SECTION 10.0
WEWPCC – SECOND PRIORITY CONTROL ALTERNATIVES

10.1 INTRODUCTION

The West End Water Pollution Control Centre (WEWPCC) achieves some nitrification through the lagoon system that is located downstream of the wastewater treatment plant. The level of nitrification appears similar to that obtained in the second priority control alternatives for the other two plants – South End Water Pollution Control Centre (SEWPCC) and North End Water Pollution Control Centre (NEWPCC). For this reason, the lagoon alternative is examined in this section to determine the likely effluent results that would occur should the current lagoon system be maintained in service.

10.2 EFFLUENT LAGOON DESCRIPTION

There are five facultative lagoon cells at the WEWPCC, with the following areas and volumes:

Cell	Surface Area (hec)	Volume (ML)
Cell 1 (old Primary Cell 1)	18.2	275
Cell 2 (old Primary Cell 2)	18.2	275
Cell 3 (old Primary Cell 3)	18.2	275
Cell 4 (old Secondary Cell 2)	25.3	380
Cell 5 (old Secondary Cell 1)	25.3	380

These lagoon cells were constructed in the mid-1960s. In the late 1960s, a portion of Cell 4 was partitioned and used for three aeration equipment tests. Although the aeration equipment was removed shortly thereafter, the berms have remained in place.

The design of the new plant in the late 1980s incorporated use of the lagoon cells as heat sinks for use during the winter. Use of the lagoon cells as a heat sink enabled lowering of the discharge temperature so that thin ice problems would not occur along the Assiniboine River. Further modifications were implemented in 1998 to maximize warm weather coliform die-off prior to discharge. The present modes of operation are described as follows:

- **Winter:** During the winter, plant effluent is discharged into Cell 5. This cell discharges into Cell 6, directly to the outfall, or some combination. The City's intent is to maintain outfall temperatures close to 0°C.
- **Summer:** During the summer, plant effluent is discharged into Cell 1. From that cell, it flows by gravity in series through Cell 2, Cell 3, Cell 4, and Cell 5

prior to discharging to the outfall. At an average flow of 30 ML/d, the retention time in the lagoon system would be approximately 53 days.

- **High Flows:** When flows exceed the peak dry weather flow (54 ML/d), secondary treatment is bypassed and primary effluent is discharged with the secondary effluent to the lagoons. Should peak flows exceed the capacity of the preliminary and primary sections of the plant (112 ML/d), it can be bypassed directly from the influent forcemain to Cell 1. Flows of this magnitude have seldom occurred. These partially treated flows occur during spring run-off and subsequent to summer and fall storms. In almost every instance, the plant is configured as indicated for the summer season to maximize retention time prior to discharge to the Assiniboine River.

Since they were constructed, the lagoon cells have never been de-sludged. In 1993, The City investigated the sludge deposits in the lagoon cells. This study indicated that the old primary cells had 0.37 metres to 0.55 metres of sludge deposition; while the old secondary cells had 0.08 metres to 0.20 metres of sludge deposited on the floor.

10.3 LAGOON AMMONIA REMOVAL PERFORMANCE

The ammonia concentration of the lagoon effluent has been monitored since 1995. The results from this period are summarized in Table 10.1.

Table 10.1: WEWPCC Lagoon Average Effluent Ammonia Concentrations

Month	1995	1996	1997	1998	1999	2000
January	-	-	29.25	-	27.85	30.04
February	-	27.90	29.81	-	28.23	26.33
March	-	28.92	31.25	22.56	25.18	15.27
April	-	12.19	15.78	7.50	11.68	16.86
May	-	2.27	4.62	1.75	4.99	-
June	-	2.95	8.30	-	10.79	-
July	1.20	10.29	8.45	5.00	8.79	-
August	1.74	15.06	3.78	1.17	2.78	-
September	4.91	5.05	13.56	2.88	7.50	-
October	13.79	5.77	5.75	7.15	6.31	-
November	16.54	-	6.25	16.58	13.15	-
December	26.36			17.88	20.38	-

The above averages are based on a minimum of four samples in any month. In months where no data is shown, no sampling results are reported in the City's information.

Effluent ammonia concentrations were often low during the summer months; however, there was significant variation. Figure 10.1 illustrates the values measured over the 1995 to 2000 period.

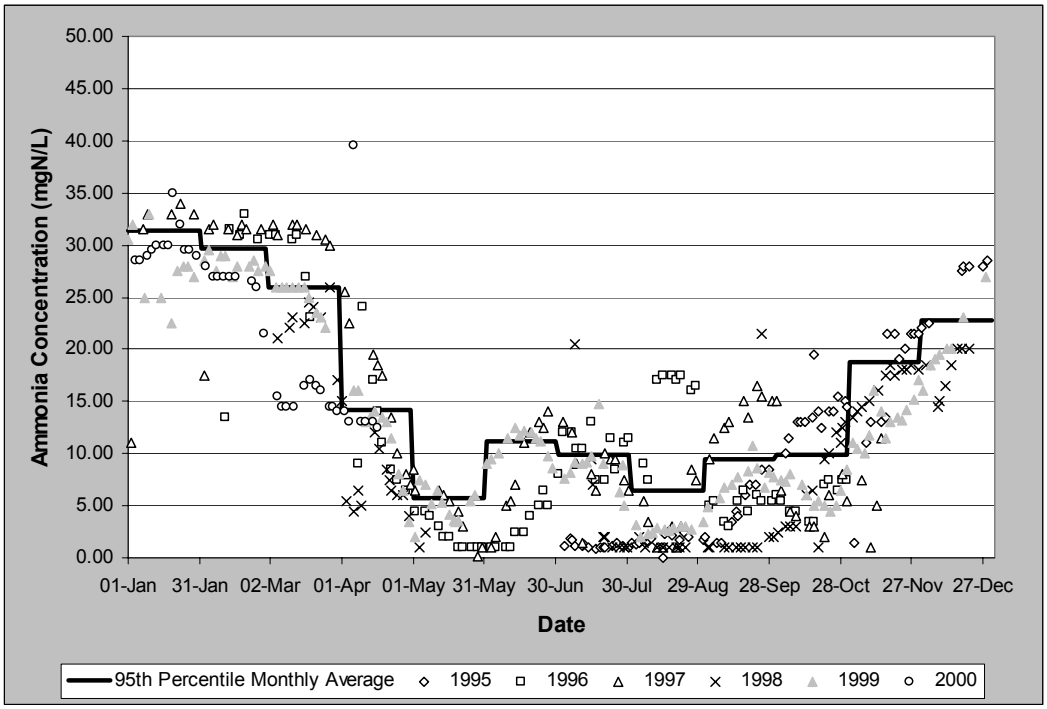

Figure 10.1: WEWPCC Lagoon Average Effluent Ammonia Concentrations

A line showing the estimated 95th percentile monthly average value is superimposed on the data in the above graph. This line indicates that the monthly average value likely will be less than 5 to 7 mg/L in May and August while likely being below 10 to 12 mg/L during June and July. These values are consistent with the high level of ammonia control described for the other two Winnipeg wastewater treatment plants in Section 8 and Section 9. They exceed the moderate level of control.

There has been some concern that the values measured by the City are not representative due to the potential for nitrification in the sampling procedure. Attached growth in the sample tube may result in erroneously lower ammonia concentrations. To evaluate this possibility, the City took a series of parallel grab samples during the summer of 2001. In June and July, approximately 10 parallel samples were taken. Results are as follows:

	Average Ammonia Concentration (mg/L)	
	Grab	Composite
June, 2001	7.4	6.4
July, 2001	5.3	4.5

In June 2001, the composite sample had ammonia concentrations that were 1.0 mg/L lower than the grab sample results. In July, the differential was 0.8 mg/L. In both cases, the averages were based on approximately 10 samples. These results suggest that a limited amount of sample nitrification occurs where composite sample analyses are reported. The data summarized in Table 10.1 and Figure 10.1 are all derived from composite samples. Hence, the reported ammonia concentrations might be lower than actual. However, as long as the differential is similar to that found in 2001, the difference in ammonia concentrations is not sufficiently substantial to cause concern that nitrification is not occurring in the lagoon cells.

Use of the lagoons for tertiary nitrification is a status quo option. As this alternative entails minimal effort on the City's part, it is the preferable route for implementation of nitrification at the WEWPCC to achieve either the high level or modest level of ammonia control. Continued use of the lagoon for nitrification would only require that the City remove sludge deposits when they begin interfering with ammonia removal. Interference would occur either as a result of ammonia release from the deposits that offsets any nitrification or due to a reduction in retention time in the lagoons.