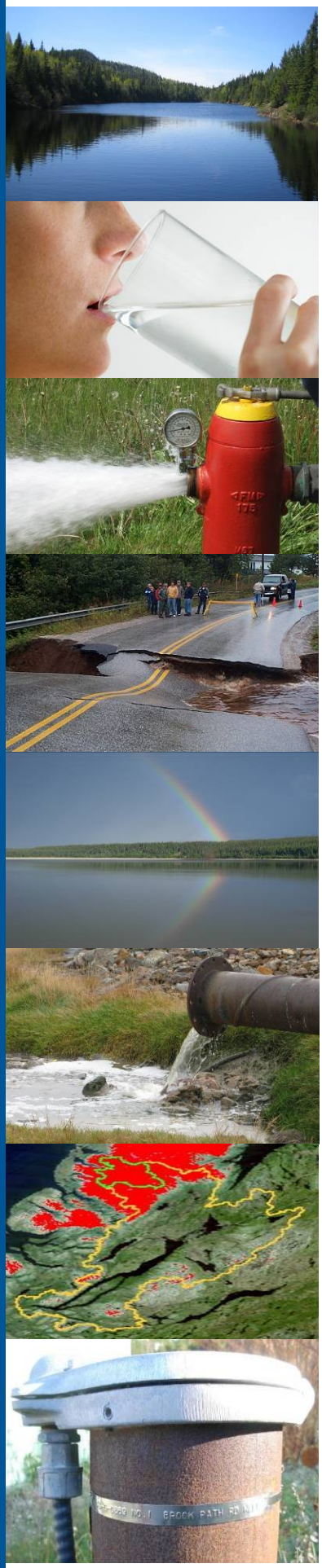


Waterford River @ Kilbride

NF02ZM0009

June to July 2007

Government of Newfoundland & Labrador
Department of Environment and Conservation
Water Resources Management Division
St. John's, NL, A1B 4J6 Canada

Real Time Water Quality Monthly Report
Waterford River - St. John's NL
June - July 2007

General

- Data from the Waterford River real-time station is monitored by the Water Resources Management Division staff regularly.

Maintenance and Calibration of Instrumentation

- The following table displays the dates when the Waterford River water quality probe was installed and removed during this deployment period for routine cleaning, maintenance and calibration.

Table 1: Table of Water Quality Probe Installation and Removal

Date Installed	**Date Removed**
June 5th, 2007	July 13th, 2007

- Water quality readings were taken with a second freshly cleaned and calibrated water quality instrument at the time of installation and removal for QAQC comparison. The QAQC instrument was calibrated prior to each use.

Quality Assurance and Quality Control

- Deployment and removal comparison rankings for the Waterford River deployment from June 5th to July 13th, 2007 are summarized in **Table 2.**
- The absence of turbidity ranking can be attributed to the QA/QC probe lacking a turbidity sensor.

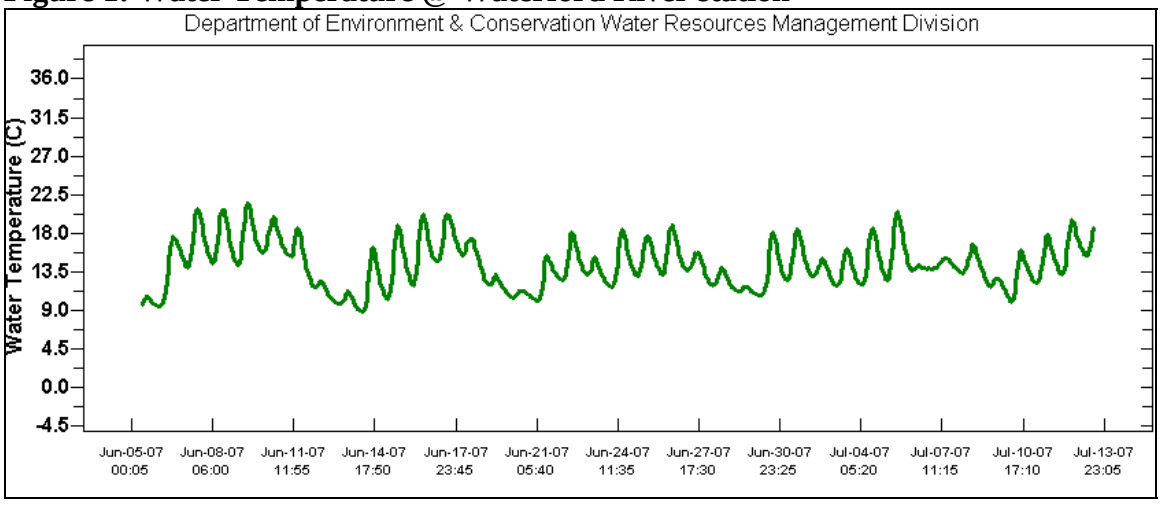
Table 2: Comparison rankings for Waterford @ Kilbride station, June 5th – July 13th, 2007

Station	Date	Action	Comparison Ranking				
			Temperature	pH	Conductivity	Dissolved Oxygen	Turbidity
Waterford @ Kilbride	June 5th, 2007	Deployment	Excellent	Excellent	Excellent	Poor	N/A
	July 13th, 2007	Removal	Excellent	Good	Poor	Poor	N/A

Data Interpretation

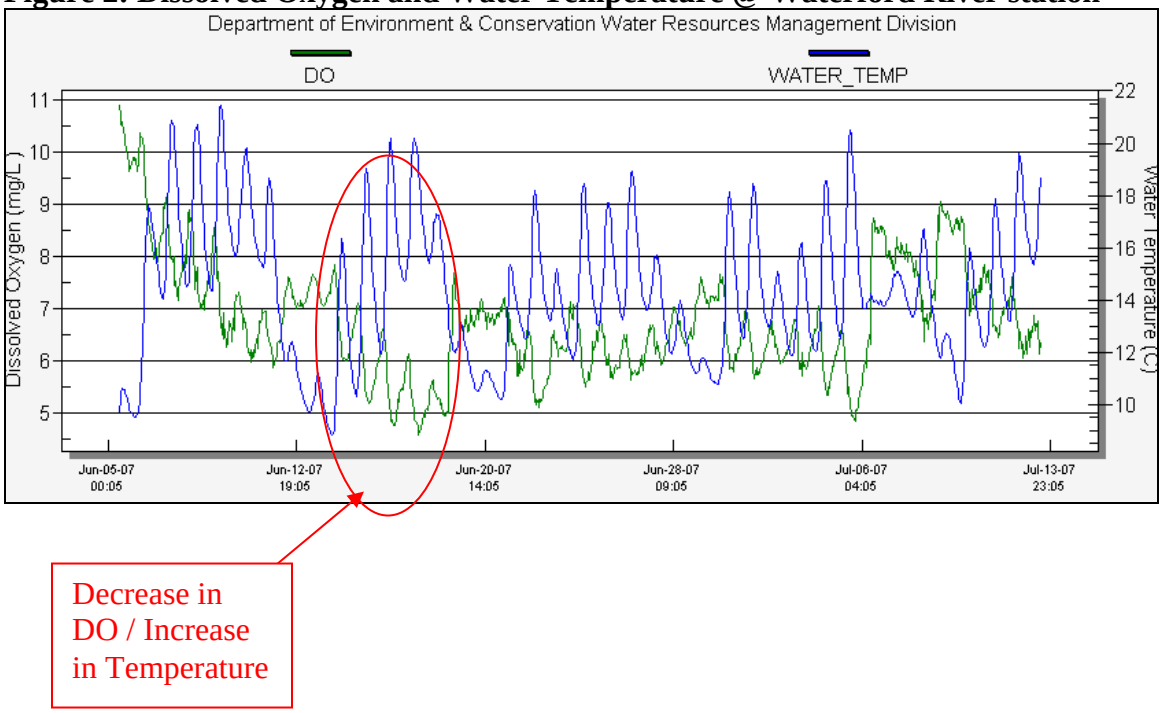
- **Water temperatures** were fairly constant during this deployment, ranging between 8.86 and 21.43°C, which is within the expected temperature range for this time of year. Water temperature data is shown in **Figure 1** below.

Figure 1: Water Temperature @ Waterford River station



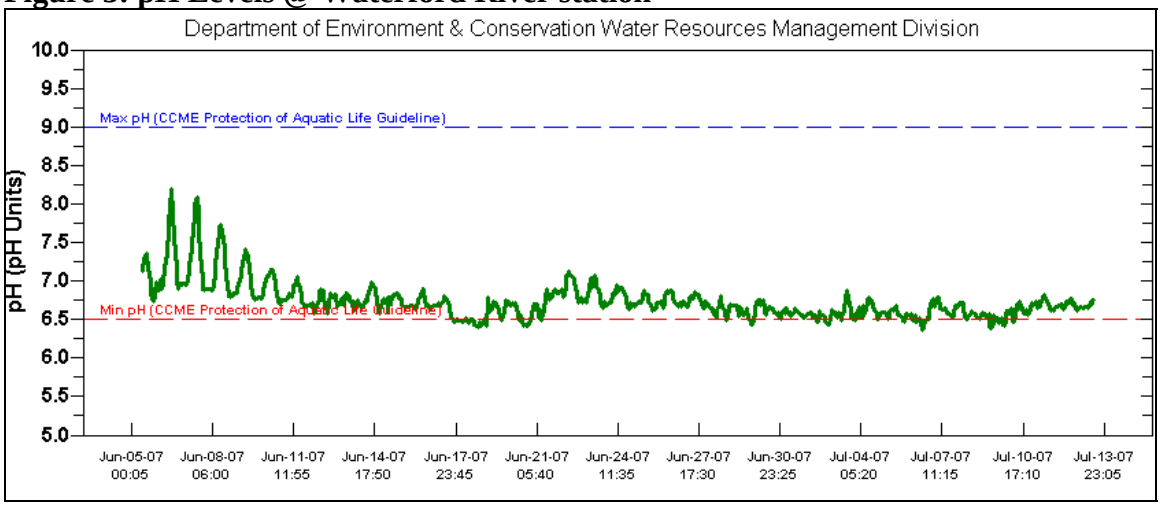
- **Dissolved oxygen (DO)** has an inverse relationship with water temperature whereby DO levels decrease as water temperature increases. Dissolved oxygen is shown in green and water temperature is shown in blue in **Figure 2**, below. The graph indicates that dissolved oxygen levels peaked at 10.88 mg/L on June 5th, the same day that water temperature reached its lowest level of 9.71 °C. It should be noted, that these values are more likely due to the DO and temperature sensor stabilizing during the first 24 hours of deployment. DO plummeted to its lowest level of 4.58 mg/L on June 17th, corresponding to the day the highest water temperatures during the deployment period were reached at roughly 18.95 °C.

Figure 2: Dissolved Oxygen and Water Temperature @ Waterford River station



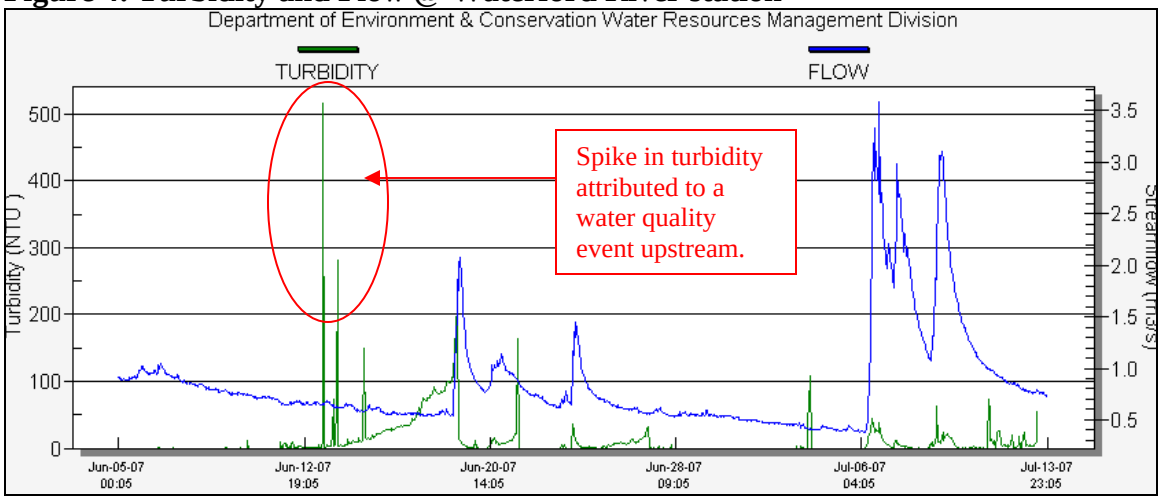
- **pH** levels were fairly constant and were within the expected range for this station, with pH values ranging from of 6.36 – 8.19. There were no sudden drops or surges in pH during the specified time frame, but it should be noted that the pH for this deployment period, infrequently fell below the minimum CCME protection of Aquatic Life Guidelines, of 6.5 pH units.

Figure 3: pH Levels @ Waterford River station



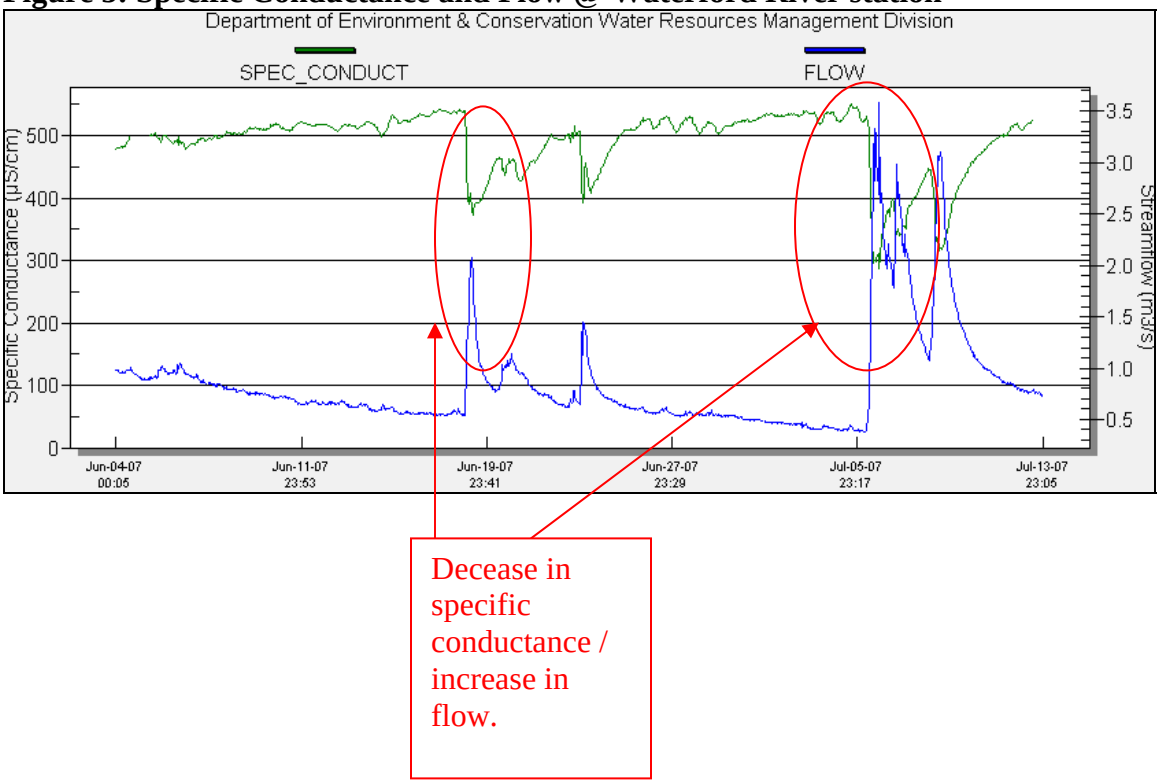
- **Turbidity** levels were fairly constant with exception of the presence of one notable turbidity spike (June12th) turbidity data for this deployment is shown in green and can be seen in **Figure 4** below. In **Appendix 1**, it can be seen that the climate data shows no significant precipitation events leading up to this turbidity spike. Therefore, it is likely that this turbidity spike is due to trapped debris in the sensor or debris build up in the housing unit of the field sonde. Since this spike occurred over a long duration, it can be deduced that this is likely the result of a water quality event upstream.

Figure 4: Turbidity and Flow @ Waterford River station



- **Specific conductivity** levels were within the expected range for Waterford River during this deployment. Specific conductivity levels ranged between 288.0-551.0 µS/cm and showed sudden increases, generally in response to the aftermath of significant precipitation events. The specific conductivity data for this deployment period shown in green is shown in **Figure 5** below. The Environment Canada Daily Climate Data for June, for the St. John's region, shown below in **Appendix 1,** indicates that there were significant precipitation events during the month of June. These events resulted in an increase of runoff, which in turn caused the specific conductivity to decrease.

Figure 5: Specific Conductance and Flow @ Waterford River station



Report prepared by: Michael Clarke
Water Quality Co-op Student
Water Resources Management Division
Department of Environment and Conservation
Confederation Building West Block 4th Floor
St. John's NL A1B 4J6
Ph. (709) 729-2316

APPENDIX 1: Weather information for St. John's, NL provided by Environment Canada for June 2007:

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
Sum				189.8	4.0	61.4	0.0	61.4			
Avg	16.8	6.8	11.8								
Xtrm	25.9	-0.7								31	74
01	11.7	0.5	6.1	11.9	0.0	9.2	0.0	9.2	0	22E	59E
02	9.9	0.0	5.0	13.0	0.0	0.6	0.0	0.6	0	31E	74E
03	9.6	-0.7	4.5	13.5	0.0	0.0	0.0	0.0	0		<31
04	14.9	0.1	7.5	10.5	0.0	0.0	0.0	0.0	0		<31
05	11.9	3.0	7.5	10.5	0.0	2.0	0.0	2.0	0	18E	46E

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
06	25.2	11.9	18.6	0.0	0.6	1.2	0.0	1.2	0	26E	35E
07	25.9	11.3	18.6	0.0	0.6	T	0.0	T	0	18E	46E
08	24.3	9.5	16.9	1.1	0.0	0.0	0.0	0.0	0	18E	48E
09	24.9	9.0	17.0	1.0	0.0	0.0	0.0	0.0	0	20E	33E
10	25.2	14.1	19.7	0.0	1.7	T	0.0	T	0	28E	37E
11	15.7	5.0	10.4	7.6	0.0	0.4	0.0	0.4	0		<31
12	7.2	4.8	6.0	12.0	0.0	1.0	0.0	1.0	0	4E	37E
13	6.5	3.7	5.1	12.9	0.0	1.0	0.0	1.0	0		<31
14	11.4	3.3	7.4	10.6	0.0	T	0.0	T	0	26E	39E
15	22.8	5.7	14.3	3.7	0.0	0.0	0.0	0.0	0	26E	57E
16	25.7	6.9	16.3	1.7	0.0	0.0	0.0	0.0	0	27E	44E
17	25.1	13.0	19.1	0.0	1.1	T	0.0	T	0	27E	43E
18	19.3	7.6	13.5	4.5	0.0	6.4	0.0	6.4	0	6E	37E
19	9.5	5.4	7.5	10.5	0.0	13.6	0.0	13.6	0	6E	44E
20	8.6	5.4	7.0	11.0	0.0	7.2	0.0	7.2	0	2E	33E
21	13.1	6.7	9.9	8.1	0.0	1.0	0.0	1.0	0		<31
22	16.7	8.9	12.8	5.2	0.0	0.0	0.0	0.0	0		<31
23	15.4	8.8	12.1	5.9	0.0	12.2	0.0	12.2	0	15E	41E
24	19.2	8.5	13.9	4.1	0.0	0.6	0.0	0.6	0	23E	46E
25	21.7	9.7	15.7	2.3	0.0	T	0.0	T	0	21E	46E
26	23.1	9.9	16.5	1.5	0.0	0.0	0.0	0.0	0	26E	46E
27	17.3	9.9	13.6	4.4	0.0	0.2	0.0	0.2	0	26E	56E
28	12.5	7.3	9.9	8.1	0.0	1.8	0.0	1.8	0	33E	35E
29	8.8	6.6	7.7	10.3	0.0	3.0	0.0	3.0	0		<31
30	19.5	8.6	14.1	3.9	0.0	T	0.0	T	0	26E	37E

APPENDIX 2: Weather information for St. John's, NL provided by Environment Canada for July 2007:

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
Sum				59.7	38.2	114.0	0.0	114.0			
Avg	21.9	12.7	17.3								
Xtrm											
01	16.7	8.5	12.6	5.4	0.0	0.0	0.0	0.0	0	26E	33E
02	14.2	7.8	11.0	7.0	0.0	0.0	0.0	0.0	0		<31
03	13.7	7.7	10.7	7.3	0.0	T	0.0	T	0		<31
04	21.5	7.8	14.7	3.3	0.0	0.0	0.0	0.0	0	26E	37E

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days °C	Cool Deg Days °C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
05	22.0	9.3	15.7	2.3	0.0	0.0	0.0	0.0	0	26E	41E
06	16.7	12.0	14.4	3.6	0.0	30.0	0.0	30.0	0	18E	50E
07	17.8	12.4	15.1	2.9	0.0	10.6	0.0	10.6	0	23E	56E
08	19.6	7.8	13.7	4.3	0.0	2.2	0.0	2.2	0	26E	46E
09	10.9	6.9	8.9	9.1	0.0	14.4	0.0	14.4	0	34E	33E
10	19.1	5.7	12.4	5.6	0.0	T	0.0	T	0	28E	46E
11	20.7	10.3	15.5	2.5	0.0	0.0	0.0	0.0	0		<31
12	24.2	11.2	17.7	0.3	0.0	0.0	0.0	0.0	0		<31
13	25.7	15.2	20.5	0.0	2.5	T	0.0	T	0	26E	37E
14	25.7	14.8	20.3	0.0	2.3	T	0.0	T	0	26E	33E
15	25.6	13.5	19.6	0.0	1.6	0.0	0.0	0.0	0	26E	37E
16	22.4	14.8	18.6	0.0	0.6	2.4	0.0	2.4	0	21E	39E
17	20.2	14.6	17.4	0.6	0.0	3.0	0.0	3.0	0	26E	37E
18	26.5	13.8	20.2	0.0	2.2	0.0	0.0	0.0	0	26E	32E
19	21.5	14.5	18.0	0.0	0.0	14.2	0.0	14.2	0	23E	65E
20	22.5	17.3	19.9	0.0	1.9	2.0	0.0	2.0	0	22E	56E
21	24.7	20.0	22.4	0.0	4.4	0.0	0.0	0.0	0	24E	65E
22	23.0	13.8	18.4	0.0	0.4	13.2	0.0	13.2	0	24E	59E
23	25.2	13.0	19.1	0.0	1.1	0.0	0.0	0.0	0	26E	44E
24	24.6	14.6	19.6	0.0	1.6	1.6	0.0	1.6	0	26E	52E
25	27.6	15.5	21.6	0.0	3.6	0.0	0.0	0.0	0	27E	37E
26	21.0	11.5	16.3	1.7	0.0	1.6	0.0	1.6	0	26E	46E
27	17.4	11.0	14.2	3.8	0.0	T	0.0	T	0		<31
28	29.6	13.4	21.5	0.0	3.5	0.0	0.0	0.0	0	25E	37E
29	27.7	18.5	23.1	0.0	5.1	0.0	0.0	0.0	0	25E	43E
30	24.4	18.0	21.2	0.0	3.2	0.0	0.0	0.0	0	25E	32E
31	26.4	18.0	22.2	0.0	4.2	18.8	0.0	18.8	0	21E	59E