i-STEPS DEVELOPMENT FOR STATE AND LOCAL AGENCIES

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ASBSTRACT

Over 20 State and local agencies use *i*-STEPS® to manage their point source emission inventory information. These agencies can also use *i*-STEPS to export this information to EPA via the NEI transport. However, most agencies need a system that performs more functions than the NEI transfer. Several States use the emission inventory information to analyze health risks and point sources of concern for specific pollutants such as ammonia and HAPs. The Nashville, Tennessee agency logs calls from the public to evaluate facility operations for potential emission violations. Other States such as Delaware and Kansas require a web-based system that allows emission data to be transferred between the State agency and regional offices or individual facilities within the State for data analysis and quality assurance. Many agencies are interested in having a system that manages multiple State recordkeeping and reporting requirements in addition to submitting data to EPA.

This paper will discuss how agencies that own *i*-STEPS are working with Pacific Environmental Services, Inc. (PES) to develop a software package that fits their needs. The paper will give examples of how this development provides applied, new, proof-of-concept technologies for air emissions estimation and meets the data management challenges such as data standards and EI system integration.

INTRODUCTION

i-STEPS was developed by PES as a tool for reporting point source emission data. Since the software was turned into an off-the-shelf package 10 years ago, PES has modified the system to meet other needs of *i*-STEPS customers. In recent years, the focus of development has been formatting the software so that it is compatible with EPA's National Emission Inventory (NEI) format. As a result of this capability, several State and local agencies have purchased the software for their required data transfer. This ownership has resulted in additional software modifications that have enhanced their *i*-STEPS programs. This paper outlines some of these developments and how future reporting requirements from EPA are being addressed by State and local agencies with the assistance of *i*-STEPS and PES.

BODY

i-STEPS is a 32-bit, object oriented, multithreaded Microsoft® Windows® software application developed by PES to manage air emissions and permit data for regulatory agencies as well as entities that produce emissions of air pollutants. *i*-STEPS manages emissions data from all types of point, area, mobile, and biogenic sources; chemical attributes of process and emitted compounds; and MSDS information on substances used/stored. *i*-STEPS calculates air emissions via AP-42 or site-specific factors and allows users to develop their own equations for calculating emissions. AP-42 emissions factors are kept up to date in *i*-STEPS through imports from the EPA's Factor Information Retrieval (FIRE) database system; the latest version of FIRE was developed for EPA by PES. *i*-STEPS maintains data on a temporal basis for time critical reports, produces an audit trail of data modifications, and provides end-user configuration capabilities. *i*-STEPS provides user level security and is available in client/server and file/server versions.

In addition to allowing the user to develop emissions inventories easily, *i*-STEPS is unique in that it allows for the simple development of emissions inventories at the source, electronic transmittal of

this data to the agency database, manipulation and analysis at the agency, and finally, transmittal to EPA in the NEI format. This holistic treatment of emissions inventory data is the single biggest reason it is so popular with agency personnel.

i-STEPS is in use at over 20 different regulatory agencies around the country including: Arkansas, Arizona, Delaware, Hawaii, Idaho, Indiana, Kansas, Kentucky, Maine, Mississippi, North Carolina, New Hampshire, Puerto Rico, South Carolina, South Dakota, West Virginia, Wyoming, Philadelphia, Allegheny County in Pennsylvania, and Nashville. Most of the agencies use *i*-STEPS primarily for air emission inventory data collection. The Arizona Department of Air Quality (ADAQ) is a prime example. PES implemented an *i*-STEPS emissions inventory database for ADAQ. The State uses the system as its method to calculate, manage, and report emissions inventory data including urban and rural areas as well as tribal lands.

To maintain current and accurate data in their database, ADAQ uses a Windows-based "Satellite" version of *i*-STEPS that can be distributed to facilities containing data specific for each facility. The Satellite software is a reduced-functionality emissions-only version of the full implementation of *i*-STEPS. The functionality reduction of the Satellite version is in the amount of utilities and data management areas that are provided, not in the data validations or data management capabilities. ADAQ distributes Satellite *i*-STEPS to regulated facilities. The individual facility can load the software, modify the data, and electronically submit the data to ADAQ, eliminating the need for a manual forms data collection from all facilities. Data that are submitted to ADAQ using the Satellite *i*-STEPS software are loaded into a quality assurance database, the Headquarters Satellite, and "compare" software algorithms are run against the Satellite data and the master data, delineating the differences between what was sent to the facility and what the facility returned to ADAQ. If the changes made by the facility are not deemed acceptable, ADAQ can choose to have the facility update and resubmit the data, or ADAQ can make the changes using the Headquarters Satellite interface (a fully functional Satellite version that can communicate with the master database). Once data are deemed acceptable, *i*-STEPS provides a Promote utility that can "move" the Satellite data into the master database. *i*-STEPS, therefore, has the ability to compile a complete inventory from satellite locations.

Upon updating of the database satisfactorily, ADAQ reports their data annually to EPA using *i*-STEPS convenient export capabilities. *i*-STEPS produces EPA NEI and Compliance Management Systems (CMS) transaction files so that regulatory agencies can submit data to EPA to maintain grant commitments. *i*-STEPS also includes batch data validations that can be applied to the database. If a facility's data contains errors, the errors are written to a text file. Once the data are corrected, then NEI and other transactions can be generated. The export interface allows the user tremendous flexibility in selecting what data to produce in the export data set.

Development for State and Local Agencies

i-STEPS is flexible to meet changing regulatory requirements. Through the *i*-STEPS' interface, a user can customize their database by adding fields, turning fields off, and upgrading user help messages. However, sometimes State and local agencies have situations that demand modifications that are beyond the typical customization that *i*-STEPS off the shelf provides. In these cases, PES has worked with the agencies to meet their growing needs. Over the 10 years of *i*-STEPS existence, PES has made several modifications and upgrades to *i*-STEPS to satisfy customers' needs. Some of these modifications and upgrades that PES has developed for specific agencies are described below.

<u>Delaware Department of Natural Resources, Division Air Quality</u>

Since 1993, the Delaware Department of Natural Resources, Division Air Quality (DAQ), has been a leading partner with PES in producing innovative *i*-STEPS functionalities to produce a more flexible product. Chief among these efforts is the development of *i*-STEPS Terminal Server, a version

of *i*-STEPS that resides at the agency and can be used by remote users through a web browser interface. Since the users access a central database, *i*-STEPS Terminal Server eliminates the need for the State agency to produce and distribute data sets and software to regulated industries. Users simply update their data on-line and then DAQ reviews the data and, if satisfactory, promotes it into their main database.

PES created data conversion methods and programming to facilitate DAQ's use of both the ORACLE and the SQL Server database management systems as the data repository. PES has also added *i*-STEPS functionality that facilitates sharing of *i*-STEPS data with other DAQ systems. PES is currently engaged in producing programs to extract reporting data from the SQL Server database.

Indiana Department of Environmental Management

PES originally implemented an *i*-STEPS emissions inventory database for the State of Indiana Department of Environmental Management (IDEM) in 1993. The State uses the system as its method to calculate, manage, and report emissions inventory data. In the original installation, PES applied *i*-STEPS' import algorithms to populate the database from EPA compliance and emissions data. To keep their data current, IDEM distributes Satellite *i*-STEPS to the regulated industries and imports the resulting data sets into their database. *i*-STEPS is accordingly suitable for large data management needs; Indiana is a highly industrialized State including over 1,260 industrial sources. In order to collect this emission information from these industrial sources more efficiently, IDEM wanted to establish a website for downloading Satellite *i*-STEPS. PES worked with IDEM to establish this website and provided additional assistance to Satellite users during the initial collection period.

Kentucky Department for Environmental Protection

PES worked with the Kentucky Department for Environmental Protection (DEP) to convert *i*-STEPS from a file/server application into the client/server architecture. The client/server architecture allows multiple users to request data from a database residing on a network server whereas the server performs the data selection processing and only issues the data to the client (data requestor) that was requested. Under the client/server architecture, multiple concurrent users are able to retrieve data, keeping network traffic to a minimum. This helps to minimize the network transfer times that are the typical bottleneck of data retrieval from large databases.

The conversion from file/server to client/server involved providing a user interface and functionality as close to the current system as possible to minimize parallel tasks and project deviations. Since *i*-STEPS is a product used by many different types of clients with a wide range of needs, PES needed to preserve the functionality *i*-STEPS currently provided during the conversion process. The conversion was performed such that the implementation of the client/server platform had minimal affect on the end-users. Enhancements to *i*-STEPS were then performed once the conversion to client/server was completed.

Kansas Bureau of Air and Radiation

The Kansas Bureau of Air and Radiation (BAR) licensed *i*-STEPS to manage its emission inventory and compliance data. BAR elected to enhance *i*-STEPS for its estimated 40 simultaneous users by implementing permit tracking and fee logging to manage data for their planning, tracking and reporting functions. BAR also added functionality to *i*-STEPS to provide data management that met some of their more specific needs that *i*-STEPS did not meet at that time.

BAR opted to enhance *i*-STEPS with functionality that would enable them to manage data in a manner to perform mission critical business tasks. The list below identifies the enhancements that PES provided to BAR in the *i*-STEPS system based on their requests.

- Fee Log
- Operating Permits Log
- Construction Permits Log
- Permit and Inspection Forms
- Compliance Tracking

The Fee Log module (Fee/Payments) was based on BAR's fee log, which existed in Quattro Pro spreadsheet files. It was decided that *i*-STEPS should manage the data that are associated with each fee transaction. The Fee Type Log records the purpose of the fee for the facility. The Fee Payments Log records each transaction for a fee type, whether the transaction is a payment or a refund. The Fee Payments Log calculates the total amount transacted for a fee type and can determine if the fee has been underpaid, fully paid, or overpaid. The Fee Type Log maintains any credit amounts that can then be applied to the next year's fee (for emission statements only). There is a one-to-many relationship between the Facility General and the Fee Type Log and a one-to-many relationship between the Fee Type Log and the Fee Payment Log. The system handles multiple fees types for a facility and multiple payment/refund transactions for a fee type.

The Permit Processing module (which includes Operating Permits, Construction Permits, and Permit Information) was based on BAR's permit application logs, which also existed in Quattro Pro spreadsheet files. It was decided that *i*-STEPS should manage the data that are associated with tracking each permit application. The Permit Log records the type of permit and various review dates of a facility's permit application. The Permit Information Request Log records each request for additional information and other date-dependent activities in a permit's review cycle. There is a one-to-many relationship between the Facility General and the Permit Log and a one-to-many relationship between the Permit Logs and the Permit Information Request Log. The system handles construction and operating permit types for a facility and multiple information requests for a permit type.

BAR's compliance tracking issue was resolved by the development of the Compliance Information module. This module tracks air programs for a facility and the pollutants and actions (facility and group level) associated with these programs. The *i*-STEPS Facility Actions data area provides the capabilities to perform tracking of complaints, enforcement actions, inspections, performance testing, and reporting. Each of the types of information to be tracked are considered action types. The Facility Actions tracks actions performed at a facility based on date scheduled and date achieved. User defined items may also augment the Facility Actions data management if the data items required for business are not present in the shrink-wrap version of *i*-STEPS. The use of the ad-hoc report writer to generate tickler reports on the various action types is essential for timely tracking of compliance actions.

South Carolina Department of Health and Environmental Control

PES made modifications to the Satellite *i*-STEPS as specified by the South Carolina Department of Health and Environmental Control (SCDHEC). SCDEHC works extensively with State-defined emission factors, and during the course of their work with facilities, they found that the existing functionality of *i*-STEPS needed modification to match their work flow. In conjunction with SCDHEC, PES added functionality that allows the agency to quickly identify any pollutants having defined emission factors that are not currently part of a facility's inventory and to add them to the inventory. This functionality is available at the Process Unit, Facility, and entire database levels. In addition, existing inventory records are updated to the most current emission factors available.

Metropolitan Government of Nashville and Davidson County

At the request of the Metropolitan Government of Nashville and Davidson County (MGNDC), PES completed two add-on modules for *i*-STEPS: a Complaint Tracking module and an Invoice Generation utility. The Complaint Tracking module allows the Agency to enter all relevant data regarding an air quality complaint for a given facility. Information includes property, owner, and complainant information as well as details of the complaint type and notes for use by inspectors. The Invoice Generation utility allows the agency to select from among six invoice types, defined by the agency, and to produce letters for all facilities to which that invoice type applies. The utility computes the appropriate fees for the facility based on their emissions and agency defined costs per ton, fills the data into predefined spaces in the letters, and creates a mail-merge document that the agency may print and distribute to the facilities as needed.

Philadelphia Air Management Services

Philadelphia Air Management Services (PAMS) maintains a multitude of paper documents that are vital to their everyday business processes. These documents include Construction Permits, Operating Permits, Stack Test Reports, Reading, Files, and Inspector Reports. To enable personnel to access these documents quickly and efficiently, PAMS had PES scan these documents into digital form using the Document Archive and Retrieval Technology (DART) system that was developed by PES. PES used DART to integrate searchable scanned images of these documents into the permits DART (pDART) database system. As an enhancement for *i*-STEPS, a link to the pDART system was created to allow users to access the digital document from within *i*-STEPS, removing the need to use multiple programs. The link allows a user to request a list of all documents pertaining to a specific facility and then select from that list a document to be viewed.

Development for Other Users

In some cases, the development of *i*-STEPS has not been at the request of a State agency but due to requirements imposed on an *i*-STEPS facility. For example, Sierra Army Depot (SIAD) in California requested PES to develop an Emission/Risk/Hazard module to demonstrate compliance with State hazardous waste regulations. SIAD operates treatment facilities for the destruction of military munitions by open burning (OB), open detonation (OD), rocket motor burning (RM), and incineration in the deactivation furnace (DF). These items are considered hazardous wastes that require hazardous waste permits for handling, storage, transportation, and disposal. The operating permit specifies acceptable levels of emissions, hazards, and risks resulting from treatment of munitions by different methods at the depot. Since SIAD uses *i*-STEPS to manage its emission inventory data, they selected to develop a module to support compliance with the hazardous waste permit conditions and to include munitions destruction planning, tracking, and reporting capabilities.

PES built an Emissions/Risk/Hazard module that allows a facility to plan and track compliance with mandated risk/hazard levels resulting from the processing of raw materials occurring at the site. Users had to be able to adjust planned processing to maximize production at the facility while maintaining compliance. Compliance was checked by calculating risk/hazard levels resulting from the processing over specific time periods using the weather conditions at the time of treatment at discrete receptors near the facility. After processing was completed, risk and hazard levels had to be available for use when assessing future compliance. Reports had to be available to document completed processing and to show compliance with the mandated risk/hazard levels. In addition, functionality of the module had to be restricted to authorized users.

This development for SIAD is only one example of how PES has modified an existing *i*-STEPS system that indirectly benefited an agency. A modification requested by nonagency customers is even more beneficial in States that use *i*-STEPS since the agency already licenses and understands the system.

These modifications usually compliment an agency's *i*-STEPS system and in turn can be passed on to other reporting facilities to improve existing data collection.

Future Development

In response to the future needs of State and local agencies, PES is proposing several options for modification of the latest *i*-STEPS system. One of these proposals involves working with a group of States that have applied for Federal grant money to develop an on-line reporting system that would comply with EPA's proposed establishment of electronic reporting.

Five States are proposing a multistate Network Challenge Grant for the development of an on-line reporting system complying with the proposed Cross-Media Electronic Reporting and Record-keeping Rule (CROMERRR) to allow facilities to submit air emissions inventory data to the State agencies. The effort, led by Delaware, also includes Arizona, Indiana, South Carolina, and Kansas.

This project, when implemented, will result in the collection of more accurate information and a reduction in effort required to capture and upload the data to the State systems and from there to EPA's Central Data Exchange (CDX). These enhancements will improve the quality of data fed to the National Environmental Information Exchange Network (NEIEN) and reduce the burden for the reporting facilities by eliminating submission of data on paper or disparate electronic media.

The five States proposing the Network Challenge Grant use *i*-STEPS satellite application developed by PES. *i*-STEPS is used by the States to capture air emission inventory data from facilities. Some States receive the data on diskettes or as attachment to e-mail. Others receive data on paper and input it into the *i*-STEPS software. Delaware used PES to develop an on-line system using Terminal Server to receive data on-line from the facilities. During 2002, approximately 100 facilities submitted their 2001 air emission inventory data using the system. Although the system is not CROMERRR compliant, Delaware intends to use the system again in 2003 to collect 2002 air emission inventory data.

The system will be developed by PES since the current system to receive the emissions inventory, Satellite *i*-STEPS, was developed and licensed by PES. The electronic signature will be handled through an authentication server and Public Key Infrastructure (PKI) to be established. Once this is established, all participating States will use the same system for electronic authentication. The electronic document receiving system developed by PES will have an API to integrate the electronic signature to the system.

PES proposes to develop a web-based data entry system for collecting the air emission inventory data. The system will be consistent with the *i*-STEPS Satellite application and will allow the collection of air emission inventory data necessary for compliance with EPA and State reporting requirements.

Additional functionality, which is not present in the *i*-STEPS Satellite, will be developed to support the proposed CROMERR rules regarding submission of electronic documents to EPA. To support this, subsystems will be developed that provide the following functionality:

- The ability of the users to review, in a human-readable form, the content that is being certified and to sign the document electronically in an informed and deliberate manner. The production and signature of this electronic document will be part of the web-based functionality.
- The ability for the users to acquire valid electronic signatures that are acceptable for identification of the users with regard to the facility emission data. This will be established as a separate service and have to be acceptable to EPA, the States and users.

- The ability of the State to manage electronic signatures so as to identify those signatures that are currently valid to certify data from a given facility. This functionality will be provided in a stand-alone application that will only be available to the agencies responsible for collecting the data.

The web Satellite initiative would provide users with a browser-based interface to *i*-STEPS using traditional web-tools and recent innovations such as .NET technology where practical. The solution will employ TCP/IP port 80 as approved by the State of Delaware and does not require the use of Microsoft Terminal Server. The application would allow industrial users to furnish their data directly to the State. PES proposes to produce a requirements document to identify the fields and functionality that must be included in the web-based version. The agreed-upon document will be the basis for subsequent construction of the web application.

PES proposes to provide a Report Generator that will allow users the ability to view predefined ("canned") reports. The Report Generator will contain five predefined report formats as provided by the State of Delaware:

- Pollutant/County
- Detail
- Emissions Summary
- Emissions of Record/Peak Ozone/Facility Emissions Reported
- Emissions by SCC Group and Fuel

The reporting interface will allow users to tailor specific aspects of the report selected. Users will be given the opportunity to specify (where relevant to the specific report):

- Inventory Year of the Data
- Specific Year or Year of Record
- County
- Facility
- SIC
- NAICS Code

PES additionally proposes to provide an ad-hoc report generator that will allow the user broad flexibility in designating data to be collected from the database. The user will select fields to be included in the report from a pick list. Users can specify a year or multiple years of inventory according to their needs. This feature allows time-series data comparisons to be constructed. Users will have the ability to limit the result set for certain parameters; for example, the result set could be limited to a specific pollutant or SIC. The report generator will then produce a query to collect the data from the database. The user will have the ability to specify how the data are presented. Specifically, they may elect to:

- view the data in a data grid,
- save the data to a new table, or
- route the data to the Report Wizard, where the user can apply specific formatting options to the report.

The query constructed by the report generator can be saved and used for subsequent analysis if desired. The result set data will be read (only) from the production database, so manipulation in the report generator has no possibility of corrupting the production data.

CONCLUSIONS

The relationship that PES has developed with State and local agencies has resulted in consolidated systems that are more efficient and user friendly. Over the past 10 years, State and local agencies have provided PES with information and suggestions that have been beneficial to the development of today's *i*-STEPS package. This development has created a network of *i*-STEPS users that work together to improve existing air programs. This network continues to grow and strive to build a point source tracking system that meets the changing requirements set by EPA.

REFERENCES

None

KEYWORD

i-STEPS
Satellite *i*-STEPS
NEI
CROMERRR