Final MTI Data Report: H.B. Robinson Plant (U)

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

October 2002

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Savannah River Technology Center
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INTRODUCTION

During the period from March 2000 to September 2002, surface water temperature data was collected at the H.B. Robinson Plant near Hartsville, SC (Figure 1). This effort was led by the Savannah River Technology Center (SRTC) with the assistance of local plant personnel. Permission for setting up the monitoring sites was granted by Carolina Power & Light, which owns the plant site. This work was done in support SRTC's ground truth mission for the US Department of Energy's Multispectral Thermal Imager (MTI) satellite (Garrett, et al, 1999). Data described in this report are available from the authors (contact information provided at the end of report).

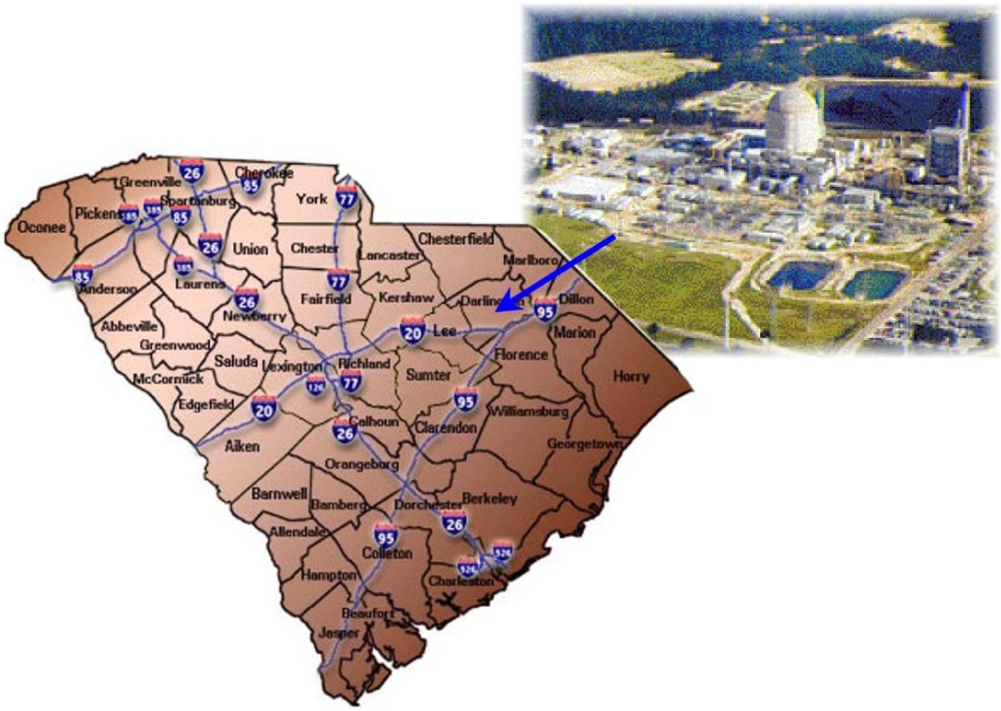

Figure 1. The H.B. Robinson Plant near Hartsville, SC

SURFACE WATER TEMPERATURE MEASUREMENTS

The H.B. Robinson Plant discharges heated water into an adjacent cooling lake. Before entering the lake, this heated water travels via a canal (Figure 2) that extends nearly the entire length of the lake before spilling into the lake itself. Two monitoring sites were chosen to capture the relatively large temperature difference within the lake/canal system. These sites are shown as the "Discharge Canal" and "Intake" in Figure 3. Note that the map in

Data described in this report are available from the authors.

Figure 3 is an actual surface water temperature map survey conducted during the MTI campaign. The brighter colors of yellow, orange and red indicate the warmest temperatures whereas the reddish-brown colors near the "Intake" site show the coolest temperatures.

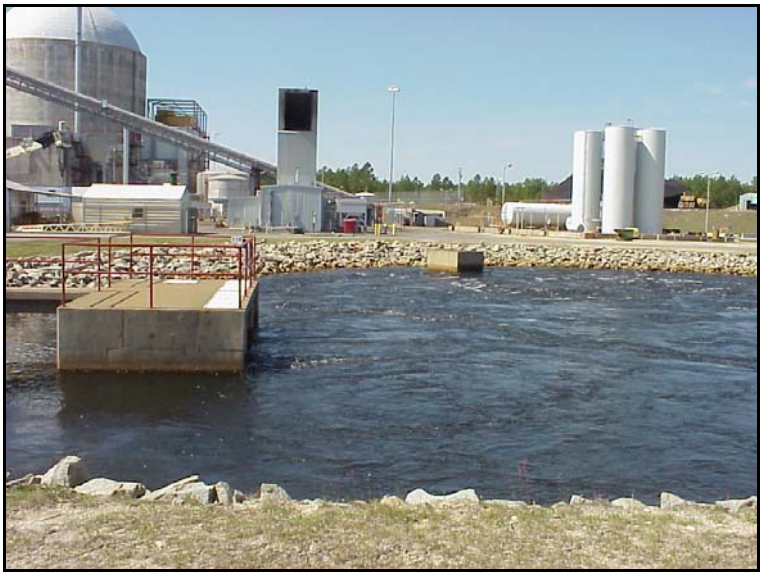

Figure 2. Water (heated) entering the discharge canal from the plant

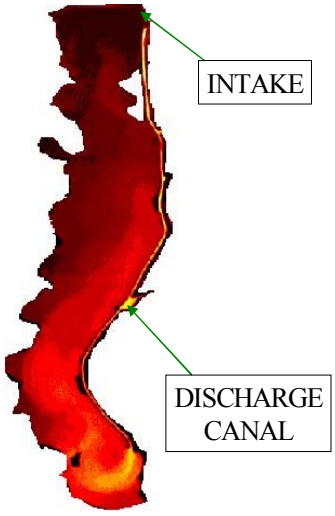

Figure 3. Locations of surface water temperature monitoring sites. Background image shows thermal variations of the surface water. Warmer water is shown as yellow, orange and brighter shades of red. Cooler water is shown as reddish brown or brown.

Surface water temperature measurements were made with the StowAway® TidbiT® (Figure 4) manufactured by Onset Computer (www.onsetcomputer.com). The sensor at the "Intake" site was suspended in a protective case approximately 30 cm below the surface at the buoy line barrier (Figure 5). The sensor at the "Discharge Canal" site was similarly suspended in a protective case about the same distance (30 cm) below the surface under a float (Figure 6) attached to a small anchor. Access to the discharge canal is limited to plant personnel only and data recovery was very good. The intake site is open to public access and, unfortunately, some sensors were lost due to vandalism.

Figure 4. The StowAway® TidbiT® (front view, left, and rear view, right).

Figure 5. The buoy line at the "Intake" site.

Figure 6. The float used at the "Discharge Canal" site.

Coordinates obtained with a hand-held GPS for each site were as follows.

Location	WGS 84
"Intake"	N 34° 24.135'
"Discharge Canal"	N 34° 26.484'

DATA DESCRIPTIONS

The following information in Table I describes surface water temperature data within the file Robinson1.xls, Robinson2.xls, Robinson3.xls. All times are local Eastern Time (Standard or Daylight). H.B. Robinson Plant personnel have compiled daily plant operating data summaries corresponding to each month of the collection campaign. Since the data are in a daily summary format, the information was not merged with the surface water temperature files. An example of a plant data summary is shown in Figure 7 and all files are available from the authors.

Table I. Description of Data Nomenclature

SURFACE WATER TEMPERATURES		
Name	Description	(All temperatures °C)
"Discharge"	Surface water temperature in the plant warm-water discharge canal	
"Intake"	Surface water temperature near the plant water intake	

Robinson File No: 17-12510D — Month/Year: August 2000

MONTHLY COMPOSITE DATA TEMPERATURE DISCHARGE

	CIRCULATING WATER FLOW (GPD) +08 #1	(GPD) +08 #2	(GPD) +08 SW	(GPH) +07 MAX	(GPH) +07 MIN	(GPD) +08 TOTAL	DAM (°F) 24HR AVG	WEIR (°F) 24HR AVG	NET GENERATION (MW) UNIT #1	UNIT #2	TOTAL	LAKE LEVEL FEET
1	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.43	102.89	3227	16855	20082	220.53
2	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.53	102.84	3346	16843	20189	220.59
3	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	87.86	103.81	3297	16828	20125	220.61
4	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	87.41	103.42	3335	16852	20187	220.71
5	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.88	102.95	2561	16830	19391	220.72
6	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	89.14	104.81	2895	16816	19711	220.72
7	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.37	104.18	3655	16827	20482	220.7
8	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.22	104.23	3605	16799	20404	220.66
9	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	89.96	104.92	3280	16745	20025	220.63
10	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	90.06	105.32	3524	16750	20274	220.59
11	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	90.67	105.49	3501	16683	20184	220.55
12	1.2528	6.7606	0.3456	3.4829	3.4				3061	16694	19755	220.49
13	1.2528	6.7606	0.3456	3.4829	3.4				2508	16730	19238	220.46
14	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.66	104.5	2727			20.41
15	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.09	104.12	3334			20.38
16	1.2528	6.7606					88.98	105.29	3587			20.36
17	1.2528	6.7606					89.08	104.9	2961			20.34
18	1.2528	6.7606					89.98	105.48	3373			20.33
19	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.74	104.4	2652			20.35
20	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.85	104.8	2419	16690	19109	220.32
21	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	87.98	104.2	2471	16776	19247	220.28
22	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.74	103.28	2416	16782	19198	220.25
23	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	85.96	102.98	3157	16799	19956	220.23
24	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.65	103.66	3283	16815	20098	220.22
25	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.18	103.2	3469	16794	20263	220.31
26	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	88.47	103.69	2571	16789	19360	220.36
27	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	87.61	103.16	2431	16823	19254	220.28
28	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.52	102.5	3028	16785	19813	220.38
29	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.05	102.32	3283	16801	20084	220.38
30	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	86.07	102.27	2727	16858	19585	220.39
31	1.2528	6.7606	0.3456	3.4829	3.4829	8.359	84.75	100.64	3522	16912	20434	220.47
MAX						8.359	90.67	105.88			20482	220.72
MIN						8.359						220.22
AVE						8.3590					19856	220.452

Discharge water temperature

Gallons per day times 10^8 for Unit 1

Power generation for Unit 1and Unit 2 in MegaWatts

Figure 7. An example of a monthly summary of H.B. Robinson Plant data.

DATA QUALITY ASSURANCE

All surface water temperature data were reviewed for accuracy. Erroneous data were deleted and left as "blanks" in the data files.

EXAMPLE DATA PLOT

An example surface water temperature plot of quality assured data is shown in Figure 8.

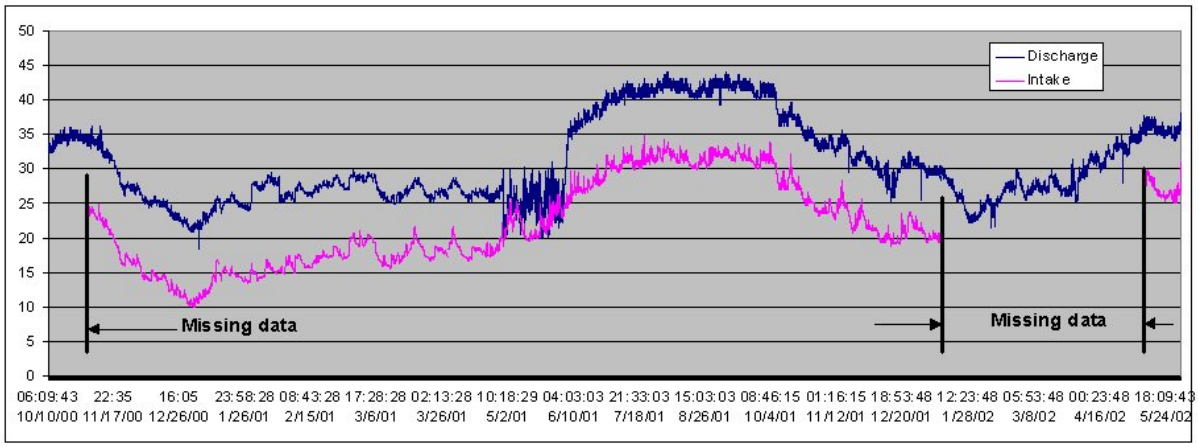

Figure 8. An example plot of surface water temperature data.

ACKNOWLEDGEMENTS

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Garrett, A. J., R. J. Kurzeja, B. L. O'Steen, M. J. Parker, M. M. Pendergast, and E. Villa-Aleman, 1999: Ground-Truth Measurements Plan for the Multispectal Thermal Imager (MTI) Satellite. WSRC-TR-99-00455. Westinghouse Savannah River Company, Aiken, SC.