

**THE 2005 SUMMER WATER
TEMPERATURE AND FLOW
MANAGEMENT PROJECT**

*NECHAKO FISHERIES CONSERVATION PROGRAM
Technical Report No. RM05-1*

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Contents

List of Figures.....	<i>i</i>
List of Tables.....	<i>ii</i>
List of Appendices	<i>iii</i>
ABSTRACT.....	1
INTRODUCTION.....	1
METHODS	1
RESULTS	9
DISCUSSION	10
Recorded Data	
Volume of Water Used	
Application of the Summer Water Temperature and Flow Management Project Release Criteria	
REFERENCES	12
APPENDICES	

List of Figures

FIGURE 1	Nechako River Study Area	2
FIGURE 2	Recorded Mean Daily Temperatures in the Nechako River Above the Stuart River Confluence, July 10 to August 20, 2005	8
FIGURE 3	Skins Lake Spillway Releases and Flows in the Nechako River Below Cheslatta Falls and at Vanderhoof, July 10 to September 8, 2005	8
FIGURE 4	Flows in the Nechako River below Cheslatta Falls Resulting from Skins Lake Spillway Releases, July 10 to August 20, 2005	11

List of Tables

TABLE 1	Daily Operations to Manage Water Temperatures in the Nechako River above the Stuart River Confluence	4
TABLE 2	Predicted and Recorded Water Temperatures in the Nechako River at Finmoore July 10 to August 20, 2005	6
TABLE 3	Recorded Mean Daily Water Temperatures in the Nechako River above the Stuart River Confluence, July 10 to August 20, 2005	9
TABLE 4	Rationale for Skins Lake Spillway Release Changes, July 10 to September 7, 2005	10

List of Appendices

- APPENDIX A Numerical Example of Water Temperature Trend Calculation
- APPENDIX B Mean Daily Water Temperatures in the Nechako and Nautley Rivers, 2005
- APPENDIX C Mean Daily Skins Lake Spillway Releases and Flows in the Nechako and Nautley Rivers, 2005
- APPENDIX D Recorded and Forecast Meteorological Data
- APPENDIX E Summer Water Temperature and Flow Management Project Reservoir Release Volume Calculations for July 10 to August 20, 2005

ABSTRACT

The 2005 Nechako River Summer Water Temperature and Flow Management Project (the Project) was undertaken to attempt to prevent mean daily water temperatures in the Nechako River above the Stuart River confluence (at Finmoore) from exceeding 20.0°C (68.0°F) between July 20 and August 20. Water temperatures were managed by regulating Skins Lake Spillway releases to control flows in the Nechako River below Cheslatta Falls and at Vanderhoof. In 2005, mean daily water temperatures in the Nechako River above the Stuart River confluence did not exceed 20.0°C (68.0°F) between July 20 and August 20.

Over the duration of the 2005 Summer Water Temperature and Flow Management Project (July 10 to August 20), the total volume of water released was 6,896.5 m³/s-d, (243,549 cfs-d), and the average release during the Project was 164.2 m³/s (5,800 cfs).

INTRODUCTION

The Nechako River Summer Water Temperature and Flow Management Project (the Project) currently in place was designed and developed in 1982 and has been successfully implemented by Triton Environmental Consultants Ltd. (Triton) since 1983. Since 1988, water temperature and flow management projects (Triton 1995a through Triton 1995h, Triton 1996 through Triton 2004) have been carried out under the auspices of the Nechako Fisheries Conservation Program (NFCP).

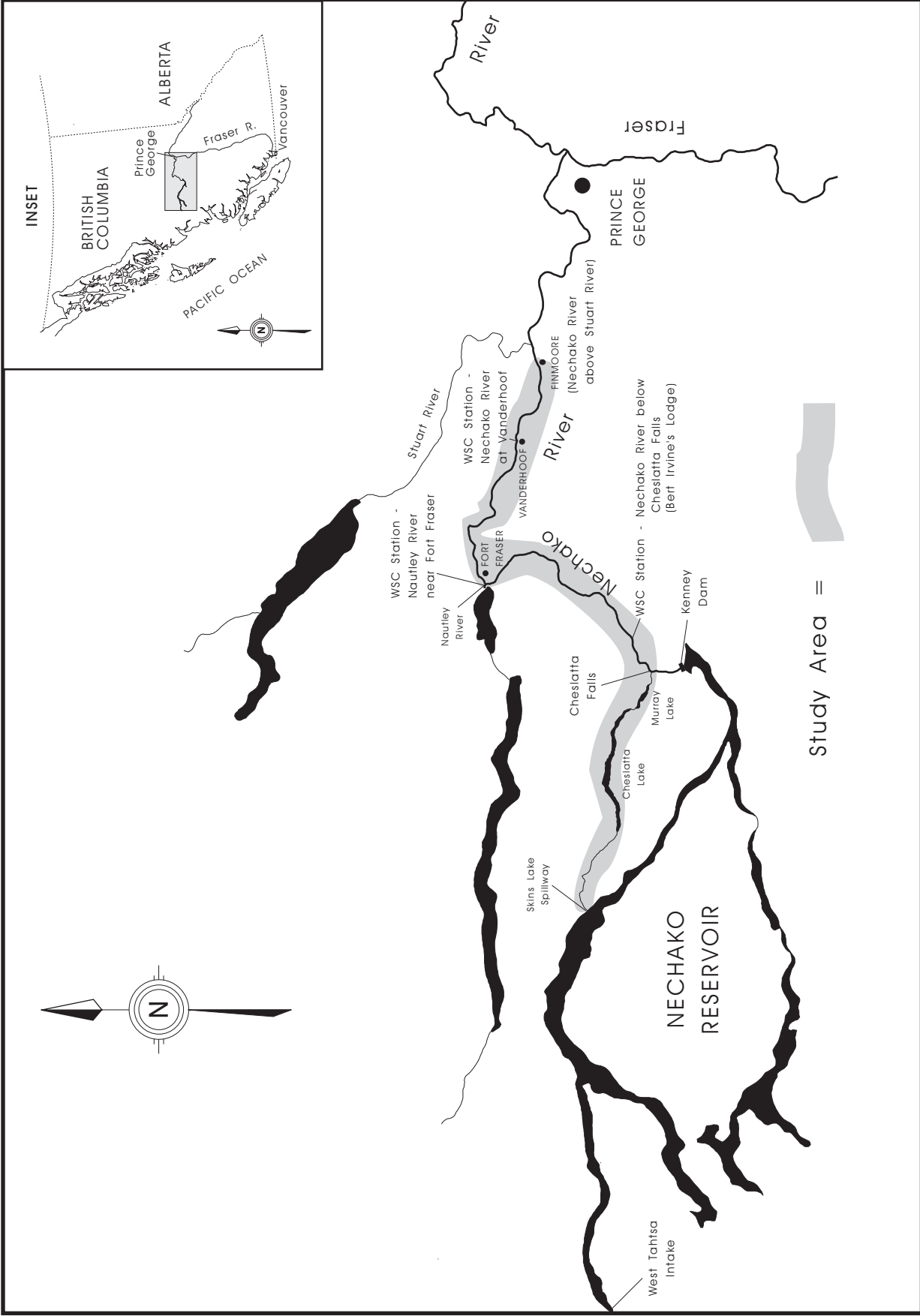
The objective of the Project is to attempt to prevent mean daily water temperatures in the Nechako River above the Stuart River confluence (at Finmoore in Figure 1) from exceeding 20.0°C (68.0°F). This objective is met by regulating releases from the Skins Lake Spillway to control flows in the Nechako River below Cheslatta Falls and at Vanderhoof. The Project is operated from July 10 to August 20 (the operational period) with the goal of managing water temperatures in the Nechako River at Finmoore between July 20 and August 20 (the water temperature control period, hereafter referred to as the control period). These dates may vary as directed by the NFCP in accordance with the timing of sockeye runs in the system. Flows in the Nechako River at Cheslatta Falls are also to be reduced to fall spawning flows by early September.

The Project study area is shown in Figure 1. Unless otherwise stated, references to water temperatures, flows (including releases) and meteorological data are mean daily values. As well, the location of the Nechako River above the Stuart River confluence refers to the Nechako River at Finmoore for temperature measurements and at Vanderhoof for river discharge measurements..

This report reviews the 2005 Summer Water Temperature and Flow Management Project and includes an outline of the method of determining Skins Lake Spillway releases, a summary of the 2005 Skins Lake Spillway release recommendations for the period July 10 to September 6 inclusive, and a summary of recorded flows (July 10 to September 6) and water temperatures (July 10 to August 20) at various locations along the Nechako River. Also discussed is the volume of cooling water used in the 2005 Summer Water Temperature and Flow Management Project.

METHODS

Management of the Nechako River flows and water temperatures in 2005 used water temperature predictions based on five-day meteorological forecasts to determine the schedule of Skins Lake Spillway releases required to meet project objectives.



Nechako Fisheries Conservation Program

Map # RM05-1

FIGURE 1. NECHAKO RIVER STUDY AREA



The Summer Water Temperature and Flow Management Project uses an unsteady-state flow routing model and an unsteady-state water temperature prediction model to compute flows and water temperatures in the Nechako River daily during the entire operational period.

Daily operations followed the protocol referenced in the Settlement Agreement (Anon. 1987), and involved collection of water temperature and river stage data from several locations in the study area, as well as development of five-day meteorological forecasts. Water temperatures were obtained daily from recorders maintained in the Nechako River below Cheslatta Falls (at Bert Irvine's Lodge), in the Nechako River at Fort Fraser (upstream of the Nautley River), in the Nechako River above the Stuart River confluence and in the Nautley River. River stages were obtained daily from recorders maintained in the Nechako River below Cheslatta Falls, in the Nechako River at Vanderhoof and from a staff gauge in the Nautley River. Five-day meteorological forecasts were provided by World Weatherwatch as a subconsultant to Triton.

River stage and minimum and maximum water temperature data were obtained daily for each identified location except the Nechako River below Cheslatta Falls. At that location, recorded hourly water temperature and river stage data were obtained from the data collection platform via computer link to Water Survey of Canada (WSC), Vancouver. Water levels recorded hourly by WSC in Cheslatta Lake at West End were also obtained (via computer link) from the station's data collection platform. These lake level data were used to assist in the analysis of daily predictions of flow produced by the flow routing model for the Nechako River below Cheslatta Falls, and to account for local inflow to the Cheslatta/Murray Lakes system.

In addition, spot and corresponding recorded water temperatures were collected at each location visited daily and used to adjust the recorded water temperatures. The spot data enabled an ongoing check

of each thermograph. If the spot temperature was higher than the thermograph record, the thermograph record was adjusted to agree with the recorded spot temperature for that day. If the thermograph record was higher than the spot temperature, the thermograph record was not adjusted. This procedure was implemented as a conservative measure.

The first 10 days of the operational period, July 10 to July 19, were utilized for system start up, for initialization of the database required to schedule Skins Lake Spillway releases and to increase flows in the Nechako River from spring flows to the minimum cooling flow of 170 m³/s (6,000 cfs) below Cheslatta Falls. The 2005 Skins Lake Spillway spring base release as directed by the NFCP was 49.0 m³/s (1,730 cfs). Upon commencement of the operational period on July 10, the recorded flow in the Nechako River below Cheslatta Falls was 141 m³/s (4,980 cfs). This flow was higher than typical for this period, and resulted from a spring spill at Skins Lake Spillway necessary to manage reservoir water levels. On July 13 and July 14, 2005, the Skins Lake Spillway release was increased to 150 m³/s (5,300 cfs) and 210 m³/s (7,420 cfs), respectively to ensure flows in the Nechako River below Cheslatta Falls reached the minimum cooling flow of 170 m³/s (6,000 cfs) by July 20 (the beginning of the water temperature control period).

Throughout the operational period, water temperatures in the Nechako River were calculated daily for the previous day, the current day and each of the next four days using the unsteady-state flow routing and water temperature prediction models. These calculations were based on recorded and five-day forecast meteorological data, recorded water temperature and computed flow data. Forecast water temperature predictions were tabulated and reviewed daily to identify trends in water temperature changes. These trends are the same as those used in the water temperature and flow management projects since 1984 (Envirocon Ltd. 1985), and are best explained through reference to Table 1.

Table 1
Daily Operations to Manage Water Temperatures in the Nechako River above the Stuart River Confluence

Date	11-Jul	12-Jul	13-Jul	14-Jul	15-Jul	16-Jul*	17-Jul	18-Jul	19-Jul	20-Jul
Fifth Day's Predicted Water Temperature @ Date + 4 Days								a5	b5	c5
Fourth Day's Predicted Water Temperature @ Date + 3 Days							a4	b4	c4	
Third Day's Predicted Water Temperature @ Date + 2 Days						a3	b3	c3		
Second Day's Predicted Water Temperature @ Date + 1 Day				a2	b2	c2				
Current Day's Predicted Water Temperature @ Date			a1	b1	c1					
Previous Day's Calculated Water Temperature @ Date - 1 Day		as	bs	cs						
Previous Day's Recorded Water Temperature @ Date - 1 Day		ao	bo	co						
Current Day's Release @ Date			ra	rb	rc					

—————> observed trend

- - - - -> predicted trend

.....> forecast trend

* The current day (i.e., the day of operation) for this example is July 16.

Assuming the current day is July 16, entries corresponding to the current day's operation are represented by the letter c. Entries co and cs represent the recorded and calculated water temperatures, respectively, for the previous day (July 15). Entries c1 through c5 represent predicted water temperatures computed using the current day's five-day meteorological forecast and an assumed current day's flow regime. The entry rc represents the current day Skins Lake Spillway release required to meet project objectives.

The following three trends in water temperature changes were reviewed on a day-by-day basis:

1. Observed trend; developed from recorded mean daily water temperatures measured in the Nechako River above the Stuart River confluence each day (bo and co in Table 1). The difference in recorded water temperatures for the previous two days is extrapolated over the next five days to determine the observed water temperature trend.
2. Predicted trend; developed from the predicted water temperatures for the previous day and the following five days (cs, c1, c2, c3, c4, c5, in Table 1). These data represent the predicted trend.
3. Forecast trend; developed from the difference between the current five-day and previous five-day predictions for the same calendar days (c3 and b4, c2 and b3, c1 and b2 in Table 1). Differences between forecasted data on coincident dates for the current day and the next two days only are averaged and added to the fifth day predicted temperature to determine the trend in forecasted temperatures.

A numerical example of how the trends are calculated is presented in Appendix A.

Each day predicted water temperatures for the five-day forecast period were checked and the three trends calculated. If two of the three trends indicated that the water temperature in the Nechako River above the Stuart River confluence could

potentially exceed 19.4°C (67.0°F) then an increase in the Skins Lake Spillway release was required. When this occurred the current day's release was revised and the flow and temperature models were rerun using the modified flow regime. Results of each day's final computer run were subsequently used to initialize water temperatures for the following day's computations. Entries in Table 1 represent each day's final cooling water release and resultant predicted water temperatures.

The following release criteria were used with the three trends identified above to determine the timing and magnitude of Skins Lake Spillway releases:

1. When two of the three trends show an increase in water temperature in the Nechako River above the Stuart River confluence, and these trends show that potentially the water temperature could exceed 19.4°C (67.0°F), increase the Skins Lake Spillway release according to criteria 2 and 3 below.
2. Operate Skins Lake Spillway such that flow in the Nechako River below Cheslatta Falls ranges between 170 m³/s (6,000 cfs) and 283 m³/s (10,000 cfs) as required, and flow in the Nechako River above the Stuart River confluence (as measured at Vanderhoof) does not exceed 340 m³/s (12,000 cfs). It is understood that the flow in the Nechako River below Cheslatta Falls is to be not less than 170 m³/s (6,000 cfs) by the beginning of the control period, and is to be reduced to approximately 31.2 m³/s (1,100 cfs) by September 6.
3. At any time, increase the Skins Lake Spillway release from the current level to 453 m³/s (16,000 cfs) to achieve the flow changes in the Nechako River as fast as possible.
4. During cooling periods when two of three trends in forecasted water temperatures are decreasing and these trends indicate that potentially the water temperature could drop below 19.4°C (67.0°F) within the forecast period (five days), reduce the Skins Lake Spillway release from the current level to 14.2 m³/s (500 cfs).

Table 2
Predicted and Recorded Water Temperatures in the Nechako River at Finmoore July 10 to August 20, 2005
 (Data Entered In Fahrenheit. See Below For Celsius)

	JULY																					
Date	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
5th Day's Predicted Water Temperature at Date + 4 Days			62.2	62.7	63.3	63.1	64.3	65.1	64.0	63.5	63.5	63.7	62.9	63.3	63.4	63.5	64.1	64.3	63.9	63.8		
4th Day's Predicted Water Temperature at Date + 3 Days			62.2	62.4	62.2	61.8	63.2	64.2	64.4	63.7	63.4	63.3	62.9	63.2	64.2	64.5	63.7	63.3	63.5			
3rd Day's Predicted Water Temperature at Date + 2 Days			62.2	62.8	62.1	61.4	62.4	62.3	63.9	64.5	63.5	63.6	63.2	62.3	63.6	64.7	64.0	63.2	63.5	64.0		
2nd Day's Predicted Water Temperature at Date + 1 Day		62.2	63.1	63.1	62.3	62.8	61.4	62.7	64.9	64.4	63.7	63.9	63.8	64.7	62.5	63.0	65.0	64.7	63.8	64.2	65.7	64.6
Current Day's Predicted Water Temperature at Date	62.1	62.6	64.0	63.9	63.8	62.6	62.4	64.6	65.4	64.5	64.6	64.2	65.2	63.7	63.2	65.3	65.1	64.8	65.1	66.5	65.9	63.7
Previous Day's Calculated Water Temperature at Date - 1 Day	62.2	63.2	64.2	64.4	63.8	62.7	63.2	64.8	65.3	64.8	64.4	64.7	64.6	64.0	64.2	65.3	64.9	65.2	65.8	66.6	65.4	63.6
Previous Day's Recorded Water Temperature at Date - 1 Day	61.2	62.1	63.8	63.6	63.5	62.8	62.9	63.9	64.0	63.7	63.6	63.4	63.9	63.5	64.3	64.0	64.8	64.8	65.5	65.8	64.9	63.4
Current Day's Skins Lake Spillway Release at Date (cfs)	3178	3178	3178	3178	5297	7416	7416	7416	7416	7416	7416	7416	7416	7416	7416	7416	1000	6000	6000	6000	6000	6000
				to	to												to	to				
				5297	7416												1000	6000				
				@	@												@	@				
				1400	1400												1600	1600				
				hrs	hrs												hrs	hrs				

Figure 2

Recorded Mean Daily Temperatures in the Nechako River Above the Stuart River Confluence, July 10 to August 20, 2003

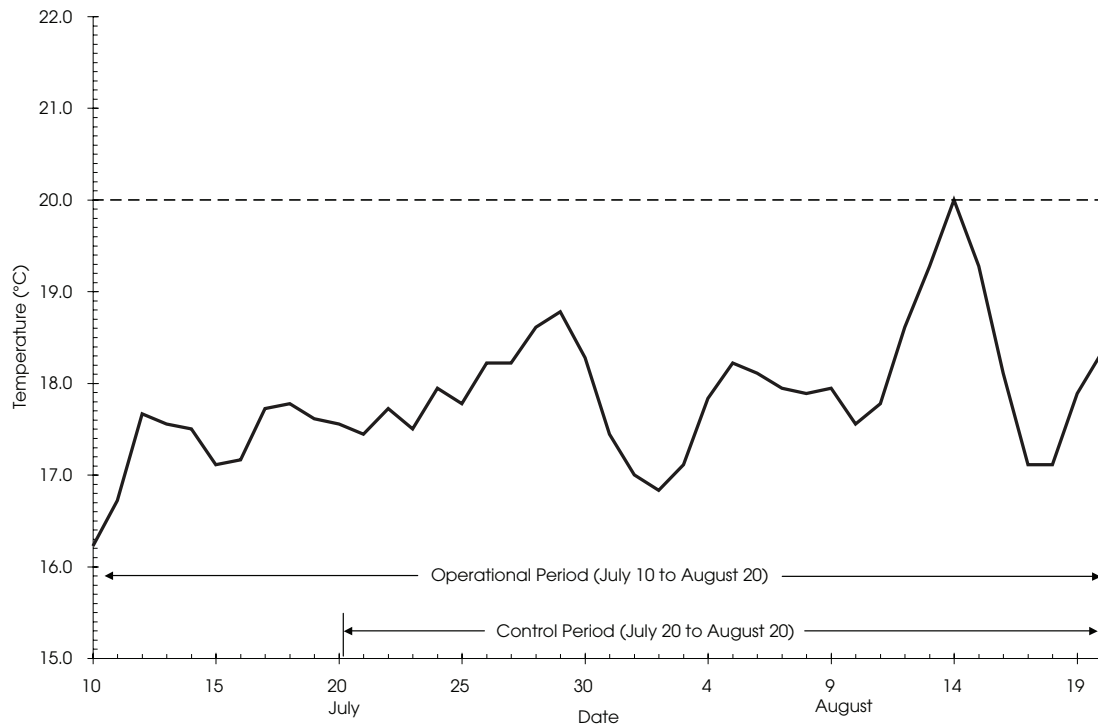
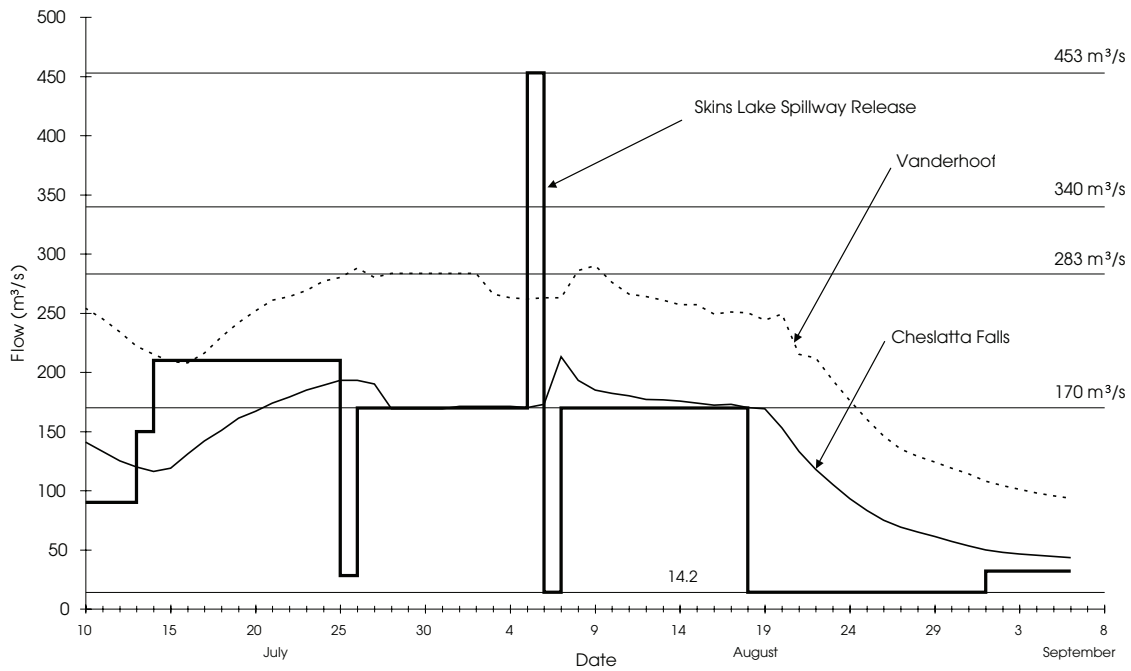


Figure 3

Skins Lake Spillway Releases and Flows in the Nechako River Below Cheslatta Falls and at Vanderhoof, July 10 to September 8, 2005



RESULTS

Predicted and recorded mean daily water temperatures for the Nechako River above the Stuart River confluence, Skins Lake Spillway releases and changes in Skins Lake Spillway releases over the duration of the Project operational period are summarized in Table 2. Note that Skins Lake Spillway releases reported are as requested by Triton. All Nechako River and Nautley River flow data reported are preliminary data, and are part of the database utilized in the daily operation of the Summer Water Temperature and Flow Management Project. These flow data are not updated as it is the preliminary data that was used in real-time modelling of the Nechako River system. Therefore, values presented may differ slightly from those reported by WSC.

Mean daily water temperatures recorded during the control period in the Nechako River above the Stuart River confluence (Figure 2 and Table 3) did not exceed 20.0°C (68.0°F). The respective minimum and maximum mean daily water temperatures recorded during the control period were 16.8°C (62.2°F) on August 2 and 20.0°C (68.0°F) on August 14. Mean daily water temperatures recorded during the summer of 2005 in the Nechako River below Cheslatta Falls, near Fort Fraser and above the Stuart River confluence, and in the Nautley River near Fort Fraser is presented in Appendix B.

As outlined in the Methods section, Skins Lake Spillway releases required for water temperature control were regulated during the control period with the objective of maintaining flows in the Nechako River below Cheslatta Falls between 170 m³/s (6,000 cfs) and 283 m³/s (10,000 cfs) and flows at Vanderhoof at or below 340 m³/s (12,000 cfs).

Skins Lake Spillway releases and their corresponding flows in the Nechako River below Cheslatta Falls and at Vanderhoof are plotted in Figure 3. Daily Skins Lake Spillway releases, flows in the Nechako River below Cheslatta Falls and at Vanderhoof, and Nautley River flows are tabulated in Appendix C.

A record of Skins Lake Spillway release changes during the Project and the reasoning behind them is presented in Table 4.

During the control period, mean daily flows measured in the Nechako River below Cheslatta Falls (based on preliminary WSC data from the WSC data collection platform at Bert Irvine's Lodge) ranged between a maximum of 213 m³/s (7,520 cfs) on August 7 and a minimum of 153 m³/s (5,400 cfs) on August 20. Mean daily flows measured in the Nechako River at Vanderhoof ranged between a maximum of 290 m³/s (10,240 cfs) on August 9 and a minimum of 244 m³/s (8,620 cfs) on August 19. Following the control period, the mean daily flow in the Nechako River below Cheslatta Falls was reduced to 43.4 m³/s (1,530 cfs) by September 6.

Date	Water Temperature (°C)	Date	Water Temperature (°C)
10-Jul	16.2	1-Aug	17.0
11-Jul	16.7	2-Aug	16.8
12-Jul	17.7	3-Aug	17.1
13-Jul	17.6	4-Aug	17.8
14-Jul	17.5	5-Aug	18.2
15-Jul	17.1	6-Aug	18.1
16-Jul	17.2	7-Aug	17.9
17-Jul	17.7	8-Aug	17.9
18-Jul	17.8	9-Aug	17.9
19-Jul	17.6	10-Aug	17.6
20-Jul	17.6	11-Aug	17.8
21-Jul	17.4	12-Aug	18.6
22-Jul	17.7	13-Aug	19.3
23-Jul	17.5	14-Aug	20.0
24-Jul	17.9	15-Aug	19.3
25-Jul	17.8	16-Aug	18.1
26-Jul	18.2	17-Aug	17.1
27-Jul	18.2	18-Aug	17.1
28-Jul	18.6	19-Aug	17.9
29-Jul	18.8	20-Aug	18.3
30-Jul	18.3		
31-Jul	17.4		

DISCUSSION

The discussion of the 2005 Summer Water Temperature and Flow Management Project has been divided into four sections. The first section reviews the collection and use of recorded field data. Variables measured include water temperature, flow, and meteorological data (recorded and forecast). The second section discusses the volume of water used during the 2005 Summer Water Temperature and Flow Management Project. The third section provides a brief discussion of the application of the Project release criteria.

Recorded Data

The modelling procedure is based on the premise that the best way to forecast water temperatures is to initialize computations with recorded conditions. For this reason, the quality of the field data used in the modelling process directly affects the accuracy of the computed water temperatures. Therefore, data must be collected accurately and consistently to ensure that random errors are kept to a minimum. Further,

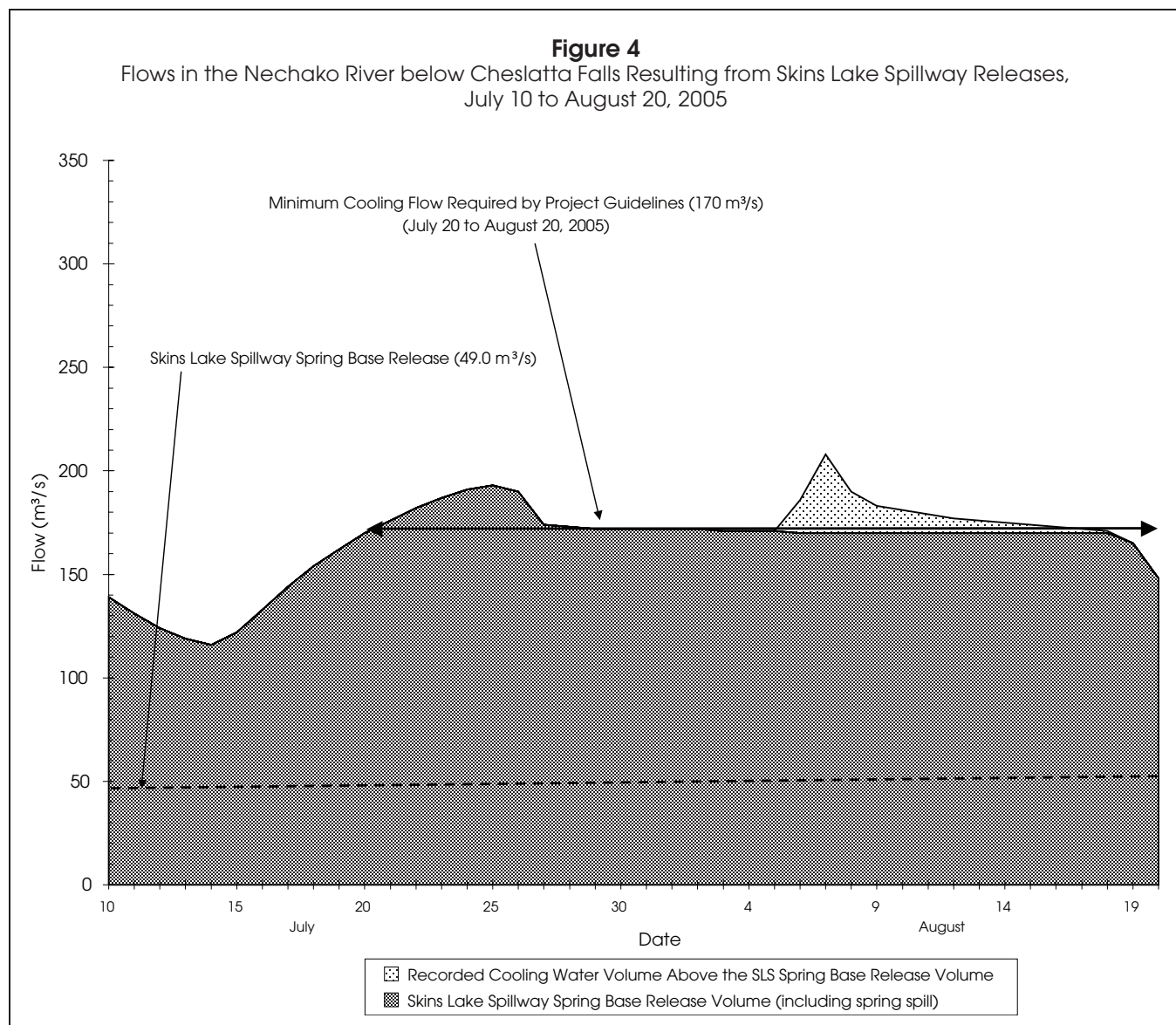
consistency in data collection techniques also ensures that, if a bias exists in the data, it remains relatively constant throughout the project.

In 2005, flow data obtained from gauging stations in the Nechako River below Cheslatta Falls, in the Nechako River at Vanderhoof and in the Nautley River near Fort Fraser appeared to be accurate. Flows in the Nechako River below Cheslatta Falls and at Vanderhoof responded as expected in response to Skins Lake Spillway releases. The Nautley River flow regime was below average throughout the Project operational period. The ability to obtain hourly stage data from the gauging stations located on the Nechako River below Cheslatta Falls and at the west end of Cheslatta Lake proved very useful in verifying the daily predictions of the flow routing model and accounting for changes in the local inflow to the Cheslatta/Murray Lakes system.

As previously stated, spot and corresponding recorder (thermograph) water temperatures were collected in the Nechako River at Fort Fraser (upstream of the Nautley River), in the Nechako River above the Stuart River confluence and in the Nautley River during

Table 4
Rationale for Skins Lake Spillway Release Changes, July 10 to September 7, 2005

Date	Old Setting (m ³ /s)	New Setting (m ³ /s)	Time of Change (hrs)	Reason for Changing SLS Release Setting
13-Jul	90.0	150	1400	Spring spill used to attain a flow of 170 m ³ /s in the Nechako River below Cheslatta Falls by July 20
14-Jul	150	210	1400	Spring spill used to attain a flow of 170 m ³ /s in the Nechako River below Cheslatta Falls by July 20
25-Jul	210	28.3	1600	Flow control
26-Jul	28.3	170	1600	Flow control
5-Aug	170	453	1600	In response to a predicted warming trend
6-Aug	453	14.2	1600	In response to a predicted cooling trend
7-Aug	14.2	170	1600	Flow control
18-Aug	170	14.2	1600	To achieve spawning flow in the Nechako River below Cheslatta Falls by early September
1-Sep	14.2	32.0	1100	To achieve spawning flow in the Nechako River below Cheslatta Falls



each site visit. The thermograph water temperatures were not consistently higher or lower than their associated spot temperatures. These data were used to adjust water temperatures following the method outlined in the Methods section of this report.

Recorded and forecast meteorological data were obtained daily from World Weatherwatch, a sub-consultant to Triton. The forecast weather data were developed using recorded weather data acquired from the Atmospheric Environmental Service (AES) station at Prince George Airport and from the meteorological monitoring station installed by

Triton at Fort Fraser. The recorded and forecast weather data were used to estimate water temperatures in the Nechako River below Cheslatta Falls and in the Nautley River for the current day and following four days. A listing of the recorded and forecast meteorological data is provided in Appendix D.

Volume of Water Used

Figure 4 presents the recorded flows in the Nechako River below Cheslatta Falls for the 2005 Summer

Water Temperature and Flow Management Project. Also indicated is the minimum cooling flow of 170 m³/s (6,000 cfs) in the Nechako River below Cheslatta Falls, and the Skins Lake Spillway spring base release of 49.0 m³/s (1,730 cfs) as determined by the NFCP Technical Committee as part of the “Annual Water Allocation” defined in the 1987 Settlement Agreement (Anon. 1987).

The total volume of water released during the 2005 Summer Water Temperature and Flow Management Project operational period was 6,896.5 m³/s-d, (243,549 cfs-d). The volume released for cooling purposes was 4,908.1 m³/s-d (173,331 cfs-d), and is based on an assumed Skins Lake Spillway release of 49.0 m³/s (1,730 cfs) for the period July 10 to August 18, inclusive, with a reduction to 14.2 m³/s (500 cfs) until August 20. The average release during the operational period was 164.2 m³/s (5,800 cfs). Volume calculations are presented in Appendix E.

Application of the Summer Water Temperature and Flow Management Project Release Criteria

The Summer Water Temperature and Flow Management Project is very sensitive to the accuracy of meteorological forecasting. If an increase or decrease in temperature occurs over a prolonged period of time (three or four days), inaccurate meteorological forecasts may predict the reversal of the temperature change prematurely. In these instances, it may be required to exercise judgment when applying the Summer Water Temperature and Flow Management Project release criteria used with the three water temperature trends. This judgment is based on experience gained in the operation of the Summer Water Temperature and Flow Management Project since 1984 and may result in exceptions to the decision based on strict adherence to the release criteria. No exceptions were made to the application of the release criteria during the entire 2005 operational period.

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APPENDIX A
Numerical Example of Water
Temperature Trend Calculation

Appendix A Numerical Example of Water Temperature Trend Calculation

From data for July 16 date of operation (Table A1).

1. Observed Trend

The observed trend is up by 1.4°C from 20.4°C (J14) to 21.8°C (J15). Take the previous day's recorded temperature 21.8°C (J15) and extrapolate the trend for five days at 1.4°C. The observed trend shows that the water temperature could potentially reach $21.8^{\circ}\text{C} + 5(1.4^{\circ}\text{C}) = 28.8^{\circ}\text{C}$.

2. Predicted Trend

The predicted trend is the difference between the previous day's calculated water temperature (J15) and the fifth day predicted water temperature (J20). The predicted trend is down from 22.2°C to 19.2°C with the potential to reach 19.2°C.

3. Forecast Trend

The forecast trend for the current day of July 16 is based on the first, second and third day forecasts.

July 16	22.3 to 22.8	=	up	0.5°C
July 17	21.6 to 21.9	=	up	0.3°C
July 18	20.6 to 20.8	=	up	0.2°C
Mean of 3 differences		=	up	0.3°C

This mean of 0.3°C is added to the fifth day predicted water temperature to give $19.2^{\circ}\text{C} + (0.3^{\circ}\text{C}) = 19.5^{\circ}\text{C}$.

Appendix A (continued)
Numerical Example of Water Temperature Trend Calculation

Table A1: Predicted and Recorded Mean Daily Water Temperatures in the Nechako River
above the Stuart River Confluence, 2005

Date	JULY										
	10	11	12	13	14	15	16	17	18	19	20
5th Day's Predicted Water Temperature at Date + 4 Days					16.8	17.0	17.4	17.3	18.0	18.4	17.8
4th Day's Predicted Water Temperature at Date + 3 Days				16.8	16.9	16.8	16.6	17.3	17.9	18.0	
3rd Day's Predicted Water Temperature at Date + 2 Days			16.8	17.1	16.7	16.4	16.9	16.9	17.7		
2nd Day's Predicted Water Temperature at Date + 1 Day		16.8	17.3	17.2	16.8	17.1	16.4	17.0			
Current Day's Predicted Water Temperature at Date	16.7	17.0	17.8	17.7	17.7	17.0	16.9				
Previous Day's Calculated Water Temperature at Date - 1 Day	16.8	17.3	17.9	18.0	17.7	17.1					
Previous Day's Recorded Water Temperature at Date - 1 Day	16.2	16.7	17.7	17.6	17.5	17.1					
Current Day's Skins Lake Spillway Release at Date (m ³ /s)	90.0	90.0	90	90 to 149.993 @ 1400 hrs	150 to 209.996 @ 1400 hrs	210	210				

APPENDIX B
**Mean Daily Water Temperatures in the Nechako
and Nautley Rivers, 2005**

Appendix B
Mean Daily Water Temperatures in the Nechako and Nautley Rivers, 2005

Date	Nechako River		Nautley		Nechako River		Nautley	
	Cheslatta Falls (°C)	Fort Fraser (°C)	above the Stuart River (°C)	Fort Fraser (°C)	Cheslatta Falls (°C)	Fort Fraser (°C)	above Stuart River (°C)	Fort Fraser (°C)
10-Jul	15.0	15.9	16.2	16.7	15.9	16.6	17.0	16.9
11-Jul	15.3	16.3	16.7	17.3	16.1	16.6	16.8	16.6
12-Jul	15.1	17.1	17.7	17.3	16.2	17.1	17.1	17.9
13-Jul	15.3	16.3	17.6	17.2	16.4	17.7	17.8	17.9
14-Jul	15.2	16.3	17.5	16.9	16.7	17.9	18.2	18.2
15-Jul	15.1	15.9	17.1	16.7	16.6	17.7	18.1	17.4
16-Jul	15.3	16.3	17.2	16.4	16.5	17.8	17.9	17.7
17-Jul	15.6	16.8	17.7	16.9	16.6	18.2	17.9	18.3
18-Jul	15.7	17.1	17.8	17.2	16.4	17.6	17.9	17.7
19-Jul	15.5	17.0	17.6	17.3	16.5	17.6	17.6	17.3
20-Jul	15.5	16.9	17.6	16.9	16.8	18.4	17.8	18.6
21-Jul	15.8	16.9	17.4	17.4	16.9	19.4	18.6	18.7
22-Jul	15.6	17.2	17.7	17.4	17.0	19.7	19.3	18.8
23-Jul	15.8	16.7	17.5	17.5	17.0	19.8	20.0	19.6
24-Jul	15.4	16.7	17.9	17.1	16.8	17.9	19.3	16.7
25-Jul	15.5	16.9	17.8	17.8	16.8	17.4	18.1	16.7
26-Jul	15.6	17.2	18.2	18.1	16.7	17.8	17.1	17.6
27-Jul	15.5	17.2	18.2	18.1	16.7	17.9	17.1	18.2
28-Jul	15.6	17.8	18.6	18.5	16.9	18.2	17.9	18.9
29-Jul	15.8	17.6	18.8	18.6	16.7	17.8	18.3	18.2
30-Jul	15.7	16.7	18.3	17.9	16.7	17.8	17.9	18.2
31-Jul	15.7	16.6	17.4	17.9	16.7	17.8	18.3	18.2

APPENDIX C

Mean Daily Skins Lake Spillway Releases and Flows in the Nechako and Nautley Rivers, 2005

Appendix C
Mean Daily Skins Lake Spillway Releases and Flows
in the Nechako and Nautley Rivers, 2005

Date	Skins Lake Spillway Release (m ³ /s)	Nechako River		Nautley River Fort Fraser (m ³ /s)
		Cheslatta Falls (m ³ /s)	At Vanderhoof (m ³ /s)	
10	90.0	141.0	254.0	46.5
11	90.0	133.0	245.0	47.1
12	90.0	125.0	234.0	44.6
13	90.0 to 150 @ 1400 hrs	120.0	222.0	44.1
14	150 to 210 @ 1400 hrs	116.0	215.0	43.6
15	210	119.0	209.0	43.1
16	210	131.0	208.0	42.7
17	210	142.0	216.0	42.2
18	210	151.0	230.0	41.7
19	210	161.0	242.0	40.7
20	210	167.0	252.0	40.3
21	210	174.0	261.0	39.3
22	210	179.0	264.0	38.4
23	210	185.0	269.0	37.9
24	210	189.0	277.0	37.0
25	210 to 28.3 @ 1600 hrs	193.0	280.0	36.3
26	28.3 to 170 @ 1600 hrs	193.0	287.8	35.5
27	170	190.0	280.0	34.7
28	170	169.0	283.6	34.3
29	170	169.0	283.6	33.6
30	170	169.0	283.6	32.4
31	170	169.0	283.6	32.0
1	170	171.0	283.6	34.0
2	170	171.0	283.6	31.8
3	170	171.0	266.0	30.3
4	170	171.0	263.0	29.9
5	170 to 453 @ 1600 hrs	170.0	262.0	29.1
6	453 to 14.2 @ 1600 hrs	173.0	263.0	30.9
7	14.2 to 170 @ 1600 hrs	213.0	263.0	30.5
8	170	193.0	286.0	29.7

Appendix C (continued)
Mean Daily Skins Lake Spillway Releases and Flows
in the Nechako and Nautley Rivers, 2005

Date	Skins Lake Spillway Release (m ³ /s)	Nechako River		Nautley River Fort Fraser (m ³ /s)
		Cheslatta Falls (m ³ /s)	At Vanderhoof (m ³ /s)	
9	170	185.0	290.0	27.8
10	170	182.0	276.0	27.4
11	170	180.0	266.0	26.5
12	170	177.0	264.0	25.8
13	170	176.6	261.0	25.8
14	170	175.6	257.0	24.8
15	170	174.0	257.0	24.1
16	170	172.0	249.0	23.8
17	170	173.0	251.0	23.5
18	170 to 14.2 @ 1600 hrs	170.0	250.0	24.0
19	14.2	169.0	244.0	22.2
20	14.2	153.0	249.0	23.7
21	14.2	133.0	215.0	
22	14.2	118.0	212.0	
23	14.2	105.0	193.0	
24	14.2	93.0	176.0	
25	14.2	83.3	160.0	
26	14.2	74.8	146.0	
27	14.2	69.2	135.0	
28	14.2	65.0	129.0	
29	14.2	61.2	124.0	
30	14.2	57.1	119.0	
31	14.2	53.4	114.0	
1	14.2 to 32.0 @ 1100 hrs	49.9	108.0	
2	32.0	47.9	104.0	
3	32.0	46.5	101.0	
4	32.0	45.3	97.8	
5	32.0	44.2	95.4	
6	32.0	43.4	93.3	
7	32.0	42.8	90.9	
8	32.0	42.4	89.3	

APPENDIX D
Recorded and Forecast Meteorological Data

**Appendix D
Recorded and Forecast Meteorological Data**

12.10	443.82	0.79	7.60	10.80	92.80	75.50	9 07 05
13.00	400.00	0.70	7.40	7.00	93.30	65.00	10 07 05
14.20	550.00	0.30	5.50	5.00	93.50	60.00	
15.50	390.00	0.60	8.50	5.00	93.40	68.00	
14.50	420.00	0.70	9.50	12.00	93.50	70.00	
14.30	480.00	0.40	7.00	6.00	93.30	62.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 10/05							

12.70	484.50	0.65	6.50	6.70	93.30	67.60	10 07 05
13.80	590.00	0.25	6.00	5.00	93.40	62.00	11 07 05
15.40	420.00	0.55	8.50	5.00	93.40	65.00	
14.80	400.00	0.65	9.50	13.00	93.50	68.00	
14.30	490.00	0.40	7.20	7.00	93.40	65.00	
14.50	570.00	0.30	6.00	6.00	93.50	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 11/05							

14.60	690.70	0.33	5.90	6.30	93.40	61.10	11 07 05
13.50	180.00	0.95	10.00	8.00	93.50	75.00	12 07 05
15.00	440.00	0.71	9.00	17.50	94.00	65.00	
14.00	350.00	0.75	7.00	6.50	94.00	60.00	
14.30	420.00	0.75	9.50	5.50	93.30	70.00	
16.70	590.00	0.40	7.00	3.00	93.20	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 12/05							

14.30	283.20	0.88	10.90	7.30	93.60	81.30	12 07 05
14.80	380.00	0.75	9.00	11.60	93.90	68.00	13 07 05
14.50	330.00	0.77	7.30	12.10	93.70	65.00	
14.50	315.00	0.80	9.70	5.20	93.10	71.00	
15.60	480.00	0.62	8.30	10.10	93.40	60.00	
16.60	560.00	0.46	7.50	9.80	93.70	58.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 13/05							

14.90	422.10	0.73	9.30	10.60	93.90	71.80	13 07 05
13.90	440.00	0.65	6.90	11.00	93.70	63.00	14 07 05
13.80	320.00	0.85	8.70	9.50	93.10	72.00	
15.50	460.00	0.71	8.20	7.80	93.20	62.00	
16.40	545.00	0.42	8.30	7.20	93.50	59.00	
14.90	560.00	0.45	6.10	8.60	92.90	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 14/05							

14.50	391.20	0.64	6.90	9.20	94.00	60.60	14 07 05
12.40	210.00	0.95	9.20	4.70	93.40	84.00	15 07 05
15.00	450.00	0.66	8.80	11.50	93.40	65.00	
17.10	570.00	0.35	9.00	8.10	93.70	57.00	
15.70	580.00	0.39	6.80	9.10	93.10	54.00	
15.00	540.00	0.44	6.20	7.10	93.10	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 15/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

12.00	187.10	0.96	9.80	3.60	93.40	87.10	15 07 05
14.20	390.00	0.84	9.60	6.70	93.40	68.00	16 07 05
18.10	540.00	0.41	8.50	9.90	93.60	55.00	
15.60	510.00	0.46	7.20	8.70	93.00	58.00	
14.50	490.00	0.51	6.00	6.50	93.10	53.00	
14.60	420.00	0.48	5.80	3.50	93.20	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 16/05							

14.80	397.60	0.81	9.80	5.50	93.60	73.80	16 07 05
17.80	540.00	0.45	9.50	9.00	93.70	62.00	17 07 05
15.00	500.00	0.55	8.00	8.00	93.00	65.00	
14.20	490.00	0.50	6.50	6.00	93.00	50.00	
14.20	450.00	0.50	6.00	4.00	93.20	55.00	
15.50	570.00	0.30	5.50	3.00	93.40	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 17/05							

17.90	518.40	0.51	10.30	12.00	93.80	63.90	17 07 05
14.80	530.00	0.45	6.00	11.00	93.10	52.00	18 07 05
14.20	490.00	0.50	6.50	6.50	93.00	50.00	
14.50	460.00	0.50	6.50	8.00	92.90	55.00	
15.50	570.00	0.30	5.80	6.50	93.40	50.00	
13.00	410.00	0.60	3.50	6.00	93.00	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 18/05							

16.40	525.80	0.48	5.40	11.80	93.20	48.90	18 07 05
14.10	510.00	0.50	6.40	8.50	93.10	55.00	19 07 05
14.20	480.00	0.55	6.30	8.50	93.00	58.00	
15.50	570.00	0.35	5.60	5.50	93.55	51.00	
15.00	440.00	0.60	5.00	6.50	93.00	53.00	
14.00	350.00	0.80	9.00	10.00	93.10	72.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 19/05							

13.20	576.70	0.39	6.00	5.50	93.20	64.00	19 07 05
13.20	400.00	0.70	7.80	8.50	93.40	65.00	20 07 05
15.00	560.00	0.40	6.40	6.50	93.60	53.00	
16.00	480.00	0.50	6.00	7.00	93.10	51.00	
14.70	370.00	0.75	9.40	10.80	93.25	72.00	
14.00	400.00	0.70	7.80	9.80	93.70	66.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 20/05							

12.10	351.57	0.64	8.00	4.80	93.50	76.40	20 07 05
14.00	570.00	0.35	7.00	3.50	93.80	60.00	98145.452
16.00	480.00	0.50	7.00	7.00	93.10	55.00	
15.00	360.00	0.75	9.00	10.00	93.30	70.00	
14.30	420.00	0.65	6.90	8.80	93.70	63.00	
15.00	550.00	0.40	7.00	4.80	93.90	59.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 21/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

13.40	657.70	0.32	6.10	3.40	93.90	66.30	21 07 05
16.00	540.00	0.50	8.00	10.00	93.10	58.00	22 07 05
14.30	330.00	0.80	9.50	11.00	93.30	72.00	
14.30	420.00	0.70	7.30	7.80	93.80	63.00	
15.40	550.00	0.40	6.50	4.70	94.00	57.00	
14.20	410.00	0.65	7.80	4.00	94.10	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 22/05							

15.70	389.09	0.63	8.90	9.40	93.10	65.30	22 07 05
14.00	320.00	0.85	8.50	11.00	93.50	70.00	23 07 05
14.50	420.00	0.70	6.80	8.80	94.00	60.00	
15.40	530.00	0.45	6.00	5.20	94.10	54.00	
15.20	440.00	0.60	7.00	5.00	94.20	61.00	
15.00	350.00	0.80	9.00	10.60	93.60	67.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 23/05							

12.80	442.30	0.90	8.50	9.20	93.70	75.80	23 07 05
14.10	380.00	0.65	7.40	8.00	94.00	67.00	24 07 05
14.50	580.00	0.40	6.80	6.00	94.10	60.00	
15.00	480.00	0.70	8.00	5.00	93.90	64.00	
15.20	350.00	0.85	9.00	4.00	93.50	66.00	
15.30	350.00	0.88	9.20	8.00	93.10	67.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 24/05							

13.60	560.00	0.64	8.30	7.90	94.10	72.10	24 07 05
14.70	660.00	0.28	6.80	4.00	94.10	60.00	25 07 05
15.00	480.00	0.70	8.00	6.00	93.90	65.00	
15.20	400.00	0.85	9.00	4.00	93.50	68.00	
15.30	400.00	0.88	9.20	5.00	93.10	69.00	
14.50	450.00	0.70	8.50	10.00	93.20	67.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 25/05							

14.80	617.00	0.34	6.70	4.50	94.20	63.10	25 07 05
16.00	480.00	0.75	8.00	4.00	93.90	62.00	26 07 05
15.80	400.00	0.80	8.60	4.00	93.50	65.00	
15.50	380.00	0.85	9.00	5.00	93.10	68.00	
15.00	520.00	0.60	8.00	10.00	93.20	63.00	
14.50	480.00	0.70	8.20	7.00	93.30	67.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 26/05							

16.60	374.50	0.84	8.90	4.60	94.10	62.90	26 07 05
16.00	300.00	0.90	10.50	4.80	93.80	69.00	27 07 05
15.80	350.00	0.87	9.70	7.50	93.10	65.00	
14.20	420.00	0.75	7.80	4.80	93.30	61.00	
15.00	510.00	0.50	7.60	6.70	93.80	62.00	
15.50	530.00	0.48	5.00	3.50	93.50	51.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 27/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

17.40	354.40	0.75	11.60	5.60	93.70	69.50	27 07 05
15.00	420.00	0.60	10.70	4.20	93.20	71.00	28 07 05
15.50	390.00	0.70	8.10	9.50	93.20	62.00	
14.80	400.00	0.80	9.20	7.20	93.40	69.00	
15.80	310.00	0.85	10.00	4.50	93.30	67.00	
14.70	440.00	0.65	8.50	8.00	93.50	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 28/05							

16.70	502.60	0.54	10.70	4.70	93.30	70.80	28 07 05
16.50	480.00	0.65	8.10	7.50	93.20	57.00	29 07 05
15.10	390.00	0.78	9.50	8.00	93.40	67.00	
16.00	260.00	0.94	10.50	8.70	92.90	69.00	
14.50	420.00	0.80	9.00	9.50	93.10	68.00	
13.80	550.00	0.42	6.50	9.10	93.70	57.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 29/05							

17.00	501.10	0.72	7.80	6.20	93.30	55.80	29 07 05
14.20	410.00	0.85	11.00	6.50	93.30	81.00	30 07 05
15.50	290.00	0.90	11.00	8.20	93.00	74.00	
13.90	390.00	0.85	8.50	10.00	93.00	69.00	
14.00	530.00	0.35	5.80	8.50	93.70	55.00	
15.10	590.00	0.18	6.10	3.50	93.80	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 30/05							

13.70	283.20	0.86	10.80	4.40	93.40	83.50	30 07 05
14.50	320.00	0.88	12.20	5.50	93.20	85.00	31 07 05
14.20	400.00	0.80	9.00	12.00	93.20	71.00	
13.70	520.00	0.43	6.70	8.10	93.80	60.00	
14.60	600.00	0.24	6.50	4.80	93.80	57.00	
16.00	470.00	0.62	9.00	4.50	93.70	61.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 31/05							

14.80	239.95	0.91	12.20	5.20	93.20	85.70	31 07 05
13.70	415.00	0.68	7.80	13.00	93.10	67.00	01 08 05
13.80	480.00	0.48	6.90	10.00	93.90	61.00	
15.50	610.00	0.30	7.50	5.40	93.90	52.00	
16.50	430.00	0.60	9.50	5.30	93.60	60.00	
16.30	410.00	0.65	10.00	8.50	93.50	66.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 01/05							

14.80	513.80	0.63	6.10	14.40	93.20	60.50	01 08 05
15.10	500.00	0.30	6.90	12.00	93.90	60.00	02 08 05
16.60	620.00	0.25	8.20	5.10	94.00	55.00	
17.60	460.00	0.40	10.50	8.00	93.60	61.00	
15.00	410.00	0.65	8.00	9.00	93.80	62.00	
15.00	410.00	0.65	8.00	8.00	93.80	62.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 02/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

14.40	536.30	0.57	5.20	10.10	93.90	56.90	02 08 05
17.50	640.00	0.25	7.50	5.00	94.00	55.00	03 08 05
18.00	500.00	0.40	9.50	6.00	93.70	57.00	
17.00	420.00	0.65	9.50	11.00	93.70	60.00	
14.50	410.00	0.70	8.20	6.50	93.70	64.00	
13.00	430.00	0.65	6.80	6.00	93.60	68.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 03/05							

14.60	588.00	0.32	5.40	4.60	94.20	55.00	03 08 05
16.50	440.00	0.60	9.50	6.00	93.70	57.00	04 08 05
16.50	430.00	0.60	9.50	5.00	93.70	60.00	
16.00	450.00	0.60	9.00	7.00	93.70	64.00	
14.00	440.00	0.65	7.00	6.00	93.60	69.00	
14.50	500.00	0.40	7.50	7.00	93.70	62.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 04/05							

17.50	460.00	0.70	8.30	4.70	93.90	58.20	04 08 05
17.20	480.00	0.58	8.90	6.00	93.60	59.00	05 08 05
14.70	450.00	0.70	9.30	5.00	93.60	66.00	
13.70	490.00	0.55	9.00	5.00	93.70	70.00	
14.80	540.00	0.35	6.00	6.00	93.70	56.00	
13.00	540.00	0.35	5.00	4.50	93.90	58.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 05/05							

17.60	537.70	0.70	9.80	5.20	93.90	63.00	05 08 05
16.00	475.00	0.65	9.30	4.00	93.70	64.00	06 08 05
14.70	510.00	0.60	8.00	5.00	93.70	67.00	
15.80	570.00	0.40	6.50	5.00	93.80	54.00	
14.00	570.00	0.40	5.50	5.00	93.90	58.00	
16.00	600.00	0.40	5.50	5.50	94.00	50.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 06/05							

15.40	362.80	0.65	9.30	4.30	93.80	68.30	06 08 05
15.30	550.00	0.50	8.00	5.50	93.80	65.00	07 08 05
16.00	570.00	0.40	7.10	5.50	93.80	56.00	
15.00	520.00	0.50	6.20	5.00	93.80	56.00	
16.60	540.00	0.50	6.50	5.00	93.90	52.00	
15.00	440.00	0.65	7.60	5.50	93.60	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 07/05							

13.90	501.40	0.26	6.50	4.00	93.90	65.40	07 08 05
15.20	580.00	0.15	7.80	2.50	93.80	62.00	08 08 05
15.50	520.00	0.40	7.50	5.00	93.70	58.00	
15.80	540.00	0.40	6.70	6.00	93.80	55.00	
15.00	460.00	0.60	8.00	3.00	93.70	60.00	
15.50	520.00	0.40	7.50	3.00	93.90	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 08/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

14.20	567.70	0.14	6.60	2.90	93.90	64.00	08 08 05
14.00	500.00	0.57	7.60	6.00	93.80	67.00	09 08 05
14.80	580.00	0.15	6.80	8.00	93.90	60.00	
15.00	460.00	0.60	8.00	6.00	94.00	65.00	
15.50	480.00	0.55	7.80	7.00	94.20	62.00	
15.80	550.00	0.40	7.40	7.00	94.10	59.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 09/05							

13.90	361.00	0.57	7.70	7.60	94.00	68.30	09 08 05
14.90	600.00	0.17	6.80	9.00	94.10	60.00	10 08 05
16.00	500.00	0.45	7.60	6.00	94.10	60.00	
16.50	550.00	0.40	7.80	4.00	94.10	58.00	
16.80	550.00	0.40	8.00	3.00	93.90	58.00	
16.50	500.00	0.50	8.40	4.00	93.50	62.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 10/05							

14.80	598.70	0.16	5.90	8.20	94.20	58.60	10 08 05
15.60	550.00	0.26	6.50	5.00	94.10	58.00	11 08 05
17.00	500.00	0.45	7.50	4.00	94.00	58.00	
17.50	500.00	0.40	8.40	3.00	93.70	58.00	
17.50	550.00	0.40	8.50	3.00	93.40	57.00	
16.50	450.00	0.60	9.00	6.00	93.10	63.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 11/05							

15.80	567.90	0.26	7.00	4.50	94.30	59.30	11 08 05
18.00	580.00	0.43	10.00	6.00	94.20	63.00	12 08 05
18.50	550.00	0.50	9.50	6.00	93.60	58.00	
18.00	580.00	0.40	9.00	4.00	93.20	59.00	
16.50	400.00	0.65	8.50	8.00	93.40	63.00	
15.00	550.00	0.40	7.00	8.00	93.70	61.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 12/05							

17.70	573.40	0.39	9.80	5.60	94.30	64.20	12 08 05
17.80	630.00	0.18	9.00	3.00	93.70	59.00	13 08 05
18.00	550.00	0.45	9.50	6.00	93.30	60.00	
16.50	400.00	0.65	8.50	15.00	93.50	62.00	
15.00	450.00	0.50	7.00	10.00	93.80	61.00	
13.50	580.00	0.30	6.00	6.00	93.60	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 13/05							

18.20	535.10	0.14	8.80	5.00	93.90	59.70	13 08 05
19.30	530.00	0.40	11.00	5.00	93.20	65.00	14 08 05
15.80	380.00	0.65	8.80	12.00	93.40	62.00	
14.50	460.00	0.40	6.50	10.00	93.70	62.00	
13.00	580.00	0.25	5.50	6.00	93.70	58.00	
15.00	500.00	0.45	5.00	5.00	93.50	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 14/05							

Appendix D (continued)
Recorded and Forecast Meteorological Data

18.50	498.30	0.39	11.10	7.80	93.40	64.80	14 08 05
14.50	390.00	0.65	8.00	12.00	93.50	60.00	15 08 05
14.00	440.00	0.45	6.80	9.00	93.60	60.00	
13.00	560.00	0.30	6.00	7.00	93.50	58.00	
14.50	520.00	0.40	5.50	5.00	93.40	55.00	
15.00	350.00	0.70	9.00	4.00	93.10	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 15/05							

14.50	304.00	0.71	7.80	10.60	93.70	64.50	15 08 05
11.20	280.00	0.75	6.50	4.50	93.50	70.00	16 08 05
12.50	550.00	0.30	5.50	8.00	93.50	60.00	
14.00	550.00	0.30	5.00	6.00	93.50	55.00	
15.00	330.00	0.70	8.00	5.00	93.20	65.00	
15.50	400.00	0.55	7.00	6.00	93.30	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 16/05							

12.00	281.00	0.77	7.00	4.00	93.60	72.50	16 08 05
14.50	600.00	0.25	5.00	11.50	93.50	65.00	17 08 05
14.70	550.00	0.25	6.00	7.00	93.50	55.00	
16.00	330.00	0.70	7.50	6.00	93.20	65.00	
15.50	350.00	0.70	7.50	6.50	93.10	62.00	
15.00	400.00	0.60	6.00	6.00	93.20	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 17/05							

13.00	571.00	0.34	3.10	10.10	93.60	53.60	17 08 05
15.00	510.00	0.55	5.00	9.00	93.50	55.00	18 08 05
16.00	380.00	0.65	7.80	6.00	93.20	62.00	
15.50	400.00	0.65	7.20	6.50	93.20	65.00	
14.00	430.00	0.60	5.50	5.00	93.20	62.00	
13.70	500.00	0.30	5.50	5.00	93.30	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 18/05							

12.50	411.00	0.49	3.80	6.10	93.50	59.00	18 08 05
17.50	567.00	0.16	7.00	8.00	93.00	58.00	19 08 05
16.00	450.00	0.30	7.30	6.50	93.30	60.00	
14.50	470.00	0.40	6.00	6.00	93.30	62.00	
13.90	490.00	0.30	5.50	6.00	93.30	60.00	
14.20	500.00	0.40	6.00	6.00	93.20	58.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 19/05							

19.00	440.00	0.40	9.00	10.00	92.20	46.00	19 08 05
16.20	410.00	0.80	9.00	9.50	92.50	60.00	20 08 05
14.20	450.00	0.50	6.00	6.50	93.00	60.00	
14.00	480.00	0.35	5.50	6.20	92.50	61.00	
14.20	490.00	0.20	5.00	6.00	93.20	60.00	
15.00	510.00	0.20	6.00	7.00	93.30	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 20/05							

APPENDIX E

**Summer Water Temperature and Flow Management Project
Reservoir Release Volume Calculations for
July 10 to August 20, 2005**

Appendix E
Summer Water Temperature and Flow Management Project Reservoir Release
Volume Calculations for July 10 to August 20, 2005

Summer Water Temperature and Flow Management Project Base Release Volume = (JD 230 - JD 190)
 * 49.0 + (JD 232 - JD 230) * 14.16 = 1,988.3 m³/s*days

Time period (Julian Day)	Time (hrs)	Flow Rate (m ³ /s)	Volume (m ³ /s*hrs)
July 10 (191) @ 2400 hrs to July 13 (194) @ 1400 hrs	86.0	90.0	7,740
July 13 (194) @ 1400 hrs to July 14 (195) @ 1400 hrs	24.0	150.0	3,600
July 14 (195) @ 2400 hrs to July 25 (206) @ 1600 hrs	266.0	210.0	55,860
July 25 (206) @ 1600 hrs to July 26 (207) @ 1600 hrs	24.0	28.3	679
July 26 (207) @ 2000 hrs to August 5 (217) @ 1600 hrs	240.0	169.9	40,776
August 05 (217) @ 1600 hrs to August 06 (218) @ 1600 hrs	24.0	453.1	10,874
August 06 (218) @ 1600 hrs to August 07 (219) @ 1600 hrs	24.0	14.2	340
August 07 (219) @ 1600 hrs to August 18 (230) @ 1600 hrs	264.0	169.9	44,854
August 18 (230) @ 1600 hrs to August 20 (232) @ 2400 hrs	56.0	14.2	793
Total	1,008 (42.0 days)		165,515
Total Release Volume			= 165,515 m ³ /s*hrs = 6,896.5 m ³ /s*days = 243,549 cfs*days
Volume Released for Cooling Purposes			= Total Volume - Base Volume = 6,896.5 - 1,988.3 = 4,908.1 m ³ /s*days = 173,331 cfs*days
Average Release over Summer Management Period (July 10 to August 20)			= 6,896.5 m ³ /s*days / 42 days = 164.2 m ³ /s = 5,798.8 cfs

