

## Off-Site Shipment Campaign Readiness Assessment (OSCRA): A Tool for Off-Site Shipment Campaigns\*

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### PURPOSE AND SCOPE

The Offsite Shipment Campaign Readiness Assessment (OSCRA) tool is designed to assist program managers in identifying, implementing, and verifying applicable transportation and disposal regulatory requirements for specific shipment campaigns. OSCRA addresses these issues and provides the program manager with a tool to support planning for safe and compliant transportation of waste and other regulated materials. Waste transportation and disposal requirements must be identified and addressed in the planning phase of a waste management project. In the past, in some cases, transportation and disposal requirements have not been included in overall project plans. These planning deficiencies have led to substantial delays and cost impacts. Additionally, some transportation regulatory requirements have not been properly implemented, resulting in substantial fines and public embarrassment for the U.S. Department of Energy (DOE). If a material has been processed and packaged for onsite storage (prior to offsite disposal) in a package that does not meet transportation requirements, it must be repackaged in U.S. Department of Transportation (DOT)-compliant packaging for transport. This repackaging can result in additional cost, time, and personnel radiation exposure.

The original OSCRA concept was developed during the Pond Waste Project at the K-25 Site in Oak Ridge, Tennessee. The continued development of OSCRA as a user-friendly tool was funded in 1995 by the DOE Office of Environmental Management, Transportation Management Division (TMD). OSCRA is designed to support waste management managers, site remediation managers, and transportation personnel in defining applicable regulatory transportation and disposal requirements for offsite shipment of hazardous waste and other regulated materials. The need for this tool stems from increasing demands imposed on DOE and the need to demonstrate and document safe and compliant packaging and shipment of wastes from various DOE sites.

Regulations governing offsite shipment of wastes apply to DOE and its contractors. These include the following: DOT-49 CFR; Nuclear Regulatory Commission (NRC)-10 CFR; the U.S. Environmental Protection Agency (EPA)-40 CFR; DOE Orders; applicable State regulations; and site-specific treatment, storage, and disposal waste acceptance criteria (WAC).

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The purpose of OSCRA is to ensure identification of and facilitate compliance with applicable regulatory requirements for specified shipment campaigns. The OSCRA tool identifies applicable DOT, EPA, NRC, and DOE requirements for packaging, labeling, marking, placarding, and emergency response for shipment of the waste to treatment, storage, or disposal sites. In addition, OSCRA can be used to identify the WAC for various disposal, storage, or processing sites (Envirocare, Nevada Test Site, etc.). This permits demonstration of compliance with WAC requirements prior to the arrival of waste at a disposal site. The OSCRA tool is currently limited to low-level radioactive or mixed waste materials.

## OSCRA ARCHITECTURE AND DESIGN

### Architecture

The principal elements of the OSCRA are the **Master Requirements List (MRL)** and the **Applicability Methodology (OSCRA-AM)**. These are illustrated in Figure 1.

The MRL is a comprehensive set of requirements and associated verification criteria that are applicable to preparation and execution of offsite shipments of waste materials from DOE sites. The list of requirements in the MRL is derived from the applicable parts of 10 CFR, 40 CFR, 49 CFR, disposal-site WAC, and DOE Orders. Within the scope of OSCRA, the verification criteria developed for these requirements are consistent with the Transportation Compliance Assessment and Assistance Program (TCAAP) data provided by TMD.

A Campaign Plan incorporates shipment information provided by the OSCRA user. The plan provides information regarding origination and destination sites, period of performance and timing of the campaign, and the scheduled number of shipments.

The Waste Description is also provided by the user. This description provides supporting data characterizing the waste as radioactive or hazardous and includes details concerning the form of the material. The Hazardous Materials Transportation Expert System (HaMTES) methodology is a PC-based tool that assists in identifying packaging requirements for shipments.

OSCRA-AM is used to prepare a Regulatory Requirements Checklist and a Project Verification Criteria report. Using the OSCRA-AM, responsibility assignments are made and the checklist and verification criteria are distributed to cognizant individuals and organizations. While shipping-site organizations are preparing for the waste shipment, OSCRA will be used to support periodic Readiness Assessments by providing the means to monitor compliance of verification criteria. Using OSCRA, the project management team will be able to track and document issues and open items. Readiness to ship will be established once all applicable requirements have been satisfied.

### Development Phases

**Phase 1A**—This phase is directed at developing a prototype of OSCRA. The prototype will apply to low-level radioactive or mixed waste transportation campaigns. The prototype version of OSCRA will be in hard-copy form and validated against a candidate campaign.

**Phase 1B**—This phase, when undertaken, will provide a completed OSCRA as a hard-copy tool and associated user information. This phase will encompass the methodology that can be applied generically. It will provide the specific requirements and verification criteria that apply for waste shipments from DOE facilities to any one of five storage/treatment/disposal sites. Phase 1B includes completion and verification of the OSCRA-MRL for four additional potential receiving/disposal sites.

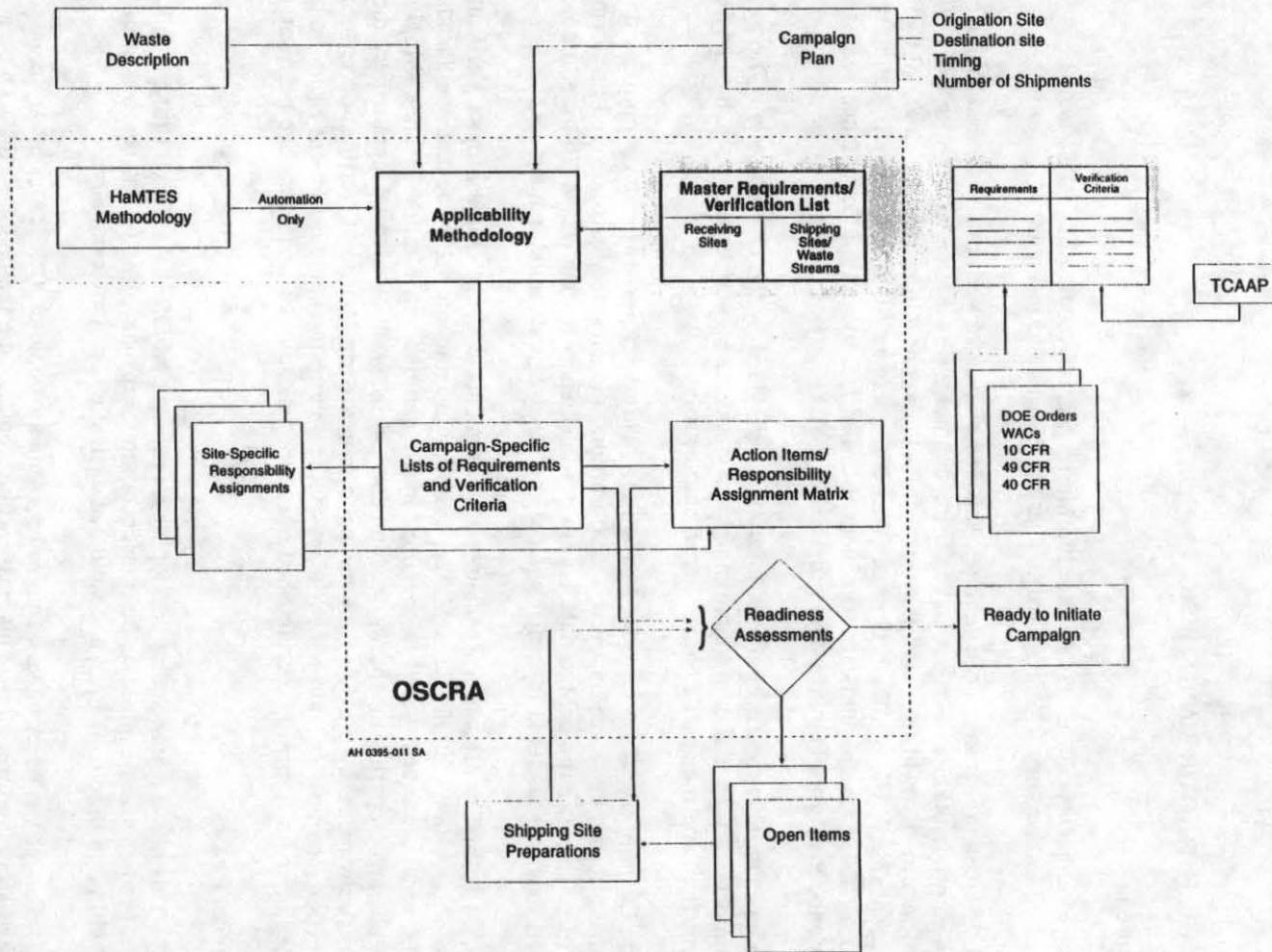


Figure 1. OSCRA Concept Description — Schematic

Phase 2—Activities in this phase, when undertaken, will include development and implementation of a fully automated version of OSCRA. In this phase, expert system methodology and other software tools, such as HaMTES, will be fully integrated with OSCRA to provide the user with the ability to perform seamless assessments of the readiness status of DOE waste shipments.

### OSCRA Design

The hard-copy version of the OSCRA tool was developed in Microsoft ACCESS database software. Use of ACCESS provides the versatility of expanding the scope of the tool to include additional users and also allows for the generation of unlimited reports. OSCRA consists of three primary elements:

- Master Requirements List applicable to shipments of low-level waste and mixed waste,
- Requirements Applicability Checklist, and
- Project Requirements Verification Criteria.

### Master Requirements List (MRL)

The MRL is the comprehensive set of requirements and associated verification criteria applicable to the preparation for, and execution of, offsite shipments of waste materials from DOE sites. It is an all-inclusive, nonduplicative database that includes applicable DOE Orders; DOT, NRC, and EPA regulatory requirements; waste acceptance requirements of receiving sites; and DOE's Regulatory Facility Guide. The following illustrates information that is included in the prototype of OSCRA for low-level waste shipments:

<u>Category</u>	<u>Reference</u>	<u>Title</u>	<u>Description</u>	<u>Verification Criteria</u>
Shipper requirements—general packaging requirements.	49 CFR 173.453	Fissile materials—exceptions/package.	All packages shall be fissile exempt.	Verify that fissile contents do not exceed 15 grams.

As illustrated in Figure 2, the "Category" column of the MRL is divided into four major sections: Ground Rules; Shipper Requirements; Carrier Requirements; and Treatment, Storage, Disposal Facility Requirements. Also shown are additional functional subsets within each of these sections. The MRL "Reference" column, shown above, presents specific regulatory requirements. The column labeled "Title" identifies the subject of the reference. The "Description" column presents a summary of the subject as it pertains to the transportation of hazardous waste.

With each regulatory requirement, the MRL includes a corresponding "Verification Criterion." The verification criterion specifies the objective measure(s) and limiting value(s) or guidelines which, when achieved, are used to verify that the regulatory requirement has been satisfied. Some verification criteria for DOT regulatory requirements were extracted from the TCAAP data provided by TMD.

Since the MRL is not project-specific, it allows OSCRA to be used flexibly. The MRL currently contains a comprehensive set of regulatory requirements that may pertain to highway or rail shipments within the United States of any solid contents that are radioactive low-level, hazardous, or mixed low-level wastes.

### Requirements Applicability Checklist

The Requirements Applicability Checklist is an abbreviated version of the MRL. Excluded are the "Description" and "Verification Criterion." The checklist is completed by a hazardous material expert from data related to waste form and shipment details and supplied by the program

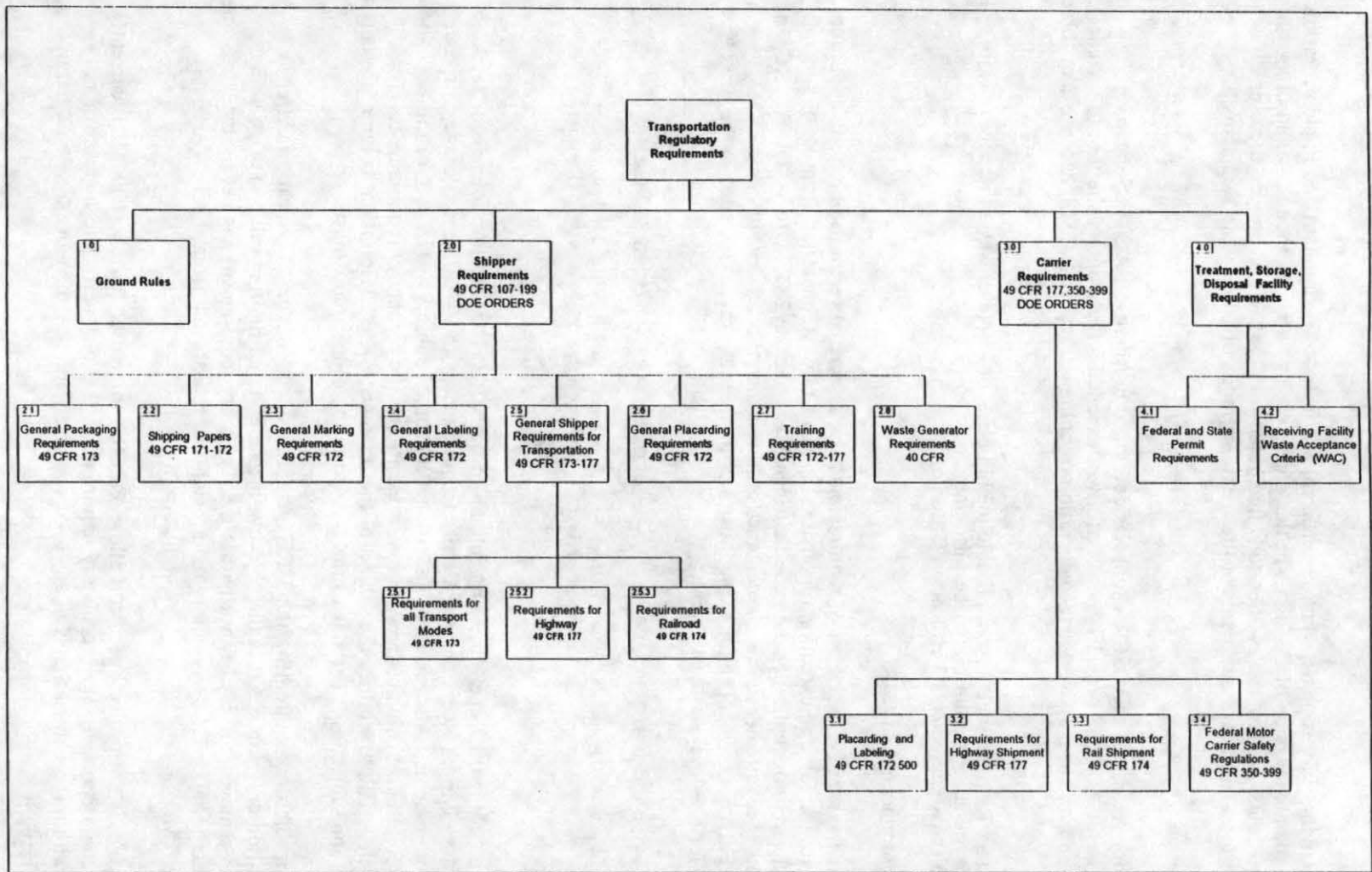


Figure 2: Master Requirements List Functional Categories

manager. It provides a space adjacent to each requirement for users to indicate if the requirement applies to the specific project being analyzed.

### Project Requirements Verification Criteria

The Project Requirements Verification Criteria report, illustrated in the example below, is also an abbreviated version of the MRL. It is provided to the project manager after the appropriate requirements have been identified using the Requirements Applicability Checklist. It includes the "Category," "Reference," and "Verification Criteria" columns, and a new column titled "Verified by." The verification column is provided for the initials of the individual responsible for ensuring the requirements have been implemented. Only the applicable requirements (those with X's on the Requirements Applicability Checklist) are printed in this report.

#### Example—Project Requirements Verification Criteria Report

<u>Category</u>	<u>Reference</u>	<u>Verification Criteria</u>	<u>Verified by</u>
Shipper requirements— general packaging requirements package.	49 CFR 173.453	Verify that fissile contents of each package do not exceed 15 grams per	_____

### USER INSTRUCTIONS

The OSCRA process is currently executed manually. A hazardous materials transportation expert takes the available waste information and relates each material characteristic to the appropriate items in the MRL. This process eliminates nonapplicable requirements items. It then provides a list of verification criteria to be used by the program manager first to define program activities needed to address requirements and then to ensure that all requirements have been satisfied. The tool also provides the means to document completion and compliance. The OSCRA tool also provides a summary of the necessary documentation needed to demonstrate compliance to regulators.

### OSCRA TOOL TEST RESULTS

As a test of the methodology and its usefulness, the OSCRA prototype was used to identify applicable requirements and associated validation criteria for shipment of low-level, mixed waste from the DOE Fernald, Ohio, facility to the Envirocare, Clive, Utah, mixed waste disposal facility.

#### Test Case Shipment Information

The test case used a mixed waste shipment from Fernald Environmental Management Project (FEMP) to Envirocare. Fifty-one drums of waste were shipped to Envirocare. Each drum contained Resource Conservation and Recovery Act listed waste (EPA waste codes F001, F002, and F005), also classified as Low Specific Activity radioactivity material under the DOT Regulations. The waste was shipped by truck from FEMP to Envirocare as an exclusive-use shipment.

#### Results

Shipping papers for the test case were obtained from FEMP. The shipping papers consisted of waste-sampling information; the waste manifest; various checklists (truck freight checklist, mixed waste debris punch list, shipment certifications, quality verification shipment checklist, and quality

certification trailer checklist); and radiological survey reports. Using the waste information, a project-specific Requirements Applicability Checklist was completed. Based on this checklist, OSCRA was used to develop project-specific Project Verification Criteria from the MRL, defining the transportation requirements for the project. The project verification criteria checklist for the test case was compared with the shipping papers provided for the test case. The results showed the following:

1. The requirements derived from the MRL were complete and accurate. All requirements identified in the FEMP paperwork were also identified by the MRL.

2. The test demonstrated that an OSCRA-developed checklist is more comprehensive than ones provided by FEMP. For example, the shipping papers did not have the documentation to show compliance with a majority of carrier and disposal site requirements. This does not mean noncompliance with requirements; however, evidence of compliance was missing. The OSCRA checklist provided a single source of requirements and compliance rather than multiple checklists developed and implemented by various functional organizations. This single source helped to ensure timely definition and implementation of transportation and disposal requirements. In addition, a documentation system consistent with OSCRA methodology significantly enhanced the likelihood that the project manager had the required, auditable documents that would show compliance with all the applicable regulatory transportation requirements. Thus, OSCRA promises to add substantial value in defining, implementing, and ensuring compliance with regulatory transportation requirements and provides a single-source document to track compliance.

#### OSCRA EXPANSION AND MAINTENANCE PLAN

OSCRA provides project managers with the capability to reliably and efficiently identify and implement transportation requirements. OSCRA requires further development to broaden its utility. One primary focus will be maintaining currency by anticipating and incorporating new or revised regulatory requirements within the MRL. Another focus will be broadening OSCRA to make it useful beyond the low-level and mixed waste disposal programs that it currently supports.

Maintenance of OSCRA's MRL and updating the Applicability Methodology will require monitoring of regulatory activities and notices published in the Federal Register. Significant revisions to the underlying regulations and decisionmaking processes must be reflected in OSCRA to maintain its effectiveness. DOE and EPA regulations, DOE Orders, and NRC agendas must be tracked for trends in regulatory activity. Regulatory activity to align U.S. domestic regulations with international regulations for hazardous materials transportation, treatment, or disposal will be included.

Broadening of OSCRA's scope will require several upgrades and expansions. Upgrades can be classified in three areas:

1. The number of product and materials streams covered by OSCRA will be increased. This will include other commodities not currently addressed, such as

- transuranic wastes designated for intermediate processing or disposal,
- former weapons fissile materials and associated materials and wastes,
- retrieval of U.S.-origin fissile materials and spent fuel from foreign countries,
- greater-than-Class-C waste, and
- spent nuclear fuel.

2. The listing of disposal site WAC will be expanded. Additional disposal sites to be incorporated for future versions of OSCRA include Hanford, Savannah River, Idaho National Engineering Laboratory, and the Nevada Test Site.

3. OSCRA's usefulness will be greatly enhanced by incorporating its logic, input forms, databases and reports to computer software. The computerized OSCRA will provide project managers and their staff with an efficient and reliable paperless tool that enhances the capability of transportation, disposal, and hazardous materials experts and provides confidence of compliance with regulations, contract, and license provisions in carrying out offsite dispositions of hazardous material wastes. The tool would then function with "experts" in the background. This means that a project manager will have access to essential hazardous materials expertise when using OSCRA through the tool's initial construction and its continuing maintenance. In addition, the organization responsible for OSCRA maintenance will be a group of experts available to project managers for special needs and questions. Ultimately, it is envisioned that OSCRA software would be maintained in the field by periodically downloading updates from a central maintenance organization's computer. This central source of updates could include on-line help, regulatory update bulletins, a project managers' bulletin board, and special notices that contribute information useful to managers responsible for efficiency and compliance in the conduct of offsite disposition projects.

## CONCLUSION

The OSCRA tool is envisioned as a centerpiece for planning waste and other DOE shipping campaigns. These types of shipments and campaigns are expected to increase dramatically around the turn of the century, with large decontamination and decommissioning activities, environmental remediation programs, spent-fuel transportation and disposal, startup of the Waste Isolation Pilot Plant, and ongoing receipt of foreign spent fuels. In addition to defining and documenting requirements, the OSCRA tool could promote a standardized, DOE-wide tool to conduct fully compliant transportation operations.