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# 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 Act (NEPA) activities for a major federal action. In many federal agencies, the responsibility for project management is completely separate from the responsibility for NEPA implementation; however, each Program Secretarial Officer in the Department of Energy has a NEPA compliance officer. These NEPA compliance officers are integrated into project management teams and are an integral part of the project development effort. 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 complementary processes. This paper will describe the integration of NEPA and project management activities for development of a rail line to the proposed Yucca Mountain geologic repository in Nye County, Nevada.

## INTRODUCTION

In 2002, President George W. Bush signed House Joint Resolution 87, 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, and the Nevada Rail Infrastructure Project. The last project is focused on developing a rail line to connect the Yucca Mountain site to existing mainline track in Nevada. The performance baselines are being developed in accordance with the Department of Energy (DOE) order on project management (DOE Order 413.3A, *Program and Project Management for the Acquisition of Capital Assets*).

The National Environmental Policy Act (NEPA) was passed in 1969. Along with implementing regulations that followed, NEPA established requirements for federal agencies considering proposals for 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 451.1B, *National Environmental Policy Act Compliance Program – Change 1*.

Since the Nevada Rail Infrastructure Project includes the potential construction of a rail line more than 300 miles long, it qualifies as both a major federal action under NEPA and a major capital system project under DOE Order 413.3A. This results in two significant planning activities, one for developing an environmental impact statement (EIS), and one for developing the performance baseline (i.e. the project requirement, scope, schedule, and cost). This paper explores the benefits of integrating the environmental studies under NEPA with the project activities needed to effectively manage a major federal action involving infrastructure development.

## NEPA COMPLIANCE AND PROJECT MANAGEMENT INTEGRATION

In some federal agencies, and in many private companies, the responsibility for environmental compliance is separated organizationally from the management of major projects. Fortunately, at DOE, each Program Secretarial Office, including OCRWM, has a NEPA compliance officer and project managers reporting through the same management chain. This helps to ensure close coordination of NEPA and project activities early in the planning process. More importantly, the processes for developing projects under DOE Order 413.3A and for developing EISs 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 way DOE ensures this integration is to incorporate NEPA milestones into project planning schedules, making them part of the performance baseline. All NEPA activities must be completed before the project performance baseline is approved, and 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 integration of NEPA and project management efforts for the Nevada Rail Infrastructure Project, some context is needed. Pursuant to the Nuclear Waste Policy Act (NWPA) and NEPA, DOE prepared 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, also known as the Final Repository EIS). That document analyzed the environmental impacts of the 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 (SNF) and high-level radioactive waste (HLW) at Yucca Mountain. The proposed action also included transporting SNF and HLW from 72 commercial reactor sites and 4 DOE sites around the country to the Yucca Mountain repository (DOE now plans to move all SNF from Fort St. Vrain to Idaho National Laboratory prior to shipping to Yucca Mountain. Therefore, the number of DOE sites is reduced from the 5 sites previously referenced).

In preparing the Final Repository EIS, DOE initiated a scoping process in 1995, and subsequently issued a Draft Repository EIS in 1999 for public comment. During the 199-day comment period on the Draft Repository EIS, DOE held 10 public hearings in Nevada and 11 hearings in other locations 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 Repository EIS in 2001, entitled *Supplement to the Draft 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*. During the 56-day public comment period on the draft Supplemental Repository EIS, DOE held three hearings in Nevada. The Department received more than 13,000 comments on the Draft Repository EIS and the Supplement. About 3,600 of these comments addressed transportation matters. The Final Repository EIS accompanied the Secretary of Energy's 2002 recommendation to the President regarding the suitability of the Yucca Mountain site for a repository. A Record of Decision (ROD) based on the Final Repository EIS was issued in April of 2004. In the ROD, "mostly rail" was selected as the mode of transport, both nationally and in Nevada. Also selected was the Caliente corridor as the corridor for detailed study of potential rail alignments to Yucca Mountain.

## PROJECT MANAGEMENT AND NEPA DECISIONS

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 transport SNF and HLW to it. In the Department's project management vernacular, the need to develop a project is established at Critical Decision 0 (CD-0). In response to the NWPA, the Department developed the Final Repository EIS which included the need to make several transportation decisions. One of the decisions was how the SNF and HLW would be shipped to the repository (by truck or by rail). If rail was selected as the mode in Nevada, a second decision concerned how and where to construct a rail line to connect the repository site to existing rail lines in Nevada.

Publication of the ROD selecting the mostly rail mode and the selection of the Caliente corridor in Nevada was accompanied by a Notice of Intent to develop a Rail Alignment Environmental Impact Statement (Rail Alignment EIS) on potential rail alignments within the Caliente corridor. Two months later, the Department's Secretarial Acquisition Executive approved development of the detailed project performance baseline for construction of a rail line along this corridor. This approval is called Critical Decision 1 (CD-1).

The Notice of Intent to develop a Rail Alignment EIS and the CD-1 that initiated development of a detailed project baseline set the stage for further integration of the NEPA and project management activities. The next step for both efforts was to define and study the alternatives for developing rail access to Yucca Mountain within the Caliente corridor. The NEPA effort was focused on the environmental impacts of each alternative; while the project management effort was focused on defining the project requirements, the resources each alternative would require, the technical work that would be involved, and the probable schedule for project completion. Based on the importance of integrating these activities, the NEPA document manager and the federal project director were assigned to the same integrated project team (IPT). Based on the overall scope and probable duration of the rail project, the federal project director was designated as the IPT lead. Similarly, the federal project director is a member of the EIS management council. This integrated management structure oversaw the detailed planning for both efforts.

## ALTERNATIVES ANALYSIS

Once a project was approved, the next step was for both the NEPA process and the project team to conduct alternatives analyses. This effort assesses various ways of achieving the project's goals, and the impacts associated with each alternative. To ensure the analyses address the full range of viable alternatives, NEPA requires scoping meetings and a public comment period on what to consider as the project is refined. The public scoping meetings for the Rail Alignment EIS were conducted in May and June of 2004. Based in part on public comments that DOE received as well as other factors, in October of 2006, the scope of the ongoing Rail Alignment

EIS was expanded to incorporate analysis of another corridor alternative (the "Mina corridor"), which will supplement the corridor analyses in the Final Repository EIS. The expanded scope was also to include detailed analyses of alternative alignments for both the Mina and Caliente Corridors. The expanded scope is addressed in the *Draft Supplemental 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 – Nevada Rail Transportation Corridor (*Draft Nevada Rail Corridor SEIS) and the *Draft Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (Draft Rail Alignment EIS). As the scope was revised to include consideration of another corridor, additional public scoping meetings were held in November and December 2006. Comments were received from a variety of stakeholders. Those comments influenced the areas of study conducted under the EIS. Good project management also includes an alternatives analysis effort, but there is no mandate for formal public involvement in that review. In this case, incorporating the formal NEPA scoping process into the project schedule provided improved feedback on the project management challenges associated with several of the implementing alternatives. This also led to consideration of alternatives that might not have been pursued without public input. Subsequent management decisions on how to develop the Nevada Rail Infrastructure Project were better informed because of the public NEPA scoping process.

The data required to assess environmental impacts associated with the alternatives under consideration is also needed to determine the scope of work for rail construction. Geological, hydrological, and topographical analyses of the alternatives are needed to understand the environmental implications of each alignment. This same data defines the complexity and cost of construction, which is a component in the project performance baseline. The plants and animals along the various alignments and cultural sites within the corridor must be addressed in the Rail Alignment EIS, and may affect the routing of the rail line and the project's cost. In very simple terms, the Rail Alignment 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 Rail Alignment EIS and for the Nevada Rail Infrastructure Project, one group of contractors was selected to develop the raw technical data for the Caliente corridor. This data set supported both the project conceptual design and the development of Rail Alignment EIS impact analyses. Close coordination between the project conceptual design and EIS preparation was needed since the scope of work for each effort affected 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 should propose an alignment that minimizes the amount of work (cut, fill, and structures) required to construct the railroad. Minimizing work may also minimize the environmental effects of the project, but not always. In cases where threatened, endangered and sensitive 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 the design to mitigate environmental impacts have conceptual design and cost consequences.

## SOFTWARE TOOLS TO INTEGRATE NEPA AND PROJECT MANAGEMENT

Iterating design options to address both environmental and engineering aspects of the conceptual design effort is the focus of the early integration efforts. Fortunately, there have been significant

advances in the tools to integrate NEPA and project management design information. Route optimization software is one of the tools used to integrate 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 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 also takes into account other project and environmental factors in its analyses. Incorporation of data collected on geotechnical details or cultural resources within the corridor are easy to include in the route development effort. 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 that was analyzed. In the example shown, only engineering data are displayed. The horizontal scale is compressed in this figure, giving the impression of a steep slope. The actual design solution is for a 2% grade.

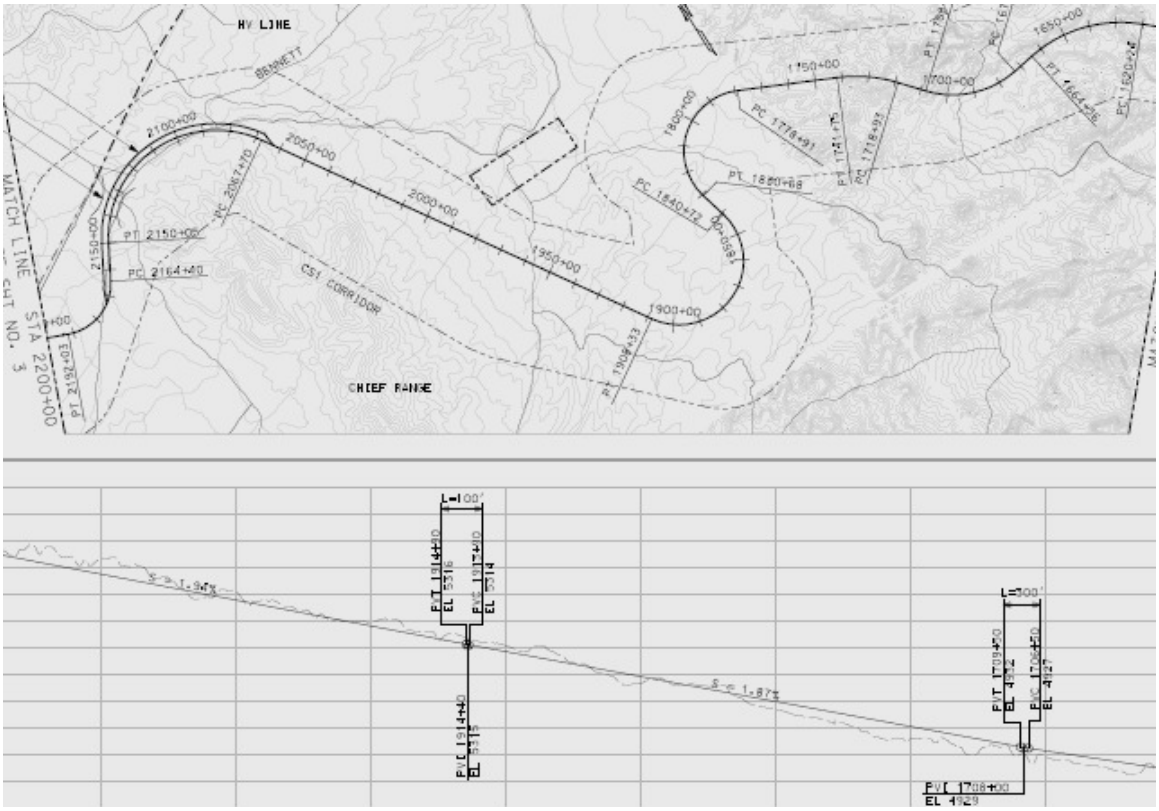


**Figure 1. Route Optimization Software Output**

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 Rail Infrastructure Project was part of the management council for development of the Draft Rail Alignment EIS. Similarly, the conceptual design contractor provided input to both the project planning and the Rail Alignment EIS development process. This tight integration between project development and NEPA continued through publication of the Draft Rail Alignment EIS in October of 2007, contributed to the quality of the document, and will continue through publication of the Final Rail Alignment EIS.

## EARLY FOCUS ON NEPA AND PROJECT MANAGEMENT INTEGRATION

It is important to instill 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 and costly to revise the design options to address different perspectives or circumstances.

The Draft Nevada Rail Corridor and Rail Alignment EIS has been issued, but the design of the potential rail line is still in the conceptual development phase. As public hearings commence on the Draft Rail Alignment EIS, there is still opportunity to influence the final outcome. The technical data for all of the alternatives being pursued has been collected, and analyses of environmental, engineering, and operating impacts of various solutions have been conducted. These analyses and the preferred alternatives described in the Draft Rail Alignment EIS will benefit from the public comment period that will begin in November. Final assessments of environmental and project alternatives will be captured in the Final Rail Alignment EIS scheduled for completion in June of 2008.

The publication of the Draft Rail Alignment 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 Rail Alignment EIS and in the project performance baseline.

The close integration of project planning and NEPA activities will continue through completion of the Final Rail Alignment EIS and issuance of a ROD. Once the ROD is issued, the focus will shift exclusively to completing preliminary design for the Nevada Rail Infrastructure 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 late in 2009.

## CONCLUSION

The Department manages major federal actions to ensure close integration of NEPA and project management activities starting 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 decisionmaking and adds to the probability of major system project success. That success is critical to ensuring safe, secure and efficient transportation to Yucca Mountain.