

(17)

EC-2000-007
II-A-020

DRAFT

LOGISTICS MANAGEMENT INSTITUTE
Hazardous Waste Manifest
Automation Pilot Phase II
Final Report

Received
JAN 12 2001
Enforcement & Compliance Docket
& Information Center

EP803L1/FEBRUARY 2000

By Carol Ann Daley

BACKGROUND

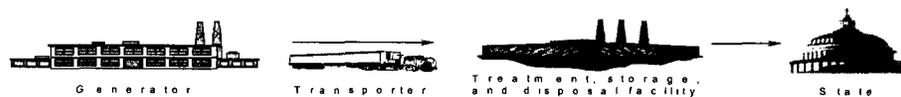
As part of its efforts to implement the Reinventing Environmental Information initiative, the Environmental Protection Agency (EPA) is beginning to use electronic commerce technologies to transmit environmental data. The Hazardous Waste Manifest is a key document in recording the origin, movement, and

Prepared for the Environmental Protection Agency pursuant to GSA Contract GS-35F-4044, in fulfillment of deliverable EP803.03-HWM5-04. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the Environmental Protection Agency. Permission to quote or reproduce any part except for government purposes must be obtained from the Logistics Management Institute.

DRAFT

disposal of hazardous waste. Data contained in the manifest are critical elements of the Hazardous Waste Report (HWR). The flow of the Hazardous Waste Manifest Process is reflected in Figure 1.

Figure 1. Flow of the Hazardous Waste Manifest Process



As a part of the effort to propose a new electronic Hazardous Waste Manifest rule using electronic data interchange (EDI), the EPA and several environmental stakeholders are participating in an extensive pilot. The objective of Phase I was to move manifest data using EDI rather than paper forms.

Phase II built on Phase I and tested the application of a digital signature to the EDI Hazardous Waste Manifest. LMI assisted EPA by providing coordination and oversight during Phase II. The EDI transaction set used in both phases was the 856 Shipment Notice/Manifest. The federally approved implementation convention for hazardous waste movement for the 856 was used in both cases.

LMI was a participant in Phase II and helped to coordinate and manage the phase.

DRAFT

This report describes the goals and results of each phase. It also identifies several problems encountered in Phase II. In addition, we requested feedback from the test participants. This report includes a brief summary of their views.

PHASE I

Goals

The goal of the first phase was to prove that all aspects of the paper-based manifest could be processed electronically. Electronic submission expedited data entry and tracking, and reduced processing costs.

Results

The first phase of the Hazardous Waste Manifest Automation Pilot consisted of implementing an EDI process using the Uniform Hazardous Waste Manifest. The test participants consisted of six trading partners: 3M, Envirite, LTV Steel, Minnesota Pollution Control Agency, Safety-Kleen, and US Filter. DPRA, Inc., and the Office of Solid Waste (EPA-OSW) provided support to the trading partners. The data were transmitted between Resource Conservation and Recovery Act (RCRA) waste handlers and state agencies. Teams were created, and trading partners rotated roles as the generator; transporter; or treatment, storage, or disposal facility (TSDF).

Sterling Commerce's *GENTRAN:Smartforms for Windows* software performed

DRAFT

the EDI translation for all test participants. This product is a low-end, personal computer (PC)-based system conducive for a test mode. Sterling Commerce also provided value-added network (VAN) services.

Sterling Commerce's communication module, *Commerce:Network*, which provides access to its VAN, was used for the EDI transmissions. The electronic manifests were signed and authenticated with a personal identification number (PIN). The digital character string generated by the PIN was adopted by the signer as a representation of the signature in an electronic format. A PIN enabled each trading partner to access the VAN, use the EDI software to complete the electronic manifests, and sign and transmit the manifest form through the VAN.

DPRA, Inc. provided oversight and coordination during Phase I, which was completed in December 1998. The test was successfully completed, and all participants exchanged the EDI transaction sets easily. The only significant issue was that the limited capabilities of the *GENTRAN:Smartforms* software and the VAN required an artificial N2 segment at the beginning of the transaction set. The addition of the artificial N2 segment, which is not in conformance with X12, did not affect the test environment adversely but could create problems if used in a production environment. For additional information on Phase I of the pilot, see *Uniform Hazardous Waste Manifest Automation Pilot—Phase I Evaluation Report*.¹

PHASE II

DRAFT

Goals

EPA is determining the best way to validate and authenticate electronic transmissions. The agency has several pilots that are testing digital and digitized signature technologies. The goal of this phase was to provide the EPA with experience in applying a digital signature using token cards and token card readers. Public-key infrastructure (PKI) technology, using token cards and token card readers, is an option that EPA is analyzing.

PKI technology will enable the EPA to protect its electronic communications transmitted via the Internet. PKI can be a hardware- or software-based solution that provides the ability to authenticate the identity of users, verify that the data have not changed since the transaction was signed, ensure the data will not be intercepted enroute, and ensure that the user is authorized to receive the data. Users receive digital certificates, and a certificate authority (CA) provides the assurance that the certificate is valid.

The participants encountered many problems during setup as well as Phase II. They are discussed in the following issues subsection.

Results

The second phase built on the successful transmission of the manifest in EDI format and attached a digital signature to it. In Phase II, the 856 transaction set continued to be used as was the Sterling Commerce *GENTRAN:Smartforms for Windows* and *Commerce:Network* products.

The Phase II test participants consisted of seven trading partners: Envirite, LMI,

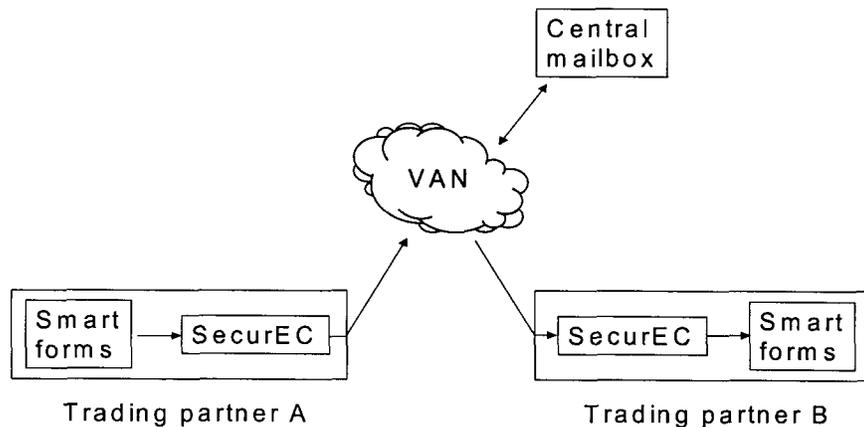
DRAFT

LTV Steel, Minnesota Pollution Control Agency, Pennsylvania Department of Environmental Protection, Safety-Kleen, and Sparta. LMI, Sparta, and EPA-OSW provided support to the trading partners. The data were transmitted between RCRA waste handlers and state agencies. Teams were created, and trading partners replicated their roles as the generator; transporter; or TSDf. LMI and Sparta coordinated and managed Phase II.

To generate the digital signature, the Sparta *SecurEC* product was integrated with the Sterling Commerce *GENTRAN:Smartforms for Windows* product to add a digital signature to the transaction set using token card technology. In this case, the token card was a PC card that, when applied to an electronic Hazardous Waste Manifest, provided the ability to apply digital signatures to transactions. This card required a token reader in a component slot on each participant's PC or, in the case of a laptop, a token card in a PCMCIA [Personal Computer Memory Card International Association] slot. The technology was tested to verify the ability to apply digital signatures to a transmission, which with a PIN, provide the ability to authenticate a document and ensure the signer is responsible for the electronic manifest. The Phase II flow of Hazardous Waste Manifest data is reflected in Figure 2.

Figure 2. Phase II Flow of Hazardous Waste Manifest Data

DRAFT



The *SecurEC* product should support the automated exchange of digital certificates. However, because of the manipulation of the transaction in the VAN, this automatic exchange is not possible. As a result, digital certificates were exchanged among trading partners by diskette before the pilot began.

The test was originally scheduled to be conducted from 5 July 1999 through 30 September 1999. However, delays in programming, distributing the hardware, and configuring of the Sterling VAN delayed the start. The pilot did not begin until 18 October 1999. It was completed on 10 December 1999.

DRAFT

Problems

Several problems were encountered in Phase II that relate to Sterling Commerce software and the VAN, *SecureEC* software, and user preparations.

STERLING COMMERCE SOFTWARE AND VAN ISSUES

An EDI software application should be selected based on a clear understanding of all EDI requirements for a business application. EPA sought a low-cost solution from Sterling Commerce for the Hazardous Waste Manifest pilot. Sterling Commerce offered to modify *Gentran:Smartforms for Windows* to satisfy the EPA's needs. However, the modification of *GENTRAN:Smartforms* may not have been the best solution. The manifest flow is not a simple "A to B" transmission and could potentially be relayed to four or more parties. Because *GENTRAN:Smartforms* is not designed to handle a complex flow, a workaround using the N2 segment and a central mailbox in the VAN were created to accommodate the next recipient's name. Although the modifications allowed for the Hazardous Waste Manifest to flow to each trading partner, *Gentran:Smartforms* did not provide an accurate picture of the Hazardous Waste Manifest process in an EDI environment.

Before the start and during the pilot, the response times of Sterling Commerce's technical support were extremely long. Finding a person that would provide help was challenging. Both Sparta and LMI staff spent many hours to identify Sterling personnel who could assist. This problem was partially caused by the manipulation of *Smartforms* and the VAN to accommodate the EPA's needs. Finding support was difficult to find because this modification to the software is

DRAFT

not common. LMI and Sparta spent weeks obtaining support for getting the correct files and the proper configuration of the VAN. Finally, a support person who performed the setup in Phase I was located, which led to the files and VAN being properly configured. Additionally, the partner files written by Sterling Commerce were rewritten and redistributed to the participants many times because the files were not in the correct format. Further, because of the integration of Sterling Commerce's and Sparta's products, we sometimes had difficulty getting support from Sterling Commerce. We had to explain the integration of the two products to technical support. We experienced many disconnects when Sterling Commerce was trying to solve our problems, particularly when the participants, unfamiliar with the technical aspects of the integration, called technical support.

The easiest and best way to access the VAN was through a Transmission Control Protocol/Internet Protocol (TCP/IP) connection rather than a dial-up telephone line. Although the VAN supports both forms of access, the participants experiences several problems installing and configuring the PC hardware and software for using a modem. This difficulty should have been anticipated and resolved before beginning Phase II. The EDI product's capability should have been matched to a task early to ease the workload during the pilot. All options needed to be tried, but the default should have been the preferred method.

Ease of use of the client EDI application should be a key selection factor. During Phase II, much time was lost working with the log-on and connections scripts in the Sterling Commerce software. The participants experienced several problems with dial-up and TCP/IP scripts, including firewall, network, and phone system.

DRAFT

In addition, the Sterling Commerce software was too complex for the users to install and configure. A user needs to know the software and network installation and configuration to use *GENTRAN:Smartforms* properly. However, most problems would not occur in a production environment if full-capability EDI translators are used properly.

SECUREC ISSUES

The security services of the *SecurEC* software need to match the EDI application. When the pilot began, the *SecurEC* configuration was not correct. One default was to retain the digital signature on an incoming interchange. When the participants realized that *Gentran:Smartforms* could not process an EDI interchange with a digital signature, *SecurEC* was configured to strip off the signature.

Another issue with *SecurEC* was the loading of certificate files. The participants did not understand that new certificate files were sent to replace the old versions. Some participants did not replace old versions, and the signature verification process did not work improperly. After all participants loaded the current set of certificate files, signature verification worked properly. In the future, certificate exchange should be automated for the users.

USER ISSUES

Many problems were encountered because the participants did not understand the software and hardware installation and configuration. Our expectation was too

DRAFT

high that the users would have a working knowledge of computers and Windows-based technology. One key mistake was to make the users responsible for loading their hardware and software. Although installation instructions were provided, the participants did not understand or read them completely. As a result, more time was needed with computer support personnel at the participant's site to resolve communications problems. We recommend that a systems or network administrator provide computer support for the users. This approach will save time and benefit everyone if everything is ready when a user begins the test.

We also overestimated the ability or willingness of users to read directions before logging in and receiving or sending transmissions. Documentation was provided to avoid most problems users encountered when operating the software. Additional delays could have been prevented if the users had read all instructions. LMI and Sparta spent many hours explaining the instructions to the participants.

User Comments

In addition, after the test we requested feedback from the users about the test. This section is a summary of comments. Appendix A contains the complete comments of the trading partners.

The management of the digital certificates was complicated. Because the exchange of digital certificates was not automated, the process to update certificates was cumbersome, and all trading partners did not update their certificates appropriately. In the future, the automated exchange of digital

DRAFT

certificates will alleviate these problems.

Gentran:Smartforms was difficult to use, and several problems were encountered. First, a user should be able to access a previous manifest and use it as a template for a new manifest. This ability would reduce the amount of time to enter static information (e.g., generator's address) again. Second, some fields were too short to accommodate hazardous waste information. Third, the inbox needs to be more user-friendly, and an ability is needed to sort by manifest number, trading partner, and date. Fourth, the ability to use *Smartforms* in Windows NT is needed because many businesses use this platform. Finally, the software did not perform consistently, and transmissions were not sent or received when both trading partners used modems.

During Phase II, we tested only one line item. Many manifests included several items with 30 to 100 line items. A more realistic test should include multiple line items.

Finally, we sent transmissions with electronic signatures but we did not demonstrate their use in a production environment. The participants encountered problems that would make this process complex in a production environment. The EPA needs to analyze these problems and implement changes to make this process seamless.

CONCLUSIONS AND RECOMMENDATIONS

The goals of both phases were met. Phase I demonstrated that EDI can transmit

DRAFT

manifest data reliably. Phase II clearly showed that the X12.58 security technology and token cards can be matched to an EDI transaction set to carry a digital signature. The test also resulted in the following important lessons:

- ◆ EDI requires an extensive and expensive setup time. An acceptable return on investment is achieved only through high-volume production operations, which did not occur in the prototype.
- ◆ Before and during the test, the participants were interested in knowing if hardware or software “tokens” are intrusive on a user’s system. Although this test did not provide results to address this interest, installing and managing the hardware card reader clearly are complex and expensive tasks.
- ◆ The pilot did not test X12.58 security protocols between translators and security systems of different manufacturers, which is a concern in the industry. The pilot also did not test a software-based PKI solution (the EPA only reached agreement on PKI with the Department of Justice in August 1999).

We recommend that the EPA work with the hazardous waste community to encourage an EDI exchange between one or more of the large waste contractors and a few states that receive a large volume of transactions from them. The goal would be to implement a *production environment* where the contractors submit their manifests (or 861 waste receipt transactions) to the state manifest system. In all cases, a “black box” system-to-system exchange is needed. Each party should

DRAFT

use the EDI system and VAN of its choice (or other communications channels that are acceptable).

Incorporating security will be the major issue of this effort. EDI has been widely used for more than 30 years. The EPA does not need to demonstrate the viability of EDI; it needs to encourage the use of electronic reporting. The large disposal firm and state exchange is the hazardous waste management transaction most suited to EDI. With that capability, contractors can work with their generators to use EDI or the Web to automate the process.

DRAFT

Appendix User Comments

This appendix contains the comments submitted by four trading partners.

TRADING PARTNER A

I am disappointed in the manifest test. Windows NT is used by an overwhelming majority of businesses, but the software couldn't handle NT. If we were testing for someone like Safety-Kleen or US Filter Recovery Services (one of the earlier testers) they would most likely carry a laptop and modem on their trucks and have the necessary codes and passwords for their customers in the machines so the transporter and generator could sign the manifest on the transporter's laptop. But we couldn't get modem to modem to work. So we wound up testing a system that works sometimes under some conditions. Not a very practical result. I suspect we should have also tested some manifests with more than one product on them, like the ones we get here with 30 or 100 lines of items. Several of the fields were way too short for the typical information, and then you could only see a part of what the field held, on the screen.

Somehow we didn't convince Sterling Commerce that it was worth their effort to truly modify their EDI system to make this work.

On the upside, we did get some things done. And I did have the opportunity to

DRAFT

meet and work with some really good people.

TRADING PARTNER B

As for phase II, assuming all the problems with transmissions are solved, the big remaining hurdle is to make the software more user friendly. To me at least, when I had a whole screen of manifests in various states and performed an operation and part of the operation turned out to be to shuffle the manifests, it was very confusing. I think they need a setup like Outlook where there is an in box, an out box, a sent items box and so forth for items in various states of preparation (I think the phase III has a setup like that). Then at least when I was looking to see whether I received something I could readily do so.

I guess we showed you could send transmissions with electronic signatures, but what we did certainly did not demonstrate how this would play out in real life, which to me is the real question. We all knew we could make the transmissions (though it proved challenging).

TRADING PARTNER C

The only change that I would recommend would be to have the ability to call up a manifest and use it as a template, this would speed up entries. At present it takes a lot of time to fill out all the information each time.

DRAFT

TRADING PARTNER D

I would have to say the biggest impression I had was that the certificate management seem quite complicated for even the limited scope of our test.

Recalling that for more than half of the test, I was unable to successfully transfer documents to the intended destination. I can't imagine the complexity of maintaining proper certificates for the large customer base, high volume transactions Safety-Kleen would require in real life.

I would also have to say while I realize *Smart Forms* was just one form tool selected for the test out of many, I find the *Smart Forms* product very difficult to use.

DPR, Inc, *Uniform Hazardous Waste Manifest Automation Pilot—Phase I Evaluation Report*, 12/31/99.