

ENVIRONMENTAL MANAGEMENT INTEGRATION PROJECT/MIXED WASTE FOCUS AREA PARTNERSHIP

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ABSTRACT

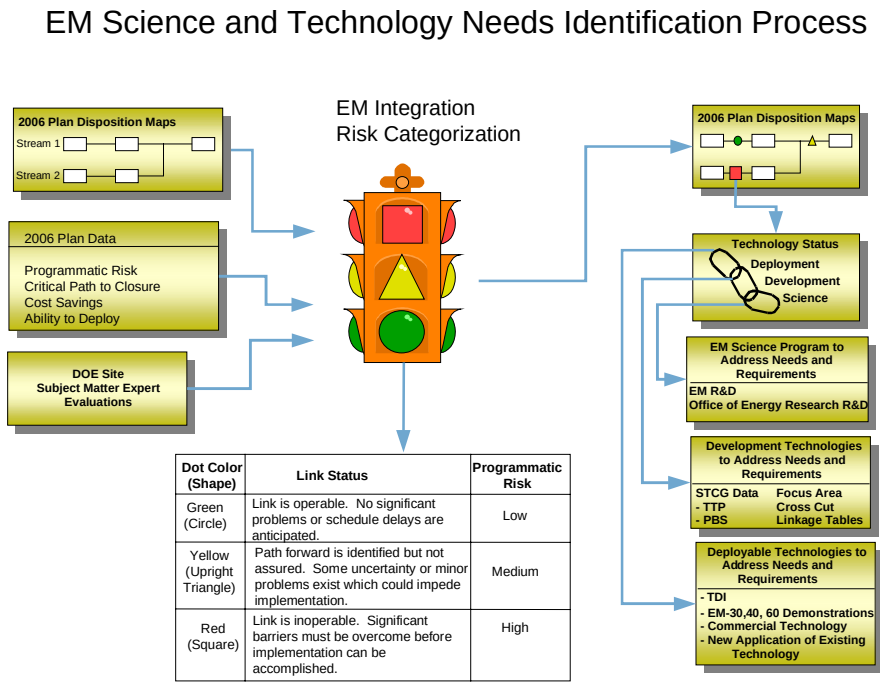
On January 16, 1998, the Assistant Secretary for the Environmental Management (EM) Program at the Department of Energy, issued DOE-Idaho the *Program Integration and Systems Engineering Guidance For Fiscal Year 1998*, herein called *Guidance*, which directed that program integration tasks be performed for all EM program areas. This guidance directed the EM Integration team, as part of Task 1, to develop baseline waste and material disposition maps which are owned by the site Project Baseline Summary (PBS) manager. With these baselines in place Task 2 gave direction to link Science and Technology activities to the waste and material stream supported by that technology. This linkage of EM Program needs with the OST activities supports the DOE goal of maximizing cleanup at DOE sites by 2006 and provide a defensible science and technology program. Additionally, this linkage is a valuable tool in the integration of the waste and material disposition efforts for the DOE complex.

INTRODUCTION

The U.S. Department of Energy's (DOE's) Environmental Management (EM) Program must be able to provide a credible, defensible technology development and deployment program. Data collected to support independent efforts such as the *Accelerating Cleanup: Focus on 2006 Plan, Complex-Wide EM Integration Report to DOE on Opportunities for Integration for EM Activities Across the Complex*, Site Treatment Plans, and Focus Area Baselines can be brought together to provide a better understanding of the complex-wide technology needs and the activities that are being undertaken to address those needs. Figure 1 illustrates how the EM Integration maps can be visually (electronically) linked to activities that will address operational needs. The integration of the operational needs and requirements drives the alignment of the EM Science Program, technology development, and technology deployment.

The primary difficulties in deployment of technologies have been: 1) the lack of a strong link between development activities and the end user, due to a lack of overall EM integration, 2) the limited end-user involvement in the selection of technology to address operational needs, 3) the limited availability of well defined needs to support technology development enabling disposition of specific waste stream, and 4) the lack of a systems engineering-based tool to provide integrated information management, alternatives analysis, and planning for the future.

It is important that the technology development needs be verifiable and have the ownership of an end user. Technology deficiencies and the associated technology development needs must be identified with specific end users with specific technical requirements in mind.

Figure 1. Integration of EM technology needs with technology development

The product delivered as a result of this activity is a mechanism, which uses the EM Integration disposition maps, to electronically match needs to technologies. This electronic matching provides a defensible technical baseline against which the opportunities for and the effectiveness of, the DOE Office of Science and Technology (OST) program can be determined. This mechanism through which additional development and deployment activities can be analyzed by the OST Focus Areas, will be useful in graphically showing the programmatic (Waste Management, Environmental Restoration, etc.) impacts of increasing or decreasing the OST budget.

COMPLEX-WIDE EM INTEGRATION

In July 1996, the DOE Assistant Secretary for EM, Al Alm, initiated a Complex-Wide EM Integration Project as a contractor-led effort to identify, analyze, and recommend integration opportunities which reduce the costs and risks associated with EM activities, shorten schedules for cleanup, and further the goals of the *Accelerating Cleanup: Focus on 2006 Plan*. Using a systems engineering analytical approach, the Complex-Wide EM Integration team was tasked to independently review the capabilities and needs of the EM systems, including: waste volumes; waste storage, treatment, and disposal facilities; waste transportation systems; and technology requirements.

The path forward for EM waste and materials was documented on the baseline and alternative disposition maps. These disposition maps graphically depict functions planned by EM programs to bring the waste to an end state. Often, planned functions require further development of technology or identification of existing technology to be able to achieve complete disposition of the waste.

INTERACTIVE EMI MAPS LINKED TO TECHNOLOGY DATA

A red or yellow light, as defined in Table 1, on the maps identifies the technology gaps/needs data displayed by the EM Integration disposition maps. These lights are electronically linked to data that contain technology development/deployment and science activities (e.g., Needs Management System (NMS), with applicable Work Package and Project Baseline Summaries (PBS). When a light is clicked, the link is displayed showing the applicable technology development or EM Science Program activities, which support the disposition of this waste stream.

Table 1 Definition of Assigned Icon Colors and Shapes

Icon Color (Shape)	Map Element Status	Completion Risk
Green (circle)	Element is operable. No significant problems or schedule delays are anticipated.	Low
Yellow (upright triangle)	Path forward is identified but not assured. Some uncertainty or minor problems exist which could impede implementation.	Medium
Red (square)	Element is inoperable. Significant barriers must be overcome before implementation can be accomplished.	High

DISPOSITION MAP ELEMENTS TO ISSUES

There are a number of reasons why a disposition element may have a medium or high completion risk (yellow or red). Some map elements require additional maturity in areas such as regulatory agreement, funding, or technology demonstration before they can support disposition of waste and materials. End users were asked to identify those areas and categorize them as defined below.

- Funding—the supply of available money necessary to perform the element process.
- Schedule—the time and/or sequence of element processes.
- Programmatic—those management-related items besides funding and scheduling.
- Regulatory/Permitting—compliance with regulation.
- Technical Limitation/Gap—the lack of a technology to successfully treat the waste or material or need for improvement.

- Facility/Equipment Limitation/Gap—the lack of the necessary facility or equipment or the lack of adequate capacity.
- Other—any other reason that there could be a problem with the baseline disposition plan.

Figure 2 Issues/Barriers to Disposition

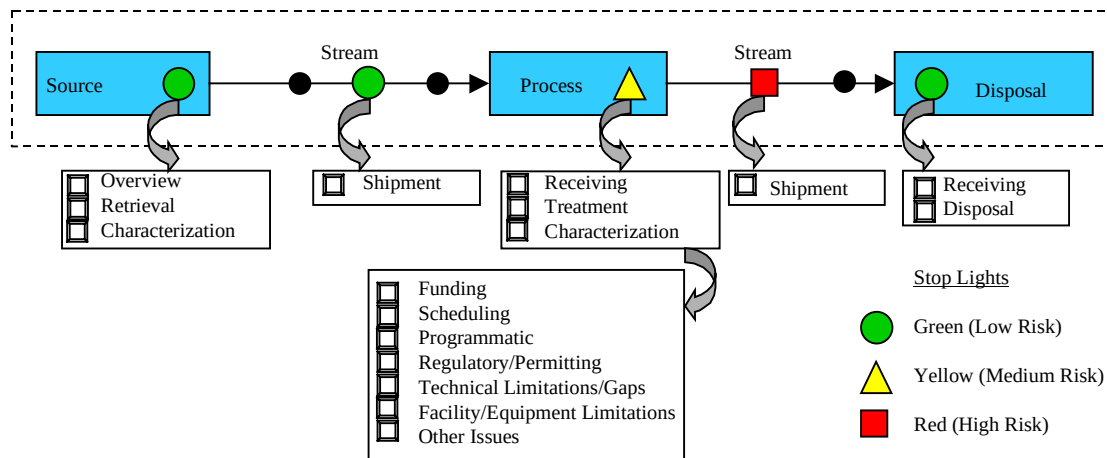
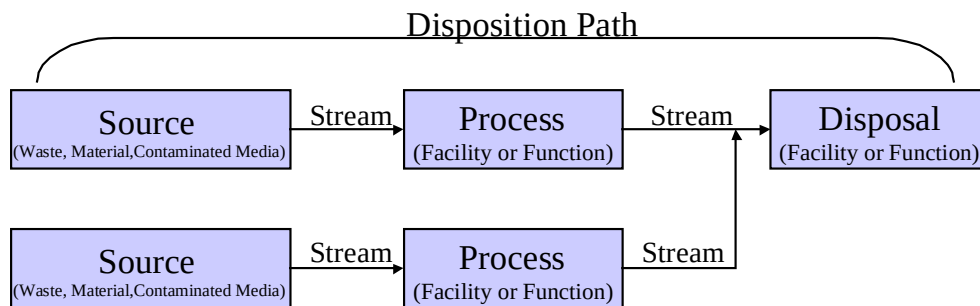


Figure 3 Disposition Map Elements



COLLECTION AND VERIFICATION THE DATA

Figure 2 shows how these identified issue are associated with any disposition map element, and are further defined by sub activities such as retrieval, characterization, shipping, receiving, treatment, and disposal. Figure 3 shows functionality of the source and process elements as they are connected by the waste stream.

To obtain a more accurate view of the completion risk from the point of view of the end users site visits were conducted. This was done in such a way that the disposition plan status

assigned could be assigned with logic, and the reasons for the status assignment were documented.

Verification and justification of the disposition maps for each site required judgement by the end user. The end user identified the issues, or recognized deficiencies that blocked technological progress. Using a questionnaire as an interview guide, team members discussed the waste and material streams at each site with the end users and STCG members. End users discussed barriers to successful waste and material disposition. Although the focus was on technology related issues, some discussed other barriers to disposition.

ANALYSIS OF SITE INTERVIEW DATA

Once the information had been collected and verified, it was analyzed to define the links and provide a tool to continually assess this rapidly changing system.

To establish the links, each disposition map element (activity) was categorized either as source, stream, process, or disposal. Using this information, the status for each map element was determined. With all the elements of the disposition maps identified and categorized, issues, such as funding and schedule, could be identified that affected the elements. These issues were reported to the end users and their evaluation documented. The linkage was completed with the identification of Site Needs associated with technology issues

Assigning the status or stoplights requires judgement by an end user. For example, an end user must judge if pending air regulations will impose restrictions on a currently operating facility. The facility may identify a site need that is “insurance” in nature and will only be required if current regulations change. The site can claim that, under current regulation or the current situation, the map element is green since the regulation has not yet been promulgated or the situation is unchanged. However, if the rule is promulgated, the site can then turn the need red and secure the necessary technology to fill the recently created technology gap. In addition, the facility maps may have needs that are green that can be considered to be “investment” needs. Given enough time and money, the waste or material can be dispositioned; however, technology may be able to significantly reduce the cost or accelerate the schedule for disposition.

DATA STRUCTURE SUPPORTS NEEDS IDENTIFICATION AND LINK TO TECHNOLOGY/SCIENCE DATA

The waste stream disposition linkage to technology development activity database has been populated using a number of data sources and other databases currently being used for other purposes.

Figure 1 shows the technology development needs identified on the EM Integration baseline disposition maps flowing down to problem categories defined by the operational requirements which then link to a problem definition. The solution path for the defined problem that has been or will be chosen, (deployment, development, or science) is evident when the available technology areas, to the right of figure, are correctly linked. This linkage enables requirements to flow down to the available technology category.

For each of the issues associated with the technical or technology gap category, the link must be associated with a validated need. Need data may come from the STCG, from subject

matter experts, or identified by the focus areas. Each need *must* have end-user support. For each need, a detailed level of supporting waste stream and processing information must be accessible. Waste stream data has been obtained from the Paths to Closure submitted by the sites.

Table 2 Summary of Waste and Material Element Status (Percent)

Disposition Map Element Status	Completion Risk	ER	HLW	LLW	MLLW	SNF	TRU	Average
Red	High	2.4%	9.3%	0.4%	1.2%	6.3%	10.0%	3%
Yellow	Medium	19.4%	32.6%	15.4%	29.8%	24.4%	28.1%	26%
Green	Low	78.2%	58.1%	84.2%	69.0%	69.3%	61.9%	74%
Total		41%	3%	17%	26%	4%	9%	

The total number of disposition map elements evaluated was 2,930. Environmental Restoration (ER) had the bulk of the disposition map elements, with mixed low-level waste (MLLW) next. As anticipated, there are very few disposition map elements (88 total) with a red status, which indicates a high completion risk. A significant number of the disposition map elements have a yellow status indicating a medium completion risk. Most of the disposition maps element had a green status indicating low completion risk.

EM INTEGRATION/FOCUS AREA MEETINGS

On September 21, 1998, Gerald Boyd (Acting Deputy Assistance Secretary for Science and Technology), Mark Frei (Acting Deputy Assistance Secretary for Waste Management) and David Huizenga (Acting Deputy Assistance Secretary for Nuclear Material and Facility Stabilization) issued a memorandum "Initiation of Focus Area Meetings with Environmental Management Integration." This memorandum directed that a series of meetings between the Focus Areas and the EM Integration Team take place to discuss how the Focus Area work packages link to the disposition maps.

During October and November 1998, the EM Integration Science and Technology Team met with the Mixed Waste Focus Area (MWFA), the Subsurface Contaminants Focus Area (SCFA), the Decontamination and Decommissioning Focus Area (D&DFA), the Tank Focus Area (TFA), the Plutonium Focus Area (PFA), and the National Spent Nuclear Fuels Program. Future meetings will include the Crosscut Area Programs.

The objectives of these meetings were to (1) evaluate the linkage of the Focus Areas' Internal Review Board (IRB) Fiscal Year 2000 work packages to the technology issues identified on the disposition maps, and (2) assess the degree to which the planned investment portfolios address the priority issues. In addition, significant broad issues were identified that may be candidates for roadmapping.

CONCLUSIONS

When the EM integration computer tool was applied to the waste disposition plans of the DOE complex for multiples types of waste (e.g., low-level, transuranic, spent nuclear fuel), multiple unaddressed technology development needs were identified. Conversely, some developmental activities were identified that were not tied to operational needs identified by the waste disposition maps. This information becomes a valuable planning tool for field operations personnel and technical focus area groups. It also provides a useful function to justify funding expenditures for DOE and Congress.

The tool proved useful in uniting the efforts of field operations personnel and technical focus areas. During initial data gathering activities, like technical development needs between sites were identified and a cooperative workshop was initiated to share information and technology between DOE sites. Thus, the computer tool serves as mechanism to systematically identify field activities needs and to promote communication between DOE sites having similar problems and technology needs.

The standardized waste disposition map is the core of this tool since this provides a standardized basis for field operations to identify the activities necessary to successful waste disposition. After identifying the path forward for waste disposition, operational personnel are asked to identify the technology deficiencies to accomplishing that disposition path. Once these obstacles are identified, they are paired with existing or planned technology development activities. After this is accomplished, deficiencies in supporting technology development activities are easily identified and the basis for justifying additional activities is readily available.

The traditional green/yellow/red stoplight colors used to identify the technology development status of each major element on the disposition map proved to be a good visual tool for users to quickly comprehend the status of technology development activities associated with any disposition map. The tool also proved useful to identify other obstacles to successful waste disposition such as regulatory/permitting issues, schedule problems, funding problems, facility/equipment limitations, and programmatic issues.

The EM integration effort has been and will continue to be a rewarding challenge. Successful enterprises know what is needed before attempting to purchase a solution. The disposition maps are a rigorous method of identifying problems before they become failures, delineating the boundaries of the problems, defining and tracking the potentially evolving minimum acceptable requirements for a solution, and ensuring that the lines of communication between the users and developers are open and used. Though this sounds simple, it has not been widely accomplished for several years. More complex environmental regulations and shrinking budgets make the need for such rigor extremely compelling. With the cooperation of the users and the technology developers, the system will be completed soon; users will know what solutions are working for their problems, and DOE and Congressional decision makers will be able to verify that resources are being wisely spent.