

6 ALTERNATE FMF SITE

As a result of the siting process (Appendix A), an alternate site was evaluated for the Fuel Materials Facility (FMF). This site is located on the Oak Ridge Reservation (ORR) in Tennessee. This chapter describes its affected environment and the environmental consequences associated with its development. It discusses only those subjects for which the potential differences between the Savannah River Plant and the Oak Ridge Reservation would be appreciable.

6.1 AFFECTED ENVIRONMENT

The alternate FMF site consists of 15 acres on the 37,000-acre Oak Ridge Reservation. The Reservation is located in Anderson and Roane Counties, Tennessee, on Melton Hill Lake, a dammed portion of the Clinch River that is controlled by the Tennessee Valley Authority (TVA) (Figure 6-1). The FMF site is to the west of the Y-12 Plant near the Y-12 Burial Ground, north of Bear Creek between Pine Ridge and Chestnut Ridge. The City of Oak Ridge is some 2.8 kilometers (1.7 miles) to the northeast on the far side of Pine Ridge. Knoxville is about 25 kilometers to the east.

Anderson, Roane, Morgan, Knox, and Loudon Counties in the ORR area have a combined population of 480,622. Only Knox County experienced a steady population growth (in excess of 10 percent per decade) during the 20-year period from 1950 to 1970. Since 1970, all five counties and all major communities except the City of Oak Ridge experienced population increases--an average of about 1.6 percent per year.

Within 10 kilometers of the Oak Ridge Reservation the land use is predominantly rural; water bodies, agriculture, and forests constitute 78 percent of the total area. Urban and builtup areas account for another 22 percent.

In the five-county area surrounding the Oak Ridge Reservation, public services generally can accommodate additional service demands. Most school districts have enough physical capacity to accommodate more students than are currently enrolled because of declining enrollments, consolidation programs, or construction plans. Water supply and waste-treatment services also can accommodate additional demand, although capacity problems presently exist or will exist in the near future in some small urban or rural communities and in the City of Knoxville. The average annual increase in housing units in the five-county area from 1970 to 1980 ranged between a low of 2.8 percent in Loudon County to a high of 4.2 percent in both Roane and Morgan Counties. Average annual unemployment rates in the five-county area varied in 1979 from 4.3 percent in Knox County to 8.7 percent in Roane County.

The Oak Ridge Reservation is situated in the Valley and Ridge Province, which is characterized in the area by northeast trending ridges and a trellis drainage pattern. Two major faults are present on the Reservation, but they are believed to be noncapable.

The FMF site elevation is above that of the probable maximum flood or of a seismically induced dam break of the Norris and Melton Hill dams. Bear Creek, which has a very low flow, originates in the Y-12 Plant area and empties in East Fork Poplar Creek. New Hope Pond, a settling basin in the Y-12 area, is the headwaters for East Fork Poplar Creek. The Y-12 National Pollutant Discharge Elimination System (NPDES) compliance point is at the discharge of New Hope Pond.

Daytime winds are usually southwesterly and nighttime winds are northeasterly. Wind speeds are somewhat decreased by the mountains and ridges. Temperatures in the area are in the moderate range, with average winter and summer temperatures of 5° and 27°C, respectively.

Low-level temperature inversions can be expected in eastern Tennessee approximately 57 percent of the time. Air quality monitoring during 1980 showed that the Oak Ridge Reservation was in compliance with State and Federal ambient air quality standards.

6.2 ENVIRONMENTAL CONSEQUENCES

6.2.1 Construction

6.2.1.1 Land use

Construction of the Fuel Materials Facility on the Oak Ridge Reservation will require approximately 15 acres of land. This is more than twice as much land area than that required at the Savannah River Plant because the ORR site is not in an existing operations area, and because shared services and facilities are more distant.

6.2.1.2 Socioeconomics

The construction of the Fuel Materials Facility is not expected to have significant socioeconomic impacts. Although the expected FMF construction work force is expected to be higher due to site preparation activities and the development of necessary auxiliary facilities, the ORR area has about the same capability to support immigrant construction workers as the SRP area. Therefore, the potential socioeconomic impact of the facility construction on demography, schools, housing, and public services and facilities will be equivalent to or less than construction impacts at the Savannah River Plant.

The regional economic benefits from construction of the facility are expected to be slightly less than those at the Savannah River Plant for similar levels of expenditures. Table 6-1 lists the matrix input/output multipliers developed for a 12-county region around the Reservation.

Table 6-1. ORR regional multipliers^a

| <u>Industrial sectors significantly affected by FMF</u> | | | | | |
|---|----------------------------------|-----------------------------------|---|---|---|
| <u>Multipliers</u> | <u>New building construction</u> | <u>New warehouse construction</u> | <u>Industrial organic and inorganic chemicals</u> | <u>Special industry equipment^b</u> | <u>Engineering, accounting, legal, and related services</u> |
| Income | 2.11 | 2.13 | 1.60 | 1.63 | 1.29 |
| Employment | 1.74 | 1.82 | 2.64 | 1.78 | 1.24 |

a. Region defined as the following counties in Tennessee: Anderson, Blount, Campbell, Cumberland, Knox, Loudon, McMinn, Monroe, Morgan, Roane, Scott, and Union.

b. Not included in other sectors.

6.2.1.3 Water quality and ecology

Construction water will be obtained from Melton Hill Lake via a large water main that passes near the site. This water will be treated by the Oak Ridge Water Treatment Plant. Site development activities would be more extensive than those required at the Savannah River Plant, but impacts from erosion and sedimentation and from construction waste-water discharge are expected to be insignificant, because erosion and construction waste-water control plans will be adopted. The shale bedrock at the ORR site acts as a downward barrier to the transport of ground water.

The site preparation and construction of the Fuel Materials Facility will displace 15 acres of mature mixed hardwood forest. Clearing this land for construction will displace arboreal and cavity-nesting wildlife, and will necessitate the removal of marketable timber and the disposal of the remaining slash. The displaced wildlife will be lost unless they can compete successfully with the fauna of adjacent habitats. No threatened or endangered flora or fauna are known to inhabit the site. In addition, the site contains no wetlands, unique natural areas, or other habitats critical to the perpetuation of protected or unique biota. Other ecologic impacts will be similar to those at the Savannah River Plant.

6.2.2 Operation

6.2.2.1 Socioeconomics

The operation of the Fuel Materials Facility is expected to require a slightly higher work force because of increased distances to other operating areas. The potential socioeconomic impacts in the ORR region would be equivalent to those in the SRP region. The regional economic benefits per dollar of operating expenditure, however, would be slightly less at Oak Ridge due to the differences in the matrix input/output multipliers.

6.2.2.2 Water quality and aquatic ecology

About 200 liters per minute of domestic and process water will be received from Melton Hill Lake via a large water main leading from the Oak Ridge Water Treatment Plant. The impact from this withdrawal will be insignificant. Waste water will be discharged to Bear Creek. No adverse impacts on stream water quality or aquatic ecosystems are anticipated.

6.2.2.3 Radiological impact

Table 6-2 summarizes the radiological impacts of normal FMF operations, in terms of radiological doses to the maximally exposed offsite individual and to the general population. The results indicate that these doses are expected to be extremely small.

6.3 FACILITY ACCIDENTS

The analysis of the risk due to incidents and accidents at the ORR site paralleled that for the SRP site. Table 6-3 summarizes the results of the risk analyses. The overall impacts of FMF incidents are considered to be small from a radiological viewpoint.

6.4 TRANSPORTATION

The results of the radiological impact analysis indicate that the doses to the maximally exposed individual located along a route where incoming and outgoing shipments pass is about 2×10^{-4} millirem per hour, which is small compared to the natural background of 125 millirem per year. The dose to the general population is estimated to be 1.9×10^{-4} man-rem per year.

6.5 COMPOSITE IMPACTS

Several major projects are planned at or near the Oak Ridge Reservation, including the Clinch River Breeder Reactor, Elmo Bumpy Torus II, and the Tennessee Synfuels Associates' synthetic fuels plant. The composite socioeconomic impact of the Fuel Materials Facility at the ORR site is expected to be equivalent to the impact that could occur in the SRP area.

Total 1978 ORR operations were estimated to have resulted in a population dose of 5.6 man-rem. The operation of the Fuel Materials Facility would result in an increase of 0.7 percent in the population dose. Compared to background doses, estimated to be 7.4×10^4 man-rem to the population within 80 kilometers, the FMF operation at the Oak Ridge Reservation is considered to have a negligible radiological impact.