EPA e-Manifest
Office of Resource Conservation and Recovery | www.epa.gov/e-manifest | June 2019

Hazardous Waste e-Manifest Advisory Board June 2019 Meeting

Background White Paper

Abstract
This document is intended to provide background information for the third meeting of the Hazardous Waste e-Manifest System Advisory Board, held in June 2019.

1 Contents

1 Purpose

Congress directed the Environmental Protection Agency (EPA or Agency) to develop the e-Manifest system to reduce the administrative burden of the paper manifest process, while meeting the needs of the user community, including states. Promoting the use of fully electronic manifests is thus an important goal of the e-Manifest program and necessary to realize the benefits of more timely and accurate data and significant cost savings associated with the e-Manifest program.

In the first year of system operation, electronic manifests (fully electronic and hybrid manifests) represented less than 1 percent of all manifests received from July 2018 through April 2019. EPA seeks to increase this percentage. Specifically, EPA requests information to better understand the barriers to using fully electronic manifests and identify actions it can take to enhance implementation.

In this Background White Paper, EPA will outline and clarify system and policy requirements related to e-Manifest and information related to potential barriers and possible solutions for overcoming them. At the e-Manifest Advisory Board meeting on June 18-20, 2019, EPA will request recommendations from the Board related to increasing adoption of the fully electronic manifest.

2 Problem Statement: e-Manifest's Unique Reporting Requirements

For more than 30 years, the RCRA manifest[1] has been a paper-intensive process, involving the carrying, signing, filing and mailing of multiple paper copies of the manifest form. While the cumulative effect of handling several million paper manifests each year in this manner results in substantial paperwork burdens for users and regulators, the actual signature process performed by waste handlers at the time of waste custody transfers is simple to accomplish as it only requires signing the manifest. By contrast some implementations of electronic reporting require pre-enrollment, registration, identity proofing, passwords, challenge questions to answer while signing the form, network access at the time of signature, and post-signature monitoring of out-of-band email addresses for evidence of unauthorized activity involving one's electronic signature.

The above paragraph highlights the differences between the simple ink signature process used in the field for years by waste handlers and the elaborate processes that sometimes may be required to use an electronic signature, but with the manifest, these differences are magnified by the fact that every manifest requires at least three signatures (generator, transporter, and receiving facility) to be executed sequentially over the course of a hazardous waste shipment. It is also not uncommon for additional transporters to act as intermediate transporters who must also sign the manifest when they take custody of the wastes. Thus, the differential complexity perceived by users between signing a manifest

[1] Hazardous Waste Manifest https://www.epa.gov/sites/production/files/2018-05/documents/uniform_hazardous_waste_manifest.pdf

with ink signatures versus electronic signatures is cumulative over the multiple, sequential signatures that the regulations require.

Adding to this complexity is another unique feature of the RCRA manifest that affects the ease of fully electronic manifest adoption: the signatures that occur in the field are executed at locations such as loading docks and transport vehicles. These locations do not always have the network access that some system architectures require to receive and verify electronic signatures in real time. The generators and transporters have also told EPA that they experience significant turnover with their personnel, which makes more challenging the training, registration, and identity proofing methods involved in the current e-Manifest system architecture. Adding to these challenges, the Department of Transportation (DOT) still requires that one hard copy of the hazmat shipping document be carried on transport vehicles to facilitate emergency response.

In summary, the full electronic manifest presents a very different workflow and user community than what is typical of other environmental reports EPA subjects to electronic reporting. While environmental reporting to EPA more typically involves a periodic (e.g., monthly or annual) compliance report submitted by a facility's regulatory affairs staff from a corporate office equipped with basic computer and network technology, the manifest clearly does not follow this norm. Therefore, for electronic manifesting to be adopted on a larger scale, our strategies in e-Manifest may need to be adjusted so that the electronic signature and related processes do not involve as much differential or cumulative complexity for the user community relative to the manual processes when using paper forms.

3 Background

3.1 Overview of e-Manifest

The Hazardous Waste Electronic Manifest Establishment Act, signed into law by President Obama on October 5, 2012, authorizes EPA to implement a national electronic manifest system. Commonly referred to as "e-Manifest," this national system, launched on June 30, 2018, is implemented by EPA in partnership with industry and states.

The overarching purpose of e-Manifest is to establish a national information technology (IT) system that enables the Agency and hazardous waste industry and state stakeholders to track domestic shipments of hazardous waste and other waste covered under the e-Manifest Act. The goal of the system is to transition from a paper-intensive, burdensome process to a more streamlined, efficient, and automated system to track and manage hazardous waste shipments.

Benefits of the e-Manifest system include cost savings; accurate and more timely information on waste shipments; rapid notification of discrepancies or other problems related to a particular shipment; creation of a single hub for one-stop reporting of manifest data to EPA and states; increased effectiveness of compliance monitoring of waste shipments by regulators; and the potential for

integrating manifest reporting with the Resource Conservation and Recovery Act (RCRA) biennial reporting process and other federal and state information systems.

Cost savings are premised upon robust adoption of electronic manifests. Currently, electronic manifests constitute less than 1 percent of total manifests. EPA's regulations, established by the 2018 e-Manifest User Fee Final Rule, contains provisions for transitioning from paper to electronic manifests, including eliminating mailed paper manifests in 2021 and enabling the Agency to pivot to a more aggressive user fee formula in 2022 with higher rates for paper manifests.

3.2 Manifest Regulation Background

The manifest regulations require that the generators of hazardous waste complete the critical data elements of the manifest form describing the types and quantities of wastes that are being shipped off-site. This is done by incorporating the DOT hazardous materials shipping description for each waste stream listed on the manifest, and entering for each waste, information about the quantities, number and types of containers, the units of measure, and applicable RCRA waste codes.

3.2.1 Generator Information

The manifest requires the entry of information by the generator about the routing of the hazardous waste shipment. This is currently accomplished by requiring the generator to complete identifying information (i.e., name, address, and EPA ID Number) of the generator company and site, the name and EPA ID Number of each transporter that will handle the waste during its transport, and the name, address, EPA ID Number and phone number of the permitted facility that will receive and manage the waste at the designated facility.

3.2.2 Receipt of Hazardous Waste

The manifest confirms receipt of the hazardous wastes, so that generators may be assured that their waste shipment arrived safely at their designated facility, the one that they selected and paid to manage their wastes. While the RCRA statute is silent on how generators will be assured that their wastes arrived at the facility they designate on the manifest, it has been the regulatory requirement and practice since the outset of the manifest program to accomplish this with a signature or certification of receipt that is entered by the facility on "Item 20" of the manifest. The receiving facility can sign to indicate that all materials shipped have been received, or the facility can note in the discrepancy spaces of "Item 18" any materials that did not arrive or that were rejected by the facility. Moreover, the regulations also require hazardous waste transporters to indicate their "acknowledgment of receipt" of waste shipments for transportation by similarly signing and dating the manifest at "Item 17" on the form. Thus, from the start of transportation at the generator site, until the delivery to the receiving facility, the signatures entered on the manifest are the means by which the manifest now records the chain of custody.

3.2.3 Paper Manifest Form

With paper manifest forms, the multi-copy set of forms are carried with the shipment on the transport vehicle. The generator initiates the manifest by signature with the "shipper's certification" under hazmat law, and with each change of custody during transportation, the transporter (or receiving facility) accepting custody of the waste from a prior handler signs the manifest and tears-off a copy for the earlier handler to keep in their files. The final copy signed by the receiving facility remains among the facility's files; another copy of this signed manifest is handed to the delivering transporter for their files, and additional copies of the manifest signed by the receiving facility are mailed back to the generator, and if required, to state agencies for tracking.

3.2.4 Changes Resulting From the e-Manifest Act and Subsequent Regulations

With the enactment of the e-Manifest Act and the issuance of the first e-Manifest regulations by EPA, the media for tracking waste shipments were altered, but the overall chain of custody process remained largely the same. That is, there is now an electronic format available for the manifest, but the chain of custody from generator to receiving facility is still commemorated by signature processes. For fully electronic manifests, all the waste handlers must sign the manifest with a valid electronic signature that meets CROMERR requirements[2]. The primary effect of the e-Manifest regulations[3] was to clarify that if an electronic manifest is obtained from and submitted to the e-Manifest system, and each manifest signature is executed with a valid electronic signature per CROMERR, then that electronic manifest is the legal equivalent of a paper manifest used in the conventional manner for all RCRA purposes.

4 Status of e-Manifest as of April 2019

4.1 Manifest Submission Breakdown

Since launching on June 30, 2018, the EPA received 1,519,983 manifest submissions as of April 30, 2019. The breakdown is as follows:

	Electronic[4]	Data plus Image	Image-Only	Mailed
Totals	4,005	1,140,003	272,627	103,348
%	0.26%	75%	18.0%	6.8%

Table 1: Manifest Submission Breakdown June 30, 2018 – April 30, 2019

[2] See 5.1 Overview of CROMERR
[3] See 5.2 e-Manifest Signature Requirements and https://www.federalregister.gov/d/2014-01352
[4] Includes hybrid submissions – 2858 fully electronic, 1147 hybrid

The following section provides a quick look at the program and will guide the discussion for this Advisory Board meeting.

- *Percentage of manifests that accompanied state-only waste – 35%*
- *Total number of waste handlers involved in paper and fully electronic manifesting under federal and state manifest programs*
  - *Generators 210,849*
  - *Transporters 4,204*
  - *Receiving Facilities 624*
- *Percentage of those generators, transporters and receiving facilities using fully electronic manifests*
  - *Generators ~0%*
  - *Transporters ~0%*
  - *Receiving Facilities 10%*

4.2 Mailed Manifest and Image Only Processing

Mailed manifests and image-only manifests require significant processing by the EPA Paper Processing Center (PPC). Data from the manifests must be manually keyed in by data entry staff, reviewed by quality assurance and quality control teams, and finally uploaded into EPA's e-Manifest system. The EPA PPC is currently only performing data entry/paper processing on mailed manifests.

In the initial months of system operation, EPA has accumulated a backlog of ~100,000 mailed paper manifests; EPA anticipates that the current backlog will be eliminated by the end of the fiscal year 2019 and that operation of the PPC will remain at steady state going forward. The following table presents the number of mailed manifests received during a given month, and the percentage of which have been processed:

Month	Manifests Received	% Processed
18-Jul	3,971	59.61%
18-Aug	11,820	26.82%
18-Sep	11,927	30.21%
18-Oct	15,481	29.93%
18-Nov	11,798	39.15%
18-Dec	10,346	25.03%
19-Jan	10,095	42.69%
19-Feb	12,315	0%
19-Mar	9,039	0%
19-Apr	9,839	0%

Table 2: Mailed Data Entry Progress as of 4/30/2019

In addition to the approximately 100,000 mailed manifests currently in the backlog, there are an additional ~270,000 image-only manifests that require processing. When the EPA finishes processing the backlog of mailed manifests, the PPC will focus on eliminating the backlog of image-only manifests.

4.3 System Development

EPA continues to use Agile software development practices to build and enhance the e-Manifest system. The Agile software development methodology embodies continuous improvement through iterative development and delivers software in two-week intervals. EPA communicates the status of its system development through regular calls with its developer community, consisting of industry and state technical contacts.

4.3.1 Major Functionality Released During First Year of System Operation

The following is a high-level list of all the e-Manifest functionality and enhancements that EPA has developed and released to the user community since system launch, organized by user type.

General Public

- Reports and data extract available on RCRAInfo Web

Industry Users

- Billing user interface and enhancements
- Bulk signatures
- Correcting a manifest
- Deleting a manifest
- Copying a manifest
- All manifest rejection scenarios[5]

State Users

- State data services
- State reports, which include:
    - Search for a specific manifest tracking number, the status of the manifest, site type, handler ID and date range
    - Designated Facilities with Delinquent Signatures Report
    - Manifest Facilities Not in RCRAInfo or Information Has Been Modified Report
    - Manifest Waste Shipment Report - Manifest Detail
    - Manifest Waste Shipment Report - Waste Line Detail
    - Transporters with High Transit Days Report

[5] Full and partial rejection of waste to the Generator, Alternate Receiving Facility, Designated Receiving Facility

4.3.2 Upcoming Functionality

The following is a high-level overview of the planned system development and enhancements in the coming months, organized by user type.

Industry

- Transporter and Broker to create a manifest
- In-transit shipping changes
- Notifications and bulk signature enhancements
- 3rd-Party Signature Intake[6]

State Users

- Additional state reports
- Ability for state user to correct a manifest

4.4 User Engagement

EPA continues to conduct frequent user engagement and outreach activities for industry, states, and the public. As of April 2019, EPA has published more than 150 Frequently Asked Questions or FAQs on the e-Manifest website that respond to questions from users, for example, regarding the scope of e-Manifest, user registration, technical issues, billing, and general policy.

The Agency also developed 12 separate Fact Sheets which provide information tailored to specific audiences (e.g., generators, transporters, receiving facilities, state programs, inspectors) regarding the e-Manifest program. These fact sheets present what each audience needs to know and how they can engage with the system.

EPA continues to hold monthly public webinars to provide updates and system status, describe and demonstrate the capabilities of the system, and to answer questions from participants. EPA also has the aforementioned biweekly webinars with industry and state IT developers to communicate changes and issues encountered with the system. Leading up to and through system launch, EPA also conducted significant outreach to EPA Regional and state regulators, including regular calls with Regional points of contact and pre-launch "Regional Roadshows" targeted at each EPA Region and their authorized state representatives.

[6] This development effort is a collaborative effort hinging on many stakeholders – industry, EPA Office of Mission Support (OMS), Office of Enforcement and Compliance Assurance (OECA). EPA is seeking input from the Advisory Board on this effort specifically during the June 2019 Advisory Board meeting.

EPA's e-Manifest team maintains a group listserv and an email box as a forum for sending and receiving information, respectively, with the user community. EPA also provides a helpdesk for industry users.[7] For more background on e-Manifest, please see www.epa.gov/e-Manifest.

Finally, EPA uses the public Advisory Board meetings as an important forum for soliciting input from the Advisory Board members, as well as the public, on significant issues impacting the direction of the e-Manifest program.

5 CROMERR/e-Manifest Current Signature Requirements

5.1 Overview of CROMERR

The Cross Media Electronic Reporting Rule (CROMERR) establishes technology-neutral performance standards for systems that collect electronic documents as part of an authorized, delegated, or approved EPA program. Its purpose is to promote the integrity of reported information and to ensure that those who knowingly make false statements can be held accountable. For the most part, the CROMERR does not impose requirements directly on the regulated community; instead, it requires that electronic reporting systems meet certain basic standards. For example, it requires that it must be possible to detect if an electronic document has been modified after signature. Similarly, it requires that the system collect legally dependable information about the identity of the person who has signed an electronic document.

During its development, there was concern that CROMERR might be an impediment to electronic reporting. Now that the rule has been in effect for several years, it appears these concerns were mostly unfounded. However, there remain areas where *any* electronic signature tool is relatively difficult to design and implement.

The full electronic manifest presents some of those challenges: namely, the need in some circumstances to sign off-line, the utility of using a third-party application in some settings, the desire for external systems to be authorized as CROMERR-compliant, and the need to permit signature by those who are not already known to the electronic reporting system. Even in commerce, systems with these capabilities are only now emerging. Still, technology had already advanced to the point that EPA believes most, if not all, of these challenges can be met. For example, EPA has already evaluated and approved an approach whereby digitizing pads can be used to collect offline signatures from individuals who are not already known to the electronic reporting system.

The CROMERR standards focus primarily on the following processes:

- Criteria for establishing a copy of record;
- Integrity of the electronic document;
- Validity of the electronic signature;

[7] 8:00 am ET – 6:00 pm ET, Toll Free: (833) 501-6826

- Determination of the identity of the individual uniquely entitled to use a signature device; and
- Opportunity to review and repudiate the copy of record.

5.1.1 General Framework

EPA issued CROMERR in 2005 to govern the submission of electronic records to EPA or states. There are performance standards in three distinct subparts at 40 CFR part 3, which are listed below.

5.1.1.1 Subpart A: Applicability, scope of documents included, definitions

- Defines "electronic signature device" and "valid electronic signature";
- CROMERR does not apply to faxes, nor to magnetic/optical media; and
- CROMERR does not apply to data transfers or sharing between EPA and states

5.1.1.2 Subpart B: Conditions on electronic reporting to EPA:

For direct reporting of electronic documents to EPA, § 3.10 requires that:

- The submitter transmits document to EPA's Central Data Exchange (CDX) or other system designated by the EPA Administrator, and
- The electronic document bears all "valid electronic signatures" that would be required from persons who would sign a paper document.

CROMERR § 3.3 defines "valid electronic signature" as a signature that is:

- Created with a device (e.g., secret code) that the person signing "owns" or is uniquely entitled to use;
- Not compromised at time of use, and
- Whose signer is authorized to sign on behalf of the reporting entity.

"Electronic signature device" means a code or other mechanism that is used to create electronic signatures.

- Must be unique to the individual at the time of use and the signer must be uniquely entitled to use it.

5.1.1.3 Subpart D: Electronic reporting under authorized state programs

According to § 3.2000(b) (1-4), the system must generate data for copy of record sufficient to prove that:

- Document was not altered without detection after transmission or receipt;
- Alterations are fully documented;
- Document was submitted knowingly; and
- Signatory had the opportunity to review (or repudiate) the document in human readable format before signature.

§ 3.2000(b)(5)(1-6) requires the system to generate data on valid electronic signatures sufficient to prove:

- Each electronic signature was a valid electronic signature (established by unique signature validation criteria) at the time of signing;
- The document cannot be altered without detection at any time after being signed;
- Each signatory had the opportunity to review document content being signed in human readable format;
- Each signatory had the opportunity to review certification statement and any warnings for false certifications;
- Each signatory has signed a signature agreement with respect to the electronic signature device used; and
- The receiving system automatically responds with acknowledgment that identifies document and signatory, and time and date of receipt.

§ 3.2000(b)(5)(vii) requires the system to generate data on identity proofing sufficient to prove *with legal certainty* the identity of the individual uniquely entitled to use the device and his/her relation to the entity. Proof can be by means of:

- Identifiers or attributes that are verified by attestation of disinterested individuals (e.g., Lexus/Nexus search);
- A method of determining identity no less stringent than allowed under (b)(vii)(A);
- Collection of either an ink signed subscriber agreement or a certification of a local registration authority that such an agreement has been received and securely stored; or
- Biometrics markers such as fingerprints.

5.1.2 Standards and Applications

The rule applies to two groups:

- Regulated entities that report to and submit other documents directly to EPA; and
- State,[8] tribal and local governments authorized to administer EPA programs.

CROMERR applies to the electronic reporting systems used to collect electronic documents in lieu of paper in authorized, delegated, or approved environmental programs. CROMERR does not apply to:

- Documents submitted via fax, magnetic or optical media;
- Data transfers between EPA and state, tribal or local governments when the transfers are part of their authorized programs or part of administrative arrangements with the EPA;
- Submissions to state, tribal or local governments not under their EPA-authorized programs; and
- Grants, cooperative agreements and other forms of financial assistance reporting under Title 40 of the CFR.[9]

[8] To be consistent with language in the final rule, the term "state" is defined to include the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of Northern Marina Islands, and the Trust Territory of the Pacific Islands, depending on the statute.

[9] See Technical Amendment of CROMERR: https://www.federalregister.gov/articles/2009/11/17/E9-27304/technical-amendment-of-cross-media-electronic-reporting-rule.

5.2 e-Manifest Signature Requirements

CROMERR addresses requirements pertaining to electronic reporting directly connected to EPA information systems.[10] Consequently, users of e-Manifest must comply with all applicable CROMERR requirements.

EPA has evaluated additional topics related to CROMERR during the development of the e-Manifest system, including the following:

- The use of digitized signature pads and pens as per the February 7, 2014, final rule (i.e., "e-Manifest One-Year rule");
- The use of the witnessed signature approach as per the February 7, 2014, final rule;
- The offeror/"on behalf of" concept as described in various documents in RCRA Online (including documents but not exclusive of RCRA Online numbers 11108, 11199, 11372, 14687)[11];
- The option of the generator and transporter continuing to use paper and then the receiving facility signing the data upload with a CROMERR compliant signature; and
- Mixed Paper and Electronic Manifests Transactions (the Hybrid) as per the January 3, 2018, final rule.

Since system launch, e-Manifest has been using EPA's CDX CROMERR electronic signature solution, which requires users to create an account, associate themselves with a site in EPA's RCRAInfo system, perform electronic signature validation, and then participate in the e-Manifest transaction either by signing the manifest as it progresses through the workflow, or certify submission of the manifest data when uploading the image or image/data file to e-Manifest. The main distinction between types of manifests is detailed in the table below:

	Manifest Tracking Number Source	Generator signature	Transporter signature	Receiving Facility signature upon receipt	Receiving Facility sign data submission to e-Manifest
Hybrid	e-Manifest System	Paper	Paper and Electronic	Electronic	N/A
Electronic	e-Manifest System	Electronic	Electronic	Electronic	N/A
Image + Data	Paper manifest	Paper	Paper	Paper	Electronic
Image Only	Paper manifest	Paper	Paper	Paper	Electronic
Mailed Paper	Paper manifest	Paper	Paper	Paper	N/A

Table 3:Manifest Submission Matrix

[10] Additional information about CROMER is available at http://www.epa.gov/cromerr.
[11] https://rcrapublic.epa.gov/rcraonline/results.xhtml?param=11108, https://rcrapublic.epa.gov/rcraonline/results.xhtml?param=11199, https://rcrapublic.epa.gov/rcraonline/results.xhtml?param=11372, https://rcrapublic.epa.gov/rcraonline/results.xhtml?param=14687

5.2.1.1 Hybrid Electronic Manifest Submission

Initial and subsequent transporters and the receiving facility must be registered for e-Manifest as either Certifiers or Site Managers (under the hybrid, generators do not need to register for e-Manifest). The manifest is created electronically in e-Manifest. Generators or transporters print out the manifest from e-Manifest and the Generator and Transporter sign a paper copy of the electronic manifest. The initial transporter, any subsequent transporter, and the receiving facility electronically sign the manifest. The manifest is then submitted into e-Manifest and is considered complete when the receiving facility signs electronically.

5.2.1.2 Fully Electronic Manifest

All handlers must be registered in the e-Manifest system as either Certifiers or Site Managers. The manifest is created electronically in e-Manifest and is signed electronically by all handlers. The manifest in e-Manifest is considered complete when the receiving facility signs electronically.

5.2.1.3 Image + Data Manifest

The paper manifest form is used, and all handlers sign paper copy of the manifest. Upon receipt of the waste, the receiving facility signs the paper manifest. Then the receiving facility uploads the scanned image of the manifest and corresponding data file into the system, electronically certifying submission of the data.

5.2.1.4 Image Only (Scanned Image with No Data)

The paper manifest form is used, and all handlers sign paper copy of the manifest. Upon receipt of the waste, the receiving facility signs the paper manifest. Then, the receiving facility uploads the scanned image of the manifest into the system, electronically certifying submission of the data.

5.2.1.5 Mailed Paper Manifests

All handlers of the manifest sign on paper. The manifest is mailed to the EPA PPC and the information is keyed into the system. This is the most expensive option for submittal.

5.2.2 Site Managers and Certifiers

The Site Manager, and Certifier are the two roles within the e-Manifest Application that allow for the electronic signature of manifests. To obtain these roles a user must:

- Register in the RCRAInfo application as an industry user,
- Verify their email address,
- Request and be granted access to a site within the RCRAInfo application, and

- Obtain an Electronic Signature Agreement (ESA)[12].

Following ESA validation, a user can sign an individual manifest or, depending on their site role in the manifest cradle-to-grave process, sign up to 50 manifests at a time.

5.2.3 e-Manifest CDX CROMERR Signature Ceremony

The steps to sign electronically are as follows:

- Authentication – user enters CDX account information (user name/password),
- Verification – user answers personal security questions, and
- Sign – user clicks "Sign" to electronically sign manifest/certify data.

Specifically, each user must certify that the information they are providing is accurate and complete to the best of their knowledge by clicking the "Accept" button. The statement for accuracy and completeness applies to all data for every manifest in this submission. [13] Next, users are prompted to provide their password and click "Login." Users must then answer one of the five security questions (i.e., "challenge questions," which are established at user registration) by typing in the correct answer in the box provided and click "Answer." Once the answer has been verified, users click the "Sign" button to complete the signature process. If this is successful, the status of all the manifests selected will be changed to "Signed."

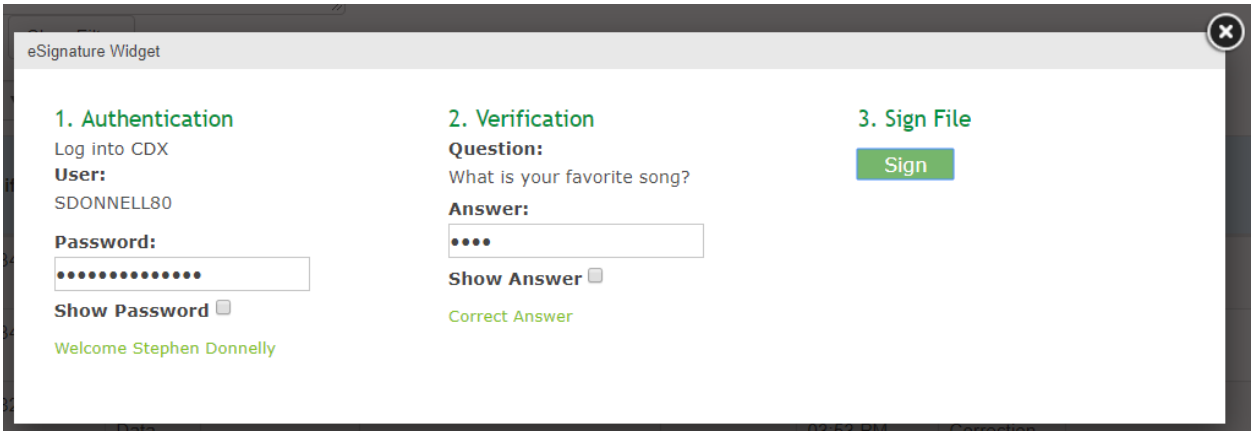

Figure 1: eSignature Widget

[12] CROMERR requires that users sign an electronic signature agreement, or ESA, normally as part of the registration process. Please see https://www.epa.gov/sites/production/files/2017-07/documents/cromerr_esa_guide_and_example-updated-language.pdf for more information.

[13] User is presented with the following statement: "I certify, under penalty of law that the information provided in this document is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

6 Challenges with Executing Signatures in e-Manifest

Real-time, online electronic signatures present challenges for e-Manifest. Since the launch of e-Manifest on June 30, 2018, electronic manifests represent less than 1 percent of the more than 1 million total manifests EPA has collected. Thus, EPA is interested in understanding the impediments to using electronic manifests, so it can better create an environment that encourages use of these manifests. Wide adoption of full electronic manifests is crucial to maximizing total cost savings and efficiencies that are at the heart of e-Manifest.

Unlike many other CROMERR submissions for other EPA program requirements, which are submitted periodically by companies' regulatory compliance officials from corporate offices, the manifest is a live, commercial transaction that is executed at a frequency of about 10,000 manifests/day nationwide, mostly at facilities' shipping and receiving docks and from transport vehicles. The user community consists of generators' and facilities' shipping and receiving staff and truck drivers responsible for waste pick-ups and deliveries. In addition, there can be high turnover among employees responsible for executing manifest requirements.

Based on extensive outreach within our regulated community, EPA has received comments and suggestions for electronic signature and user registration that is outside of the CDX CROMERR electronic signature method currently in use[14].

The table below identifies the specific manifest user community, and their interest in the electronic signature methodologies that will be discussed.

	User Registration	Biometrics/3rd Party Applications	External System Authorization	Off-line Signature
Generators	x	X		x
Transporters	x	X		x
Receiving Facilities	x	X	x	x
Rail			x	x

Table 4 User Requested Electronic Signature Modes

6.1 User Registration

6.1.1 User Registration Request from Industry

Industry users have indicated that allowing users to sign manifests electronically without performing the standard CDX account creation, would increase electronic submissions. This is of particular interest to

[14]Adopting this methodology is would require rework and enhancement to the current system architecture.

the generator and transporter communities, who prior to e-Manifest launch, were not fully engaged in the RCRAInfo Industry Application.

In our engagement with the generator and transporter communities, we have heard many times that streamlining or eliminating[15] the user registration process would increase the number of users who would use the electronic manifest option.

6.1.2 EPA Considerations on User Registration

User registration is not a requirement of CROMERR (a signatory does not need to create an account on the system to sign); however, a user does need to provide a vehicle for out-of-band notification. This, however, does not necessarily require the existence of a user account.

For example, if a user can prove that they received an email through a supplied email address, the system itself can associate the named user, device, or biometric with that email address such that future instances of signature with the same credential or device are reported to that same email address. The underlying idea is that the system must have some way to alert the user if/when documents are being signed with their credential. User registration is one way to do this, but it's not the only way.

To date, the e-Manifest system depends on a user-created account to handle certain important functions. The account currently associates the name of the user with their signature credentials, the evidence that they have signed a signature-holder agreement (and, thus, understand the legal import of their electronic signature), and the information needed to supply an out-of-band notification when their signature credentials are used (and, thus, a vehicle to alert them of potential compromise of those credentials).

Without an account, the system may well require that users enter and validate anew with each such signature the information (such as an email address for out-of-band notification) that they have entered and validated before. This is similar to the structure of current web-based commerce, where users who make a purchase as a "guest" (*i.e.,* without creating an account on the website), will typically have to provide much of the same purchaser information again if they make a future purchase from the same site.

Also mirroring current commercial vending solutions, it might be possible for a user to create an account from information that they have previously entered, if, and when, they have decided that it would be

[15] This includes off-line user registration – where a user would create an account in an area with limited Internet connectivity, be permitted to sign electronically, and when the Internet connection is available, that information would be submitted to the e-Manifest system. As with all software enhancements, this would require augmentation of the current e-Manifest system architecture to a device/program that could reliably and directly collect biometric evidence of identity in an off-line setting

advantageous to do so. It may also be that some of this information could be pre-populated on the device or through a provisional account to further minimize burden for a low-frequency system user.

6.2 3rd Party Applications and Biometrics

6.2.1 3rd Party and Biometrics Request from Industry

Industry stakeholders have expressed interest in 3rd party applications (specifically those that leverage biometrics, tailored to smartphones, such as fingerprint readers or facial recognition software) that could be used to electronically certify a manifest in shipment, particularly during the handoff from the generator to the transporter.

Industry has expressed a desire for a smartphone application and/or compatible device that can seamlessly integrate with e-Manifest reporting requirements and be used in the many manifest transactions, while forgoing many of the user registration, connectivity and signature steps that are a part of the e-Manifest application.

6.2.1.1 Off-line Signature Capability for Applications/Devices

In addition, there are sites where waste is either picked up or dropped off that lack a stable cellular connection, or cell phones/mobile devices are not allowed into the facility. This lack of communication between a user and the e-Manifest system mean that, under the current system architecture, manifests cannot be signed at the time of pick up or drop off – or mid-shipment should a transporter change hands where there is no connection. The desire for an application or device with an "off-line" signature capability, where the electronic signature is captured at the time of receipt and communicated once a connection is available, has also been requested by industry users.

6.2.2 EPA Considerations on Biometric and 3rd Party Applications

Electronic signature devices involve three forms or factors: "What you know," "What you have," and/or "What you are." For electronic signatures to be valid, they are typically linked, uniquely, to information about the signing individual, "what you know." Biometric signature devices are "what you are" and may be combined with a physical "what you have" factor such as a digital pad or mobile device, to provide additional evidence and assurance on how the electronic signature was performed and how it may be re-validated.[16]

EPA has begun to consider the conditions under which a biometric scan can meet the requirements articulated in CROMERR. We, thus, expect to evaluate biometric options to ascertain whether:

- The biometric information proposed for use is truly unique to a specific individual and sufficiently stable;

[16] When using biometrics, it is critical that the device guards against reuse of the "what you are" factor and protect the confidentiality of the sensitive personally identifying information it represents.

- Whether that information can be misappropriated and used to "spoof" the biometric reader proposed for use;
- Whether the device proposed for use can reliably and with adequate accuracy scan the biometric proposed for use;
- Whether other features of system design adequately protect the biometric information collected from misuse (*e.g.,* unauthorized use); and
- If biometric information is validated but not actually collected, how the system demonstrates the true identity of the individual who executed the electronic signature, as well as
- How the system demonstrates that the validation event pertained to a particular electronic document.

EPA is confident that biometric authentication of the quality we need can be achieved with both current technologies and technologies that are immediately forthcoming. Also, it makes sense to move cautiously in an area where technology is advancing so quickly. To date, federally-articulated standards address business cases different thane-Manifest. For example, the National Institute of Standards & Technology (NIST) standard SP-80063B is framed around a scenario in which biometric information is scanned and validated in order to govern access to a secure government computing system.

It may be that elements of this standard are inapplicable or too stringent in the new system architectures that EPA is considering. For example, stringent standards for false positives might not be relevant or appropriate in a system that does not validate signatures against an enrolled template at the time of signature but, instead, collects and securely stores biometric information for validation if and when the authenticity of a signature is called into question.

6.3 External System Authorization

6.3.1 External System Authorization Request from Industry

Most manifests coming into the system are from receiving facilities who utilize our system-to-system API data services to send a PDF of an individual manifest in a zip file along with the corresponding data file. This system-to-system process allows industry to interact with the e-manifest system without needing to log into our web application and enter data twice. At present, the receiving facility user must log in to the application to sign the manifests and that process has been described by users as time-consuming.

In addition, stakeholders in the rail industry have expressed their desire for their system to integrate into the e-Manifest application to electronically sign manifests shipped over rail.

6.3.2 EPA Considerations on External System Authorization

There have been numerous applications which have been approved for external submissions to the EPA.[17] These include EPA-developed solutions, commercially developed solutions, and custom-built solutions.

To implement electronic reporting, external systems must submit to EPA a CROMERR Application Checklist which describes how the processes and systems they implement will comply with this regulation. The checklist includes 20 items that require response around user identity-proofing, signing documents, and creating and maintaining legal copies of record.[18] For all interested parties, the CROMERR help desk[19] can aid in determining the best path forward.

Chapter 7, below, provides more detail regarding the CROMERR application review process.

7 CROMERR Application Review Process

To better serve the user community, EPA has created a website[20] that provides substantial resources on both CROMERR and the performance-based, technology neutral standards that support this program. Of particular importance is the guidance on the CROMERR application review process, which provides a step-by-step guide on creating and submitting a successful CROMERR application. Figure 2 below describes the CROMERR application review process.

[17] https://www.epa.gov/cromerr/sample-cromerr-applications-and-checklists
[18] The checklist and samples can be found at https://www.epa.gov/cromerr/cromerr-application-tools-and-templates#Application%20forms.
[19] https://www.epa.gov/cromerr/forms/cromerr-help-desk
[20] https://www.epa.gov/cromerr

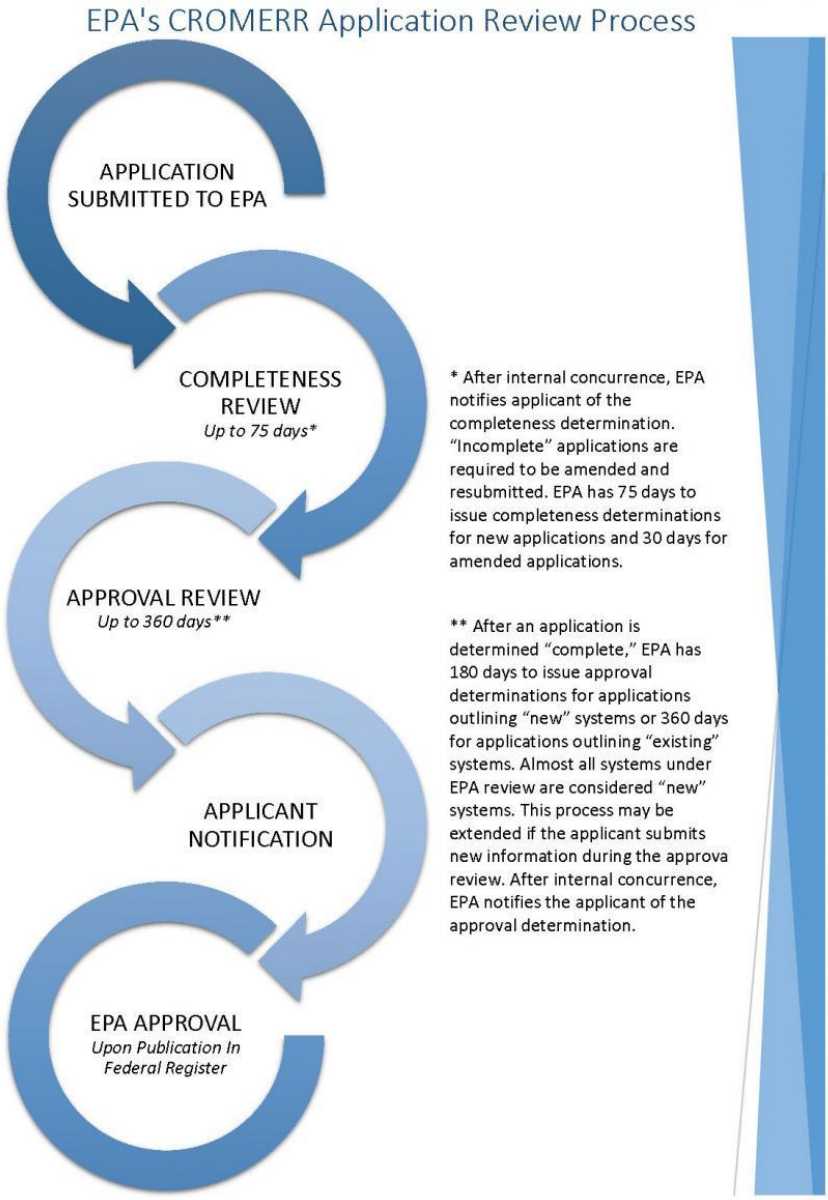

Figure 2: Overview of EPA's CROMERR application review and approval process

7.1 Expedited and Traditional Application Review

Over the past several years, there have been many changes in program processes as well as an increase in off-the-shelf and shared services options that make achieving CROMERR compliance and approval easier. These changes have created two paths to CROMERR approval: Expedited and Traditional.

In brief, Expedited leverages Shared CROMERR Services[21] (SCS) or pre-vetted commercial off-the-shelf (COTS) solutions, while Traditional relies on the ability of descriptions that an applicant provides for each of the 20 checklist requirements to reflect how the applicant's approach will meet the CROMERR §3.2000(a) and (b)[22] requirements through a combination of business processes and system functionality. Table 5 below summarizes the differences between both types of CROMERR approval paths.

Expedited - Estimated Time to Approval: 1-3 months	**Traditional - Estimated Time to Approval: 6 months to 1 year**

• An applicant may not need to submit any technical or legal documentation
• Typically proceeds directly to CROMERR approval after sending a simple request for action by EPA.
• Applicants are often utilizing SCS or pre-vetted COTS solutions.
• Submits to EPA:
  ○ Generic or system-specific Application Cover Sheet
  ○ Attorney General/Legal Certification or acknowledgement to use an approved CROMERR AG certification already on file
  ○ Completed template CROMERR System Checklist for COTS solution or other limited CROMERR technical documentation, if needed
	• An applicant provides extensive technical documentation describing how the proposed electronic reporting approach meets all CROMERR standards.
	• Applicants are typically pursuing entirely custom-developed solutions, or a future COTS product not yet evaluated for CROMERR compliance.
	• Submits to EPA:
	  ○ Generic Application Cover Sheet
	  ○ Full CROMERR System Checklist and, if needed, supporting technical documentation
	  ○ Attorney General/Legal Certification or Acknowledgement to use an approved CROMERR AG certification already on file

Table 5: Two Paths to Approval

7.2 OECA CROMERR Advocate Case Study

In the recent past, there have been calls from the user community for EPA to provide an Agency resource to assist with applications and devices completing the CROMERR approval process and then implementing those signature solutions for wider industry use.

[21] SCS are a suite of application programming interface (API) components offered by EPA's Central Data Exchange (CDX) that can provide for end-to-end CROMERR compliance. An applicant pursuing electronic reporting using the entire suite of SCS components will have a solution that is by definition compliant with CROMERR technical and business process standards. See https://encromerrdev.epacdxnode.net/ About for more information.
[22] These detail the overall requirements for electronic reporting. For more information, visit: https://www.epa.gov/cromerr/lesson-5-overview-cromerr-requirements-electronic-reporting

EPA's Office of Enforcement and Compliance Assurance (OECA) operates and maintains a data system called the Integrated Compliance Information System (ICIS) which manages all federal enforcement and compliance monitoring data, as well as state data for certain programs like the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES). In 2009, OECA put into production an electronic reporting tool called NetDMR for the reporting of Discharge Monitoring Reports (DMRs), which is a mandatory report required under the NPDES program. DMR reporting at that time was commonly referred to as the "second highest reporting burden" next to taxes for the IRS. DMRs are compliance reports required by facilities that have an individual NPDES permit and cover a diverse universe of facilities, from very large facilities to very small rural facilities such as wastewater treatment, industrial discharges, etc.

In 2015, the EPA published the NPDES Electronic Reporting Rule which required EPA and states to implement electronic reporting over a period of five years for all DMRs, general permits and associated reports, and compliance monitoring and enforcement data. This rule covered a very large universe, every authorized agency, and a very large data set. One major concern that was expressed to EPA, mostly by states but also by smaller regulated facilities, was the barriers to electronic reporting created by the CROMERR requirements. There were several areas of concern expressed by states, such as:

- The internal administrative processes needed to get approval for CROMERR (e.g., obtaining the Attorney General's certification for the legal authority to accept electronic reporting under their statutes and regulations);
- Obtaining the certification for their existing e-reporting system via EPA's governance process;
- Making any technical enhancements that may be needed for their existing e-reporting system to comply with the CROMERR requirements; and
- Concerns that their regulated universe would have a difficult time with e-reporting given the CROMERR requirements – especially their smaller facilities (e.g., small wastewater treatment facilities, transient contractors for construction stormwater reporting).

OECA listened to the states and had many internal and external discussions surrounding the issues that were presented and how to address them. OECA concluded that the states would greatly benefit from having an advocate from within EPA to work directly with each state to individually oversee their specific issues and make sure they are addressed. Consequently, OECA hired a "CROMERR Advocate" in the beginning of calendar year 2015 to specifically work directly with states to resolve their issues in implementing the CROMERR requirements as they related to NPDES e-reporting.

Through continuous outreach and communication, the CROMERR Advocate initially facilitated the submission of nine CROMERR applications through the governance process, increasing the number of states that were prepared to implement the NPDES e-reporting rule. To this date, the Advocate continues to schedule outreach calls (as necessary) and communicates with EPA and state personnel to

provide continuous assistance with technical preparation for e-reporting. Two years after the CROMERR advocate program began, over 100 applications have been received and approved. More than 80 percent of current applicants pursue COTS solutions or use EPA's CDX Shared CROMERR Services.

OECA's CROMERR Advocate has made a positive contribution toward the growth of the NPDES e-reporting program. The results illustrated in Figures 3 and 4 below show that CROMERR requirements have not been a barrier for implementing electronic reporting for the NPDES program; rather, significantly increasing the level of communication with EPA state partners as well as providing outreach and training for the regulated facilities has been a key for successful implementation.

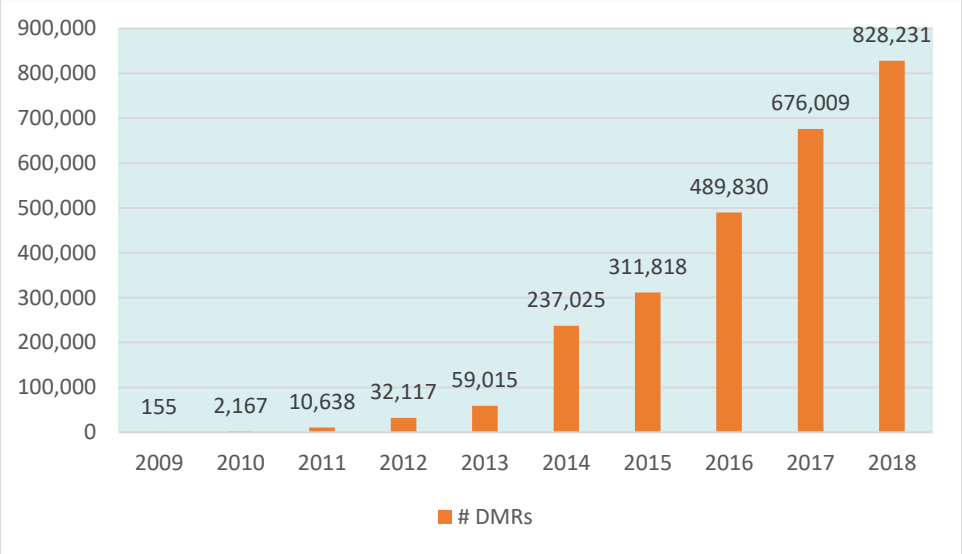

Figure 3: Number of DMRs Submitted through NetDMR

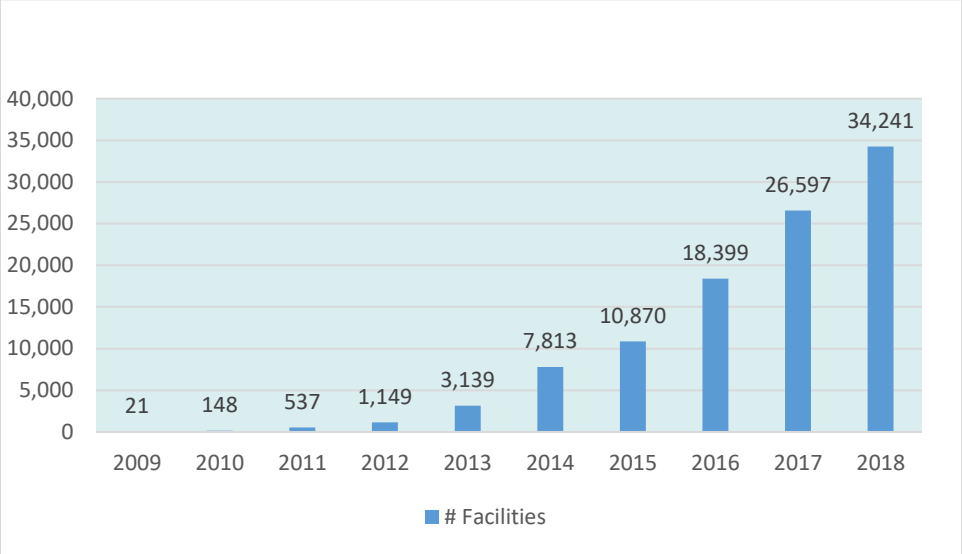

Figure 4: Facilities with DMRs Submitted through NetDMR

8 Charge Questions