

HILL CREST DAIRY
SLUDGE REMOVAL PLAN
Illinois General NPDES Permit

IL0074705

Prepared for:

Hill Crest Dairy, L.L.C.

And

Illinois Environmental Protection Agency

Prepared by:



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Date:

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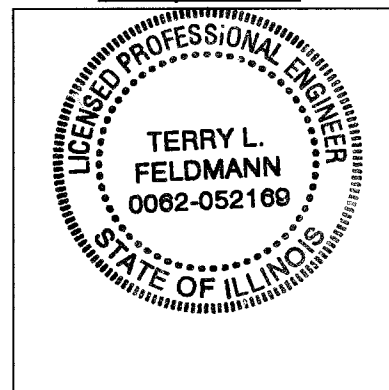
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MSI Project No. 238-09006B

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INTRODUCTION

On May 1, 2002 a Consent Order was approved by the Tenth Judicial Circuit Court Peoria, IL as case No. 01 CH 76 as agreed to by the Illinois EPA, Illinois Attorney General, and Hill Crest Dairy, LLC (formerly New horizons dairy, LLC). This plan has been prepared pursuant to the compliance section of this Consent Order as one of several required plans.

The purpose of this sludge removal plan is to detail the procedures that will be followed in the operation of Hill Crest Dairy, L.L.C. of Elmwood, Illinois. The plan contains provisions for the removal of sludge from the dairy's 6-acre lagoon.

The manure and wastewater from this 1610-cow dairy is treated in a digester and then a solids separator before going to the lagoon. The dairy plans to increase their herd to 1970 head in the future with the construction of a new barn.

Lagoon Sludge Accumulation With Digester

Nearly all of the manure generated on this farm will be digested in the plug flow methanogenic digester. During this digestion process, approximately 29% of the total solids will be removed. The digested waste then passes through a solids separator. Approximately 38% of the solids will be separated out in this process. The remainder of the waste will pass into the lagoon but are mostly very fine solids.

Sludge Volume Accumulation for 1610 cows (2214 AU):

T.S. from Manure: $9.87 \text{ \# T.S./ day / AU} \times 2214 \text{ AU} \times 365 \text{ days/ year} = 7,973,060 \text{ \# T.S. /yr}$

98% Digested (100%-29%=71% T.S not removed): $7,973,060 \text{ \# T.S./yr} \times .71 = 5,547,655 \text{ \# T.S./yr}$

2% Not Digested: $7,973,060 \text{ \# T.S./yr} \times .02 = 159,461 \text{ \# T.S./yr}$

Total Manure Left Over: $5,707,116 \text{ \# T.S./yr}$

38% Total Separated Out: $7,973,060 \text{ \# T.S./yr} \times .38 = 3,029,763 \text{ \# T.S./yr}$

T.S. in Liquid going to Lagoon: $5,707,116 \text{ \# T.S./yr} - 3,029,763 \text{ \# T.S./yr} = 2,677,353 \text{ \# T.S./yr}$

ASAE Sludge Accumulation Rate: $0.0729 \text{ ft}^3/\text{\# T.S.}$ for typical dairy lagoons.

Sludge Accum. (reduced fiber & non-biodegradables): $.75 \times 0.0729 \text{ ft}^3/\text{\# T.S.} = 0.0547 \text{ ft}^3/\text{\# T.S.}$

Lagoon Sludge Accumulation = $2,677,353 \text{ \# T.S./yr} \times 0.0547 \text{ ft}^3/\text{\# T.S.} = 146,451 \text{ ft}^3/\text{yr}$

Sludge Volume Accumulation for 1970 cows (2718 AU):

T.S. from Manure: $9.89 \text{ \# T.S./ day/1000 \#} \times 2718 \text{ AU} \times 365 \text{ days/ year} = 9,812,660 \text{ \# T.S. /yr}$

98% Digested (100%-29%=71% T.S not removed): $9,812,660 \text{ \# T.S./yr} \times .71 = 6,827,649 \text{ \# T.S./yr}$

2% Not Digested: $9,812,660 \text{ \# T.S./yr} \times .02 = 196,253 \text{ \# T.S./yr}$

Total Manure Left Over: 7,023,902 # T.S./yr

38% Total Separated Out: 9,812,660 # T.S./yr x .38 = 3,728,811 # T.S./yr

T.S. in Liquid going to Lagoon: 7,023,902 # T.S./yr - 3,728,811 # T.S./yr = 3,295,091 # T.S./yr

ASAE Sludge Accumulation Rate: 0.0729 ft³/# T.S. for typical dairy lagoons.

Sludge Accum. (reduced fiber & non-biodegradables): .75 x 0.0729 ft³/# T.S. = 0.0547 ft³/# T.S.

Lagoon Sludge Accumulation = 3,295,091 # T.S./yr x 0.0547 ft³/# T.S. = 180,241 ft³/yr

Sludge Monitoring

Sludge accumulation will be monitored in the lagoon by using the COLIWASA to identify and qualify stratified layers of manure. Samples should be taken from different areas of the lagoon. Alternately, sludge levels can be observed after pumping each year.

Steps to use the COLIWASA to sample:

1. Assemble the COLIWASA according to the instructions provided.
2. Open the bottom port of the sampler.
3. Advance the open sampler **slowly** hand over hand into the manure mass letting the manure fill the tube.
4. Continue to advance the sampler until the sinking action of the sampler stops.
5. Gently shake the outer tube of the sampler while pulling up on the plunger rod knob to seat the plunger into bottom port.
6. Remove the closed sampler from the manure mass.
7. Place the sampler between you and a light source.
8. Record the stratified layer locations using the etched graduations on the outside of the sampler tube.
9. Each 1" of graduation of column contains 2 oz of manure liquid.
10. The identified stratification layers can now be sampled specifically for nutrient content of each layer.
11. Refrigerate the sample before sending it to the lab.

Sludge Removal

Sludge will be removed from lagoon at least one time per year via agitation and pumping. During clean out, sludge is best removed with good agitation and pumping from the bottom. If necessary, additional water may be added to the lagoon to dilute sludge during agitation.

As a note concerning sludge storage, management and disposal, it must be understood the potential future challenges that may exist with respect to the obligation, liability, and expense associated with sludge disposal and utilization.

Waste Application

Application of the waste, soil, and sludge to the land shall not exceed the nitrogen requirement to obtain targeted yields pursuant to 8 IAC 900.813. The provisions of 35 IAC 506.303 (o) through (u) shall be met or exceeded when applying waste to field.

Waste shall not be applied within:

- o) 200' of surface water unless the water is upgradient or there is adequate diking to prevent runoff, and
- p) 150' of a potable water supply well.
- q) Waste shall not be applied in a 10-year flood plain unless the injection or incorporation method of application is used.
- r) Livestock waste shall not be applied in waterways.
- s) Waste that is spread on frozen or snow-covered land shall be limited to areas which:
 - 1. Land slope is 5% or less, or
 - 2. Adequate erosion control practices exist
- t) The certified livestock manager shall inspect all berm tops, exterior sides, non-submerged interior sides for evidence of erosion, burrowing animal activity, and other indications of berm degradation at least every two weeks until lagoons are filled and closure is complete.
- u) Livestock waste shall not be applied during a rainfall or to saturated soil and conservative application; rates shall be used in the case of a high water table or shallow earth cover to fractured bedrock. Caution shall be exercised in applying livestock waste, particularly on porous soils, so as not to cause nitrate or bacteria contamination of the groundwater.

Lagoon Maintenance

All pipes, pumps, signs, measuring devices, and concrete structures associated with the lagoon should be checked regularly and kept in good repair. The berms, slopes, and a strip (15 foot, min.) adjacent to the outside toe of the berm should be kept in permanent grass. The grass should be mowed and kept in good condition. Check inside berm sideslopes for wave action erosion problems. If erosion is a problem, stone protection may need to be added. Check the outside earthen embankment for holes or slippage in the bank. Burrowing animals should not be allowed to establish dens in the embankment. Fill any holes located in the embankment.

Annual Check List

1. Clean all sumps and settling tanks and remove debris
2. Service all application equipment and inspect for wear
3. Review all records and reports update as needed
4. Plan next years application windows

Weekly Check List

1. Maintain all pumps and motors per manufacturer recommendations
2. Check all hoses and lines for leaks and excessive wear
3. Inspect all building foundations for leaks and cracks
4. Inspect all earthen dikes for channeling and seepage
5. Eliminate all rodent activity from buildings and containments
6. Remove or spray all weeds and shrub trees from dikes and perimeters
7. Assure good vegetative cover on dike slopes and tops and mow as needed
8. Be sure all pump-out covers are in place
9. Assure all containments have freeboard space available
10. Clean and check all manure transfer pumps and recycle lines
11. Clean and check all separation equipment
12. Be sure all security covers and fences are in place
13. Maintain all warning placards
14. Review all spill contingency plans
15. Check location and readiness of all spill recovery equipment
16. Check condition of all surface water diversion structures
17. Repair and report on all incidents of deterioration