IV. UNAVOIDABLE ADVERSE EFFECTS

This section describes adverse effects on the environment from effluents from waste management operations that cannot be eliminated as long as plant production facilities are operating, and the remaining adverse effects from continuing waste storage operations.

A. EFFECTS ASSOCIATED WITH PRODUCTION OPERATIONS

The most significant adverse effect caused by effluents from normal waste management operations at the Savannah River Plant is the small offsite population dose commitment from the release of radionuclides to the atmosphere. For 1975, this dose was calculated to be 115 man-rem to a population of 668,000 within a 100-km radius of the center of the plant. This value is 0.15% of the population dose from natural radioactivity. The releases are primarily tritium (as water vapor) and noble gases in large volumes of ventilation air. Some dose to the population is unavoidable because complete elimination or recovery of these releases is technically and economically impractical. However, the annual dose from SRP atmospheric releases could conceivably be reduced up to 20% by a combination of methods under study as described in Section V, if these methods are shown to be technically and economically feasible.

The offsite population dose from releases of radionuclides to plant streams in 1975 was calculated to be 15.5 man-rem to a downstream population of 70,000. This is 0.2% of the population dose from natural radioactivity. Nearly all of this dose was caused by tritium releases. The annual dose from SRP releases to streams could perhaps be reduced by up to 30% with identified alternatives under study (Section V).

Other small effects are caused by thermal effluents. Water is pumped from Par Pond or the river to remove the heat generated by nuclear fission in the 3 operating production reactors. This water cools to near ambient temperatures as it flows back through Par Pond or to the Savannah River through existing stream beds and the river swamp. Although effects on the river itself are small (Section III), the large flow of hot water changes the characteristics of several plant streams and some areas of the swamp. Over one-third of the trees and plants in the beds of Four Mile Creek, Pen Branch, and Steel Creek and in about 1200 acres (16%) of the swamp have been killed by exposure to high water or hot

water. No additional adverse thermal effects are anticipated from future operations. Since the high flow discharge of hot water to Steel Creek was discontinued in 1968, fish have returned and plant life has made a partial recovery.

Other small effects result from the release of SO_2 and fly ash from the coal-fired power plants. SO_2 emissions are at or below 65% of the South Carolina emission standard. These emissions are believed to be unavoidable because low-sulfur coal is already being burned and alternative fuels are impractical because of energy conservation requirements. Should high-sulfur coal have to be substituted for any of the low-sulfur coal now being utilized, SO_2 emissions would increase, and possibilities for removal of SO_2 from the stack gases would be investigated. Emissions of fly ash exceed S. C. standards by as much as 5 times. The fly ash emissions from the largest powerhouse, 484-D, have been reduced to well below the standards by the electrostatic precipitators installed in 1975. Possible corrective actions for the smaller powerhouses onsite are planned or under study (see Section V).

B. ADVERSE EFFECTS FROM WASTE STORAGE OPERATIONS

The potential adverse effect of SRP radioactive waste storage operations is the potential for release from unlikely accidents. This potential will continue after the generation of waste ceases, but will be reduced by the radioactive decay of the constituents (primarily ^{137}Cs and ^{90}Sr that decay with a half-life of about 30 years), evaporation of high-level liquid waste supernates to a less mobile crystallized salt, and construction of storage tanks of improved design. Plans are also being developed for eventual conversion of the wastes to a more stable form. This improved form and its containers will further reduce the potential for accidental release. The waste will still be retrievable for improved methods or locations of storage that are developed in the future.

Other unavoidable effects are the continuing slow releases of tritium and ^{90}Sr from seepage basins through the ground water to plant streams, and the slow release of ^{137}Cs that was previously deposited in stream beds and the swamp.

Of the 420,000 Ci of tritium discharged to the F- and H-Area seepage basins since 1955, about 97,000 Ci have migrated to Four Mile Creek (8900 Ci during 1975). An estimated 110,000 Ci (total) have evaporated, and 120,000 Ci have decayed. Of the 233,000 Ci of tritium discharged to the K-Area 50-million-gallon basin since 1965, about 84,000 Ci have migrated to Indian Grave Branch and Pen Branch (15,800 Ci in 1975), and an estimated 60,000 Ci (total) have decayed; no estimate has been made of the evaporation.

Of the total of 75 Ci of ^{90}Sr discharged to the F and H seepage basins, about 9 Ci have migrated to Four Mile Creek (1.1 Ci in 1975). A total of 12 Ci have decayed.

Approximately 200 Ci of ^{137}Cs is estimated to be deposited in streambeds above the Road A crossings (Figure II-2). Another 200 Ci is estimated to be deposited in the stream beds and swamp below Road A, including about 25 Ci in the offsite swamp below the plant boundary. An estimated 0.2 Ci reached the river in 1975 (Appendix A, Table A-4) as a net result of sorption and desorption from stream beds and the Savannah River swamp.