

# ENVIRONMENTAL SITE CHARACTERIZATION FOR THE CENTRAL INTERSTATE COMPACT LOW LEVEL RADIOACTIVE WASTE DISPOSAL FACILITY

Kathleen S. Pahl  
Linda M. Ulland  
Bechtel Environmental, Inc.  
San Francisco, California

## ABSTRACT

The Central Interstate Compact (CIC) low level radioactive waste (LLRW) disposal facility in Nebraska is the first above grade facility for which a license application has been submitted in compliance with the Low-Level Radioactive Waste Policy Act of 1980 and its 1985 amendments. The proposed facility is being developed for disposal of low-level radioactive waste generated within the five-state Central Interstate Compact (CIC) of Louisiana, Arkansas, Oklahoma, Kansas and Nebraska. The facility will operate for 30 years or until the period of time when 5 million ft<sup>3</sup> of waste is received, whichever comes first. The facility is being developed and will be operated by U S Ecology and is being designed by Bechtel National, Inc.

A license application was submitted to the State of Nebraska by U. S. Ecology in July 1990 and includes an Environmental Report (ER) and Safety Analysis Report (SAR), in compliance with State and federal requirements. The license application and supporting documentation are currently being reviewed by the State of Nebraska, which has authority to grant the license.

This paper describes the environmental site characterization program conducted by Bechtel National, Inc., from October 1989 to October 1990, its development, compliance with regulatory requirements, and technical approach to environmental technical studies.

## INTRODUCTION

The Nebraska Department of Environmental Control (NDEC) Title 194, "Rules and Regulations for the Disposal of Low-Level Radioactive Waste" requires the LLRW disposal facility to be sited, designed, operated, closed and controlled in accordance with performance objectives in Chapter 4 of Nebraska Title 194 (Appendix A). The facility will provide for the protection of public health and the environment through the use of multiple natural and engineered barriers. Chapter 5 of Nebraska Title 194 sets technical requirements for a facility. The primary features providing long-term isolation include the natural characteristics of the waste disposal site, waste form stability, and the disposal unit structures. At closure, a multilayer engineered closure cap system will limit the potential for wind and surface water erosion, water infiltration, and inadvertent intrusion. Environmental monitoring programs to verify facility performance will be conducted by U.S. Ecology and the state of Nebraska during the operational life of the facility. The facility will be monitored by the Nebraska Department of Health for a minimum of 100 years following closure and transfer of the license to the state of Nebraska.

The Nebraska Low-Level Radioactive Waste Disposal Act and the implementing regulations, Nebraska Title 194, require "a written analysis on the impact of the facility on the environment" as a part of the license application for the disposal facility. The environmental report (ER) fulfills this requirement. In the ER the proposed action, alternative actions, alternative siting, and alternative engineering designs for both the facility and the closure cap are presented. The existing conditions at the sites and their vicinities are

described and potential impacts of the proposed action are evaluated. The impact assessment includes radiological and nonradiological impacts to the public health; impacts on waterways and groundwater; environmental, social and economic impacts; a cost-benefit analysis; and the evaluation of any long-term impact of the facility following closure. Geotechnical and environmental investigations and studies were conducted to characterize the sites and to establish environmental baseline conditions for the ER and included: geography, demography, ecology, atmospheric conditions, geology and seismology, hydrology, cultural resources, socioeconomic and ambient noise. The environmental portion of the site characterization program described in this paper addresses geography/demography, ecology, cultural resources, socioeconomic and ambient noise resources.

The scope of the environmental site characterization studies was based upon:

- responding to state and federal regulatory requirements and federal guidance documents,
- integrating engineering design concepts,
- incorporating site specific characteristics, and
- addressing public concerns.

Following a two-year site selection study, three candidate sites were identified for environmental site characterization; the one-year site characterization program discussed below addressed characteristics of these three sites and the surrounding vicinities.

## REGULATORY REQUIREMENTS AND GUIDELINES

The focus of the regulatory statutes and guidance documents used in the development of the site characterization program for the CIC Project in Nebraska is to protect human health and the environment. Included in the regulations and statutes are provisions that pertain to public health and safety, worker health and safety, environmental quality, and ecological quality. Federal statutes delegate authority to the states such as Nebraska to develop programs related to low-level waste disposal and issue licenses in accordance with each state's unique statutory goals. Federal statutes also require that the state programs (regulations) be as stringent as the federal programs. Therefore, both federal and state statutes and regulations were reviewed in designing the environmental site characterization program to provide meaningful information necessary to address the focus and provisions of the regulations. Table I lists federal and state statutes, regulations, and guidance documents used as the basis for the site characterization programs.

Initially the design of the investigations conducted at each site was developed based on site specific characteristics, project design requirements and the availability of previous studies and existing data, within the regulatory framework described below. Meetings with representatives of the Nebraska Game and Parks Commission and with the Nebraska Department of Environmental Control also provided input for development of the field characterization efforts. Public information meeting were also conducted, where the site characterization program was described and the citizens in the areas surrounding the three candidate sites were given the opportunity to express their concerns regarding the facility. The issue areas emerging from these meetings were tabulated and the site characterization program reviewed to insure that the program addressed resource areas of concern.

Following direction by the Nebraska State Department of Environmental Control, Regulatory Guide 4.18, was the guiding document in developing the environmental characterization program and impact assessment for the Environmental Report. NUREG 1199, was the primary document used in developing environmental information for the Safety Analysis Report (SAR). Other federal and state guidance documents and statutes used in developing and conducting environmental site characterization are included in Table I.

## DESIGN CONCEPTS AND CRITERIA

Nebraska Title 194 establishes the procedures, criteria and conditions upon which a license for a facility would be granted. The procedural requirements, performance objectives, and specific technical requirements for low-level radioactive waste disposal are set forth. Design criteria for the CIC facility were based on these objectives, and coordi-

nation and integration of environmental considerations relating to the design requirements were consistently followed throughout site characterization.

Specific siting and design requirements were considered in developing the site characterization program and were incorporated into the environmental program as appropriate. Similarly, general and site specific environmental considerations were incorporated into facility design and layout. This coordination and integration of environmental and engineering design was particularly apparent in the consideration of 42.6 acres of wetlands on the Butte preferred site. Detailed wetland delineations were incorporated into early environmental site characterization studies. The wetland delineation was then used in planning and engineering facility layout and design that avoided surface disturbance to the wetlands or disturbance of surface drainage to the wetlands.

## SITE SPECIFIC CHARACTERISTICS

Site specific environmental characteristics of each of the three candidate sites: Butte site in Boyd County, Nemaha County site and the Nuckolls County site, also influenced development of the characterization program. What was important was to ensure that environmental studies at each site provided an equal level of detail for an adequate comparison of alternatives and still to consider those environmental characteristics unique to each site. For example, the Butte and Nemaha County sites contained wetlands areas that required detailed wetland delineation studies that were not required at the Nuckolls County site. All sites were surveyed for cultural resources. Following the initial resource evaluation, a barn on the Nemaha County site was subjected to more intense evaluation due to its potential historic significance. The evaluation determined that the barn was eligible for inclusion in the National Register of Historic Places.

## PUBLIC ISSUES

Prior to initiation of environmental characterization studies, information meetings were held in each of the three site areas. The intent of the meetings was to summarize the proposed environmental data collection program, to solicit information, and identify issues of particular or local concern that should be addressed in the characterization program. While the proposed site characterization data collection program addressed all resource areas that were identified during the public meetings, the priority of issues varied among the sites. In Nemaha County, for example, issues relating to population distribution and agricultural activities (particularly livestock) were emphasized. At the Butte and Nuckolls sites, social and economic issues were of major interest. At the Butte site, ecological issues also were of particular importance.

TABLE I

Federal and State Statutes and Regulations Addressed  
in the CIC Environmental Site Characterization ProgramFederal Statutes

- 10 CFR 51, NRC Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
- 10 CFR 61, NRC Licensing Requirements for Land Disposal Radioactive Waste
- Low-Level Radioactive Waste Policy Amendments Act of 1986 (Public Law 96-573, 99-240)
- National Environmental Policy Act of 1969 (42 USC 4321-4361)
- 40 CFR 1500-1508, Regulations for Implementing NEPA
- Clean Water Act of 1977 (33 USC 1251-1376) and Particularly Sections 401, 402, 404 of the Act
- Safe Drinking Water Act (42 USC 300)
- Clean Air Act, as amended (42 USC 7401)
- Endangered Species Act of 1973 (16 USC 1531-1543)
- Fish and Wildlife Coordination Act (16 USC 661)
- Executive Order 11990, "Protection of Wetlands"
- Migratory Bird Treaty Act, As Amended (16 USC 703 - 711)
- Bald and Golden Eagle Protection Act (16 USC 668-668d)
- National Historic Preservation Act of 1966, as amended (16 USC 470 *et seq.*)
- Historic Sites, Buildings and Antiquities Act, As Amended (16 USC 461-467)
- Archaeological and Historic Preservation Act (16 USC 469-469c)
- American Indian Religious Freedom Act (42 USC 1996)
- Noise Control Act of 1972 (42 USC 4901, E. O. 12088)

State Statutes

- Nebraska Radiation Control Act (Nebraska Rev. Stat. 71-3519 *et seq.*, 1963)
- Nebraska Low-Level Radioactive Waste Disposal Act (Nebraska Rev. Stat. 81-1578 *et seq.*, 1989)
- Memorandum of Understanding between Nebraska Department of Health and Nebraska Department of Environmental Control
- Permits for Scientific or Educational Purposes (Nebr. Rev. Stat. 37-209 *et seq.*, 1967)
- Safe Drinking Water Act (Nebr. Rev. Stat. 71-5313 *et seq.*, 1983)
- Soil and Water Conservation Act (Nebr. Rev. Stat. 2-1575 *et seq.*, 1983)

Federal Regulatory Guidance

- NUREG - 0902, Site Suitability, Selection and Characterization
- NUREG - 1199, Rev.1, Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility, Safety Analysis Report
- NUREG - 1200, Rev.1, Standard Review Plan for the Review of a License Application for a Low-Level Radioactive Waste Disposal Facility, Safety Analysis Report
- NUREG - 1300, Environmental Standard Review Plan for the review of a license application for a Low-Level Radioactive Waste Disposal Facility, Environmental Report
- NRC Regulatory Guide 4.18, Standard Format and Content of Environmental Reports for Near-surface Disposal of Radioactive Waste
- NRC, Combined NRC-EPA Siting Guidelines for Disposal of Mixed Low-Level Radioactive and Hazardous Waste

State Regulations and Guidance Documents

- Nebraska Department of Environmental Control, Title 194
  - Rules and Regulations for the Disposal of Low-Level Radioactive Waste 1987)



## TECHNICAL STUDIES AT THE CANDIDATE SITES

The environmental characterization program for the three sites provided the basis for the ER and environmental considerations incorporated into the SAR. In addition to the candidate sites (one-half section of land), studies were conducted for an area up to a 30-mile radius of the sites. Specific technical work plans were prepared for each resource area prior to conducting environmental studies. The technical resources addressed in the site characterization program are briefly discussed below.

### Geography and Demography

The ER and SAR contain information on current and projected land uses and population on the site and within the site area (approximately 6-mile or 10-km radius). More generalized population and land use information is provided for an approximate 30 mile (50 km) radius surrounding the three sites. Current and projected population data were based on the most recent U. S. Census (1980 and 1985 updates) and state data. Residences within a three mile radius were verified by field studies and population estimates derived from average household size data. For the Butte preferred site, these data were verified with local officials. Land use information was developed from available maps, aerial photographs and field reconnaissance. The data gathered and used in the ER and SAR were designed to meet requirements and guidance of NDEC Title 194 Chapter 3, NUREG-0902, NUREG-1100 and 1200 and NUREG-1300.

### Cultural Resources

The ER contains information on the archaeological, historic and Native American resources on each of the three sites and in the site areas. Literature review and agency consultation (e.g. State Historical Society) were the basis for initial identification of cultural resources in the area; 100 per cent walkover surveys were then conducted at each of the three sites. Native American tribal representatives were also contacted to determine if the site areas contained sensitive Native American resources. More extensive resource evaluation was conducted at the Nemaha County site to determine the eligibility of an historic barn for inclusion in the National Register of Historic Places. The studies addressed requirements and guidance of NDEC Title 194, NUREG-0902 and NUREG 1300 and Regulatory Guide 4.18 as well as specific legislation relating to historic, archaeological and Native American resource preservation.

### Socioeconomics

The socioeconomic section of the ER includes information on the local and regional economic base and labor force, housing availability, educational resources, commu-

nity services and facilities (health care and emergency services, protective services, transportation and utilities) and public sector fiscal conditions. The focus is on those characteristics that are most likely to affect or be affected by project development. Data were obtained from published available federal, state and local sources, and agency consultation. For the Butte site, local officials provided additional information and verification of data. Guidance for study design and impact assessments was provided by NUREG-0902 and 1300 and Reg. Guide 4.18.

### Noise

Ambient noise studies were undertaken at the Butte preferred site to characterize the existing noise levels in the site and vicinity and to project increases in noise levels as a result of project construction and operation. The noise studies were based on guidance from NUREG-1300 which includes consideration of noise effects on important terrestrial species.

### Biology

A number of state and federal statutes and regulations require characterization of the terrestrial and aquatic features of the site and vicinity, including consideration of "important" species. Important species were defined as those that are commercially or recreationally valuable, threatened or endangered. Also, included in the definition are those species affecting the well-being of the important species defined above. Species considered biological indicators of radionuclides or chemical pollutants in the environment were also addressed. These regulations identify the necessity for a year-long field program to accommodate seasonal variations in biological resources. The data collected, methods used, and level of detail depends on site and project specific characteristics and data availability. A biological resources work plan was prepared to guide the site specific investigations. This work plan was reissued prior to each season of field sampling to include data collection activities and methods that were specific to the upcoming seasonal sampling period and to incorporate information learned during the previous seasons of sampling. Ongoing consultations with the Nebraska Game and Parks Commission also guided development of seasonal field studies.

Surveys for the potential occurrence of threatened and endangered species and special interest species within the study areas were also conducted. In addition, a special field study and report on the johnny darter, a Nebraska special concern species, was carried out as a result of spring 1990 studies. Discovery of the johnny darter in Ponca Creek, which is within the study area of the Butte site, was unrecorded until the spring survey. The presence of the johnny darter in Ponca Creek represented a range extension for that species.

Two special wetland delineations were conducted for the Butte and Nemaha County sites. Guidance for the biology field investigations were based upon NDEC Title 194, NUREGS 0902, 1199 and 1200 and 1300 and Regulatory Guide 4.18.

#### **KEY ENVIRONMENTAL ISSUES AT THE BUTTE PREFERRED SITE**

Site characterization studies were begun at all three sites in the fall of 1989. Geotechnical data, engineering design criteria and environmental factors were used to evaluate the suitability of each of the three sites. The Butte site, was considered the most suitable based on geotechnical, engineering and safety factors and that site was identified as the preferred site in December 1989. While environmental studies begun in the fall 1989 were continued at all three sites to provide an equal level of detail for evaluation of alternatives, radiological and noise studies were also conducted for the Butte preferred site.

Key environmental issues from the regulatory and public viewpoint at the Butte site focused on wetlands and socioeconomic impacts.

##### **Wetlands**

Wetland delineations were conducted early in the site characterization program for the Butte site; that information was incorporated into the layout of the facility so surface disturbance and disruption of drainage to the wetlands was avoided. No 404 permit will be required by the U. S. Army Corps of Engineers for the facility. The Butte site wetlands in a regulatory context and as a public issue are interesting since of the 42.6 acres under U. S. Army Corps of Engineers jurisdiction, 5.9 acres are classed as problem area wetlands. These problem area wetlands are scattered across the site and have been altered by farming practices, either by changing the drainage or by tilling or both. These problem area wetlands do not function as wetlands because of the past land treatment. Due to the presence of remnant hydrophyte vegetation and hydric soil however, they are under the jurisdiction of the U. S. Army Corps of Engineers. The remaining 36.7 acres of palustrine emergent-seasonal wetlands on the site are grazed and degraded. Both the problem area wetlands and palustrine-emergent wetlands on the Butte site will be fenced as part of the facility design and at least the palustrine emergent wetlands can be expected to improve in quality, with removal of grazing pressures during facility operation.

##### **Socioeconomics**

Other key issues are related to socioeconomic aspects of facility development both during the construction phase and during facility operations. The Butte site is located in a sparsely populated area that has been experiencing a decline in population and an increase in the proportion of

older residents over the last 30 years. As the population has declined, so has the level and diversity of the regional economy and availability of housing and community services and facilities. During project construction, between 220 and 250 workers would be required during a six-month peak construction period. During project operations, between 20 and 30 people would be employed at the facility. The characteristics of the Butte area, and the facility construction and operational characteristics, provide both opportunities and constraints to the local area and region. Facility construction and operation would provide opportunities for local employment, economic development and for improvements to facilities and services. At the same time, an influx of outside workers to meet construction workforce requirements could temporarily strain limited housing and community resources. In the long term, facility operation could cause changes to the rural, agricultural nature of the community.

#### **CONCLUSION**

Development and implementation of the environmental site characterization program for the CIC project can provide insights to other states and compacts still in early stages of LLRW facility siting and licensing efforts. As the milestones established by the LLRW Policy Act near, it is important that states and compacts undertake characterization studies that are technically sound, thorough, and meet agency and licensing requirements in a cost-effective and timely manner. An environmental site characterization program must consider the regulatory context, site specific characteristics, facility design requirements or constraints, and agency and public concerns.

Planning an environmental site characterization program clearly requires an understanding of applicable federal, state and local regulations. However, seldom are these regulations and guidelines site or project specific; instead they provide only general direction of the type and extent of technical studies necessary for facility licensing. Consequently, site and project specific characteristics, along with agency and public consultation are imperative elements in developing a site characterization program that meets the purpose and intent of the licensing requirements.

Early consultation with agencies regarding the review and licensing process is also important so that technical studies are designed and implemented with a clear purpose and focus on issues most crucial for licensing and that review of licensing documentation be conducted in a timely manner.

Finally, agency consultation should be early and continuous, throughout the site characterization process. In this way issues that may arise during technical studies can be identified and resolved thus avoiding delays that could impact milestone compliance.