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AUTOMATED TRANSPORTATION MANAGEMENT SYSTEM (ATMS)

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ABSTRACT

This paper describes the Department of Energy (DOE) EM 63 Automated Transportation Management System (ATMS). The ATMS is a web based transportation management software product utilized by 31 DOE sites complex wide. The ATMS software application assists DOE and DOE contractors in automating day-to-day shipping activities for general, hazardous, radioactive and waste material in support of DOE site closures nation-wide. The system is available to DOE and DOE Contractor personnel at no cost and includes upgrades, on-call help desk support and system maintenance and licensing.

Through the day-to-day usage of the system software, the ATMS users generate regulatory compliant Bills of Lading, International air Transport Association (IATA) Dangerous Goods Shipping Declarations and Uniform Hazardous Waste Manifests for general, hazardous and radioactive waste shipments. Quality assured shipping documentation is prepared using ATMS resulting in improved efficiency and accuracy in compliance with the applicable Department of Transportation (DOT) regulations. This not only reduces document preparation costs and possible fines due to non compliance with the DOT regulations but also produces accurate shipping documentation that is critical in the safe transport of waste, hazardous and radioactive material.

Additionally, for the transportation of DOE owned materials, freight invoices are processed utilizing Electronic Data Interchange (EDI) and an automated pre-payment audit process using DOE EM 63 nationally negotiated rates. ATMS data is also used to prepare statistical and performance metric reports that include hazardous and radioactive shipment information. Significant costs savings have resulted in utilizing the system for determining freight rates, automated freight bill audit and payment processes and various reporting capabilities. The General Services Administrator (GSA) has approved ATMS reporting as an approved pre-payment audit program and alternative to submitting copies of freight bills over $100 for post payment audit.

The ATMS was built by DOE as the result of a 1989 feasibility study and recommendation by congress and the DOE Inspector General that significant costs savings could be realized through an automated transportation management system. System development is managed by the Headquarters DOE Office of Transportation and utilizes the concept of Joint Application Design (JAD) and annual User Group Meetings with development staff and system users to keep the system updated and relevant to day-to-day operations. This collaborative process helps ensure system design meets the needs of a broad base of users. It also supports the DOE initiative to move materials in the most cost effective and safe manner.

A brief history of software development, current utilization and efficiencies, and future direction to meet the changing needs of the DOE sites will be included in the paper.

INTRODUCTION

The Automated Transportation Management System (ATMS) is a web based transportation management application conceived in the late 1980's and first implemented in 1993. This system was created to automate many of the day-to-day transportation activities conducted by Department of Energy (DOE) and DOE contractors. Labor intensive tasks such as generating various shipping documents, prepayment audit and approval of freight bills and carrier/mode selection were incorporated.

Use of the ATMS has resulted in a substantial savings to the DOE in both hard dollar and through cost avoidance. The savings have been realized through manpower reduction, reducing transportation costs using negotiated rates and prepayment auditing. The system is available to DOE and DOE Contractor personnel at no cost and includes upgrades, on-call help desk support and system maintenance and licensing.

1.0 BACKGROUND

In 1989 Congress required (Public Law 99-672) the General Services Administration (GSA) to conduct a government wide Transportation Management Automation Feasibility study. Subsequently the DOE Inspector General's (IG) office performed a review of DOE's transportation and billing system. Both the study and review resulted in a number of feasibility conclusions indicating that the system would be technically feasible and economically justifiable. Also that the system should be designed to account for changing technologies including a centralized database repository and interface for Electronic Data Interchange (EDI) with transportation providers. The GSA was unable to support development of such a system so the DOE assumed responsibility for the task and created a system customized to its needs.

Development of the ATMS started in 1990 with a stand-alone personal computer (PC) version and progressed to a web based system in 2005. The table below shows the versioning history for ATMS from inception to its current web based platform.

Year	Version	Description
1993	1.0	Stand-Alone PC
1996	2.0	Oracle Client/Server
1999	2.3	Y2K Compliant
2001	2.3	DOE Information Technology Award
2003	3.0	Consolidated Database
2004	3.0	ETAS/ATMS Integration
2005	4.0	Web Deployment
2006	4.2	Modify EPA Manifest System
2007	4.3	Deploy to new Infrastructure at the Savannah River Site

The annual budget for ATMS has averaged $650K for the last several years with the total DOE investment in the ATMS program of approximately $9 million. However, when these ATMS operational costs are compared to the cost savings and avoidance generated by the system, which is estimated to be over $6 million annually, it is apparent that the system has a positive per year cost/benefit factor for the DOE. The ATMS is currently utilized by 31 DOE sites and has been considered by several other federal organizations such as the GSA, Internal Revenue Service and United States Navy for possible use in their organizations.

2.0 ATMS OBJECTIVES, SUCCESS CRITERIA AND DEVELOPMENT DRIVERS

In order to measure the success of ATMS, financial and non-financial criteria were established. It was determined that ATMS must ensure compliance with federal regulations, maintain 95% uptime and maintain positive customer satisfaction. Using the 80/20 rule ATMS was initially migrated to the DOE sites having the largest freight volume. It was determined that 20% of the DOE sites handle 80% of the DOE shipping activities. Financially, ATMS was to achieve consistent annual savings through prepayment auditing, discount cost avoidance, lowest cost carrier determination and labor reduction.

Overall the ATMS has measured up very well to the financial and non-financial criteria established during its implementation. The system has been very stable over the course of its usage and has maintained a consistent 99 percent uptime. The ATMS has undergone frequent

revisions to ensure continued compliance with federal regulations, specifically in preparation of hazardous materials shipping documentation. The ATMS user community has been highly involved in the enhancement of ATMS and as a result feedback has been positive with regards to meeting the needs of the site users and in the areas of help desk support and supporting a changing transportation environment. Financially ATMS has been a major success having achieved upwards of $3M annual savings in labor reduction alone. In a typical year prepayment audit savings exceed $400K. Combining these amounts with the annual carrier rating discount cost avoidance, $8.6M in FY06, results in a substantial annual savings to the DOE.

In addition, funding was eliminated for the DOE funded Enterprise Transportation Analysis System (ETAS) program in 2004 and the ATMS project was tasked with providing statistical transportation data for the DOE complex. The ETAS database, formerly known as the Shipment Mobility Accountability Collection (SMAC) system was developed in the 1980's as a complex-wide historical database to report transportation statistics. The ETAS data was integrated with ATMS information and the Transportation Archive Management System (TAMS) database established for historical reporting. Numerous detail and summary reports are prepared annually on shipment volume; commodities shipped, including hazardous and radioactive shipment information; and cost analysis. The consolidation of ETAS and ATMS significantly reduced costs for DOE to maintain a comprehensive historical database for transportation statistics.

Although the number of sites and users has significantly increased since consolidation and the Web Based application deployment the annual budget for development and support has decreased. Original budget in the development stage exceeded $1M annually and now averages $600K per year. In FY2007 the system usage was at an all time high with over 300 current users at 31 sites. Additionally, three DOE-EM sites have been successfully cleaned up and closed. The ATMS system was used extensively for day-to-day transportation activities during the site closure process for the payment of freight bills and the preparation of DOT compliant shipping papers, including the Uniform Hazardous Waste Manifest (UHWM).

The development drivers established in 1993 continue to be the primary drivers used today for ATMS modifications. These drivers include maintaining compliance with federal regulations, implementing technology improvements and incorporating new functionality to suit changing business requirements. Hardware, software, and data maintenance activities are performed on a re-occurring basis.

3.0 ATMS STAKEHOLDERS AND USERS

ATMS stakeholders are comprised of DOE and DOE Contractors. The DOE Environmental Management Office of Transportation currently funds the ATMS program. This stakeholder had several objectives which include standardizing transportation management operations, the reduction of transportation costs, and provide a tool to accommodate the site organizations in their daily transportation tasks in support of the EM mission of site cleanup and eventual closure. Additionally eleven National Nuclear Security Administration (NNSA) sites use the ATMS extensively. It is the intent of DOE to capture and/or process 80% of DOE transportation volume using this system. The ATMS has met this goal and is continuing its efforts to get more sites using the system.

Other DOE contractors under various organizations (i.e., Office of Science, Office of Civilian Radioactive Waste Management, Bonneville Power Administration,) use the system as part of their day-to-day transportation operations. This has reduced errors in preparing shipping documentation, eliminated redundant data entry tasks, and automated freight bill payment and carrier selection. Additionally, transportation data has been generated for use by DOE and contractor management in their day to day management activities.

To help ensure that the ATMS continually meets the needs of the user community, several channels of communication were established. These include conducting annual Joint Application Development (JAD) sessions, holding User Group meetings, involvement in the Transportation Management Council, and use of an ATMS Steering Committee.

4.0 ATMS FUNCTIONALITY

In an effort to accommodate system modification, the ATMS development process incorporated a modular design methodology. Using this approach, the ATMS could be readily updated and new functionality added as needed. Currently, the system is comprised of six specific modules. These are the Rate/Route, Electronic Data Interchange (EDI), Shipping Documents, Logistics, Reporting and Administration modules.

The Rate/Route Module in ATMS was developed concurrently with the Logistics module to provide automated carrier selection based on mode and cost in addition to incorporating freight rates into the prepayment audit process for freight bill approval and payment. Comparisons between carrier modes and cost within modes by carrier are calculated and displayed using unique rating methods for Air Express, Less Than Truckload (LTL), Parcel, and Truckload.

Air Express tenders are based strictly on weight although future development may enhance this to a zone based rating. Parcel rates are zone based from or to the user site and updated annually. Weight and dimensional calculations provide alerts to the users for oversize or overweight parcel shipments. Less Than Truckload (LTL) rates are re-bid biannually and currently use the CZARLITE 2005 Class 50 Rate Base to calculate rates based on specific discounts. Biannual TL rates are mileage based using PC Miler software that calculates the rate using commodity and equipment requirements. The Rate/Route module is used by transportation organizations as well as procurement personnel to select appropriate transportation for shipments.

A recent enhancement to the Rate/Route module incorporates the DOE-HQ Motor Carrier Evaluation Program (MCEP) approved carrier listing into ATMS. The user may select approved carriers which are listed by ranking or view and print the entire list. These carriers have been evaluated and approved to ship hazardous material and waste for the DOE.

The Logistics module of ATMS is used to process site freight invoices. Invoices are received from the commercial air and motor carriers via Electronic Data Interchange (EDI) or input manually. An automated pre-payment audit is completed by the ATMS and the invoice is either approved for payment or flagged for correction. In FY 2006 340,000 shipment records were entered into ATMS for freight bill prepayment auditing and subsequent payment. Additionally, several sites have electronic feeds to their Accounts Payable and Warehouse Receiving systems,

eliminating duplicate data entry. The DOE transportation data captured in the ATMS Logistics module is also used to prepare statistical reports and performance metrics that include hazardous and radioactive shipment information.   ATMS data is archived to the Transportation Archive Management System (TAMS), which replaced the Enterprise Transportation Analysis System (ETAS).   The TAMS data provides annual and adhoc reports for the DOE, other government agencies and congressional inquiries.

 ATMS is utilized by DOE sites to prepare Bills of Lading (BOL) for general, hazardous and radioactive material shipments.   The ATMS Shipping Document module also assists in preparation of Uniform Hazardous Waste Manifests (UHWM) for the shipment of Resource Conservation and Recovery (RCRA) waste. The UHWM was modified in 2006 to comply with mandated use of a standardized form for all states.   The ATMS Shipping Documents module provides templates, pick lists, formatting assistance and DOT reference tables (i.e., 172.101 Hazardous Material Table) to assist the site HAZMAT Specialist in the preparation of waste manifests and bills of lading, which must meet exacting DOT regulatory requirements in 49 CFR Parts 171-178.   In FY 2006 8,427 BOL's were prepared using ATMS, 145 UHWM's and 873 IATA Dangerous Goods Shipper Declarations. The number of UHWM's increased in FY 2007 to over 1500. The automated process increases both efficiency and accuracy in preparing shipping documentation to meet these requirements for safe and efficient movement of material supporting site closure.   ATMS also prepares the official shipment paperwork used in TRANSCOM shipments (WIPP, Spent Nuclear Fuel) and has the potential to provide an interface to TRANSCOM with shipment information.

5.0 ATMS Infrastructure

The backbone of the ATMS is comprised of multiple hardware and software subsystems.   For hardware, the ATMS uses a Sun E-450 server for its data repository. The application is served out to the user community from a web server that hosts the ATMS.

The ATMS software platform utilizes Oracle technologies for the database and application Graphical User Interface (GUI).

Security hardware systems and software security protocols have been implemented to ensure data confidentiality, integrity, and availability. Multiple layers of security were installed into the ATMS infrastructure. Oracle 8i uses a high level of encryption for data transferred from the user to the web server and a hardware firewall utilizes IP filtering to thwart attacks. Application security requires login authentication by the users, and role based security gives system users access to only relevant data and system functions.

6.0 ATMS…A look forward

In FY 2007 new Intel based database servers were purchased and configured with upgraded operating systems. Additionally, the ATMS application interface was upgraded along with the Oracle database to version 10G. The primary production machine will be hosted at the Savannah River Site (SRS) General Support System (GSS) location and maintained by a DOE-EM 43 contractor Project Performance Enhancement. The ATMS system will be under the DOE-EM 43

Certification and Accreditation Boundary to ensure ATMS is compliant with all applicable software and security requirements. Another server will be located at the Consolidated Business Center (CBC) in Cincinnati, Ohio. This machine will serve the dual purpose of providing backup and recovery in the event of disaster or failure at the SRS site and as a development server.

Development enhancements will focus on the feasibility of creating an interface with RADCALC, another DOE-EM program. RADCALC assists DOE site packaging and transportation management personnel in radioactive material category (e.g., LSA II, Limited quantity, Type A, Type B) determinations for shipment of radioactive material and waste. The shipment preparation process from initial categorization determination of material to final documentation and shipment of radioactive material waste shipments can be a very time-consuming and labor intensive process. Interfacing RADCALC with ATMS would eliminate many steps and allow use of the information to populate shipping documentation including the Nuclear Regulation Commission (NRC) 540 and 541 documents.

The IATA Dangerous Shipping Declaration format is currently in columnar format and adding an option to create the material description, quantity, etc. in paragraph form was identified as a high priority change at the 2007 User Group Meeting. This change is to accommodate material description formatting for Reportable Quantity (RQ) shipments to meet the 49CFR requirement to not break up the proper shipping name sequence

Another future plan would be to create a computer based training program used to provide remote ATMS training to new users. This would reduce annual travel costs to system users and provide for timely training updates.

Also being considered as a development enhancement is an interface between ATMS and TRANSCOM. This would allow shipping papers such as Bills of Lading prepared in ATMS to be "uploaded" into TRANSCOM. This would eliminate duplicate input for TRANSCOM users.

CONCLUSION

DOE continues to successfully manage day-to-day site transportation activities using the ATMS system. Operation and freight costs have been reduced by automating many of the tasks once performed manually Tasks such as carrier selection, prepayment audits, and electronic data transfer are now easily accomplished Quality assured shipping documentation is now prepared using ATMS resulting in improved efficiency and accuracy in compliance with the applicable DOT regulations. This not only reduces preparation costs and possible regulatory fines, but also produces accurate shipping documentation critical in the safe transport of waste and hazardous or radioactive material.

The ATMS software can perhaps best be described as a tool used on a day-to-day basis to assist in the handling of day-to-day transportation management functions. Currently used by 31 DOE sites, ATMS has a proven track record for providing DOE and DOE contractor transportation managers with the tools needed to effectively and efficiently perform many transportation tasks. This has resulted in the ability to transport a myriad of materials that include hazardous and

radioactive materials and hazardous waste. This is all provided in direct support of Environmental Management and NNSA activities across the United States.

ACKNOWLEDGMENTS

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