

ADDRESSING CONCERNS ABOUT THE AGRICULTURAL IMPACTS OF
SITING A NUCLEAR WASTE REPOSITORY IN TEXAS

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ABSTRACT

Public concerns related to the siting of a nuclear repository have included the potential impacts to specific economic sectors. In Texas, local residents have expressed concern about how a repository will affect agriculture. Several major questions have arisen with respect to this issue including: 1) how will a repository's requirements for land and water affect agriculture, 2) how will a repository affect agricultural land values, and 3) how will actual or perceived contamination of locally grown products affect their marketability? This paper describes the concerns raised by local residents and discusses the approach to analyzing the concerns identified. An evaluation of agricultural impacts has been prepared for the Department of Energy's Environmental Assessment (EA) documents. In addition, activities needed to further evaluate these impacts are planned for site characterization. Both the current analysis and planned activities are described.

INTRODUCTION

Public concerns related to the siting of a high-level nuclear waste repository have included the potential impacts to specific economic sectors. In Texas, local residents have expressed considerable concern in how a repository will affect agriculture. Several major questions have arisen with respect to this issue including: 1) how will a repository's requirements for land and water affect agriculture, 2) how will a repository affect agricultural land values, and 3) how will actual or perceived contamination of locally grown products affect their marketability? In considering these questions, the Department of Energy (DOE) performed an analysis of agricultural impacts for its draft Environmental Assessment (EA) for Deaf Smith County¹. The purpose of our paper is to discuss this analysis and to describe activities which are planned for the future. This analysis is based primarily on secondary data sources and evaluates a 9-county socioeconomic region in the Texas Panhandle. The Deaf Smith site is one of five sites nominated for further study (site characterization) in the draft EAs published in 1984 (the nine counties include Oldham, Potter, Deaf Smith, Randall, Swisher, Castro, and Parmer in Texas as well as Quay and Curry Counties in New Mexico).

The State of Texas ranks first among all states in the production of rice, beef cows, calf crop, cattle on feed, and sheep and lamb. It ranks second in the production of onions, carrots, broccoli, and cotton. Texas has the second largest acreage of irrigated farmland in the United States, with 7.8 million acres in 1982. Over 42 percent of Texas irrigated land is located in the 23 counties comprising the Southern High Plains region of the Texas Panhandle. This region is a major producer of corn for grain (50 percent of Texas production), grain sorghum (23 percent of Texas production), wheat (41 percent of Texas production), sugarbeets (99 percent of Texas production), soybeans (48 percent of Texas production), potatoes (49 percent of Texas production), and cattle marketed from feedlots (71 percent of Texas-fed cattle marketed).

In the seven Texas counties selected for socioeconomic study in the repository program, almost 93 percent of the land is devoted to farming. The cash receipts from farm marketings in this region for 1982 totaled \$803 million. Livestock sales were the largest single item in the region's agricultural cash receipts. Deaf Smith County accounted for 38 percent of livestock sales for the seven-county region in 1982; this county continues to be one of the most important beef production counties in the United States.

Seed production is another important component of the agricultural industry in Texas. Most of the State's seed is produced in the High Plains area. In the socioeconomic study area, a variety of seeds are produced, including barley, hybrid field corn, upland cotton, oat, hybrid sorghum, soybean, wheat, rye, peanut, and sorghum sudangrass. These seeds are used in commercial farming. The Texas Department of Agriculture estimates that 157,750,122 pounds of seed were produced in the seven-county study area and sold in the state of Texas in 1984².

The major employment sectors in the study area are government (18 percent), retail trade (15 percent), services (14 percent), manufacturing (10 percent) and agriculture (10 percent). Some of these employment sectors support or are closely related to the regional agricultural industry. For example, in the manufacturing sector, production of food and food products, agricultural chemicals and fertilizers, and farm equipment compose 40 to 50 percent of the sector.

In a recently published report by the Texas Department of Agriculture³, "Economic Effects of a High-Level Nuclear Waste Repository: A Survey of Businesses in Deaf Smith, Oldham and Swisher Counties", the authors concluded that although agricultural activity was present in all sectors of the local economy, it was difficult to determine the amount of activity from published data sources. The use of broad economic categories and the classification process makes it difficult to determine the number and size of agriculturally-related businesses.

AGRICULTURAL IMPACTS OF SITE CHARACTERIZATION

In analyzing impacts on agriculture during site characterization, several factors were considered: the amount of land and water required, and type of activities to occur on site. The total land area required and protected for site characterization activities would be 5,760 acres. The estimated 61 acres to be acquired for site characterization are primarily cropland. The total loss in crop receipts projected as a result of this acquisition would be about .1 percent of the projected crop receipts in Deaf Smith County in 1986.

With the removal of 61 acres of land from production, requirements for irrigation water would be displaced by water needs for site characterization activities. The amount of water used to irrigate the 61 acres of cropland is similar to the amount that would be used for site characterization activities. Assuming that 57 percent of the site is currently irrigated, (percentage similar to that found in the county), the average annual project water use during site characterization would be essentially the same as that required to irrigate land in the site area (47 acre-feet compared to 46 acre-feet). Thus, additional agricultural impacts related to project water demands are not projected.

Unlike repository development, site characterization is a testing phase, and radioactive waste will not be emplaced during this time. Therefore, perceptions of contamination of agricultural products and potential impacts on sales associated with those perceptions are not expected during this phase.

AGRICULTURAL IMPACTS OF REPOSITORY DEVELOPMENT

In analyzing agricultural impacts associated with a repository, project requirements for land and water were considered. In addition, perceptions related to nuclear waste emplacement were evaluated.

A high-level nuclear waste repository will require approximately 408 acres for the surface facilities. The site will also consist of the geologic repository underground operations area of approximately 2,240 acres. An additional area of about 3,120 acres will be required to assure control of human activities at the proposed site to preserve the integrity of the site. Residential land requirements associated with in-migrating persons are estimated to total 365 acres in the peak construction

year, 1997 and 228 acres during the operations peak. We assume for the analysis that land needed for residential development would be consumed from agricultural land near urban areas.

We used data on existing conditions in the site area and region as a basis for evaluating the impacts of displaced agricultural land and water requirements. We examined data on the types of crops grown on the site and in the region as well as data on the value of crops and livestock, irrigation practices, and seed production. Table I illustrates the estimated direct effects of the repository on crops and livestock in the region. In the study area in 1997, crop and livestock revenues lost as a result of the project would total \$1.6 million. In 2005, revenue loss is projected to be \$1.7 million (constant dollars). These projected losses represent approximately .1 percent of the regional crop and livestock revenues projected for years 1997 and 2005.

We also considered the indirect effects of crop and livestock reduction in our analysis. Such effects are changes in livestock and poultry purchased; feed for livestock and poultry; animal health costs; seeds, fertilizers, and agricultural chemicals; labor, customwork, and machine hires; and energy petroleum products. (Loss in indirect revenues was calculated by applying the ratio of lost crop/livestock revenue to total crop and livestock revenues to the total estimated production inputs.) The projected decrease in total indirect agricultural business activity is \$2.5 million in 1997 and \$3.0 million in 2005. This represents approximately .2 percent of the projected crop and livestock revenues for both 1997 and 2005.

Water needed for the repository activities and related municipal development will result in demands on ground-water sources. In 1997, the year of peak construction activity, average annual water use is expected to be 80 acre-feet. During this year, in-migrating population is expected to require an additional 370 acre-feet of water for a total of 450 acre-feet. The average annual water use during operation is about 132 acre feet and the in-migrants which are expected to need an additional 358 acre-feet for a total of 490 acre-feet. Comparing the water demands for the repository and in-migrants with equivalent requirements for irrigating land, we found that during 1997 (peak construction) the 450 acre-feet to be used by the project would be significantly less than the 6,718 acre-feet required to irrigate acres in the site area (assuming 57 percent of land on-site is irrigated

TABLE I

Estimated Direct Effects on Crop and Animal Agriculture, Deaf Smith Site, County, and Region
(in 1984 Dollars)

	Estimated Crop Revenues Lost (1997)	Estimated Livestock Revenues Lost (1997)	Total Crop and Livestock Revenues Lost (1997)	Estimated Crop Revenues Lost (2005)	Estimated Livestock Revenues Lost (2005)	Total Crop and Livestock Revenues Lost (2005)
Deaf Smith Site	\$1,325,415	\$203,680	\$1,529,095	\$1,325,415	\$278,720	\$ 1,604,135
Deaf Smith County (including site)	\$1,336,965	\$220,780	\$1,557,745	\$1,336,215	\$297,440	\$ 1,633,655
Deaf Smith Region (including D.S. County and site)	\$1,375,788	\$273,880	\$1,649,668	\$1,372,080	\$348,920	\$ 1,721,000

and 1.3 acre-feet of water per acre is used for irrigation). Thus, there would be a net gain of water available to irrigate 4,822 acres. Similarly, in 2005 (peak operations), there would be a net gain of water available to irrigate 4,792 acres.

In addition to the concern over changes in land and water use resulting from the project, we considered the effects of perceived radiological contamination on the marketability of agricultural products. A public perception that products might be contaminated, even if they are safe to consume, could affect the actions of some agricultural commodity purchasers which, in turn, could have an effect on agricultural businesses in the area.

In our assessment of this issue, we reviewed research literature which had measured business or individual consumer reactions to the possibility that food products might be radiologically contaminated. In studies of the accident at Three Mile Island, a case in which radiological releases did occur, the Pennsylvania Department of Health found that effects on agricultural sales were limited to the week following the accident⁴. The only other food-related decline was in recreational fishing in the Susquehanna River. Fishing was restricted for a period by the Nuclear Regulatory Commission, but the decline did not affect the total-year fish catch⁵.

In our evaluation of potential impacts of perceived contamination on agricultural products, we assumed that three conditions must be present to negatively affect consumer purchases of products grown near a repository: 1) the consumer must be able to clearly identify the product with the locality in which it was grown, 2) the consumer must be aware that a nuclear repository is located in the region where the product is grown, and 3) the consumer must identify the existence of a repository with a health hazard that is transmitted through the food chain.

Because many of the agricultural products grown in the Deaf Smith County area are exported from the region to national and international markets and because most of the products grown in the region are not readily identified with the region, we expect that overall sales for these products will not be affected by the repository project. There could be some decline in sales, however, for particular manufacturers of products such as bottled water, specialized health foods, and hybrid seeds which are identified with the region.

In the recent survey performed by the Texas Department of Agriculture, 24 percent of business owners surveyed indicated that they would close their businesses or relocate if their county were selected for a repository. However, most agricultural businesses surveyed (73 percent) expected to maintain their current patterns of local purchases due to loyalty to local farmers and cost barriers to importing commodities from other areas.

Given the evidence from the actual accident scenario at Three Mile Island, effects on sales from

perceptions are likely to be short-term. As the repository operations are monitored and the public is reassured of its safety, these markets should stabilize. If markets do not stabilize, however, and there is documented evidence of business losses due to the repository program, the state may wish to consider asking the DOE for compensation as part of its socio-economic impact assistance request.

PLANS FOR FUTURE RESEARCH

The agricultural impact analysis in the Environmental Assessment focuses on the resources to be used by the repository and compares their use with resources used in current agricultural practices. Our analysis indicates that water use will be similar to or less than current water use and that diversion of the land to repository activities will cause a loss of less than one percent of the agricultural revenues in the region. Our analysis of the impacts of perceived contamination provides a systematic view of the types of businesses that would and would not be affected.

If a Texas site is selected for site characterization, we will perform additional analyses of agricultural markets and potential impacts of the repository project. An economic base study will be conducted to provide an in-depth understanding of the businesses in the region and the interactions between agricultural producers and consumers. Such a study will provide information on where businesses are getting inputs for their products and where their final products are being sold. In addition, agricultural land values in the region will be monitored so that changes resulting from DOE activities can be identified. Public attitudes and perceptions of the repository program will also be examined as they may affect purchasing behavior. The analyses done during the several years of site characterization will provide a thorough evaluation of the agricultural issues which are of concern to state and local residents.

REFERENCES

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