BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

Prepared by:

National Compliance Monitoring Policy Branch
Compliance Assessment and Media Programs Division
Office of Compliance
Office of Enforcement and Compliance Assurance
U.S. EPA

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EXECUTIVE SUMMARY

Better use of technology in compliance monitoring activities has the potential to significantly increase productivity and efficiency throughout the inspection process. It can also improve the quality and timeliness of inspection reports and data entry.

The Office of Enforcement and Compliance Assurance (OECA), other EPA offices, and other government agencies are increasingly incorporating the use of technology in their compliance monitoring programs. This Strategy, referred to as the FACT Strategy, provides an approach for improving the use of technology in the EPA compliance monitoring program on an on-going basis. It discusses technologies currently being used or piloted, especially portable personal computers, the advantages of using such technology, and options and recommendations for moving towards the wide-scale use of technology to increase the efficiency of inspections.

This Strategy does not address on-going efforts within EPA to advance the use of technical equipment for monitoring and sampling, e.g., satellite imagery and ground based remote sensors.

FACT STRATEGY

Effectively incorporating technology into EPA's work requires an on-going effort where certain steps are repeated. Because technology continues to change and improve, any one technology adopted may be quickly out-dated and may no longer be the best technology for the job. Part 1 describes the iterative steps for improving the use of technology in field activities. These steps include:

SELECTION OF TECHNOLOGY

- Review the workflow process.
- Identify changes in the process that will improve performance and which can be achieved by the application of new technology, increased availability of technology, or replacement of aging equipment.
- Elicit information on what is being used by others.
- Ask persons doing the work being reviewed about their needs.
- Identify, research, and evaluate technology of interest.
- Select technology to adopt/expand or determine if aging equipment needs replacement.
- Analyze potential impact on the enforcement process. Determine if new policies are needed to address changes in process.

- Determine if technology is ready to use or if more research or development is needed.

IMPLEMENTATION OF TECHNOLOGY THAT IS READY TO USE

Working with the users:

- Develop and issue policies needed, e.g., to ensure integrity of the inspection/enforcement process. Reassess as needed.
- Decide on equipment. Determine and communicate whether there is flexibility on the specific equipment based on individual needs/preferences or if there is a need to standardize or limit the specific equipment choices.
- Determine number of units needed, resources available, who will provide, and the distribution process.
- Provide equipment to users and provide training/guidance as needed. Assess need for technical support; if needed, determine source for this support.
- Re-evaluate periodically using steps above.

STEPS IF TECHNOLOGY IS NOT READY TO USE OFF THE SHELF

If technology of interest is not ready to use and more research is needed to determine best equipment or there needs to be software development or further research into the best software applications for the work, the following steps should be taken:

- Elicit information on the technology of interest.
- Identify hardware/equipment. If new technology, consider purchasing multiple modules of the hardware to evaluate prior/during the pilot.
- Identify additional software application development needed if any, and who will do this.
- Identify partners for a pilot; identify commitment for pilot, e.g., extent of deployment, who is funding.
- Work with partners to review the workflow process; solicit information on their needs and preferences.
- Complete development of software for pilot.
- Go through the steps for implementation of technology that is ready to use.
- Conduct pilot.
- Decide on areas of expansion for the pilot or for additional pilots. Repeat steps for pilot and implementation of technology that is ready to use.
- Full implementation. Repeat steps for implementation of technology that is ready to use.
- To update technology or expand further, repeat process.

OVERVIEW OF OECA ACTIVITIES TO PROMOTE THE USE OF TECHNOLOGY

OECA activities to improve the use of technology in EPA's compliance monitoring/inspection program have included:

- Piloting the use of Personal Digital Assistants (PDAs), early efforts.
- Piloting and expanding the use of Tablets for the Toxic Substances Control Act – Polychlorinated Biphenyls (TSCA PCB) program, on-going.
- Providing 132 digital cameras to HQs and regional inspectors to ensure access to such cameras for conducting inspections.
- Actively encouraging the sharing of information on new technology being used through National EPA Inspector Workshops and other national meetings, workshops, and training courses in which OECA participates.
- Improving how inspector training and credentials are tracked.
- Establishing a Change Board to facilitate sharing and adoption of new approaches, including the use of new technology.

PORTABLE PERSONAL COMPUTERS

With appropriate software, portable personal computers can provide the inspector with the ability to:

- Load documents such as permits, previous inspection results, regulations, statutes, inspection manuals, and compliance assistance material.
- Prepare and print inspection forms.
- Document findings during the inspection using templates that eliminate duplicative information entry.
- Prepare inspection reports utilizing software templates that self-populate with information collected during the inspection.
- Transmit reports from the field.

Portable personal computers are currently available in several forms including Tablets, PDAs, and Ultra Mobile Personal Computers (UMPCs). With this technology, information that is used in multiple documents prior to, during, and after the inspection would only need to be recorded once. With portable personal computers such as the Tablet or PDA, the inspector can collect field notes in handwriting and draw diagrams that are recorded electronically for use in the report. The software can convert the handwritten information to typed information and populate forms, field notes, and the inspection report. Unlike a laptop, the Tablet or PDA allows the inspector to work while holding the computer in one hand and entering the information with his other hand without needing a desktop or a place to sit. In addition, it is possible to automate the collection of field data so that it can be extracted from the information collected during the inspection to populate the data fields required for reporting by direct transmission into EPA's Integrated Compliance Information System (ICIS) or other Agency databases. This eliminates the need for the inspector to enter data separately or to provide the data to a data entry person.

Thus, this technology can reduce data entry costs, transcription errors, and time delays in data entry.

Given the available technology, the increasing need to capture valuable knowledge of experienced inspectors, and the potential for increasing productivity, it is an ideal time to give serious consideration to changing from pen and paper to the use of portable personal computers and software developed specifically for inspections. Other offices within EPA and other government agencies have begun using portable personal computers such as the Tablet and PDAs for inspection activities. Part 4 highlights results of an informal survey conducted by the National Compliance Monitoring Policy Branch (NCMPB) in OECA on the use of portable personal computers in the field. It includes an overview of EPA activities in this area as well as examples from a survey of how other government agencies (federal, state, and local) are using portable personal computers such as PDAs and Tablets including information on the benefits. Lessons learned are included in italics. (Appendix A contains the results of the survey.)

In addition to the informal survey, the NCMPB held discussions about new technology during the National EPA Inspector Workshops and other National EPA meetings, and conducted research to learn more about what other EPA offices, individual regions, and in some cases, individual inspectors were using in the field, and the lessons they had learned. The Branch also met with other Federal agencies and contractors to hear about their efforts and ask questions

PILOT PCB PROJECT USING TABLET AND SOFTWARE TEMPLATES

A number of pilots using Tablets and PDAs have been conducted within EPA, including a successful OECA PCB Pilot (discussed in detail in Part 5) using a Tablet and software templates to conduct PCB inspections and prepare reports. The PCB Pilot provides a blue print for selecting a program, developing software, and incorporating this technology effectively into inspection work.

The goal of the PCB Pilot was to develop software for Tablets which would allow the inspector to use the Tablet to prepare for an inspection, conduct the inspection using the Tablet to take handwritten notes in the field, make drawings, generate the required inspection forms during the inspection, and produce a nearly complete inspection report based on the handwritten notes entered during the inspection.

For this pilot, the NCMPB, Region 5, and the State of Indiana worked together to identify an agreed upon workflow process for conducting PCB inspections. OECA and its contractor used the results of this workflow process to develop software and inspection templates for use on the Tablet to prepare for and conduct inspections and self-populate inspection reports. Region 5 and Indiana field tested the software and Tablets. OECA is encouraging the adoption of this technology by regions and states responsible for TSCA PCB compliance monitoring. OECA has also initiated discussions with the regions and plans to facilitate efforts to develop software for the TSCA asbestos inspection program, which utilizes the same inspection forms.

EXPANSION OF THE PCB PILOT

The next step for implementing and continuing to evaluate this program is to expand it to all ten regional PCB programs and to fund state PCB programs that are interested in using this technology. The NCMPB has transferred grant funding to the regions for three states, who requested grant money under their PCB compliance monitoring grant for purchasing the Tablets and software to conduct inspections. Training sessions have been scheduled for these states. In addition, this Strategy recommends that OECA consider funding the purchase of Tablets and software for 15 inspectors who conduct PCB inspections. (Note: Most regions have one or two PCB inspectors; Region 10 has eight and Region 2 has seven inspectors who are trained to conduct PCB inspections). The Strategy recommends funding one to two Tablets per region. This investment will provide additional information on what is needed to successfully adopt this technology in the field. One of the lessons learned from the information received during the survey and the many discussions with programs beginning to implement this technology is that continued support is needed as with any new computer technology.

Part 5 also discusses options for expanding the PCB project to address collection and entry of data into the Agency's databases on compliance and enforcement, i.e., ICIS. For 2007, regions are to enter their TSCA inspection data into ICIS. The next phase of the PCB project is to modify the template to use data collected by the inspector during the inspection to self populate a form, which can be printed and provided to the ICIS data entry person or entered by the inspector into ICIS. Ideally, the software would be able to use the data collected in the field in handwritten form or typed, to populate the ICIS data fields and directly transmit the data, including Inspection Conclusion Data Sheets (ICDS) data, to ICIS, eliminating separate data entry. Parts 5 and 6 discuss options for future work that include developing software to achieve direct transmittal of inspection data (e.g., facility name, date/type of inspection) from the Tablet to ICIS using information collected during the inspection.

EXPANSION OF TABLET USE TO OTHER INSPECTION PROGRAMS

The FACT Strategy recommends that OECA begin an initiative to expand its use of technology, specifically the use of portable personal computers with appropriate software to other inspection programs. It also recommends expanding the capability of this technology to not only prepare for, conduct, and write inspections but also to provide direct data entry into EPA's databases. Parts 5 and 6 identify options for doing this. Using the iterative process to expand to additional inspection programs will allow adoption of improved hardware and software technologies as they become available.

Transitioning from a pilot in one program for one type of inspection to adopting the use of this technology in additional programs requires careful consideration of many options as well as funding available. There are many directions that can be taken to improve the use of technology in EPA's compliance monitoring activities. It is important to determine what gets automated, whether states or tribes are included, and where to start. Regardless of which options are selected, it will be important to incorporate the steps identified in Part 1 of the Strategy. Options range from phasing in individual programs to developing enterprise-wide software. Part 6 addresses options for expanding the capabilities of the software to address various functions

(e.g., loading permit information prior to the inspection, report writing, direct data entry) and options for expanding to other programs (identifying a few programs for a phased in approach or a systems based approach). Part 7 discusses options for providing hardware to regions and states/tribes, including a discussion on leveraging resources to provide the hardware, i.e., the portable personal computer. It also discusses options for leveraging resources for software development. Part 8 includes a brief summary of conclusions and recommendations in the Strategy, including a recommendation to periodically update the technology survey and to collaborate with other EPA offices.

At this time, there are numerous individual efforts in this area. Individual offices and sometimes individuals within EPA and states are adopting better technology for specific programs, developing their own checklists/templates for PDAs, Tablets, or laptops. Other offices within EPA such as the Underground Injection Control (UIC) program have developed templates for UIC inspections across the regions. The Office of Environmental Information (OEI) is developing templates for obtaining Global Positioning System (GPS) data during inspections which is intended to be used for all programs. A coordinated approach among programs would reduce duplicative efforts and incompatible systems as various offices seek to adopt portable PC technologies to improve how they do inspection work. Establishing a workgroup to be co-chaired by the NCMPB in OECA and OEI and with representatives from other offices and regional programs is strongly recommended. The purpose of this workgroup would be to share information on the various efforts and identify areas where joint efforts would be advantageous. It will also provide a forum for sharing lessons learned.

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 1

OVERALL STRATEGY FOR MAKING BETTER USE OF TECHNOLOGY

PART 1
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1.0 OVERVIEW

The route to ensuring that programs are using the best technology on an on-going basis is not linear. Rather this is a cyclical process. While some parts of the process are more step-like where one picks a technology and then takes steps to pilot and expand and selects from various options, this is only one phase of ensuring good use of technology.

To understand this concept, consider EPA's approach to providing staff with desktop computers. The goal was not to purchase a computer for each employee. Instead, the goal was to provide each employee with "up-to-date" equipment including software and skills to effectively incorporate the use of the technology into EPA's work. EPA has an on-going evaluation plan to assess the state of this technology, make changes to hardware and software being used, and replace computers as necessary to ensure they are state-of-the art.

Technology is constantly changing. This has been especially rapid in technology that can be adapted to field use such as digital cameras and portable personal computers (PDAs and Tablets). For portable personal computers, there have been tremendous advances, both in the hardware and software capabilities. Although advancements will continue, this doesn't mean OECA should wait until the technological developments are "complete" anymore than it did when it adopted desktop computers for office use.

This part of the Strategy identifies key elements of a continuous cycle for incorporating technology into OECA's compliance monitoring work and ensuring that such technology is continually updated.

1.1 KEY ELEMENTS FOR MAKING BETTER USE OF TECHNOLOGY

These steps were identified by analyzing two of OECA's recent efforts to make better use of technology in field activities. The two projects analyzed were the 1) TSCA PCB Pilot Project involving tablets and software template development, and 2) a project for providing digital cameras to regions and HQs to ensure that inspectors have access to digital cameras during inspections.

SELECTION OF TECHNOLOGY

- **Review the workflow process.**

  This phase involves an overview of what the work is and how it is carried out and by whom. The detailed analysis of the workflow process occurs later. Training in knowledge management can be helpful.

- **Identify changes in the process that will improve performance and which can be achieved by the application of new technology, increased availability of technology, or replacement of aging equipment.**

  Changes that can improve performance may include changes such as simply assuring that all inspectors have the necessary equipment or changing how information is collected and stored. Areas of improvement in the use of technology can include quantity and quality.

- **Elicit information on what is being used by others.**

  Within own program, find out what other offices are doing.
  For other programs, attend national meetings and invite others to give presentations at meetings.
  For other agencies, contact those with similar work, e.g., FDA.
  Read magazines/newspapers/press.
  Consult with others who have an interest in computers/software.

- **Ask persons doing the work being reviewed about their needs.**

  An example is OECA's decision to provide digital cameras to inspectors originated during a discussion at the National EPA Inspectors Workshop. When asked what problems or issues there were, inspectors indicated that they needed more digital cameras in the regional offices.

- **Identify, research, and evaluate technology of interest.**

  Check websites, industry sources, and experts within and outside the Agency. Determine capabilities and limitations of the technology for the intended work process. Find out the options for the technology and determine the advantages and disadvantages, e.g., for portable personal computers, there are three main types currently available – Tablet PCs, PDAs, and Ultra Mobile PCs (UMPCs).

- **Select technology to adopt/expand or determine if aging equipment needs replacement.**

- **Analyze potential impact of making this change on the enforcement process. Determine if new policies are needed to address changes in process.**

  It is particularly important to determine if policies/guidance documents are needed to ensure the evidentiary value of the documentation collected during the inspection or to provide adequate security for enforcement sensitive or confidential information.

- **Determine if the technology is ready to use or if additional research or development is needed.**

  An example of technology which is ready to use "off the shelf" is the digital camera. The decision to make better use of this technology meant that funds were needed to supply a sufficient number of cameras. Decisions were focused on what type of camera to buy,

features needed and funding sources. However, even with ready to use technology, an analysis of the changes made by using such technology identified a need for a guidance document on how to ensure the integrity of the photograph as evidence and technical guidance on battery life and types of batteries to use in the field.

An example of technology where more research and development was needed is the use of PC Tablets. While the Tablet hardware is ready to use, decisions on what software to use and the development of specific templates to capture field data for PCB inspections were needed to maximize the usefulness of the technology.

IMPLEMENTATION OF TECHNOLOGY THAT IS READY TO USE

Working with the users:

- **Develop and issue policies, e.g., to ensure integrity of the inspection/enforcement process. Reassess as needed.**

  Review the workflow process and evaluate what has changed. If there were previous policies/procedures in place, determine if they remain applicable or if new policies/procedures are needed.
  Determine if there are security concerns that need to be addressed.

- **Decide on equipment.**

  For equipment purchases, solicit information on users' needs and preferences.
  Determine and communicate whether there is flexibility on the specific equipment based on individual needs/preferences or if there is a need to standardize or limit the specific equipment choices.

- **Determine number of units needed, resources available, who will provide the resources, and the equipment distribution process.**

  A phased-in approach for providing equipment may be needed depending on resources available. Determine if there are advantages to centrally purchasing equipment (e.g. cost savings, standardization, more efficient) instead of providing funding to individual offices/regions.

- **Provide equipment to users and provide training/guidance material as needed. Assess need for tech support and determine source.**

  Determine if training and/or a manual is needed. Determine who will provide, how, and when. Note, a training course or a manual may need to be developed.

- **Reevaluate periodically using steps under the Selection of Technology.**

STEPS IF TECHNOLOGY IS NOT READY TO USE OFF THE SHELF

If more research is needed to determine the best equipment or if there needs to be software development or further research into the best software applications for the work, the following steps should be taken:

- **Elicit information on technology of interest.**

  Attend meetings internal/external – ask questions, include technology on agenda.
  Conduct informal survey internally.
  Search the web to identify agencies using technology.
  Call other agencies identified by the above activities and ask what they are doing and the benefits.
  Invite others to come in and discuss their use of technology or ask them to give presentations during meetings.

- **Identify hardware/equipment.**

  For technology that is not ready to use and for which additional research into hardware features or software development is needed, consider purchasing different types or models of the hardware to evaluate prior to and/or during the pilot.

- **Identify additional software application development needed if any, and who will do this.**

  This requires a mixture of personnel with background knowledge of software development and those who may lack prior knowledge related to software or technology as well as persons with a high level of program expertise to collaborate and create a workable solution.

- **Identify partners for a pilot; identify commitment for pilot, e.g., extent of deployment, who is funding.**

  Identify potential partners – especially from the ultimate users of the technology, i.e., regional or state/tribal inspectors and their managers.
  Select individuals willing to invest time and energy in a pilot and in evaluating the technology, ideally a mixture of proficiency working with the technology.

- **Work with partners to review the workflow process; solicit information on their needs and preferences.**

  Persons responsible for decisions on software should be knowledgeable of the program, meet with the technical experts/users to fully capture the workflow process, and consider accompanying an inspector during an inspection to better understand the workflow process.

- **Complete development of software for pilot.**

- **Go through the steps for implementation of technology that is ready to use.**

- **Conduct pilot.**

  Decide on what to pilot.
  Identify what is needed prior to piloting.
  Perform detailed workflow process analysis.
  Identify policy or software needs.
  Identify commitment and extent of deployment for pilot, who is funding.
  Identify areas of flexibility.
  Decide on timeframe and scope of pilot.
  Have users become familiar with equipment its capabilities.
  Identify process for training users.
  Have user conduct a field test under actual use conditions.
  Evaluate and revise as needed during pilot.
  Solicit feedback from pilot.
  Revise as needed.

- **Decide on areas of expansion for the pilot or for additional pilots.**

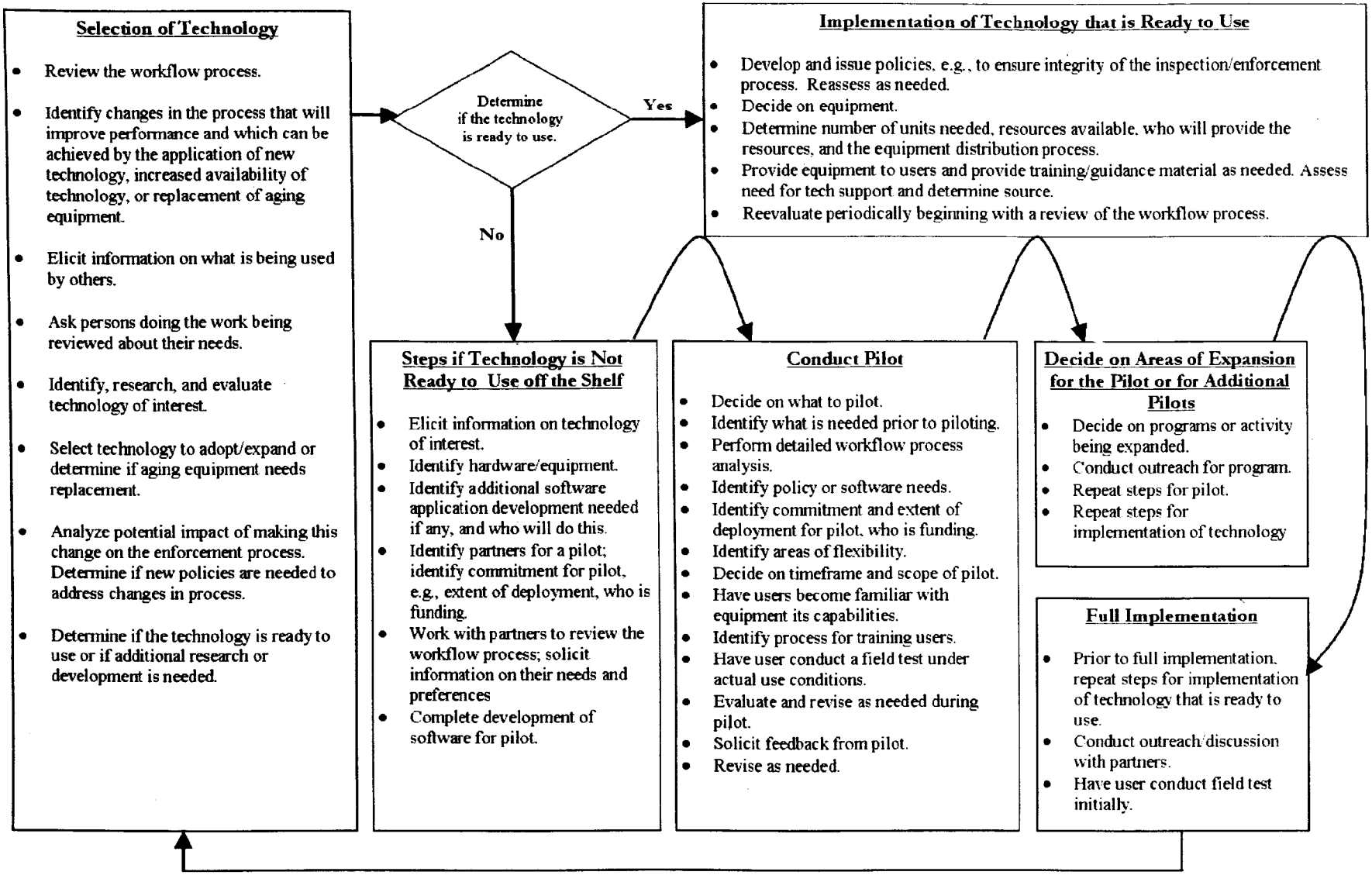
  Decide on programs or activity being expanded.
  Conduct outreach for program.
  Repeat steps for pilot.
  Repeat steps for implementation of technology that is ready to use.

- **Full Implementation**

  Prior to full implementation, repeat steps for implementation of technology that is ready to use.
  Conduct outreach/discussion with partners.
  Have user conduct field test initially.
  Implement routine use.

- **To update technology or expand further, repeat process.**

Overall Strategy for Making Better Use of Technology



BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 2

OVERVIEW OF OECA ACTIVITIES

PART 2
OVERVIEW OF OECA ACTIVITIES

2.0 OVERVIEW

EPA's compliance monitoring and enforcement program is responsible for ensuring compliance with federal environmental statutes dealing with prevention and control of air pollution, water pollution, hazardous waste, toxic substances and pesticides. Inspections are a primary tool in determining compliance for the Agency. An active field presence deters violations and helps bring regulated facilities into compliance. Enforcement actions also motivate violators to cease noncompliant actions and return to compliance.

The integration of technology into workflow processes for compliance monitoring and enforcement can increase the efficiency of the inspection process, improve the timeliness of the inspection report, improve the timeliness and accuracy of data entry, and increase the speed and efficiency of case development and enforcement actions. Development of workflow processes, a necessary step to developing software templates, also offers an effective way of capturing the knowledge of experienced inspectors and providing more uniformity to inspections. In addition, the use of technology can streamline management of the program in such areas as tracking inspector training requirements.

The advancement of new technologies such as portable, lightweight computers and improved software capabilities has made it possible to collect information in an electronic format in the field. Rather than using pen and paper, electronic information can be used to create inspection forms, prepare inspection reports electronically using the information generated during the inspection, and submit data in a timely manner to the appropriate database. Digital cameras allow the inspector to immediately view the picture and save it, alleviating the need for waiting for film to be developed. GPS equipment provides accurate information on the latitude and longitude of a facility or site. Both GPS data and digital photographs can be incorporated into the inspector's reports electronically. Data on the inspection, such as facility, date, time, type, etc. has the potential to electronically move from the inspector's data collected during the inspection directly to Agency databases such as ICIS. The potential for inspectors and others is that data or information can be compiled quickly and accurately, and automatically integrated into existing databases, inspection reports, and other documents including forms. This same data could populate case preparation and enforcement response documents. Although this Strategy will reference possible applications to case preparation and enforcement response documents, it primarily addresses applications to inspection programs.

2.1 SUMMARY OF OECA ACTIVITIES

While there are many applications of technology, this overview summarizes recent and ongoing efforts within OECA to foster the use of technology by inspectors in the field, specifically the use of PDAs, and Tablets, digital cameras, and tracking systems for inspector credentials and training requirements.

Portable Personal Computers

OECA has reviewed, piloted, and evaluated several portable personal computers over a number of years. A general discussion of portable personal computers, including information for hardware evaluated by OECA, is found in Part 3. Part 4 discusses the results of a survey of EPA efforts as well as research into what other government agencies are using and their results. A detailed discussion on OECA's PCB Pilot and its expansion is found in Part 5 following the technical discussion of this technology and an overview of its potential benefits.

National EPA Inspectors Workshops Feature New Technology Panel Discussions

The National EPA Inspectors Workshop, hosted by OECA (previously held annually but now held every other year), is attended by inspectors from all regions across all programs. It offers a unique opportunity for inspectors to hear what other programs, other regions, and even other government agencies are doing to make better use of technology for inspections. This topic has been on the agenda during each of the six workshops held. EPA headquarters and regional personnel have participated in these panel discussions. Discussions have mostly been about digital cameras and portable computers such as PDAs and Tablets. In addition, states have given presentations as have the Federal Aviation Administration (FAA) and Food and Drug Administration (FDA). During a couple of the workshops, display tables were provided for industry to demonstrate their portable personal computers.

The upcoming Workshop in December 2007 will again feature presentations on new technology for field use. The use of portable personal computers will be discussed in depth. There will also be discussion by regions on other types of technology used for monitoring/analyzing pollutants.

Digital Cameras

When digital cameras first became available, inspectors were using 35 mm cameras or Polaroid cameras to take photographs during inspections. They created photo logs as they took the pictures, recorded time, date, and their initials in the photographs for later use as evidence, and included selected photographs in the inspection report by taping them to pages inserted into the report. Initially, a few inspectors requested their offices to purchase digital cameras, and they began to use them for inspections. More inspectors opted for the digital cameras. As technology improved, the advantages of the digital camera in the field increased. Inspectors can take pictures in the field and view them instantly, ensuring they have a good photograph which captures what they intended. Digital cameras are easy to use and compact. The camera records the data and time of the photograph. Most can also provide short video recordings, which can be useful for certain types of documentation during inspections. The inspector can directly insert the photograph into the inspection report if he chooses. As this technology became more common place, there were many lessons learned. To share the lessons learned and to facilitate the use of this technology, OECA did the following:

- **Developed and Issued Digital Camera Guidance for Civil Inspections and Investigations**

As more inspectors began to use digital cameras to gather evidence, the NCMPB, Compliance Assessment and Media Programs Division (CAMPD), Office of Compliance (OC), OECA worked with regional and headquarters inspectors and attorneys to develop guidance on recommended procedures to ensure the integrity of the digital image and resulting photographs as evidence. The Guidance was issued July 2006 and is available on the EPA Inspector Intranet Website: **http://intranet.epa.gov/oeca/oc/campd/inspector/**. The Guidance also provides basic technical information for the inspector on the selection and use of digital cameras including practical tips such as recommendations on the type of battery needed for taking photographs in extreme hot or cold weather and a discussion of computer requirements.

The NCMPB continues to address policy questions as they arise regarding the use of digital cameras. Recent discussions with the regions indicate that there are differing policies on providing copies of digital images to the inspected facility. The Branch has researched the practices among regions and is developing a national policy on this issue.

- **Centrally Funded and Provided 132 Cameras to Regions/HQs for Use by Inspectors**

During the December 2005 National EPA Inspector Workshop, inspectors expressed their concern that the regional offices did not have a sufficient number of digital cameras available to ensure that inspectors had access to them for inspections. To address this concern, Catherine McCabe, Principle Deputy Assistant Administrator, OECA, provided funding to purchase digital cameras which were distributed to the regions and headquarters for use by inspectors. The initial purchase provided 93 cameras. A second purchase was made in July 2007, which provided an additional 39 cameras. Regional and headquarters offices have purchased digital cameras on their own as well.

- **Plan to Provide Training on Taking Photos for Use as Evidence**

A training session on taking digital photographs during an inspection will be offered during the December 2007 National EPA Inspector Workshop. It will include a review of the Digital Camera Guidance.

Tracking Inspector Training: Train Trax

The NCMPB has evaluated different databases to use for tracking training requirements for inspectors. They have identified Train Trax, a database currently used by On-Scene Coordinators as a data system that is currently available at no charge and which can track training and provide advance notification when training is required, e.g., annual refresher courses. This system can be accessed nationally and can be used to verify completion of training prior to issuing credentials. OECA will work with regions that agree to use Train Trax to help enter data and to provide training.

Tracking Credentials

The NCMPB currently provides EPA credentials to regions to provide to employees of states and tribes that meet criteria in the 2004 Guidance on Issuing EPA Credentials to Authorize Employees of States/Tribes to Conduct Inspections on EPA's Behalf. The NCMPB tracks the transfer of credentials to the regions using an Access Database. The region is responsible for tracking the issuance of the credential to the state/tribe.

The Office of Administration and Resources Management (OARM) tracks credentials issued to EPA employees. Credentials issued to Senior Environmental Employees (SEE) or contractors are tracked by the office responsible for the grant/contract.

OECA is pursuing discussions with OARM to issue and track all EPA credentials in a centralized database using the recently adopted electronic system which allows photographs and signatures to be sent electronically. Alternatively, OECA is evaluating the feasibility of developing a system similar to OARM's which provides increased security for the issuance, delivery, and tracking of EPA credentials. This avoids the need for each region to have a separate tracking system for issuing EPA credentials to states/tribes.

Change Board

OECA sponsors a Change Board, which is a group established with managers within OECA, to recognize and support compliance monitoring and enforcement projects proposed by regions and HQs offices, including outside of OECA, which have the potential to effect positive change. Best Practice Awards are provided to those projects which have been successfully implemented and which can be replicated across regions. This allows innovative approaches to be piloted and evaluated. In February, 2005 OECA gave a Best Practice Award for a project which focused on the use of PDAs programmed with checklists to inspect and inventory Class V Wells in the Underground Injection Control program.

Enforcement and Compliance Document Sharing

The Enforcement Targeting and Data Division (ETDD) has been exploring the possibility of integrating enforcement and compliance documents for State and Federal activities into EPA's Online Tracking Information System (OTIS). These materials would supplement the existing summary data with detailed site compliance history, thus providing a single source for both inspectors and case developers to compile facility information. If permits, past inspection reports, facility self-reports, and enforcement documents (e.g., Notices of Violation, Compliance Orders, and Consent Decrees) were readily accessible and downloadable, they could make pre-inspection and case development activities more efficient. In addition to these direct benefits, document sharing of compliance and enforcement materials could have additional benefits of improved oversight. The NCMPB has expressed interest in whether inspection reports for inspections conducted by states/tribes using EPA credentials on behalf of EPA could be submitted to the region electronically for review. This would eliminate the need for the state to submit hard copies to the region.

Although some enforcement and compliance documents are already available in EPA databases—and could potentially be linked to OTIS—there is currently no source for inspection reports. An important step in the document sharing process would be to develop a method to electronically store inspection reports. While developing a new database would be costly and time-consuming, the Office of Compliance is exploring ways to leverage existing agency systems (e.g., OSW's Emergency Response Team website), and alternative funding sources (e.g., Grants Administration Division, or Office of Environmental Information's Network Exchange Grants).

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 3

PORTABLE PERSONAL COMPUTERS IN THE FIELD: OVERVIEW OF HARDWARE/SOFTWARE OPTIONS CURRENTLY AVAILABLE

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3.0 PORTABLE PERSONAL COMPUTERS AND SOFTWARE TEMPLATES

The use of mobile, lightweight hardware and software allows the inspector to collect and use information in the field in a manner that reduces redundancy by writing once and subsequently populating numerous documents. This can expedite the preparation of inspections as well as the completion of the inspection report and entry of data into EPA's data systems. Eliminating the need to record the same information numerous times and by different individuals can also improve data quality. The ability of these computers, unlike a laptop, allows the inspector to collect data by handwriting including drawings as though he were using pen and paper, to save the information electronically and to incorporate it into typed format into forms and reports including the inspection report. This can dramatically improve efficiency during an inspection. Technology exists which can make it possible to use this same information to populate EPA's databases, e.g., ICIS.

While this Strategy focuses on the inspector and the inspection process, the same technology could be applied to case development and the issuance of enforcement actions. Software templates can be developed to identify violations and appropriate enforcement responses and to prepare the enforcement action, taking advantage of templates to self populate fields using information already entered by the inspector during the inspection.

3.1 STRATEGIC VISION

The increased use of technology such as computer hardware and software is one way to improve the collection of information during inspections as well as data collection in Agency databases such as ICIS. Using this technology in compliance monitoring and enforcement workflow processes can improve accuracy, consistency, and efficiency in the information collected and used by EPA managers and staff. Benefits include:

- Accurate data entry.
- Quick generation of accurate and complete documents and reports.
- Consistent information across regions, programs and individuals.
- Reduction of physical documents that an inspector takes with him. CFRs, program policies, testing methodologies can be carried as electronic files not as paper; forms are electronic files that can be printed anywhere.
- Quick tally and summary of inspection data.
- Ability to highlight specific areas for inspection as records are reviewed and information collected during the inspection.
- Collection and integration of other sources of field data into reports, i.e., photos and physical samples.

There are a number of individual programs and individual inspector efforts to better use technology in the field, especially portable personal computers. While inspectors often take their laptops with them to use after the inspection, some inspectors are turning to the lightweight, very portable units such as the Tablet and the PDA. While these units are convenient word processing units, in the field, they can be used to record handwritten notes and diagrams. More importantly, with appropriate software, they can automate much of the inspection process by populating reports and forms automatically using information that has been entered once. This offers tremendous potential to improve how EPA inspectors do their work. It also facilitates the transfer of knowledge from senior inspectors who have extensive experience in conducting inspections to software templates that can help lead a less experienced inspector through the inspection process. With the tremendous improvements in the actual technology of these portable units, it is an opportune time to consider how OECA might improve its work-flow processes by adopting such technology.

HYPOTHETICAL EXAMPLE

A hypothetical example of how using workflow processes could improve an EPA inspector's efficiency in collecting and reporting inspection data using software and hardware that is currently available is provided below:

> It's Monday morning. Inspector Jane Hughes is beginning her workweek by preparing for a Resource Conservation and Recovery Act (RCRA) inspection at the "ACME Corporation" scheduled for next week. Within this week, Inspector Hughes will download past inspection reports, review past enforcement actions, and download applicable inspection forms, CFR citations, RCRA policies and equipment checklists all from the local area network on to her portable computer (PDA or Tablet). In addition to these compliance monitoring materials, there is a variety of pollution prevention pamphlets and compliance assistance information available to Inspector Hughes.
>
> The inspector has the choice of taking the compliance assistance materials with her or downloading it in the field using wireless communications. In addition, Inspector Hughes is equipped with a portable scanner, a portable color printer, a GPS antenna and software, and a digital camera. This equipment allows the inspector to accurately identify sites within the facility using geospatial data, capture the condition of the facility at the time of the inspection, collect data electronically, print out required documents, and leave the facility with initial results of the inspection.
>
> When Inspector Hughes finishes collecting the field data, she will be able to automatically generate a 90% complete inspection report and a completed compliance monitoring form ready for transmission to the ICIS database from the data collected during the inspection. Once the samples are analyzed and reported, Inspector Hughes will complete the inspection report and forward it electronically to her supervisor for approval.
>
> When the inspection report is approved, the report and all supporting documentation are again forwarded electronically to the regional case officer, who

reviews the documentation to determine the appropriate enforcement response. Should the response be an administrative or civil enforcement response, the case officer takes the inspection and supporting data and synchronizes with the administrative enforcement response documents. Once the violations are identified, the case officer inputs the RCRA violations into the RCRA Penalty Policy Worksheet, which automatically generates a proposed penalty. The case officer reviews and modifies the documents to reflect accurately the enforcement action to be taken against "ACME Corporation".

Once the enforcement action is finalized, actions to be taken, pollution reductions, penalties, and SEPs are sent to Regional Counsel for review and approval. When the enforcement action is resolved, data from the enforcement action is entered into the enforcement actions section in ICIS. If there are milestones to monitor, a tickler system can alert the appropriate staff person of what is due to the Agency and when.

3.2 PORTABLE PERSONAL COMPUTERS – CURRENT HARDWARE

The primary portable hardware technologies used today for collecting inspection information are Personal Digital Assistants (PDAs) and Tablet PCs (Tablets). Some companies have developed specialized hardware for inspection tasks, but these tend to be dedicated to specific functions and unsuitable for EPA's wide array of inspections. Both PDAs and Tablets present their own advantages and disadvantages. PDAs generally cost a few hundred dollars per unit, while Tablets are several thousand dollars each. Due to their size and memory/storage limitations, PDAs lend themselves to checklist style inspections, while Tablet PCs allow for adding more text and provide increased software options and capabilities. A comparison of each type of hardware is outlined in Table 1 below.

TABLE 1: COMPARISON OF TABLETS TO PDAS	
Tablet PCs	**PDAs**
Screen is 10 to 12 inches diagonally; approximately the size of a piece of paper; size is good for notes and text. The inspector can write on the screen with a stylus; similar to taking notes on a paper pad.	Small screen works better for checklists with yes/no answers. May limit the scope of the inspection. Difficult to use to record lengthy notes and text.
Size of screen allows inspector to draw diagrams and read pre-loaded reference material such as CFRs or statutes.	Small screen size makes drawing diagrams and reading long documents difficult. Inspector has to scroll down.
Good handwriting recognition ability; better than the PDA. New Windows Vista Tablet operating system greatly improves on the handwriting algorithm. Converts notes to typewritten text.	Handwriting recognition not as good as the tablet; inspector less likely to take notes though due to screen size.
Keyboard component allows inspector to type text. Keyboard is similar to that of the desktop PC. Allows touch typing.	Keyboard is small and doesn't allow touch typing with 10 fingers. Stylus or typing with one or two fingers/thumbs.
Allows digital signatures.	Allows digital signature.
Can be connected to a portable printer for	Generally must be connected through a laptop

printing forms pre-filled by the computer.	or computer to print.
Can double as an inspector's computer.	Cannot double as an inspector's computer.
Heavier and bulkier than a PDA. May be more difficult to hold/carry for a long time or in places where the inspector's hands need to be free such as climbing a ladder. Cases/shoulder straps are available.	Small, lightweight – can be placed in a pocket when inspector needs his hands free.
Higher costs – 10 x the price of the PDA.	Low cost.
Can be used as a scheduler.	Can be used as a scheduler.
Familiar XP interface is easier to adapt to.	Uses Microsoft Windows Mobile or Palm OS, which may not be compatible with all applications. Software may be unfamiliar.
Can be connected to a GPS receiver to collect geospatial data.	Can be connected to a GPS receiver to collect geospatial data.

Note: Although PDAs have been used for collecting inspection information, with the introduction of the Tablet PCs, most inspection programs have been moving away from PDAs and are adopting Tablet PCs. One office is considering Ultra Mobile PCs, which are mid-sized between Tablets and PDAs.

Examples of PDAs and Tablets are pictured below. Figure 1 is a clamshell or notebook Tablet with an integrated keyboard. Its screen pivots at a single point and rotates to cover the keyboard. Figure 2 is a Windows-based PDA, which can fit comfortably in a person's hand. Figure 3 is a Tablet PC from Motion Computing. It does not have an integrated keyboard like the Toshiba; instead data is entered via an on-screen (i.e., digital) keyboard or an external plug-in keyboard. The Toshiba and Motion Computing systems each have a 12" screen (diagonal) and weigh about 3 pounds. All use a stylus or pen primarily to enter data; keyboards can also be used by each unit.

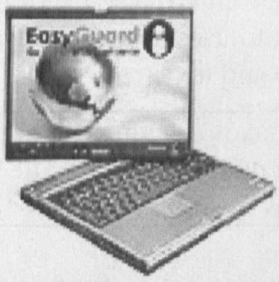

Figure 1 - Toshiba Tablet

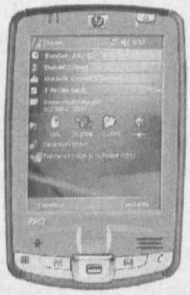

Figure 2 - HP iPAQ PDA

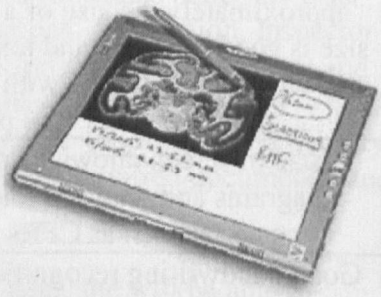

Figure 3 – Motion Computing Tablet

In addition to purchasing the base unit—PDA or Tablet—there are many accessories available for field use. The most useful additions include portable printers and scanners, Global Positioning Systems (GPS) and Global Information Systems (GIS), digital cameras/recorders, wireless technology, and Bluetooth devices. Portable printers allow the inspector to print various forms and notices on-site. Scanners allow the inspector to photocopy documents into electronic files during the inspection. GPS and GIS accurately identify or locate a position. Digital

cameras allow inspectors to take photos and save the pictures electronically to their reports. Wireless technology allows web access to agency data and information. Bluetooth technology allows two pieces of equipment to communicate without wires, which might otherwise be tangled and lost in the field. While these add-ons are desirable, there are costs associated with them.

3.3 PORTABLE PERSONAL COMPUTERS - CURRENT SOFTWARE

The hardware is only as useful as the software it is operating. Without appropriate software, the portable personal computer is a word processor and a place to take notes. To maximize the return on the investment of purchasing these units and to achieve efficiencies in how inspections are conducted, it is important to identify appropriate software that can collect the requisite information during the inspection process and facilitate the inspection and preparation of the inspection report. Software can be programmed to load background documents, populate and print completed inspection forms, reduce repetitive entry of the same information, collect inspection field notes, collect data for the Agency's databases, and populate inspection reports using information collected during the inspection.

It is important for software to take full advantage of the benefits of the hardware, but more importantly, for the software's capabilities to fully integrate the inspection workflow process. One reason why some efforts to adopt technology do not succeed is that the software's capabilities are not fully utilized or tested, which leads to an incomplete trial of the workflow process that may end in rejection.

In general, there are three broad categories of software: commercial off-the-shelf (COTS), customized, and proprietary. The cost associated with each category tends to increase exponentially from hundreds to hundreds of thousands of dollars with the level of programming required. This cost is also relative to the degree of automation, and ultimately, efficiency. COTS software such as spreadsheets, databases, and word processing software are the least expensive and often lead to small increases in productivity because they are viewed and used as individual functions and they are not integrated into multiple tasks. If the software is customized, either in-house or by a third party, the individual software can usually combine several tasks such as site selection, data collection, and report writing. Software packages such as Microsoft Access and InfoPath on the Tablet or Dragon forms on the PDA can be used to create forms or checklists specific to each inspection program. Finally, proprietary software can often integrate the field activities with an agency's database creating real-time updating of data and reducing the need for multiple data entry. Table 2 summarizes the type and potential cost of various software programs.

TABLE 2: TYPES OF SOFTWARE SOLUTIONS AND POTENTIAL COSTS

Solution	Cost
Note taking software (COTS)	$100
Spreadsheet/Database forms (COTS)	$100s-$1,000s
Customized Commercial Form/Checklist Software	$1,000s-$10,000s
Proprietary Software Solutions	$10,000s-$1,000,000s

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COLLECTION TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 4

RESULTS OF SURVEY AND RESEARCH ON USE OF PORTABLE PERSONAL COMPUTERS WITHIN EPA AND BY OTHER GOVERNMENT AGENCIES

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RESULTS OF SURVEY AND RESEARCH ON USE OF PORTABLE PERSONAL COMPUTERS WITHIN EPA AND BY OTHER GOVERNMENT AGENCIES

4.0 METHOD USED FOR INFORMAL SURVEY

The National Compliance Monitoring Policy Branch (NCMPB) conducted a survey during the summer of 2005 of headquarters and regional EPA offices that have inspectors to determine the level of technology use among EPA inspectors. A summary of information obtained from the survey as well as other available information on EPA's efforts to adopt portable personal computers to field use is provided below. The PCB project being implemented by the NCMPB, Region 5 and the State of Indiana are included in the summary below but detailed information is provided in Part 5 of this document.

In addition to surveying EPA regions and offices with compliance inspectors, the NCMPB contacted over 30 different federal, state, local and foreign agencies. While this research effort was not designed to be comprehensive, the NCMPB identified a number of agencies at the federal, state, local, and international level that are using portable personal computers in the field. The NCMPB staff asked about hardware and software being used in either an inspection or enforcement capacity and solicited information on the results other agencies were achieving by using the technology.

The agencies contacted were identified by web searches of news reports about governmental organizations investigating or using new hardware and software in the course of compliance monitoring activities. The NCMPB also contacted federal agencies with compliance monitoring responsibilities as part of their mission and other organizations identified by OC managers as ones using new technology.

During the inquiry, the NCMPB staff described the purpose of the call and asked questions about their project to determine the name, the objective and a description of the project; the cost to develop; the known benefits, if any, of implementing the project including savings in inspector time, program dollars saved, and data improvement. While most of the respondents could provide a name for the project and a description, in many cases, the respondent did not know the cost for development nor could they provide evaluation information on the success of the project. Much of the evaluation information provided was anecdotal. Information collected during the survey is found in Appendix A. Examples which show the types of projects being implemented and information on their benefits are provided below.

4.1 OVERVIEW OF THE SURVEY AND RESEARCH

In 2007, the NCMPB updated the information from 2005 based on summer interns contacting a number of the original contacts. During the initial contact in 2005, many of the agencies questioned indicated they were considering the possibility of automating their inspection processes through new hardware and software solutions. Many of the contacted agencies have not implemented these programs quickly due to high start up costs and/or

restrictive budgets. However, given the multitude of options and the high variability in costs in implementing new workflow processes, a majority of agencies found some way to incorporate new technology into the inspection workflow process. In most cases, the savings in efficiency and productivity outweigh the initial investment. The primary difficulty for government agencies is defining the appropriate level of integration based on data needs and available funding. Many government programs successfully funded new technology programs for their field agents from several different sources although the benefits and efficiencies occurred at different points within the workflow process. It is sometimes difficult for one part of the organization to justify the costs when the benefits are dispersed across the whole organization.

Appendix A provides a detailed list of results from the survey. The discussions below highlight examples of the various ways in which agencies are adopting technology and the results.

4.2 USE OF PORTABLE PERSONAL COMPUTERS

Agencies at the federal, state, and local level are making progress in adopting portable personal computers into their field work. Within EPA, there are a number of efforts. Some are program wide, e.g., the Safe Drinking Water program developed and field-tested PDAs for their Underground Injection Control (UIC) Class V inspection program and Sanitary Sewer Survey program. OECA's pilot of the PCB inspection template is directed towards one type of TSCA inspection. At this time, efforts within EPA are program specific or even specific to a region or to individual inspectors; these efforts seem to be increasing. Some efforts focus on the use of checklists which are filled in during the inspection, and others seek to maximize the use of technology to automate the inspection and report writing process.

4.2.1 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

OECA

At this time, OECA's primary focus is on the use of Tablets and software that can be used to prepare for an inspection, conduct the inspection, prepare the inspection report, and report information on the inspection (facility, date, inspector, type, etc) into Agency databases.

- **TSCA PCB Pilot**

  Current efforts include the TSCA PCB Pilot project. Software was developed based on the inspection work flow process and allows the inspector to record information once and the software uses that information to populate forms. Information that is entered prior to the inspection and during the inspection can be manipulated by the software so that it populates screens as the inspector conducts the inspection, e.g., information gathered during the opening conference and by reviewing records at the facility can be used during the walk through without the inspector having to re-enter the information. This can help the inspector during his walk through. For example, he can flag what equipment he wants to inspect, and the computer will show the pertinent information recorded during the records review when the inspector physically inspects the equipment. The software can take information and

photographs gathered during the inspection and use it to populate the inspection report. Part 5 provides an in-depth discussion of the pilot, for the PCB program and expansion of the pilot. The pilot provides a blueprint for applying the FACT Strategy and adopting this technology.

- **Survey of use of new technology within EPA, other Federal Agencies, and States**

The NCMPB conducted web searches, made phone calls and sent e-mails to gather information on the extent that other agencies or offices are adopting technology, especially portable personal computers, for field use by compliance inspectors. Appendix A contains the results of the survey. In addition to the survey, the NCMPB met with the FAA and FDA to discuss their use of technology.

- **OECA and OEI coordination**

The NCMPB has periodically checked in with the OEI to ensure that its efforts were consistent with OEI policy. OEI participated at one of the National Inspector Workshops and provided an update on their work. Recently, the NCMPB met with OEI staff to discuss a tool which OEI is developing, the Facility Field Data Collection Tool. OECA will share this FACT Strategy with OEI and work to identify areas of common interest for further development.

- **Discussions at national meetings**

The NCMPB has given presentations at EPA and state meetings on its PCB pilot project. They made a presentation at the June 2007 National PCB Meeting, which was attended by EPA PCB personnel. They also led a discussion of this topic at the October 2007 Field Operation Group (FOG) Meeting. The FOG consists of EPA Regional supervisors and staff who conduct environmental monitoring and/or compliance inspections. Meetings such as these provide an opportunity to not only share what OECA is doing but to also gather information on what others are doing.

- **Outreach to states**

The NCMPB participated in the Planning Committee for the September 2007 Pesticide Regulators Enforcement Program (PREP) Compliance Monitoring course. They gave a presentation on the use of new technology for compliance programs during the course.

In August the NCMPB gave a presentation for Region 1 and its states that conduct TSCA asbestos inspections. Additional presentations were given at a Region 4 state asbestos meeting and a tri-regional asbestos meeting with Regions 1, 2, and 3 their states.

UIC PROGRAM

In 2002, the Office of Water began developing UIC software for PDAs through a contractor. Due to the lack of a national UIC database, and the regional variation in data, the software had to be developed individually for each region. The software consisted of a series of checklists on a PDA with GPS integration, and an interim Access database for a laptop. After collecting data on the PDA, inspectors could connect to the laptop, print trip reports from the field, and export data to the regional database. Each program was developed by spending a day analyzing the workflow process with regional inspectors. The contractor would develop a sample program, which would be tested by the region before delivering the software. At the same time, many of the regional databases were upgraded to Microsoft Access databases. Training consisted of an operations manual developed at Headquarters, and training by a lead inspector at the regional level. One primary benefit of the software was the reduction in transcription errors.

By 2006, seven regions were using PDA software for their UIC inspections. The total cost for the programs, including upgrading regional databases, ranged from $45,000 to $100,000 per year. The Office of Water stopped funding and supporting the UIC software in 2006, but many regions continue to use the software. Some regions have even tried to broaden and improve the software themselves. Meanwhile, Office of Water has shifted toward developing a national UIC database.

SAFE DRINKING WATER - SANITARY SURVEY PROGRAM

The Office of Water developed a PDA template in 2004 for use in its Sanitary Survey Program. Since different states have different survey requirements, the software allows for individuals to add their own questions or create standard sets of questions depending on the drinking water system they are going to survey. The software prints reports, cover letters, and deficiencies in the field; exports data to the Safe Drinking Water Databases; and makes it easier to follow-up. Most surveys are not considered inspections. As of November 2006, 16 states and several EPA regions have tested the software or started developing question sets to begin testing, and over 800 surveys had been completed. In fall 2005, Office of Water released a new version of the software for Tablet PC, which allowed inspectors to choose their application based on hardware preference and the length of the survey. According to preliminary results, inspectors are finding a savings of between 3 to 14 hours in conducting sanitary sewer surveys using the new hardware and software. The Office of Water publishes a newsletter with updates about the software and its use.

OEI - SOFTWARE FOR PORTABLE PERSONAL COMPUTERS

OEI has developed a Facility Field Data Collection Tool, which is a software model designed to support the EPA Locational Data Improvement Project. The application software enables users to capture latitude/longitude readings in the field—using a GPS receiver—and add comments. The system can also connect to the Facility Registry System (FRS) for import and export, or be exported to a text file for upload into any database. Currently the application runs on Windows Mobile (for PDAs) or Windows XP (for Tablet PCs or Ultra Mobile PCs). The

design of the tool allows for integration into other software applications. OEI is currently beginning field usability tests.

OSWER AND REGIONAL EMERGENCY RESPONSE TEAMS

The Emergency Response Team has developed an extensive set of tools for its On-Scene Coordinators. Applications for field use allow for modeling, 3D mapping, statistical analysis, data acquisition, and data management. On-Scene Coordinators use a variety of hardware, including PDAs, laptops, GPS, digital cameras, scanners, and data monitors. This combination of tools allows for real time coordination of office and field activities. The unique needs for: immediate response; coordination of multiple individuals in different locations; and communication from individuals who spend extended periods of time on-site, provides the incentive for the Emergency Response Team to use technology in the field.

One of the primary tools used by ERT has been in constant development over the past 15 years. Scribe—a required deliverable for all EPA Emergency Response contracts—allows for captures of sampling, observational, and monitoring field data. Examples of Scribe field tasks include Soil Sampling, Water Sampling, Air Sampling and Biota Sampling. Scribe can import electronic data including Analytical Lab Result data (EDD) and Sampling Location data such as GPS. Outputs include labels for collected samples, Chain of Custody generation and Analytical Lab Result data reports. The flexible user interface allows individuals to manage, query and view all the information, or export electronic data to other tools, so sampling data may be further analyzed and incorporated into report writing and deliverables. Additionally, Scribe supports the development of PDA extension applications by OSCs or the Emergency Response Team on an ad-hoc basis. OSWER has a dedicated staff of EPA and contract employees to develop and support the software. All of the tools are shared and discussed among regions through an IT Forum, Federal Remediation Technologies Roundtable, and a framework that stores the applications centrally.

The Scribe system has been used for many EPA response actions including World Trade Center, the Columbia Shuttle recovery, and Hurricanes Katrina and Rita.

REGIONS

- **Region 1 TSCA Program**

  In 1998, Region 1 developed a Microsoft Access based system to audit asbestos training providers, based on a checklist created by states in Regions 1, 2, 3, and 4 to enhance reciprocity. In 2001, it was expanded to include a checklist-based tool for Asbestos Hazard Emergency Response Act (AHERA) inspections. The system is used on laptop computers, and allows inspectors to identify observations related to specific statutory requirements. Summary reports of inspections and links to photos are also integrated into the software. Since 2001, a TSCA Lead inspection checklist has been added, and the states are looking to upgrade the system to work with Tablet PCs with a Web-based feature to immediately update their databases over a secure site.

- **Region 2 UST Program**

  Beginning in 2001, a Region 2 inspector, in collaboration with the State of New York, began developing a PDA based software tool for Underground Storage Tank (UST) inspections. Development of the software was based on a thorough analysis of an inspector's workflow. After initial design, the inspector created a series of paper based checklists for inspectors to use and test in the field. This process helped to refine the checklists without additional programming. After many iterations of testing, the software allowed inspectors to collect facility information, inventory USTs, and collect GPS data using a combination of checkboxes, drop-down menus, and handwritten entry. Progress on the project stopped in 2005 when the inspector wanted to upgrade the back-end database to allow updates from the field. The IT department would not support the new database software. Since that time, the inspector has moved to the National Pollutant Discharge Elimination System (NPDES) program and is trying to develop a storm water inspection checklist. The Region 2 UST office is currently looking into having a contractor upgrade the PDA software. They have received funding from the Office of Underground Storage Tanks (OUST), but the Office of Site Remediation Enforcement (OSRE) denied additional funding.

INDIVIDUAL EFFORTS IN REGIONAL OFFICES

A number of inspectors have been investigating the use of PDAs or Tablets on their own. Some inspectors believe that pen and paper is still the most efficient method of data collection, and they consider the new workflow process using new technology an unwelcome distraction. Other inspectors ask why EPA has not invested in new workflow processes to adopt the new technologies when states in their region have been using PDAs and Tablets for some time.

4.2.2 OTHER U.S. GOVERNMENT AGENCIES

FOOD AND DRUG ADMINSTRATION (FDA)

FDA uses the Tablet and software to generate reports providing during closing conference. They don't use it to conduct the inspection although it provides inspection targeting information. They also use the deficiency data to analyze deficiencies across sectors.

The Food and Drug Administration is responsible for inspecting a variety of facilities, including fish processing plants, pharmaceutical and medical devices manufacturers and cosmetics. Many companies inspected by the FDA complained that enforcement response among the regional offices varied greatly. There was a concern that a violation in one region resulted in a warning letter while, the same violation in another region resulted in a fine. Industry wanted consistency in the agency's enforcement response. In response, the FDA began in 1999 and completed in 2003 their first module called Turbo Electronic Inspection Report (Turbo EIR). Today, 1,200 FDA inspectors use this module. The Turbo EIR has several functions. It allows inspectors to download their assignments, generate and print reports and citations, and upload the field data into an agency-wide database for real-time updates. The software contains "plain English" translation of the CFR that ensures the prescribed information is used to issue inspection observations consistently throughout the country. The primary benefit

of this program is quality control. Standard procedures and language are used in all reports. This workflow process has promoted more unified enforcement actions by the Agency.

The Turbo EIR module is the equivalent to an EPA inspector providing his/her observations during the closeout meeting with facility representatives. While the EPA inspector provides a list of potential deficiencies, the FDA inspector provides the facility representatives a formal printout of the specific deficiencies found by the inspector at the facility. The Turbo EIR includes the Code of Federal Regulations and plain English language for each regulation. The FDA inspector identifies the deficiencies in the software, prints the information onto the FDA form (FDA-483), the FDA's official notification of deficiencies, and gives the FDA-483 to the facility representative. The deficiency data is uploaded onto the mainframe back at their office. Any FDA inspector can search the database to determine if similar deficiencies are occurring in other company facilities in the US or if the deficiency is a common problem within an industrial sector.

In terms of cost, the FDA spent roughly $2 million dollars from 1999 to 2005, developing, testing, implementing, training and working through software issues. The FDA currently spends approximately $35,000 a month for programming support from the USDA, one FDA FTE and one Project Officer FTE for contract oversight.

There are some unique items to note about the FDA project. The programmers are based in the Department of Agriculture. Should EPA utilize their services, costs should be a bit lower since software and knowledge have been developed during the FDA project. OECA could join with the FDA contract to take advantage of development costs already paid for by the FDA. The other unique feature is the development of the plain English verbiage of the CFR used in this software. The FDA figures 1000 man-hours, both program and legal, staff and managers, were required to develop the plain English verbiage.

U.S. POSTAL SERVICE

In 2003, the U.S. Postal Service equipped 600 safety inspectors with Compaq iPAQ PDAs to annually inspect their 39,000 Post Office facilities for OSHA requirements. Inspectors use software that a team of in-house and contract programmers began developing in 2001. The software integrates three databases into a checklist, and provides a web interface to upload information into an Oracle database and immediately print reports and access references.

CENSUS BUREAU 2010 ENUMERATION PROCESS

The Census Bureau awarded a contract to make the 2010 enumeration process paperless. The software and hardware are standardized to the Census' IT policies and there is no ability by the user to amend the workflow process. The software will allow the enumerator to follow-up with citizens who did not submit their long or short census form. All the information will be on a handheld unit similar to a TREO. The TREO is a combination phone and PDA. It will have wireless capability with information transmitted on a regular basis to the national database. This project is a true makeover for the enumeration process scheduled in 2010. As of May 2007 the product is being field-tested. The contract award totals $600 million. The contract includes all

hardware (500,000 handheld units) and software, back-end programming thru database, wireless development, training and support. A unique feature about this project was how the contracting process was used. The Census knew what it wanted in terms of performance but did not know what hardware and software there was that could address their needs. During the contract process, each contractor was required to develop a prototype of the software and hardware that would be used in the field. As a result, the Census Bureau currently has an 85-90% complete prototype package. There will be some modification to the prototype software to reach the final product but this contracting process took about six months to complete yielded a near perfect workflow process which was scheduled for field testing by May 2007.

4.2.3 STATE AND LOCAL AGENCIES

The survey contains many examples of the use by state and local agencies. States and local governments seem to be ahead of the Federal government in their efforts to adapt this technology to specific programs. See the Appendix for additional examples.

SOUTH FLORIDA WATER MANAGEMENT DIVISION (SFWMD)

They use mobile laptop computers with data link cards. The software is Avantgo business server. Digital photos and GPS can be incorporated. The original program was developed in 1999. It was developed in-house for time reasons. Everything is done through web browsers. The SFWMD used an analysis of workflow process to develop the software. It was a one year process from development to deployment. The M-business server is high security. They created a Web-based technical manual, and there is personal training for each new person. There was resistance from more experienced inspectors who were concerned with security issues. Also some of the inspectors found that small PDAs are hard to enter data, but the mobile tablet PC does not have that problem. There are 45 inspectors, and they are adding ten more in the next few months. They are required to use the technology. Over the last six years about 2,000 inspections, focused on wetlands and storm water programs, have been completed with this technology. They have not encountered any legal, enforcement, technical, or security issues. The Avantgo start-up cost was $10,000; the 25 original PDAs cost $300 a piece. The programmer time was about $45,000. It was about $60,000 total. The program paid for itself in less than a year.

FLORIDA HEALTH DEPARTMENT IN VOLUSIA COUNTY

Their program includes the use of arc pad with attached GPS service, and XV6700 Pocket PC/IPAC. The technology is used for several different inspection programs to pre-fill out forms and to upload information back to a database. These inspection programs focus on septic tanks, pools, and irrigation systems. The technology does not incorporate digital photos. The in-house program began 3-5 years ago. It was developed using a combination of statute-based checklists and analysis of the workflow process. It allows detailed notes to be taken by inspectors, should the inspector desire. The program took a couple of months to develop and a couple of months to implement, but it is constantly being revised. The inspectors were given hands-on training on how to use the technology. At the beginning of the program they encountered resistance from inspectors because of the small size of the Pocket PCs. Inspectors

are encouraged, but not required to use the technology. They have not encountered any legal, enforcement, technical, or security issues. Hardware costs are roughly $10,000 (rough figures) and software costs are roughly about $10,000. The cost per inspector may be going down from around $1,750 per inspector to around $1,500 because upgrading the software is less expensive than buying it. They have experienced time savings by elimination of duplication of effort, reducing the of chance errors. Efficiency has improved.

FLORIDA DEPARTMENT OF ENVIRONMENTAL RESEARCH MANAGEMENT

Their program uses Tablet PCs with Microsoft Windows Shop and custom built software. They can incorporate GPS/GIS maps and digital photos. The program began in 2003. The software was created in-house. They used both statute-based checklists and analysis of workflow process. The program is constantly being revised with more than five versions developed in the first four years. The 5th version is coming out in the next few weeks. There is a separate training group for the technical process. Inspectors are required to use the tablets. There was some resistance from inspectors at first, but no more than is usual for any change in the inspection process. There are 70-75 inspectors using the tablets. No novel legal, enforcement, technical, or security issues have come up. Nobody has done a study on efficiency but the consensus is that the program has increased the number of inspection per year and been worth it.

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

In 2005, the Rhode Island Department of Environmental Management reported that they use Tablet PCs with Microsoft Office InfoPath to conduct UST inspections. The InfoPath software transformed a ten-page paper checklist into a single form that auto-fills with pre-inspection information. During an inspection, the inspector can access all the references and site history he/she needs as it was downloaded before going into the field. In addition, the software and digital pen allow the inspector to draw and store site diagrams on the form. The data is uploaded to their Oracle database allowing for immediate follow-up with enforcement action. The new system is expected to save about $200,000 per year compared to the paper process.

Update from June 2007: Their program is still in its pilot stage. Inspectors just started using tablets in the field within the last couple of months. Underground storage tank inspectors are now using HP Tablet PCs. They can incorporate other electronic data such as digital photos and GPS. The software for the programs was developed by consultants based on Microsoft software. They used a check list to develop the software. The check list is part of a larger system of data management tools developed by a consultant. Three inspectors are currently using the Tablet PCs and one more is being trained. They are getting input from the inspectors and deciding how to alter the program. The inspectors get in-house training on how to use the tablets. They encountered a little resistance from the inspectors, the major complaint being that the screen is hard to read in the sun. The program began with a Microsoft grant for upwards of $100,000. Because this is a pilot program, they are still waiting for some feedback on time savings.

TEXAS STATE BOARD OF BARBER EXAMINERS

Since 2001, the Texas State Board of Barber Examiners, with eight inspectors, has used PDAs equipped with wireless technology to visit fifteen to twenty businesses per day to check for sanitation violations. It took about one year to develop the software and to work through the software bugs. With the implementation of the new technology into their inspection process, the Board eliminated paper forms, reduced transcription errors and duplicate data, saved time in the field, and reduced office staff (a direct saving of $28,000 per year).

4.2.4 FOREIGN GOVERNMENT AGENCIES

HONG KONG ENVIRONMENTAL PROTECTION DEPARTMENT

In 2000, the Hong Kong Environmental Protection Department equipped inspector teams with PDAs to carry out inspections of chemical waste collectors and their vehicles. The inspectors download site histories from their database, complete inspection checklists, and synchronize the inspection data into their database for processing, and report generation. The agency found that the teams saved 1.5 man-hours per day, with an increase in productivity of 10%. This solution reduced paper waste, data duplication, and data entry errors. Beyond PDAs, the Environmental Protection Department started a GIS-based system for logging and mapping public complaints about potential polluters, and the Department requires major development sites to mount webcams at construction sites for public internet monitoring.

NEW ZEALAND MINISTRY FOR THE ENVIRONMENT

Inspectors in the New Zealand Ministry for the Environment are field-testing PDAs. The current system produces draft letters and allows access to site history in the field. Ultimately, they hope to have a system that will pre-load inspection forms and site information, record findings, integrate digital photos, print out forms, and download real-time information.

UNITED KINGDOM HEALTH CARE WORKERS

The healthcare sector in the United Kingdom equipped health care workers with Tablet PCs using Microsoft InfoPath during patient visits. This allows for a team approach to patient care by creating a single record with information shared among the database systems of several care agencies. The solution is expected to save £3 million ($5.95 million) by eliminating assessment duplication, and reduce administrative costs by £850,000 ($1.69 million).

4.3 ADVANTAGES AND DISADVANTAGES OF PORTABLE PERSONAL COMPUTERS IDENTIFIED BY THE SURVEY/RESEARCH

PDAs have been on the market since 1997 and Tablet PCs since 2001. Agencies that adopted their use see benefits within their organizations and a positive return on investment. In the case of the South Florida Water Management District, a cost analysis of their $10,000 investment into their PDA program produced a savings of about $70,000 annually.

Advantages:

- Improves efficiency and productivity.
- Decreases data entry errors by doing away with replication.
- Reduces paper waste.
- Can carry all reference materials in the PDA or Tablet.
- Decreases time spent preparing reports.
- Standardized responses ensure consistency.
- Standardized inspection reports, uniformity of inspection data across the organizations.
- Provides solid evidence for any legal disputes or hearings.

Disadvantages:

- Initial cost of development, time to develop, training and deployment.
- Staff resistance in adopting a new workflow process and/or new equipment/software.
- Issues/bugs may arise that were not detected during initial testing.
- On going costs of maintaining and/or upgrading the software plus adding new functions/capabilities over time.
- Costs of maintaining and replacing equipment.

4.4 ADDITIONAL CONSIDERATION IDENTIFIED DURING THE SURVEY AND RESEARCH LESSONS LEARNED

Adapting to new workflow processes and using new hardware and software in the field requires planning and awareness of the technology's capabilities. Before purchasing the equipment or software, managers need to check with their Information Technology (IT)/Help Desk to ensure that the equipment and software will be supported. Knowledge of IT policies including security requirements can impact the choice of hardware and software.

Energy use becomes an important consideration for the inspector using a portable computer and other portable devices to collect compliance monitoring information. Inspections usually last several hours and access to an electrical outlet may not be convenient. Extra batteries and portable chargers will be required to help the units last through the day. The possibility of data loss can be reduced by manipulating the device's software to extend battery life. In this new workflow process, regular data backup is necessary to ensure the collected field data is not lost during the inspection.

The physical environment in which an inspector operates can be a limiting factor when using electronic devices. Temperature, glare from sunlight, or exposure to water or hazardous materials are all concerns. However, polarized screens, units without fans, and even ruggedized versions of PDAs and Tablets are available. There may be situations where the environment is so hazardous that using any electronic device within the environment could cause an explosion. There are ruggedized units that can operate in most of these environments.

The cost to purchase portable computing devices is a definite consideration, as the Tablets are more expensive when compared to comparable desktop systems. The cost and risk of damage can be spread out by purchasing the Tablet and requiring the inspector to use the Tablet as both his desktop unit as well as a field unit. Leasing mobile units might be an alternative as hardware technology changes rapidly. The Colorado Department of Agriculture has been using Tablets in the field for several years and has a leasing plan with one of the Tablet manufacturers. As part of the leasing program, the department purchased an Accidental Damage Replacement (Insurance) Plan. If anything happens to the Tablet, the manufacturer will replace the Tablet free of charge, no questions asked. The Colorado Department of Agriculture has yet to take advantage of the replacement plan.

As with anything new, employees are apprehensive when a change is made within the organization. Introducing new workflow processes along with new hardware and software will cause anxiety. Some EPA inspectors have raised the issue of learning a new and foreign process that is very different from what they have become accustomed. This is a valid concern when introducing any new system or set of procedures. One way to reduce the anxiety is to incorporate the future users into the planning and development stage. This process helps ensure that when the workflow process is ready to be implemented, the users understand the new workflow process and have had adequate training including support services.

When considering the adoption of a new workflow process into inspection and enforcement programs, there are additional issues to consider and respond to in order for the workflow process to have a successful implementation. These issues include:

- Make sure technology fits the goals; don't set goals to available technology.
- Increase familiarity with applicable hardware through purchase and use of devices.
- Provide adequate training and support.
- Personal interaction with operators still required.
- Security: passwords, FOIA request access, CBI, backups.
- Integration into back-end system (ICIS).
- Provide look and feel of paper forms.
- Include business stakeholder in design.

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 5

APPLICATION OF THE KEY ELEMENTS FROM THE FACT STRATEGY: OECA'S PILOT PROJECTS USING PORTABLE PERSONAL COMPUTERS

PART 5
APPLICATION OF THE KEY ELEMENTS FROM THE FACT STRATEGY: OECA'S PILOT PROJECTS USING PORTABLE PERSONAL COMPUTERS

5.0 OVERVIEW

The NCMPB has successfully applied the key elements identified in Part 1 for making better use of technology for the TSCA PCB inspection program and conducted a pilot program with Region 5 and the State of Indiana. Software templates have been developed and are in use that load documents prior to inspections and allow one time entry of information by the inspector to populate multiple forms, field notes, photo logs, and inspection reports. Part 5 provides detailed information on the NCMPB's early efforts to pilot PDAs and voice recognition software and explains the reasoning behind its selection of the TSCA PCB Inspection Program for the pilot and why it chose to pilot the larger Tablet rather than the smaller, less expensive PDA. Lessons learned are identified in italics throughout this part. Examining the process the NCMPB used for the PCB pilot demonstrates how one moves from identifying the technology to improve a workflow process through to a pilot project. It describes the process to develop inspection program specific software. Cost information is also provided.

This part recommends that OECA expedite the expansion of the TSCA PCB pilot to all Regions and to states which conduct inspections under TSCA Compliance Monitoring Agreements by providing funding for equipment. The NCMPB has already provided TSCA STAG funds to regions to provide to additional states to purchase Tablets and to participate in a training course being conducted by the NCMPB in fall of 2007. The NCMPB will provide the software templates. Regions are very interested but have not purchased Tablets. OECA plans to purchase and provide 15 Tablets to the regions at an approximate cost of $4,500 per Tablet (including needed accessories) for a total amount of $67,000. This will equip one to two inspectors per region. Most regions only have one or two PCB inspectors. (There are 26 PCB inspectors across regions.)

In addition to the PCB Pilot, the NCMPB is working with regions to help them develop a software package for TSCA AHERA (asbestos in school) inspections. Note that the inspection forms are the same as for TSCA PCB inspections, eliminating the work needed to develop electronic forms for the Tablet. The NCMPB is in the process of working with Regions 1 and 3 to evaluate the AHERA workflow process and discussing how the regions can merge their existing systems with features from the PCB template. Region 1 states have already requested funding to purchase Tablets under the TSCA STAG funds, and the NCMPB has provided this funding to Region 1 to transfer to their states.

The final recommendation in this section is to provide funding to develop inspection software that is able to communicate directly with OECA's databases to:

- Allow inspectors to upload inspection data directly from information entered during the inspection to ICIS.

- Download data for targeting, providing assignments, and pre-inspection review, e.g., information on permits and compliance history.

In addition to the time and cost of integrating any export capabilities into inspection templates, there is a need to ensure that ICIS has the ability to import the batched data. This functionality is currently not a priority for ICIS development. Management would need to make this an ICIS priority and fund the development in order to fully integrate field data collection with ICIS. A joint effort between the NCMPB and ETDD would be required to develop the export and import functionality and ensure compatibility. The NCMPB would ensure that software exports meet the business rules developed by ETDD, and ETDD would lead the efforts to develop the ICIS import functionality.

Finally, this section identifies policy issues that were raised during implementation of the PCB pilot. The issues are primarily related to data security and enforcement sensitivity of information. Further investigation is needed to determine the extent of policy or guidance that would need to be developed. These policy issues are relevant to any compliance program that uses technology in the field.

5.1 EARLY EFFORTS

Starting in 2000, OECA began reviewing the inspection workflow process and identified the potential for handheld devices to capture field information electronically. The NCMPB researched the available technology and selected PDAs to determine if they could be used to benefit inspectors in the field.

PDAS FOR COLLECTING ICDS INFORMATION

The first attempt by the NCMPB to use PDAs was in conjunction with the development of the ICDS form. The NCMPB provided PDAs to Region 2 to collect ICDS information. The inspectors completed their inspections with pen and paper, and then used the PDA to input ICDS information into an electronic form. Since the ICDS form was only a small part of the information collected, it was faster to continue with the paper form than to switch to the PDA. The pilot demonstrated that even if a given task is improved, the use of field activity collection technologies must take into account the entire workflow process.

PDAS FOR RCRA INSPECTORS

Later, Region 9 conducted a limited piloted using PDAs provided by OECA for RCRA inspections. No RCRA specific software templates were developed. The inspectors used the limited MS Word and Excel software that came with the PDA. The inspectors created their own checklists on MS Word and proceeded to collect field information. However, this was a two person effort. One inspector used the PDA while the other used pen and paper. This pilot demonstrated the need for software specific to the program.

OTHER USES OF TECHNOLOGY IN THE FIELD

Additional individual efforts have been made by inspectors to use PDAs in the field. OECA shared their information and knowledge as requested. Several inspectors developed checklists which they used to conduct inspections. Most inspectors found PDA screens to be too small and that while drop down menus and checklists worked okay, they found it difficult to take extensive notes or to draw diagrams.

Technology was not limited to the use of PDAs. OC also funded voice recognition equipment for a pilot with one inspector in Region 4; at that time, this technology did not seem to work well. Additionally, a few inspectors adopted the use of video taping equipment for inspections. In some cases, they used their digital cameras to take short video clips during inspections. They found that short video clips of no more than several minutes could be useful during enforcement cases.

LESSONS LEARNED FROM EARLY EFFORTS

Lessons learned from these early efforts included valuable information on obstacles to adopting new technology. These efforts also demonstrated the importance of software that facilitates data collection and report writing. A great deal of useful information on technical considerations such as battery life, time and training needed to learn to use the hardware, and whether facilities objected to its use was collected and shared during National Inspector Workshops and is listed in the lessons learned sub-section below. Note: Facilities have not objected to the use of PDAs or Tablets during inspections.

Lessons learned:

- *Using portable personal computers is not worthwhile unless it is used for most or all of the inspection and inspectors are more likely to use the portable computer if it can be used for most of their work. If the application is limited and results in them having to switch between pen and paper and the computer, inspectors are unlikely to take it into the field and it is less efficient.*

- *Providing the equipment without software provides limited success. While some inspectors have found ways to improve the inspection process using various technology, it is far more efficient to design software that meets the needs of many and reflects upfront input from the persons using it.*

- *Screen size of the PDAs is too small and does not lend itself to inspections that require more than checklists or yes/no answers to questions. It's too difficult to type text other than abbreviated text. It is too difficult to use a PDA to draw complicated diagrams, often a necessary part of documentation. Please note that the upcoming workforce that grew up text messaging on cell phones may not have the same concerns as inspectors that learned typing skills on a full keyboard.*

- *The technology keeps changing and improving. What did not work well a few years ago may work later as the technology advances. It is important to revisit the technology periodically to determine what advances have been made.*

- *Industry accepted the use of the portable computer during the inspection. Some technologies can interfere with the inspection process especially during interviews, e.g., filming a person being interviewed is likely to hinder the interview as the person is usually more careful of what he/she is saying and may be more nervous.*

- *Training/guidance will be needed to share information on battery life and operating conditions that may affect battery life or operation of the Tablet, e.g., extreme temperatures.*

- *Early efforts indicate that inspectors need some time to learn how to use the equipment. It will be important to provide ample opportunity for inspectors to get comfortable with using the equipment itself as well as the software. It will be more productive to train on template use after the inspector has learned the basics of the device. The inspector's comfort level with using the device is an important factor. At the same time, new hires that grew up routinely using computers and who have relied on computers much of their lives expect to use this type of technology in their jobs.*

5.2 TSCA PCB INSPECTION PILOT USING TABLETS

INITIAL EFFORTS

In 2004, the NCMPB began investigating the use of Tablets as an alternative to the smaller PDAs. The Branch decided to attempt to load TSCA inspection forms such as the Notice of Inspection and the Receipt for Samples on the Tablet using software that would allow forms to be populated using the Tablet and printed from the Tablet on-site. To explore what might work best for doing this, two different types of Tablets were purchased for use to develop the TSCA PCB Pilot.

BASIS FOR SELECTING THE PCB INSPECTION PROGRAM

The PCB program was selected because the NCMPB is the media lead for this program and has technical expertise on the rule requirements and how inspections are conducted. The Branch had recently completed updating the PCB Inspector Manual, which provided a good starting point for identifying the workflow process. Senior and junior inspectors and supervisors participated in the development of the PCB Inspector Manual. This helped ensure there was basic agreement on the inspection process itself. An agreement on the detailed specifics of the work flow process is critical to being able to develop program specific templates.

In addition, PCBs were selected because the NCMPB manages the TSCA State and Tribal Assistance Grants (STAG) for compliance monitoring programs. The STAG grants provided a mechanism for funding the purchase of the Tablets for potential state partners for the pilot. Under TSCA PCB compliance monitoring grants, states conduct inspections on EPA's behalf using EPA procedures. Thus, templates developed for EPA's TSCA PCB inspection program could also work for the state. Under TSCA PCB grants, states are required to submit

the inspection reports to the region because the state conducts the inspection under EPA's authority using EPA credentials. This provided an added opportunity to evaluate the reports generated using the new technology.

IDENTIFYING PARTNERS FOR A PILOT

In order to identify specific partners to pilot the template, in December 2004, the NCMPB demonstrated the forms at the National EPA Inspectors Workshop. This generated quite a bit of interest and came at a time when the NCMPB was in the process of attempting to expand the capability of the software to gather field data and populate forms and the inspection report. Region 5 and the State of Indiana were interested as they were exploring the use of Tablets for their PCB inspection program.

Lessons learned:

- *Expanding to the states is easier if the states use the same forms and procedures as EPA does, which is the case for the TSCA PCB template. As the program is expanded to asbestos inspections (see EXPANSION TO TSCA AHERA below), the Agency will have an opportunity to see how well this works when expanding to states that inspect under their own laws and regulations. TSCA AHERA offers the opportunity to see both as half of the states have waivers and operate under their own regulations and the other half do not and must use EPA forms and procedures.*

- *Generating strong interest in using this technology is important especially in its initial use. Presentations and demonstrated success will help ensure interest.*

WORKING WITH PARTNERS TO REVIEW THE WORKFLOW PROCESS AND SECURE EQUIPMENT

In 2004, Region 5 and Indiana agreed to work with the NCMPB to evaluate the use of Tablet computers with commercial off-the-shelf software to collect PCB inspection data under field conditions and create inspection reports. In early 2005, the NCMPB staff and the contractor developing the software template met with Region 5 for a day to discuss the project and to capture the PCB inspection workflow process in detail, using the recently updated TSCA inspection manual as a starting point. While the contractor began work on the software, the NCMPB collaborated with Region 5 to provide them with hardware and software packages for regional use, as well as STAG funds under the TSCA Compliance Monitoring Program Grants to purchase hardware for states. Region 5 negotiated and awarded the grant to Indiana for this activity. Managing funding for the hardware was a critical component of working with the partners in the pilot project to ensure that both the hardware and software packages were ready for the pilot. In August 2005, the NCMPB and the contractor met with Region 5 and Indiana inspectors and their supervisor to provide training on the newly acquired hardware (the Tablet) and to review the beta version of the software.

Indiana chose to replace their six inspectors' desktop PCs with Tablets, consistent with their policy of one computer for one employee. This compelled the inspectors to learn quickly how to use the Tablet computer.

Lessons learned:

- *The level of effort to reach agreement on an acceptable workflow process for a specific type of inspection can have a major impact on the time and resources it will take to develop software templates. Proceeding in programs that have recently updated old inspection manuals may be the better approach. Alternatively, developing the workflow process for an inspection to develop a template also provides the basic information needed to update out-of-date manuals. What is not desirable is to use outdated manuals to map the workflow process for software development.*

- *Development of agreed upon workflow processes provides an excellent knowledge management tool as this activity can capture the expertise of well experienced inspectors in the Agency. It can also be used as a starting point for developing updated inspector training.*

- *New technology is more likely to be embraced and adopted if someone is supplying the equipment rather than requiring offices to find the money in existing budgets. Thus, the availability of state grant funds for this activity made it more attractive to the states. Money to fund the purchase of new equipment under the TSCA grant was provided in addition to the previous amounts funded for each grant. Under TSCA, states still had to contribute 25% of the total amount of their grant.*

- *Inspector support is needed to ensure that an effective workflow process that has agreement across the program is developed. The effectiveness of the inspection will depend a great deal on the quality of the workflow process identified in the development stage.*

- *Prior to selecting the type of computer that is to be purchased, consultation with the program's IT support office and familiarity with purchasing policy restrictions is advised. Any expansion to other programs or within the PCB program needs to be cognizant that decisions on equipment and software may be impacted by IT policy or purchasing policies. Be aware that flexibility on equipment decisions may be needed. It is not a good idea to decide on a particular type of computer/software and simply provide it to another office, state or EPA, and assume that their IT office will support it or that there are no other restrictions. For example, in Indiana's case, there was a policy of one computer for one inspector. Providing a Tablet under the TSCA state grant did not change this requirement. When the NCMPB were considering PDAs for field work, an IT issue arose as to PDAs with Microsoft Windows versus Palm Pilots. Regional or state IT policies impact equipment choices.*

TSCA PCB TEMPLATE – DEVELOPMENT OF SOFTWARE AND FEATURES

The inspection template was developed specific to the workflow process identified for PCB inspections for use on the Tablets in the field. The template includes the capacity to load documents needed for an inspection, prepare and issue required forms, document findings during the inspection, eliminate duplicative information entry, and prepare inspection reports using templates that self-populate with information collected during the inspection

Inspectors participating in the pilot have Tablets that are pre-loaded with TSCA inspection forms, the PCB Inspection Manual, the PCB regulations, and a Microsoft Access template to collect field information. MS Access was selected as the software that could meet the workflow requirements. The MS Access templates are programmed to take information entered and populate any template within the software file. As a result, the inspector need only record information once. The software uses that information to populate forms, the inspection field notes, and the inspection report.

Information that is entered prior to the inspection and during the inspection can be manipulated by the software so that it populates screens as the inspector conducts the inspection. For example, information gathered during the opening conference and by reviewing records at the facility can be used during the walkthrough without the inspector having to re-enter the information. He can flag what equipment he wants to inspect during his records review. The computer will show the pertinent information recorded during the records review when the inspector physically inspects the equipment. Because of the Tablet's software capabilities, the inspector can input data by handwriting/printing; the software will convert it to text. Creating drawings/diagrams is also easy using the Tablet, and these images can easily be incorporated into the template and report. When photographs are added to the hard drive, the software gathers all the information and produces a nearly complete inspection report with photographs, sample results, and detailed information on the equipment inspected.

TSCA PCB TEMPLATE – TRAINING AND FIELD TESTING

Field Test by the NCMPB - One member of the NCMPB accompanied a Region 3 inspector on two PCB inspections and took notes during the inspections. Each inspection took three to four hours during which time NCMPB staff used the Microsoft Access based PCB template. Battery life was sufficient to power the unit through the inspection process from pre-inspection to closing conference. Battery life was low by the end and may not have lasted beyond 4-5 hours.

Lessons learned:

- *Inspectors should have an additional battery pack available. To improve battery life, they should use the extended battery pack, reduce the tablet screen brightness settings when powered by the battery, use a car charger, or plug in the unit during indoor conferences. These issues should be addressed in a guidance/training document.*

- *The Tablet was light and easy to carry during the inspection. The polarized screen was easy to read, even outside in direct sunlight. A smaller unit might be more convenient. The inspector carried other equipment such as a flashlight and a digital camera.*

- *The inspector should consider using a sling case such as the Motion's bump case or Intelligent Technologies Tablet PC case. By using this type of carrier, the inspector will not need to set down equipment or ask someone to hold it when he is taking photographs. A carrier such as these would allow the inspector to use both hands when climbing a ladder.*

- *Inspections involve different conditions, including harsh weather conditions. If the inspection involves harsh weather conditions, added protection is available in the form of a case such as the OtterBox 4600 Tablet PC Case for the Fujitsu Stylistic Tablet PC.*

Pilot with Indiana – The NCMPB provided one Tablet, with accessories (see discussion under costs), to Region 5. They also provided TSCA grant funding to the Region to fund Indiana's purchase of Tablets, Tablet accessories, and travel costs for training. Indiana obtained Tablets in time for most inspectors to become familiar with the Tablet's features. One Indiana inspector received his Tablet just two days before the training occurred.

After the initial training, Indiana inspectors began comparing the old workflow process to the new workflow process. During the inspections, one inspector used the traditional pen and paper to take field notes while the other used the Tablet. Within three months, the State relied on the Tablet rather than having a backup by using pen and paper. The NCMPB invited two representatives from Indiana to give a presentation on the Pilot at the December 2005 National EPA Inspectors Workshop. During this time, they also met with the NCMPB staff to discuss their experience and to identify areas for improvement.

Lesson learned:

- *Even though the EPA and the state were in agreement on the project, it took awhile for the state to receive the funds due to some delays in their PPG grant due to issues unrelated to the TSCA grant.*

- *Training will be needed and is desired by those considering this technology. Training will help improve the comfort level and avoid costly mistakes in using this technology, e.g., losing data or having the battery die during the inspection.*

- *It is easier to train the inspector on the software if he is already familiar with the equipment and how to operate it. Learning to use the software is easier if the inspector has completed the manufacturer's tutorial on pen use and functions and has accustomed himself to pen entry. Time to learn to use the basic Tablet prior to training on the software will help make the transition easier. Also, during the*

initial few months of the pilot, Indiana had two inspectors participating in inspections being conducted with the Tablet.

- *When initially testing the Tablet PC in the field, it is important to have multiple inspectors. This allows the inspection notes to be captured in writing on paper and via the Tablet. It also helps to identify the efficiencies or areas where changes might need to be made within the Tablet and software.*

TSCA PCB TEMPLATE – PERIODIC RE-EVALUATIONS AND REVISIONS IDENTIFIED DURING PILOT

The field testing allowed the inspectors and the NCMPB to assess the usefulness of the Tablet and software and to identify software changes that were needed. Certain features of the PCB template, such as the ability to collect all necessary information to generate an inspection report did not require revision. Revisions were identified based on input from regional, state, and the NCMPB staff identified a need for better print and edit capabilities for the forms. Originally, the forms printed out as MS Access reports, but this does not allow modification to forms. Listed below are the specific revisions made to the software template based on initial field tests:

- Converted the inspection report and assorted detailed reports from MS Access to MS Word so the inspector can edit the field notes and the print output is more accurate. Continued use of Microsoft Access to collect information, but added capability to convert data to a format that can be read by word processing software.

- Added Small Business Regulatory Enforcement Fairness Act (SBREFA) fact sheet that can be printed in the field.

- Added capacity to populate a form that can be provided to data entry personnel to enter into ICIS. At this time, a form that collects ICIS required information including the ICDS form has been added to the basic template. The goal is to have the form self populated by the software using data already entered by the inspector as he conducts the inspection.

Lesson learned:

- *Re-evaluations and on-going revisions are critical to successful software development because even the best workflow process design is not a substitute for actual field testing.*

- *Technology continues to improve; moving somewhat slowly in this project has not been a disadvantage in that technology has improved.*

5.3 COSTS TO DATE

TABLE 3: SUMMARY OF OECA'S COSTS TO DATE FOR THE TSCA PCB TEMPLATE PROGRAM PILOT		
TASK	HARDWARE/SOFTWARE	COST
TSCA Forms Development and Defining the Workflow Process w/ Region 5	Electronic TSCA Forms	$9,000
Software Development	PCB Template	$34,000
Revisions to Template (4th Quarter 2007)	Revised PCB Template	$13,000
Hardware Costs (Regions/HQ)	Tablets with accessories (2 Regions, 1 HQ)	$15,000
EPA's State Grant Costs	Tablets with accessories (6 units)	$28,000

COSTS OF SOFTWARE

For software development, OC spent $56,000 for contractor support through FY 2007. The total OECA outlay included $9,000 for the initial TSCA forms and workflow process development, $34,000 for template development in Microsoft Access, and $13,000 for the updates identified during the pilot—which will be completed in FY 2007. Note – the $34,000 was spent over 3 years, and the maximum in any one year was $25,000.

COSTS OF HARDWARE AND ACCESSORIES

The NCMPB purchased three Tablets – one for HQ staff use and two for the Region 5 inspectors. EPA provided $28,000 in STAG funds towards the purchase of six complete sets of equipment plus travel costs for training for their inspectors under the TSCA Compliance Monitoring Cooperative Assistance funds. Note: TSCA requires states to contribute 25% of the total grant amount. The hardware packages included the Tablet, mobile combo printer/scanner, mobile CD-RW player, pre-loaded software (MS Office Professional Suite and Adobe Acrobat), an extra battery for the Tablet, carrying case for hardware, and a protective case for the Tablet.

Tablet PC cost depends on the type of Tablet selected. When the NCMPB first began exploring this technology, there were only a few Tablet manufacturers. Since the introduction of Tablets in 2003, the technology has improved and more companies are manufacturing Tablets. Factors to consider in Tablet PC selection are: power, speed, weight, ruggedness, screen features such as polarization, and personal preferences. Indiana chose Motion Computing Tablets for their original use, while Region 5 selected Toshiba Tablets.

As explained previously, Indiana has a policy of one computer for one inspector. Thus, Indiana inspectors had to give up their desktop personal computers when they received the Tablet. This provided an extra incentive for them to get familiar with the use of these computers

quickly. The downside of this approach is that not all inspectors may be receptive to this approach. This approach provides and option for cost management. EPA and states already provide personal computers for their employees. If the Tablet is purchased to replace the desktop computer, this could reduce the extra costs for purchasing Tablets for use in the field. Note: This approach requires a docking station.

5.4 EXPANSION OF THE TSCA PCB PROGRAM PILOT

The next step for implementing and continuing to evaluate this program is to expand it to EPA regions and states with the TSCA PCB Compliance Monitoring Grants. The NCMPB has already made extensive efforts to ensure that managers and inspectors in regions and states know about the availability of the PCB template and STAG funding for states. Additionally, the NCMPB has developed a training program for inspectors, and recommends OECA funds Tablets for regional inspectors to expedite the expansion process.

SCOPE OF THE PCB PROGRAM

The PCB program is primarily a federally implemented program, with nine states that have cooperative compliance monitoring grants. There are no PCB state programs other than in those states with EPA grants, and TSCA preempts states unless their regulations are identical to EPA's. All state inspection reports are submitted to the region, and the region is responsible for taking enforcement action, if appropriate. There are 26 EPA inspectors assigned to PCB inspections in the regions, and EPA inspectors generally inspect in states without grants, but also conduct oversight/training inspections with grant states. Most regions have only one or two inspectors who are dedicated to the PCB program. However, Regions 2 and 10 have 15 inspectors between them, most of whom conduct other types of inspections in addition to PCB inspections. Regions 2 and 10 do not have PCB state grants. In Fiscal Year 2006, EPA inspectors conducted 171 inspections (including those conducted by Senior Environmental Employees), and states conducted 336 PCB inspections.

EXPANSION TO REGIONS

Staff from the NCMPB have discussed the use of the Tablet with templates during PCB monthly conference calls and at the June 2007 National PCB meeting in Washington, D.C. During the meetings, cost estimates were provided for the hardware packages including the accessories such as carrying straps, and photocopier/scanner. Most regional staff and inspectors were interested in learning more and after seeing a demonstration of the Tablet and software and what it can do. However, staff in one region indicated that they are strongly opposed to adopting this technology for PCB inspections—but other staff in that Region are interested in its use for AHERA inspections. Reception to changing from pen and paper to personal computers, therefore, varies with individual preferences and experience with technology. Despite the interest from most regions, staff also indicated they did not believe their offices had the resources to purchase the hardware. In order to assist regions in the adoption of the PCB template, this Strategy recommends funding the cost of Tablets for one to two inspectors per region (estimated funding needs are detailed below).

EXPANSION TO STATES WITH PCB GRANTS

The NCMPB is pursuing expanding the pilot to other states implementing PCB programs through the use of STAG funding for their TSCA compliance monitoring programs. Funds will assist in costs for hardware, accessories, and travel for training. EPA's National Program Guidance, the TSCA State grant guidance, and the Catalogue of Domestic Federal Assistance all included language encouraging states with PCB programs to adopt the Tablet and software for conducting inspections. At this time, OECA has sufficient STAG funding to provide this additional funding to existing grants. These funds can only be provided if the state can fund 25% of the total grant.

In addition to Indiana, three of the other eight states with PCB grants have already indicated that they are interested in adopting this technology. One state (Alabama) would like to purchase Tablets but cannot provide the 25% of the total grant as required by the TSCA statute for state grants for this year; they plan to participate in FY 2008. Region 5 has requested $5,000 in additional state grant funds for Indiana to upgrade equipment used in the PCB Pilot program. They will purchase scanners better suited to field use as well as wireless internet cards to e-mail documents from the field including the inspection data and inspection reports. Illinois will receive $12,000 in TSCA grant funds to purchase Tablets and for travel to attend training on the use of Tablets and the PCB inspection templates. The NCMPB has reprogrammed the funds to Region 5. Missouri has already received its grant funding and two inspectors traveled to Washington, D.C. in September 2007 for a two day training program, hosted by the NCMPB. Region 8 and North Dakota indicate that they are interested in learning more about the Tablet and templates developed before making a commitment. The NCMPB is setting up a meeting to review the templates. Timing of when the states purchase and begin to use the software will depend on when their grants are amended to include the funding and to some extent on how quickly they can identify the appropriate hardware based on IT/state policy considerations.

TRAINING/GUIDANCE FOR STATES AND REGIONS

The NCMPB staff will provide the necessary training for both regional and state inspectors on the use of the Tablet PCs and the PCB template. Staff is available to provide training either in Washington, D.C. or the region/state, depending on availability of travel funds. Webex, an on-line conferencing system, may also be used for training. This option would have minimal cost due to the lack of need for travel funds, but it would not provide the hands-on experience of on-site training.

Training material has been developed by the NCMPB for use by regional and state inspectors. It will address technical information such as battery life, suggestions for phasing in the use of the Tablet during inspections (e.g. the inspector should initially use the Tablet in the office and for the first few inspections have another inspector collect the information by pen and paper as the original inspector uses Tablet), and points on the use of the Tablet including troubleshooting.

ESTIMATED FUNDING NEEDS FOR PCB TEMPLATE EXPANSION

Since the PCB Template is complete, and training materials are being developed in-house, hardware and travel costs are the only immediate funding needs. Regions have already indicated concern with their ability to fund hardware and travel costs for small programs. The NCMPB proposed and OECA management has decided to provide centralized funding and sourcing for the hardware, similar to the distribution of digital cameras described in Part 2.1. After consulting with regional inspectors and IT staff, the NCMPB will identify two or more Tablet PCs from which the regions could choose. The benefits of providing standard sets of hardware and accessories to all regions include that it would ensure that the systems are fully compatible with the PCB Template and that it would facilitate the NCMPB's ability to provide technical support. Additionally, the unit price of the Tablets may be lower if they are purchased with a single acquisition. The NCMPB has also developed a schedule for rapid deployment of the PCB Template if all the hardware is acquired at the same time. Since funding for states is available through STAG funds, states will continue to be encouraged to purchase the appropriate hardware; ideally training could be provided for both states and regions at the same time. At this time, there are no immediate changes to be made to the PCB Template. However, as more inspectors provide their input and make suggestions to automate other functions, there may be a need to enhance the template in the future. Table 4 below depicts the estimated costs of expanding the TSCA PCB Program Pilot to other regions/states.

TABLE 4: TASKS, COSTS, AND SCHEDULE TO EXPAND PCB PILOT

TASKS	COSTS	SCHEDULE
Identify inspectors who will receive Tablets.	$0 NCMPB staff time	3 weeks
Identify regional IT requirements in terms of equipment manufacturers and types of units.	$0 EPA inspectors will consult with IT staff.	8 weeks
The NCMPB will order and arrange for delivery of one to two Tablets to each region.	$67,000 15 Tablets and accessories purchased by OECA at a cost of $4,500 each.	18 weeks (may be less; will depend on the procurement procedure; need to submit paperwork, await delivery)
Train Inspectors	$18,000 Travel costs for regional inspectors to be provided by each region. Ideal to combine training state and EPA personnel. $0 for WebEx training. Plan to offer both WebEx and in person training as necessary.	6 weeks min. (2 days training, remainder time scheduling, travel arrangements) Will plan to work with regions in event there are upcoming meetings with their

		states to minimize travel costs.
Update & Maintenance	No immediate needs with current template. See discussion on ICIS (5.6) for immediate funding needs. Approx. $15,000 to $30,000 may be needed based on feedback from regions.	Future enhancements could take up to 8 weeks, but the existing template could be used at the same time.
Total	$85,000 $67,000 from OECA, and $18,000 from regions.	Est. 35 weeks (Equipment delivery is main issue)

5.5 EXPANSION OF TEMPLATES TO TSCA AHERA

The NCMPB has begun initial work to expand the TSCA software package to TSCA Asbestos Hazard Emergency Response Act (AHERA) asbestos in school inspections. Region 1 TSCA staff has indicated an interest in receiving guidance and support from Headquarters on this project. Region 1 has already developed checklist-based software for laptop computers that state inspectors use for asbestos inspections. However, the software has some limitations, and it is primarily completed in the office based on pen and paper notes collected in the field. Region 3 has also begun developing Tablet PC software for asbestos NESHAP and AHERA inspections. NCMPB will coordinate these regional efforts to develop AHERA inspection software. After the completion of a pilot will facilitate adoption of the software by regions and states by providing copies of the software, a training manual (based on the PCB inspection manual), and STAG funds ubder the TSCA compliance monitoring grants. NCMPB will coordinate this review process.

Similar to PCBs, the TSCA asbestos program, especially AHERA, is a small program that has very defined requirements and lends itself to the development of uniform inspection procedures. The Branch has the OC lead for this program and also funds state grants under this program. For states without waiver status, TSCA asbestos inspections require the same inspection forms as TSCA PCB inspections. Expanding to AHERA offers the unique opportunity of working with states that must use EPA forms and procedures, i.e., the non-waiver states, as well as states that adopted regulations that mirror the federal requirements and conduct inspections under their own authority. Branch staff has taken additional technology and AHERA training both to improve their expertise on asbestos issues under AHERA in general for other job responsibilities as well as to build their expertise in order to develop the workflow process. Staff has also participated in AHERA inspections with both regional and state inspectors. Unlike the PCB program, inspection manuals have not been updated recently. At the same time, the regulations have not changed either. The development of the AHERA inspection software would mirror the approach used with the PCB pilot project. The final product would include the inspection software with printable forms and reports. It would not include the ability to transfer data into ICIS.

ESTIMATED FUNDING NEEDS FOR EXPANSION OF SOFTWARE TO TSCA AHERA

The NCMPB began the workflow definition process by meeting with Region 1 inspection staff at the end of September 2007, and will assist them by reviewing their final workflow process. After the initial workflow process is completed, it will be reviewed by other regional and state inspectors. Several AHERA inspection protocols have already been developed by other regions, and having them review the workflow process will ensure that expansion of the AHERA inspection software will be an easy transition.

Since the NCMPB has already developed the template for PCBs, and Region 1 has AHERA inspection software, these resources could be leveraged to develop the necessary inspection software for the field. The NCMPB will work with Region 1 to provide its pilot state appropriate STAG funds for contractor support in software development. Discussions with Region 3 about their efforts will continue and their ideas will be incorporated as appropriate.

If Region 1 completes the software with a non-waiver state, as is planned, the inspection software has the potential to be used by EPA inspectors as well. If the pilot is successful, regional EPA inspectors should be encouraged to use the system. Regions will need to provide the necessary hardware to its inspectors. Estimated hardware costs are similar to the PCB program, with one or two inspectors per region at a cost of $4,500 per inspector. With regard to funding states, the NCMPB has communicated to the regions that funds are available under the TSCA STAG funds to provide Tablets to states with cooperative compliance monitoring grants for the TSCA asbestos program. Region 1 has already requested funding for Tablets for some of its states. Again, like PCBs, this grant program requires states to contribute 25% of the total grant. NCMPB and Region 1 will need to discuss training and expansion of the new software once it is completed.

TABLE 5: TASKS, COSTS & SCHEDULE TO DEVELOP AHERA INSPECTION SOFTWARE

TASKS	COSTS	SCHEDULE
Assist Region 1 in defining workflow process.	$0 Staff time to provide input in defining the workflow process.	4 weeks
Review workflow process with regional and state inspectors.	$0 Staff time to review workflow process and provide feedback.	6 weeks
Develop appropriate software based on workflow process.	[Estimate $25,000-40,000] NCMPB anticipates providing STAG funds upon request to Region 1 to fund a state for this project.	26 weeks To set up contract and complete development.

Purchase hardware for pilot	$9,000 NCMPB anticipates providing STAG funds upon request to Region 1 for its pilot state to purchase Tablet PCs.	2 weeks
Pilot software and make revisions.	[Estimate $5,000] NCMPB anticipates providing STAG funds for software revisions, if needed.	16 weeks
Hardware purchase for expansion.	$51,000 OECA or regional funds depending on funding options. TSCA STAG money depends on state interest and commitment. Plan to use existing funding.	18 weeks total (May be less if similar requirements to PCB software. Submit paperwork, await delivery)
Training on Tablet and Templates	$11,000 Travel 11 regional inspectors Interested states would fund from STAG grants. $0 WebEx through NETI access	6 weeks (one for preparation and one for DC meeting)
Total	$61,000 For hardware and training for EPA inspectors, provided by regions or OECA. [Estimated $54,000] STAG funds for state pilot. Additional STAG funds may be provided to regions (contingent on availability) if more states are interested in using the software.	74 weeks

5.6 SOFTWARE DEVELOPMENT TO PROVIDE DIRECT INTERFACE WITH ICIS

One of the primary benefits of collecting information electronically in the field is to reduce data entry errors and to ensure timely, accurate data entry into Agency databases. Although inspection software, such as the PCB Template, can already aid in inspection report completion and electronic recordkeeping, in order to fully integrate the data into agency databases, the functionality to import the data must be developed for those databases. Electronically completing a form that is given to a data entry clerk is only an interim solution. In order for the data integration to be seamless, both the inspection software and the agency databases must have similar data structure, as well as the ability to export and import that data.

EPA's primary enforcement and compliance database, ICIS, does not currently have the ability to import compliance monitoring data using a batched method. Even if inspection software had the data available and the ability to export the data, it will still have to be entered into ICIS separately. This Strategy proposes that OECA management make it a priority to fund the development of batched compliance monitoring data import for ICIS. The first step for this integration would require that the data structure standards are available for developers who are creating inspection software. This would ensure that all of the necessary data is collected in the inspection software, and that the software exports that data using the correct structure.

The PCB inspection software could be used to test the compliance monitoring import functions. If the appropriate ICIS batch process is developed, this could be used for all inspection software whose regulatory programs use ICIS as the database of record. A joint effort between the NCMPB and ETDD could begin the process to develop the business rules needed to import compliance monitoring data. The NCMPB would then build the appropriate export functionality into ICIS while ETDD leads the efforts to develop the ICIS import functions. The immediate benefit of funding this project would be to reduce the resources needed for data entry of inspection data.

5.7 POLICY ISSUES

Implementation of new technology in the field raises policy issues as well as process issues. Potential questions/issues identified during the PCB Pilot include the following:

- Indiana plans to use wireless cards to transmit inspection reports. There are possible security risks, and guidance to address the potential risks will need to be developed as we expand the project.

- Expanding the use of Tablets to regional inspections raises issues regarding the handling of CBI. There is current guidance on the use of computers for CBI but additional guidance may be needed to address CBI collected electronically as field notes on a personal computer and whether such information can be transmitted over wireless cards. The NCMPB will work with the Office of Prevention, Pesticides, and Toxic Substances (OPPTS) and the Office of General Counsel (OGC) staff on this issue. States do not have access to TSCA CBI.

- Policy concerning security issues and technology issues can rapidly change. While the NCMPB has checked in periodically with OEI, it is important to stay abreast of IT policies, especially concerning security of data. In rolling out the pilot to other regions and states, they will need to check their own office's IT policies and security policies to ensure that use of this technology is in compliance with other requirements.

- The IT policy or practice regarding the use of Tablets as an employee's personal computer will need to be considered. For Indiana, the inspector was required to give up his desktop computer in order to have a Tablet. At EPA, some desktops are being replaced with laptops. Tablets have not replaced desktops in OECA although this may be occurring in other offices. If IT staff agrees that the Tablet can replace the desktop and that the Tablet can be connected to the LAN system, then there may be cost savings in that Tablets replace the personal computers rather than being additional equipment. Follow-up with the IT personnel is needed to determine if this is feasible.

- Issues may arise as to what information is provided to the facility during the inspection. A question has been raised regarding digital photographs and whether the inspector may provide copies of the digital photographs to the facility during the inspection at the facility's request. Similarly, if the inspector uses the computer to scan in documents, facilities may ask for electronic copies of what the inspector scanned. Policies for this type of issue will be needed.

- Process issues regarding what physically is transferred from the inspector to the case development officer to the attorney handling the case. One question will be whether electronic copies are sufficient or whether hard copies of the inspection report and attachments such as photographs will need to be provided for cases that go to hearing. Issues may arise as to what is kept as the official record and by whom. Research into what Courts accept will be needed also if EPA decides on a paperless approach.

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 6

STRATEGY FOR EXPANDING THE USE OF PORTABLE PERSONAL COMPUTERS TO OTHER PROGRAMS OR FUNCTIONS

PART 6
STRATEGY FOR EXPANDING THE USE OF PORTABLE PERSONAL COMPUTERS TO OTHER PROGRAMS OR FUNCTIONS

6.0 INTRODUCTION

OECA manages enforcement and compliance activities across a broad range of media programs. Approximately 40 inspection types fall under these inspection programs. Inspection manuals usually establish the process for conducting these inspections. Inspections by EPA as well as states and tribes are a primary tool in determining compliance with environmental statutes. There is a tremendous potential to improve the efficiency of EPA's compliance monitoring programs through better use of technology, specifically the portable personal computer. The PCB Pilot established that it is feasible to successfully integrate the use of portable personal computers and software into the preparation and conduct of inspections and the preparation of inspection reports. Benefits include expedited report preparation, electronic data that has the potential to be exported into databases, and standardization of inspection procedures. While Part 5 focused on on-going efforts and provided a strategy for the short term with a focus on TSCA PCB and TSCA AHERA inspections, this part provides a discussion of directions OECA could take to improve its use of available technology, separated into near-term and long-term options. Cost estimates, especially for the longer term options, are very rough and would need to be refined for options selected for further development. Initial scoping work would need to be completed in order to arrive at more accurate estimates. There are many choices that can be made, and many of those are not mutually exclusive.

6.1 OPTIONS FOR EXPANDING THE USE OF PORTABLE PERSONAL COMPUTERS IN COMPLIANCE MONITORING ACTIVITIES

Developing software that can be applied across inspection programs to facilitate data collection and reporting is a huge task given the number of inspection programs and the diversity of operations between programs, across ten regional offices, and across the states/tribes. Similarly, ensuring all inspectors have access to the equipment for use during inspection will also be a challenge. While the PCB template for use on Tablets allows the inspector to collect field data and print out an inspection report, several TSCA forms, and a data sheet for separate ICIS entry, and organize data collected during the inspection electronically for use during the inspection, there are other functions that could be selected for automation.

One example is the automation of data entry into Agency's databases by directly using information collected during the inspection using the Tablet. Under the current PCB template, the data from the ICDS form and inspection information collected automatically are input into ICIS by printing the information collected by the software during the inspection and having someone separately enter the data into ICIS. As discussed in Part 5.6, one of the objectives of this national strategy is to identify directions that could make the information/data process seamless between the computer/mobile unit and ICIS, thereby reducing human error by manual typing of the information into ICIS.

Choices for incorporating portable personal computers into OECA's compliance monitoring programs include bringing in programs one by one, adopting a system-wide approach, or developing a combination of approaches. Not only are there choices on what programs are addressed, but there are also choices on what functions are automated – targeting; scheduling/providing assignments to the inspectors; providing resource materials on the Tablet, including compliance assistance; providing resources from EPA's databases, such as permit information or results from the previous inspection, to data entry to case development functions. This part discusses options on identifying what to automate. To expand initially, this Strategy recommends that initial efforts focus on the functions piloted during the TSCA PCB pilot along with adding a data entry function to facilitate data entry into Agency's data bases such as ICIS. Whether expanding this technology to one program or multiple inspection programs, decisions will be needed to determine what functionality will be developed for each program. Ultimately, much of the decision making on the options discussed in this part will be based on funds available and interest by headquarters and regional programs in this technology.

Based on a review and analysis of the types of inspection programs for which OECA is responsible, a decision to expand the use of personal portable computers sequentially could be based on the size of the program (number of inspectors/inspections), such as, the smaller inspection programs (TSCA, FIFRA, EPCRA) or the larger inspection programs (CWA, CAA, RCRA). The expansion could focus on the current OECA National Priorities or use a sector-based approach (petroleum refineries, cement kilns, coal-fired power plants). To expand to the larger inspection programs, success is more likely if specific types of inspections are identified, and the FACT Strategy applied to them separately. Expansion could be phased in for the larger programs.

One approach for addressing multiple programs is to use a systems-based approach. A national workgroup would provide the necessary data and program standards that would apply to their specific media program workflow process. This would require each national inspection program (by statute) to bring together representatives from the regions and headquarters to establish uniform processes, templates and reports for each individual program. Template or software development would occur on an ad hoc basis even on a regional program basis. OECA could provide parameters/criteria for this approach and maintain a list of available software by media program and region.

Another way to implement a systems wide approach is to identify certain elements that are common and develop a template that works for the element across all statutes. An example would be to develop templates for chain of custody information or for entering ICIS data.

Last, an option could be an enterprise wide approach that seeks to develop agreed upon software across all programs. Given the differences in programs, from a policy standpoint, this approach would be the most difficult and take the most time. It would replace the traditional stove pipe type approach to implementing programs with a centralized, uniform approach across statutes. It involves an up-front commitment to implementing change across all programs as part of the software development process. This option requires the application of customized Proprietary Software Solutions (cost estimates range from $10,000's to $1,000,000's) rather than adapting commercial off the shelf software. Ultimately, it may save money over the

implementing across programs using a sequential program by program approach. At the same time, it may not allow the flexibility needed for some programs such as those inspections where there are less prescribed methods for conducting the inspection.

To begin this effort, this document recommends that initial efforts be sequential. Before considering a more enterprise wide or systems wide approach, an Agency workgroup should convene to discuss approaches across programs. It may be better to gain more experience in the application of this technology to individual programs before making decisions on changes across all programs. Lessons learned from pilots/implementation should help inform the decision making. Other decisions that impact how far this technology is expanded across EPA's inspection programs and how quickly include decisions on who takes the lead and the extent to which others commit to work on this, how the work is staffed, and the amount and source of money. Many of the different types of decisions interrelate and must be made in the context of all the choices. Table 6, below, lists categories of decisions, discussions follow on each of these. Table 7 provides a summary of options for accelerating the delivery of templates and describes for each option the office who would be responsible for requirements development and systems development.

TABLE 6: DECISIONS TO BE MADE FOR EXPANSION RELATED TO DEVELOPMENT OF SOFTWARE
Identification of Hardware. Selection will impact software decisions. Choices include Tablets, PDAs, Ultra Mobile PCs, or other new technology as it is developed...
Identification of Functions to Be Automated
Method of Expansion to Other Programs – sequentially, simultaneous effort, combination
Approach to Software Development – specific to individual programs or systems based approach for some functions or enterprise wide
Order of Work. Go through entire process for a specific program from mapping the workflow process to software development to pilot to implementation or separate out tasks such as workflow process and complete this task first for several or all programs or use a combined approach. Mapping could also be done sequentially, simultaneous, or a combination of these approaches.
Who Takes the Lead and Their Role. The role of the lead could include: developing software and providing equipment; being a co-lead with other parties to providing standards, criteria and oversight; or providing support on request.
Standards and Criteria. While these can be established, there are policies issued by other offices that affect these.
Funding Options. These range from central funding to providing no additional funding. Funding options apply similarly to providing equipment (Tablets or PDAs).

IDENTIFICATION OF HARDWARE

Part 3 presented information on the different hardware available and provided information on the advantages of Tablets and PDAs. For inspections that can be conducted through the use of checklists and drop down menus, the PDA may be preferable. Most inspections require diagrams and field notes and more detailed inspection reports. The Tablet provides advantages for this type of work. In addition, technology and types of hardware is

evolving. Following the FACT Strategy which includes working with partners/end users on their needs and preferences should be helpful. Funding decisions also impact this choice.

IDENTIFICATION OF FUNCTIONS TO BE AUTOMATED

Functions which can be automated include those identified immediately below as ones automated under the PCB Pilot as well as others. Most can be automated for use with the Tablet or PDA but the PDA is more limited as a result of memory and storage limitations.

Functions automated for the PCB pilot:

- Pre-inspection information.
- Forms for the inspection (templates to collect the necessary inspection information, forms particular to the inspection program, forms required of any EPA inspection).
- Inspection data collection for collecting information during inspection and populating forms, field notes, and the inspection report.
- SBREFA Fact Sheet – for printing during the inspection.
- Information collection for input into Agency's data bases, e.g., ICIS and ICDS information collected via the software and printed for data entry at a later time.
- Reference materials identified as useful during the inspection (CFR, inspection manual, compliance assistance materials, program specific information, and SBREFA materials).
- Outputs necessary after the inspection (inspection report, supporting documents, ICDS form, inspection information for data entry).
- Data input (data to paper to ICIS - manually or data to ICIS – electronic synchronization).
- Inspector findings/observations.
- Preparation of inspection report using information entered during the inspection.
- Photos (create an electronic log, placement into reports, maintain photos per Digital Camera Guidance).

Other functions that may be automated:

- Data entry into ICIS – see discussion under Parts 5 and 6 on this topic.
- Scheduling for inspections/assignments.
- Targeting information.
- Permit information, compliance history information, and previous inspection reports.
- GPS data.
- Samples (create an electronic log, placement into reports, chain of custody).
- Inspection information transferred for case preparation, paper or electronically.
- Design standard case development documents and Notices of Noncompliance and Notices of Proposed Civil Complaints which can be populated automatically with data entered during the inspections.
- Tracking system for settlement conditions.
- Wireless transmission of data (security protocols will be needed).

Note: Additional functions listed here could be automated and piloted for the TSCA PCB program. The Strategy recommends pursuing software development for other programs with some revisions being made to the PCB pilot as identified by inspectors/managers during the expansion phase with the exception of taking steps to interface with ICIS. This should be pursued in addition to other expansion efforts.

METHOD OF EXPANSION TO OTHER PROGRAMS - DEVELOPING TEMPLATES FOR OTHER PROGRAMS

Simultaneous efforts can be on-going although simultaneous for all programs would be a costly approach. Part 7 discusses ways to leverage resources to develop software applications and equipment delivery by distributing work across offices. Workable options depend on funding and many of the other decisions identified in this section. A combination of continuing to work on a few programs while convening a workgroup to discuss opportunities for a more expansive approach offers a good solution. Lessons learned from the initial programs will be useful whether a program by program approach is maintained or if a system based or an enterprise wide solution is sought. A strategy for selecting specific inspection programs for sequential development is provided below, recognizing that several programs could be in different states of the FACT Strategy at any time, and some could be developed simultaneously dependent on available resources and expertise.

Options could include a massive effort to develop templates for all programs. Initially, the overall effort could focus on the workflow process analysis. OECA media leads could be assigned to work with the regions to develop a workflow process analysis similar to the one conducted for the PCB Pilot with the idea of capturing this for future template development. Other options include an enterprise wide approach for certain overlapping activities such as issuing Notices of Inspections (although not all programs currently provide), developing a compliance history and inspection report database, or reporting to ICIS. It is more practical to select programs for individual development unless sufficient funding and resources are made available to consider an enterprise wide approach.

OPTIONS FOR SELECTING PROGRAMS FOR DEVELOPING TEMPLATES

- Small programs.
- Priority programs.
- Large programs (as a whole or specific types of inspections)
- Sector based approach.
- Systems based approach.
- Enterprise wide.

Developing templates and persuading programs to switch to portable personal computers in the field rather than pen and paper can occur program by program or even region by region. In some programs, it may work well to include states/tribes, especially for programs where they use identical inspection procedures, e.g., when states/tribes inspect using EPA credentials. The program by program approach may be the most feasible, especially given limited funding.

APPROACH TO SOFTWARE DEVELOPMENT – SCALE OF AUTOMATION

Options range from developing software specific to each program to a selective enterprise wide approach for a small subset of similar functions to developing this enterprise wide software for some functions but allowing each program to have their own specific processes. Some programs may elect to use the limited enterprise wide functions automated but may or may not develop software that would assist in the inspection process and automatically generate reports. This issue relates to what is to be automated for a specific program. None of these decisions should be made in isolation from a review of all the available options.

- **Develop software for individual inspection programs or groups of programs under the same statute.**

- **Develop and adopt an enterprise wide approach for some functions which are essentially the same across programs or would lend themselves to a uniform approach.** For example, consider developing a Notice of Inspection form that can be used across all inspection programs. Develop template for such forms. Other examples might be chain of custody forms and photo logs. ICIS data is another possibility.

- **Develop software for certain functions that apply to all programs but allow each program to have their own individual forms/workflow process.** Develop software that allows the inspector to enter information one time which will then populate the Notice of Inspection form for that program, or the photo-log for that program. This allows each program to keep its current forms and procedures in place. This effort would not include developing software that captures the entire inspection workflow process. The inspector could still take notes during the inspection electronically. The inspection report would not be automatically generated in draft.

ORDER OF WORK – APPLY FACT STRATEGY TO EACH PROGRAM OR COMPLETE TASKS SUCH AS MAPPING THE WORKFLOW PROCESS ACROSS PROGRAMS

Consider whether to go through the FACT Strategy from beginning to end for each program or whether it would be beneficial to go through mapping the workflow process prior to applying the FACT Strategy. This would provide information on the similarity and differences between inspection processes and help with decision making on whether a systems based or enterprise base approach would be feasible. It can also help with hardware and software decisions.

Mapping all the workflow processes would provide information for future software development efforts. Also, captures information prior to very senior inspectors leaving the Agency (Succession Planning/Effective Knowledge Management). Decisions made after mapping and determining which functions are sufficiently similar for enterprise wide software development. In addition, this work could be used for updating inspection manuals and training courses.

WHO TAKES THE LEAD AND THEIR ROLE

The NCMPB is willing to take a lead role for applying the Strategy to expand the use of personal portable computers, including software development, for use during inspections but believes there are a number of options for how this could work to expedite expansion across programs. Factors to consider on who has what role are primarily the expertise and experience needed to effectively develop software and succeed in changing how inspections are conducted. These skills include: knowledge management skills including expertise in mapping work flow processes, expertise in conducting the type of inspection to be mapped (usually senior inspectors and media lead experts), including familiarity and expertise in the statute and the regulations as well as with Inspection Manuals/Policies/guidance documents, sampling skills including sample preparation, and expertise with technology, both the hardware and software development. Pulling together these skills is important to develop workable solutions. The lead could set standards and criteria such as those found in the section below.

Software Delivery Process Stages: To better understand the skills needed to lead this effort, below is a summary of the process stages for software delivery. See also Table 6.

Requirements Development – Defining the standards and expectations for building the software. This process usually involves a workgroup of stakeholders (managers, users, and developers or technology staff) to develop three types of requirements. The three types of requirements are:

- Business Requirements – The broad visionary outline of expectations (i.e. processes to automate);
- User Requirements – The workflow procedures and necessary documentation; understanding the legal and technical requirements for conducting an inspection as well as the actual sequencing of events during an inspection, and how to write an inspection report is important for this stage.
- System Requirements – The technical abilities and limitations of specific hardware and software.

System Development – Coding or contracting of coding based on the requirements.

Implementation – Testing, piloting, and expanding use of the templates.
Options for delivery of templates for other programs need to address who does the work and how the work is done.

Identification of policies needed to address workflow changes. This is necessary to ensure that the change does not negatively impact the enforcement process.

Who Leads the Effort – Options for Implementation

- The NCMPB: It isn't possible for the Branch to provide template development for more than a few programs at a time unless there were additional FTE and contract money. Even with

this, additional support would be needed from other offices and the regions. Options for this support are included below and mentioned also in Part 7.

- The NCMPB as Co-lead with Other Offices: This could be a co-lead on multi-statutory approach or as co-lead for applying the FACT Strategy to one or more programs.
- The NCMPB could chair a workgroup consisting of inspection program leads who in turn would chair subworkgroups. NCMPB would provide oversight and guidance/support as the workgroup members applied the FACT Strategy to identify the appropriate technology and to develop software for automating inspection processes. Policy and technical support would be provided. NCMPB would review progress at different intervals.
- Assign Media Leads with NCMPB providing technical guidance and support as requested. NCMPB would serve as a clearinghouse on information on what is being done.
- Establish interagency workgroup and wait to find out their recommendations.
- Ask OEI to take this on.
- No one assigned. Provide Strategy and programs are on their own to decide if they want to apply Strategy. NCMPB available to answer questions. FACT Strategy would be distributed widely.

STANDARDS AND CRITERIA

The degree to which the lead or a workgroup develops standards and criteria can range from very general to very specific. External factors often affect these. Awareness of these external factors is important.

Options for standards include:

- Software/Hardware – Agency standards may impact this.
- Software – compatible with ICIS and allows transport.
- Software and hardware – Security features.
- Wireless technology (or not). – Security issues.
- Hardware – minimum memory, storage space on hard drive.
- IT office requirements – OEI – may vary with region/state.
- Windows XP or VISTA or web-based approach.
- Best Practices.
- Require inspection process consistent with inspector manuals/EPA guidance. (May need to revise guidance).
- Other requirements such as whether Confidential Business Information is involved and Agency statute specific requirements for handling this information.
- QA requirements for templates.

FUNDING OPTIONS

These are addressed in Part 7. Deciding that funding should be identified is perhaps the first major decision. Options for funding range from centralized HQs funding, the optimum for expanding the use of this technology in a uniform and expeditious manner, to using existing funds.

Table 7 provides an overview of the options available for accelerating delivery of templates for other programs along with pro's and con's.

TABLE 7: OPTIONS FOR ACCELERATING DELIVERY OF TEMPLATES FOR OTHER PROGRAMS					
OPTION	REQUIREMENTS DEVELOPMENT	SYSTEM DEVELOPMENT	IMPLEMENTATION	PROS	CONS
CAMPD Pilots with National Roll Out	Business: CAMPD User: CAMPD with media lead input System: CAMPD	CAMPD	2-3 Templates every 2 years based on current FTE, following OPTIONS FOR DEVELOPING TEMPLATES	CAMPD familiarity with development process; Greater centralized control and standardization of templates; Lower cost individual solutions spread out over implementation period.	Slow implementation schedule for incorporation of all inspections based on current FTE and contract funding.
Centralized Requirements for Media Lead System Development with National Roll Out	Business: CAMPD User: Media Leads System: Media Leads based on CAMPD examples	Media Leads	CAMPD develops high level requirements and OC assigns media leads to develop software for its programs at a rate of 2-3 templates per media every 2 years	Implementation occurs as workflows are developed.	Needs high level buy-in from media leads; Media leads may have difficulties developing sufficiently detailed requirements.
Centralized Requirements with Development on an Ad Hoc Basis with Roll Out by Region, Media, or Program	High Level Requirements: CAMPD/ETDD workgroup define minimum standards Detailed Requirements: State and Regional	Individual Offices	Joint work group defines high level minimum requirements in 1-2 years. Regions, media leads or programs develop and deploy the templates in their area. CAMPD engages actively in outreach and manages lists of all software developed.	Costs distributed across agency and states; Maintains standards while providing flexibility for implementation; Leverages existing templates; States could be encouraged to develop software through STAG funds.	Templates scattered in time and space, possibly with duplicates; Initial buy-in may be slow, but implementation would accelerate as more templates are developed and used by inspectors.
Enterprise Development with Roll Out Nationally Could consider enterprise wide only for functions that are uniform across inspection programs, e.g., ICDS.	All Requirements: OC Workgroup	ETDD	4-6 year process for requirements and system development similar to ICIS or FDA's TurboEIR.	Consistent standards and software; Depending on option chosen, may be able to leverage FDA program contract.	Pre-developed software (PCB, UIC, etc.) becomes obsolete; Single hardware solution; High initial cost; Potential for high resistance from some inspectors/managers/programs. This would mean standardizing across programs, which is often difficult to do within a program across 10 regions.

6.2 NEAR-TERM OPPORTUNITIES

The following activities are presented as additional workflow projects that could be implemented through OC's current process of selecting small inspection programs and developing an inspection workflow process. This could be undertaken with current resources. In addition to the expansion of portable personal computers to the TSCA AHERA program, OECA's National Priorities provide a logical near-term opportunity for further expansion. One of these opportunities is discussed in detail below.

NATIONAL PRIORITY

A workflow process can be developed for one of OECA's National Priorities, for example, the Wet Weather priorities focused on Storm Water. The Office of Compliance is aware of several storm water inspection templates having been developed. One is currently being used by an EPA region and a second by a contractor on behalf of a state. During the workflow development process, the workgroup would review these storm water templates. One or a combination of the templates could be adapted to create a national storm water inspection template. The cost to implement would be one inspector per region equipped with a Tablet and accessories at $4500 = $45,000. Travel for one storm water inspector from each region for one-3 day meeting at $1000 each = $10,000. The first meeting would be to review the various templates currently developed and to develop a national storm water template to be used by all the regions. Contractor support for the meeting and identification of workflow process = $10,000. Template development should be $50,000 as most of the development has already occurred. Total cost to implement is $115,000. Software training could be absorbed through NETI's access to the WebEx software.

TABLE 8: TASKS, COSTS & SCHEDULE TO DEVELOP STORMWATER WORKFLOW PROCESS

TASKS	COSTS	SCHEDULE
Identify one inspector per Region	$0	4 weeks
Identify workflow process and forms	$10,000 (travel costs for 10 inspectors)	2 weeks (one for preparation and one for DC meeting)
Contractor support for workflow process	$10,000	3 weeks (one week for moderation and two for report)
Review report with group and determine the appropriate templates	$0	4 weeks
Template development	$40,000	4 weeks

Hardware and Software	$45,000 (for 10 inspectors)	26 weeks total (will need to investigate purchase vs. leasing option, submit paperwork, await delivery)
Training on Tablet and Templates	$10,000 travel costs $0 (if able to utilize NETI's access to WebEx)	2 weeks (one for preparation and one for DC meeting
Pilot workflow process	$0	12 weeks (identify bugs, improvement to template)
Template Modification	$10,000	3 weeks
Deployment	$0	
Total	$115,000 $105,00 (using WebEx for training)	40 – 52 weeks

6.3 LONG-TERM OPPORTUNITIES

The following activities are presented as workflow process that could be implemented though they would require considerably more resources, staff, funds and time, to develop workflow processes for a larger inspection program or modify ICIS to accept data from another computer, from a wireless transmission or from the Internet.

SYSTEMS-BASED APPROACH

Two options are presented under this approach. The first option allows a national program to identify and develop its own hardware/software workflow process for a particular inspection program on its own time and cost. The second option identifies common (general) activities, forms that are used across all inspection and/or enforcement programs.

Option 1 takes a holistic view that for a specific inspection program; all the regions would come together and develop a workflow process for the particular inspection program, i.e., RCRA, CWA, CAA, etc. This approach requires a workgroup of regional, headquarters inspectors, as well as IT representatives to develop a comprehensive workflow process package for the inspection program. The information required in this package can be divided into three categories:

- Business requirements - The broad outline of expectations from the specific inspection program and Agency IT
- User requirements - The workflow procedures and necessary documentation
- System requirements - The technical abilities and limitations of specific hardware and software

The cost for this option includes some travel and staff time to develop the national standards for a national inspection program. A group of 20 staff and managers meeting over 18 months to two years would be tasked to develop the necessary business, user and system requirements that all inspection programs need to meet. Once this is completed, all ten regions could pool their resources and create the workflow process at once, or each region could develop the workflow process for that inspection program based upon the resources available. The cost is approximately $51,000 to develop a national workflow process for one inspection program. The requested funding is for travel costs.

TABLE 9: TASKS, COSTS & SCHEDULE TO DEVELOP NATIONAL DATA AND PROGRAM STANDARDS FOR ONE INSPECTION PROGRAM

TASKS	COSTS	SCHEDULE
Identify 16 inspectors and managers (14 inspectors (one from each region, two-first line supervisors, NEIC and HQ) four IT staff (OEI, ETDD, Two from the regions)	$0	8 weeks
Meetings (three - initial, midterm and final)	$51,000 (travel costs for 17 people @ $1,000)	6 weeks (one for preparation and one for DC meeting)
Final Systems Report	$0	18 – 24 months

Option 2 examines common activities associated with inspections or enforcement activities. A review of each inspection program and enforcement activities might yield commonalities for which a workflow process could be developed and used across all regions and inspection programs. For example, each Office of Regional Counsel develops compliance orders. A workflow process could be created to produce uniform compliance orders across the ten regions. Information would be entered once and populated through all the forms. Since no specific activity has been identified at this time, some costs are known, but others are uncertain until the workflow process is identified, and its complexities are known.

TABLE 10: TASKS, COSTS & SCHEDULE TO DEVELOP UNIFORM WORKFLOW PROCESS ACROSS TEN REGIONS

TASKS	COSTS	SCHEDULE
Survey inspection programs and regional counsel	$0 (staff time)	16 weeks
Analyze results; identify common inspection/enforcement	$0 (staff time)	3 weeks

activities.		
Select and prioritize common activities	$0 (staff time)	2 weeks
Brief managers, select common activity	$0 (staff time)	8 weeks
Identify workgroup (1 from each region)	$ 10,000 (travel cost)	8 weeks
3-day workgroup meeting to identify workflow process)	$3,000 (contractor support)	1 week
Develop blueprint of workflow process with cost estimate	$3,000	3 weeks
Development of workflow process	$50,000 - $200,000 (depending on software and contractor's time)	12 - 52 weeks (complexity and programming requirements)
Template modification and training required		3 weeks
Pilot workflow process		
Total (Estimate)	$66,000 - 216,000	52 - 78 weeks

CONVERTING WHOLE INSPECTION PROGRAMS

The magnitude of converting EPA's compliance monitoring and enforcement programs from a paper-based workflow process into an effective electronic workflow process will be immense. Of the seven statutes overseen by the Office of Compliance, there are 40 inspection programs. (See Appendix B, the identified inspection programs for which OC has responsibility). CERCLA has been excluded from the list of statutes, as it is not a compliance-monitoring program. The seven statutes are:

- Clean Water Act
- Clean Air Act
- Resource Conservation and Recovery Act
- Toxic Substances Control Act
- Federal Insecticide, Fungicide and Rodenticide Act
- Safe Drinking Water Act
- Emergency Planning and Community Right to Know Act

What would be the estimated cost of converting a large inspection program (data collection and report creation only) from paper to an electronic-based program? The Clean Water Act, an example of a large inspection program, has 15 major inspection programs and 38 inspection types. (See Appendix B for the PCS data input sheet for the specific inspection programs and inspection types). The development costs of identifying the workflow process and

creating the appropriate inspection templates for each of the 15 CWA inspection programs is estimated at $300,000 each (or a total of approximately $4.5 million). Effectively adopting an enterprise-wide solution, such as this, will require resources to identify the workflow process and develop the proprietary inspection templates (at a programmer contract cost of $125 per hour), converting the necessary forms and documents into electronic files and print-ready forms, reports and other documents. This figure does not include the necessary hardware and ability to migrate the collected data electronically from the hardware directly into ICIS. The $4.5 million cost is based on initial projects costing more than the average ($300,000) while later projects costing less than the average. This is due to the contractor's ability to use some of the initial developed templates (common data fields) in the later inspection templates. The cost may be lower if a single software solution is developed for all 15 CWA programs, but that would require initial planning and standardization of inspection procedures.

TRANSFER INSPECTION DATA DIRECTLY INTO ICIS

One of the major objectives of this Strategy is to improve our collection of compliance information and to insert the data into the appropriate ICIS data fields accurately. To ensure we can achieve this objective, all workflow processes need to adhere to standards that ensure whatever software is used to collect or generate compliance monitoring data/reports can be shared with other workflow processes within the Region, among Regions and/or with Headquarters. This approach allows the regional and Headquarters programs to select appropriate software that meets their program's particular workflow needs while maintaining the capability of sharing the information with others even though they use different software.

These principles should guide OECA as we move forward in creating new workflow processes that interfaces seamlessly with ICIS:

- The product or workflow process must collect the necessary compliance monitoring information to document the inspection and to create a complete and accurate inspection report consistent with the current national program requirements.

- The product or workflow process must be compatible with the ICIS database. ICIS will be the national compliance monitoring and enforcement database for all environmental programs, which OECA is responsible.

- The data/information created by the product or workflow process must be in such a form so that it can be shared/utilized with other programs or other workflow processes with little or no translation issues.

SOFTWARE STANDARDS FOR DEVELOPING A WORK FLOW PROCESS THAT IS COMPATIBLE FOR DATA/INFORMATION ENTRY INTO ICIS

The initial standards can be divided into two areas: ICIS-specific requirements and Agency requirements. ICIS-specific requirements are not available at this time; however, the

ICIS manager indicates the eXtensible Markup Language (XML) will be one of several program languages that will allow data to flow into ICIS electronically. The XML supports a wide variety of software applications, but the applications must be able to communicate in a common language. For that to happen, an XML Schema must be developed. The XML Schema expresses shared vocabularies and allows computers to carry out rules made by people. The Schema provides a means for defining the structure, content and semantics of XML documents. Currently, the XML Schema being developed for ICIS Compliance and Enforcement is scheduled to be available in approximately 36 months. Information about an XML Schema currently used by ICIS can be found at: http://iaspub.epa.gov/emg/portal.navigate_det?P_DATA_IDENTIFIER=98296. This XML Schema was created for the NPDES program.

In regards to Agency requirements, EPA developed the Central Data Exchange Network in which future EPA data systems must comply. Current information about the Central Data Exchange, Data Standards and the Exchange Network can be found at http://intranet.epa.gov/oic/projectfactsheets.htm under Exchange Network.

How does this impact the current activities and future endeavors undertaken since the XML Schema has not been finalized. It should have very little impact. During the developmental stage of the workflow process, whatever software is selected, it must be XML compatible. For example, the PCB Inspection Templates use MS Access software. MS Access software is XML compatible. When the ICIS workgroup establishes its XML Schema, we will need to review the PCB Inspection Templates to determine if the current data field names are consistent with the XML Schema. If not, some work will be required to reconcile the differences. The effort that went into developing the PCB Inspection Templates will not have been wasted.

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 7

LEVERAGING RESOURCES FOR EXPANSION SOFTWARE DEVELOPMENT AND EQUIPMENT PURCHASES

PART 7
LEVERAGING RESOURCES FOR EXPANSION SOFTWARE DEVELOPMENT AND EQUIPMENT PURCHASES

7.0 OPTIONS FOR LEVERAGING RESOURCES

Options for funding range from centralized funding to leaving it up to individual offices to decide whether to invest in the use of portable personal computers. Centralized funding is the preferred option for a number of reasons. It is more cost effective to centralize software development instead of having decentralized efforts by individual regional programs/offices, resulting in duplicative efforts without coordination or collaboration. Centralized funding of equipment (hardware and accessories) is also highly recommended. It provides a strong motivating factor for regions to switch from a pen and paper approach to the use of this technology. Centralized funding also allows standardization of the equipment purchases and cam be used to minimize the number of different types of equipment purchases. This creates efficiencies in training and technical support, while ensuring that software and instructions developed by headquarters will be applicable to the specific units purchased. Centralized software development and equipment selection also provides cost savings with regard to technical support.

EQUIPMENT- FUNDING OPTIONS

Decisions as to what type of portable personal computers will be used for a specific program have a huge impact on funding needed. For some programs, especially those inspections that require only a checklist, the PDA may be the equipment of choice. For most though, the Tablet will likely offer the best option.

- **Centralized funding.**
  Headquarters funds and centralizes decision on equipment. OECA or OEI provides separate funds for the purchase of Tablets for inspectors as software programs are developed for specific types of inspections. Hundreds of Tablets would be needed over the long term to provide access by EPA inspectors.
- **Tap existing OECA funds that are provided to the regions.**
  Taps OECA funds for compliance monitoring activities which are usually distributed to the regions prior to their distribution. Purchase Tablets for distribution to inspectors located in programs where software is developed and for which regions request the equipment.
- **Direct/request regions to use OECA funds to purchase Tablets.**
  Similar option to above but direct regions to use compliance monitoring funds provided to the region by OECA to purchase equipment for inspectors in those programs where software has been developed. OECA would provide guidelines on equipment selection.
- **Direct/request/encourage regions to replace existing desktop computers assigned to inspectors with Tablets when upgrading the desktops.**

This approach uses the current method of acquiring computers. This results in an inspector having only one computer; this eliminates the need for a region to fund both a desktop and a Tablet for an inspector. It also provides every inspector with a Tablet eventually. This same approach could be combined with a request to expedite the replacement of the inspectors' desktop computers. This approach will require further exploration with the IT staff to determine if it is a feasible approach. Even if a different approach is adopted for funding Tablets, this option is also worth considering in that it could be a mechanism for providing updates to the Tablets as needed.

- **Leasing.**
  Determine whether leasing is a viable option as technology changes quickly.
- **Loaner program.**
  Headquarters purchases Tablets and loans to a region for three to six month trials. This gives the region an opportunity to investigate the Tablet for a specific program prior to purchasing with its own funds. Loans would be for inspectors in a program for which software has been developed.
- **STAG Funding for State/Tribal Inspectors**
  For States wanting to purchase Tablets, consider funding sources available under TSCA, FIFRA, and Multimedia STAG funds.
- **Technical support funding.**
  Explore whether technical support could be provided by the IT folks. This would be the case if the desktop is replaced with the Tablet. It would be helpful to verify whether regional IT staff would provide this support.

TEMPLATE DEVELOPMENT

While this is a funding issue, it is also an issue of expertise in hardware, software development, specific regulatory requirements, inspection manuals/guidance/policies, and in conducting inspections. This combination of skills and experience needed point out the necessity to use a variety of approaches. It will be important to decide what skills are available and which ones are not in deciding how to staff this work. Decisions made with regard to the options presented in Part 6 will impact the choices for template development.

- **NCMPB lead.**
  Additional staff and contract support would be needed to address added programs. Even with added support, some of the options below would also need to be employed.
- **Contracts/in-house programmers.**
  Contract funds will be necessary unless there are in-house programmers.
- **In addition to staff, employ students through the Student Career Experience Program (SCEP) and intern programs.**
  Employ students that have experience with software development and environmental issues. Alternative, explore recruiting University teams to design and develop the software for specific types of inspections.
- **Recruit through Details.**

Preference given to experienced inspectors/data experts with programming skills.

- **Share work with ETDD.**
- **Explore whether support can be provided through existing IT personnel.**
- **Assign work to HQ/Region media leads either with oversight/support from the NCMPB or a co-lead role.**
  Alternatively, assign work and provide standards and criteria. Note: Support from OC program/media lead experts/staff, and in some cases from other offices, and from regional experts and senior inspectors will be necessary to effectively map workflow processes.
- **The NCMPB would provide support on request to offices interested in developing software.**
- **Use multimedia STAG funds to solicit requests from States interested in developing software for their programs.**
  Use OECA STAG funds for a State to develop the inspection template for a specific inspection program. The criteria for development to be provided by OECA.

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

PART 8

CONCLUSIONS AND RECOMMENDATIONS

PART 8
CONCLUSIONS AND RECOMMENDATIONS

8.0 CONCLUSIONS

Effectively incorporating technology in OECA's compliance monitoring work on an on-going basis can significantly improve the efficiency and quality of inspections, inspection reports, and/or data entry into OECA's data bases. It is important to recognize that technology will continue to change and improve and to remain open to modifying choices (including hardware or software). Advances in technology provide continuing opportunities to apply the "best" technology available at the time and to make improvements in how EPA accomplishes its work. Investing in new technologies which result in positive changes to the existing workflow process requires time, money, and commitment on the part of management and staff.

FACT STRATEGY

Applying the FACT Strategy to identify opportunities for making better use of technology by inspectors can maximize benefits. Experience indicates that inspectors are willing to use effective technology that is provided to them; a number of them are willing to seek out new technology and do the groundwork to try to improve how they do their work. While individual efforts are valued, they often involve a trial and error approach without input from others who may be making similar attempts.

Using the systematic, structured approach, described in this Strategy to identify, evaluate, and select technology for use, expansion, or further development is strongly recommended. Instead of a trial and error approach, it offers a process for upfront analyses, collaboration, field testing, evaluation, and faster, broader implementation. In addition to providing for an analysis of the workflow process and evaluation of hardware/software options, it also includes a step for analyzing the potential impact of changes to the inspection and enforcement process. This allows the identification of policy or procedural changes needed to ensure that the adoption of new technology supports the enforcement process and does not negatively impact it.

USE OF PORTABLE PERSONAL COMPUTERS WITH APPROPRIATE SOFTWARE – LESSONS LEARNED FROM THE TSCA PCB PILOT

The TSCA PCB Pilot demonstrated that it is feasible to develop software for use on a Tablet that allows an inspector to enter information once during the inspection and have the data automatically populate inspection forms, field notes, inspection reports, and data fields for subsequent entry into Agency data bases, thus minimizing duplicative entry. Use of this technology reduces the time to collect and record information during the inspection, facilitates the inspection process, and generates nearly complete inspection reports electronically from the information entered during the inspection.

Investing in the "up-front" work to select software and develop specific templates significantly increases the value added of using a Tablet PC. Simply providing hardware with little investment in identifying software options appropriate for the specific workflow process will not offer the same level of benefits.

While technology will continue to change and to improve, taking steps to incorporate the use of portable personal computers should be initiated now. Work completed for different pilots provides useful information and firmly lays the groundwork for future improvements. There have been many lessons learned to date, as identified throughout the Strategy, which need to be applied to any effort to expand the use of this technology. For example, input from inspectors who do the work as well as program experts is key to correctly mapping the workflow process. Their input on their needs and preferences is invaluable. In addition, allowing time for the inspector to learn how to use the equipment, providing adequate training, and providing adequate instructions prior to actual field use are necessary for successful field implementation. Creating opportunities to share information on the use of the technology can generate interest and capitalizes on lessons learned from the efforts of others.

Benefits of using this technology in the field include more timely completion of inspection reports and data entry and increased consistency on how inspections are conducted and the results reports. In addition, capturing the workflow process for specific types of inspections using input from Agency experts and senior inspectors provides a tool for knowledge management by recording detailed information on how to effectively conduct inspections.

EXPANDING THE USE OF PORTABLE PERSONAL COMPUTERS TO OTHER PROGRAMS

Efforts are underway to expand the use of Tablets and the software templates to PCB compliance programs in EPA's ten regional offices and to states operating under the TSCA PCB Compliance Monitoring Agreements using STAG funds. In addition, preparatory work has been initiated to begin software development for the TSCA AHERA (asbestos) program.

To expand the use of portable personal computers to other programs, there are many options on how to proceed. Decisions on the best approaches will be determined in part by available funding and who agrees to take the lead.

Options range from developing software for each type of inspection under each statute to an enterprise based approach. Factors to weigh in selecting an approach besides funding include the extent to which the approach offers flexibility for individual programs (best provided by a program by program approach) versus the uniformity and broad application of an enterprise wide approach. An enterprise wide approach requires more up-front investment of personnel to develop and agree upon uniform workflow processes. An enterprise wide solution will likely involve less cost than developing solutions for each type of inspection within each statute. The result would be Agency wide once completed. Programs are likely to be more resistant to this

approach. Combining approaches may achieve broad implementation in a more realistic resource scenario.

The Strategy strongly recommends applying the elements identified in Part 1 for any expansion effort. Pilots are crucial to develop useable software technology that can be implemented across regions. In selecting a partner with which to carry out a pilot, a high level of interest and commitment by participants in the Pilot is necessary to success. As OECA considers expanding the use of technology, this should be considered as one of the criteria for selecting programs for this investment. Related to this, outreach efforts are an important part of generating strong interest in using technology. Facilitating the sharing of success stories remains a good investment.

The speed with which this technology could be expanded is very dependent on funding and almost as important, the sources of that funding for both software development and equipment purchases. Centralization or at least coordination of the various efforts to adopt technology for inspectors is desirable to eliminate a large number of individuals or programs repeating the same beginning steps. Adoption of new technology across offices, especially at the regional and state level, will occur much faster if Headquarters develops the software and provides the equipment, related software, training, and technical support. Identifying appropriate equipment and limiting choices to a few types reduces potential problems of incompatibility of hardware with software and makes providing technical support, training, and manuals easier.

8.1 LIST OF RECOMMENDATIONS

- **Continue expansion of the PCB pilot to all regions and states.**

  Continue outreach and training of PCB inspectors interested in adopting this technology.
  Fund Tablets for regional inspectors: $60,000 (OECA)
  Continue to provide technical support and training

- **Continue to provide technical support, training, and funds to revise the software as needed.**

  Fund travel costs for training as needed.
  Funds software revisions as needed.
  Develop policies as needed.

- **Continue work to facilitate regional and state collaboration on the TSCA AHERA pilot.**

- **Provide outreach to other programs to demonstrate what has been achieved for the TSCA pilot program.**

- **Identify interface with ICIS as an ICIS priority.**

Pilot the PCB project for ICIS interface.

- **Expand software development for inspections and investigations to National Priorities (e.g., stormwater), or large programs (e.g., RCRA).**
- **Continue outreach, research and elicitation of information related to the use of portable personal computers and other technology.**
- **Integrate field technology efforts within the Agency. Establish a workgroup co-chaired by the NCMPB and OEI.**
- **Identify next steps for expansion after a review of the workgroup recommendations.**
- **Further analyze policy issues and develop policies as needed on an on-going basis.**

8.2 DETAILED EXPLANATION OF RECOMMENDATIONS

- **CONTINUE EXPANSION OF THE PCB PILOT TO ALL REGIONS AND STATES**

Regions and several states have expressed interest and a number of states have requested STAG funding to purchase Tablets and related equipment/accessories. Funds have been transferred to regions. The NCMPB will provide training for regional/state personnel on request; a number of states have scheduled training for fall 2007. The NCMPB will continue outreach to regions and states with PCB programs to encourage them to adopt this technology, i.e., the Tablet and templates.

Continue outreach and training of PCB inspectors interested in adopting this technology.

Fund Tablets for regional inspectors: $67,000 (OECA funds)
Regional inspectors have indicated an interest but did not believe their region had funds to invest in the Tablet. Providing funding or the actual Tablets and related equipment will facilitate the use of this technology. In addition, it is likely that once PCB inspectors are using this technology, other programs will be interested in working with OECA to develop software capability for their programs and be willing to invest in the technology once they see the benefits. Lessons learned from the survey and discussions with other agencies indicate that initial funding of the purchase of the equipment by headquarters or some other source besides the inspector's immediate office's administrative funds provides a strong incentive for moving to this technology.

Provide training as needed. Training on the use of the Tablet and the software is important to the success of the adoption of this technology. The NCMPB is prepared to provide training in person and through WebEx.

CONTINUE TO PROVIDE TECHNICAL SUPPORT, TRAINING, AND FUNDS TO REVISE THE SOFTWARE AS NEEDED.

Fund travel costs for training as needed.
Funds software revisions as needed.
Develop policies as needed.

Lessons learned from researching efforts by other offices indicate that some level of continued support is needed to maximize the use of the technology and to ensure that it is up to date. In programs where continued support was not provided, use of the technology declined, e.g., PDAs, in the UST program.

- **CONTINUE WORK ON THE TSCA AHERA PILOT**

As the media compliance monitoring lead for TSCA AHERA, the NCMPB will continue to coordinate regional and state efforts to develop software for AHERA inspections. Since this program is very similar to the TSCA PCB program and utilizes the same inspection forms, the NCMPB will provide its experience with interested state and regional parties. NCMPB staff has already begun work on analyzing the workflow process for AHERA inspections with regional inspectors. Next steps include coordinating efforts between regions on the project, assisting in identifying partners for a pilot, and providing funding through STAG funds to assist states in developing software and conducting a Pilot.

Provide STAG money to regions to fund grants for AHERA states to purchase tablets and to travel to EPA HQs/Regional offices for training.

At least one region has requested funding for Tablets for their states. Note: Under TSCA Asbestos Compliance Monitoring Agreements funded with STAG funds, states must contribute 25% of the total grant (statutory requirement).

- **PROVIDE OUTEACH TO OTHER PROGRAMS TO DEMONSTRATE WHAT HAS BEEN ACHIEVED FOR THE TSCA PILOT PROGRAM**

The NCMPB has conducted a number of presentations at national meetings such as the National PCB meeting attended by EPA PCB managers/staff. Presentations were also provided at the pesticide managers training course on compliance monitoring (PREP course), several asbestos meetings being held for regional and state personnel, and the National EPA Inspectors Workshop, attended by HQ and regional inspectors across all media.

- **IDENTIFY INTERFACE WITH ICIS AS AN ICIS PRIORITY**

The potential for improving the quality and timeliness of the entry of inspection data, including ICDS data on the results of the inspection (a GPRA measure) through this effort is tremendous. More importantly, it significantly reduces the workload to collect data and enter the data for EPA's databases. The inspector could collect information that is needed as part

of his inspection and enter it once into the Tablet and the software would use this data to populate the data fields for EPA's databases and transmit the data directly to EPA's ICIS database. This could provide a mechanism for states/tribes to collect this data and enter it automatically with little effort on their part.

Pilot the TSCA PCB Program for ICIS Interface: The work already completed for the TSCA PCB Pilot positions this program as ideal for a pilot for developing software to populate ICIS directly or through batch reporting. The official database of record for TSCA PCB inspections is ICIS for both federal inspections and state inspections conducted with EPA credentials.

- **EXPAND SOFTWARE DEVELOPMENT FOR INSPECTIONS AND INVESTIGATIONS TO NATIONAL PRIORITIES OR LARGE PROGRAMS**

  Encourage other compliance and enforcement offices to develop software for use in the field in areas where they have the media lead. NCMPB can demonstrate its PCB template and provide its experience with developing a workflow process. Primary efforts should be focused on National Enforcement Priorities (e.g., stormwater, air toxics, and financial assurance) and large programs (e.g., RCRA). NCMPB has already begun outreach efforts to other programs. Each potential program will need to establish a workgroup to provide input on the workflow process for that particular inspection or investigation program. The workgroup should work with the NCMPB to decide on a process to elicit information on what has done so far in this area by regional and state staff, identify partners for a pilot, develop detailed information on the workflow process for inspections and report writing. Costs will be determined after evaluating what work has already occurred for each program. For a pilot similar to the PCB template, costs are expected to be $45,000 for initial contract work and $9,000 to purchase two sets of equipment for regional inspectors. Additional funding would be needed to include a state in a pilot.

- **CONTINUE OUTREACH, RESEARCH AND ELICITING OF INFORMATION RELATED TO THE USE OF PORTABLE PERSONAL COMPUTERS AND OTHER TECHNOLOGY**

  Conduct periodic updates to the survey; continue to feature discussions of the application of technology to inspections during the National EPA Inspectors Workshop, other EPA National Meetings and Workshops, joint EPA state meetings, workshops, and training courses, especially inspector training courses.

- **INTEGRATE FIELD TECHNOLOGY EFFORTS WITHIN THE AGENCY – ESTABLISH A WORKGROUP CO-CHAIRED BY THE NCMPB**

  The Office of Compliance, after speaking with representatives from several offices, recommends the creation of an intra-agency workgroup for improving the use of new technology in the field. This Strategy would be provided when the workgroup is formed.

New information can be added to it on current efforts based on the workgroup. Ideally, the workgroup would include managers from the various programs as well as staff level users and software developers.

This project could begin with meetings with the workgroup prior to the National EPA Inspectors Workshop in December. A plenary session on technology is scheduled during the December Workshop. Additional discussions will occur in the media specific breakout sessions. This effort could be followed by a two day meeting later in the year that includes staff level users and software developers from OECA, OW, OEI, OSWER, ORD, and regional offices to demonstrate the variety of field software and database solutions they have developed. The workgroup would develop a summary of available technology and recommendations on how to coordinate between offices to improve each program's use of technology. The report will be shared with senior level managers, who may discuss cost considerations and options for coordinating programs. The Workgroup would explore how to best leverage resources for software development, equipment purchases, and technical support across programs. It should look at program specific and enterprise wide options. The intra-agency field technology workgroup should continue to meet through monthly conference calls to discuss progress and new developments across the Agency.

Staffs from several offices such as OEI and OSWER have indicated a strong interest in participating.

- **IDENTIFY NEXT STEPS FOR EXPANSION AFTER A REVIEW OF THE WORKGROUP RECOMMENDATIONS**

- **FURTHER ANALYZE POLICY ISSUES AND DEVELOP POLICIES AS NEEDED ON A ON-GOING BASIS**

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

APPENDIX A

AGENCIES SURVEYED WITH SUMMARIZED COMMENTS

APPENDIX A
AGENCIES SURVEYED WITH SUMMARIZED COMMENTS

SURVEYED AGENCIES

FEDERAL

Internal Revenue Service

Rob Leahy, Large and Mid Size Business Division Information Officer; (202-622-0746).

As a pilot project in 2001, IRS equipped 150 agents with notebook PCs to perform audits of diesel truck drivers. The notebooks were connected through SafeNet, a government wireless VPN.

Source: http://www.mobileinfo.com/Case_Study/field_inspection.htm

United States Forestry Service

Christine LaBerge, Walsh Environmental (303-443-3282)

Walsh Environmental conducted over 700 surveys in regions 2 and 3 for USFS, EPA, BLM, and experimental forests. They use ruggedized notebooks, digital cameras, and GPS units to survey water and wastewater sanitary conditions. Sites varied from hand pumps to wastewater plants. The field data is imported into a database for consistent wording, and the inspectors can print customizable reports.

Source: 2004 National PDA Conference presentation;

Occupational Safety and Health Administration

Glen Lamsons, Salt Lake City Health Response Team (801-233-4914)

Most offices use laptops for inspectors. The Office of Health Enforcement has experimented with PDAs, but this has not been a coordinated effort. They have been used as repositories of data, or for data logging with their measurement equipment. About five years ago, Salt Lake City's Health Response Team tried to integrate the PDAs with forms entry. They had a pilot project with Region 8, and gave one to two pocket PCs to eight area offices. These contained standards and the legalese for citations. The pilot failed because of budget cuts and problems with getting their IT group to support the PDA software. Additionally, PDAs were used on site at the World Trade Center. Currently, OSHA does not have any program using full-time hardware or software.

National Oceanic and Atmospheric Administration

Tom Altvater, Environmental Compliance and Safety Office (301-713-2870 x132)

NOAA inspectors use pen and paper, and sometimes laptops in the field for 20-40 inspections annually. Additionally, all 800 sites have self-inspections. The data is transcribed and entered into an automated system that they have been using for the past four to five years. Once it is entered into the system, assessments and

findings are automatically e-mailed as weblinks. The system is compatible with Tablet PC use, but they have not had money to purchase the Tablets yet.

United States Geologic Survey

Cynthia Duffield, Safety and Environmental Branch (703-648-7551)
Facilities complete a self-inspection checklist annually, with auditors conducting inspections every four years. The data was previously entered into spreadsheets, but they are now testing an in house interactive system that includes safety and environmental standards and policies.

Bill Miller (703-648-7552)
During surveys, inspectors use specialized electronic equipment for data logging and measurements, but nothing in terms of inputting the data.

National Park Service

Louis Rowe. Risk Management Program. (202-513-7222)
NPS has had a team of regional and local inspectors evaluate an automated inspection system over the past 18 months. They want a consistent way to audit themselves in field, using Tablet PCs that will populate fields automatically and incorporate questions from other systems. NPS is preparing to develop the software and test it over the next nine months. Note: Louis has sent information on the needs of the agency and specifications of the three top programs they were reviewing.

United States Postal Service

Frank Lundblad (202-268-3692) and Sam Pulcrano (202-268-2067), Safety Performance Management
In 2003, USPS equipped 600 safety inspectors with Palm PDAs to annually inspect its 39,000 Post Office facilities for OSHA requirements. Inspectors use software that a team of in- house and contract programmers began developing in 2001. The software integrates three databases into a checklist, and provides a web interface to upload information into an Oracle database and immediately print reports and access references. This saves many hours of handwriting notes and inputting data.
Source: http://www.gcn.com/print/22_31/23963-1.html

United States Census Bureau

The Census Bureau awarded a contract to make the 2010 enumeration process-paperless. The software and hardware are standardized to the Census' IT policies and there is no ability by the user to amend the workflow process. The software will allow the enumerator to follow-up with citizens who did not submit their long or short census form. All the information will be on a handheld unit similar to a TREO. The TREO is a combination phone and PDA. It will have wireless capability with information transmitted on a regular basis to the national database. This project is a true makeover for the enumeration process scheduled in 2010. The final product was tested for seven weeks in May and June 2007. The contract

award totals $600 million. The contract includes all hardware (500,000 handheld units) and software, back-end programming thru database, wireless development, training and support. A unique feature about this project was how the contracting process was used. The Census knew what it wanted in terms of performance but did not know what hardware and software there was that could address their needs. During the contract process, each contractor was required to develop a prototype of the software and hardware that would be used in the field. As a result, the Census Bureau currently has an 85-90% complete prototype package. There will be some modification to the prototype software to reach the final product but this contracting process took about six months to complete.
Source:
http://www.computerworld.com/mobiletopics/mobile/story/0,10801,110244,00.html
http://www.computerworld.com/action/article.do?command=viewArticleBasic&articleId=292016

Food and Drug Administration

Office of Regulatory Affairs: David Gallant (240-632-6812) & Scott Lewis (781-596-7748).
Approximately 2,000 Inspectors use laptops and digital cameras n the field. They have an automated system, TurboEIR, which was developed by programmers at USDA. Scott Lewis is in charge of managing the program at FDA. Through the program inspectors can download assignments, generate and print reports and citations, and upload them into an agency wide database for real-time updates. The EIR software contains a "plain English" translation of CFR regulations, and ensures that this prescribed information is used to issue inspection observations and automate the inspection report process. This is for quality control to ensure that standard procedures and language are used for all reports, and that inspectors adhere to the regulations. They are also looking to modify the program to allow input from checklist PDA software that will be used during some of their easier inspections.

Division of Field Investigations. Michael Rogers (301-827-5653)
They have been looking into the use of Tablet PCs, but do not have the funds to provide them to all the inspectors. Blackberrys have not been provided either, as they have not shown a significant cost to benefit ratio. They have compiled standards and specifications for digital cameras.

Securities and Exchange Commission

Office of Compliance Inspections and Examinations, Lori Richards (202-551-6200)
Laptop computers are provided for all examiners, and they use a docking station with a monitor at the office. Senior supervisors use Blackberrys. The SEC currently uses software for examinations that was created in house, but is looking for vendor software for auditing. Since inspectors often collect e-mails and large amounts of data, they use software called Autonomy and Concordance to sort the

information. The SEC has developed techniques to analyze large amounts of data, and to use standardized language in reports to maintain consistency between the regions. They hope to have an automated system that will create and save work papers in the field.

United States Department of Agriculture

Food Safety and Inspection Service, Pat Abraham (202-690-4165)
No new technology in use by field inspectors.

National Information Technology Center, John Laderer (970-295-5195)
NITC programmed the TurboEIR software used by FDA, but is unaware of any technology use or automated software at USDA.

Environmental Protection Agency

Office of Water, UIC Program, Suzanne Kelly (202-564-3887)
In 2002, the Office of Water began developing UIC software for PDAs through a contractor. Due to the lack of a national UIC database, and the regional variation in data, the software had to be developed individually for each region. The software consisted of a series of checklists on a PDA with GPS integration, and an interim Access database for a laptop. After collecting data on the PDA, inspectors could connect to the laptop, print trip reports from the field, and export data to the regional database. Each template was developed by spending a day analyzing the workflow process with regional inspectors. The contractor would develop a sample program, which would be tested by the region before delivering the software. At the same time, many of the regional databases were upgraded to Microsoft Access databases. Training consisted of an operations manual developed at Headquarters, and training by a lead inspector at the regional level. One primary benefit of the software was the reduction in transcription errors.

By 2006, seven regions were using PDA software for their UIC inspections. The total cost for the programs, including upgrading regional databases, ranged from $45,000 to $100,000 per year. The Office of Water stopped funding and supporting the UIC software in 2006, but many regions continue to use the software. Some regions have even tried to broaden and improve the software themselves. Meanwhile, Office of Water has shifted toward developing a national UIC database. The PDAs improved efficiency, but some inspectors reported trouble with their reliability and handwriting recognition.

Office of Water, Sanitary Surveys, Jamie Bourne (617-918-1610)
Beginning in 2003, EPA employed a contractor to develop an open platform (software) to collect information for sanitary sewer surveys. This includes 1,200 detailed questions, which can be pared down to 100-120 questions for smaller inspections. The question sets are flexible, and states can even design their own questions and add them to the database. Once a survey of questions is designed, it is put into a PDA for the inspection, and uploaded directly from the field upon completion. The software can print reports, cover letters, and deficiencies in the

field. Additional technologies include digital photos, GPS, and the ability to send the data through the Internet. This workflow process makes it easier to follow up on inspections than the previous method, which just stored reports in folders for three to five years. As of FY 2007, 13 states are either using the software or field testing. With the ability of the workflow process to develop smaller question sets other states have expressed interest in using the software for their programs.

While it took approximately one year to work through software bugs and crashes that occurred in the field, reports of time savings during inspections are now being observed. According to preliminary results, inspectors are finding a savings of between 3 to 14 hours in conducting sanitary sewer surveys using the new hardware and software. While the intent of this workflow process is to input the survey data into a central database, some states have had security issues with their network administrators. In terms of hardware, PDAs were initially selected because of their longer battery life. Initially, Tablets were not selected because of cost, weight, and size, but they seem to be better for longer surveys that require typing. In FY 2006, a Tablet version (software) was released and is being evaluated by some of the states. The Office of Water publishes a newsletter with updates about the software and its use.

Region 2, UST Program, Rebecca Jamison & David Bernstein
Beginning in 2001, a Region 2 inspector, in collaboration with the State of New York, began developing a PDA based software tool for UST inspections. Development of the software was based on a thorough analysis of an inspector's workflow. After initial design, the inspector created a series of paper based checklists for inspectors to use and test in the field. This process helped to refine the checklists without additional programming. After many iterations of testing, the software allowed inspectors to collect facility information, inventory USTs, and collect GPS data using a combination of checkboxes, drop-down menus, and handwritten entry. Progress on the project stopped in 2005 when the inspector wanted to upgrade the back-end database to allow updates from the field. The IT department would not support the new database software. Since that time, the inspector has moved to the NPDES program, and is trying to develop a storm water inspection checklist. In 2007 the Region 2 UST office began looking into having a contractor upgrade the PDA software. They received funding from OUST, but OSRE denied additional funding.

Region 1, AHERA Program, James Bryson
In 1998, Region 1 developed a Microsoft Access based system to audit asbestos training providers, based on a checklist created by states in Regions 1, 2, 3, and 4 to enhance reciprocity. In 2001, it was expanded to include a checklist-based tool for Asbestos Hazard Emergency Response Act (AHERA) inspections. The system is used on laptop computers by state inspectors in Region 1, and it allows them to identify observations related to specific statutory requirements. Summary reports of inspections and links to photos are also integrated into the software. Since 2001, a TSCA Lead inspection checklist has been added, and the states are

looking to upgrade the system to work with Tablet PCs with a Web-based feature to immediately update their databases over a secure site.

Office of Environmental Information, Andrew Lowe
In 2006, OEI began developing a Facility Field Data Collection Tool, which is a software model designed to support the EPA Locational Data Improvement Project. The application software enables users to capture latitude/longitude readings in the field—using a GPS receiver—and add comments. The system can also connect to the Facility Registry System (FRS) for import and export, or be exported to a text file for upload into any database. The application runs on Windows Mobile (for PDAs) or Windows XP (for Tablet PCs or Ultra Mobile PCs). The design of the tool allows for integration into other software applications. After a year of software development at a cost of $15,000, OEI began field usability tests in summer 2007.

Office of Solid Waste and Emergency Response, Emergency Response Team, Robert Cibulskis
The Emergency Response Team has developed an extensive set of tools for its On-Scene Coordinators. Applications for field use allow for: modeling, 3D mapping, statistical analysis, data acquisition, and data management. On-Scene Coordinators use a variety of hardware, including PDAs, laptops, GPS, digital cameras, scanners, and data monitors. This combination of tools allows for real time coordination of office and field activities. The unique needs for: immediate response; coordination of multiple individuals in different locations; and communication from individuals who spend extended periods of time on-site, provides the incentive for the Emergency Response Team to use technology in the field.

One of the primary tools used by ERT has been in constant development over the past 15 years. Scribe—a required deliverable for all EPA Emergency Response contracts—allows for captures of sampling, observational, and monitoring field data. Examples of Scribe field tasks include Soil Sampling, Water Sampling, Air Sampling and Biota Sampling. Scribe can import electronic data including Analytical Lab Result data (EDD) and Sampling Location data such as GPS. Outputs include labels for collected samples, Chain of Custody generation and Analytical Lab Result data reports. The flexible user interface allows individuals to manage, query and view all the information, or export electronic data to other tools, so sampling data may be further analyzed and incorporated into report writing and deliverables. Additionally, Scribe supports the development of PDA extension applications by OSCs or the Emergency Response Team on an ad-hoc basis. OSWER has a dedicated staff of EPA and contract employees to develop and support the software. All of the tools are shared and discussed among regions through an IT Forum, Federal Remediation Technologies Roundtable, and a framework that stores the applications centrally.
http://www.epaosc.org/sites/ScribeGIS/files/scribe%20info%20sheet.pdf

STATE AND LOCAL

Department of Environmental Resources Management (FL), Jerry Crawford (305-372-6677), Tom Dratler (305-372-6462).

Since 2003, about inspectors at DERM have been using Tablet PCs with Excel as an input form for air and water quality inspections. As of 2007, there are 70-75 inspectors using the tablets. They utilize the wireless technology that is part of the Tablet, which allows them to work remotely, software and wireless automatically transfers information from the state database into the form, uploads or e-mail inspections for authorization, and access GIS to pinpoint locations. The inspectors use software that was developed in-house through analysis of both statue-based checklists and the workflow process. The software is frequently updated, with more than one version created per year in the first several years. While the program increases the accuracy of information because data clerks are not needed for transcription, the software and workflow process requires a significant amount of training. There is a separate training group for the technical process. The state is working on incorporating the ability to print in the field. This project has cost about $100,000 to date. While an official study on efficiency has not been conducted, there is consensus that the program has increased the number of inspections per year and the project has been worth the cost.

Management and Information Services Department (Boston), Chris Burlingame (607-635-4783).

In 2003, the Office of Neighborhood Services began using Tablet PCs to record citizen comments on government PDF forms using LiquidOffice eForm. Also, they have been testing wireless connectivity to submit the forms in real time. Mr. Burlingame thought the Tablets were pricey, and may not be durable enough for use by building and health inspectors. However, it has the advantage of using Microsoft XP and other Microsoft products, and ease of use on a larger screen than a PDA. Representatives from Cardiff, who created the software, said they decreased the cost of processing for routing, approval, completion, and data entry from $100-150 to just $7.
Source: http://www.fcw.com/geb/articles/2003/0707/web-boston-07-09-03.asp

Office of Planning and Environment (Washtenaw County, MI), Dan Myers (734-222-6844).

In early 2005, Washtenaw started using laptops and PDAs to collect soil erosion data for land and permit management. Using wireless technology, staff has real-time access to the agency's database and to quickly shift their daily activities from the office to the field, thus improving efficiency and providing faster results to citizens. They use a complete software solution by Accela.
Source: http://www.govtech.net/magazine/channel_story.php/94283

Department of Health (Washington, D.C.), Denise Pope (202-442-5999).

Since 2004, the department uses Tablet PCs with GIS to inspect the city's 30,000 health facilities for permits and licensing. The system allows remote access to schedules and permit information, improving efficiency and improved tracking of noncompliance.
Source:
http://www.govtech.net/magazine/channel_story.phtml?channel=14&id=89496

Department of Agriculture (CO), John Picanso. john.picanso@state.co.us
The Colorado Department of Agriculture has been using Tablets for about three years, and has upgraded their workflow process to use Microsoft Infopath forms. Incorporating Infopath into the system, 35 inspectors save an hour per inspection and conduct 20 more business and livestock inspections per week. The Tablets are used heavily in the Colorado environment but they have not had to replace any Tablets. The advantages of using this workflow process includes immediate data entry (previously one week), decreased transcription errors, larger screens for comments, paperless inspections, and ink technology. They want to deploy 50 more Tablets in the near future.

State Board of Barber Examiners (TX), Glen Parker (512-936-6333).
Since 2001, eight inspectors visit fifteen to twenty businesses per day to conduct field inspections. They use PDAs with wireless technology to send their inspection information to the main office. Although it took about one year to work out the bugs, they have eliminated paper forms, reduced transcription errors and duplicate data, saved time in the field, and been able to cut back on office staff (saving $28,000 per year).
Source:
http://www.hansen.com/NEWS/InthePress/GovTechSep01/MobileInsp.htm

City of Chicago, IL. Deborah McCann, Deputy CIO (312-742-0617).
In 2001, the City of Chicago implemented a mobile inspection solution from Hansen Information Technologies, which integrated 500 users across fifteen agencies, including the Department of Buildings, Fire Prevention Bureau and Department of Public Health. The solution involves Pocket PCs, laptops, and Tablets. Some activities will link with digital cameras, printers, and GPS.
Source:
http://www.hansen.com/news/InthePress/govtechjanuary02/govtech0102.htm

Health Department, (Volusia County, FL) Peter Thornton (386-822-6247), Regina Harris (386-274-0699).
Peter Thornton (Volusia County, FL) described a thoroughly comprehensive and integrated approach to information exchange and data management across the county's entire public health mission. From a philosophical standpoint, he advocated that regulatory agencies first think about the ideal and most expansive possible uses of these new technologies and then set about designing an approach to achieve these goals (rather than letting the limitations of the technology dictate the approach). The approach used by the county health department includes use of

arc pad with extra memory, a wireless modem to synchronize data, and an attached GPS device. The forms were created in house beginning in 2002 for use on a Windows-based PDA. The forms were developed using a combination of statute-based checklists and an analysis of the workflow process. The program took only a few months to develop and implement, although the software has undergone several revisions. The technology is used for inspections to pre-fill forms—with the ability to take detailed notes if desired—and to upload information to a database. The cost to outfit each inspector with the necessary hardware and software was initially approximately $1,750, but that cost has decreased as software upgrades have been less expensive than initial purchases. As of 2007, inspectors in 7 different programs use the PDAs, and the agency has experienced time savings and reduction in errors through the elimination of duplicate efforts.
Source: 2004 National PDA Conference presentation summary.

Broward County Environmental Protection Department, Pollution Prevention and Remediation Division. Jeffery Halsey (954-519-1486).

Since 2003, nine inspectors in the PPRD have used Tablet PCs to carry out 5,000 inspections annually. This data is collected in the field using proprietary software, and uploaded to the main Oracle database on home internet connections. The software integrates digital photos into reports, and allows printing in the field. E-forms are sent to the state, quality controlled, then sent to EPA. This has resulted in a 14% increase in the number of inspections, and a 40% decrease in data errors. Additionally, the County is beginning to automate Building Code Services, with 75 inspectors doing 10,000s of inspections on PDAs per year starting in 2005.
Source: Environmental Compliance Consortium, Managing Environmental Information Forum 2004 and 2005 presentations;
Source: http://www.complianceconsortium.org/Events/Events.asp

South Florida Water Management District. Jay Marshall (561-682-6950)

The District began experimenting with PDAs and self-designed inspection forms in 1997. In 2001, they implemented a new program (M-Business Anywhere) with web-based forms and checklists that were developed in-house by a programmer over the course of a year. Currently, 45 field staff use the forms, which allow them to spend more time in the field with no data re-entry, better efficiency, and greater accuracy. In the firs six years, approximately 2,000 inspections were completed per month with the new technology. New inspectors are required to use the software, and they receive personal training along with the use of a web-based technical manual. This workflow process is estimated to reduce program costs by approximately $70,000 a year based on an initial software license of only $10,000. The inspectors use GIS maps stored on memory cards for the PDAs.
Source: http://www.ianywhere.com/success_stories/sfwmd.html

Louisiana Office of Public Health. Curry Perkins (225-763-8775)

In 2004, retail food inspectors began using Tablet PCs to document violations and to replace the paper workflow process. Over 350 inspectors have been outfitted with a Tablet PC, digital camera, and printer which cost $3,500 per person. The software including the combining of forty different forms into one electronic version cost $120,000. This does not include annual maintenance to the software. The software generates reports and uploads them instantly from the field. While some sanitarians have had trouble with the new technology, most think it is excellent, making them more accurate and productive. The program has been expanded to include building and premises, sewage and wastewater, and seafood inspections. They also plan to replace all notebooks and desktops with Tablet PCs.

City of New York Department of Health.

The Department of Health developed two systems to carry out restaurant (public health) and lead inspections on Tablet PCs. The software allows inspectors to create a standardized, focused inspection with code-based wording for violations. It allows them to capture signatures and print violations on site, improving efficiency, productivity, data quality, and revenue from fines.
Source:
http://www.dsii.net/us/AboutUs/SuccessfulStory/tabid/932/ctl/Edit/mid/Consulting/PublicSector/tabid/1023/Default.aspx

Rhode Island Department of Environmental Management. Terrence Gray (401-222-4700 ext. 7100), Ronald Gagnon (401-222-6822 ext 7500)

Five inspectors began testing Tablet PCs in the field for UST inspections in June 2005. Contractors developed a single inspection template, from the previous ten-page paper checklist, using Microsoft's Infopath software. Inspectors identify their inspection site from a database list and the system will auto-fill pre-inspection information regarding that site. During the site inspection, inspectors have access to all the references and site history they need. They can collect the inspection data, including digital photos and GPS, electronically and create site diagrams on the form for future inspectors. The data can be uploaded to the main Oracle database, allowing for immediate follow-up for legal action, if necessary. The new system, which was partially funded by a Microsoft grant, is expected to save Rhode Island DEM about $200,000 per year compared to the paper process. Mr. Gray said that there was interest from other state agencies, but mentioned that the EPA region was not as interested. Also, Mr. Gray suggested that as a member of ASTSWMO, he could tap into waste management officials if EPA wanted to promote more technology use among the States.
Source:
http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=53916

FOREIGN

London Borough of Lewisham. Simon Berlin, Head of e-Government. (Tel: 020 8314 6000).

Since October 2003, 200 inspectors have been collecting tax data on Tablet PCs using Microsoft Office Infopath. This automated process has increased the proportion of their time spent in the field from 50% to 80%. Meanwhile, processing of applications can be completed in one hour instead of 48 hours, and costs of each inspection are reduced by up to 30 percent. Additionally, inspectors no longer had to carry reference materials, and the automated data entry reduced errors.
Source:
http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=52258

Hong Kong Environmental Protection Department

In February 2000, inspector teams began using PDAs for inspections of 70 chemical-waste collectors and their 200 vehicles. The teams save 1.5 man-hours per day, with an increase in productivity of 10%. This complete solution has direct integration into the back-end database, allowing for easy report generation and viewing, as well as reduced paper waste, data duplication, and data entry errors.
Source: http://www.palm.com/au/solutions/studies/hk_edp.html

Ministry of Public Safety and Solicitor General, Commercial Vehicle Safety and Enforcement. British Columbia. Rob Kroeker (250-953-4024).

In the summer of 2005, the ministry conducted a pilot program using ruggedized Tablet PCs for its 35,000 annual roadside inspections. The wireless solution makes data accessible in minutes, compared to the two weeks it took to complete the forms in the field, forward them to the regional office, and then forward them to the central office for data entry.

Energy Regulator. Canada.

An unnamed Canadian energy regulator is using rugged Tablet PCs with GPS and a GIS interface to help cut preparation time for inspections of oil wells, gas plants, and pipelines. They no longer have to carry binders of reference documentation, and they can collect consistent data, with ability to reference historical information.
Source:
http://www.xploretech.com/public/Mobile_CaseStudy_FinalDraft041904.pdf

UN World Food Programme, Zimbabwe.

In July and August 2002, the UN deployed inspectors with 35 PDAs to collect more than 2,500 survey responses. The software was a custom Microsoft Survey Application, which created standardized lists and options to ensure accuracy and consistency. Analysis could be done in one day instead of two weeks, and even novice inspectors were able to use the hardware.

Source:
http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=51485

Cambridgeshire County Council, UK. (011-44-845-045-5201).

The Council uses Tablet PCs with Microsoft Infopath for health care workers during patient visits. This allows for a team approach to patient care by creating a single record with information sharing among the back-end systems of several care agencies. The solution is expected to save 3 million pound by eliminating assessment duplication, and reduce administrative costs by 850,000 pounds. The ratio of time spent on administrative duties to assessment duties shifted from 70/30% to 30/70%.

Source:
http://www.microsoft.com/casestudies/casestudy.aspx?casestudyid=53859

New Zealand Ministry for the Environment. Michael LeRoy-Dyson.
michael.leroy-dyson@mfe.govt.nz

For the past several years, the Ministry has been testing PDA use by inspectors. Their current system produces draft letters and allows access to site history in the field. They can also print or e-mail letters as required. However, they have found the screen size of PDAs to be limiting. They hope to have a system that will pre-download inspection items, record findings, integrate digital photos, print out forms, and download real-time information. Two other "state type" agencies currently use Tablets for similar functions, with 50 to 100 in the field. They hope that all their field staff will be using new technologies over the next year, as they "see the cost savings and increased efficiencies possibilities of far outweighing any of the disadvantages or hard/software costs. He desires and sees room for collaboration in progressing toward field technology implementation.

SUMMARY OF EPA HARDWARE USAGE BY REGIONAL PROGRAM

Note: This table reflects responses collected by 12/23/05 during an internal EPA survey. Numbers reflect the number of inspectors using that technology in the field. The numbers do not necessarily reflect sole possession of that equipment, as some equipment is shared. An 'X' reflects that use was reported, but no specific number was given. The percentages at the end represent the percentage of programs of those that responded use that type of technology.

Region	Program	Division	Laptop	PDA	Tablet	GPS	Satellite	Digital Voice Recorder	Digital Camera	Wireless/ Bluetooth
1	CAA	OES	0	0	0	0	X	0	X	0
1	RCRA		0	0	0	0	0	0	5	0
1	CWA	OES	0	0	0	0	X	0	X	0
2	CWA		3	0	0	6	4	0	15	2
2	CAA		5	0	0	0	0	0	22	0
2	RCRA		0	1	0	2	0	0	7	0
2	SDWA		5	6	0	7	1	0	5	5
2	FIFRA		0	0	1	5	1	0	6	1
2	AHERA		0	0	0	0	0	0	1	0
3	CWA	OECEJ	0	0	0	X	0	0	X	0
3	CAA	OECEJ	0	0	0	0	0	0	X	0
3	RCRA	OECEJ	0	0	0	X	0	0	X	0
3	SDWA	OECEJ	0	X	0	X	0	0	X	0
3	TSCA	OECEJ	0	0	0	0	0	0	X	0
3	FIFRA	OECEJ	0	0	0	0	0	0	X	0
3	EPCRA	OECEJ	0	0	0	0	0	0	X	0
3	OPA	OECEJ	0	0	0	0	0	0	X	0
3	CERCLA	OECEJ	0	0	0	0	0	0	X	0
4	CAA	OEA	1	0	0	0	1	1	1	1
4	RCRA	OEA	0	0	0	0	2	0	2	2
4	RCRA	UST	0	0	0	0	0	0	1	0
4	CERCLA	SEIMB	X	X	0	X	X	X	X	0
4	CWA	WMD/WPEB	12	0	0	12	4	0	16	12
4	SDWA	WMD/WPEB	6	0	0	6	1	0	6	6
4	RCRA	Waste	X	0	0	X	0	0	X	0
4	CWA	OEA	2	0	0	0	2	0	2	0
5	CAA	ARD	20	0	5	0	10	0	10	20
5	SDWA	Drinking Water	0	1	0	1	0	0	1	0

Region	Program	Division	Laptop	PDA	Tablet	GPS	Satellite	Digital Voice Recorder	Digital Camera	Wireless/ Bluetooth
5	TSCA	WPTD/PTB	0	0	X	0	0	0	X	0
5	SDWA	UICB/Water	0	6	0	8	2	0	2	0
6	CAA	CAA 112r	0	0	0	1	0	0	3	0
6	CAA	Enforcement	3	0	0	0	0	0	5	0
6	CWA	6EN-AS	7	0	0	0	0	0	7	7
6	FIFRA	Pesticides	0	0	0	0	0	0	3	0
6	OPA	311 Oil Program	X	X	X	X	X	X	X	X
6	RCRA	Enforcement	0	0	0	3	8	0	18	0
6	RCRA	UST	0	0	0	0	0	0	1	0
6	CWA	6WQ-EM-Wetlands	0	0	0	0	0	0	8	0
7	EPCRA		X	0	0	X	0	0	X	0
7	TSCA		0	0	0	0	0	0	X	0
8	CWA	NPDES	0	0	0	6	6	0	6	0
8	RCRA	Enforcement	0	0	0	1	1	0	0	0
8	SDWA	Enforcement	0	3	0	5	0	0	5	5
9	CAA	Air	0	0	1	0	0	0	7	0
9	CWA	CWA	0	0	0	X	X	0	X	0
10	CWA	OCE	3	X	0	4	1	0	4	0
10	CAA	OCE	6	0	0	2	2	1	7	0
10	TSCA	OCE	4	0	0	4	2	0	8	0
10	FIFRA	OCE	1	0	0	1	0	0	3	0
10	EPCRA	OCE	X	X	0	X	X	0	X	0
10	OPA	OCE	X	X	0	X	X	0	X	0
10	CERCLA	OCE	2	X	0	2	2	0	2	0
HQ	TSCA	OC/AgD	0	0	0	0	0	0	0	0
HQ	FIFRA	OC/AgD	0	0	0	0	0	0	0	0
HQ	CAA	OECA/ORE/AED/MSEB	4	0	0	6	0	0	8	4
NEIC	CWA	OECA/OCEFT/NEIC	6	0	0	6	4	1	6	0
NEIC	CAA	OECA/OCEFT/NEIC	10	2	0	1	3	1	6	0
NEIC	RCRA	OECA/OCEFT/NEIC	1	0	0	1	5	1	5	0
NEIC	TSCA	OECA/OCEFT/NEIC	1	0	0	1	1	1	1	0
NEIC	EPCRA	OECA/OCEFT/NEIC	4	0	0	0	0	0	4	0
NEIC	CERCLA	OECA/OCEFT/NEIC	1	0	0	1	1	1	1	0
% Use			**45.9**	**21.3**	**8.2**	**55.7**	**47.5**	**14.8**	**95.1**	**19.7**

SUMMARY OF SOFTWARE USAGE BY REGION

Note: This table reflects responses collected by 12/23/05 during an internal EPA survey. A 0 response represents no special software reported.

Region	Program	Targeting	Scheduling	Research	GIS	Data Collection	Reference	Data Analysis	Report Writing	Trend Analysis	Other	Contact
1		EPA Databases	0	0	ArcGIS	0	Intranet	0	0	0	0	Steven Rapp
2		GIS/RMP/ Internet	Spreadsheet/ GIS	0	ArcGIS	Custom Checklists/ oneNote	EPA Database	RMP		Spreadsheets		Dave Bernstein/ Hillenbrand
3		0	0	0	0	0	0	0	0	0	0	
4		Envirofacts		Spreadsheet	ArcGIS	Voice Recognition	e-CFR	Spreadsheet	0	0	0	
5		Registration Database	Database	0	Maps & Streets	Checklists/ NotePad	Access Database	Access VBA	0	0	0	Constantinos Loukeris
6		Customized Database/ GIS	0	Customized Database	0	0	0	Database	0	SQL	SQL	Bob Goodfellow/ Don Smith
7		0	0	0	0	0	0	0	0	0	0	
8		0	0	0	0	Customized Database (UIC)	0	0	Checklists	0	0	
9		OTIS	0	0	0	0	Cyber Regs	0	0	0	0	
10		0	0	0	ArcIMS	0	0	0	0	0	0	Phil Wong
HQ	TSCA	Customized Database	0	Customized Database	0	0	0	0	0	0	0	Francisca Liem
HQ	CAA	Database/ Spreadsheet	Database/ Spreadsheet	Database/ Spreadsheet	0	Database	0	Spreadsheet	Database	Contracted	0	John Connell
NEIC	CAA	Customized Database	Customized Database	COTS	COTS	Customized Database/ COTS	EPA Databases/ CyberRegs	Customized Database	Customized Database	Customized Database	COTS	Valerie James

BETTER USE OF TECHNOLOGY IN COMPLIANCE MONITORING ACTIVITIES

FIELD ACTIVITY COMPLIANCE TECHNOLOGY STRATEGY (FACT STRATEGY)

APPENDIX B

NUMBER OF INSPECTION PROGRAMS AND INSPECTION TYPES

APPENDIX B
NUMBER OF INSPECTION PROGRAMS AND INSPECTION TYPES

INSPECTION PROGRAMS AND INSPECTION TYPES

Statutory and Regulatory Compliance Programs Where OC Has Some Role *

Statute	Regulatory Compliance Program
CAA	New Source Performance Standards (NSPS) and State Implementation Plans (SIP)
	Prevention of Significant Deterioration (PSD) and New Source Review (NSR)
	National Emission Standards for Hazardous Air Pollutants (NESHAPS) Air Toxics
	Stratospheric Ozone including chlorofluorocarbons (CFCs)
	Wood Heaters compliance and enforcement program
	112 (r) General Duty Clause (GDC) and Risk Management Plans (RMP)
	Asbestos Demolition and Renovation (D&R)
	Acid Rain inspection and trading programs
CWA	National Pollutant Discharge Elimination System (NPDES)
	Pretreatment of wastewater (Industrial Users)
	Biosolids (POTW sludge)
	Oil Pollution Act (OPA) – Section 311
	Industrial Stormwater: includes Concentrated Animal Feedlots (CAFOs) and all other non-municipal stormwater permits
	Municipal Stormwater: Combined Sewer Overflows (CSOs), Sanitary Sewer Overflows (SSOs)
	Wetlands (Section 404)
	Wastewater Trading Programs
RCRA	Subtitle C – Hazardous Waste
	Subtitle I – Underground Storage Tanks (UST)
	Recycled Oil
	Mercury Containing Battery Recycling Management Act (MCBRMA)
	Import/Export Program
TSCA	Core TSCA: Sections 4, 5 and 8
	Polychlorinated Biphenyls (PCBs)

	Asbestos disposal
Statute	**Regulatory Compliance Program**
	Asbestos Hazard Emergency Response Act (AHERA)
	Lead Paint
	State Grants management
	Import/Export Program
	Good Laboratory Practices (GLPs)
FIFRA	State Grants management
	Worker Protection Standards (WPS)
	Traditional pesticides program
	Biotechnology pesticides program
	Anti-microbial pesticides program
	Import/Export program
	Good Laboratory Practices (GLPs)
SDWA	Underground Injection Control (UIC)
	Public Water Supply Supervision (PWSS)
EPCRA	Section 313 program
	Non-313 program

* **Does not include CERCLA statutory programs**

EPA

United States Environmental Protection Agency
Washington, D.C. 20460

Water Compliance Inspection Report

Section A: National Data System Coding (i.e., PCS)

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac Type
1 [ ] 2 [5]	3 [ ] 11	12 [ ] 17	18 [ ]	19 [ ]	20 [ ]

Remarks

21 [ ] 66

Inspection Work Days	Facility Self-Monitoring Evaluation Rating	BI	QA	Reserved
67 [ ] 69	70 [ ]	71 [ ]	72 [ ]	73 [ ] 74 [ ] 75 [ ] 80

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*	Entry Time/Date	Permit Effective Date
	Exit Time/Date	Permit Expiration Date
Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)	Other Facility Data *(e.g., SIC, NAICS, and other descriptive information)*	
Name, Address of Responsible Official/Title/Phone and Fax Number — Contacted ☐ Yes ☐ No		

Section C: Areas Evaluated During Inspection *(Check only those areas evaluated)*

☐ Permit	☐ Self-Monitoring Program	☐ Pretreatment	☐ MS4
☐ Records Reports	☐ Compliance Schedules	☐ Pollution Prevention	
☐ Facility Site Review	☐ Laboratory	☐ Storm Water	
☐ Effluent/Receiving Waters	☐ Operations & Maintenance	☐ Combined Sewer Overflow	
☐ Flow Measurement	☐ Sludge Handling/Disposal	☐ Sanitary Sewer Overflow	

Section D: Summary of Findings/Comments
(Attach additional sheets of narrative and checklists, including Single Event Violation codes, as necessary)

SEV Codes	SEV Description
☐☐☐☐☐	
☐☐☐☐☐	
☐☐☐☐☐	
☐☐☐☐☐	

Signature of Management Q A Reviewer	Agency/Office/Phone and Fax Numbers	Date

Section C identifies 16 CWA areas subject to inspection

INSTRUCTIONS

Section A: National Data System Coding (i.e., PCS)

Column 1: Transaction Code: Use N, C, or D for New, Change, or Delete. All inspections will be accepted unless there is an error in the data entered.

Columns 3-11: NPDES Permit No. Enter the facility's NPDES permit number. (third character in permit number indicates permit type: I for Unpermitted, G for general permit, etc.) (Use the Remarks column to record the New Jersey number, if necessary.)

Columns 12-17: Inspection Date. Insert the date entry was made into the facility. Use the year/month/day format (e.g., 041001 = October 01, 2004).

Column 18: Inspection Type*. Use one of the codes listed below to describe the type of inspection.

A	Performance Audit	U	IU Inspection with Pretreatment Audit	!	Pretreatment Compliance Oversight
B	Compliance Biomonitoring	X	Toxics Inspection	@	Follow-up (enforcement)
C	Compliance Evaluation (non-sampling)	Z	Sludge - Biosolids		Storm Water-Construction-Sampling
D	Diagnostic	#	Combined Sewer Overflow-Sampling		Storm Water-Construction-Non-Sampling
E	Pretreatment Follow-up	$	Combined Sewer Overflow-Non-Sampling	:	Storm Water-Non-Construction-Sampling
G	Pretreatment Audit	+	Sanitary Sewer Overflow-Sampling	-	Storm Water-Non-Construction-Non-Sampling
I	Industrial User (IU) Inspection	&	Sanitary Sewer Overflow-Non-Sampling	<	Storm Water-MS4-Sampling
J	Complaint	`	CAFO-Sampling	=	Storm Water-MS4-Non-Sampling
M	Multimedia	~	CAFO-Non-Sampling	>	Storm Water-MS4-Audit
N	Spill	2	IU Sampling Inspection		
O	Compliance Evaluation (Oversight)	3	IU Non-Sampling Inspection		
P	Pretreatment Compliance Inspection	4	IU Toxics Inspection		
R	Reconnaissance	5	IU Sampling Inspection with Pretreatment		
S	Compliance Sampling	6	IU Non-Sampling Inspection with Pretreatment		
		7	IU Toxics with Pretreatment		

Column 19: Inspector Code. Use one of the codes listed below to describe the lead agency in the inspection.

A	State (Contractor)	2	Other Inspectors, Federal/EPA (Specify in Remarks columns)
B	EPA (Contractor)	P	Other Inspectors, State (Specify in Remarks columns)
E	Corps of Engineers	R	EPA Regional Inspector
J	Joint EPA/State Inspectors—EPA Lead	S	State Inspector
L	Local Health Department (State)	T	Joint State/EPA Inspectors—State lead
N	NEIC Inspector		

Column 20: Facility Type. Use one of the codes below to describe the facility.

1 — Municipal: Publicly Owned Treatment Works (POTWs) with 1987 Standard Industrial Code (SIC) 4952.
2 — Industrial: Other than municipal, agricultural, and Federal facilities.
3 — Agricultural: Facilities classified with 1987 SIC 0111 to 0971.
4 — Federal: Facilities identified as Federal by the EPA Regional Office.
5 — Oil & Gas: Facilities classified with 1987 SIC 1311 to 1389.

Columns 21-66: Remarks. These columns are reserved for remarks at the discretion of the Region.

Columns 67-69: Inspection Work Days. Estimate the total work effort (to the nearest 0.1 work day), up to 99.9 days, that were used to complete the inspection and submit a QA reviewed report of findings. This estimate includes the accumulative effort of all participating inspectors, any effort for laboratory analyses, testing, and remote sensing; and the billed payroll time for travel and pre and post inspection preparation. This estimate does not require detailed documentation.

Column 70: Facility Evaluation Rating. Use information gathered during the inspection (regardless of inspection type) to evaluate the quality of the facility self-monitoring program. Grade the program using a scale of 1 to 5 with a score of 5 being used for very reliable self-monitoring programs, 3 being satisfactory, and 1 being used for very unreliable programs.

Column 71: Biomonitoring Information. Enter D for static testing. Enter F for flow through testing. Enter N for no biomonitoring.

Column 72: Quality Assurance Data Inspection. Enter Q if the inspection was conducted as follow-up on quality assurance sample results. Enter N otherwise.

Columns 73-80: These columns are reserved for regionally defined information.

Section B: Facility Data

This section is self-explanatory except for "Other Facility Data," which may include new information not in the permit or PCS (e.g., new outfalls, names of receiving waters, new ownership, other updates to the record, SIC/NAICS Codes, Latitude/Longitude).

Section C: Areas Evaluated During Inspection

Check only those areas evaluated by marking the appropriate box. Use Section D and additional sheets as necessary. Support the findings, as necessary, in a brief narrative report. Use the headings given on the report form (e.g., Permit, Records, Reports) when discussing the areas evaluated during the inspection. The heading marked "Multimedia" may indicate medias such as CAA, RCRA, and TSCA.

Section D: Summary of Findings/Comments

Briefly summarize the inspection findings. This summary should abstract the pertinent inspection findings, not replace the narrative report. Reference a list of attachments, such as completed checklists taken from the NPDES Compliance Inspection Manuals and pretreatment guidance documents, including effluent data when sampling has been done. Use extra sheets as necessary.

*Footnote: In addition to the inspection types listed above under column 18, a state may continue to use the following wet weather and CAFO inspection types until the state is brought into ICIS-NPDES: K: CAFO, V: SSO, Y: CSO, W: Storm Water 9: MS4. States may also use the new wet weather, CAFO and MS4 inspections types shown in column 18 of this form. The EPA regions are required to use the new wet weather, CAFO, and MS4 inspection types for inspections with an inspection date (DTIN) on or after July 1, 2005.

Column 18 identifies 38 inspection types in the CWA program