

Intelligent Data Collection, Monitoring and Reporting – for Plant Operations

Wayne Ramey, Ramey Environmental Compliance, Inc. (REC, Inc.)

The Problem

Data collection, monitoring and reporting of water and/or wastewater treatment facilities is one of the most time consuming and oftentimes mistake riddle aspects of a plant operator's day. Proper data collection and tracking of process control testing and equipment maintenance is essential to a smooth operation and compliance with water quality regulations. Additionally, there are always financial pressures to REDUCE COSTS and INCREASE EFFICIENCIES in plant operations.

REC, Inc. operates and maintains many water and wastewater facilities that require an enormous amount of staff time documenting, monitoring, maintaining and reporting to validate compliance to regulatory authorities and to ensure that all equipment was properly and expeditiously maintained. It was imperative for us to remain competitive and provide value to our clients to come up with a computerize method to improve all aspects of data collection and reporting. Our plan and goals were simple. The goals were to reduce or eliminate errors in field data collection, eliminate duplicate effort in hand recording of information and then entering the data into a computerized database, validate that data is correct even if it is collected by an inexperienced operator, and to make sure that no tasks or samples were omitted for each facility. The system that was selected was "FlexSystems" FlexOps PDA Hand Held Barcode Scanners and Operator 10® Water, Wastewater Data Management and Antero® Preventative Maintenance Software packages.

The key points of this project were targeted below:

- Paper based field data collection is prone to errors
- Requires re-entry thus doubling the work effort
- Data validation is limited to the experience of the person writing the report
- Control of Chain of Custody issues with sample collection during site visits
- Validation of sample data for the automatic generation of Discharge Monitoring Reports (DMR's), Turbidity and Chlorine reports to CDPHE
-

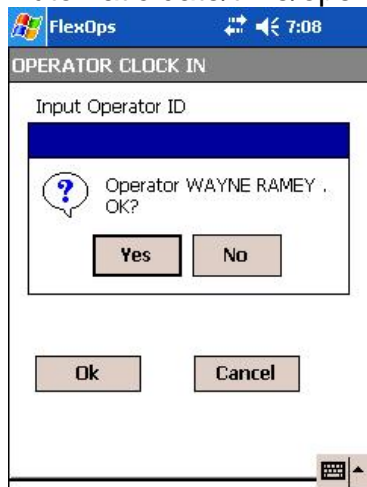
Is it possible to automate this process with technologies currently available?

Goals and Objectives of Project

Ramey Environmental Compliance, Inc. was looking for a seamless, easy to use field based handheld solution which was capable of covering the broad range of aspects all within a single PDA based system.

- Laboratory sample tracking
- Tracking and confirmation of multi scan locations via barcode

- Data input based upon route and location
- Intelligent data validation
- Ability based upon data input to guide operator through specific steps based upon the initial input.
- Provide the following inputs:
 - YES/NO
 - Numeric
 - Numeric with high/low validation
 - Alpha
 - Multiple Choice
 - Multiple Select
- Automatic date/time/operator stamp per transaction



- Increase efficiency and reduce errors
- Paperless operation with single step data entry and data validation at point of capture
- Upon completion of a “Round” the operator could download data for transfer to multiple systems, I.e. Operator 10® Water, Wastewater Operations and Antero® Preventative Maintenance Software packages
- Paperless Plant Data Collection



The Solution

In June 2006 a proposal was accepted for a system which provided many of the necessary components required by each of the facilities. Implementation was split into 2 phases:

- Phase 1
 - Set up Customer database
 - Compile scan locations for selected pilot installation sites
 - Define Standard Operating Procedure for each scan location based on Client requirements.
 - Convert SOP procedures into form based questions based on question type
 - Yes/No
 - Multiple Choice
 - Alphanumeric input
 - Alphanumeric input with High/Low validation
 - Define logic control tree based upon the above inputs for data validation and activity control
 - Run internal tests
 - Implement field tests and check results

- Phase 2

- Training of operators
- Integration into Operator 10
- Field testing
- System rollout

The Result

Paperless data collection - All plant data that was previously recorded manually is now captured electronically. Due to the flexibility of the system configuration and setup Ramey Environmental Compliance, Inc. can configure unique routes and data collection inputs based upon the unique need of each of our customers. The PDA system also covers many areas previously recorded but not always reviewed unless a problem arose. Examples are listed below.

- Flow readings
- Blanket depths
- Temperatures
- Grit screen status
- Vehicle condition
- Pump status
- Valve status
- Vehicle problems/solutions
- Past problems and their solutions

The implementation of the PDA based system has effectively provided:

- Automatic chain of custody
- Automatic validation of sample bottle and tracking
- Elimination of transcription errors
- Increased efficiency by eliminating paper based documentation
- Customized in-plant condition/incident recording
- Productivity increase due to prompt data availability
- Easy troubleshooting of problems by field personnel
- Elimination of scheduled sample collection requirements

The Future

Due to the inherent design of the software, implementation of other data collection applications is a natural progression and includes Fats, Oil & Grease inspections, industrial pretreatment inspections, valve exercising, manhole inspections and Fire Hydrant flushing among many others.