

## PLANNING FOR THE LICENSING AND CONSTRUCTION OF A LLRW DISPOSAL FACILITY

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### ABSTRACT

An organizational system for planning the licensing and construction of a low-level radioactive waste disposal facility is described. The system uses graphical representation to track changes to the evolving processes of licensing and permit reviews and hearings, design modifications, and the development of construction contracts. Progressively incorporating changes on the figure allows a full definition of the system at any point in time.

### INTRODUCTION

The period between submission of the license application and the award of the license to construct and operate a low-level radioactive waste (LLRW) disposal facility is one of high activity. Major subtasks to complete the licensing process and to plan construction of the facility include (1) interfacing with agencies and developing compliance strategies to support the evolving license and permit process; (2) incorporating design modifications during the licensing period; (3) providing engineering support during interrogatories and hearings; (4) meeting the congressional milestones in order to avoid financial and operational penalties in the Low-Level Radioactive Waste Policy Amendments Act (LLRWPA); (5) developing a system to procure the items and services to construct the facility; (6) preparing contractual requirements, technical specifications, and drawings for construction contracts; (7) awarding contracts; (8) developing schedules and plans to begin construction; and (9) obtaining a license to construct and operate the facility.

Because many of these subtasks are concurrent activities and the successful completion of some are dependent upon activities and issue resolutions in other tasks, a sequential punchlist of items, activities, and services cannot represent adequately the system to complete the licensing process and begin facility construction. A detailed diagram of the subtasks and their interactions provides a better definition of this dynamic system. Among the uses of the diagram or detailed graphic representation are to allow the definition of tasks and responsibilities, to identify deficiencies, and to serve as a focus of communication among project members. A major advantage of graphic representation is that the system can be changed in a manner that allows all project personnel to recognize and evaluate the impact of the change on their areas of responsibility and knowledge. This is accomplished by highlighting the area and making a notation on the figure and relevant documentation which explains the nature and extent of the modification.

This paper describes the systems engineering approach for communicating, organizing, and completing the tasks to license and to begin construction of a low-level radioactive waste disposal facility. It is not possible to include a figure which identifies in sufficient detail all tasks, responsible groups, and interactions among all components. Thus, a general diagram (see Fig. 1) of the major components in a system to complete the licensing and detailed design and to begin

construction of the facility has been developed for this paper. An overview of the system is provided below.

### DEFINING THE INTERACTIVE REGULATORY PROCESS

An early task for the project is to develop the bases for the design, operation, and closure of a LLRW disposal facility. The design bases are derived from engineering design codes and from the precise identification of the regulatory requirements found in Federal, state, and local approvals, licenses, permits, and standards. The results of the regulatory analysis provide the bases for developing the detailed design of the facility and preparing documentation, analyses, and calculations to support the license application and environmental and safety assessments.

Major challenges for any project are the (1) identification of regulatory approvals, jurisdictional agencies, and administrative processes associated with permit and license issuance and (2) development of design and operating standards in compliance with the regulatory requirements without adverse schedule conflicts. A greater challenge is to continue these tasks during the interactive process of license review and to maintain consistency among the components of licensing materials and the engineering and operating documents. Modifications to these tasks may be the result of either evolving regulations and guidance or resolving agency comments to the license and permit applications. Including the regulatory system in the detailed graphic representation assists in defining tasks and tracking modifications.

Figure 2 is a general illustration of the interactive regulatory process between the project and agencies. Within this process, a major constraint for the project is the schedule deadline to meet the congressional milestones set forth in the LLRWPA. Development of permit applications *must* respond to meet schedule deadlines as a clearer definition of the system appears. Changes in license materials may occur as a result of (1) the promulgation of new or amended regulations or changes in regulatory policies and (2) evolution of the design with time. A project must be able to react to these changes, evaluate their impacts, and incorporate them into the project appropriately.

A detailed graphic representation will assist in determining which documents, drawings, or plans require revision. The detailed graphic representation contains all components of the project, and each component and its relationship with other components may easily be identified. For example, under activities conducted by the regulatory agencies, (1)

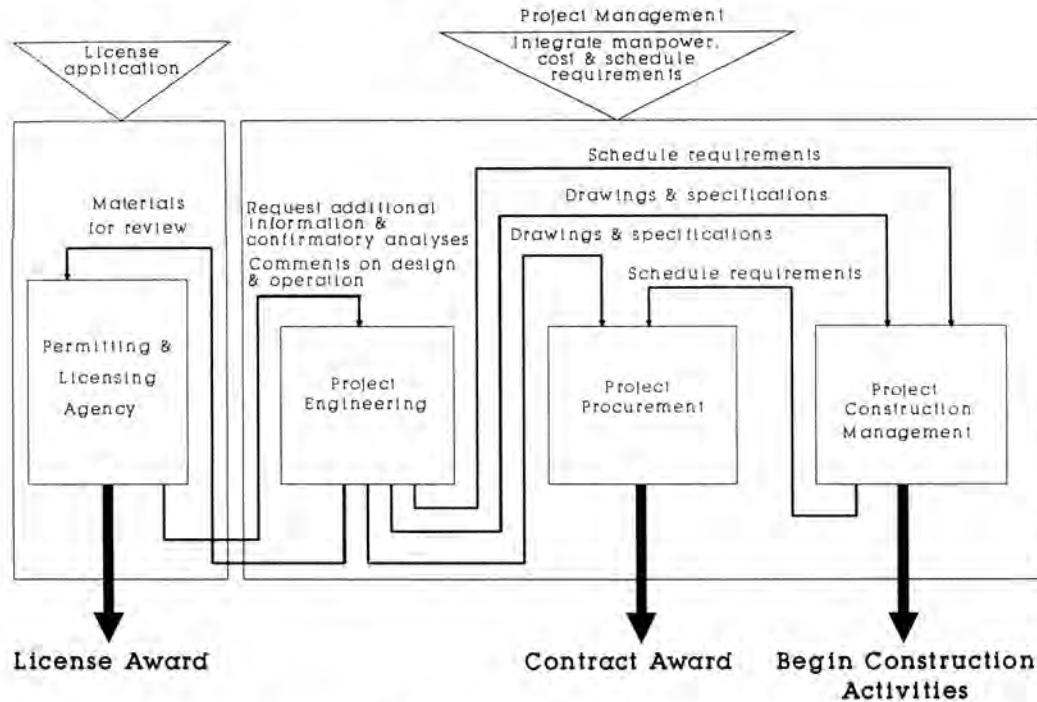


Fig. 1. Overview of interactions to complete licensing and begin construction of a LLRW disposal facility.

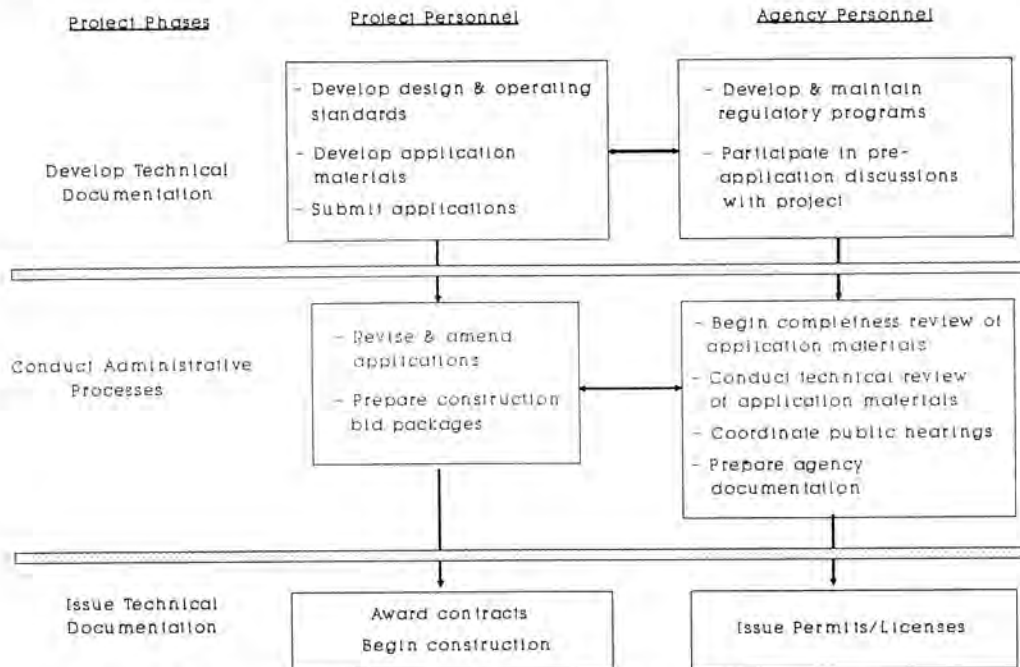


Fig. 2. Evolution of project during licensing and planning for construction.

interagency reviews and a public comment period are identified for issuance of the surface water discharge permit and (2) comments received during the public comment period may affect design documents, procurement documents, and construction requirements. Because of annotations to the detailed graphic representation, the impact of a change to any single factor may be easily identified.

Table I summarizes license and permitting programs and illustrates the complexity of the processes related to license/permit negotiations, public reviews, and administrative hearings on the applications. New programs may be required

by statute to support state programs for LLRW disposal, and standards for project design not required by license/permit are recognized but not included in the table.

#### DESIGN AND THE DEVELOPMENT OF THE CONSTRUCTION MANAGEMENT PROGRAM

A parallel task to the licensing review is the design of the facility. In order to meet the milestone to begin construction, design must continue through license review. The design schedule may be affected by constraints similar to those for licensing (e.g., regulatory revisions, agency and public

TABLE I

## Administrative Process of Various Regulatory Programs

Regulatory Programs	Application or Notification	Inter/Intra Agency Review	Public Review	License or Permit
LLRW Disposal	Yes	Yes	Yes	Yes
<u>Solid Waste Disposal</u>				
Generator ID	Yes	No	No	Yes
Mixed Waste Disposal	Yes	Yes	Yes	Yes
<u>Water Programs</u>				
Potable Water	Yes	No	No	Yes
NPDES (Point Source)	Yes	Yes	Yes	Yes
NPDES (Storm Water)	Yes	Yes	Yes	Yes
Septic (Construction)	Yes	No	No	Yes
Septic (Operation)	Yes	No	No	Yes
Well Registration	Yes	No	No	Yes
Water Quality Certifications NPDES	Yes	Yes	Yes	Yes
<u>Air Programs</u>				
Dust Emissions	Yes	No	No	Yes
NESHAP (Radionuclides)	Yes	Yes	Yes	Yes
<u>Construction Programs</u>				
Driveway	Yes	No	No	Yes
Fuel Storage Tanks	Yes	No	No	Yes
Fire Detection & Protection	Yes	No	No	Yes
Building Occupancy	Yes	No	No	Yes
Building Demolition	Yes	No	No	Yes
Electricity	Yes	No	No	Yes
Yes	Required			
No	Not Required			

comments, and evolution of design) and, in addition, by improvements resulting from project review. Such time constraints, which can cause significant impact to the schedule leading up to construction, can be managed by a continuing effort by the design team and by communication with the licensing agency. Design evolution must be accurately communicated to the licensing agency personnel for evaluation and incorporation into licensing and permitting materials.

The other parallel task to the licensing review is the development of the construction management program. The construction schedule identifies the environmental, safety, and health plans and programs such as training and compliance reporting which are required and the proper time(s) for implementation at the site. Development of the construction

schedule and construction programs is a coordinated effort between construction management and project engineering. To maintain an aggressive project schedule, the identification, planning, and development of construction plans and programs must begin during the process of license application and review and before the resolution of all agency comments. It is, therefore, important to individuals developing these programs to be kept informed of any changes on the design and planned operation of the facility resulting from the licensing and permitting process so that their documents and programs can maintain consistency. Annotations on the detailed representation of the system communicate changes across the project.

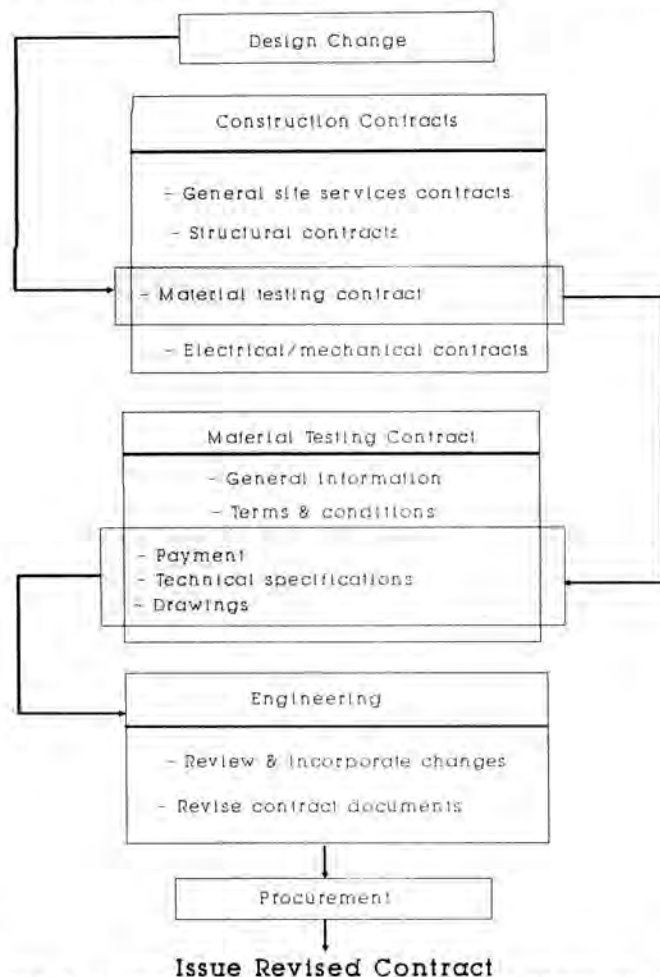


Fig. 3. An example of the impact of a design change to the material testing contract.

### CONTRACT DEVELOPMENT

The third component of the program to organize the licensing and construction of a LLRW disposal facility involves coordinating project procurement, engineering, and construction staffs for the development of contracts. Contract development begins with project procurement and engineering dividing the responsibilities to prepare documents for inclusion in the contract. Procurement is responsible for contractual terms, conditions, and payment; engineering is responsible for technical specifications and design drawings. During the development of contract documents by engineering and procurement, project engineering and construction management develop the construction schedule.

Contract documents are subject to change through project review and in response to agency comments on the design and planned operation of the facility. For example, Fig. 3 shows the process involved with a design change to a construction contract. In many cases, a design change affects payment, technical specifications, and drawings. Engineering is responsible for incorporating the desired change and forwarding the revised contract documents to procurement. Procurement then issues a revised contract.

A detailed graphic representation can be used to track the development, revision, and issuance of all project documents related to contract development. Thus, as contract

documents, manuals, plans, and procedures evolve, changes are annotated on the detailed figure, and any impacts to the project are easily identified.

A detailed graphic representation can also aid in the performance of readiness reviews. A readiness review is one method that allows management to evaluate and improve the likelihood of success in undertaking an activity. A readiness review is planned following the prequalification of bidders (i.e., potential contractors) and before the issuance of the contract for bid. This readiness review provides (1) a consistency check among the sections within the contract, (2) a check to ensure that all tasks and services required to construct are defined, and (3) consensus among technical contributors to the contract that the specified work can be performed in accordance with license and permit conditions. Because contract documents, manuals, plans, and procedures are identified visually and in an organized manner on the graphic, reviewers are more likely to detect any deviation from the system.

Following the readiness review of contracts to be issued for bid, the review of returned bids, and the recommendation and selection of bidders, another readiness review is conducted. A readiness review at this juncture ensures agreement on construction tasks and the schedule between the project and contractors; this ensures that there are contracts in place for all work and services to begin construction. This review includes checking to make sure that project and contractor plans, procedures, training, and permits are in place and are consistent with the construction schedule. This readiness review is the last major activity before construction begins. The use of a detailed graphic representation during this review provides the opportunity for reviewers to check all aspects of the construction program. Because the system is well defined, a more thorough review can be expected.

### CONCLUSIONS

Graphic representation of any system forces a clear definition of components and their relationships. It is especially useful to represent highly dynamic systems in which there are both evolutionary or planned changes and discrete or abrupt changes. This concept from systems engineering is being applied to organizing the tasks to complete the licensing of a LLRW disposal facility and to developing simultaneously the detailed design of the facility and the preparation of contracts to construct. Detailed figures which represent these major tasks have been developed for one project. The figures provide the project personnel with a focal point to communicate project status; changes and potential changes in one or more components which affect other components; and the division of responsibility to achieve the project milestones of license award, awarding contracts, and beginning construction.

Developing and maintaining methods to communicate within a project is one of the principles in total quality management and has been demonstrated to reduce errors which can adversely impact the schedule. Effective communication can identify glitches in a current system due to misinformation, oversight, or the result of changes in the system. Timely identification of problems and their resolution can help keep a project "on track" -- on schedule and within budget.