

LICENSING THE CALIFORNIA LOW-LEVEL RADIOACTIVE WASTE DISPOSAL FACILITY

A. L. Dressen and P. J. Serie
Environmental Issues Management, Inc

R. Junkert
CA Department of Health Services

ABSTRACT

California has made significant progress toward the issuance of a license to construct and operate the Southwestern Compact's low-level radioactive waste disposal facility. However, obstacles to completing construction and preparing to receive waste still exist. This paper will describe the technical licensing issues, EIR/S process, political events, and public interactions that have impacted on California regulators' ability to complete the license application review and reach a decision on issuing a license. Issues associated with safety and liability evaluations, finalization of the environmental impact report, and land transfer processes involving multiple state, federal, and local agencies will be identified. Major issues upon which public and political opposition is focusing will also be described.

INTRODUCTION

A major step forward in the development of the California low-level radioactive waste disposal facility has been taken recently. The regulatory staff of the Department of Health Services (DHS) informed US Ecology (USE) on December 26, 1991, that all technical information needed to make a licensing decision had been submitted to the Department. While this is a major development, a number of obstacles still exist before the facility will be ready to receive waste for disposal.

A year ago, the California licensing process was proceeding smoothly and a licensing decision was expected within a few months. This would have meant that the licensing review could have been completed within the 15-month timeframe anticipated by the U.S. Nuclear Regulatory Commission (NRC) and many other states. DHS, as the designated Agreement State agency, was nearing completion of its review of a license application from USE for the Ward Valley site. The site was considered an excellent one, with almost no nearby population, great depth to groundwater, and very little rainfall. The environmental impact report/statement (EIR/S) and most of the safety evaluation report (SER) had been drafted to support a licensing decision. Very little controversy over the proposed facility existed at that time, to the surprise of many observers.

What happened in the interim to slow completion of the licensing decision and preparations to construct the facility? In the sections that follow we will describe a series of technical issues that had to be resolved before DHS staff and technical consultants could complete their review of the license application and preparation of the SER. The development of the license and associated license conditions will be summarized. The EIR/S finalization process will be outlined. We will also describe how significant public and political opposition has arisen since release of the final EIR/S and identify the major issues upon which the public is focussing. Finally, the remaining obstacles to constructing the facility and receiving waste will be identified.

THE CALIFORNIA LOW-LEVEL WASTE PROGRAM

The process of developing a new disposal facility for low-level radioactive waste generated in California and the Southwestern Compact has been underway for several years

under the direction of the California Department of Health Services (DHS). DHS has the responsibility for overseeing the project development as well as issuing the facility license and regulating site operations.

DHS selected USE as the license designee responsible for completing site selection and characterization studies, preparing a facility design and operating procedures, and compiling a license application to construct and operate the California disposal facility. USE selected the Ward Valley site in the Mojave Desert about 20 miles west of Needles, California, on federal land to be transferred from the Bureau of Land Management (BLM) to the State of California. The site is comprised of 1000 acres, of which 70 acres will be used for the disposal area and approximately 8 acres for the support facilities. The facility design employs a near-surface disposal method in which trenches that are 40 to 60 feet deep will be constructed progressively and covered as waste and backfill are emplaced.

USE submitted a license application for the Ward Valley facility in the Fall of 1989. The application was composed of 11 volumes, containing over 7000 pages of information. During the course of the licensing review, the review record was expanded to include another 5000 pages of responses to interrogatories and supplemental reports. Based on its review of this material, DHS prepared a draft SER to assess compliance with the regulatory requirements of 10 CFR Part 61, as adopted in California's regulations. DHS then developed a set of draft license conditions to ensure continued compliance with the regulatory requirements and commitments made in the application and supplementary materials.

The license application was accompanied by a four-volume Proponent's Environmental Assessment. The latter formed the basis for a joint EIR/S prepared by DHS and BLM to evaluate the environmental impacts and biologic assessments necessary for the transfer of land for the facility from BLM to the state and to meet the requirements of the California Environmental Quality Act.

The major effort of the DHS program has been directed toward completion of the SER, license, and EIR/S. Additional efforts were required to negotiate a lease between DHS and USE for the use of the land, to become effective upon transfer of the land to DHS from BLM. Activities associated with responding to public comments on the initial design features

and both the draft and the final EIR/S also placed demands on the time of the regulators, applicant, and technical consultants and have caused some significant technical changes in the proposed design of the facility.

TECHNICAL ISSUES IN THE CALIFORNIA LICENSING REVIEW

The license application submitted by USE was the result of a very large effort over a long period of time. It would be very understandable if the applicant had a sense of considerable accomplishment at this point and relaxed a little. However, the fun was just beginning!

In a paper presented at Waste Management '91, we described the process used in California to review the license application submitted by USE. The detailed technical review was conducted by DHS and its technical review contractor, Roy F. Weston, Inc., and subcontractors, including ERM - Program Management Corporation, Rogers and Associates Engineering Company, and Environmental Issues Management, Inc. An independent review of the applicant's quality assurance program was performed by Ebasco Services, Inc.

These reviews resulted in four rounds of interrogatories seeking further information, clarification, or justification for statements and analyses in the application. Many of these could be responded to with relative ease, but several caused considerable extra effort on the applicant's part. The latter kinds of technical issues are summarized in the following subsections.

Trench Cover Design

The design proposed by USE employs two types of near-surface trenches. One type of trench is to be used for disposal of Class A waste, while Class B and C wastes, as well as high radiation level Class A waste that is stable, will be placed in a smaller trench (i.e., the BC30 trench). Because of the higher activity and the longer length of the radiological hazard posed by the Class B and C wastes, the technical review of the proposed design focussed strongly on the trench design for these wastes. The original design for the BC30 trench called for placement of a cover comprised of 8 different layers, each with a different function. The technical review of this cover design raised potential concerns about possible interactions between the various layers, long-term stability of several of them, and ultimate performance of the combination of layers to keep water away from the waste and radioactive gases in the trench.

As a result, DHS and its support contractor developed regulatory guidance on expectations for the BC30 cover and the applicant revised the cover design. The result is a three-layer cover system, in which the lowermost layer will be a 2-foot intrusion barrier and capillary break constructed of sand, gravel, and cobbles. The next layer will be a 2-foot thick layer of site soil amended with clay to provide a permeability contrast to enhance the capillary break. Finally, a 22-foot layer of site soils will be placed on top. Although the revised design is *much simpler* than the original, it is expected to satisfy the regulations while providing much greater confidence in its long-term performance.

Trench Liner Systems

The Class A and BC30 trench designs proposed by USE do not include any type of liner for containment of any releases

from the waste and infiltrating water. This approach is consistent with that in Part 61, which relies on the natural characteristics of the site to isolate the wastes and limit releases to the general environment. This is also consistent with the regulatory requirement to minimize the potential contact of waste with water by avoiding the potential creation of a "bathtub" that might result if the disposal unit cover is more permeable than the bottom of the trench. Finally, it complies with the requirement to avoid the need for active maintenance such as would be required for pumping and treatment of any accumulated water and leachate or repair of damaged liners.

However, the potential need for a dual liner system became a major issue when the draft EIR/S was issued for public review. Reflecting experience with hazardous waste disposal, the Environmental Protection Agency - Region 9, State Water Control Board, and Regional Water Quality Control Board all raised major concerns over the lack of a liner system.

DHS responded with its position that such a liner system is not required since mixed waste will not be accepted. DHS described why liners are not only unnecessary at the Ward Valley site but would be detrimental to the facility's ability to isolate the waste. This latter is because liners are expected to be effective in capturing moisture during a design life of only about 30 years. After that, the liner is expected to eventually fail, releasing any contents into the natural system instantaneously and at finite versus dispersed locations. Such a circumstance is far more likely to lead to deep infiltration than a system that relies on natural site features to absorb and attenuate the small amount of moisture that may be present in the waste or result from precipitation.

Resolution of this issue finally came about as a result of resolution of a related concern with vadose zone monitoring, which is discussed next. The conclusion was that liners are not included in the Ward Valley design.

Vadose Zone Monitoring

At the Ward Valley site, the groundwater is 650 to 700 feet below the surface. Age-dating of the groundwater and the presence of highly soluble ions in site soils indicate that the groundwater has been isolated from precipitation-derived recharge for at least 12,000 years. Infiltration is very limited because the evapotranspiration rate is extremely high (on the order of 80 to 100 inches per year) in contrast to very low precipitation (less than 5 inches per year). Site characterization studies found nearly constant soil moisture contents at the proposed disposal depths and indicated little, if any downward movement of soil moisture below the plant root zone at the site (10-12 feet below the surface). Movement of soil moisture in the upper 100 feet of the unsaturated zone may actually be upward to the ground surface.

These natural conditions are very favorable for protection of the groundwater under the site. In fact, the applicant's performance assessment showed that even with very conservative assumptions (a probable maximum precipitation event followed by complete infiltration of the average annual precipitation), only the most mobile radionuclides I-129 and C-14 would even reach the water table and this would take at least 1000 to 2000 years. Once in the groundwater, it would take hundreds more years for the radionuclides to leave the buffer zone around the site and reach any downgradient groundwater wells.

While this analysis of the groundwater pathway is very positive for the Ward Valley site, it indicates a significant concern with groundwater monitoring. In the unexpected event that a radionuclide release was to occur from a disposal trench, a very long time would transpire before the release would be detected in groundwater monitoring wells. In the meantime, a potentially very large amount of the unsaturated zone could become contaminated and require difficult corrective actions to clean up a soil column that is 600 feet thick and very wide due to lateral spreading of the plume. Moreover, site characterization and performance assessment studies indicated that the major potential pathways of concern are upward movement of soil moisture and gases through the trench cover.

DHS believed that it was essential to employ a comprehensive vadose zone monitoring system at the Ward Valley facility to provide early detection of any releases. To evaluate the kinds of monitoring systems and address public and other agencies' concerns about the need for a liner, DHS formed a Select Committee on Vadose Zone Monitoring, which included geologic, hydrologic, monitoring and performance assessment experts from EPA, NRC, USGS, DOE, state agencies, academia, industry, and special interest groups. Through a facilitated workshop, this group considered several options for a vadose zone monitoring system. These included angled and cased boreholes under the trenches, synthetic membrane liners with leachate collection systems, pan lysimeters under the bottom of the trench, and various other methods to enlarge the zones of monitoring coverage. It was the general consensus of the group that a liner and leachate collection system was not the preferred alternative.

Based on the Select Committee's recommendations, DHS provided regulatory guidance to the applicant on its vadose zone monitoring system. USE subsequently proposed to expand its monitoring to include a series of five integrated monitoring points across the width of each trench. These will be repeated at approximately 200-foot intervals along the length of the trench. The monitoring points will monitor the trench cover, trench edges, adjacent area, and below-trench area. Monitoring techniques to be employed include soil gas sampling, neutron and gamma spectral logging, measurements of surface vapor flux and plant transpiration rates, vegetation sampling, and soil sampling.

Environmental Monitoring

Each of the preceding technical issues required a very concentrated effort by DHS, its consultants, the applicant, and others over relatively short stretches of time. However, the technical issue that has had the most impact on project schedules has been the preoperational environmental monitoring program. 10 CFR Part 61.53(a) requires that at the time a license application is submitted, the applicant shall have conducted a preoperational monitoring program to provide basic environmental data on site characteristics. For those characteristics that may vary seasonally, the data must cover at least a 12-month period.

The California license application submitted in late 1989 contained information on the preoperational monitoring program but committed to submitting a supplemental report presenting additional data and analyses. That supplemental report was submitted 8 months later. As a result of reviews of the report, DHS and its consultants raised a number of signif-

icant concerns about the data, sample collection procedures, laboratory analyses, and data review and interpretation.

As a result, DHS required the applicant to reanalyze some samples, perform at least one additional quarter of monitoring, and submit a comprehensive report on the preoperational, operational, and postclosure monitoring programs. DHS issued a lengthy piece of regulatory guidance on its interpretation of the regulatory requirements related to environmental monitoring, the findings that must be made to show compliance with these requirements, and the activities to be performed by the applicant to provide complete information to support these findings. The resulting comprehensive report was submitted by USE in December 1991 and allowed DHS to complete the SER and license for the facility. It should be noted, however, that DHS has included conditions in the license that require the licensee to continue monitoring during the remainder of the preoperational period, expand the quality assurance and quality control program for environmental monitoring, and obtain DHS approval of the results as a prerequisite to authorization to receive waste.

Clearly, this particular issue has caused delays in the licensing review process, extending it more than 6 months. Moreover, during that period of delay, public and political opposition began to arise and grow, creating additional difficulties in completing the project. What lessons can be learned from this experience? We suggest that environmental monitoring programs should include the following:

- Ensure that the preoperational environmental monitoring program is started as early as possible during site characterization.
- Ensure that monitoring results are reviewed in a timely fashion and that any changes needed to provide meaningful data are implemented as soon as possible.
- Request informal review of the early results by the regulatory agency to ensure that these will fulfill the regulatory needs.
- Conduct a blind standards program with the laboratory(ies) and send replicate samples to secondary laboratories to ensure that the results reflect adequate quality control. This is especially important due to the fact that analyses are being performed for very low levels of constituents.
- Continue monitoring after the license application is submitted to provide additional data to demonstrate that the data in the application are representative of typical conditions and to expand the data base to address questions arising from the licensing review.

License Conditions

The final category of major technical issues arising from the licensing review relates to development of the license conditions themselves. A draft license containing over 120 specific conditions was issued for public review and comment in the Summer of 1991. Specific comments were received from 20 commentors. Several of these prompted DHS to reassess the basis for the proposed condition and, in some cases, to revise the condition. These included conditions relating to radium wastes, dewatered ion exchange resins, biological wastes, and special requirements for Class B tritium waste containers and container activity limits.

A particular issue that caused considerable consternation was a comment by one major radiopharmaceutical manufacturer that its new projections of future waste generation were about one-third of its original estimate. Because this particular waste accounted for most of the activity originally projected to be received at the facility, it was a driving factor behind the performance assessments and license conditions that were proposed to keep releases as low as reasonably achievable. With the change in waste projections, it was necessary to perform special analyses to determine what effect this might have on overall facility performance and to determine if any relaxation of the proposed license conditions relating to the targeted waste was justifiable.

EIR/S PROCESS

A separate effort was conducted in parallel to the licensing review to review the proponent's environmental assessment and prepare a joint EIR/S with BLM for the project. A draft EIR/S was issued in June 1990 for public review. As evidence of the lack of major public opposition at that time, only 179 comment letters were received and 31 people provided testimony at 4 public hearings. The comments were addressed and a final EIR/S was issued in April 1991.

However, in the meantime considerable public opposition had begun to arise and many people complained that they had not had an adequate opportunity to comment on the draft document. Therefore, a decision was made to offer a second opportunity to comment on the EIR/S as part of the public review of the draft license and three more public hearings were conducted. Over 4000 comments were received from about 850 commentors.

Many commentors stated their opposition to licensing the facility and allowing the land transfer from BLM to the state. The principal issues raised in the public comments included many that could well arise in other states, such as the following:

- Concern that the state could be liable for the long-term care of the site and any future remedial action
- Worries about the risks from waste transportation to the site
- Fears that the site will not be limited to wastes from the Compact states, in response to requests already presented by other states wanting to contract for waste disposal
- Concerns that NRC is empowered under the emergency access provisions of the Low-Level Radioactive Waste Policy Amendments Act and 10 CFR Part 62 to force acceptance of out-of-compact waste, federally-produced or defense waste, high-level waste, mixed waste, or international waste at the site
- Questions whether or not the potential impacts of NRC's proposed policy for below-regulatory-concern wastes have been adequately considered
- Fears that hazardous and mixed wastes will be accepted at the facility and worry that "delisting" is just a paperwork exercise to define away the hazardous portion of the waste

Because of the volume and diversity of comments received, a major effort was required by DHS and its consultant, Environmental Issues Management, Inc., to analyze, categorize,

and track the comments and prepare a comment response summary. That summary has been completed recently to support the EIR/S certification and the licensing decision.

GROWTH OF PUBLIC OPPOSITION

The California low-level waste program has never experienced the degree of public opposition and civil disobedience encountered in many of the other states that are pursuing new disposal sites. However, in the past year a number of national organizations have targeted Ward Valley in the hope that if this project can be stopped, it will have a major impact on the continued use of nuclear power in this country. These and other local organizations have been effective in gaining media attention and enlisting the support of a number of well-known Hollywood stars to promote opposition to the land transfer and licensing of the facility. They have also succeeded in getting some legislators to conduct hearings and bring about other political pressures on DHS and the Governor's office.

However, strong support continues to be expressed by some residents of the community of Needles. The waste generator group in California (CALRAD) has also been very active in its support of licensing the facility at the public, media, and political levels. A series of recent newspaper articles has created quite a flurry by pointing out that if the site is not licensed by 1993, it may become necessary to store the waste at broker facilities in major metropolitan areas or even at the various hospitals, universities, and other places where it is generated.

THE LAND TRANSFER

Although preparations for a the licensing decision and EIR certification are major steps forward, construction of the facility cannot proceed until the land transfer is completed. Up until July 1991, DHS was working with the State Lands Commission, BLM, and USE to acquire the Ward Valley site. Throughout this period, all parties operated with the explicit understanding that the Ward Valley site would be acquired by the State Lands Commission through the indemnity land selection process and then be transferred to DHS. However, on July 2, 1991, the Commission asked BLM to suspend the indemnity selection process. The letter to BLM indicated that if DHS wants to license the facility, it must decide how to acquire the land.

DHS, USE, and BLM have explored several alternative processes for transfer of the land. However, a decision has not been made by top management of DHS as to which alternative should be pursued. Once an alternative is selected, it is likely that several additional months will elapse before the transfer can be completed because of a policy decision by BLM to prepared a supplemental environmental assessment and obtain public comment on the new realty action.

REMAINING STEPS

At this time, a decision on whether or not to issue the license for the Ward Valley facility is still pending. The land transfer also has to be completed, as discussed above, before the lease can be effective. All of these actions must be completed before USE can begin construction of the facility. To further complicate the process, construction cannot begin until fencing to protect the endangered desert tortoise has been installed and tortoises within the fenced area have been

relocated. This latter operation must be confined to certain portions of the year that will be least harmful to the tortoises.

Once construction is completed, DHS will perform a final inspection to determine the following as prerequisites to providing a written authorization to receive waste:

- The facility has been constructed according to design specifications.
- All site operations procedures have been prepared and approved by DHS.
- The necessary operations personnel have been employed and have completed the licensee's training program.
- Recordkeeping systems have been established.
- Preoperational environmental monitoring has been continued through completion of construction and the baseline values and corresponding action levels for each parameter have been identified and approved by DHS.

SUMMARY

The California low-level waste program has demonstrated that there are many complexities to the successful licensing of a new disposal facility. The applicant made a commendable effort to carry out comprehensive site characterization and design studies and to present a very detailed license application. In spite of this, a number of technical issues identified by the regulator as well as outside reviewers required considerable effort to resolve. This is further complicated by the process associated with certification of the joint EIR/S in a manner that would be consistent with evolving changes resulting from the licensing review, public input, and land transfer processes. All of these pale in comparison with the challenges presented by public and political opposition that has the land transfer temporarily halted. Finally, there is no certainty that there will not be other unexpected obstacles before the first truckload of waste drives through the gate of the facility.