BACK ON TRACK

Mir Kazim Ali and Ian Harrison, Process Solutions Canada Ltd, discuss the modernisation of waste material tracking of alternative fuels/raw materials.

Waste generation is a global issue that represents many challenges and opportunities. Approximately, "2 billion t of solid waste (2016) is expected to rise to 3.4 billion t by 2050".[1] The global cement industry has taken an active role in waste reduction by utilising the waste as alternate fuel/raw material (AFR) in cement kilns. Cement companies realise the ethical responsibility of minimising CO_2 emissions and reducing the amount of waste going to long-term storage or landfill.

Process Solutions Canada Ltd (PSCL) responded to the issue in early partnerships with the industry. In the late 1990s, it worked with a customer to develop a solution, which came in the form of the Waste Fuels Information Management System (WFIMS). This solution has been implemented in over 25 facilities in the US, Canada, and Australia. Recent consolidation in the AFR market affected the WFIMS customer base, giving PSCL the opportunity to modernise and enhance the product. One of the major influences was a regulatory change for electronic manifests for waste materials.

WFIMS provides a comprehensive solution for the management of information regarding the analyses, approvals, handling, and processing of waste material streams as alternative fuel sources in cement kilns. WFIMS allows users to trace efficiently pre-qualified waste streams, shipments, and analytical samples. Further, it facilitates reporting requirements for both customers and regulators.

The primary components of the current WFIMS Suite are the following:

- Qualification creation.
- Qualification approval.
- A laboratory module.
- A waste tracking module.
- Inventory management.
- Data query and reporting.
- An inventory scanner.
- Safety.

Qualification creation

In the qualification process, the generator delivers samples to determine suitability and risk in the alternate fuel stream. The creation process provides a mechanism for organising and storing the extensive data associated with requests for the pre-qualification of waste streams. As samples are registered and analysed, the link to analytical results is stored in the laboratory module. The link follows both the qualification and future stream throughout the lifecycle.

Qualification approval

Waste streams are diverse in source and content. Qualification approval is a module that allows users to register their approval decision on waste streams. Waste streams are pre-qualified to permit the transportation of the bulk material. The qualification approval is also integral to the invoice process; all shipment manifests and invoices are linked to the approval.

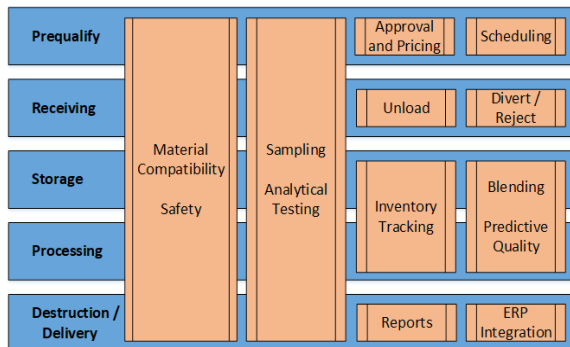**Figure 1. Waste material tracking: inventory management.**

Figure 2. The WFIMS high-level workflow.

Figure 3. Container VAC liquid removal.

Laboratory module

The laboratory module is the core of the WFIMS package. It eliminates the requirement for hand copying and the multiple handling of sample analysis results. The laboratory module integrates with laboratory equipment to pull data directly into the WFIMS. Automated result capture reduces transcription cost and error. Reporting from the laboratory module provides the ability to directly compare sample analytical results and a defined profile for a pre-qualified waste stream.

Waste tracking module

Sites that collect waste for the AFR process have a hazardous material risk. The waste tracking module (WTM) is an end-to-end method of recording waste material transactions and logging inventory location. Information is recorded throughout the initial scheduling of incoming shipments, as well as receiving, storage, and processing. New shipments outbound to alternative waste handling facilities are created and tracked.

Inventory management

The WTM supports the recording and tracking of bulk shipments via tank inventory and individual containers into storage. Material tracking is present throughout the lifecycle, from inbound containers, batch sampling, and transfer to fuels processing. The WTM includes an inventory verification function that allows periodic inventories of all containers in the storage and reconciliation of records, based on inventory results (Figure 1).

Data query and reporting

WFIMS Query is a tool that allows users to generate ad-hoc reports that include Waste Material Profile and analytical data from the laboratory module, along with shipment data from the WTM. Analytical results across all samples associated with a set of shipments can easily be extracted and correlated.

Inventory scanner

A mobile application at the material point of entry speeds up processing. Bar codes are widely used to eliminate error. Most generators will track the manifest detail and pre-qualification directly into the WFIMS.

Safety

The integration of the laboratory module, the WTM, and the inventory scanner improve the data collection and management associated with the analysis, approval, handling, and processing of waste fuel materials. Integrated reporting tools assist in the analysis of constituents present in a waste stream, in order to determine the safe sampling and handling of waste at the receiving facility. The system categorises waste material to produce a handling and storage risk assessment based on the site's specific safety requirements.

Table 1. Current fee schedule.	
Manifest submission type	Fee/manifest
Paper	US$15.00
Scanned image	US$10.00
Data + image	US$6.50
Fully electronic	US$5.00

Figure 4. Liquid waste tanker.

The process

Waste materials processing normally starts with the submission of a waste material profile and pre-qualification sample by a generating facility (Figure 2 for the WFIMS high-level workflow). After accepting a waste stream for processing, a pre-qualification identity is assigned. Each pre-qualified waste stream is associated with a specific billing name and a generating facility. The pre-qualification data is maintained in the laboratory module and qualification creation applications.

Inbound shipments are scheduled against pre-qualified waste streams. The new shipment function creates a shipment record identified by waste material category and transportation mode, which can be scheduled for arrival at a specific date and time. When a shipment arrives onsite, the receiving process includes creating the load record for the carrier and recording detailed manifest information. Further analysis of an acceptance sample may be required before unloading. Unloading assigns the received material to one or more storage/processing locations. Containers are individually identified with a bar code and unloaded to a storage location to await acceptance sampling and categorisation, before going into processing. The waste tracking process ends when the waste is accepted for processing onsite, sent to another destruction facility, or returned to the generator. The WFIMS includes the provision of 'death certificate' documentation for waste streams to meet regulatory requirements.

Environmental Protection Agency

Across the US, the Uniform Hazardous Waste Manifest (UHWM) is a paper form required by the Environmental Protection Agency (EPA) and the Department of Transportation. Generators must produce the UHWM to transport hazardous waste to treatment, storage, and disposal facilities (TSDFs).

This is a key document that includes tracking information related to the waste being transported, instructions on how to handle the material, and signatures and dates for each party involved in the transportation and disposal of the waste. Each party involved in the handling of the waste retains a signed copy of the manifest. Once the waste reaches its destination, the TSDF sends a signed copy of the final manifest back to the generator to inform them that the waste has reached its destination.

Historically, it was each party's responsibility to maintain its own copy of the signed paper manifests. The submission of paper manifests to the EPA was not required.

The proposal to move from paper-based manifests to electronic manifests was initiated by the EPA in May 2001.[2] The stated benefits were the following:

- Cost savings.
- Better and more timely information on hazardous waste shipments.
- Faster notification on discrepancies related to shipments.
- A single portal for the reporting of manifest data to both the EPA and states.
- Improved compliance monitoring of waste shipments by regulators.
- The integration of manifest reporting with the biennial report from the Resource Conservation and Recovery Act (RCRA).

On 5 October 2012, the Hazardous Waste Electronic Manifest Establishment Act was enacted, authorising the EPA to implement a nationwide electronic manifest system. This act requires that the cost of developing and operating this system be recovered by user fees that are charged to users of the electronic manifest system to track hazardous waste manifests for offsite shipments of hazardous waste. The fee schedule at that time was not finalised, but it was known that submitting paper manifests would be significantly more expensive than submitting a manifest electronically. The fee schedule at the time of writing is shown in Table 1.[3]

Essentially, TSDFs that would be able to submit their manifests electronically would be able to save more per manifest than those that would continue to record (and thus submit) their manifests via paper. In the short term, those that could take advantage of the cheaper option could see an immediate cost savings benefit. In the long term, the EPA is only planning to support the submission of paper manifests until 30 June 2021, at which time an electronic method of submission will be required by all TSDFs.[4]

Development of the EPA's e-Manifest system started in 2014, with architecture discussions of the back-end system. Not until June 2017 were a series of web services made available for user experience testing. The target production release date was still on track for official release on 30 June 2018.

WFIMS and the EPA e-Manifest

The WFIMS was originally designed as a cradle-to-grave system for tracking waste, with the main goal of being the primary system for billing, reporting, and safety. The introduction of the EPA's e-Manifest system triggered PSCL to add environmental regulatory compliance into the list of features and benefits of the WFIMS.

With this feature WFIMS would help producers to realise an up to US$10 saving/manifest submitted. For one company, with 10 sites averaging 100 daily shipments, this represented US$3 million in annual savings. The major changes to the WFIMS included the following:

- Additional data collection to the existing manifest forms to support required fields for the EPA e-Manifest system.
- The inclusion of RCRA Biennial Report information, along with each submitted manifest.
- Support for different waste codes/state, in addition to federal waste codes.
- Support for dealing with partial and full manifest rejections.
- Support for a manifest review process within the WFIMS.
- Support for the submission of manifests from the WFIMS to the EPA e-Manifest system.

PSCL continues to work to support the EPA e-Manifest as it evolves. As the EPA adds more functionality to its web services, WFIMS will continue to add functionality and benefits for producers. ∎

References

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4. US Environmental Protection Agency, e-Manifest: JUNE e-MANIFEST WEBINAR BLITZTOPIC: "WHAT RECEIVING FACILITIES NEED TO KNOW"'. Accessed 11 February 2019: https://www.epa.gov/sites/production/files/2018-06/documents/finalreceivers.blitzpresentation.june152018_.pdf.

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