

LAGOON INSPECTION REPORT

State of Montana
Department of Environmental Quality

Name/Location of Facility: Amsterdam Churchill Sewer District

Inspected by: Mike Abrahamson Date: August 23, 2005

Operator/Contact Person: Eldon Van Dyken

Address: 7260 Churchill Road, Manhattan, MT 59741

Telephone: (406) 580-0825 (cell)

Year Constructed (or Last Upgrade): 1977

Service Area Population: 727 (2000 census) + 100 (new subdivision)

Design Population Equivalent: 1100

Average Flow (or Winter Water Use) (mgd): 82,700 gpd (estimated using 100 gallons/day/person)

Average Design Flow: 150,000 gpd

Number of Lagoon Cells: 3

Lagoon Area (acres): 1 4 2 3.52 3 5.28

Depth of Cells: 5 feet Liner Type: hypalon cell 1, bentonite (2&3)

Volume of Cells (gal): 1 5.24 2 5.73 3 unused

Detention Time (days): 1 63 2 69 3

Total Detention Time (days): 132 (208 days considering evaporation)

Org Loading (#BOD/d): 165

Org Loading (#BOD/ac.-d): cell 1 35 total 18.6

Receiving Water and MPDES permit #: ND
(Indicate "ND" if non-discharging)

Provide Schematic Diagram of Systems, attach Photographs if available:

A. GENERAL

1. Does facility have adequate fencing and locked gates? Yes
2. Does facility have adequate warning signs? No – very faded
3. Does facility have storage for records, O&M Manual, as-built plans, spare parts, etc.? Is plant O&M Manual available? Storage is available; O&M manual could not be located at the time of the inspection.
4. Is operator certified? Yes
Backup operator provided? Yes but not certified
5. User rate? \$6.00/month
6. Is system adequately funded? \$50,000 in reserve

B. CONVEYANCE SYSTEM

1. Are lift stations well maintained? Yes, new pumps recently installed in Churchill lift station. Pumps at lagoon lift station will be replaced next year.
2. Are lift stations adequately sized and reliable? Yes, overflow into lagoon cell
3. Do lift stations show signs of significant corrosion? Some corrosion is evident
4. Do combined sewer overflows or sanitary overflows occur? No
#/year? _____
5. Are spare parts stocked for pumps and other mechanical equipment? Yes
6. Is collection system periodically inspected for infiltration and inflow, obstructions, etc.? Cleaned and video taped collection system 2 years ago.
7. Is a confined space entry program in effect, and is confined space safety equipment available to operations staff? Blower, harness with rope, operator never enters a confined space alone.

C. LAGOON MAINTENANCE AND LEAKAGE

1. Is vegetation on levees adequately controlled by mowing or other means? Top of dikes mowed 2 X a year. Horses graze as well. The horses appear to stay off of the synthetic liner.
2. Is there vehicle access to levees, and are levees driveable? Yes
3. Are levees free of animal burrows, erosion, or other potential causes of levee/liner damage? A few animal burrows are present. Large tree growing on inner dike slope of cell 2.
4. Are lagoon levels consistent with flows; weather and evaporation; and, control structure levels? Yes

5. Are levees free of indicators of seepage, such as damp spots or lush vegetation at the toe of embankment? Yes

D. TREATMENT OPERATIONS

1. Are cells free of significant quantities of floating scum and debris? Yes
(In winter, % of re-coverage?)
2. Are cells free of significant odors which may indicate overloading or anaerobic conditions? Yes
3. What color is primary cell? Green
4. Are cells free of extensive coverage by duckweed or other vegetation that could adversely impact treatment? Filamentous algae in cell #2 (seaweed)
5. Are sludge levels periodically measured so that lagoon clean-out operations can be scheduled when necessary? No
6. Is sludge accumulation a problem? Does not appear to be. Facility does not discharge and sludge accumulation was not noticed in either cell and odors were not present.
7. If facility has multiple cells, are control structures, valving, and piping in-place to allow bypassing of one cell or parallel operation? In what condition are control structures? Yes, however the valve between cell 1 and 2 must be operated from within the manhole.
8. If facility discharges, what type of flow measurement is provided? Is proper calibration an issue? N/A
9. Is there seasonal discharge or varying water surface levels which may indicate leakage or interaction with ground water? No, however a water balance indicates possible leakage.
10. If facility discharges, is a representative sample point used for effluent sampling? N/A
11. If gaseous chlorine is used, are cylinders securely stored in a properly marked, safe locations? N/A
12. If UV system is used, is it adequately operated and maintained? N/A
13. Is facility in compliance with discharge permit conditions? (attach DMR from Permits) N/A
14. Is facility approaching capacity in terms of organic or hydraulic loading? Does not appear to be. No odors were present and one cell is not in use.

15. Describe receiving stream. Ephemeral or perennial? N/A

Man made ditch? _____

16. Approximate number of days/year that water, other than wastewater, flows in the stream or ditch? N/A

E. FOR SPRAY IRRIGATION FACILITIES

1. Type of spray irrigation system? The facility is set up for spray irrigation but has never used it since the system was built. The electrical has been disconnected from the irrigation pump so it is no longer operational. Cell 3 which they would pump from is mostly empty. System operated like a total retention facility.

2. Adequate protection of public health? (set backs, disinfection, filtration) N/A

3. Surface area irrigated? ~ 1200 x 1200 = 33 acres available (from plans)

4. Type of crop? Farmer grows various crops including barley, grains, etc.

5. Is crop harvested? The farmer would harvest it.

6. Is crop over-irrigated? N/A

7. Explain irrigation procedures if necessary. Not in use

F. FOR TOTAL RETENTION SYSTEMS

1. What is water depth in primary cell? 5 feet
Secondary cell? 3 feet

2. How does water level fluctuate in primary cell? _____
Secondary cell? _____

3. Have all cells ever been completely full? No

4. Has there ever been a discharge from the system? No

G. ADDITIONAL COMMENTS AND OBSERVATIONS

Discussions with the system operator indicated that the District board is supportive of the wastewater system including operator training and equipment needs. He also indicated that the District has a reserve of approximately \$50,000.

I have listed a few items that the District will need to address to ensure the continued proper operation and maintenance of the system.

- 1. The lagoon warning signs around treatment site are very faded and need to be replaced or repainted. One sign should be placed every 500 feet of the perimeter. You should also consider adding an emergency contact number to the lagoon gate sign and Churchill lift station.**

2. I recommend that the Town purchase hand held gas detectors for use by the operators when they enter a confined space and that a tripod or similar device should be used in conjunction with the harness. It is my understanding that a rope is attached to the harness but it may be difficult to pull someone out of a manhole by just a rope if they became disabled.
3. The interior slopes of cells 2 and 3 have tall weeds and grass. If the growth becomes too tall and thick it can be difficult to inspect the condition of the dikes and may provide habitat for burrowing animals. In addition, cell 2 has a large tree growing on the inner slope. This tree needs to be removed, as the roots will compromise the liners integrity of the lagoon resulting in leakage.
4. Holes in the liner of cell 1 should be patched or at least monitored to make sure they do not become larger. Vegetation that has grown from these holes should be removed.
5. The valve or valve stem in the transfer manhole between cell 1 and 2 needs to be replaced. The operator can only operate this valve by going into the manhole. This unnecessarily places the operator in a potentially hazardous situation. All additional valves or slide gates at the lagoon should be regularly exercised to ensure that they would still work if needed some day.
6. There is a significant discrepancy between influent flows and system losses through allowable seepage and evaporation. Influent flows were estimated using 100 gallons per day per person. Based on population of 827 people this equates to 82,700 gallons per day or 30,185,500 gallons per year. Allowable seepage is estimated at 3,109,800 gallons per year, based on 1000 gallons per acre per day considering cell 1 (4 acres), cell 2 (3.52 acres) and cell 3 (about 1 acre since not completely used). Annual net evaporation for the area is about 27 inches per year, which equates to 6,246,000 gallons from the system. Calculating the water balance I was unable to account for approximately 20,830,000 gallons per year of influent flows. This indicates that the system (possibly the 3rd cell) may be leaking excessively.

Since my calculations simply estimated influent flows, which may not represent the actual conditions, I recommend that a pump draw down test be performed on the lift station at the lagoon site. I have included a procedure that can be used to determine the output of the pumps. In addition your operator will need to begin recording pump run times on a daily or weekly basis. This information can then be used to determine influent flows to the lagoons and the water balance can be calculated again. Not only is recording pump run time data useful for assessing leakage, but it can also help to identify if the collection system is experiencing seasonal infiltration or inflow (I/I).

7. For facilities with exposed liners, safety ropes that extend down into the water should be installed. These liners can become very slick when wet or icy, making egress difficult if necessary. It is recommended that a safety rope be installed near each corner of cell 1.