Wastewater Stabilization Pond Operation

Stabilization ponds are providing wastewater treatment for many of the municipalities in North Dakota. Generally, the wastewater stabilization ponds are built in a square or rectangular shape. The levees have an outside slope of 3:1 and have a minimum top width of 8 feet to ensure stability. Stabilization ponds will operate satisfactorily on liquid levels from 2 to 5 feet. The embankments for the majority of the stabilization ponds in North Dakota have been designed to provide a maximum liquid level of 5 feet with an additional 3 feet of freeboard. Keeping these factors in mind, the main purpose of this discussion will be to outline the proper operational procedures for a gravity wastewater stabilization pond system. With the proper operation, a stabilization pond system will allow sufficient time for the biochemical reactions to take place to reduce organic wastes to more stable forms and will allow suspended solids to settle out of the water. Thus, with the proper treatment, the effluent from the stabilization ponds will meet all the secondary treatment standards established by the North Dakota Pollutant Discharge Elimination System regulations.

When transferring and discharging wastewater stabilization ponds, the following operational procedures should be followed:

PRESENT STATUS OF STABILIZATION PONDS

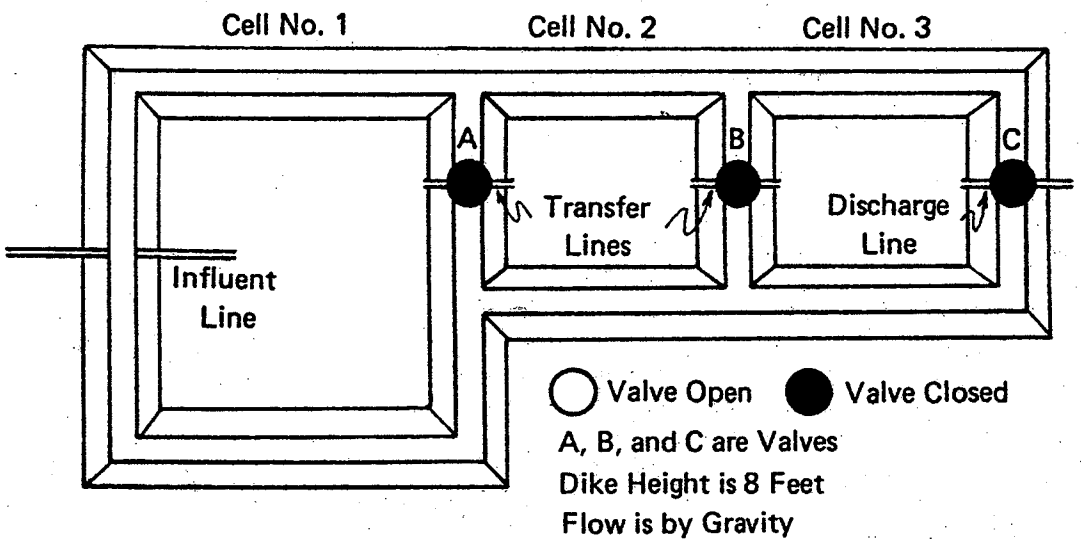

Figure 1 a. Three Cell Wastewater Stabilization Pond

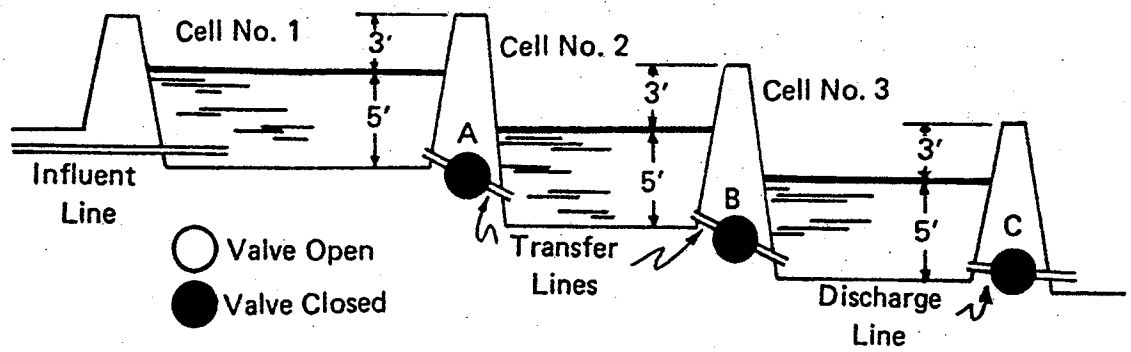

Figure 1 b. Split Level System

1. All valves are closed. (Refer to Figure 1).

2. Cell No. 1 is being filled with wastewater from a lift station or by gravity flow.

3. Cell No. 2 has 5 feet of wastewater and 3 feet of freeboard.

4. Cell No. 3 has 5 feet of wastewater and 3 feet of freeboard.

DISCHARGE OF WASTEWATER FROM CELL NO. 3

During the summer and fall, discharges must be made in order to ensure room for the anticipated winter volume of wastewater.

1. Collect a sample from Cell No. 3 and send the sample to an approved laboratory or to the North Dakota Public Health Laboratory for analysis. If the analysis is satisfactory, the North Dakota State Department of Health will give the facility permission to discharge.

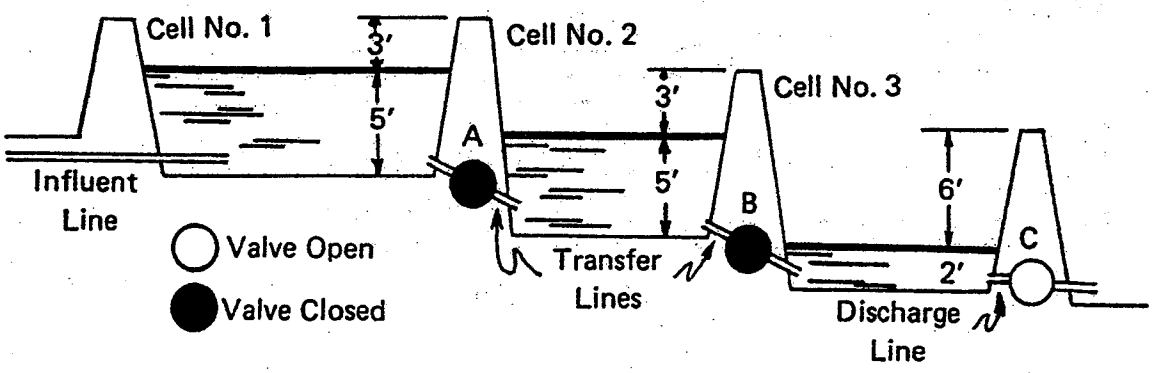

Figure 2. Discharge From Cell No. 3, Split Level System

2. Open valve C only. Do not open valve B. Only the wastewater in Cell No. 3 is to be discharged, since only its effluent meets discharge standards. (See Figure 2.)

3. Close valve C when approximately 2 feet of wastewater remains in Cell No. 3.

TRANSFER OF WASTEWATER FROM CELL NO. 2 TO CELL NO. 3

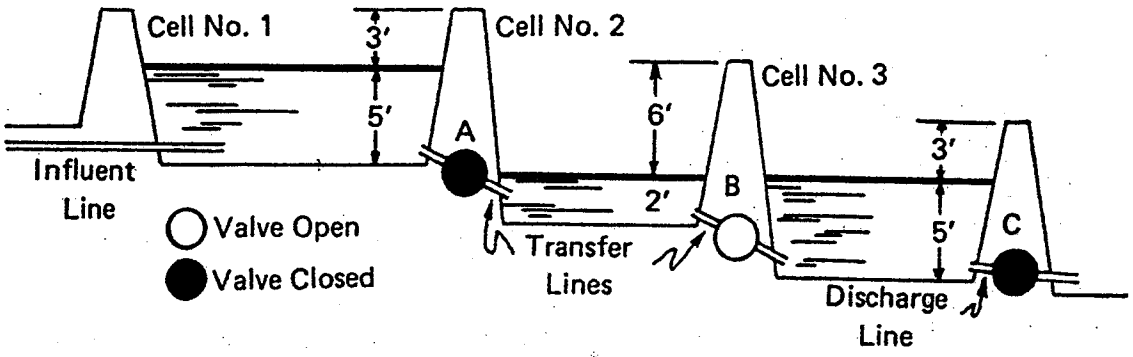

Figure 3. Transfer From Cell No. 2 to Cell No. 3, Split Level System

1. Open valve B and allow wastewater to transfer from Cell No. 2 to Cell No. 3. Valves A and C are securely shut during this time. (See Figure 3.)

2. Close valve B. Cell No. 3 is now full. It can be allowed to remain isolated from the other units so that treatment may take place.

TRANSFER OF WASTEWATER FROM CELL NO. 1 TO CELL NO. 2

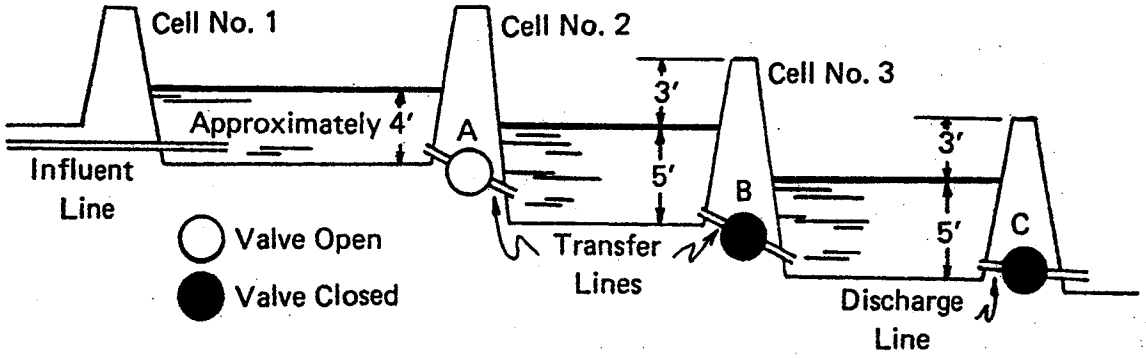

Figure 4. Transfer From Cell No. 1 to Cell No. 2, Split Level System

1. Cell No. 2 may now receive wastewater from Cell No. 1.

2. Open Valve A and allow the transfer to take place. Valves B and C are shut during the transfer. Cell No. 2 should be filled with 5 feet of wastewater. Maintain at least 3 feet of freeboard. (See Figure 4.) The wastewater level will equalize and the flow between cells will stop if the cells are at equal elevations.

3. Shut valve A. Note that Cell No. 1 has a greater volume than Cell No. 2 (refer to Figure I b) and the liquid level in Cell No. 1 is not reduced more than 1 to 2 feet in the transfer. (Refer to Figure 4).

The operators of some stabilization ponds will find it necessary to discharge a number of times in the summer and fall so that the liquid level in Cells No. 1 and No. 2 are approximately 2 to 3 feet. Only in this way will they be assured of ample room for the winter volume of wastewater. If this is the case, the operational procedure would be repeated a number of times.

STABILIZATION PONDS OF EQUAL ELEVATION

The foregoing procedure is for a split level stabilization pond system with gravity flow. Follow the same operational procedures if your stabilization ponds are about the same elevation. Wastewater levels will equalize between cells; therefore, less wastewater will be transferred. The operational procedure must be repeated more times during the year to assure adequate winter storage.

Proper transfer and discharge of wastewater pond contents, when permitted by the Pollutant Discharge Elimination System regulations, should result in better pond operation and provide adequate storage.