Chapter 10

Special Surveys and Projects

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IN addition to routine sampling and special sampling during nonroutine environmental releases, special sampling for radiological and nonradiological surveys is conducted on and off site by personnel from the Savannah River Site (SRS) Environmental Protection Department's Environmental Monitoring Section (EMS) and from other groups, such as the Savannah River Technology Center (SRTC).

Both short- and long-term radiological and nonradiological surveys are used to monitor the effects of SRS effluents on the site's environment and in its immediate vicinity.

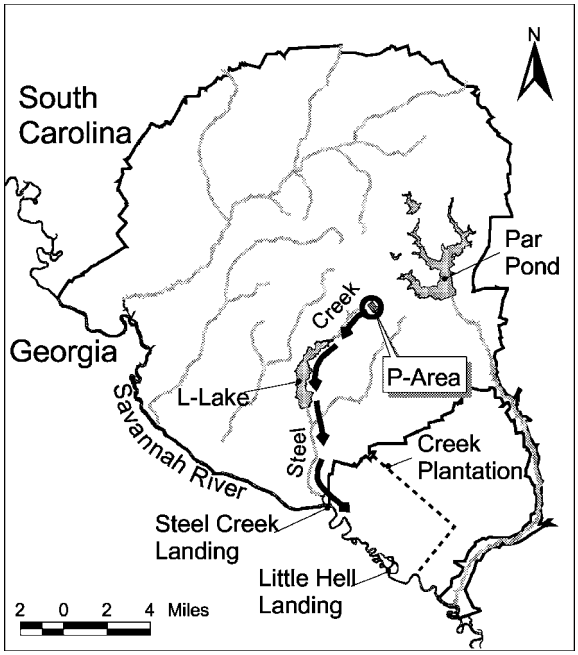
All conclusions discussed in this chapter are based on samples and analyses that have been completed. Because of sampling and/or analytical difficulties, some sample analyses may be missing. These analyses typically are small in number and represent only a very small fraction of the total number of samples. Their exclusion does not affect the results drawn from the data set. Detailed analytical results are presented in *SRS Environmental Data for 2001* (WSRC–TR–2001–00475).

Savannah River Swamp Surveys

Introduction

The Creek Plantation, a privately owned land area located along the Savannah River, borders the southeast portion of SRS. The land is primarily undeveloped and agricultural; it is used in equestrian-related operations and is a recreational hunt club. A portion of Creek Plantation along the Savannah River is a low-lying swamp known as the Savannah River Swamp, which is uninhabited and not easily accessible.

In the 1960s, an area of the Savannah River Swamp on Creek Plantation—specifically, the area between Steel Creek Landing and Little Hell Landing—was contaminated by SRS operations (figure 10–1). Failed experimental fuel elements leaked activity into the



SRTC Map

Figure 10–1 Swamp Contamination
Radioactivity released from SRS operations contaminated the Savannah River Swamp between Steel Creek and Little Hell Landing—an area outside the SRS boundary—during the 1960s. Approximately 25 Ci of cesium-137 and 1 Ci of cobalt-60 were released from the P-Area storage basin to Steel Creek and migrated downstream to a part of the swamp.

P-Area storage basin, from which water occasionally was discharged to Steel Creek. During high river levels, water from Steel Creek flowed along the lowlands comprising the swamp, resulting in the deposition of radioactive material. This water eventually discharged to the Savannah River at Little Hell Landing, contaminating a portion of the Savannah River Swamp. SRS studies estimated that a total of approximately 25 Ci of cesium-137 and 1 Ci of cobalt-60 were deposited in the swamp.

In 1974, a series of 10 sampling trails was established through the swamp, ranging in length from 240 to 3,200 feet (figure 10–2). Fifty-two monitoring

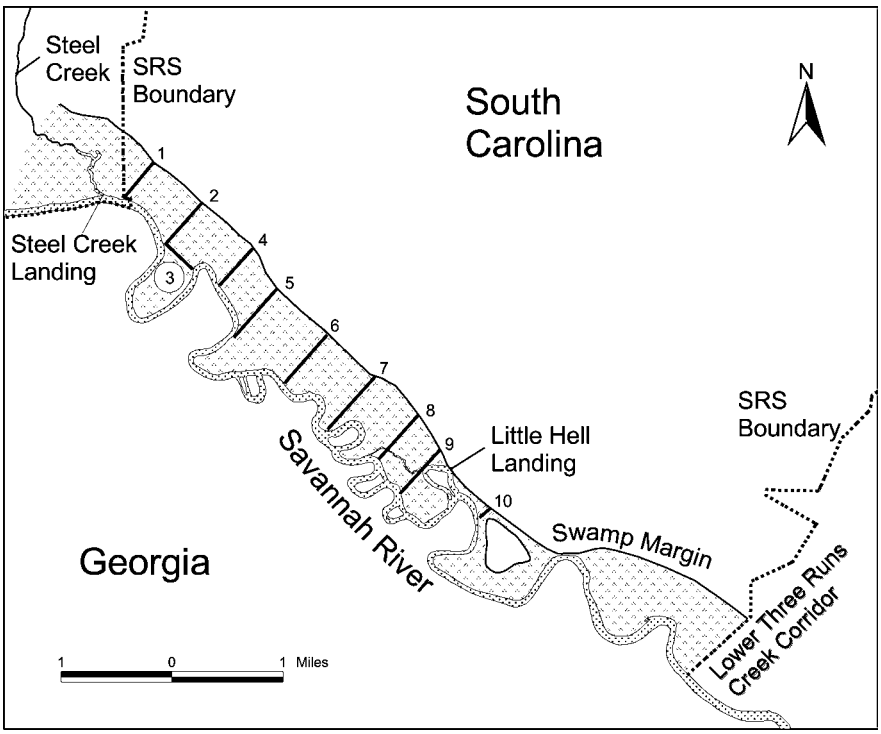


Figure 10–2 Savannah River Swamp Sampling Trails

Ten sampling trails were established in the Savannah River Swamp in 1974 so that surveys could be conducted on the movement of contamination from SRS operations.

SRTC Map

locations were designated on the trails to allow for continued monitoring at a consistent set of locations. Comprehensive and cursory surveys of the swamp have been conducted periodically since 1974. These surveys measure radioactivity levels to determine changes in the amount and/or distribution of radioactivity in the swamp. A cursory survey was conducted in 2001.

Details – 2001 Survey

The 2001 survey was conducted from early June through early September. Cursory surveys are conducted to provide assurance that conditions observed during the more detailed comprehensive surveys have not changed significantly. During cursory surveys, soil and vegetation samples are collected from one location per trail—typically at or near the area of highest observed activity. During the 2001 survey, soil samples were collected from seven of the 10 trails and vegetation samples from nine of the 10 trails.

Analytical Results

All 2001 survey samples were analyzed for gamma-emitting radionuclides, and all vegetation samples were analyzed for total strontium. However, laboratory problems prevented the analysis of soil samples for total strontium. As anticipated, based on source term information and historical survey results, cesium-137 was the primary radionuclide detected. Also, total strontium was present at low concentrations in one vegetation sample.

Cesium-137 was detected in all the soil and vegetation samples. Cesium-137 concentrations varied from approximately 0.2 to 77 pCi/g in soil, and from approximately 0.2 to 26 pCi/g in vegetation. These concentrations are consistent with historical results. In general, higher levels of cesium-137 in soil were observed in the trails closer to the SRS boundary, although somewhat elevated levels in soil were observed as far away as approximately 2 miles (trail 5).

As observed in previous surveys, the vertical distribution profile in soil—that is, the variation of contaminant concentration with depth in a soil column—is not as pronounced in the swamp, where significant scouring and/or deposition is possible, as it is in areas of undisturbed soil. These results indicate some movement (mobilization, movement and/or redeposition) of contamination in the swamp. No elevated cesium-137 levels were observed in samples from trail 10, indicating that the area of contamination has not spread beyond the current survey area boundary.

Cobalt-60 was not detected in any sample, while total strontium was detected in one of the nine vegetation samples.

Thermoluminescent dosimeter (TLD) sets were placed at all 54 monitoring sites to determine ambient gamma exposure rates. All the 50 sets were retrieved from the swamp; the exposure time varied from 43 to 84 days. The gamma exposure rate ranged from 0.19 to 0.74 mrem/day, which is consistent with the range observed in the 2000 survey—the most recent in which exposure rates were determined.

The highest exposure rates were measured on trails 1, 4, and 5. This follows the trends observed in previous surveys. Because of the limited scope of soil sampling, correlations between gamma exposure rate and cesium-137 concentrations in soil could not be examined.

Conclusion

Results of the 2001 survey of the Savannah River Swamp generally were consistent with those observed in previous surveys. Over time, some changes in the spatial distribution of activity throughout the swamp have been observed, which means that some localized movement of activity may be occurring. However, there has been little change in the results from the downstream location (trail 10), which indicates that activity is not migrating out of the identified contaminated area.