

Transportation Project Development and the National Environmental Policy Act

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ABSTRACT

This paper explores the nexus between project management and the National Environmental Policy Act¹ (NEPA) activities for developing the Nevada Rail Line to Yucca Mountain. In many federal agencies, the responsibility for project management is completely separate from the responsibility for NEPA implementation; however, each Department of Energy (DOE) Departmental Element has a NEPA Compliance Officer. This ensures effective integration between NEPA and project management activities. As the project management and NEPA activities are implemented, it becomes clear that they are very complimentary processes. This paper will describe the integration of NEPA and project management activities for development of a rail line to the Yucca Mountain geologic repository in Nye County, Nevada.

INTRODUCTION

In 2002, President George W. Bush signed House Joint Resolution 87², designating Yucca Mountain, Nevada, for the development of an underground repository for disposing of spent nuclear fuel. Following this action, projects taking the Yucca Mountain repository from the study phase into detailed development began to take shape. In 2004, the cost range and the preliminary schedule for three major system projects received formal approval. This authorized the Office of Civilian Radioactive Waste Management (OCRWM) to begin development of detailed project execution plans and performance baselines for the three projects. The three projects are the Yucca Mountain Project, the National Transportation Project (including Cask Acquisition, Rolling Stock Acquisition and Transportation Support Facility Acquisition), and the Nevada Transportation Project, primarily the Nevada rail line. The performance baselines are being developed in accordance with the DOE Order on Project Management (DOE O 413.3).

¹ National Environmental Policy Act of 1969 (NEPA); 42 U.S.C. 4321-4347

² On July 23, 2002, President Bush signed House Joint Resolution 87 which then became known as the Yucca Mountain Development Act (Public Law 107-200) <http://thomas.loc.gov/cgi-bin/query/C?c107:./temp/~c107EKtY35>

NEPA was passed in 1969, and along with implementing regulations that followed, it established requirements for federal agencies considering proposals for legislation or a major federal action. A key requirement of the Act is preparation of a detailed statement by the responsible official on the environmental impact of the proposed action. The Department established its requirements for implementing NEPA in DOE Order 451.1B³.

Since the Nevada Transportation Project includes the potential construction of a 320-mile long railroad, it qualifies as both a major federal action under NEPA and a major system project under DOE O 413.3⁴. This results in two significant planning activities, one for developing an Environmental Impact Statement, and one for developing the performance baseline (the project requirements, design solution, work scope, cost and schedule). This paper explores the benefits of integrating the environmental studies under NEPA with the engineering efforts for construction project management.

NEPA COMPLIANCE AND PROJECT MANAGEMENT INTEGRATION

In some federal agencies, the responsibility for NEPA compliance is separated organizationally from the management of major projects. Fortunately, at DOE, each Program Secretarial Office, including the Office of Civilian Radioactive Waste Management, has a NEPA Compliance Officer and Project Managers reporting through the same management chain. This ensures close coordination of NEPA and project activities early in the planning process. Most importantly, the processes for developing projects under DOE Order 413.3 and for developing Environmental Impact Statements under DOE Order 451.1B are both viewed by the Department as improving management's ability to make informed decisions. The expectation that both processes will lead to better decisions forces effective integration of NEPA and project management efforts. One result of this integration is the requirement for NEPA milestones to be incorporated into the project planning schedules. All NEPA activities must be completed before the project performance baseline is approved and the start of field work to implement the project can begin.

To illustrate how well these processes integrate, this paper describes the status of NEPA and project planning for a proposed rail line to the Yucca Mountain geological repository in Nevada. To understand the current NEPA and project management efforts, some context is needed. Pursuant to the Nuclear Waste Policy Act (NWPA) and NEPA, DOE issued the "Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada" (DOE/EIS-0250F, February 2002, or Final Repository EIS). That document analyzed the environmental impacts of a proposed action to construct, operate, monitor, and eventually close a geologic repository for the disposal of 70,000 metric tons of heavy metal (MTHM) of spent nuclear fuel

³ DOE Order 451.1B, NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE PROGRAM
<http://www.eh.doe.gov/NEPA/orders/O4511BC1.pdf>

⁴ DOE Order 413.3, PROGRAM AND PROJECT MANAGEMENT FOR THE ACQUISITION OF CAPITAL ASSETS
<http://www.directives.doe.gov/pdfs/doe/doetext/neword/413/o4133c1.pdf>

and high-level radioactive waste at Yucca Mountain. The proposed action also included transporting spent nuclear fuel and high-level radioactive waste from commercial reactors and DOE sites to the Yucca Mountain repository.

In preparing the EIS, DOE initiated a scoping process in 1995, and subsequently issued a Draft EIS in 1999 for public comment. During the 199-day comment period on the Draft EIS, DOE held 10 public hearings in Nevada and 11 hearings in other states across the country. An additional hearing was convened in Las Vegas for members of Native American Tribes in the region. OCRWM issued a Supplement to the Draft EIS in 2001, and during the 56-day public comment period, DOE held three hearings in Nevada. The Department received more than 13,000 comments on the Draft EIS and the Supplement. About 3,600 of these comments addressed transportation matters. The Final EIS accompanied the Secretary of Energy's 2002 recommendation to the President regarding the suitability of the Yucca Mountain site for a repository.

PROJECT MANAGEMENT PROCESS

In April of 2004, the Department selected the "mostly rail" mode for transporting spent nuclear fuel, both nationally, and in the State of Nevada. This was announced in a Record of Decision based on the analyses in the Final Repository EIS. In the same Record of Decision, the Department selected the Caliente corridor to study potential rail alignments connecting the repository to existing mainline railroad track in the state. The intent to develop a Rail Alignment Environmental Impact Statement (RA-EIS) on potential rail alignments along the Caliente corridor was announced in parallel with publication of the Record of Decision on mode and corridor. Two months later, the Department's Senior Acquisition Executive gave approval to develop the performance baseline for potential construction of a rail line along this corridor. This approval is called Critical Decision 1 in the Department's project management vernacular.

The first steps in both the project management process and in development of an EIS are to establish the purpose and need for the effort. The NWPA established the purpose and need for a repository and for a transportation system to ship spent nuclear fuel and high-level radioactive waste to it. The Record of Decision on mode of the transport and corridor for implementing the mode decision in Nevada provided the impetus for both the RA-EIS and the Nevada Transportation Project activities that are currently underway.

ALTERNATIVES ANALYSIS

The next step in both the NEPA process and in project management is to conduct an alternatives analysis. To ensure the analyses addressed the full range of viable alternatives, scoping meetings and a public comment period for the RA-EIS were conducted in May and June of 2004. Over 4,000 comments were received from a variety of stakeholders. Those comments have influenced the areas of study conducted under the EIS, and are also being addressed in conceptual design efforts for the Nevada Transportation Project.

The data required to assess environmental impacts associated with the alternatives under consideration is also needed to determine the scope of work for the rail construction project.

Geological, hydrological, and topographical analyses of the alternatives are needed to understand the environmental implications of each alignment and effects on the complexity of construction. This same data is necessary for development of the project performance baseline. The plants and animals along the various alignments and cultural sites within the corridor must be addressed in the RA-EIS, and may affect the routing of the rail line and the project's cost. In very simple terms, the RA-EIS and the project conceptual design are dependent on many of the same data sets and are very closely linked through the conceptual design phase of the project.

To ensure thorough integration of the alternatives analyses for the RA-EIS and for the Nevada Transportation Project, one group of contractors was selected to develop the raw technical data for the Caliente corridor. This data set will support both the project conceptual design and the RA-EIS development. Close coordination between the project conceptual design and EIS preparation is needed since the scope of work for each effort affects the outcome of the other.

An example of this interrelationship is the work to determine the recommended route of the rail line through the selected corridor. The optimal engineering solution will propose an alignment that minimizes the amount of work (cut, fill, and stabilization) required to prepare for construction. Minimizing work may also minimize the environmental effects of the project, but not always. In cases where sensitive plants or endangered species habitats are involved, or where cultural resources are found along an alignment being studied, these environmental factors must be considered in the design effort. The options for changing the alignment or for mitigating environmental impacts have conceptual design consequences.

SOFTWARE TOOLS TO INTEGRATE NEPA AND PROJECT MANAGEMENT

Iterating design options to accommodate the environmental and engineering aspects of the conceptual design effort is the focus of the early integration efforts. Fortunately, significant advances have been achieved in the development of tools that facilitate the integration of NEPA and project management approaches in analyzing alternatives. Route optimization software is one of the major tools for integrating environmental and engineering aspects of rail design. Although the software is typically used to recommend optimal alignments that minimize the amount of construction work, it can be run with both engineering and environmental constraints placed on the solutions being generated. The software imports terrain contour data collected by the Department's aerial surveys and analyzes the amount of cut and fill involved with a range of alignment options to attain a specified grade between two points in the terrain.

The software can also take into account other project and environmental factors in its analyses such as incorporation of data collected on geotechnical details or cultural resources within the corridor. For example, an alignment based solely on minimizing the amount of cut and fill to obtain a desired slope would have one solution. When geotechnical details are added, the results might indicate that an alignment with more cut and fill may be easier to construct if the earthwork involves alluvial materials rather than working in bedrock. This may lead to a different solution if ease of construction is a major driver in the selection of an alignment.

Figure 1 shows a generic analysis from a route optimization software package. The image shown is for one of the common segments of the Caliente corridor being analyzed. In the example shown, only engineering data is driving the analysis.

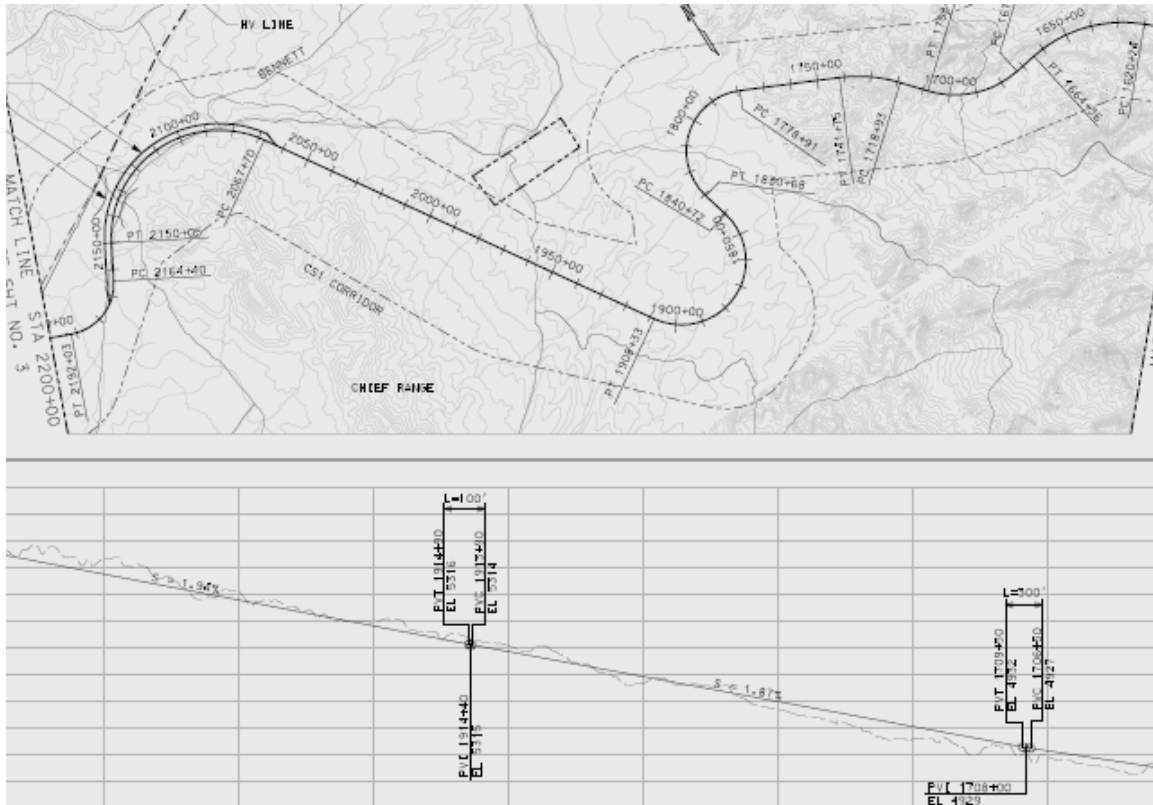


Fig. 1. Route Optimization Software output

The real power of the tool is illustrated when the full range of constraints are applied to the routing analyses. Areas of land can be removed from consideration by the software for a variety of reasons. Environmental constraints can be incorporated into the modeling to eliminate consideration of specific areas when recommending alignments. Restrictions based on eventual rail operational impacts can also be incorporated into the modeling to further constrain the available solutions. In this way, the analysis can integrate construction, environmental and operating aspects of alignments before recommending solutions. To maximize the benefit of these analyses, close coordination between the project design and NEPA requirements is necessary.

To achieve this degree of integration, the project manager for the Nevada Transportation Project is part of the Management Council for development of the RA-EIS. Similarly, the conceptual design contractor provides input to both the project planning and the RA-EIS development process. This tight integration between project development and NEPA will continue through publication of the Final RA-EIS and the Record of Decision on whether to construct a rail line, and if so, along which alignment.

It is important to inculcate this strong integration between NEPA and project development in the early stages of work. The opportunities to influence outcomes are greatest early in the development cycle, both for project and NEPA work. As details are more completely developed, it becomes more difficult to adjust the analysis to address different perspectives or circumstances.

Figure 2 illustrates the decreasing prospects for influencing projects as they proceed through the development cycle. Similar difficulties exist with development of an EIS, in that the level of rework associated with changes identified late in the process will be more extensive and costly than changes addressed early in the planning process.

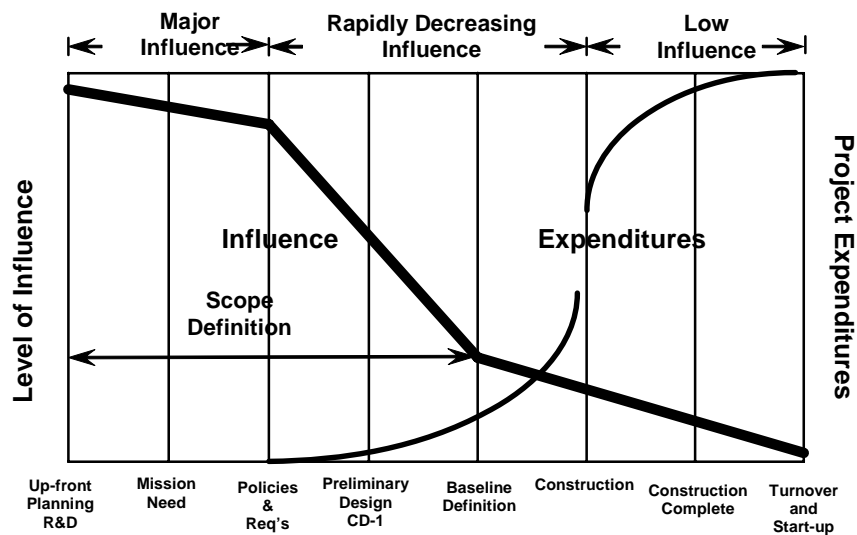


Fig. 2. Opportunity to influence projects

The Draft RA-EIS and the design of the potential rail line are both in their conceptual development phases. The opportunity for influencing the final outcome is still in the area of major influence. The technical data for all of the alternatives being pursued has been collected, and analyses of environmental, engineering, and operating impacts of various solutions are being conducted. These analyses will support completion of the EIS chapters on the affected environment and identifying possible consequences. The culmination of these analyses will be the publication of the Draft RA-EIS, which is scheduled for issue in the late spring or early summer of 2006.

The publication of the Draft RA-EIS is expected to generate considerable public interest and comments. Resolution of the public comments may require additional design work that will be reflected in both the Final RA-EIS and in the project performance baseline. The opportunity to influence both the RA-EIS and the Nevada Transportation Project will remain high until the comment period for the Draft RA-EIS closes. Once the Draft RA-EIS comment period closes, the two efforts will shift into the realm of rapidly decreasing influence.

The close integration of project planning and NEPA activities will continue through completion of the Final RA-EIS and issuance of a Record of Decision. Once the Record of Decision on whether to construct a railroad and on the selected alignment is issued the focus will shift exclusively to completing preliminary design for the Nevada Transportation Project. This stage of DOE project development is complete when the formal project baseline is approved, and authority to start final design is granted. This phase of the project is not expected until 2007.

CONCLUSION

The Department of Energy manages major federal actions to ensure close integration of NEPA and project management activities early in the planning effort. This integration assures broad consideration of environmental, construction, and operational attributes as management decisions are made. This broad base of information supports informed decision making and adds to the probability of major system project success.