

I, Tadeusz Smoter, Professional Engineer registered in the Province of Manitoba, 31 Nikki Lane, Winnipeg, MB R2V 4M3, Canada, have examined the results and all relevant information dealing with a biological treatment done by Nordevco Associates Ltd. of the accumulated sludge in the primary cells of the Oakbank lagoon system in the Rural Municipality of Springfield in the Province of Manitoba.

### **1. Documentation Used in the Assessment of the Treatment.**

- A. Resolutions and correspondence leading up to the treatment.
- B. Reports of the independent third-party consultant in charge of sludge level and water level measurements before and after the treatment.
- C. Verification of all documentation detailing the chain of custody of the said samples transmitted by the third-party consultant to the Enviro- Test Laboratory in Winnipeg. The results of all laboratory analyses pertaining to the said treatment including the results
- D. of sampling carried out by Nordevco Associates Ltd., the contractor.

### **2. Field Verification.**

Site visitation in order to compare the information received with the actual treatment site.

### **3. Biological Product Verification.**

The lagoon treatment consisted of an application of a Nordevco Associates Ltd. biological product labelled BactiDomus® Technology Product # 402.

- 1. The product itself is a fine powder that consists of a inorganic carrier material ( a potassium aluminum silicate) on which a consortium of microorganisms has been implanted.
- 2. Some of these microorganisms are facultative anaerobic allowing them to function under anoxic and/or anaerobic conditions.

#### **Note:**

- 1. It should be pointed that, according to Nordevco, the organisms that constitute the active components of the product have been or are in the process of being notified with the New Substances Branch in accordance with the stipulations of the Canadian Environmental Protection Act ( 1999 ) for appearance on the Domestic Substances List.

2. At our request, Nordevco submitted a sample of the product to the Enviro-Test Laboratory in Winnipeg for analyses for possible presence of pathogens.  
The product was examined for the presence of salmonella, staphylococcus aureus, clostridium, E.coli and fecal and total coliforms.  
The results indicate that none of the above pathogens are present.

#### **4. Site Description.**

The Oakbank lagoon system consists of two independent systems each with primary and secondary cells.

The westerly system consists of an inverted L-shaped primary cell and two secondary cells, one to the north of the primary cell and one to the east of the downward leg of the primary cell.

The surface area of the westerly primary cell is 1.67 hectares.

The easterly system consists of one large secondary cell and a primary cell that consists of two basins.

The present easterly primary cell consists of a large south basin and a smaller north basin that was previously a small secondary cell.

At some point in time the dyke separating the two basins was breached as to enlarge the primary cell.

The surface area of the east primary cell is 3.86 hectares.

#### **5. The Treatment.**

##### **A. Rational for the Treatment.**

The following factors determined the decision of the Springfield Rural Municipality Council to proceed with the treatment.

- 1 Discharges from the secondary cells had difficulties meeting provincial discharge standards.
- 2 Septic trucks (up to 12 per day) were discharging in the northeast corner of the westerly primary cell. Since the point of discharge is quite close to the connection between the primary and secondary cells the dumping of septic waste had a negative impact on the quality of water entering the secondary cell and on the performance of the primary cell as a whole.
- 3 The amount of sludge ( 15 to 20 cm ) accumulated in the west primary cell was sufficiently important to affect the performance of the cell causing it to lose about 2,500 cubic metres in capacity.

## **B. Treatment Methodology.**

- 1 Council and Nordevco jointly decided to treat the whole of the west primary cell.
- 2 Council and Nordevco also opted for a partial treatment of the east primary cell: a 1 hectare area of the northeasterly part of the east primary cell. The reasons to treat only part of the east primary cell were (a) to keep costs down and (b) to have a basis of comparison between the untreated west side and the treated east side of the north basin of the east cell.
- 3 The application of product was done in two stages:
  - a. -The first application took place on May 31, 2001 at which time product was applied at a rate of 1,000 kg per hectare.
  - b.- The second application took place on August 16,2001 at which time product was applied again at a rate of 1,000 kg per hectare.

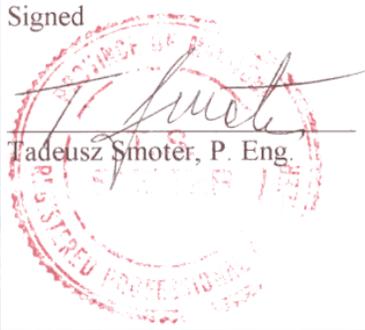
## **C. Results of the treatment.**

- The west primary cell recovered, in four months, about 2,000 cubic metres of the lost capacity, as a result of an of 80 percent reduction in the sludge accumulation.
- The remaining sludge was much lighter and contained more water than the untreated one.
- A sharp reduction ( between 50 and 90 percent' in the total Kjeldahl nitrogen (TKN) in the water. This is true not only for the west cell but also for the treated part of the east primary cell. The TKN in the treated part is 67 percent of what is observed for the untreated part.
- A similar reduction was observed for the phosphorous, with reduction ranging between 40 and 90 percent.
- The treatment also resulted in a sharp decrease in the number of E.coll and total coliforms.
- It would appear from observations made by administrators and councillors of the Rural Municipality of Springfield that the complaints about odours coming from the lagoon system, especially the west system, have completely stopped after the treatment.

**6. Conclusions and Recommendations.**

- 1 We have ascertained that the treatment carried out by Nordevco Associates Ltd. was indeed very effective in terms of reductions of sludge, nitrogen, phosphorous and both E.coli and total coliforms.
2. While the use of Product # 402 in itself is effective, we are of the opinion that its effectiveness could be enhanced by combining it with the use of an ambulant or temporary aeration system. Not needing a permanent aeration system would greatly reduce the cost of aeration.

Signed



Tadeusz Smoter, P. Eng.

Note: Original letter, received by fax, is on file at the offices of Nordevco.

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