

2. I believe that the ministry should undertake my Review to protect the environment because:

There was an error made when calculating the capacity of the Noëlville sewage treatment lagoons in the Municipality of French River. The stated capacity that is mentioned in the Certificate of Approval is 20% greater than the actual capacity of the lagoons. As a result, the lagoons are receiving more volume than they can handle. This has caused the lagoons to be discharged without holding the sewage for proper treatment on 4 of the last 7 discharge events. This has adversely affected the downstream waters to the extent that the Sudbury District Health Unit now considers the water in the French River, Canada's first official heritage river, to be unsafe for human consumption.

Furthermore, I believe that this may not be an isolated incident. The error was made in the Ministry's Approvals Branch in Toronto. If the Approvals Branch used the same method for calculating the capacity of other lagoon systems, then there may be hundreds of Municipal Waste Water Systems in the province operating under erroneous capacity guidelines. I have learned that the lagoons in St. Charles, a community next to French River, is having problems similar to those being experienced at the Noëlville facility.

The review I am requesting would be very inexpensive; I only ask that officials read my brief report and consider my claims. Given the widespread environmental and economic damage that will ensue if I am correct, I strongly urge you to take my claims seriously and investigate them accordingly.

3. The following is a summary of the evidence that supports my Application for Review:

The evidence for my claims is contained in the Certificate of Approval for the lagoon, in a report prepared by Trow Associates Inc. and submitted to the Corporation of the Municipality of French River in January, 2010, and in reports from the Ontario Clean Water Agency (OCWA), the Ontario Lake Partners Program and the Sudbury District Health Unit. This evidence is detailed in the following attachments;

#3)a describes the works and the error in the stated design capacity. The Certificate of Approval describes the design and operation of the works. From this, it is relatively straight forward to calculate the capacity of the works. The design capacity stated in the certificate of approval is incorrect and overestimates the capacity of the facility by 20%.

#3)b contains excerpts from a Septage Plan Review Prepared by Trow Associates Inc. of Sudbury. This report describes the calculation of lagoon capacity and contains several errors. The report and its errors are discussed here to help understand the correct design capacity of the lagoon system.

#3)c is a summary of the lagoon discharge activity reported by OCWA for the years 2007 through 2009. These reports show the consequences of operating over capacity and demonstrate that adequate retention times to treat sewage are not being achieved.

#3)d presents evidence that the lagoon activity may be having significant environmental effects. A copy of an order from the Sudbury District Health Unit is included, which advised residents that the water in the French River is not safe for people or their pets due to toxic blue-green algae blooms. These blooms originate in Wolseley Bay, the first 'large' water body downstream of the sewage works. This suggests that the inefficient operation of the sewage works may be having a detrimental effect on the environment. Also included are data from the Ministry of Environment's Ontario Lake Partners phosphate monitoring program for 2009, which demonstrate the correlation between the early release of lagoon contents and elevated phosphorus levels in the downstream waters.

In summary, I think that the evidence herein clearly demonstrates that there are problems with the operation of the Noëlville sewage treatment lagoons. One only has to contemplate the fate of the sewage that entered the South lagoon in October 2008, and was discharged into the river early in November 2008, to see that. There are many factors that contribute to the poor performance of the facility; however, their consideration goes beyond the scope of this specific application for review. One factor, which is the subject of this review, is that it is operating under erroneous capacity guidelines. If I am correct, and if there are many other lagoons in the province that are also operating under incorrect capacity guidelines, then this is a very serious situation indeed.

#3)a Design of the works

Certificate of Approval # 9346-7SLKMD describes the facility as

A seasonal retention facultative lagoon (UTM Zone 17: 544933 m E, 5109588 m N), with a design retention time of 300 days, including:

- *Two (2) cells arranged in parallel, with Cell No. 1 having a surface area of 4.84 hectares and a volume of 64,994 cubic metres at 1.5 metres liquid depth and Cell No. 2 having a surface area of 5.82 hectares and a volume of 78,174 cubic metres at 1.5 metres liquid depth*

The intended operation schedule is depicted in figure 1.

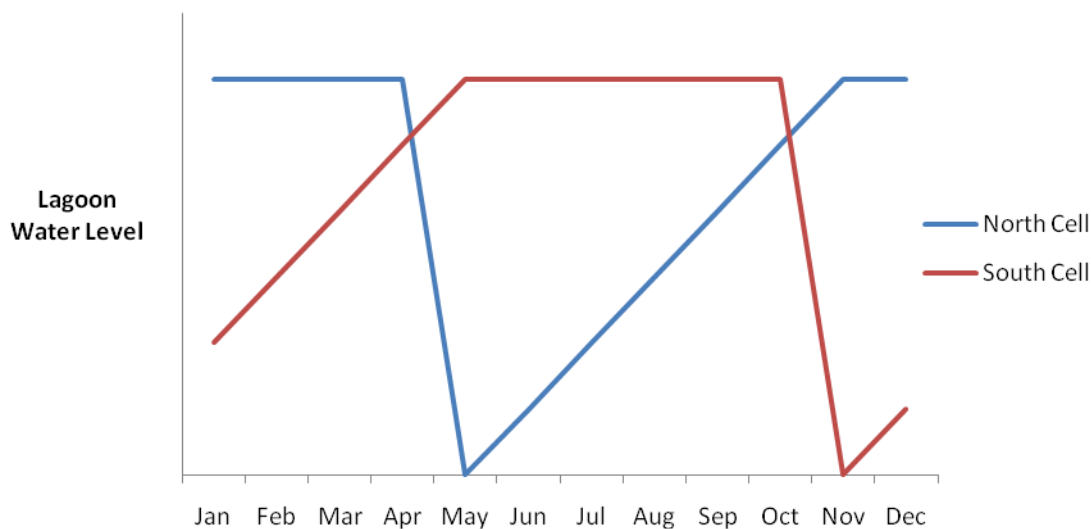


Figure 1, operation of a 2 cell, seasonal discharge, facultative lagoon.

The 300 day retention time is the combined retention time of the two cells, 150 days each. Therefore, each cell is to receive water for half a year (lines segments with +ve slope in figure 1), hold it for 5 months (150 days; line segments with zero slope), then treat and release the contents within a month (line segments with -ve slope) to complete the yearly cycle. When operating on complementary cycles, one of the lagoons is discharged each spring and fall. Combined, the two lagoons are designed to receive a full year's worth of sewage.

The combined volume of the two lagoons is 143,168 cubic metres. Therefore, the average daily flow at maximum capacity is;

$$143,186 \text{ cubic metres per year} / 365 \text{ days per year} = 392 \text{ cubic metres per day}$$

That is the only point I wish to make. However, the Certificate of Approval states that the municipality applied for approval of sewage works with a rated capacity of 477 cubic metres per day. At 477 cubic metres per day the lagoons would be full in 300 days and therefore they would not be able to operate as designed. Consideration of the effect of rainfall onto the lagoon and the reduction in lagoon volume due to sludge accumulation only makes the scenario worse. This error has necessitated the early discharge of a lagoon on numerous occasions, including 3 times in 2008-2009, with retention times as low as 2-3 days. I believe that this mismanagement has had serious negative consequences on the environment downstream.

The error was caused by assuming that the retention time was equal to the filling time, which is true for continuous flow filtration systems but is not true for batch treatment systems such as the French River Sewage Treatment Lagoons. It appears that the 477 figure was arrived at by dividing the volume of the lagoons by the retention time, rather than the filling time. I have explained this to officials at the Municipality of French River, Sudbury East Planning Board, Ontario Clean Water Agency, and the Ministry of the Environment. The responses have ranged from sympathetic to condescending to hostile, but not one official has disputed my calculations or offered an explanation of how the system could operate properly at the rated capacity of 477 cubic metres per day. More than one MOE official has agreed with me that there is a problem but informed me that it wasn't their responsibility.

#3)b – Evidence from the Septage Plan Review Prepared for the Municipality of French River by Trow Associates Inc. of Sudbury.

(In what follows, the figure of 180 days is used for half a year for simplicity and to maintain consistency with the Trow report.)

The Municipality of French River received a septage plan review from Trow Associates in January, 2010. Section 2.2 of the report addressed the capacity of the lagoons and explicitly made the same error that was described above. The report stated that;

The design hydraulic retention time of the lagoon is 300 days according to the lagoon's Ministry of Environment Certificate of Approval. This figure indicates that any effluent entering the lagoon should remain for an average of 300 days prior to being discharged, and determines the lagoon's allowable daily average loading.

That is incorrect, as it confuses the hydraulic retention time of a continuous flow filtration system with the retention time in a batch treatment, facultative lagoon. The 300 day retention time is the combined 150 day retention time of the two cells. A cell that fills for 180 days and holds the waste for an additional 150 days for treatment has an average total retention time of $180/2+150=240$ days. To operate as described in the Trow report, a lagoon that filled in half a year would have to sit for an *additional* 210 days after it was filled to achieve the average hydraulic retention time of 300 days before discharge ($180/2+210=300$ days). That cannot be achieved with two lagoons, and indicates a problem with the rationale employed by Trow Associates (and the MOE officials who calculated the capacity).

The Trow report then goes on to calculate the daily loading capacity as follows;

Based on this information, the daily allowable average sewage inflow is determined by the following calculations: [Volume Available ÷ Retention Time = Allowable Daily Hydraulic Loading] = $[143,168\text{m}^3 \div 300 \text{ days} = 477 \text{ m}^3/\text{day}]$, which is also the permissible hydraulic loading given in the lagoon's C of A.

This is true if, and only if, the retention time is the same as the filling time. Although that is the case with continuous flow water treatment systems, it is NOT the case with a batch treatment, facultative lagoon system such as the French River Sewage Treatment Works. Water is received for 365 days a year, although the retention time is 300 days! **At 477 m³/day the lagoons would fill in 300 days.** The proper calculation is [Volume Available ÷ ~~Retention~~ Loading Time = Allowable Daily Loading] = $[143,168\text{m}^3 \div 300 \text{ 365 days} = 477\text{-}392 \text{ m}^3/\text{day}]$. At 392 m³/day, the lagoons can hold 365 days of sewage.

In the final two sentences of section 2.2 of the report from Trow Associates, the authors did suggest that there was something wrong with the accepted calculation, but they decided not to worry about it;

With consideration to practical aspects of lagoon management, a residence time of 180 days – half a year – would more reasonably divide the use of each of the cells between the regular spring and fall discharges. This report, however, will assume that a 300-day retention time is correct.

Note that in this passage, the 180 days refers to the time to fill one lagoon while the 300 days is the combined retention time of the two lagoons. The report's author(s) clearly realized that something was wrong with the numbers but apparently they did not think it was their responsibility to ask questions.

#3)c Recent operation of the lagoons

The error described herein, in combination with problems related to poor maintenance of the facility, has had serious consequences on the operation of the sewage treatment lagoons and on the environment. I have included copies the lagoon reports from the Ontario Clean Water Agency for the years 2007-2009. The lagoon operations for this period are summarized schematically in figure 2.

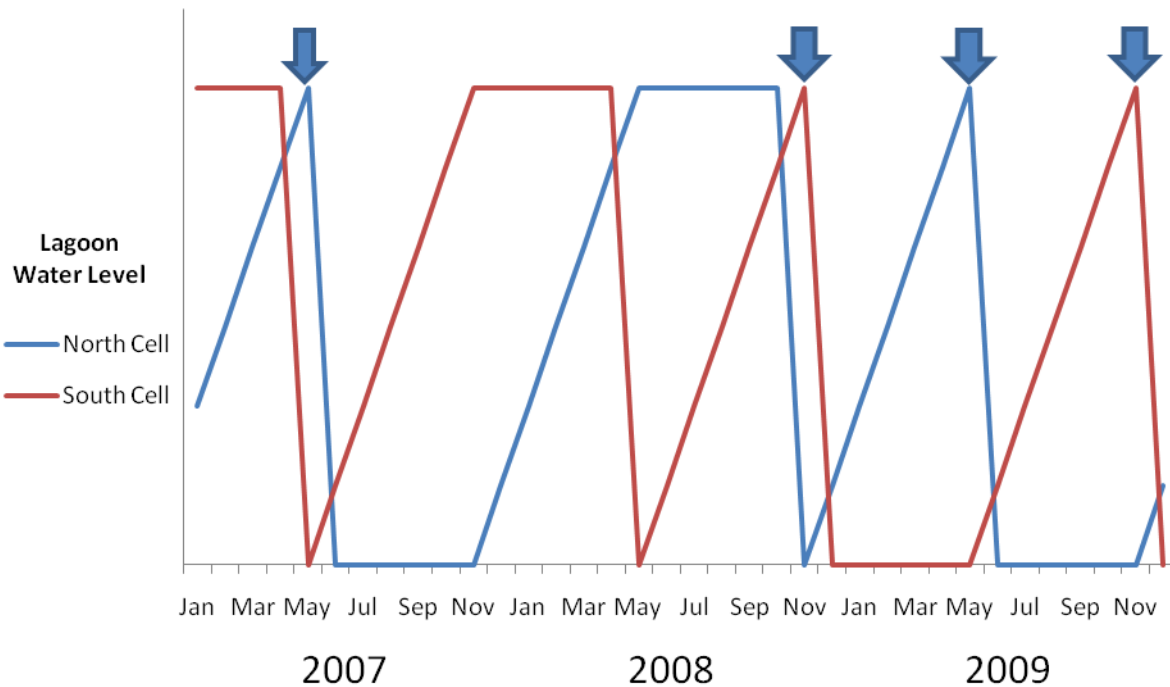


Figure 2. Operation of Noëlville Sewage Treatment Lagoons. Blue arrows indicate where lagoon contents were released to the environment without adequate treatment time.

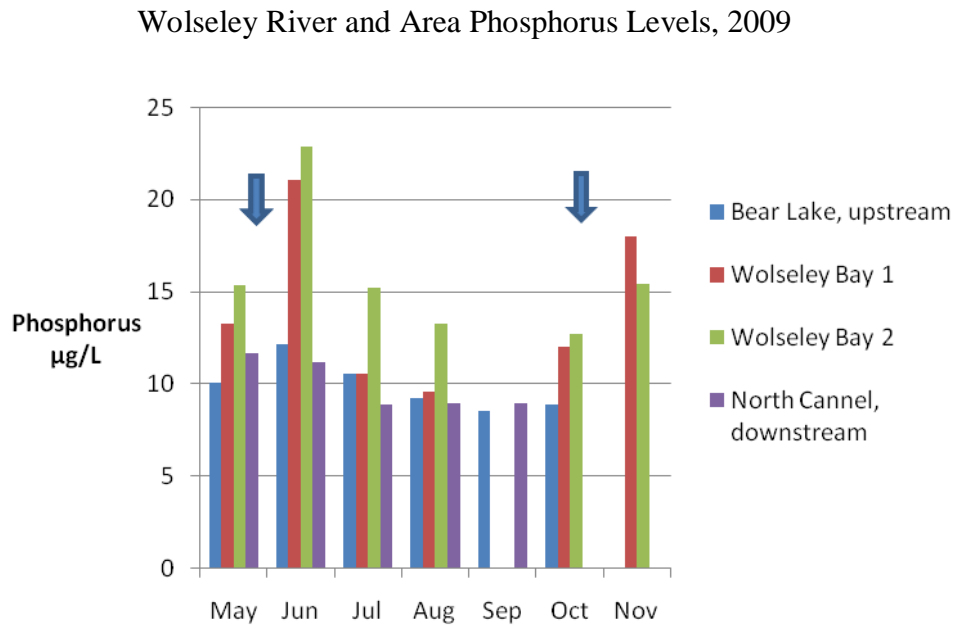
In the April of 2007 there was a bypass of the lagoon and about 300,000 litres of untreated sewage (suspended solids = 94 mg/L; *E.coli* = 700 cfu/100mL) was discharged to the river. In addition, both of the lagoons were drained down that spring, which resulted in approximately 70,000,000 litres of sewage from the South lagoon being discharged with inadequate retention time. In fact, from May 14-16, 2009, both lagoons were being discharged at the same time. About 1,000,000 litres of sewage passed through the system during that period. Sewage must be held in the lagoon for months to allow for biological processes to properly treat the waste. The reason that effluent levels are low in the south lagoon discharge is because large amounts of rainwater infiltrated the system and diluted the contents, not because the sewage was properly treated. Dilution is still pollution.

There was no release of the lagoons in the fall of 2007 and the south was drawn down in the spring of 2008. In the fall of 2008, both of the lagoons were released again, with a minimum retention time of 2 days to 2 weeks for the south lagoon. The south lagoon discharge exceeded MOE effluent limits for suspended solids by >30% and had *E. coli* levels of 280 cfu/100mL in the 42,252,000 litres of effluent discharged.

In 2009 the lagoons were both released without adequate retention time. The north lagoon, which began filling in November of 2008, was filled until April 2009 and promptly released into the river in May. In a meeting I had with Municipal Councillor Ron Garbutt and representatives of OCWA in April 2009 Mr. Dave Walters, operations manager for OCWA, agreed that it would be preferable to let the lagoon sit for the summer but was worried that there was not enough capacity to hold the water until the fall. It was agreed that the North lagoon would be discharged only if further analysis by OCWA determined that there indeed was not enough capacity to hold and treat the water. The lagoon was subsequently discharged in May without adequate treatment, confirming that the volume of sewage that it was receiving was too much for the lagoon to handle. The south lagoon was then filled from May through the summer and then discharged prematurely in October of 2009, well before the 150 day designed retention time. The average daily flow into the lagoons for 2009 was reported by OCWA to be 523 m³/day, which is 110% of the 477 m³/day design capacity stated in the Certificate of Approval and 133% of what I believe to be the true capacity of 392 m³/day.

#3)d Environmental Effects

I have been collecting samples for determination of phosphorus levels by the Ontario Lake Partners Program since 2007. Elevated phosphorus levels are consistently found in Wolseley Bay of the French River, which is the first 'large' body of water downstream from the Noëlville sewage treatment lagoons. In 2009 I recruited a volunteer to collect samples in Bear Lake, which is the last lake on the Wolseley River system upstream of where the sewage treatment lagoon discharge enters the river. The data are summarized in the graph below and show that phosphorus levels spiked in Wolseley bay following the two lagoon discharges (represented by blue arrows).



This disproportionate increase in phosphorus levels in Wolseley Bay following lagoon discharges is consistent with a cause and effect relationship whereby effluent releases from the Noëlville Sewage Treatment Lagoons contribute to the elevated phosphorus levels in Wolseley Bay of the French River.

Anthropogenic nutrient loading is known to be a source of elevated lake phosphorus levels and a contributor to algae blooms. Tests done by the MOE in October 2007 and November of 2009 confirmed the presence of blue-green algae in the French River. The samples contained *Anabaena*, and were positive for microcystin toxins. Sudbury District Health Unit has advised area residents to stop taking drinking water from the river, and to find alternative sources for household use. The 2009 algae bloom lasted for more than 3 months and had several episodes of very heavy algae mats. This appears to be a growing problem in many areas of the province.