

## **Abstract**

Waste information management is a mission essential function in managing low level, intermediate level, hazardous, and mixed wastes. Electronic tracking of the cradle-to-grave operating histories of waste containers enables more efficient long-range planning for the management and disposition of radioactive wastes. The Waste Information Management System (WIMS) for the Department of Energy's (DOE) three Oak Ridge Reservation (ORR) plants is a computerized tracking system that provides for data acquisition, verification, summarization, and reporting of waste container information from generation through disposition.

Because the requirements for a waste tracking system are dependent on the facilities for which it is used, the data model used by WIMS to track and report waste information must be standard enough to consistently report waste across the ORR, yet flexible enough to correctly reflect the different Waste Management Operations of these plants. By utilizing powerful, hand-held, portable programmable bar code readers, data is captured accurately, consistently, and quickly across all three Oak Ridge Sites. The application of barcodes to containers permits a rapid inventory of these items with all pertinent information such as location, history, and regulatory status attached.

A web-based application in WIMS enables the generation of planning and regulatory reports. The web-reporting tool allows for the production of the entire spectrum of waste management reports from executive level to detailed inventories at a click of a button from any PC with Internet connectivity to WIMS.

In summary, WIMS is flexible enough to meet the disparate needs of the different missions of the three ORR Plants without compromising the accuracy of the information it manages. The benefits of this system are many and include accuracy of data capture, timely processing, and reporting in support of the management of waste.

## **INTRODUCTION**

Waste information management is a mission essential function for managing low level, intermediate level, hazardous, and mixed wastes. Electronic tracking of the cradle-to-grave operating histories of waste containers enables more efficient long-range planning for the management and disposition of radioactive wastes. The WIMS for the Department of Energy's three ORR Plants is a computerized tracking system that provides for data acquisition, verification, summarization, and reporting of waste container information from generation through disposition.

The primary functions of cradle-to-grave tracking of wastes are recording waste generation information, storing characterization information, tracking movements

to treatment, storage, and disposition facilities, tracing repackaging activities, and providing the basis for regulatory reporting. The result of managing this information electronically is a powerful tool for waste managers that facilitates near and long term planning for treatment, storage, and disposition needs and the activities required to perform these tasks.

## **System Background Information**

Use of computers to track waste on the ORR has been evolving for the past decade as Waste Management Operations and use of computer technology have evolved. The DOE ORR is comprised of three plants: the East Tennessee Technology Park (formerly known as the K-25 Site) which is currently an environmental restoration and waste management facility; the Y-12 Plant which is an active weapons facility; and the Oak Ridge National Laboratory (ORNL) which is a research facility. Because these plants have such distinct missions the kinds of waste they produce and the information they need to track about these wastes also vary. Over time, each plant developed its own waste tracking system. This resulted in the three facilities reporting waste information inconsistently. Unfortunately, this practice did not meet the needs of the DOE who owned the facilities. Further complicating the problem of inconsistency is the fact that the technology used to manage the data also varied from plant to plant. For example, the information was managed partly on servers and partly on desktop applications. More recently, web-based applications were added to the mix.

Today, WIMS is a compilation of several interrelated systems utilized for the tracking of low level waste, transuranic waste, spent nuclear fuel, RCRA waste, TSCA waste, mixed waste, and other chemical waste. The foundation of these interrelated systems consists of three major systems which collectively are referred to as WIMS – the CLUE (Common Lookup Environment), the GES (Generator Entry System) and the WITS (Waste Inventory Tracking System). These systems are currently managed by EET Corporation through a contract with Bechtel Jacobs Company, LLC who is a prime contractor to DOE. Because the requirements for a waste tracking system are dependent on the facilities for which it is used, the data model used by WIMS to track and report information is standard enough to consistently report waste across the ORR, yet flexible enough to correctly reflect the different waste operations of these plants.

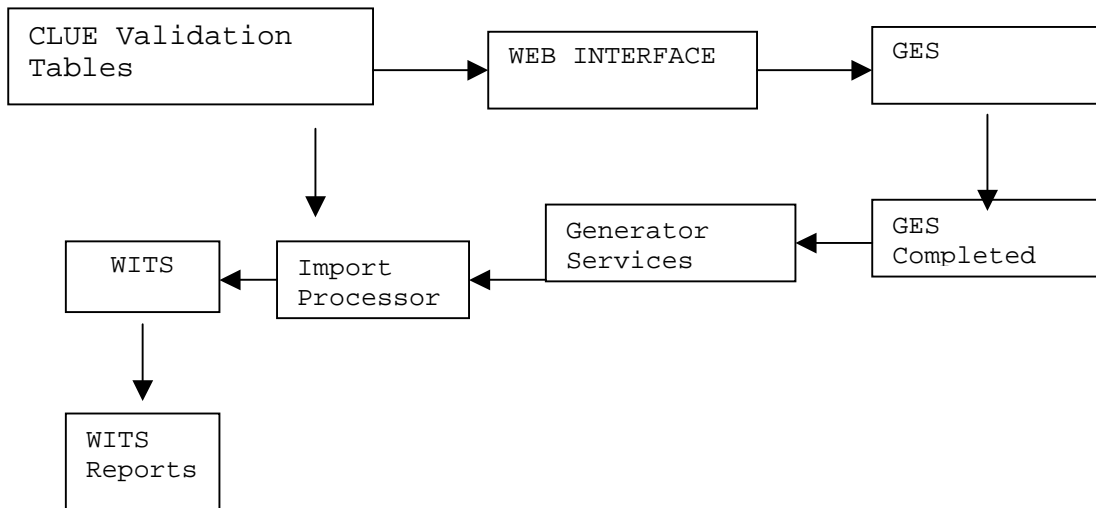
The GES is the system used by generators to declare the characteristics of their waste to waste management as well as notify them that waste is available for pickup. Data entered into GES is validated according to CLUE which is a series of database tables that update nightly with pertinent company information such as employee badge number, facility location, charge number, etc. Once data has been electronically validated it is imported into the WITS which is the primary repository of the data. At this point, additional information is entered into WITS from hard copies of request for disposal form packages. These data are also

validated against CLUE. A high level flow of waste information through the WIMS system is depicted in Figure 1, found below.

In WITS, movements of waste containers from facility to facility, plant to plant, and to disposition are recorded with powerful, hand-held, portable programmable barcode readers. The application of barcodes to containers permits rapid inventory of items with all relevant information such as location, history, and regulatory status attached.

Standard regulatory and managerial reports are initiated via a web application that references WITS tables. Ad hoc reporting can also be accomplished through accessing the WITS tables. Users may request reports, changes to data, user access, and changes to the system through the WIMS Help Desk. All such requests are processed through a help desk procedure designed to ensure the validity and expeditious processing of the requests.

**Figure 1: WIMS Flow of Information**



Because WIMS has evolved over a long period, the components of the system are in a variety of platforms. The GES is currently written in FoxPro, while CLUE is in Sybase, the WITS data entry screens are in Uniface, the WITS data tables are in ORACLE, standard reports are written in Java, and ad hoc reporting is accomplished through query tools such as SQL, IQ Objects, and MSAccess. Technical goals of the WIMS team include integrating as many WEB tools as practical to allow for all pieces of information to be managed in one platform and enabling Waste Management Operations to move away from as many hard copy

forms as possible. In this regard, future evolution of WIMS is dependent on waste management practice and policy changes as well as technology improvements.

## **THE GENERATOR ENTRY SYSTEM (GES) AND THE COMMON LOOKUP ENVIRONMENT (CLUE)**

Waste information tracking begins when waste is generated. A generator must completely and accurately declare the characteristics of the waste in order for a waste management organization to be able to appropriately handle, store, treat, and dispose of it. The generator must have a mechanism for communicating to the waste management organization that waste will be delivered to them or is available for pick up by them. On the ORR these tasks are accomplished through an electronic process that supports the generator's process. In Oak Ridge the waste management organization is Bechtel Jacobs, LLC. Generators may be employed by Bechtel Jacobs Company, Lockheed Martin Energy Systems, Lockheed Martin Energy Research, or other smaller firms. WIMS, itself, is managed, operated, and maintained by EET Corporation according to a statement of work prepared by Bechtel Jacobs.

### **GES**

The GES is a custom written Foxpro 2.6 software program used to allow generators throughout the ORR to complete the request for disposal form set including applicable waste certification attachments necessary for waste pickup by Bechtel Jacobs. The requirements of this form set and its contents are defined by the waste management organization. They are designed to include all the information necessary for waste management to determine the disposition of the waste items. It is on these forms that the generator declares the known characteristics of the waste such as regulatory status including EPA codes, physical form, compactibility, incinerability, radioactive handling requirements, etc.

Bechtel Jacobs's business rules are electronically programmed into GES so that it is difficult for a generator to leave required fields blank or enter faulty data. The GES validation rule matrix is updated and published over the web to the user community with each software version release.

By requiring generators to use GES, the waste management organization is able to ensure the consistency of the data entered into the WIMS and perform validation of the data at the point of entry (1). Another benefit of using GES is the ease of data transfer from generator to generator, which is necessary when several generators have contributed waste or waste items to a single waste drum. Additionally the form set completion is streamlined since all fields in GES are entered once, but appear in many places on the form set.

The GES input screens were initially designed in 1995-1996 around the paper forms, which began evolving before the widespread use of PCs. Every effort was made to keep the order on the screen the same as on the paper forms. Although efforts to standardize the paper and electronic form set have been fairly successful, differences exist in the way the waste documentation forms are used for each site. GES is flexible enough to accommodate the different requirements of the receiving waste management organization at each plant. As Bechtel Jacobs standardizes these requirements, GES will be modified by EET to reflect the changes. The primary site difference involves the use of the Waste Item Description (WID). A WID and at least one corresponding attachment are required for all incoming wastes at all three sites. At the ETTP and Y-12 Plant the WID is used to detail a waste characterization or profile that can apply to multiple waste items. ORNL has a business practice that requires a WID to be submitted for every waste item.

Once a generator has completed profiling the waste using GES, a form set and matching electronic file are created and submitted to the waste management organization. Upon approval from the receiving organization, this form set is coupled with other transmittal documents and the matching electronic file is approved to be uploaded into the WITS, which is the main inventory system. The hard copy form set is signed and becomes the record copy. When the data are imported into WITS, the WIMS data operations staff creates a pickup waste activity request, also known as a job order. This is the mechanism for notifying the waste management organization that a generator's waste is available for collection.

Although the data captured through GES is primarily intended for uploading into the WITS, other organizations throughout the ORR rely on this information. Examples of these groups include the Facility Categorization Management Program who uses the data as one of multiple inputs to determine compliance with radioactive limits in storage facilities and the Waste Transportation Group who uses GES information to perform Department of Transportation calculations in order to ship wastes.

## **CLUE**

The information used to validate the data entered into GES and WITS are maintained in the CLUE. It is managed in Sybase. In the 1994-1995 time frame, a CLUE team was chartered to define and implement common look-up tables for waste management enterprise data and to establish the associated business rules governing the data (2). CLUE itself is a tool for facilitating consistency and reducing redundancy of effort across the ORR by establishing and maintaining the common look-up tables. For instance, TCE may be entered by one site while another enters trichlorethene, and another enters trichlorethylene. Standardizing the names of items entered into GES and WITS is essential to

standardizing and streamlining reporting. If a customer wants a report on TCE then the database needs to only be queried for one chemical, not three.

Examples of the types of data stored in the CLUE include: facility information such as location, permit status, and function; personnel information such as employee badge number, division, and waste management role; waste classification information such as EPA code, DOT class, and radioactivity level; constituent information such as chemical substance, radioisotope, and CAS number; and container information such as type, material of construction, and container style. Some of the information stored in these tables is refreshed nightly through a link to the Corporate Information Center. These are items such as badge number and charge numbers. Other changes and additions to existing CLUE data such as those regarding facility permit status or EPA codes are performed through a tightly controlled approval process managed by the WIMS Help Desk staff.

Once the tables are extracted from the Corporate Information Center or updated through the WIMS Help Desk process, they become the basis for the pick lists found in GES and WITS. Therefore only valid choices for each field in GES and WITS may be entered. Controlling input in this manner also limits plant to plant differences in naming conventions.

A waste generator must fully declare his or her waste to the receiving organization so it may be handled properly. In many instances it is not acceptable to the waste management organization for a generator to leave fields in GES blank. By utilizing the CLUE, the waste management organization is able to require input in many fields by controlling the data housed in the pick-list. If the CLUE table does not offer, "other," or "unknown" as alternatives, then the generator must select one of the valid choices from the CLUE pick list in order to complete a GES data set which must be done before waste can be picked up by the waste management organization.

This restriction of data also enables GES and WITS to enforce other business rules established by the waste management organization. For example, a generator may not claim that a waste is RCRA regulated without specifying a valid RCRA EPA Code.

The data control capability of CLUE also facilitates WIMS flexibility. It is through the judicious use of the CLUE data addition approval process that some necessary site-specific needs may be accommodated. True plant to plant differences are managed and accepted through this process, while requests that would enable impractical differences between the plants to continue are rejected.

## **WASTE INVENTORY TRACKING SYSTEM (WITS)**

Once a form set has made it through the GES and CLUE validation process, it is ready for acceptance into WITS which is a comprehensive, integrated, secure, flexible, and portable database system for managing waste and waste information. It is the consolidated waste information tracking system supporting the ORR. WITS was deployed in three phases beginning in late 1997 with the conversion of KWTARS (K-25 Waste Tracking and Reporting System) to WITS, followed by the conversion of the Y-12 Waste Tracking in early 1998, and conversion of the ORNL Waste Tracking System in mid-1999. It is designed to provide cradle-to-grave tracking of waste from identification, through characterization, to storage and/or disposition. The data contained in WITS is used to assess and ensure quality, safety, and regulatory compliance of waste management activities.

WITS is comprehensive enough to support the collection of information used in managing the following types of waste: low-level, transuranic, RCRA, TSCA, RCRA Mixed, TSCA Mixed, and spent nuclear fuel. The operation of WITS is considered integrated since information is entered one time and it is designed to enable sharing of information across departments and organizations. For example, environmental compliance reporting personnel and a storage facility manager can access the same storage facility inventory data.

WITS is also designed with the flexibility and capability to meet the waste tracking and management information needs for many kinds of users. These include, but are not limited to: waste coordinators, field technicians, sampling crew supervisors, facility technicians, data analysts, shipping coordinators, and project managers. WITS is referred to as a portable system since its core functionality can be deployed to numerous databases and operating system platforms. Users may access and query information stored in WITS with a variety of tools such as MSAccess, IQ Objects, MSEXcel, and Foxpro.

Because users are assigned appropriate organizational roles and only authorized users can enter and update information, WITS is considered a secure environment. The data entry to the over 260 screens found in WITS is controlled through proper assignment of user roles. By default, user accounts are “read-only” with only a limited number of WIMS data operations staff having “write” privileges to the database. The WITS Operations Manager and the WITS Application Manager must approve the user roles before the database administrator can assign them. Security is further enhanced in WITS because it tracks changed data records and when changes were made.

There are two basic levels of data contained in WITS. The first is information provided on request for disposal forms such as generator, origin site, and charge number. These data apply to all the containers found on an individual request for disposal form set. The second type of data is information that pertains to a specific container or waste item such as weight or volume.

A few key components and processes of WITS are described below.

### **Import Process**

Once waste is ready to be released from the generator to the waste management organization, the data that the generator has entered to GES is ready to be uploaded into WITS through the import process. This process consists of four steps: performance of basic security checks, parsing of data stored in the CFF file (which is the output from GES), validation of the GES data against WITS business rules, and moving the imported data into the WITS database (3). These steps must be performed sequentially as listed.

The import function adds two more levels of security to WIMS. The first security point in this process is embedded in the CFF file, which is a text file that could potentially be edited by anyone coming in contact with it. Therefore, to secure the file, a 16-bit checksum is computed from its contents and is included in the CFF file. The import function recomputes the checksum and then compares it to the value contained in the CFF file. If the two checksums do not match, the import process is terminated and the rejected file is returned to the generator for review and correction. The second security point in the import process is at the user level. Only users for whom the proper authority has been established through the user role process may import data into WITS.

Once the import process has verified the CFF file's integrity and the user's authority to perform the import, the parsing stage of the process verifies that the data meet the CFF specification. If no major errors are found, the data are validated against the WITS database. If any file format or data validation errors are discovered the user is notified, an error message log is produced, and the import process is terminated. Otherwise, the data are loaded into the WITS database.

### **Waste Activity Requests and Reports**

The WIMS predecessors on the ORR were "after the fact" systems. That is, the scope of waste tracking was limited to recording events that had already happened. The Waste Activity Requests and Reports module of WITS was developed to allow WITS to group distinct items by an event, such as a bulking of several small containers into a larger one, and tie them to it. Utilization of this functionality enables waste managers to use WITS as a planning tool and to track personnel associated with various jobs. In this manner Waste Management Operations are integrated with waste tracking.

A waste activity request (WAR) refers to a planned activity or job-order, while the waste activity report (also, WAR) simply records an event that previously occurred. Both WARs are part of the operating record. Once completed, waste activity requests typically contain signatures used for evidence of completion.

These are filed as part of the waste management operating record. Waste activity reports can be keyed into the system using preexisting documentation. For example, a waste activity request can group items 12345-1 through 12345-10 on a request for disposal and associate them with a planned pickup of waste. Upon completion of the activities, the waste activity report is updated to record the date and time the items were picked up as well as the personnel involved. WARs typically contain the instructions for waste management operation personnel to conduct the work. They are used to document all the significant events in the life cycle of waste container once it has been accepted into the waste management system. There are currently eight types of WARs in WITS: pickup, movement, inventory, repackaging, shipment, termination (e.g., treatment and disposal), nondestructive assay (NDA) event, and weight event.

### **Pickup**

Pickup WARS are used to plan the retrieval of waste containers from a generator area into the waste management system - most likely to a storage facility. The WAR details the current location of the waste and where it is to be taken for storage. The pickup location is specified in the GES file while waste management personnel who request the Pickup WAR must specify the where the waste item is to be taken.

### **Movement**

If a container that has already been accepted by the waste management organization needs to be relocated, a Movement WAR is issued to plan and record the activity. In order to gain efficient use of waste management personnel movement WARs generally are issued for several containers at one time. Movements can also be recorded via a barcode reader which will create an “after the fact” WAR.

### **Inventory**

Barcode readers are used to support the inventorying of waste management facilities. WARs are created in WITS when the bar code files are downloaded into it. Frequent inventorying of waste storage facilities permits waste managers to monitor their organization’s progress toward moving waste to disposition, manage facilities according to their permit limits, and plan for near term disposition activities.

### **Repackaging**

All repackaging actives are recorded after the fact using similar source documents at each of the three ORR plants. WIMS personnel are developing a

standardized form set to capture this data. Currently, only overpack operations are supported by barcode readers.

## **Shipment**

Shipment WARs are also recorded after the fact. They allow the recording of information pertinent to waste shipments such as DOT codes associated with the shipment, transporter EPA code ID, manifest document number, and the date of the shipment.

## **Terminating Events (Treatments and Disposals)**

Treatment and disposal are both considered terminating events in WITS. The life cycle of the waste ends when a terminating event occurs. Wastes generated from the treatment of waste are tracked as new waste items in WITS.

Terminating events, which are generally recorded after the fact, record information regarding treatment or disposal of waste such as EPA treatment or disposal codes, EPA ID of the treatment or disposal facility, and the date of the terminating event.

## **Non-Destructive Assay (NDA) Event**

The NDA event in WITS merely records the date when a waste item processed through an NDA facility on the ORR. Data derived from the NDA process are currently maintained outside the WIMS environment.

## **Weigh Event**

The weigh event in WITS records a change in weight of item due to a reweighing of the item not associated with any other event. This functionality is supported by barcode readers.

## **Barcode Activities**

The most efficient method for waste operations to collect information is through the utilization of powerful, hand-held, portable programmable barcode readers. Janus 2020 and 2010 barcode readers are currently in use on the ORR. This equipment enables waste operations to capture data regarding the waste and the activities being performed on the waste accurately and quickly, with little or no keypad input. Transfer of data to the database servers into WITS is achieved electronically thereby eliminating many potential data entry errors.

As mentioned above, bar code files are the source materials used to create several types of WARs. In order for these transactions to be posted to the WITS database, the barcode files created during the work activities must be downloaded from the barcode reader. This is accomplished through a barcode

reader docking station that is connected to a PC that is networked to the WITS server. The download process itself is initiated through a software function on the barcode reader. Once the server begins to receive the data, it formats it and places it in a directory for incoming barcode files. At this point, the file byte counts on the barcode reader and the server are compared to ensure that the server has received the entire file. Upon completion of this step, the user receives confirmation that the barcode reader's information was successfully transferred to WITS for nightly processing and the barcode reader is cleared of data.

The barcode files are posted to the WITS database on a nightly basis. This process reads the files that have been transferred to the directory for incoming barcode files. This process validates the barcode files for errors and then imports the files into a "queued transactions" staging area for review. From the staging area the barcoded activities are posted to the appropriate place in the WITS database. Error correction occurs in the queued transactions screens. Upon correction, the barcode files are reprocessed and checked for more errors. This part of the process is repeated until the files are error free and can be processed accordingly.

## **DATA RETRIEVAL AND REPORTING**

The fundamental purpose for tracking waste information electronically is so that it can readily be reported and therefore analyzed by waste managers to improve their operations or report on the status of them. Because the data entry points in WIMS are controlled through the validation and security processes described in the previous sections, reports from it are extremely accurate, as long as Waste Management Operations have delivered all the data to the tracking system. To ensure that this occurs, waste management on the ORR has established administrative procedures to ensure the timely downloading of barcode readers and delivery of operating record documents to WIMS staff.

There are currently four ways to retrieve data from the WIMS system. The first is through the request function of the WITS application. The second is through a newly developed web-based reporting application that is universally accessible to anyone with a web browser and access privileges to the system. Established regulatory and other waste facility management reports are found in this application. The final methods for retrieving data from WITS enable users to produce or request their own ad hoc reports. The "significant events table," which details all the chain of custody events for each waste container that was ever tracked by WITS may be accessed, manipulated and queried to produce reports. This method is ideal for waste managers with more refined computer skills. The alternate method of submitting a report request through the WIMS Help Desk via email or telephone, may be used for more complicated reports or for users who need training regarding the use of the "significant events table."

### **Request Function**

Most information that was uploaded from the request for disposal form set through the import process can be reviewed in this function. For example, a user can key in the document ID they are looking for and view it on screen. This function allows the user to view item level details, but not analyze data across items. The request screen is used to identify the GES Validation Status, the date received, generator, origin date, pickup facility, and other items associated with the original request for disposal for specific items. From here other waste characterization screens, such as the Generation Process Information screen, may be accessed. Here data points such as charge number, generation process description, and waste category can be reviewed. In keeping with the complexity and scope of the Request for Disposal form set, the scope of information in the Request module is vast. The module consists of 18 significant screens, additional sub-screens, and navigational buttons to other areas of the database.

### **Web-based Reporting**

The newest addition to the core capability of WIMS is its Web-based Java reporting applet. It is the easiest data retrieval method available to WIMS users. Routine regulatory reports and frequently asked for management reports can be generated from here by any established user with a web browser. Currently there are approximately twenty-five reports available to users through this application.

The WIMS team has pre-programmed reports that are known to be regularly needed by waste management for reporting to regulatory agencies or for operations tracking and planning. A site selection screen precedes the logon screen of this reporting environment. The three plants using WIMS have physically separate databases so users can only generate reports from one plant at a time. Unfortunately, when a user is tracking the life events of waste that was generated at ORNL but stored at ETTP, he or she must create a report from each plant to get its entire history. This scenario developed as a result of the three ORR plants initially developing independent tracking systems based on three separate waste management organizations.

### **Regulatory Reporting**

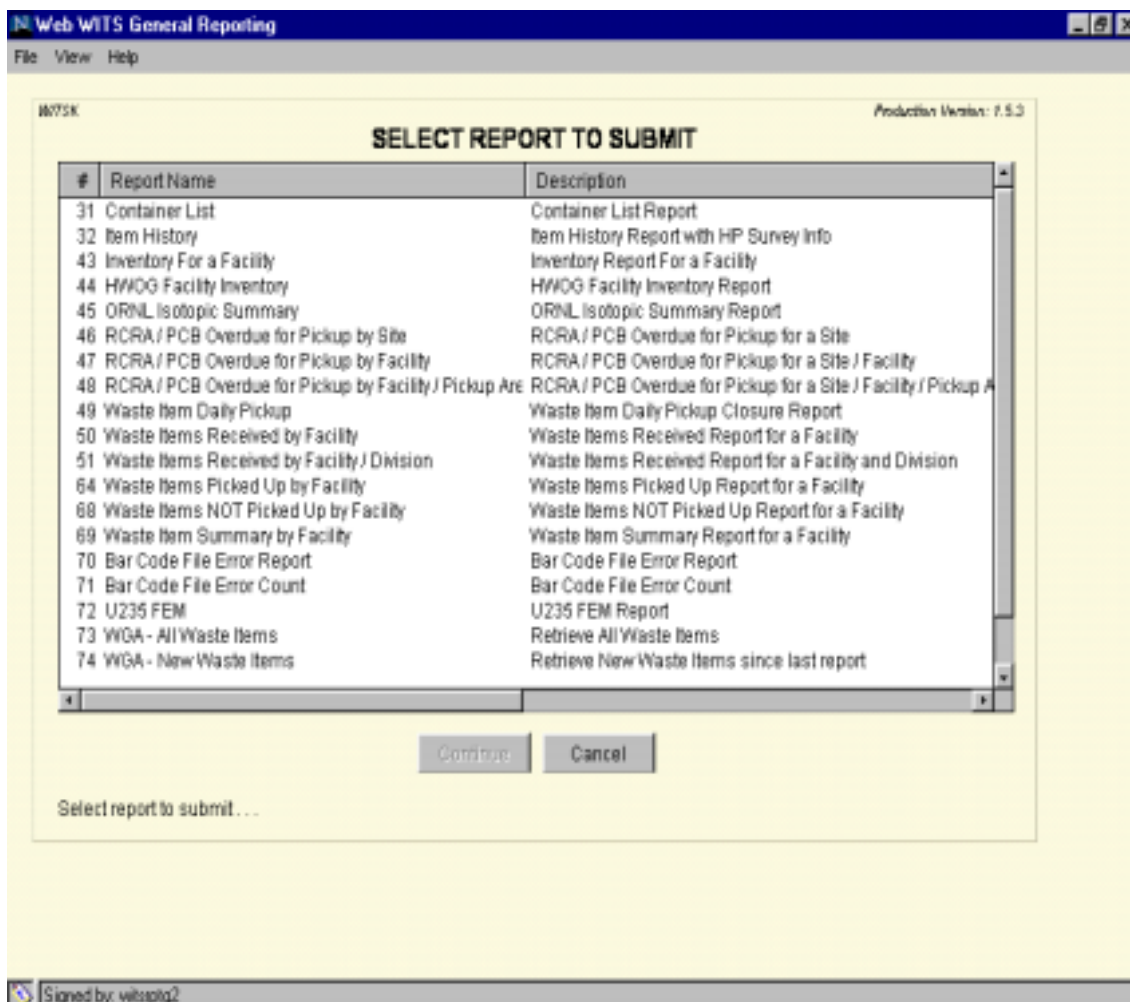
Two of the more complicated regulatory reports that any waste generator, storage facility, or disposition facility faces regularly are the RCRA (Resource Conservation and Recovery Act) Annual Report and the TSCA (Toxic Substances Control Act) Annual Document. On the ORR these reports are particularly cumbersome because there are approximately 100,000 containers of waste on the reservation representing hundreds of waste streams. For both reports, the web application is able to provide the relevant inventories to the report preparers for thorough QA review. The user may select the beginning

inventory, ending inventory, generated inventory, inventory treated, inventory shipped, or inventory disposed, in a variety of sorting arrangements for any period of time he or she designates. These inventories can then be printed or stored on the user's PCs for his or her review and formatting in the software of the user's choice. In the case of the RCRA report, the data are submitted back to WIMS and into an MSAccess application after certification for formatting into the State required forms.

## Management Reporting

The fundamental reason for integrating a waste tracking system with waste operations is so it can be used as a waste management tool. Designing reports that enable waste managers to better use the data available to them is critical to the success of WIMS. As of this writing, the WITS reporting application contains sixteen management reports. The report selection screen for this functionality is shown below in figure 2. Three of the more unique reports are described below it. They report on the daily, weekly, monthly

**Figure 2: Web WITS General Reporting Selection Screen**



activities of the waste management organization and are used by waste managers to track movements of particular wastes, plan for treatment capacities, even as a baseline for budget planning.

### Waste Container History

The Waste Container History Report allows the user to view or print the history of a specific container, or a group of containers that is associated with a specific waste request, paper request, or facility. This report lists, in chronological order, all the WARs that have been completed for the selected containers. The information for each event is formatted appropriately for the specific event type.

### Waste Item History

The Waste Item History Report is a way of retrieving all the information on the Waste Container History Report based on the waste item identifiers as opposed to waste container identifiers. There may be many items in one container which may be individually selected and removed from one container and placed in another container with more items. Each event will point back to a WAR if further detail about the event is required.

### RCRA/PCB Overdue for Pickup

In the complicated compliance arena of waste management at a DOE facility, it can be difficult to maintain waste in a 100% compliant manner. The RCRA/PCB Overdue for Pickup report prompts waste managers to create WARs to move RCRA and or PCB contaminated waste from temporary storage areas as they approach their regulated time limit in these locations.

### Facility Inventory Report

The facility inventory report provides detailed information (29 fields per item) on all waste items in a given facility. Data fields include Origin date, Date to current location, last inventory date, RCRA start date, PCB start date, Generator information, exact location information (Area, row & level), container type, characterization flags (RCRA Y/N, PCB Y/N, RAD Y/N, etc.), physical form, weight, volume, and EPA codes. There are currently thirty combinable query parameters for the facility inventory report including Generator, Origin facility, Current facility, Origin Division, Waste Group Type, NDA report date range, container type, physical form, characterization flags, etc. This allows the user to ask questions such as:

What is the total volume of waste currently stored in facility X?  
Where is all the waste currently on site that was generated by X division stored ?

Do I have any containers of liquid in facility X ?  
Do I have any RCRA or PCB waste stored in facility X ? How much ?, etc.

In short, combining the query parameters can result in meaningful, detailed looks at specific universes of waste or conditions. Note that Facility Inventory Report only reports items that are in active inventory. It does not report on items that have been terminated (treated or disposed).

## **Ad Hoc Reporting**

The WITS database itself is a complex arrangement of ORACLE database tables. Since most users are not versed in ORACLE it can be difficult to prepare ad hoc queries of the data set. Therefore two methods of ad hoc reporting were established so that the data tracked in WITS may be used to its fullest extent.

### Significant Events Table

The “significant events table” was created to enable a more sizable group of users to prepare their own ad hoc reports of the system. This table is prepared nightly and contains all pertinent information regarding the cradle to grave events in the life cycles of all the containers that were ever accepted into the waste management system and therefore tracked by WITS. Each time a WAR is generated for a container, it is included in this table. Therefore it is possible for a container to have multiple records associated with it. The significant events table can be queried through an ODBC link to common software tools such as MSAccess or IQ Objects thereby enabling a wide variety of users to access the WITS data without assistance.

### Help Desk

Occasionally report requests are too complicated or cumbersome to be achieved through the above mechanisms. When this occurs, users may submit requests via email or phone to the WIMS help desk which is a fully functioning help desk utilized by WIMS staff to manage a wide range of support issues. One of its uses is to track and provide solutions to user problems or requests for data. Each report request is tracked through its life cycle from initiation to closure. The help desk staff has created efficient case categorizations so that requests may be tracked as being related to WITS, GES, or CLUE. Once the category is identified, the request is routed to the appropriate subject matter expert for processing. Each subject matter expert has been highly trained on the WIMS database structures and a variety of programming languages. If necessary, they will contact the requestor for further clarification of the request. Once the request is completed by the subject matter expert it is sent to the requestor for review and acceptance.

A WIMS knowledge-base is a natural product of the Help Desk process. As the knowledge base matures it will become a valuable tool to enable efficient and effective processing of future problems, and identifying significant trends associated with customer support.

All requests to the help desk are tracked, routed and escalated based on the case categorization. When WIMS users request reports, the help desk “knowledgebase” is reviewed for similar requests so that they may be handled and routed in a consistent manner. All requests are reviewed weekly so that trends in report requests can be evaluated. When the same report (or very similar report) has been requested repeatedly, it is reviewed to determine if it can be automated. If so, it is added to the list of reports available in the Web reporting application. This way it will be available to the user at his or her convenience without having to submit the request through the help desk process.

## **CONCLUSION AND SUMMARY**

As technology evolves and waste management practices become standard across the ORR, WIMS will continue to be modified to encompass more and more Waste Management Operations. Long term goals for modifying WIMS include moving GES into a Web based platform, enabling more waste management functions to be handled by barcode readers, migrating CLUE from Sybase to ORACLE, and managing all three plant databases as one consolidated database. It is important to note that the tracking system is a reflection of waste management practices, not the converse. Therefore, modifications to WIMS will be timed with the appropriate waste management policy modifications.

In summary, WIMS is flexible enough to meet the disparate waste tracking needs for the different missions of the three ORR plants without compromising the accuracy of the information it manages. Given adequate time and a team environment, WIMS is portable enough to be installed and tailored to any large waste tracking enterprise. The benefits of this system are many and include accuracy of data capture, timely processing and reporting in support of the management of waste.

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