

Center for Nuclear Waste Regulatory Analyses

CRYSTAL GATEWAY ONE, SUITE 1406 • 1235 JEFFERSON DAVIS HWY. • ARLINGTON, VIRGINIA, USA 22202
(703) 979-9129

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Nancy Porter, Technical Program Chairman
Attn: Transactions Office
American Nuclear Society
555 North Kensington Avenue
La Grange Park, IL 60525

Subject: Systems Approach to Designing a High-Level Waste
Licensing System
Reference: Log Number 483

Dear Ms. Porter:

Attached please find the subject abstract for presentation at the 1988 ANS Annual Meeting. It has been revised to the extent possible (within the word-count constraints) in accordance with your review comments.

Please advise us concerning any further actions that may be needed.

Sincerely yours,

for Wesley Adler
Robert E. Adler
Director

WP/yl

Attachment

cc: J. Latz
A. Whiting
W. Patrick



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SYSTEMS APPROACH TO DEVELOPING AND IMPLEMENTING AN HLW LICENSING PROCESS

R. Adler, W. Patrick, A. Whiting

INTRODUCTION

Developing and licensing a repository for the disposal of high level nuclear waste is an important national goal. Congress reaffirmed this goal by the passage of the Nuclear Waste Policy Amendments Act (NWPAA) in December 1987. In addition to designating Yucca Mountain in Nevada as the sole site to undergo characterization, it authorized a Monitored Retrievable Storage facility (MRS), and created a Negotiator, a Technical Review Board and other entities whose efforts are directed to provide greater certainty in the nation's ability to manage its high-level nuclear wastes. Responsibility for the formal licensing process for the life of the repository is assigned by law to the Nuclear Regulatory Commission (NRC).

In October of 1987, the NRC established the Center for Nuclear Waste Regulatory Analyses (the Center) as a Federally Funded Research and Development Center (FFRDC) to assist in fulfilling its licensing mission with regard to high level nuclear waste (HLW). The broad objective of the Center is to assist the NRC in identifying and recommending solutions for technical, regulatory, and institutional uncertainties to insure timely and credible completion of the licensing process. To meet this objective, the Center is currently developing a systems approach to implement and streamline the HLW licensing process. This paper describes the basic systems approach, the design process, and provides a status on the initial efforts of the Center to develop this system.

SYSTEMS APPROACH AND PROCESS

The HLW licensing process is technically and administratively complex and sophisticated. In addition to requiring a formal administrative law procedure for life-cycle licensing and a multiple-party evaluation and approval process involving many institutions, the entire system will be under public scrutiny. The NWPAA requires that NRC review the license application within three years of receipt. Furthermore, licensing approaches to date have focused on but one subsystem of the HLW management system—the mined geologic repository. All of these factors contribute to producing a high-risk HLW licensing system. In order to achieve a credible and efficient licensing process, these risks must be recognized, controlled, and reduced.

The Center is using a "top down" systems engineering approach that is mission oriented, requirements based, proactive, integrated, and dynamic. This approach will result in the development and implementation of a licensing system which will, in a timely manner, identify and provide alternative solutions to technical, regulatory, and institutional issues and uncertainties (both inconsistencies and points of contention), in many cases prior to submission of the initial license application. Important aspects of this approach are its inclusion of the entire HLW management system (mined geologic repository, at reactor storage, defense high-level waste, West Valley wastes, MRS, transportation, and alternative programs [if developed]) and its treatment of the entire life cycle of the repository (construction authorization, operational license, operational monitoring, closure and decommissioning, and post-closure monitoring).

A reference system design concept has been conceived based upon the regulatory requirements, required findings, and identification and resolution of issues. The process of developing the system description, referred to as the "program architecture" is shown in Figure 1. At specific points in this step-by-step process, inputs from the program elements are reviewed and integrated at a systems level to eliminate redundancy, establish priorities, and provide a basis for development of system alternatives. As they are developed, the results are compared to the reference system design requirements.

CONCLUSION

By August of 1988, the specification for the final design will be completed and a first-stage prototype system to reduce the risk in the licensing process will be developed using the systems approach and systems engineering techniques described here. Successful implementation of this systems approach to the HLW licensing process will:

- Reduce schedule risks through (a) comprehensive evaluation of programmatic requirements and uncertainties, (b) early identification of problems and issues, (c) proactive resolution of issues, and (d) streamlining the licensing process.
- Conserve resources through (a) focusing on the NRC-HLW mission, (b) prioritization of actions, (c) inclusion of only essential program elements, and (d) integration, both programmatically and organizationally.
- Increase public confidence through (a) objective evidence that a DOE license application is being processed in a timely manner, (b) a comprehensive basis for license review that includes all regulatory requirements, and (c) an established, demonstrable license application review process.

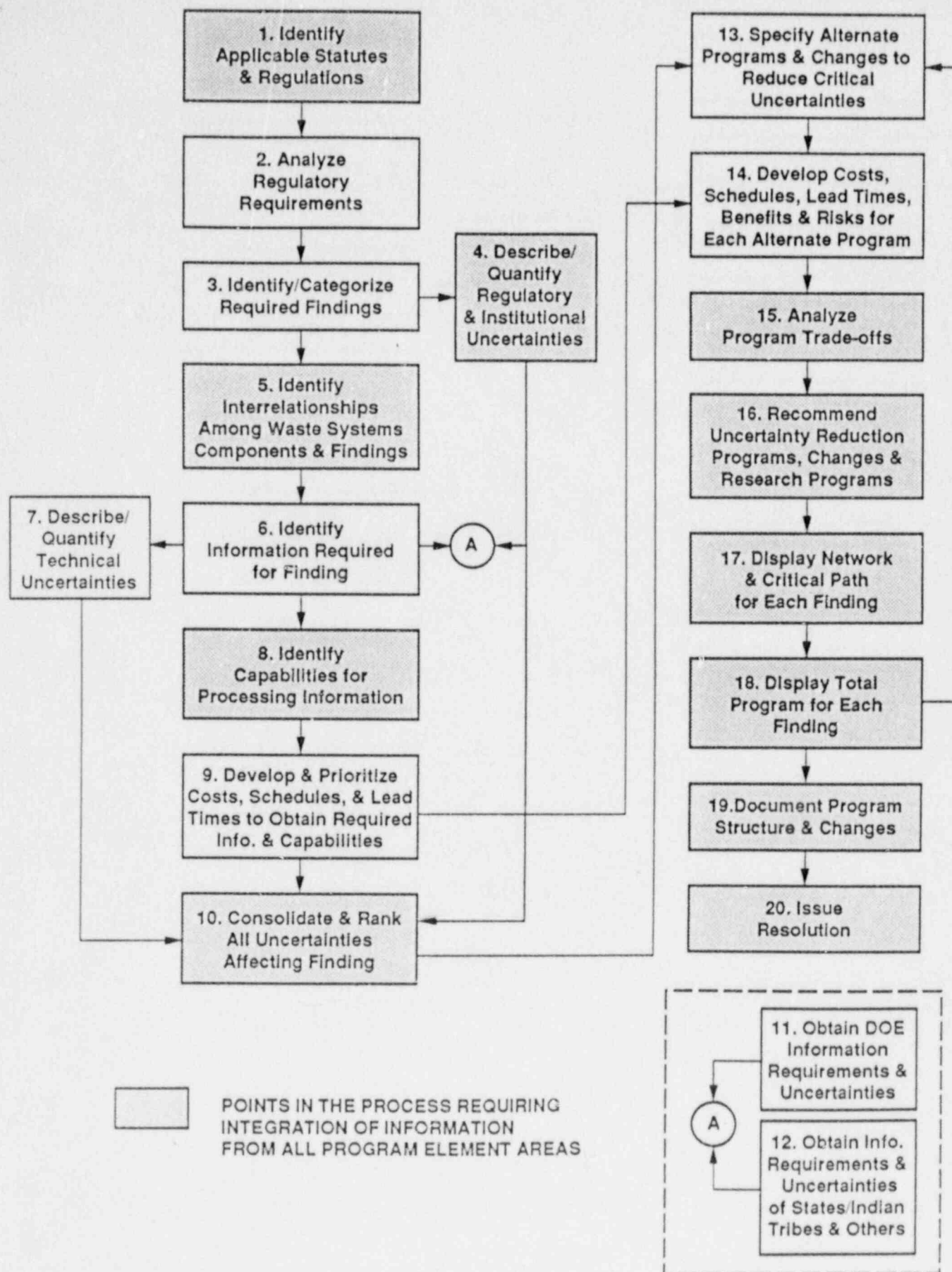


Figure 1. Process Diagram for Developing and Maintaining the Program Architecture