

Tritium at the Steel Creek Landing

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Tritium at the Steel Creek Landing

*A discussion of recent sampling results from WSRC's Environmental Monitoring Section
and the South Carolina Department of Health and Environmental Control*

January 23, 1998

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Summary

In December 1997 and January 1998, the South Carolina Department of Health and Environmental Control (SCDHEC) collected routine weekly grab samples from the Savannah River near the Steel Creek Boat Landing. The samples from December 30 and January 5 showed atypically high tritium concentrations (around 20 pCi/mL, compared with typical concentrations of 1 to 3 pCi/mL). The Environmental Monitoring Section (EMS) of Westinghouse Savannah River Company (WSRC) investigated and found no abnormal tritium releases to the Savannah River. Portions of SCDHEC's samples were provided to EMS for confirmatory analyses, and EMS confirmed SCDHEC's results. Investigation of prior studies of the Savannah River revealed firm evidence that the elevated tritium concentrations originated in Four Mile Creek and Pen Branch and that they appeared in SCDHEC's samples as a result of (1) incomplete mixing of stream water and river water and (2) differences in the sampling locations and methods."

Details

Tritium in the Savannah River

SCDHEC's weekly sample from December 30 showed a tritium concentration of 19.6 pCi/mL. The Savannah River's tritium concentration typically is 1 to 3 pCi/mL.

Normally, the largest contributions of tritium in the Savannah River originate in tritiated groundwater that migrates into Four Mile Creek and Pen Branch. Concentrations in Pen Branch and Four Mile Creek typically are 100 and 200 pCi/mL, respectively. In 1996, site streams transported about 8000 curies of tritium to the Savannah River. Of the 8000 curies, about 4600 curies were transported by Four Mile Creek, and about 2300 curies were transported by Pen Branch. All other streams combined transported about 1000 curies [*SRS Environmental Data for 1996*, WSRC-TR-97-0077, p.26). Because Four Mile Creek and Pen Branch account for most tritium in the Savannah River, they are identified as likely sources of the tritium in SCDHEC's samples of concern.

Additional smaller sources of tritium in the Savannah River include process water discharged into Beaver Dam Creek at D-Area, ETF discharges into Upper Three Runs Creek, and small amounts from PAR Pond and Steel Creek.

Sampling Locations

EMS and SCDHEC maintain networks of sampling locations. Data from multiple stations are compared routinely. EMS monitors tritium in the Savannah River at several locations and in each site tributary to the river. Sampling points are shown in figure 1. EMS sampling devices work continuously, and samples are collected and analyzed weekly. EMS samples are collected from sections of the river at which flow is always available for sampling. SCDHEC's grab samples are taken near the river bank. When the river's water level rises, SCDHEC's sampling points recede landward.

EMS quantifies the amount of tritium discharged to each site stream, the tritium transported by each stream, and the tritium transported by the river. Any abnormal result from any single station can be confirmed or refuted by data from other stations. EMS's key sampling locations for this study are located at River Mile 120 (Highway 301 Bridge) and River Mile 140 (just downstream of the Steel Creek Mouth). Sampling stations on each site tributary contribute supporting data.

In this case, EMS evaluated samples collected from each tributary and from the Savannah River stations at the same times that SCDHEC's samples of concern were collected. None showed abnormally high tritium concentrations. Likewise, SCDHEC's weekly composite samples from the Savannah River showed no abnormally large tritium transport in the river.

The initial interpretation was that incomplete mixing of low-tritium water in the Savannah River and high-tritium water from Four Mile Creek and Pen Branch caused the water near the bank at Steel Creek Landing to show elevated tritium concentrations, while fully mixed downstream river water showed normal levels of tritium.

Previous Studies

Three previous SRS studies were identified as relevant to interpreting the observed conditions.

In March 1983, thermal infrared aerial photographs surveyed parts of the Savannah River where site tributaries discharged hot water. Conditions at the time of this survey included a high river stage and a flooded swamp. The photographs (reproduced in figure 2) show clearly that in this flow regime, waters discharged from Four Mile Creek and Pen Branch emerge into the swamp and migrate close to the river bank for several miles, then merge and mix with the main river flow downstream of Steel Creek landing.

In August 1991, thermal infrared aerial photographs were taken in the same area. Conditions at the time of this survey were low river flow, without swamp flooding. The photographs show clearly that in these conditions, waters from Four Mile Creek and Pen Branch enter the Savannah River and mix thoroughly within 2000 feet of downstream flow. These photographs are reproduced in figure 3.

In February 1990, under conditions of high river flow and flooded swamp, water samples were collected in a transect from the submerged normal riverbank location landward toward the floodstage riverbank. Analyses of these samples showed low tritium concentrations in the river channel and near the normal bank. Concentrations were low along most of the transect but were elevated for the few hundred feet of swamp nearest the temporary bank. Analytical data from this study are shown in figure 4.

Current Data

SCDHEC's weekly grab samples from 1997 occasionally show elevated tritium concentrations. The highest concentrations observed coincide with high river stage and swamp flooding. Weekly composite samples from EMS's samplers at the Highway 301 Bridge show a decreased concentration of tritium when the river flow is high. The Savannah River stage, as reported by the U.S. Army Corps of Engineers at their Jackson gauging station, is shown in figure 5. Note that the periods of highest flow in the last year occurred in March, May, and December, which coincide with times of elevated tritium concentrations in SCDHEC's weekly grab samples. SCDHEC's weekly sample results are reproduced in attachment 1. Composite samples from the same periods show depressed tritium concentrations, as would be expected when a fairly constant source of tritium in SRS streams is diluted by high river flow. Results from 1997 composite sample analyses are shown in table 1.

Conclusions

Historical studies have shown two distinctly different patterns in the mixing of water from the Savannah River with water from two tributaries, Four Mile Creek and Pen Branch. It is expected that the mixing pattern shown in the thermal infrared aerial photographs applies to tritiated water in the tributaries, as well as to hot water. This conclusion was confirmed with a sampling study in 1990.

When the Savannah River stage is high, the swampy area along SRS is flooded, with average water depth of a few feet, and with slow low-turbulence flow. Under these conditions, Four Mile Creek and Pen Branch water enters the swamp and stays close to the bank. This water does not disperse and mix fully with Savannah River water until it moves downstream past the Steel Creek Landing.

When the Savannah River stage is low, Four Mile Creek flows through a well-defined mouth directly into the river channel and mixes thoroughly with river water within a few thousand feet.

Regardless of river stage, the Savannah River at the Highway 301 Bridge is fully mixed with all tributaries that cross SRS.

SCDHEC grab samples collected at the water's edge during high-flow conditions would be expected to reflect Four Mile Creek and Pen Branch water that has not been mixed completely with Savannah River water. The incomplete mixing leads to tritium concentrations in those samples that do not represent tritium concentrations in the main flow of the Savannah River. December 1997 samples from downstream and from the two tributaries did not show unusual tritium levels.

Figure 1 Sampling Locations

Reproduced from *SRS Environmental Data for 1996*, WSRC-TR-97-0077

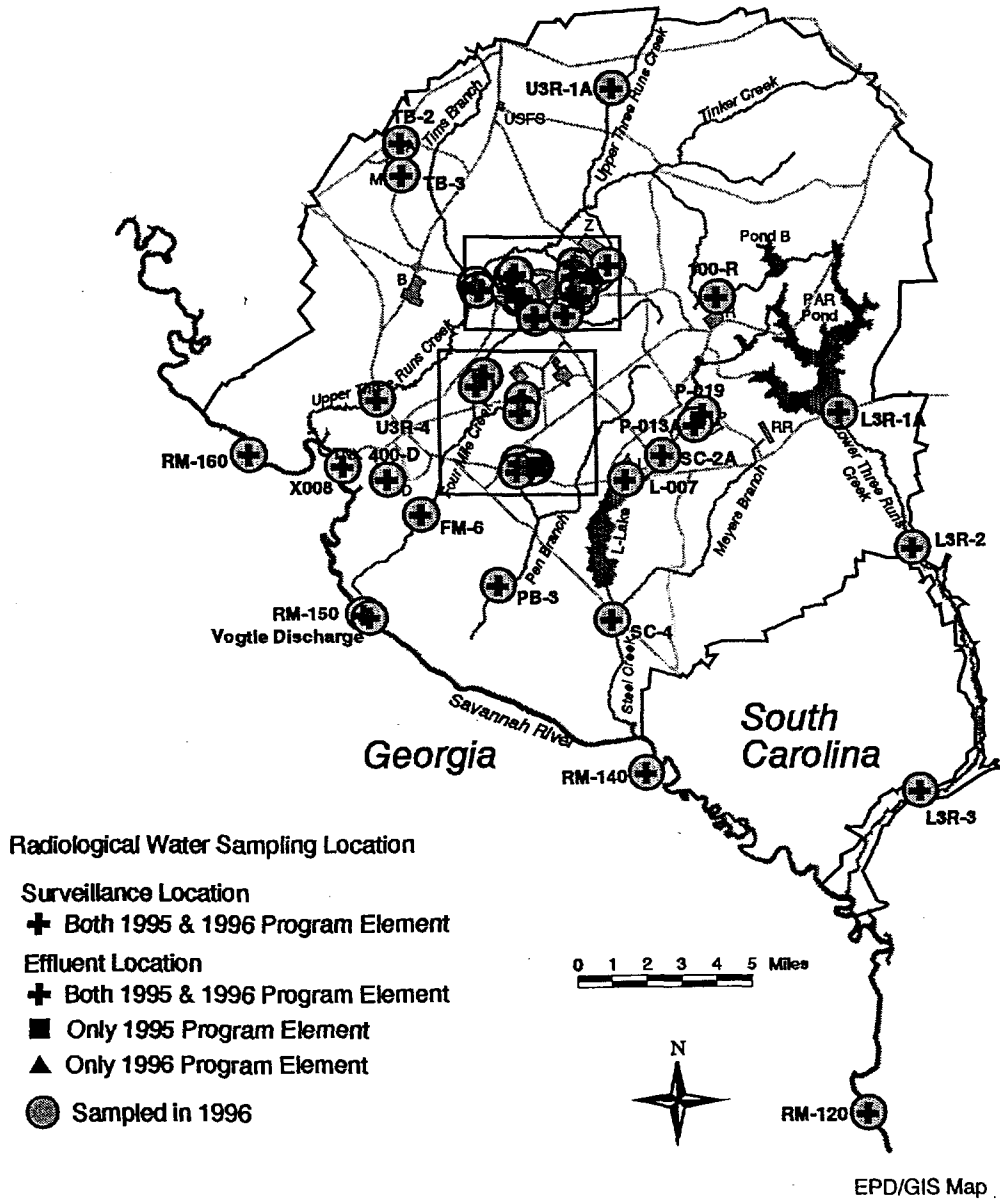


Figure 2 Aerial Photograph, Thermal Infrared Image At High River Stage

This figure shows the flow pattern of hot-water discharge from Four Mile Creek and Pen Branch into the Savannah River Swamp. The left side of the figure shows the discharge from Four Mile Creek and from Pen Branch. The right side of the figure shows (1) the adjoining downstream section of the swamp and (2) how the heated water from Four Mile Creek and Pen Branch maintains its identity close to the bank for about 5 miles. The lower edge of the right-hand panel shows where the swamp narrows at the Steel Creek Landing. Note that the hot water's thermal infrared signature does not enter the river's main channel until some point downstream of the mouth of Steel Creek.

This image was duplicated from *A Thermal Infrared Survey of the Savannah River Plant, Aiken, South Carolina, Winter Survey*, DOE/ONS-8317. The survey was conducted March 12, 1983. The report was issued by EG&G Energy Measurements in December 1983.

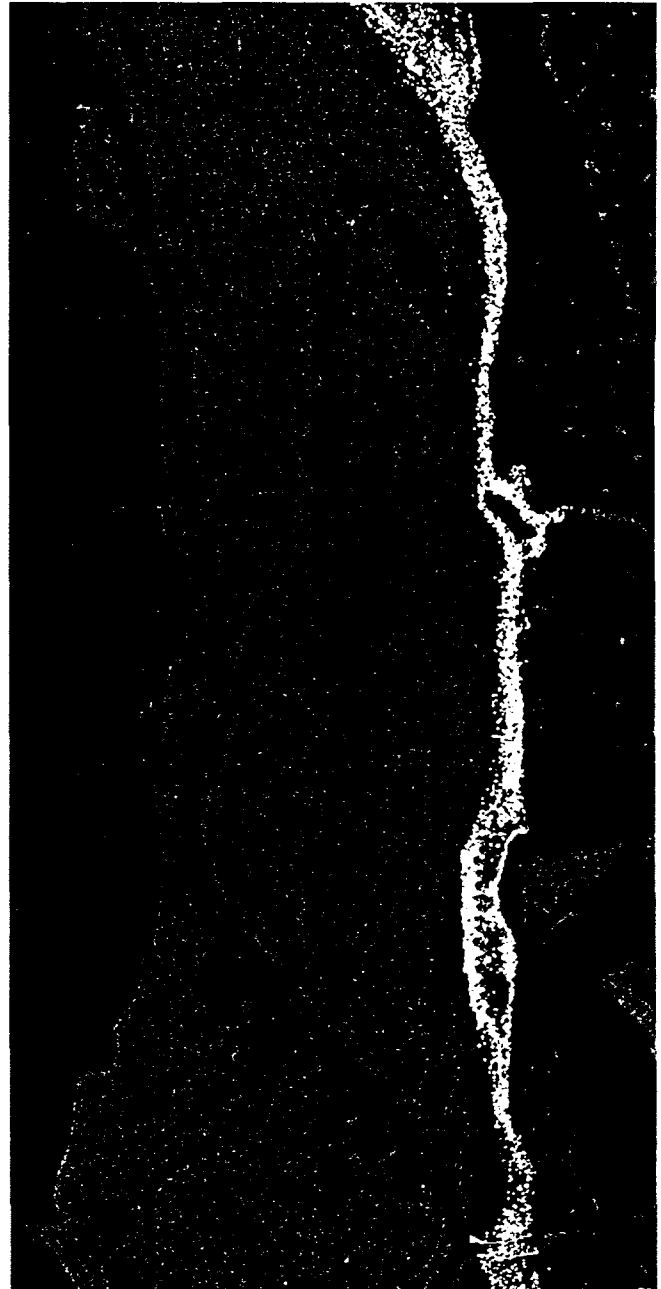
SAVANNAH RIVER PLANT

MARCH 12, 1983

COMPOSITE IMAGE OF SAVANNAH RIVER AND SWAMP

UPPER SECTION

LOWER SECTION



1 2.8 5 10
TEMPERATURE
ABOVE RIVER AMBIENT
(°C)

0 4000 8000
APPROXIMATE SCALE
(FEET)

Figure 2 Aerial Photograph, Thermal Infrared Image at High River Stage

Figure 3 Aerial Photograph, Thermal Infrared Image At Low River Stage

This figure shows the flow pattern of hot-water discharge from Four Mile Creek into the Savannah River. The left side of the figure shows the discharge from Four Mile Creek on March 28, 1981. The right side of the figure shows the same area in August 1981. Note that the discharge from Four Mile Creek enters the main channel of the Savannah River and mixes enough to lose its temperature differential in a few thousand feet.

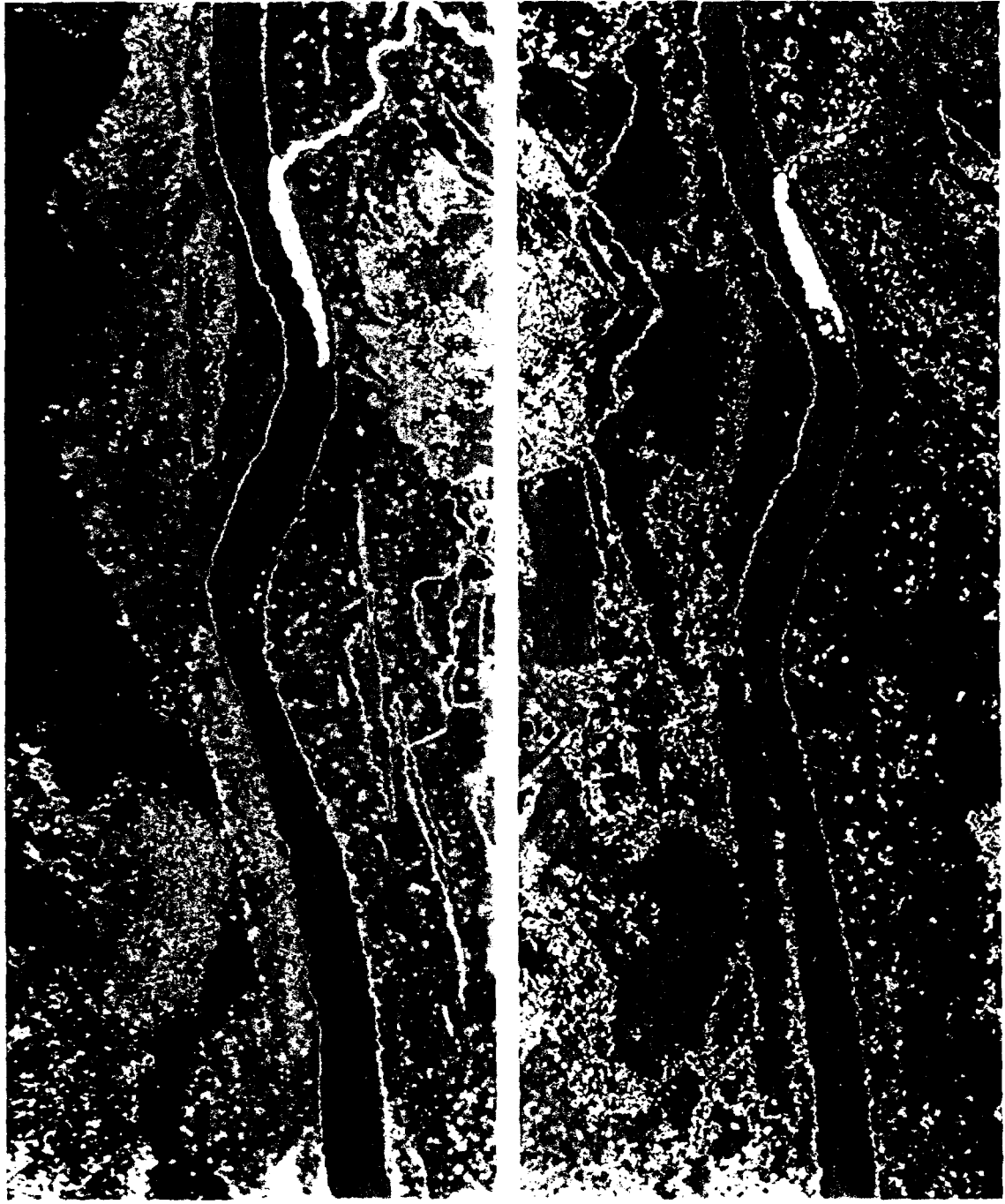
This image was duplicated from *A Study of Thermal Plumes at the Savannah River Plant, Aiken, South Carolina*, EGG-1183-1827. The survey was conducted in 1981. The report was issued by EG&G Energy Measurements in June 1982.

SAVANNAH RIVER PLANT

COMPARISON OF THE THERMAL PLUME FROM FOUR MILE CREEK
IN MARCH AND AUGUST 1981

MARCH 28, 1981

AUGUST 25, 1981



0 2.8

TEMPERATURE
ABOVE RIVER AMBIENT
(°C)

0 1000 2000

APPROXIMATE SCALE
(FEET)

Figure 3 Aerial Photograph, Thermal Infrared Image at Low River Stage

Figure 4 Tritium Concentration Along Steel Creek Landing Road During Flood Stage

This figure, supplied by David Hayes of the Savannah River Technology Center, shows tritium concentrations at various points along the road to Steel Creek Landing while the Savannah River is at flood stage. The distance reference point ("0" on the horizontal axis) is the location of the bank at low flow. Increasing distance shows landward distance from the "normal" bank. At flood stage, the water's edge is about 1600 feet up the road from the "normal" water's edge. Note that tritium is nominally absent from the water except in the 600 feet closest to the water's edge.

**Tritium Concentration Along Steel Creek Landing Road
During Flood Stage, 2/28/90**

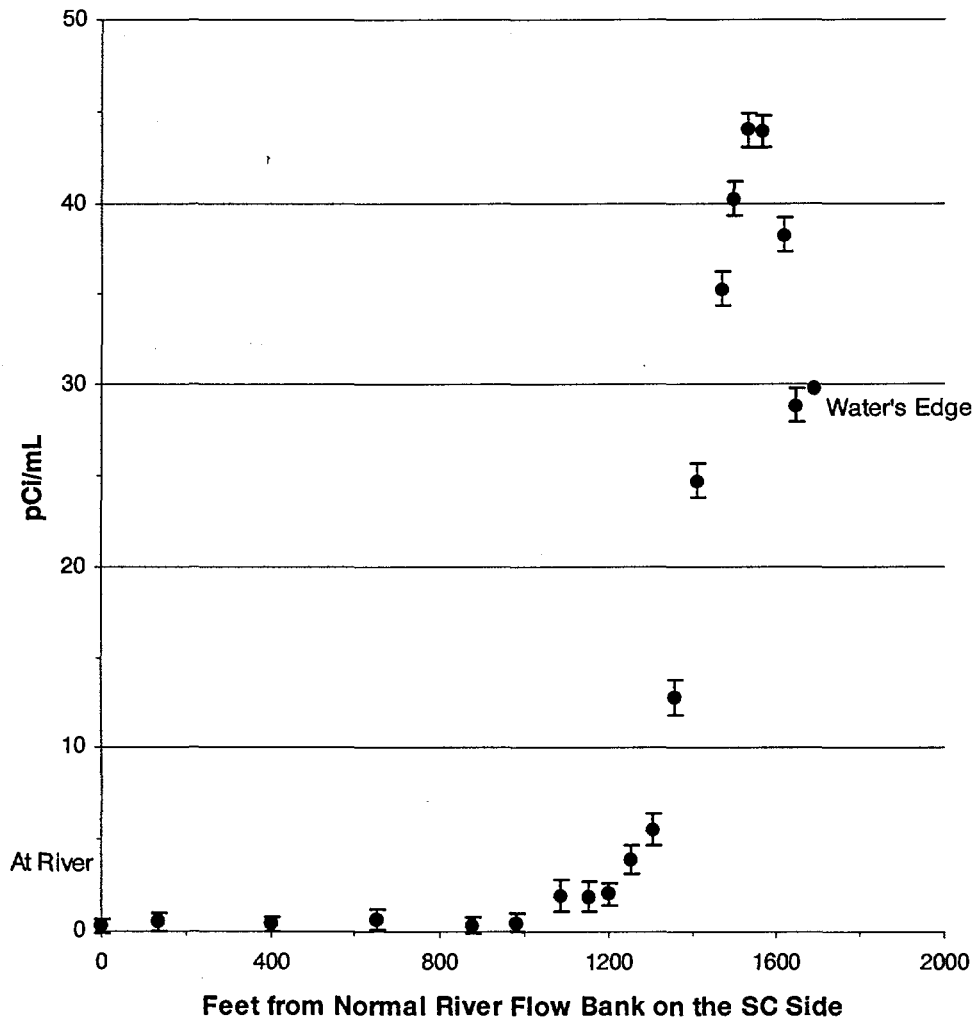


Figure 5 River Stage from January 1997 to January 1998

This figure shows changes in river levels from January 1997 to January 1998. Data are supplied through the U.S. Army Corps of Engineers Website. Note that river stage was at its highest in March and December and also was high in May. SCDHEC's weekly grab samples showed elevated tritium concentrations at Steel Creek Landing February 18 and 25, March 4 and 11, May 6, and December 30. EMS weekly composite samples from River Mile 120 show below-average concentrations for those weeks.

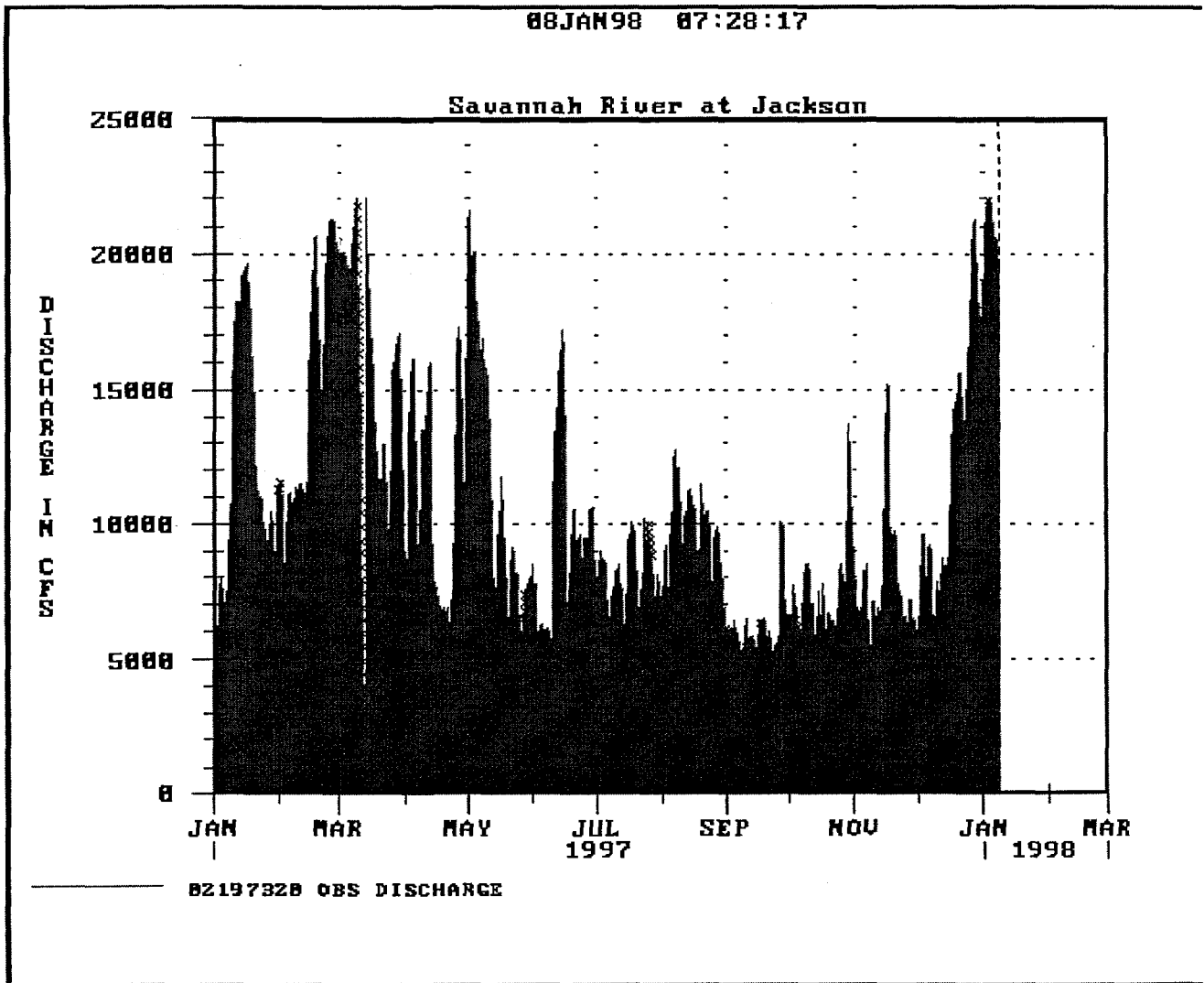


Table 1 Tritium Concentrations in the Savannah River at River Mile 140 (Steel Creek)

Note that these are 1997 weekly composite samples. Steel Creek itself had a fairly stable concentration of tritium throughout the year, ranging from 4 to 8 pCi/mL in SCDHEC's weekly samples. An asterisk in the "Stop Sample" column denotes a grab sample rather than a composite.

Tracking Number	Start Sample	Stop Sample	Sample Days	Activity (pCi/L)	Sigma (pCi/L)	Eff Vol (L)	Release (Curies)
97000485	31DEC96	07JAN97	7	2.10E+03	1.47E+02	**NA**	**NA**
97000486	07JAN97	14JAN97	7	1.48E+03	1.43E+02	**NA**	**NA**
97000487	14JAN97	21JAN97	7	1.31E+03	1.41E+02	**NA**	**NA**
97000488	21JAN97	28JAN97	7	1.59E+03	1.43E+02	**NA**	**NA**
97808088	04FEB97	04FEB97*	0	1.32E+03	1.42E+02	**NA**	**NA**
97001673	04FEB97	11FEB97	7	1.32E+03	1.40E+02	**NA**	**NA**
97001674	11FEB97	19FEB97	8	1.21E+03	1.48E+02	**NA**	**NA**
97001675	19FEB97	25FEB97	6	1.14E+03	1.49E+02	**NA**	**NA**
97002324	25FEB97	04MAR97	7	4.33E+02	1.40E+02	**NA**	**NA**
97002325	04MAR97	11MAR97	7	4.51E+02	1.41E+02	**NA**	**NA**
97002326	11MAR97	18MAR97	7	5.06E+02	1.36E+02	**NA**	**NA**
97002327	18MAR97	25MAR97	7	9.84E+02	1.45E+02	**NA**	**NA**
97003322	25MAR97	01APR97	7	1.20E+03	1.37E+02	**NA**	**NA**
97003323	01APR97	08APR97	7	1.18E+03	1.38E+02	**NA**	**NA**
97003324	08APR97	15APR97	7	8.53E+02	1.34E+02	**NA**	**NA**
97003325	15APR97	22APR97	7	1.59E+03	1.38E+02	**NA**	**NA**
97003326	22APR97	29APR97	7	1.21E+03	1.38E+02	**NA**	**NA**
97004242	29APR97	06MAY97	7	1.09E+03	1.38E+02	**NA**	**NA**
97004243	06MAY97	13MAY97	7	1.05E+03	1.37E+02	**NA**	**NA**
97004244	13MAY97	20MAY97	7	9.82E+02	1.40E+02	**NA**	**NA**
97004245	20MAY97	28MAY97	8	9.16E+02	1.36E+02	**NA**	**NA**
97005624	28MAY97	03JUN97	6	1.84E+03	1.45E+02	**NA**	**NA**
97005625	03JUN97	10JUN97	7	2.88E+03	9.36E+01	**NA**	**NA**
97005626	10JUN97	17JUN97	7	2.43E+03	1.48E+02	**NA**	**NA**
97810279	24JUN97	24JUN97*	0	7.31E+02	1.36E+02	**NA**	**NA**
97006557	24JUN97	01JUL97	7	1.02E+03	1.34E+02	**NA**	**NA**
97006558	01JUL97	09JUL97	8	2.08E+03	1.41E+02	**NA**	**NA**
97006559	09JUL97	15JUL97	6	2.61E+03	1.43E+02	**NA**	**NA**
97006560	15JUL97	22JUL97	7	1.73E+03	1.37E+02	**NA**	**NA**
97006561	22JUL97	29JUL97	7	1.08E+03	1.37E+02	**NA**	**NA**
97006951	29JUL97	05AUG97	7	9.69E+02	1.37E+02	**NA**	**NA**
97006952	05AUG97	12AUG97	7	1.03E+03	1.37E+02	**NA**	**NA**
97007447	12AUG97	19AUG97	7	1.10E+03	1.38E+02	**NA**	**NA**
97007448	19AUG97	26AUG97	7	1.32E+03	1.40E+02	**NA**	**NA**
97008070	26AUG97	02SEP97	7	1.06E+03	1.11E+02	**NA**	**NA**
97008872	02SEP97	09SEP97	7	1.42E+03	1.14E+02	**NA**	**NA**
97008873	09SEP97	16SEP97	7	1.52E+03	1.14E+02	**NA**	**NA**
97008874	16SEP97	23SEP97	7	1.81E+03	1.16E+02	**NA**	**NA**
97808520	30SEP97	30SEP97*	0	1.60E+03	1.48E+02	**NA**	**NA**
97009956	30SEP97	07OCT97	7	8.59E+02	1.42E+02	**NA**	**NA**
97009957	07OCT97	14OCT97	7	1.15E+03	1.38E+02	**NA**	**NA**
97009958	14OCT97	21OCT97	7	1.33E+03	1.15E+02	**NA**	**NA**
97009959	21OCT97	28OCT97	7	1.57E+03	1.17E+02	**NA**	**NA**
97010867	28OCT97	04NOV97	7	1.45E+03	1.47E+02	**NA**	**NA**
97010868	04NOV97	11NOV97	7	1.35E+03	1.16E+02	**NA**	**NA**
97010869	11NOV97	18NOV97	7	1.22E+03	1.15E+02	**NA**	**NA**
97010870	18NOV97	25NOV97	7	1.39E+03	1.15E+02	**NA**	**NA**
97011826	25NOV97	02DEC97	7	1.65E+03	1.17E+02	**NA**	**NA**
97011827	02DEC97	09DEC97	7	1.43E+03	1.17E+02	**NA**	**NA**
97011828	09DEC97	16DEC97	7	2.02E+03	1.21E+02	**NA**	**NA**
97011829	16DEC97	23DEC97	7	7.65E+02	1.18E+02	**NA**	**NA**
97011830	23DEC97	30DEC97	7	1.28E+03	1.21E+02	**NA**	**NA**

Table 2 Tritium Concentrations in the Savannah River at River Mile 120 (Highway 301 Bridge)

Note that these are 1997 weekly composite samples. SCDHEC grab samples showed elevated tritium concentrations at Steel Creek Landing (March, May, December) when the downstream concentrations were low, as would be expected during times of high river flow.

Tracking Number	Start Sample	Stop Sample	Sample Days	Activity (pCi/L)	Sigma (pCi/L)	Eff Vol (L)	Release (Curies)
97000429	31DEC96	07JAN97	7	1.64E+03	1.45E+02	1.02E+11	1.68E+02
97000430	07JAN97	14JAN97	7	8.78E+02	1.39E+02	2.04E+11	1.79E+02
97000431	14JAN97	21JAN97	7	9.25E+02	9.80E+01	3.14E+11	2.90E+02
97000432	21JAN97	28JAN97	7	1.50E+03	1.41E+02	1.83E+11	2.74E+02
97001618	28JAN97	04FEB97	7	1.06E+03	1.41E+02	1.54E+11	1.63E+02
97001619	04FEB97	11FEB97	7	9.42E+02	1.39E+02	1.72E+11	1.62E+02
97001620	11FEB97	19FEB97	8	7.52E+02	1.03E+02	2.84E+11	2.14E+02
97001621	19FEB97	25FEB97	6	8.07E+02	1.46E+02	2.87E+11	2.31E+02
97002264	25FEB97	04MAR97	7	6.26E+02	1.42E+02	3.88E+11	2.43E+02
97002265	04MAR97	11MAR97	7	4.59E+02	1.41E+02	3.84E+11	1.76E+02
97002266	11MAR97	18MAR97	7	5.52E+02	1.36E+02	4.27E+11	2.36E+02
97002267	18MAR97	25MAR97	7	8.24E+02	1.44E+02	2.36E+11	1.95E+02
97003255	25MAR97	01APR97	7	8.50E+02	9.55E+01	2.43E+11	2.06E+02
97003256	01APR97	08APR97	7	1.09E+03	1.37E+02	1.96E+11	2.14E+02
97003257	08APR97	15APR97	7	6.40E+02	9.30E+01	2.05E+11	1.31E+02
97003258	15APR97	22APR97	7	9.89E+02	1.33E+02	1.17E+11	1.16E+02
97003259	22APR97	29APR97	7	7.17E+02	1.34E+02	1.93E+11	1.38E+02
97004185	29APR97	06MAY97	7	1.06E+03	1.37E+02	2.89E+11	3.06E+02
97004186	06MAY97	13MAY97	7	7.90E+02	1.35E+02	2.82E+11	2.22E+02
97004187	13MAY97	20MAY97	7	9.54E+02	1.39E+02	1.49E+11	1.42E+02
97004188	20MAY97	28MAY97	8	8.03E+02	1.37E+02	1.36E+11	1.10E+02
97005565	28MAY97	03JUN97	6	1.83E+03	1.45E+02	1.05E+11	1.92E+02
97005566	03JUN97	10JUN97	7	2.61E+03	9.21E+01	1.02E+11	2.65E+02
97005567	10JUN97	17JUN97	7	4.14E+02	1.37E+02	2.14E+11	8.87E+01
97005568	17JUN97	24JUN97	7	9.87E+02	1.37E+02	1.61E+11	1.59E+02
97006501	24JUN97	01JUL97	7	1.09E+03	1.34E+02	1.56E+11	1.69E+02
97006502	01JUL97	09JUL97	8	1.88E+03	1.01E+02	1.48E+11	2.78E+02
97006503	09JUL97	15JUL97	6	2.16E+03	9.92E+01	1.06E+11	2.29E+02
97006504	15JUL97	22JUL97	7	1.57E+03	1.37E+02	1.34E+11	2.10E+02
97006505	22JUL97	29JUL97	7	1.05E+03	9.71E+01	1.33E+11	1.39E+02
97006923	29JUL97	05AUG97	7	8.90E+02	9.55E+01	1.24E+11	1.10E+02
97006924	05AUG97	12AUG97	7	7.87E+02	1.35E+02	1.65E+11	1.30E+02
97007421	12AUG97	19AUG97	7	1.21E+03	1.39E+02	1.54E+11	1.86E+02
97007422	19AUG97	26AUG97	7	8.84E+02	1.38E+02	1.48E+11	1.31E+02
97008007	26AUG97	02SEP97	7	1.39E+03	1.14E+02	1.23E+11	1.71E+02
97008835	02SEP97	09SEP97	7	1.13E+03	1.12E+02	8.78E+10	9.89E+01
97008836	09SEP97	16SEP97	7	1.90E+03	8.25E+01	8.52E+10	1.62E+02
97008837	16SEP97	23SEP97	7	1.87E+03	1.16E+02	8.80E+10	1.65E+02
97008838	23SEP97	30SEP97	7	1.40E+03	1.46E+02	1.11E+11	1.55E+02
97009890	30SEP97	07OCT97	7	1.04E+03	1.43E+02	9.94E+10	1.04E+02
97009891	07OCT97	14OCT97	7	8.30E+02	1.36E+02	1.07E+11	8.89E+01
97009892	14OCT97	21OCT97	7	1.04E+03	1.12E+02	1.02E+11	1.06E+02
97009893	21OCT97	28OCT97	7	1.30E+03	8.14E+01	1.14E+11	1.48E+02
97010813	28OCT97	04NOV97	7	1.01E+03	1.44E+02	1.46E+11	1.47E+02
97010814	04NOV97	11NOV97	7	1.15E+03	1.15E+02	1.06E+11	1.22E+02
97010815	11NOV97	18NOV97	7	1.03E+03	1.14E+02	1.51E+11	1.57E+02
97010816	18NOV97	25NOV97	7	1.11E+03	1.13E+02	1.29E+11	1.44E+02
97011767	25NOV97	02DEC97	7	1.05E+03	1.13E+02	1.06E+11	1.12E+02
97011768	02DEC97	09DEC97	7	1.05E+03	1.14E+02	1.32E+11	1.38E+02
97011769	09DEC97	16DEC97	7	1.38E+03	1.16E+02	1.39E+11	1.91E+02
97011770	16DEC97	23DEC97	7	3.70E+02	1.15E+02	2.35E+11	8.69E+01
97011771	23DEC97	30DEC97	7	9.64E+02	1.19E+02	3.31E+11	3.20E+02

Attachment 1 SCDHEC Analytical Data from Weekly Grab Samples

This table was provided by Michael Moore of SCDHEC. Location SAV-23 is the station of interest. A map identifying the sampling station locations is provided at the back of this attachment. Note that the highest concentrations seen at SAV-23 coincide with dates of high river stage (figure 5).

Radiological Surface Water Tritium Data (pCi/L)

Collected	02/04/97	02/11/97	02/18/97	02/25/97	03/04/97	03/11/97	03/18/97	03/25/97	04/01/97	04/08/97	04/15/97
UTR-10	432.84	438.08	653.70	361.93	589.15	571.32	552.82	492.93	510.73	354.56	417.92
SAV-24	<238	<238	248.77	372.64	<229	<231	<229	<230	242.55	<221	<233
FMB-07											
UTR-08	37298.98	28302.13	1753.80	16416.47	1257.71	1393.51	1259.68	1275.31	1318.66	2056.98	1134.92
SAV-02	277.76	851.33	631.80	523.81	260.22	263.27	644.62	<230	240.86	758.51	<233
FMB-03	226626.59	245751.06	175638.12	216033.08	253591.87	276642.96	273398.72	249363.74	243880.69	254359.96	277384.96
PNB-03	138323.13	160445.67	93038.44	94050.39	112625.25	127468.05	123572.14	140605.71	143215.88	153274.95	153730.40
STC-04	8155.11	8181.96	7854.04	7736.51	7916.95	7657.48	7523.43	7407.48	7067.10	7059.29	7399.82
SAV-23	2853.59	1811.54	12666.98	15833.32	24286.56	20942.55	3731.16	1154.68	3004.28	1529.70	3259.39
SAV-05	1454.69	697.31	798.77	1919.89	11328.43	17657.75	1961.47	1097.19	2009.71	444.74	<233
SAV-08	910.46	1024.80	981.54	1015.48	455.73	565.77	696.44	948.94	1622.59	1270.58	1450.56
LTR-02	3172.75	835.65	1006.36	877.34	870.33	882.31	752.20	761.92	819.61	1010.88	1148.05
SAV-25		872.91				499.80					1118.89
SV-355										1398.05	
SV-191										1250.98	
SV-356											
SAV-08C											
LTR-02C											
FMB-03C											

Radiological Surface Water Tritium Data (pCi/L)

Collected	04/23/97	04/29/97	05/06/97	05/13/97	05/20/97	05/27/97	06/03/97	06/10/97	06/17/97	06/24/97	07/01/97
UTR-10	801.57	560.05	431.37	475.30	462.70	366.44	562.85	288.33	474.17	440.38	<239
SAV-24	316.97	246.38	<223	<225	<230	<229	<221	<227	<218	<221	<239
FMB-07											
UTR-08	12567.08	2482.65	1632.01	1802.36	765.16	940.61	901.46	933.70	1067.73	1146.75	843.32
SAV-02	389.72	566.33	404.40	434.82	<230	290.44	<221	<227	436.44	<221	<239
FMB-03	231855.89	146957.17	247359.45	225157.22	295508.01	298417.84	285700.26	249068.22	217624.75	268467.86	212103.91
PNB-03	166666.13	57319.18	132643.35	165106.62	177593.86	159186.21	158894.08	155664.75	156655.33	156543.73	157614.66
STC-04	7131.87	6769.82	7291.66	5553.51	6251.64	5861.44	5986.23	5906.32	6549.43	5666.16	5599.68
SAV-23	1787.97	4669.92	14897.57	3939.80	1218.00	1186.08	1313.87	927.51	5576.87	1081.25	1079.28
SAV-05	577.96	696.33	1142.07	635.23	645.65	836.25	1348.80	1826.29	409.41	659.45	578.07
SAV-08	1047.98	1395.20	800.80	1258.64	680.00	881.32	1078.76	1951.31	1745.76	1089.13	517.25
LTR-02	874.96	911.04	1017.21	971.02	845.14	1015.55	1050.20	998.46	965.24	808.81	811.22
SAV-25											
SV-355			941.89							432.75	
SV-191										932.88	
SV-356										<239	
SAV-08C											
LTR-02C											
FMB-03C											

Radiological Surface Water Tritium Data (pCi/L)

Collected	07/08/97	07/15/97	07/22/97	07/29/97	08/05/97	08/12/97	08/19/97	08/26/97	09/02/97	09/09/97	09/16/97
UTR-10	487.69	528.80	272.93	255.11	502.84	450.52	541.83	537.81	271.76	573.29	395.89
SAV-24	220.75	<219	<219	<227	<222	224.13	<215	<217	<228	233.71	299.03
FMB-07											
UTR-08	1042.39	1218.09	999.05	12898.38	1054.42	1129.12	1071.28	915.68	907.09	822.76	925.82
SAV-02	373.93	296.22	235.75	779.40	<222	<216	<215	274.25	<228	351.97	<215
FMB-03	248041.04	276279.06	317538.37	303046.70	320213.37	337560.46	263269.19	305663.65	278313.52	330214.17	314055.71
PNB-03	134610.27	128102.51	152045.78	161340.74	177231.11	168256.78	151517.97	174565.19	214316.32	152452.55	193563.05
STC-04	5309.94	5945.74	6301.62	6091.59	6324.00	6214.36	3879.01	6657.56	6777.14	7085.55	7057.96
SAV-23	1688.32	1864.03	1039.61	959.61	3177.92	806.99	839.79	818.82	1137.46	1139.82	4896.02
SAV-05	2087.03	1369.02	1309.45	1120.67	963.71	1057.03	998.06	822.76	1028.19	1106.03	1726.62
SAV-08	1080.68	1200.64	1004.12	781.65	805.39	4529.98	1036.92	531.05	1508.63	1081.25	811.50
LTR-02	964.68	745.61	984.97	592.43	679.19	997.34	846.54		848.52		1351.00
SAV-25											
SV-355				607.73				764.74	1275.95		
SV-191				876.77				585.75	1145.20		
SV-356				<222				<228	<211		
SAV-08C							1031.85		1102.60	1117.37	1908.88
LTR-02C								1145.45	1102.60	1316.93	
FMB-03C											

Radiological Surface Water Tritium Data (pCi/L)

Collected	09/23/97	09/30/97	10/07/97	10/15/97	10/21/97	Min	Max
UTR-10	588.49	534.71	304.95	396.76	499.51	<220	801.57
SAV-24	<217	302.13	<226	<227	<221	<220	372.64
FMB-07			617887.72	605428.96	412312.97	412312.97	617887.72
UTR-08	6610.25	1363.10	788.13	937.51	907.23	765.16	37298.98
SAV-02	331.70	719.99	<226	239.66	301.29	<220	851.33
FMB-03						146957.17	337560.46
PNB-03	196173.81	112670.23	169029.14	172404.20	143126.22	57319.18	214316.32
STC-04	7265.20	6563.79	6934.35	6725.33	6125.94	3879.01	8181.96
SAV-23	1055.91	3384.81	936.80	1361.62	1950.19	806.99	24286.56
SAV-05	1336.35	892.87	678.31	1471.46	738.85	<220	17657.75
SAV-08	1120.11	6027.11	735.19	758.96	1415.76	455.73	6027.11
LTR-02			737.11	931.90	709.66	592.43	3172.75
SAV-25						499.80	1118.89
SV-355					1875.61	432.75	1875.61
SV-191					844.25	585.75	1250.98
SV-356					<221	<220	<220
SAV-08C	1909.45	1261.41	985.73	967.99	1127.91	967.99	1909.45
LTR-02C	1135.41	1150.35				1102.60	1316.93
FMB-03C	307871.43	200624.10	252930.71	298429.97	237716.31	200624.10	307871.43

SCDHEC ESOP, Surface Water Sampling Locations

