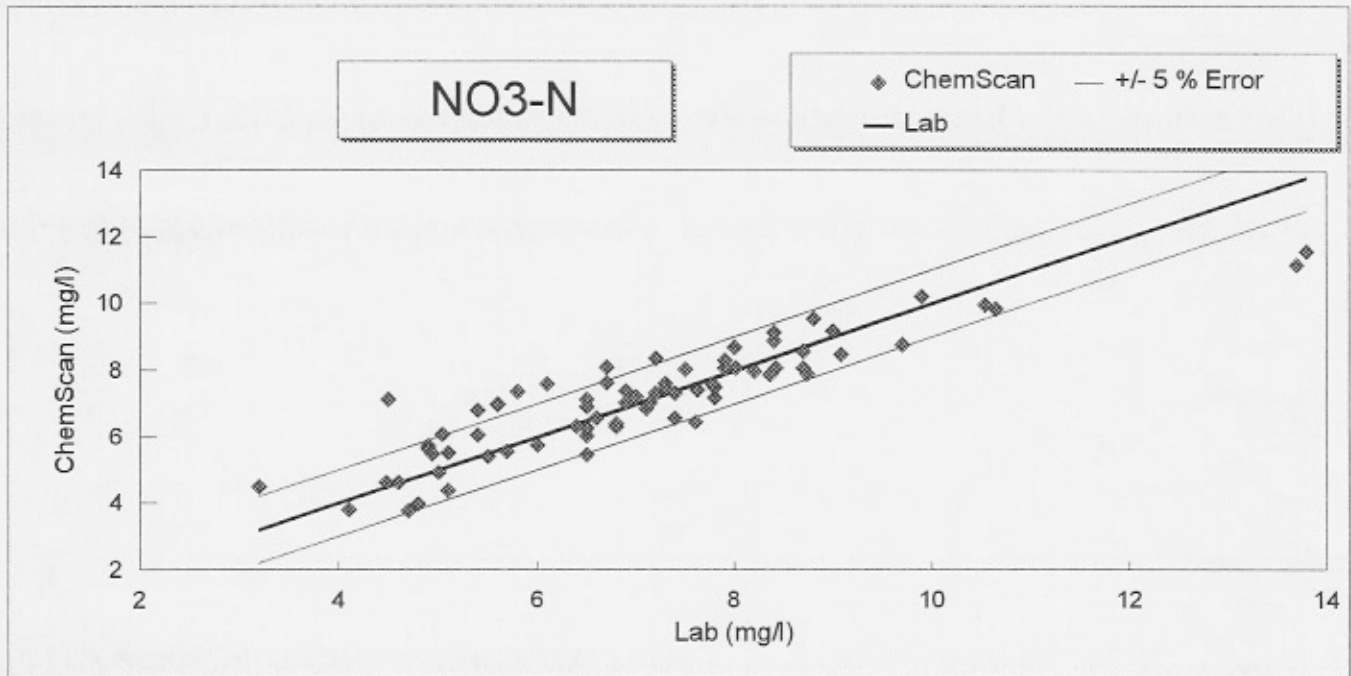
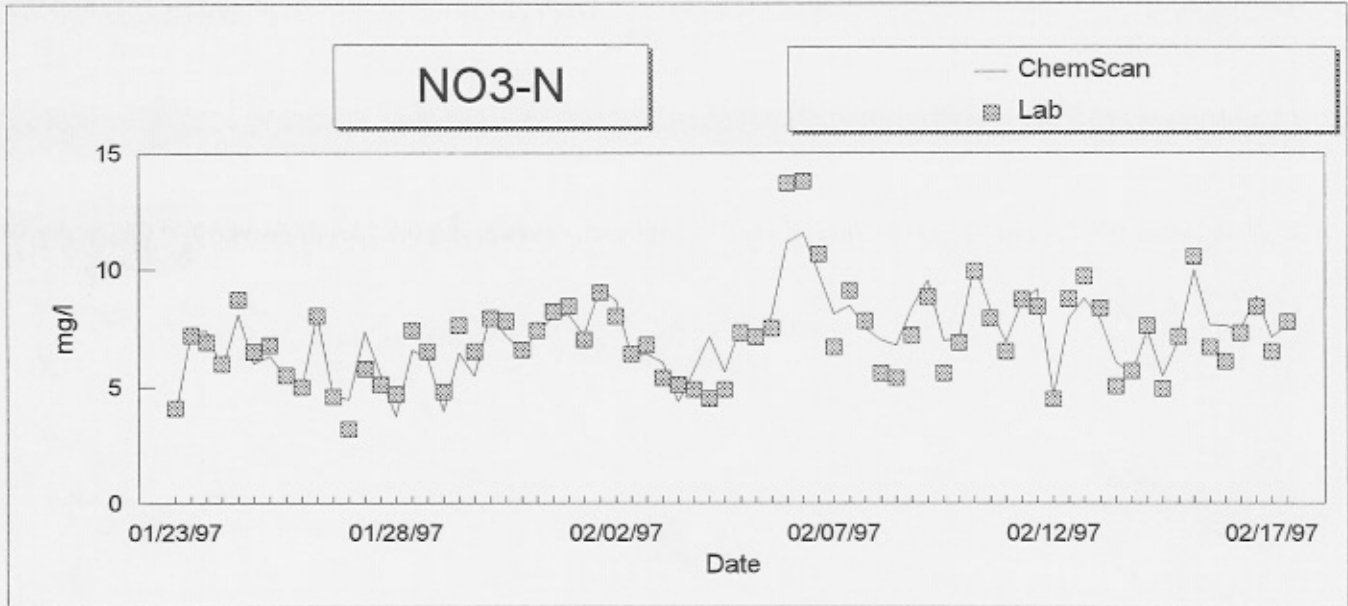
Controlling the individual processes is difficult without real-time process chemistry data. The intent is to optimize the nitrification and denitrification processes by controlling aeration utilizing real-time ammonia and nitrate data.

ChemScan Analyzer Evaluation

City of Orlando

1/23/97-2/17/97

NO₃-N Average Absolute Error 3.2%

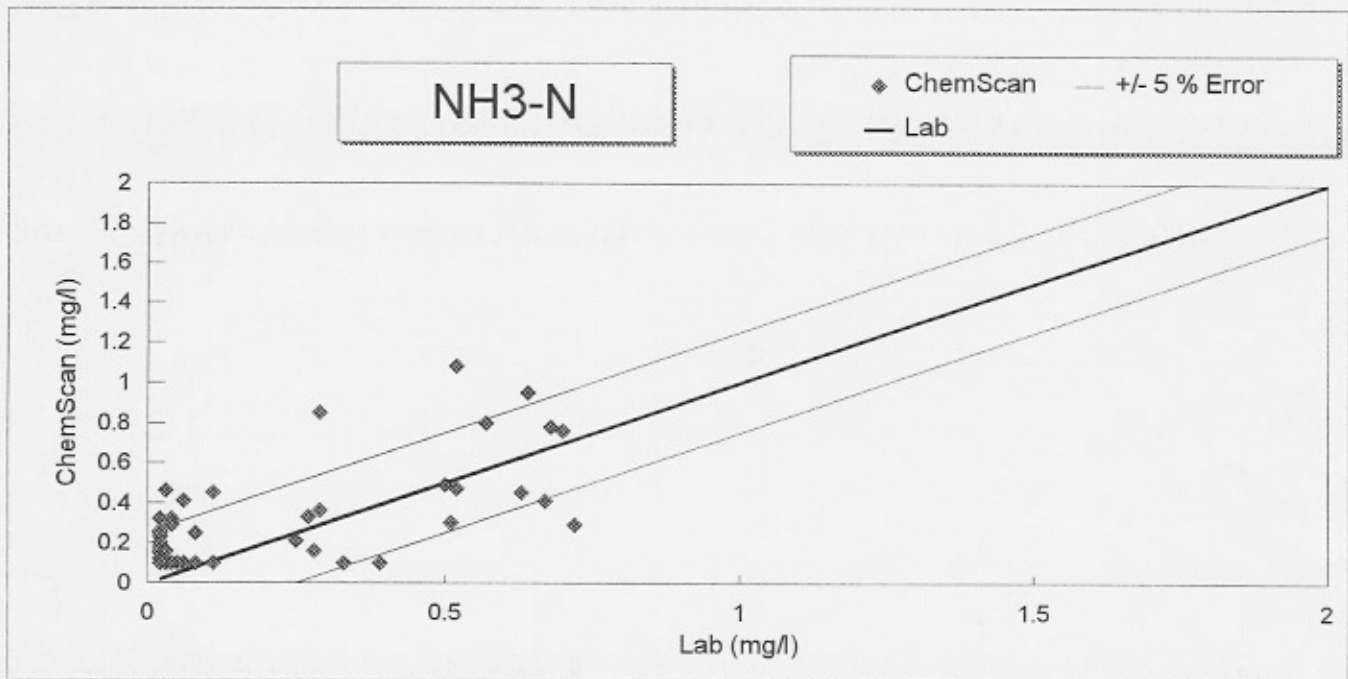
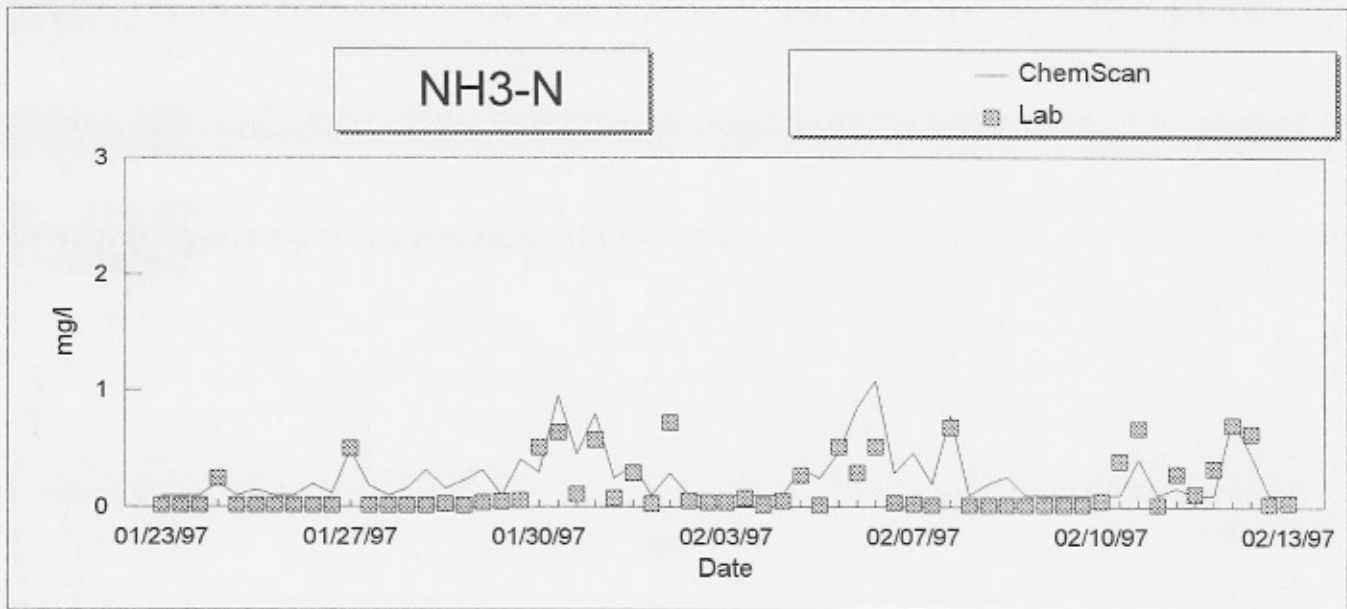


ChemScan Analyzer Evaluation

City of Orlando

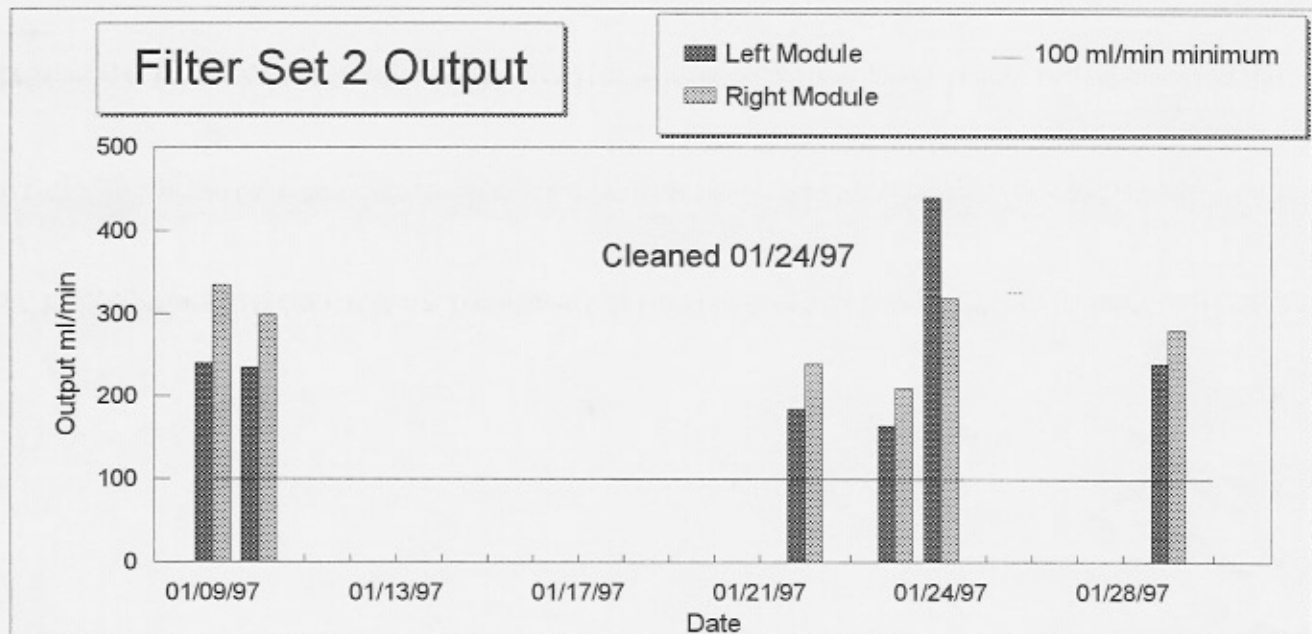
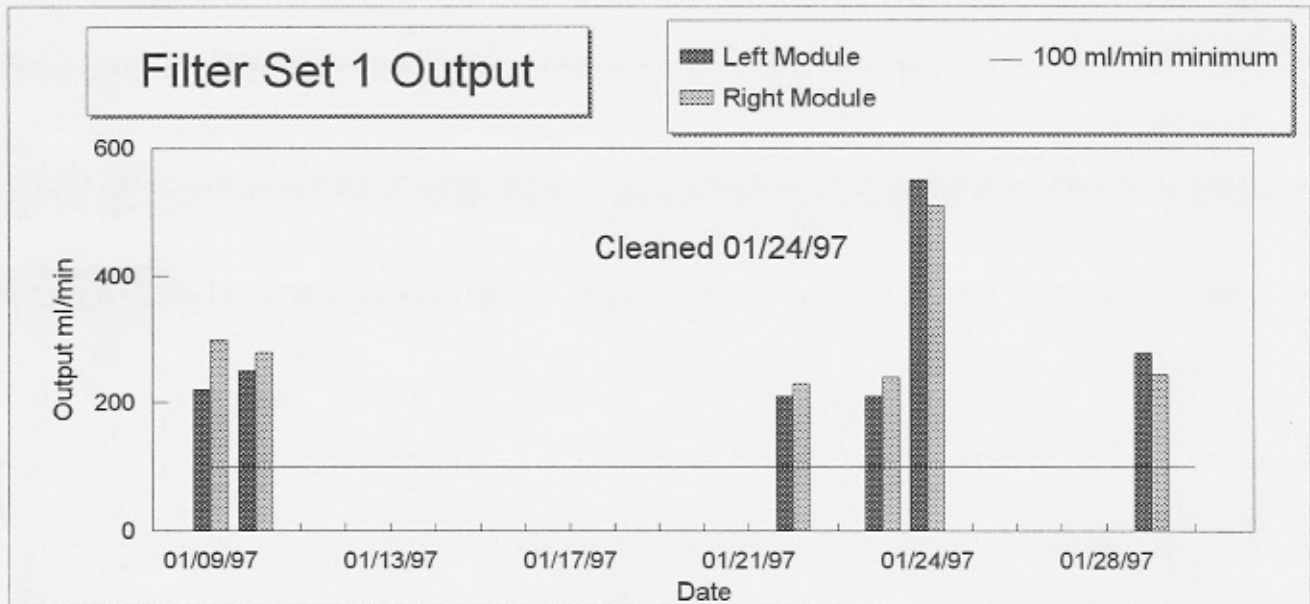
1/23/97-2/14/97

NH3-N Average Absolute Error 3.1%



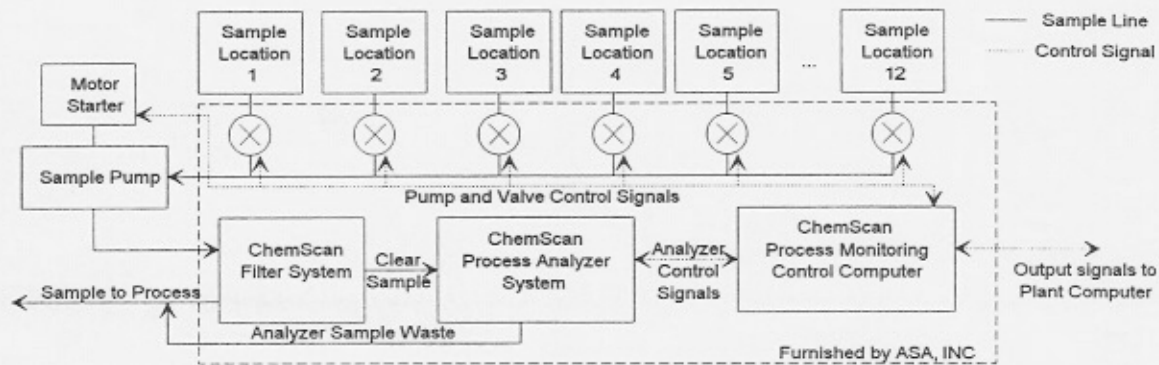
ChemScan Filter Output Data

City of Orlando



ChemScan[®] BNR Process Monitoring System

ChemScan has developed a Biological Nutrient Removal Monitoring System which provides a turn-key solution for measuring multiple parameters from multiple sample locations with high solids concentrations. At the heart of the system is the Process Monitoring System Control Computer. The system controller choreographs the operation of the sample ball valves, sample pump, sample filter and ChemScan Analyzer System and interfaces directly to the plant computer. The analyzer can be configured to measure a number of parameters including: nitrate, nitrite, ammonia, phosphate and organics.

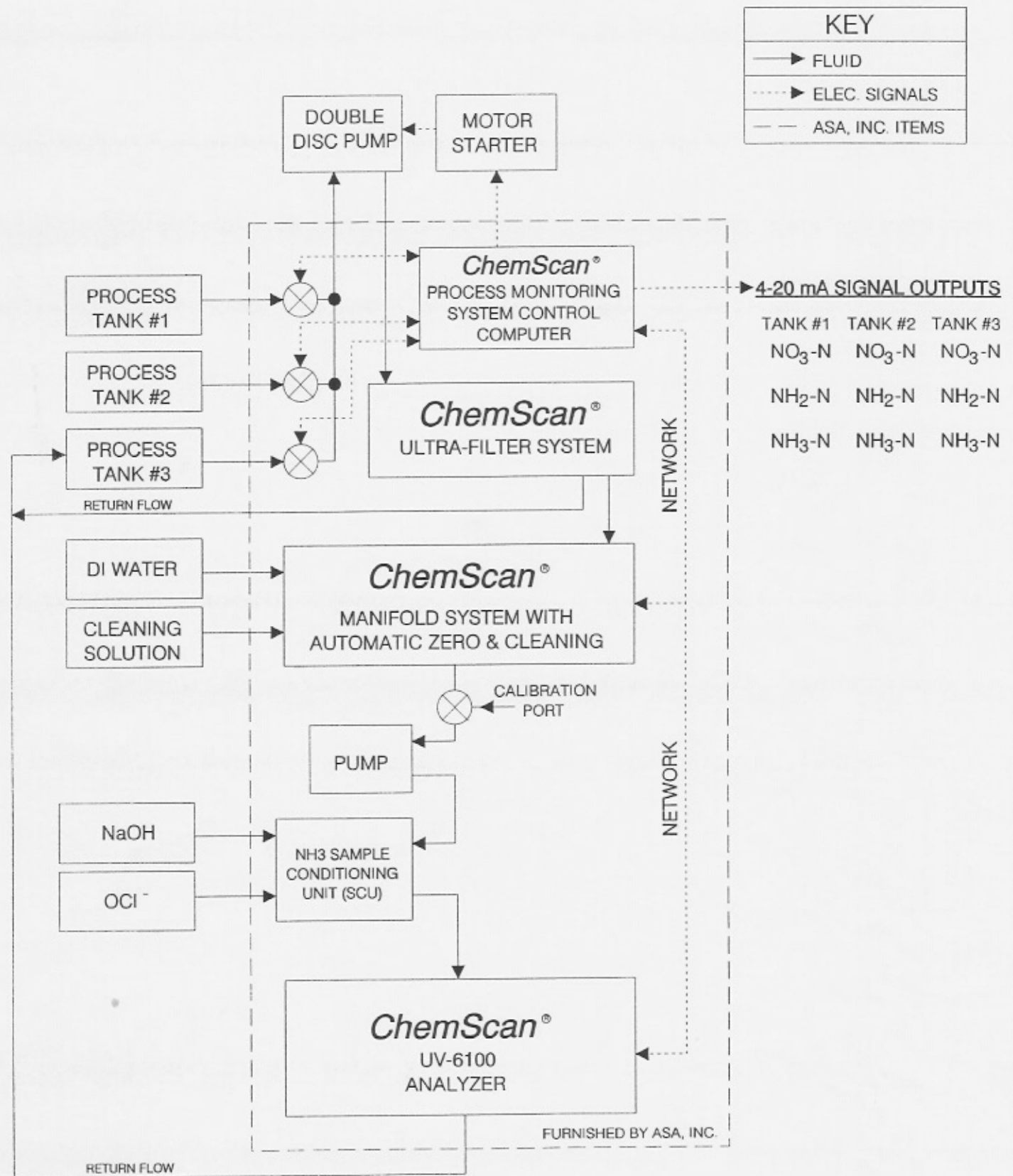


The complete measurement time for each sample point is as follows:

Parameters	Total Reading Time Per Sample Location (minutes)
Nitrate, nitrite and organics	5
Nitrate, nitrite, ammonia and organics	10
Nitrate, nitrite, ammonia, phosphate and organics	15

Sequence of Operation:

- 1) The controller opens sample location 1 valve.
- 2) The sample is flushed through the filter system until a fresh sample is flowing through the filters.
- 3) The controller initiates the analyzer analysis.
- 4) The analyzer notifies the controller when it has finished using the sample and the controller begins flushing sample from sample location 2.
- 5) The analyzer notifies the controller when the analysis has finished and the concentration values are communicated to the controller.
- 6) The controller communicates the concentrations to the plant computer and initiates the analysis of the second sample location.
- 7) The sequence continues for all the sample locations.
- 8) Following the last sample location, the sequence begins at the first location again.



ChemScan[®]
 Functional Block Diagram Process Monitoring System
 City of Orlando, FL
 Water Conserve II AWT Facility
 Proposal # 970206
 February 26, 1997

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F# PP970206
D# M3S1+CT
REV: 970221

ChemScan Analyzer Evaluation

City of Orlando

1/23/97-2/17/97

NO₂-N Average Absolute Error 3.5%

