

APPENDIX A

COMPILATION OF RELEASES OF RADIOACTIVE MATERIALS FROM THE SAVANNAH RIVER PLANT

This appendix consists of a compilation of radioactivity release data accumulated since plant startup and a list of miscellaneous radioactive waste in soil. Additional information regarding releases to specific seepage basins and other unlined earthen basins is given in the report, *Control and Treatment of Radioactive Liquid Waste Effluents at the Savannah River Plant.*¹

RADIOACTIVE RELEASE DATA

Some small releases of natural uranium to settling ponds that overflow to surface streams occurred in 1952 and 1953 during preparations for startup of the Savannah River Plant. Other radionuclides were not released until 1954, the first year of operation of SRP reactors. The pre-startup releases of uranium are included in the appropriate tables.

Explanatory footnotes accompany many tables. In addition, the following general comments apply to all tables:

1. **Specific Nuclide Analysis.** During the 1950's, most data was derived from gross alpha and gross nonvolatile beta-gamma analyses, supplemented by radiochemical separations and measurement of critical nuclides in composited samples. The state of the technology of radioanalysis in those years did not permit routine, running records of releases of specific radionuclides. Early in the 1960's, improvements in gamma spectrometry and low level beta counting, combined with automation and reduction of data by computer, allowed a more detailed analytical program of individual radionuclides. These improvements are reflected in the appended tables by the appearance of specific isotope release data. Dashes and other blanks indicate releases less than the sensitivity of the analysis or that no analysis was reported.
2. **Accuracy of Data.** Measurement of curie quantities of radioactivity released depends on a number of measurements and analytical techniques, each contributing some degree of imprecision to the final release number. These include such factors as:

- Measurement of flow rates and volumes
- Representative sampling
- Compositing and aliquoting of samples
- Analytical recovery
- Counting statistics (including self-absorption, scatter, counter efficiency, background, etc.)
- Human errors in data processing

During the 1950's, it is judged that curie releases are accurate to $\pm 50\%$ because of these variables. Improvements in the 1960's reduced this to about $\pm 30\%$.

3. Decay Corrections. Annual releases are decay corrected as if the releases occurred during the middle of the year. Where analytical techniques did not permit separation of nuclides, e.g., $^{95}\text{ZrNb}$, $^{103,106}\text{Ru}$, $^{134,137}\text{Cs}$, $^{141,144}\text{Ce}$, etc., the longest half-life of each pair was used for decay corrections.

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REFERENCE FOR APPENDIX A

1. W. R. Jacobsen, W. L. Marter, D. A. Orth, and C. P. Ross, *Control and Treatment of Radioactive Liquid Waste Effluents at Savannah River Plant*. USAEC Report DP-1349, E. I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S.C, (1974).