Wireless Record Keeping – Field Applications

Appeared in Pit and Quarry, February 2002

Prepared by:
Arron Heinerikson • Principal Consultant

Trinity Consultants
12770 Merit Drive
Suite 900
Dallas, TX 75251
trinityconsultants.com
(972) 661-8100

June 26, 2001
In today’s regulated world, facilities face numerous compliance demonstration requirements. From testing for visible emissions to monitoring control device parameters, environmental managers must gather and store a great deal of compliance-related information. Documentation of various operational parameters can be required daily, weekly, monthly, quarterly, or annually. Consolidating this information can also be a time-consuming problem. Recent developments in wireless record keeping devices such as hand-held personal data assistants (PDAs) are providing new solutions. Newer PDAs have improved speed, memory, and graphics capabilities as well as more flexibility for customization. Customized PDAs can store and generate maintenance or compliance data collection worksheets or checklists that include logic structures that guide the user through the route that requires minimal labor. These PDAs can enable field personnel to gather information in an electronic format while reducing opportunities for transcription errors and allowing for more efficient processing and utilization of the data. This paper will present two scenarios illustrating how facilities can fulfill regulatory requirements by utilizing PDA-type wireless record keeping devices.

**Example Applications**

This paper focuses on the use of mainstream PDAs that can be used to display photographs, complete checklists, and perform numerous other functions. These types of wireless devices are more affordable and user friendly than their commercial counterparts and generally cost substantially less. Following are two examples of how PDAs can be utilized in the workplace.

**Example 1. Visible Emissions Monitoring**

Most air pollution related environmental regulations applicable to the various types of coal and stone processing industries include visible emissions standards such as New Source Performance Standards (NSPS) Subparts Y (Coal Preparation Plants), OOO (Nonmetallic mineral processing plants, and F (portland cement plants) as well as National Emissions Standards for Hazardous Air Pollutants (NESHAPs) for the portland cement industry, Subpart LLL. These regulations often require initial visible emissions testing as well as ongoing visible emissions monitoring and periodic reporting. Title V permits require many facilities to perform visible emissions testing on a monthly,
weekly, or even daily basis. A facility may be required to perform testing on multiple pieces of equipment using different test methods and test durations on the same day. Gathering and tracking this information is often only one of the many functions that an environmental manager is required to perform.

The most common reference methods for visible emissions testing are 40 CFR 60, Appendix A, Reference Methods 9 and 22. Both of these methods require that the recording of parameters specific to the emission source be tested and the environmental conditions during the testing. Table 1 provides a listing, as an example, of the types of parameters to be collected for these common test methods.

Table 1. Method 9 and Method 22 data collection requirements

<table>
<thead>
<tr>
<th></th>
<th>Method 9</th>
<th>Method 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Name</td>
<td>Company Name</td>
<td>Industry</td>
</tr>
<tr>
<td>Emission Location</td>
<td></td>
<td>Process Unit</td>
</tr>
<tr>
<td>Facility Type</td>
<td></td>
<td>Observer’s Name</td>
</tr>
<tr>
<td>Observer’s Name</td>
<td></td>
<td>Date of Observation</td>
</tr>
<tr>
<td>Date and Time of Observation</td>
<td></td>
<td>Wind Direction</td>
</tr>
<tr>
<td>Distance to the Emission Location</td>
<td></td>
<td>Wind Speed</td>
</tr>
<tr>
<td>Wind Direction</td>
<td></td>
<td>Wind Speed</td>
</tr>
<tr>
<td>Wind Speed</td>
<td></td>
<td>Sky Condition</td>
</tr>
<tr>
<td>Sky Conditions and Color</td>
<td></td>
<td>Sketch of the unit being observed</td>
</tr>
<tr>
<td>Plume Background Color</td>
<td></td>
<td>Indicated position of observer relative to the sun</td>
</tr>
<tr>
<td>Sketch of the unit being observed</td>
<td></td>
<td>If the source is indoors, indicate the type of light and the illumination level.</td>
</tr>
<tr>
<td>Indicated position of observer relative to the sun</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Provide the user with a detailed list of visible emissions fields required by all types observations (i.e., wind speed, sky color, etc.)
• Allow the facility to decide which pieces of equipment to test during a user’s shift and automatically guide the user to record the required test parameters
• Track test results to determine if further actions are required by the facility
• Store test information used to create multiple summary reports for assisting managers with compliance management and regulatory reporting

The VEMS program was developed to run on PDAs that prompt the user to collect the information required by these test methods. Further, the information collected for multiple tests can be stored on the PDA and later electronically transferred to a plant data management system for record keeping purposes. The information can then be used to create internal compliance reports, write reports that may be required by a facility’s permit, or provide information requested by a regulatory agency.

Example 2. Recording Equipment Parameters

Some industries track emissions by keeping records of equipment parameters. Permits for these industries require facilities to record and monitor equipment parameters to maintain compliance with specific regulations. For example, a facility may be required to record the pressure drop across a baghouse during each shift for which the controlled source operates. Many facilities are required to record the pressure drop to demonstrate that the device is operating in compliance with applicable emission limits. Individual facilities can have multiple pieces of equipment and multiple parameters that must be recorded during each shift, day, week, or month. Making sure that each parameter for a piece of equipment has been documented for the specific reporting period is a daunting task for an already-overburdened environmental staff.

In Scenario 2, a wireless device can be used to solve the same time consuming task described in Scenario 1. The device can be designed to prompt the environmental coordinator to document the required parameters for each piece of regulated equipment. However, with parameters that must be recorded for multiple shifts, an environmental manager may not be available to perform the documentation tasks. Since the device can be designed to prompt the
user to record all required parameters, another individual can documentation the parameters during shifts when environmental staff is unavailable.

Another issue arises when a different individual performs the documentation tasks for each shift. A connection must be established to the designated computer in order to download the documented parameters. Depending upon the arrangement of the facility, all individuals may not have access to the environmental coordinator and the record-keeping computer. With wireless technology, this issue can easily be solved. Depending upon the funding available, increasingly convenient solutions are available, such as:

- Installing a wireless device docking station in an accessible location from which the documented information can be downloaded to the designated computer
- Attaching a modem to a docking station and transmitting the documented information to the designated computer through a phone system
- Using a wireless modem that can be embedded or attached to the wireless device in order to transmit the documented information to the designated computer through a phone system
- Utilizing a wireless device that has an integrated radio frequency transmitter designed to send the information to another transmitter that is attached to the designated computer

Any of these solutions could be used to solve the accessibility problem created by utilizing different individuals to complete documentation tasks. The solutions entailing the use of modems or radio frequencies could also be employed to solve problems with remote facilities that do not have on-site environmental personnel. Companies that have an environmental staff located at a single office can transmit the documented information directly to an independent computer from multiple facilities.

**Is a Wireless System Right for You?**

Using a wireless device to save time and document data poses both advantages and disadvantages. Some of these are provided below:

**Advantages**
A wireless device . . .
• Can replace paper versions of data collection worksheets, reducing information storage space
• Is often pocketsize, freeing up hands for climbing ladders, carrying maintenance equipment, etc. relative to a clipboard with paper
• Can collect information in an electronic format and transfer it to plant data management systems, eliminating transcription time and errors
• Reduces human error by instructing the user with logic structure based informational questions
• Provides a more appealing visual format for reports

Disadvantages
A wireless device . . .
• Has additional development and equipment costs relative to a paper system
• May require more effort to make revisions to data collection worksheets than forms prepared via a word processor
• Holds the possibility of equipment (PDA) failure during use, leading to lost or duplicative efforts
• Requires a minimal amount of additional training in the use and care of the PDA
• Can be intimidating to plant personnel with no previous computer/electronic experience

CONCLUSIONS

To keep up with ever-changing and increasing regulatory requirements, companies must find and apply new technologies to assist with the associated data collection and storage tasks. A PDA can assist industry by automating the record keeping process, allowing for more flexibility in the personnel capable of collecting the data, as well as increasing confidence in the quality of the data collected.