

**DEQ CNMP for
Michigan Example Dairy**

January 2007



I. General Information:

Date of Implementation: _____

Date of latest update of NMP: _____

Facility Information

Sec. 21, Green Township, Sand County, Michigan
456 Deer Rd.
Junction, MI 49999

Driving directions to the farm from nearest town: Take Main Street in Junction, MI, go south 4 miles to Hill Rd. Go west 2.5 miles to Deer Rd. The farm buildings are on the north side, at 456 Deer Rd.

Owners and Operators:

David and Joe Brown

Phone numbers:

Farm: (123) 555-7890

David Brown home: (123) 555-7890; cell: (123) 555-2345

Joe Brown home: (123) 555-7891; cell: (123) 555-3456

Signature of CNMP Provider

Print Name

Address

Phone and email contact information

Signature of Producer

Print Name

Background

Management

Example Dairy, Inc. is owned and operated by father and son David and Joe Brown.

Animals

The farm currently has 750 mature cows.

There are 340 replacement heifer calves on site.

Additional young stock is raised at contracted facilities, not a part of this CNMP. The manure generated off-site from these animals will be utilized by the individual landowners on their own land and are not included in this plan.

The number and size of off-site livestock may vary due to time of year and as the farm adds new milk cows to the herd.

Annual updates will capture the current numbers and reflect them in future CNMPs.

Cropland

Example Dairy has 2,284 acres of cropland (905 of these are rented). 728.2 acres are irrigated.

The farm has sufficient land base for the manure but manure is sold, off site, to a Hillview Crop Farm, a neighboring farm. This is custom applied and manifest requirements are in this CNMP.

The land application strategy is to utilize all manure nutrients agronomically and maintain soil tests about where they are over time. There are numerous fields adjacent to surface water as well as tiled fields on this farm. Proper application setbacks are observed. The primary resource concern is nitrogen leaching. This is being addressed by only applying 2 years of phosphorus per application, which limits the nitrogen, such that PSNT tests are taken before any additional nitrogen is applied to the corn crop.

There are over 599 acres acceptable for winter spreading on this farm, scoring less than 37 on MARI analysis.

There is 6 months of storage on this farm. Straw pack manure could be left in the barns for 6 months but by following MARI scores, this manure is applied during the winter.

Approximately 80 acres are needed each winter for this winter spreading.

There is 6 months of liquid storage on this farm but, by following MARI scores, some of this may be applied during the winter to relieve spring time rush.

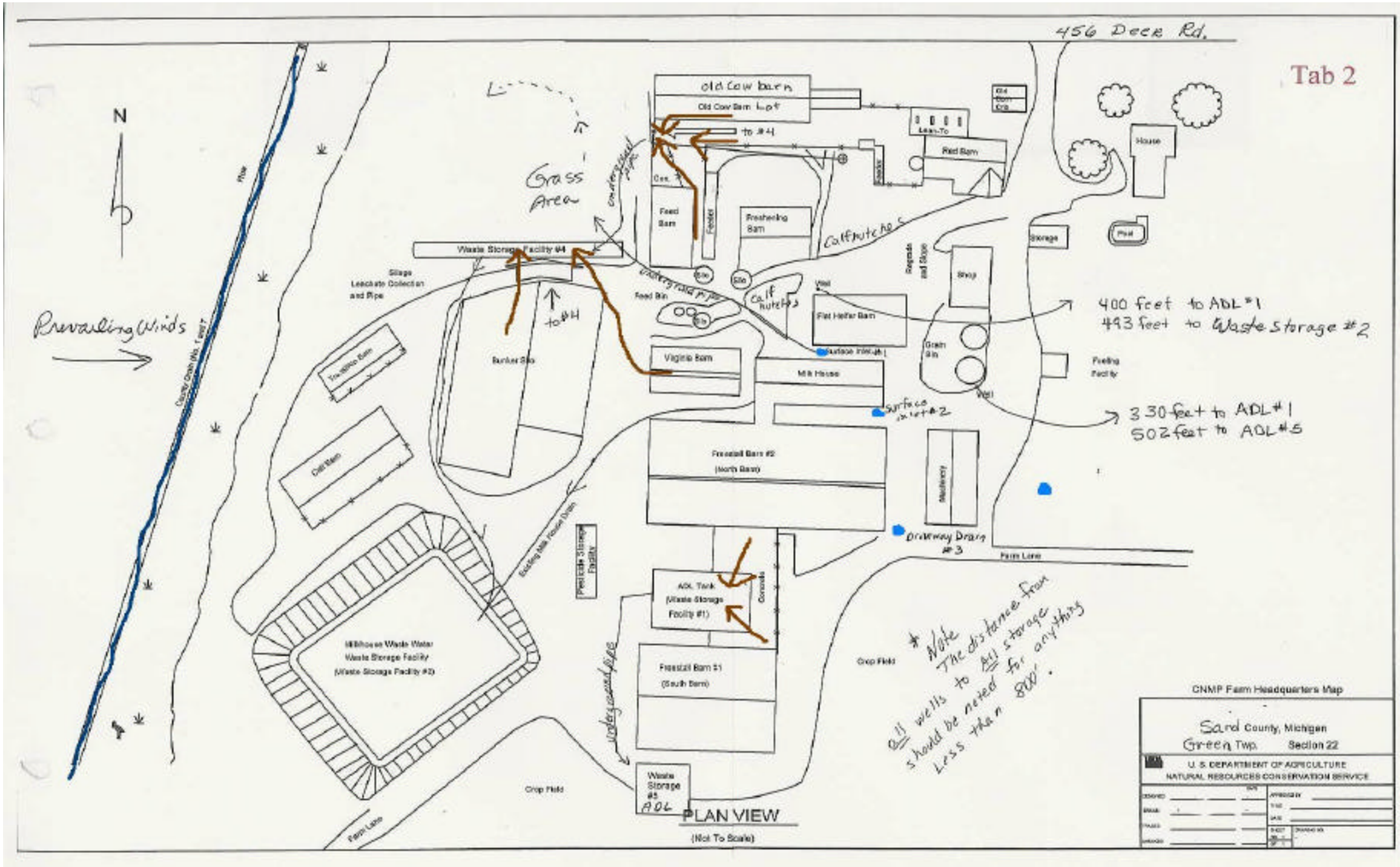
Example Dairy raises corn, silage, hay, haylage, soybeans, wheat, straw and some double crop rye green chop.

Manure is injected when hauled as a liquid and incorporated as appropriate when solids are hauled.

In no-till situations, alfalfa and wheat stubble, the manure is not injected or incorporated.

Tile drain inlets and outlets are noted on maps. These outlets are monitored prior to, during and after manure applications.

Farm Headquarters Site Map



Manure Storage

The farmstead has two main freestall barns using sand bedding. All of this manure goes first to ADL #1, then liquids are pumped over to ADL #5 (both pre-cast concrete structures) for a combined capacity of 6 months of storage.

Annual Inputs into ADL #1 and ADL #5	Annual gallons generated
Total Sand used for 750 cow herd: 40 lbs. per day per cow (farmer's knowledge) x 750 cows x 365 days = 10,950,000 lbs. sand x 50% deduction when mixed with manure = 5,475,000 lbs. sand ÷ 105lbs/cu.ft.(conversion unit) = 52,142 cu. ft. of sand x 7.48 lbs. per gal. =	390,028
Annual rainfall into ADL #1 storage is: [3 inches (rain – evaporation) ÷ 12 in/ft] x 112 ft. x 80 ft. = 2240 cu. ft. x 7.48 =	16,755
Annual rainfall into ADL #5 storage is: [3 inches (rain – evaporation) ÷ 12 in/ft] x 172ft x 172ft = 7396 cu. ft. x 7.48 gal./cu. ft. =	55,322
Annual rainfall from the 5000 sq. ft of concrete surface that will runoff into ADL #1 storage is: 5000 sq. ft. x (32.5 inches annual rain ÷ 12in/ft) x 50% x 7.48 =	50,646
Annual amount of manure from 750 mature cows (as per MMP calculations, based on MWPS as excreted) =	4,867,000
	5,379,751 gallons per year
One time capacity of ADL #1 and ADL #5 = 2,728,585 gallons 5,379,751 ÷ 12 months = 448,313 gallons per year; 2,728,585 ÷ 448,313 gal/mo. = 6 months of combined storage.	

The manure in ADL #1 has a much greater sand content than ADL #5, so two different manure analysis are utilized in the spreading plan.

Stormwater from several paved outdoor lots and the silage area goes to Storage #4. The total capacity of ADL #4 is 47,872 gallons (approximately 1 week of storage). This is pumped over as needed to Earthen Structure #2.

Milkhouse wash water is stored in an Earthen Structure (#2), with 6 months capacity. The total volume capacity for Storage #2 is 1,212,067 gallons. 1,955,356 gallons are collected annually. This is irrigated onto cropland twice per year.

Ten percent of the phosphorus on this farm is in 7 different replacement livestock facilities. This manure is straw or sand bedded and weekly hauled requiring 36 acres per year for two year's worth of phosphorus crop removal. This manure is surface applied on no-till, wheat stubble and alfalfa. MARI scores are followed for manure applications to frozen and or snow covered ground.

5.b.1. Large CAFO Waste Storage Structures

a) Volume Design Requirements

Storage ID	Storage Type	Dimensions, Capacity, Freeboard
Calf Barn	Manure pack	Total Confinement. hauled every 6 weeks
ADL Tank #1	Outside prefab liquid storage	112 ft x 80 ft x 8 ft (6.75 useable 15 in. freeboard)=60,480 cu. ft. Ramp (84 x 20 x 8 divided by 2 = 6,720 = 53,769 cu. ft x 7.48 = 402,125 gal capacity)
Earthen storage #2 Washwater and some runoff	Earthen storage	230 ft. x 164 ft (top) x 8 ft. (1.4 ft. or 16 in. freeboard) 4:1 slope =1,212,067 gal. capacity. (utilizing MMP calculator)
Transition Barn	Manure pack	Total Confinement, hauled MWF
#4 ADL Production area stormwater/runoff collection	Outside prefab liquid storage	120 ft. x 20 ft x 4 ft (3 ft useable). Ramp = 10 x 40 x 4 divided by 2 = 6400 cu. ft.= 47,872 gal All of this is sump pumped over to #2 as needed, and accounted for in system #2 for hauling purposes.
#5 ADL New	Outside prefab liquid storage	172 ft x 172 ft. x 12 ft deep, 11' useable (1ft. fbd.). 20 x 120 x 12' ramp = 311,024 cu. ft. = 2,326,460 gal.
Virginia Barn	Manure pack	hauled MWF, small outdoor, concrete lot in middle of barn
Flat Heifer Barn	Daily scrape & haul (liquid)	hauled MWF, total confinement
Freshening Barn	Manure pack	weekly haul, outdoor concrete lot goes to #4
Old Cow Barn sand	Daily scrape & haul (liquid)	weekly haul, outdoor concrete lot goes to #4
Old Cow Barn straw	Manure pack	weekly haul, Indoor area of barn.

Estimated Days of Storage

Storage ID	Storage Type	Capacity	Units	Annual Collected	Days Storage
#1 ADL	Outside prefab liquid storage	402,125	Gal	753,165	195
#5 ADL	Outside prefab liquid storage	2,326,460	Gal	4,626,406	184
Earthen storage #2	Earthen storage	1,212,067	Gal	1,955,356	226
Mon.Wed. Fri. Haul	Daily scrape & haul (solid)		1 Ton	1,700	0
Weekly Haul	Manure pack		1 Ton	1,900	0

Storage Totals		Capacity	Units	Annual Collected
Liquid Manure		3,940,652	Gal	7,334,927
Solid Manure			2 Ton	3,600

Estimated Annual Acres Needed for Each Storage System

Storage ID	Annual Volume	Units	Annual P205	Acres for one year or P crop removal	Acres for 2-yr. P crop removal applications	Acres needed for 2-yr P rate for winter
#1 ADL	753,165	Gal	18,076	322.8	161	
#5 ADL	4,626,406	Gal	69,396	1,239.2	620	
Earthen storage #2	1,955,356	Gal	1,564	27.9	14	
Mon.Wed. Fri. Haul	1,700	Ton	3,060	54.6	71 for all solid manure	
Weekly Haul	1,900	Ton	4,940	88.2		36

The 25 yr./24 hr. storm event for this county is: 4.3 inches

Between the dates of November 1st and December 31st, manure from the ADL tanks and earthen storage ponds is drawn down to a level that provides a minimum of 6 months of storage during the winter months.

5.b.1. Large CAFO Waste Storage Structures

b) Physical Design and Construction Requirements

An existing components inventory was completed on all storage structures. The inspection indicated that the structures are consistent with the requirements of a CNMP. The components inventory and design documentation of the storage structures are attached.

c) Inspection Requirements

All structural and vegetative practices will be operated and maintained in accordance with the manufacturer's recommendations and other guidelines (e.g. NRCS). Records of all scheduled and completed inspection and maintenance activities will be kept on file.

All waste storage structures contain easily visible, clearly marked depth gauges. The minimum required freeboards are currently maintained at all times.

All storage areas are inspected on a weekly basis and documented in the Storage Inspection Form. Weekly inspections consist of the following:

- Assessment of functional and structural soundness of storage facility
- High traffic areas, (i.e., pump access and agitation equipment areas),
- Fences, posts, wire, gates, etc.
- Piping, pumps, agitation equipment, valves, etc.,
- Areas adjacent to storage system – identify signs of wet soil or unusual settlement indicating potential leakage.
- Safety equipment (swim rings, ropes, guardrails) and warning signs
- Assessment of push-off ramps adjacent to storage structures. The ramps are inspected for separation, cracks, erosion, etc.

Concrete storage systems

Inspections of concrete waste storage facilities will include:

- Visual check for evidence of leaking
- Visual check for cracks in concrete or joint sealer
- Check for wall movement as evidenced by tilting (vertical alignment) or bulging (horizontal alignment)

Repairs are made immediately. If vegetation is damaged, the cover is reestablished promptly.

Vegetation around storage structures is mowed a minimum of twice per year to discourage weeds and tree growth.

Human waste, pesticides, oil, syringes, dead animals or waste other than that intended for the manure storage is never added to any waste storage facility.

Earthen Pond

Whenever the pond is emptied, the integrity of the clay liner is assessed and any necessary repairs are made immediately.

Agitation equipment is inspected weekly to verify that it is not causing damage to the bottom surface and creating the potential for leakage out the bottom. Any needed repairs are made immediately.

All sides of the earthen storage are inspected weekly to check for burrow holes, eroding areas, wet or soggy areas (that might be an indication of potential leakage or potential beginning breaches in the sides), etc. Vegetation is maintained and kept mowed to 6 inches. Any areas needing attention are repaired and reseeded where necessary. All unwanted animals are controlled.

Weekly records are maintained of the depth of manure. The storage will have 6 months of available capacity some time between November 1 and December 31.

Manure handling equipment

All application equipment is calibrated annually to ensure proper application rates. Written records of inspections and calibrations are maintained. Hoses and fittings are kept in good repair on all manure spreaders.

When in use, manure handling equipment is checked daily and written records are maintained.

Irrigation Equipment

Pumps, hoses and fittings are in good repair on all irrigation equipment used for manure and wastewater applications. Worn or damaged component(s) that will prevent the equipment from operating as intended are repaired as needed. At a minimum, visible portions of the transfer component(s) are inspected at least once a year. Damaged, missing, or inoperable safety items are repaired or replaced immediately.

Bunker Silo

The silage pile is covered at all times and the silo pad is scraped daily after loading to reduce waste.

Leachate runoff from the bunker silo is diverted to ADL #4 (runoff collection structure) and transferred to the Earthen Storage Pond (#2) with the milkhouse wash water.

d) Operation and Maintenance

The O & M schedule will be conducted in accordance with the regular inspections.

Records of inspections and records documenting any actions taken to correct deficiencies will be kept with the CNMP for a minimum of 5 years. Deficiencies not corrected within 30 days will be accompanied by an explanation of the factors causing the delayed correction.

November 30, 2005

Existing Components Inventory

Engineering for Agriculture

2333 Ag. Lane
Sample, MI 49999

Engineering – Sample Dairy, Comprehensive Nutrient Management Plan,
Evaluation of Existing Components
Sand County, Michigan

Mr. David and Joe Brown,

This letter is provided as documentation for your evaluation of existing components to be included in the Comprehensive Nutrient Management Plan (CNMP) for your farm operation.

On May 5, 2004, an inspection of the waste storage facilities were conducted at the Sample Dairy farm operation located in Sand County, Michigan. This is a family owned and operated farm with three concrete tanks and one earthen storage facility.

The inspection of these facilities addressed the suitability of using the existing waste storage facilities as components of the CNMP. As-Built documentation was available for review on all of the waste storage facilities for this evaluation of existing component document.

Freeboard for each storage type and estimated usable storage capacity is identified below. The capacities calculated may be less due to limitations of pumping accumulated solids out of each storage facility.

Ag CNMP consultants provided the manure and wastewater production amounts for each facility. Based on this information the estimated number of available storage days for each storage facility is calculated.

The Michigan Agricultural Environmental Assurance Program has identified the conditions under which existing components may be included in a Comprehensive Nutrient Management Plan (CNMP). These conditions are described below.

Existing Components may be included as part of a CNMP only if all of the following are met:

1. The existing component is consistent with the safety guidance of the CNMP.
2. An investigation/inspection of the existing component indicates it is in good operating condition, based on observable and/or measurable features and conditions;
3. The failure of an existing component will not impair the structural integrity or operation of new components;
4. The existing component can be managed as part of the CNMP.

This letter reports the finding of Ag Engineering's inspection in terms of the criteria described above. This investigation and evaluation is **not a certification** of the components, only an investigation of existing conditions. Refer to the CNMP site map for the locations of the existing components.

Waste Storage Facilities Evaluated:

Waste Storage Facility # 1 – Pre-cast concrete ADL tank (transfers waste to # 5)

Waste Storage Facility # 5 – Pre-cast concrete ADL tank

Waste Storage Facility # 2 – Milkhouse wastewater storage pond (clay lined)

Waste Storage Facility # 4 – Pre-cast concrete ADL tank (transfers waste to # 2)

Carcass Composting – Remodeled lean-to barn

Waste Storage Facility # 1 – ADL tank:

This facility is located between the Freestall Barn # 2 (North Barn) and the Freestall Barn # 1 (South Barn). Manure from 500 lactating cows, sand bedding, and 5,000 sq.ft. area runoff is stored in this facility. The dimensions of this waste storage facility is 80 ft x 112 ft x 8 ft deep. It was constructed in 1998 by ADL, Inc and approved for cost share dollars from NRCS. This structure is constructed with pre-cast, reinforced concrete panels and the floor and access ramp are poured in place concrete. The facility contained approximately 1 foot of waste during the day of inspection. The panel joints were visible along the sides and at the top and appeared to be tight and well sealed. The walls showed no bowing or tilting. There is a fence barrier around the entire facility. No signs of deterioration in the concrete were evident. The top of the storage facility is only slightly above ground level so there appears to be no potential for a failure of the structure that would not affect surface water quality. Clean runoff adjacent to the storage facility is diverted away. As long as the facility joints remain in the conditions observed, the waste storage facility should provide adequate protection from seepage and ground water contamination. ADL uses designs that have been approved as meeting NRCS Waste Storage Facility practice standard and American Concrete Institute for reinforced concrete structures. Accumulation of waste stored is visible and is monitored.

Fabricated storage structures must maintain 0.5 feet of freeboard plus the volume generated from a 25yr/24hr storm event on the storage surface and from the 5,000 sq.ft. area. This equates to a depth of 1.25 ft. of which must be maintained open in order to store the 25yr/24hr storm event while maintaining the required freeboard depth.

The usable storage capacity of this tank is calculated to be 402,125 gallons. Based on production information given in the CNMP, this facility can store a little over 4 months of waste, generated from the N and S freestall facilities and normal monthly rainfall.

Responses to the existing component criteria are as follows:

-This facility appears to be consistent with the safety guidance of the CNMP with the presence of a fence barrier around the entire facility.

-Based on observable features and conditions, the waste storage tank appears to be in good operating condition. This facility has been in operation for 5 years without any evidence of deterioration in the structure.

-The failure of an existing component will not impair the structural integrity or operation of new components.

-The existing component can be managed as part of the CNMP.

Waste Storage Facility # 5 – ADL tank:

This facility is located south of the Freestall Barn # 1 (South Barn). Liquid waste that accumulates in the ADL # 1 storage tank is transferred via an under ground pipe to this facility. The dimensions of this waste storage facility is 172 ft x 172 ft x 12 ft deep. It was constructed in 2002 by ADL, Inc and approved for cost share dollars from NRCS. This structure is constructed with pre-cast, reinforced concrete panels and the floor and access ramp are poured in place concrete. The facility contained approximately 2.5 foot of waste during the day of inspection. The panel joints were visible along the sides and at the top and appeared to be tight and well sealed. The walls showed no bowing or tilting. There is a fence barrier around the entire facility. No signs of deterioration in the concrete were evident. The top of the storage facility is slightly above ground level so there appears to be no potential for a failure of the structure that would affect surface water quality. Clean runoff adjacent to the storage facility is diverted away. As long as the facility joints remain in the conditions observed, the waste storage facility should provide adequate protection from seepage and ground water contamination. ADL uses designs that have been approved as meeting NRCS Waste Storage Facility practice standard and American Concrete Institute for reinforced concrete structures. Accumulation of waste stored is visible and is monitored.

Fabricated storage structures must maintain 0.5 feet of freeboard plus the volume generated from a 25yr/24hr storm event on the storage surface. This equates to a depth of 1.0 ft of which must be maintained open in order to store the 25yr/24hr storm event while maintaining the required freeboard depth.

The usable storage capacity of this tank is calculated to be 2,326,460 gallons. Based on the percentage of production information transferred given in the CNMP that is transferred into this storage facility from ADL # 1(75%), ADL # 5 can store approximately 11 months of waste and normal monthly rainfall.

Responses to the existing component criteria are as follows:

- This facility appears to be consistent with the safety guidance of the CNMP with the presence of a fence barrier around the entire facility.
- Based on observable features and conditions, the waste storage tank appears to be in good operating condition. This facility has been in operation for 2 years without any evidence of deterioration in the structure.
- The failure of an existing component will not impair the structural integrity or operation of new components.
- The existing component can be managed as part of the CNMP.

Milkhouse Wastewater Waste Storage Pond (Waste Storage Facility # 2):

The waste storage facility (pond) is located in the southwest part of the farm headquarters. It is an earthen structure with a clay liner that was constructed in accordance with a design developed and approved by NRCS in 1997. It was designed to store the volume of milkhouse wastewater produced in 180 days. Currently, this facility receives wastewater generated in the milkhouse parlor and wastewater from ADL # 4 (silage leachate/ runoff collection storage tank) is pumped into this

storage. The As-Built dimensions of this storage facility are 230 ft x 164 ft x 8 ft deep and indicate that one foot of clay liner material was installed along with 1 foot of soil cover. The maximum outside embankment height is approximately 7 ft in the southwest corner of the facility.

The facility was ½ full on the day of inspection for the facility evaluation. Based on what could be observed of the embankment it appeared to be in good condition with no bulging, erosion, rodent holes or trees. There is a fence around the entire facility. No signs of deterioration in the embankment material were evident. The Browns use a float on the end of the pump-out pipe in order to prevent damage to the clay liner during emptying. As long as the embankment remains in good condition and the liner is not damaged, the waste storage facility should provide adequate protection from seepage and ground water contamination and the risk of a failure of the structure and the potential contamination to surface water is minimal. Accumulation of waste stored is visible and is monitored.

Earthen storage structures must maintain 1.0 feet of freeboard plus the volume generated from a 25yr/24hr storm event on the storage surface. This equates to a depth of 1.4 ft. of which must be maintained open in order to store the 25yr/24hr storm event while maintaining the required freeboard depth.

The usable storage capacity of this storage pond is calculated to be 1,212,067 gallons. Based on milk house waste production and amount of wastewater pumped from ADL # 4 information given in the CNMP, this facility can store approximately 7.5 months of wastewater generated from the milkhouse, normal monthly rainfall and an estimated 461,320 gallons transferred from the runoff collection and silage leachate storage tank – ADL # 4.

Responses to the existing component criteria are as follows:

-This facility appears to be consistent with the safety guidance of the CNMP with the presence of a fence barrier around the entire facility.

-Based on observable features and conditions, the waste storage pond appears to be in good operating condition. This facility has been in operation for 6 years. As-Built design documentation was also reviewed indicating evidence of a clay liner installed to the depth indicated on the design.

-The failure of an existing component will not impair the structural integrity or operation of new components.

-The existing component can be managed as part of the CNMP.

Waste Storage Facility # 4 – ADL tank:

This storage facility is located north of the bunker silo. The facility collects polluted runoff from the Old Cow Barn concrete lot (38,400 sq.ft. area), silage leachate and the bunkers initial runoff is stored in this facility. The dimensions of this waste storage facility is 120 ft x 20 ft x 4 ft deep. It was constructed in 2003 by ADL, Inc and approved for cost share dollars from NRCS. This structure is constructed with pre-cast, reinforced concrete panels and the ramp and floor is poured in place concrete. The facility contained approximately 1 foot of waste during the day of inspection. The panel joints were visible along the sides and at the top and appeared to be tight and well sealed. The walls showed no bowing or tilting. There is no fence barrier around the facility. No signs of

deterioration in the concrete were evident. The top of the storage facility is slightly above ground level so there appears to be no potential for a failure of the structure that would affect surface water quality. Clean runoff adjacent to the storage facility is diverted away into a well established vegetative channel. As long as the facility joints remain in the conditions observed, the waste storage facility should provide adequate protection from seepage and ground water contamination. ADL uses designs that have been approved as meeting NRCS Waste Storage Facility practice standard and American Concrete Institute for reinforced concrete structures. Accumulation of waste stored is visible and is monitored.

Fabricated storage structures must maintain 0.5 feet of freeboard plus the volume generated from a 25yr/24hr storm event on the storage surface, and the Old Cow Lot runoff area (38,400sq.ft.), plus the bunker silo runoff area. This equates to a depth of 1.58 ft. of which must be maintained open in order to store the 25yr/24hr storm event while maintaining the required freeboard depth.

The usable storage capacity of this tank is calculated to be 43,384 gallons. This structure is considered a temporary storage where liquids are transferred on a regular basis through an underground pipe to the earthen storage pond # 2. Based on the runoff calculated, this storage needs to transfer waste to the earthen storage pond # 2 every 34 days.

Responses to the existing component criteria are as follows:

-This facility is NOT consistent with the safety guidance of the CNMP. A safety fence or barrier needs to be installed around the entire facility.

-Based on observable features and conditions, the waste storage tank appears to be in good operating condition. This facility has been in operation for over one year now without any evidence of deterioration in the structure.

-The failure of an existing component will not impair the structural integrity or operation of new components.

-The existing component can be managed as part of the CNMP once the safety fencing or barrier is installed.

In summary, the ADL Tank (Waste Storage Facility # 1), (Waste Storage Facility # 5), and the milkhouse wastewater storage pond (Waste Storage Facility # 2) are suitable for use in the CNMP. The ADL tank (Waste Storage Facility # 4) is not suitable for use in the CNMP until it meets the safety requirements by installing a fence or barrier around the entire facility.

It is also recommended that waste depth gauges be installed in each waste storage facility. This will add thorough recordkeeping to better estimate the volume of waste generated in each storage facility along with the volume of waste transferred to ADL # 5 and the earthen storage pond # 2. The depth gauges will also provide good information on the volume of waste hauled to the fields during land applications, and verify the land application rates.

In 2004 the carcass composting was moved into a remodeled lean-to structure. This structure has a concrete floor, existing roof and modular blocks were brought in to construct the bins needed.

This facility appears to be consistent with the safety guidance of the CNMP.

Based on observable features and conditions, the remodeled structure appears to be in

good operating condition.

The failure of this component will not impair the structural integrity or operation of new components.

The existing component can be managed as part of the CNMP.

Sincerely,

I. M. Engineer

I. M. Engineer, PE
Environmental Engineer

5.b.2. Best Management Practices

a) Divert Clean Water

The gutters and downspouts are designed to keep clean water from entering feedlots and animal holding areas and are checked and maintained regularly to insure their effectiveness.

If problems (such as broken, damaged, leaking or missing sections of gutters, erosion or pooling near outlet points, etc.) are observed, then repairs are done immediately.

This clean storm water is diverted to grassed areas, away from the production areas.

Debris is removed on a regular basis to keep gutters functioning as designed.

A weekly inspection of clean water diversion areas is conducted and information is documented in the Storage Inspection Form.

Two surface inlets (#1 and #2) around the farmstead travel via underground pipe to a grass area. The grass is in excellent condition. Surface Inlet #1 is located in a driveway area and has no contact with manure. Surface Inlet #2 is by the milking parlor. Since both of these collect water from non-production sites on the farm, they are directed to a grassed area. A driveway drain (#3), located at the south end of the machinery barn, collects only rain and travels to the field tile system. (marked in blue on map)

Production Area stormwater:

Storage ADL #4 is designed for silage leachate and runoff from outdoor lots associated with the Old Cow Barn, the Freshening Barn and the Feeder area. These are all concrete surfaces. This storage was designed by NRCS in 2002 and is functioning successfully. These lots are also scraped on Monday, Wednesday and Friday, to reduce the volume and nutrients that need to go to #4. This is then pumped over, weekly or as needed, to Earthen Storage #2.

b) Prevent Direct Contact of Confined Animals with Waters of the State

There are no areas on this farm where animals come into direct contact with waters of the state.

c) Animal Mortality

Dead cows are being composted in the old lean-to.

The Bodies of Dead Animals Act (BODA) is followed for the composting requirements. Records are on file in the farm office.

d) Chemical Disposal

No hazardous or toxic chemicals (i.e., pesticides, petroleum products) are allowed to enter waste storage structures. Any banned pesticides or those no longer needed are disposed of at a hazardous waste landfill. Refer to the Emergency Plan (posted at the farm) for steps in handling products as a result of a spill, leak, or accident.

e) Inspection, Proper Operation and Maintenance

Daily inspections of water lines, drinking water and cooling water lines, above ground piping and transfer lines are conducted and recorded.

Weekly visual inspections of the clean storm water area will be conducted.

Records of the inspections and corrective actions taken will be kept for a minimum of 5 years. An inspection of manure application equipment will be kept daily during use of the equipment.

f) Land Application of Large CAFO Waste

A) Field-by-Field Assessment of all land application areas

See attached maps at end of this section.

All fields were evaluated on-site for appropriateness of land application of manure. The field assessment determines the form, source, amount, timing, rate and method of application to assure that the application is in accordance with appropriate utilization of nutrients. The assessment has identified soil types, drainage tile, tile outlet locations, and offsite conditions such as buffers and distance to surface water.

There are over 590 acres of cropland that contain either complete or random tile drainage. All surface water inlets and tile outlets are documented on field maps in the CNMP and are carefully considered prior to land application of manure.

Field conditions are checked no more than 48 hours prior to land application to evaluate the suitability for application, including the state of all tile outlets, evidence of soil cracking, the moisture holding capacity of the soil, and condition of conservation practices.

All tiled fields that will be applied with manure, will be checked within 24 hours of the next rain event of one-half inch or greater within 30 days of application. Written records will be kept of color, odor or other characteristics from the tile outlet point.

MARI scores plus a field-by-field assessment have been conducted with 599 acres acceptable for spreading on frozen and snow covered times. Only whole fields that are acceptable are being recommended since there are plenty of these fields on this farm.

B) Testing of production area waste and soils at land application sites

Large CAFO waste will be sampled a minimum of once per year for nutrient content. Nutrient levels, analysis methods used, and the basis for determining land application rates will be recorded. An average of the samples is utilized for planning purposes. The entire Nutrient Management Plan is on file at the farm.

Sampling procedures are as follows: Manure samples are collected during hauling after manure has been agitated to be most representative of what is going to the fields. Sequential samples are taken of the liquid fraction (in ADL #5) and of the sand fraction (in ADL #1). Samples are then frozen and submitted for analysis.

Fields are soil tested every three years and all fields in this plan have a current test (less than 3 years). Soil tests are taken by Ag Co-op and are pulled using soil management groups to determine sampling areas, in less than 20 acre increments, unless the soil types and 10 year cropping history is similar. If this is the case, then a maximum of 40 acre sample sizes will be taken. When soil tests are similar, based on the phosphorus levels, the twenty acre increments are averaged together for one soil test for an entire field. This is how the Brown's farm the field and how manure is spread. Where soil tests indicate a significant difference, they are separated out and treated as a new sub-field.

Tri-State fertilizer recommendations are utilized and generated via MMP.

- C) Field Inspections prior to and following land applications
Records of inspections, monitoring, and sampling will be recorded in the Land Application Log. Fields receiving manure will be inspected prior to application. Tile outlets are monitored before and after manure applications. Field observations and any corrective actions taken, if necessary, are documented in the Land Application Log.
- D) Inspections of land application equipment
All application equipment is calibrated annually to ensure proper application rates. Written records of daily inspections during hauling as well as calibrations are documented on a form and kept on file. Hauling records and acres covered are a double check on the maintained accuracy of application rates. See Land Application Equipment Inspection Form.
- Hoses and fittings are kept in good repair on all manure spreader tanks.
Damaged, missing, or inoperable safety items are repaired or replaced immediately.
- E) Field specific application rates for large CAFO wastes
Land application rates are applied on the basis of: 1) preventing dry weather discharges, 2) wet weather discharges, and 3) not exceeding the capacity of the soil and planned crops to assimilate nutrients, and are quantified and based on the most limiting nutrient in the soil, type of crop, realistic crop yield goals, soil type, and all nutrient inputs in addition to those from the large CAFO waste. All manure nutrients can be used agronomically. It is planned to utilize manure ahead of corn crops. Fields are generally rotated corn/soybeans, so manure is planned to be applied at two years of phosphorus and the same field is not applied two years in a row. This program is expected to keep the soil tests about where they are over time. There is sufficient land base for the nutrients produced. There are limited surface waters on this farm and since manure is injected, are a limited concern. The primary resource concern is nitrogen leaching. This is being addressed by only applying 2 years of phosphorus per application, which limits the nitrogen, such that PSNT tests are taken before any additional nitrogen is applied to the corn crop. This also allows for any residual nitrogen from the soybean crop to be accounted for in the corn year. Manure samples are used for this plan.
- The basis for determining nutrient applications for each individual field is carefully considered prior to application and detailed information is listed in the CNMP.
- F) Appropriate prohibitions for land application.
Manure is never applied on land that is flooded or saturated with water or during rainfall events. All waste application will be delayed if rainfall exceeding ½ inch (or less if a lesser event is capable of producing an unauthorized discharge) is forecasted by the National Weather Service within 24 hours of the time of the planned application. All manure is incorporated within 24 hours of application. (See Copy of Forecast.)
- G) Methods of application.
Liquid manure is injected at time of application unless the field is in no-till, alfalfa or wheat stubble. Liquid manure may be surface applied and immediately incorporated upon occasion.
Solid manure is surface applied and incorporated, unless in no-till, alfalfa or wheat stubble.
Frozen and snow covered conditions are surface applied based on MARI ratings.

H) Setback requirements for each field.

Waste is not applied closer than 100 feet (injected or incorporated) to any down-gradient surface waters, open tile line intake structures, sinkholes, agricultural wellheads, or grassed waterways, ditches and swales that are conduits to surface waters. All setbacks and vegetative buffers are identified on field maps. See maps.

Fields Acceptable for Frozen and Snow Covered Applications

This summarizes all fields that score less than 37 on the manure application risk index (MARI)

The lower the MARI score the better for winter spreading. Fields over a score of 37 are NOT to be applied with manure during frozen and snow covered times of the year.

Only fields where the entire field is acceptable to winter apply have been suggested for utilization on this farm since there are plenty of acres and only approximately 80 acres are needed for winter time. Therefore topographic maps are not included.

Field ID	Sub ID	Acres	MARI
DTS	S	12.4	15
LM	1	40	29
CN	2	29.2	29.5
SE	1A	8.3	29.5
CN	3	14.1	31
D	1	50	31
HM	2	38.8	31
SW	1	12.1	31
SW	2	23.9	31
CN	1S	19.5	31.5
SH	4	10.3	31.5
W	4	20.4	31.5
CN	4	6.7	32
LM	2	36.5	32
SE	7	10.1	32
SE	8	10.1	32
SE	9	10.1	32
CO	N	36.4	32.5
SH	3	18.3	33
BG	4	17.3	33.4
F	N3,4	37.2	33.5
SH	5	14	33.5
HM	1	19.4	34
CN	1N	20	34.5
CO	S	40	35.5
HO	3	9	36
F	S1,2	35	36.5
		599.1	

MICHIGAN MANURE APPLICATION RISK INDEX WORKSHEET					Fill in shaded areas only!			ctrl "c" to c	
Farm Number:	Sample Dairy				Date:				
Township:	Sand County				Tract No:	as is			
Farm or Producer Name:									
Field No:	F S	F N	HM 1	HM 2	HM 3	HO 1	HO 2	CO N	
Acres:	35	37.2	39.1	39.1	20	57	51.8	36.4	
FIELD FEATURES "INPUT"									
I. SOIL MAP UNIT									
If drained, enter Y									
Insert Soil Series									
	Fox	fox	fox	fox	fox	fox	fox	oshtemo	
1. Soil Hydrologic Group	B	B	B	B	B	B	B	B	B
2. Soil Management Group	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	4a
3. Percent Slope	1	1	1	1	1.9	1	1	1	1
II. WATER QUALITY									
4. Soil Test Phosphorus Value	160	104	142	138	104	322	468	138	
5. Conc. Water/Surface Inlet	p	p	p	p	f	p	s	p	
6. Nitrogen leaching Index	m	m	m	m	m	m	m	m	m
	prompt for cell above								
	m	m	m	m	m	m	m	m	m
III. SURFACE COVER									
7. Residue/Cover Crops/Per. Cover	40	40	40	40	40	40	40	40	40
8. Surface Water Setback	1	1	1	1	8	1	2	1	
9. Vegetative Buffer Width	na	na	na	na	15	na	25	150	
IV. MANURE									
10. Manure Phosphorus Application	90	90	90	90	90	45	45	90	
11. Manure Nitrogen Application	130	150	140	150	125	125	125	150	
12. Manure Application Method	s>3	s>3	s>3	s>3	s>3	s>3	s>3	s>3	s>3
FIELD FEATURES "OUTPUT"									
I. SOIL SMG									
	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	3/5a	4a
1. Soil Hydrologic Group	2	2	2	2	2	2	2	2	2
2. Soil Management Group	2	2	2	2	2	2	2	2	2
3. Percent Slope	1	1	1	1	1	1	1	1	1
II. WATER QUALITY									
4. Soil Test Phosphorus Value	6	3	3	3	3	12	12	3	
5. Concentrated Water Flow or Surface Inlet Discharge	1.5	1.5	1.5	1.5	3	1.5	6	1.5	
6. Nitrogen Leaching Index for Soil Hydrologic Group	6	6	6	6	6	6	6	6	
III. SURFACE COVER									
7. Residue/Cover Crop/Per. Cover	1	1	1	1	1	1	1	1	1
8. Surface Water Setback	1	1	1	1	8	1	2	1	
9. Vegetative Buffer Width	1.5	1.5	1.5	1.5	12	1.5	6	1.5	
IV. MANURE									
10. Manure "P" Application	4	4	4	4	4	2	2	4	
11. Manure "N" Application	2	4	4	4	2	2	2	4	
12. Manure Application Method	8	8	8	8	8	8	8	8	
FIELD FEATURES INDEX TOTALS									
	36	35	35	35	52	40	50	35	
	LOW	LOW	LOW	LOW	MEDIUM	HIGH	HIGH	LOW	
TOTAL ACRES BY "MARI" RISK CATEGORY:									
	0	599.1	1252	433	2284.1				
	V. LOW	LOW	MEDIUM	HIGH	TOTAL		599.1	Total Low	

5.d. Effluent Limitations and Monitoring Requirements

CNMP Revisions

Prior to a significant change in the operation of the large CAFO, whenever there is an unauthorized discharge or if the Department determines that the CNMP is inadequate in preventing pollution, the CNMP shall be revised and the revisions approved by a certified CNMP Provider. Within ninety (90) days of a significant change, an unauthorized discharge or a Department requested revision; the revised portions of the CNMP shall be submitted to the Department with a copy of the Certified CNMP Provider certification that the revised CNMP has been approved.

Significant change includes, but is no limited to, any of the following:

1. An increase in the number of animals that is greater than or equal to 10% of the number identified in the CNMP.
2. An increase in the number of animals that results in a decrease in the waste storage capacity time, as identified in the CNMP, by one month or greater.
3. An increase in the number of animals where the large CAFO waste generated by the livestock requires more land for its application than is available at the time of the increase.
4. A decrease in the number of acres available for land application, where the large CAFO waste generated requires more land for application than will be available after the decrease.

Field Specific Information

Field	Sub ID	Size(Ac.)	Spreadsize	Predominant Soil Type	P Lvl	Units	MARI	Crop Year 1	Yld	Crop Year 2007	Yld	Crop Year 2008	Yld	Notes
BK	2	11.3	11.3	Locke FSL (15B 1-4%)	12	ppm	36	Soybean	35	Wheat	50	Corn grain	135	
BM3	A	10.0	10.0	Fox SL (27A 0-2%)	13	ppm	32	Corn grain	150	Corn silage	25	Corn grain	145	
BG	4	16.8	16.8	Hatmaker L (7B 1-4%)	15	ppm	48.5	Soybean	45	Corn grain	145	Soybean	45	BG4: 100' setback around surface riser . No winter spread.
BK	5	54.0	54.0	Elmdale FSL (11B 0-6%)	16	ppm	39	Soybean	35	Corn grain	135	Soybean	35	BK5 No winter spread.
BK	6	5.9	5.9	Elmdale FSL (11B 0-6%)	16	ppm	43.5	Soybean	35	Corn grain	135	Soybean	35	BK 6: No winter spreading
BK	7	3.0	3.0	Hillsdale FSL (5B 2-6%)	16	ppm	43.5	Soybean	35	Corn grain	135	Soybean	45	BK 7: no winter spread
BK	1	21.7	21.7	Kidder FSL (2B 2-6%)	17	ppm	36	Soybean	35	Wheat	50	Corn grain	135	
BK	4	16.9	16.9	Locke FSL (15B 1-4%)	17	ppm	33	Soybean	35	Corn grain	135	Soybean	35	
NO	4	29.1	29.1	Barry L (17 0-1%)	21	ppm	37.5	Soybean	45	Corn grain	145	Soybean	45	NO4: 66' buffer on W No winter spreading
SH	4	10.3	10.3	Locke FSL (15B 1-4%)	21	ppm	33	Corn grain	145	Soybean	50	Corn grain	145	
SH	5	14.0	14.0	Hatmaker L (7B 1-4%)	21	ppm	35	Corn grain	145	Soybean	50	Corn grain	145	
W	1	19.7	19.7	Locke FSL (15B 1-4%)	23	ppm	44.5	Corn grain	145	Soybean	50	Corn grain	145	No winter spreading
W	2	10.0	10.0	Locke FSL (15B 1-4%)	23	ppm	31	Corn grain	145	Soybean	50	Corn grain	145	
W	3	23.9	23.9	Locke FSL (15B 1-4%)	24	ppm	52.5	Corn grain	145	Soybean	50	Corn grain	145	No winter spreading.
W	4	20.4	20.4	Locke FSL (15B 1-4%)	24	ppm	37.5	Corn grain	145	Soybean	50	Corn grain	145	No winter spreading
SA	3	23.3	23.3	Teasdale FSL (12A 0-3%)	25	ppm	42.5	Soybean	45	Corn grain	145	Soybean	45	SA3: 100' setback from tile riser, no winter spread
SA	4	14.5	14.5	Teasdale FSL (12A 0-3%)	25	ppm	42.5	Soybean	45	Corn grain	145	Soybean	45	SA4: 66' buffer on east ditch.
D	3	45.0	45.0	Teasdale FSL (12A 0-3%)	26	ppm	45.5	Corn grain	175	Corn grain	175	Soybean	55	no winter spread
CN	2	29.2	29.2	Ormas LS (33B 0-6%)	27	ppm	36	Alfalfa topdress	6	Corn grain	145	Alfalfa seeding	3	CN 2, 100 ft. setback for surface spread on east. no winter spread
SE	2	11.3	11.3	Fox SL (27B 2-6%)	27	ppm	54.5	Alfalfa topdress	6	Alfalfa topdress	6	Alfalfa topdress	6	SE 2: No winter
SE	3	7.4	7.4	Fox SL (27A 0-2%)	27	ppm	54.5	Alfalfa topdress	6	Alfalfa topdress	6	Alfalfa topdress	6	SE 3: No winter spreading or surface applications
BM	2	20.0	20.0	Locke FSL (15B 1-4%)	28	ppm	46.5	Corn silage	25	Corn silage	25	Corn silage	25	No surface winter spreading
BM	2	20.0	20.0	Locke FSL (15B 1-4%)	28	ppm	46.5	Rye for cover		Corn silage	25	Corn silage	25	No surface winter spreading
SE	4	14.2	14.2	Fox SL (27A 0-2%)	28	ppm	52.5	Alfalfa topdress	6	Alfalfa topdress	6	Alfalfa topdress	6	SE4: No winter spreading. 100 ft. setback from pond when surface applying

Rest of fields omitted in lieu of space.

Table 17: Summary of Total Annual Acres and Nutrients Spread

Crop Yr	Acres Spread	Avail.N	P2O5	K2O
2007	699.1	62,651	56,711	99,109
2008	552.3	59,501	43,114	72,953

Table 18: Summary of Manure Hauled for each storage system

Crop Yr	Storage	Annual Volume or Wt.	Amount Hauled	Units	Acres Spread	N	Annual P2O5	P2O5	K2O
2007	#1 ADL	753,165	642,000	Gal	131.5	5,717	18,076	15,442	16,674
2007	#5 ADL	4,626,406	2,178,000	Gal	391.6	52,310	69,396	32,772	63,187
2007	Earthen storage #2	1,955,356	2,052,000	Gal	76.0	1,824	1,564	1,672	9,424
2007	Mon.Wed. Fri. Haul	1,700	950	Ton	47.5	1,330	3,060	1,995	5,415
2007	Weekly Haul	1,900	1,050	Ton	52.5	1,470	4,940	4,830	4,410
2008	#1 ADL	753,165	720,000	Gal	175.7	10,250	18,076	17,288	18,721
2008	#5 ADL	4,626,406	1,494,000	Gal	282.8	46,911	69,396	22,473	43,331
2008	Earthen storage #2	1,955,356	1,940,000	Gal	71.8	1,723	1,564	1,580	8,903
2008	Mon.Wed. Fri. Haul	1,700	100	Ton	5.0	140	3,060	210	570
2008	Weekly Haul	1,900	340	Ton	17.0	476	4,940	1,564	1,428

Annual volume and annual P₂O₅ are calculated values from this plan. Amount hauled is based on actual (from records) or projected values. N, P₂O₅ and K₂O are total pounds per year, per storage system.

Manure transferred off site via Manifest

TransferType	Storage ID	Nutrient Content	Year	Month	Amount	Units	Operation	Location
Exported manure	#1 ADL	16 – 24 – 24	2007	May	300000	Gal	Hillview Crop Farm	Missy Farm Address:
Exported manure	#5 ADL	16 – 24 – 24	2006	Apr	900000	Gal	Hillview Crop Farm	Jones Farm Address:
Exported manure	#5 ADL	16 – 24 – 24	2006	May	500000	Gal	Hillview Crop Farm	Sacket Farm Address:
Exported manure	#5 ADL	16 – 24 – 24	2006	Oct	900000	Gal	Hillview Crop Farm	Park Farms Address:
Exported manure	#5 ADL	16 – 24 – 24	2006	Nov	370000	Gal	Hillview Crop Farm	Summers Farm Address:
Exported manure	#5 ADL	16 – 24 – 24	2007	Mar	900000	Gal	Hillview Crop Farm	Billy Farm Address:
Exported manure	#5 ADL	16 – 24 – 24	2007	Apr	300000	Gal	Hillview Farms	Sears Farm Address:

Field ID	Subfield	Size(Ac.)	SpreadSize	Predominant Soil Type	Irrigated	No Manure	Drained	Rented
BG	1	10.3	10.3	Branch LS (25B 1-4%)				
BG	4	16.8	16.8	Hatmaker L (7B 1-4%)			x	
BG	2	14.3	14.3	Branch LS (25B 1-4%)				
BG	3	26.0	26.0	Branch LS (25B 1-4%)				
BK	1	21.7	21.7	Kidder FSL (2B 2-6%)				x
BK	2	11.3	11.3	Locke FSL (15B 1-4%)				x
BK	3	16.8	16.8	Locke FSL (15B 1-4%)				x
BK	4	16.9	16.9	Locke FSL (15B 1-4%)				x
BK	5	54.0	54.0	Elmdale FSL (11B 0-6%)				x
BK	6	5.9	5.9	Elmdale FSL (11B 0-6%)				
BK	7	3.0	3.0	Hillsdale FSL (5B 2-6%)				x
BM	2	20.0	20.0	Locke FSL (15B 1-4%)	x		x	
BM	1	27.5	27.5	Locke FSL (15B 1-4%)	x			
BM3	a	10.0	10.0	Fox SL (27A 0-2%)	x		x	
BY	1	47.4	47.4	Fox SL (27A 0-2%)	x		x	x
CN	1S	19.5	19.5	Fox SL (27A 0-2%)				x
CN	1N	20.0	20.0	Fox SL (27A 0-2%)				x
CN	2	29.2	29.2	Ormas LS (33B 0-6%)				x
CN	3	14.1	14.1	Ormas LS (33B 0-6%)				x
CN	4	6.7	6.7	Fox SL (27A 0-2%)				x
CN	5	5.2	5.2	Fox SL (27B 2-6%)				x
CO	N	36.4	36.4	Oshtemo SL (4B 0-6%)	x			
CO	S	40.0	40.0	Fox SL (27A 0-2%)	x			
CS	1	45.7	45.7	Locke FSL (15B 1-4%)				
CS	2	6.8	.1	Fox SL (27A 0-2%)		x		x
CS	3	3.6	.1	Fox SL (27A 0-2%)		x		
D	1	50.0	50.0	Teasdale FSL (12A 0-3%)	x		x	
D	2	36.9	36.9	Teasdale FSL (12A 0-3%)	x		x	
D	3	45.0	45.0	Teasdale FSL (12A 0-3%)	x		x	
D 10		4.5	4.5	Oshtemo SL (4B 0-6%)				
D 11		3.2	3.2	Oshtemo SL (4B 0-6%)				
D 12		2.3	2.3	Teasdale FSL (12A 0-3%)				
The rest of the fields were omitted in lieu of space								
Totals:		2432.9	2284.4		728.2	149.1	593.2	905.8

(All maps would be included in a real plan.
Only 1 page is shown in this example).

Sec. 21, Green Township,
Sand County



Map Not to Scale